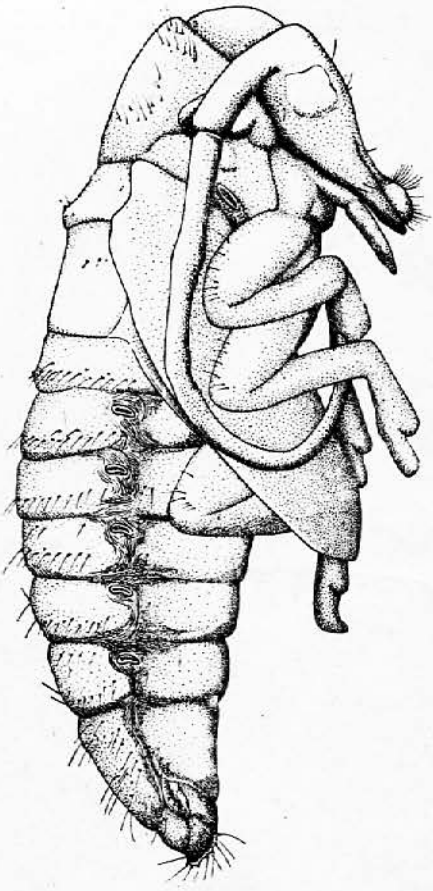


Coptops aedificator (Fabricius). Pupa. Lateral aspect

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A MONOGRAPH OF THE IMMATURE STAGES OF AFRICAN TIMBER BEETLES (*CERAMBYCIDAE*)

BY

E. A. J. DUFFY

(COMMONWEALTH INSTITUTE OF ENTOMOLOGY)

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PREFACE

THE importance of wood-boring beetles, both to forestry and the timber trade, cannot be too strongly stressed. The great increase in the use of African timber in the last few decades has emphasised our lack of information about the longhorn beetle larvae which so seriously damage it. The present work may therefore be expected to fill a long felt gap in our knowledge of these pests. The purpose and scope of this monograph are well set out by the author in his Introduction, but attention should be drawn to the fact that it includes the fauna of the mediterranean region of northern Africa as well as that of the Ethiopian Region and the associated Mascarene and Seychelles subregions. The work follows closely, in its arrangement, the author's previous monograph on the British Timber Beetles published by the Trustees in 1953. It has been thought unnecessary to repeat the general account of the biology and morphology of the Cerambycidae which appeared in that work, but frequent references are made to this account in the text of the present work.

The larvae and pupae of a very large number of African species are described and figured here for the first time and the extensive keys should enable the student to identify African cerambycid larvae with ease and certainty.

Mr. Duffy is at present engaged on the preparation of a third volume dealing in a similar way with the timber beetles of Central and South America.

W. E. CHINA,
Keeper of Entomology

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INTRODUCTION

THIS monograph, which is virtually a continuation and expansion of the author's previous volume, *A monograph of the immature stages of British and imported timber beetles* (*Cerambycidae*), constitutes the second of what is hoped will be a series of volumes dealing with the immature stages of timber beetles.[1] Its presentation and lay-out have deliberately been made to correspond as closely as possible with those of the previous monograph so as to facilitate comparison and cross-reference.

In order to eliminate unnecessary repetition, frequent reference is made to the previous monograph in which the biology and morphology of the Cerambycidae have been dealt with on a comparative basis. For the sake of completeness, the comparatively few African species which have been dealt with therein, together with additional figures and information where available, have also been included in the present work.

It was originally intended to confine this study exclusively to species of tropical and southern Africa, mainly because those of north Africa are essentially mediterranean. As, however, it is ultimately hoped to produce taxonomic and biological studies of the timber beetles on a regional basis, it was felt that a work devoted exclusively to only part of the African continent would, in the long run, prove uneconomical. Consequently, in this volume, material from all parts of Africa has been studied, together with that from Madagascar, Mauritius, Rodriguez, La Réunion and the Seychelles.

The keys for the identification of larvae and pupae deal with 137 genera and 203 species and 61 genera and 83 species, respectively. The majority of these larvae and pupae have been described and illustrated for the first time. Reference is also made to approximately 200 genera and 400 species. Most of the north African (palaearctic) species, however, have already been discussed in the previous volume to which reference is made, but additional information and references have been given in a number of cases.

In view of the many thousands of African species already known, these numbers will no doubt appear grossly inadequate. On the other hand, all species of major economic importance have been included, and it is hoped that this work, despite its shortcomings, will at least serve as a reliable basis for present reference and future expansion.

The descriptions of the immature stages are supplemented by a correlated account of all available bionomic information including many original observations. In certain cases where a species is of outstanding economic importance, a brief description of the adult has also been included for the guidance of field workers.

Reference to and summaries of control measures have also been included whenever such information has been available, but no attempt has been made to discuss their relative efficacy.

[1] Volume three, now in preparation, deals with the immature stages of timber beetles (Cerambycidae) of Central America, South America and the West Indies.

As regards existing literature, there is scarcely anything of a comprehensive nature. Very few immature stages of African Cerambycidae have been described and bionomic information is extremely scattered and, with few exceptions, superficial. Less than a dozen species have been dealt with at all thoroughly. Villiers' excellent paper (1946) on North African Cerambycidae, although dealing specifically with adult classification only, has proved particularly useful in furnishing details of distribution and host plants.

References to literature have been obtained from various sources, to which end the *Review of Applied Entomology* and the *Zoological Record* have been indispensable. Over 500 books and papers have been consulted and the author is confident that very few, if any, important publications have been overlooked. Host-plant names have been checked with Willis (1948), Howard (1951) and Kelsey and Dayton (1942).

All original figures of larvae, pupae and adults have been executed by the author with the aid of a Bausch and Lomb binocular dissecting microscope and a Leitz monocular microscope, both in conjunction with an Abbé *camera lucida*. Certain figures have been reproduced from the author's previous monograph and a few other figures have been copied from other publications. In all these cases acknowledgement has been made in the legends.

The photographs, except where otherwise indicated, have been carefully prepared by Mr. J. V. Brown, Photographer, British Museum (Natural History). Most of the wood samples photographed were sent on loan by Mr. G. H. Thompson and original photographs of infested wood have been kindly provided by Dr. R. C. Fisher, Mr. J. C. M. Gardner (taken by Mrs. A. K. Ryland), Mr. E. S. Brown and Mr. R. C. H. Sweeney.

In the course of the preparation of this monograph a great deal of material assistance has been received from many friends and colleagues. Firstly, the author is most deeply indebted to Mr. J. C. M. Gardner, Forest Entomologist, East African Agriculture and Forestry Research Organisation. Owing to the general inadequacy of immature material, it was only through the kind gesture and unstinted co-operation of Mr. Gardner in sending the author his entire collection of larvae and pupae that a study such as this was made at all possible. Mr. Gardner has also kindly provided useful lists of host plants and bionomic observations. It should be mentioned that Mr. Gardner started a survey of east African forest insects in 1950. Particular attention was given to building up a collection of identified larvae. In the Cerambycidae, a considerable amount of rearing was done in his laboratory from material collected both in the field and sent in by forest officers and other enquirers.

A smaller but most interesting collection of immature material from the Gold Coast was kindly sent on loan by Mr. G. H. Thompson of the Imperial Forestry Institute, Oxford. This collection was supplemented by numerous notes and original observations which, through the kind generosity of Mr. Thompson, have been incorporated in this work.

Much useful material has been borrowed from other sources, and the author is most grateful to the following persons for their kind co-operation in this respect: Dr. P. Basilewsky (Musée Royal du Congo Belge, Tervuren), Mr. E. B. Britton (British Museum (Natural History)), Dr. E. A. Chapin (Smithsonian Institution,

Washington), Monsieur A. Descarpentries (Muséum National d'Histoire Naturelle, Paris), Dr. F. I. van Emden (Commonwealth Institute of Entomology, London), Dr. R. C. Fisher (Forest Products Research Laboratory, Princes Risborough), Dr. E. Franz (Natur-Museum und Forschungs-Institut, Senckenberg), Dr. Sv. G. Larsson and Dr. J. Dahl (Universitetets Zoologiske Museum, Copenhagen) and Prof. R. Mayné (Commission d'Étude des Bois du Congo, Boitsfort).[1]

The author also wishes to thank the following persons for kindly sending larvae which, along with Mr. Gardner's invaluable collection, have now been presented to the British Museum (Natural History): Dr. J. R. Dürr (Department of Agriculture, Union of South Africa), Dr. G. H. Bunzli (Salisbury, S. Rhodesia), Mr. D. W. Hall (Pest Infestation Laboratory, Slough), Mr. E. W. John (Tung Oils, Ltd., Swaziland), Mr. D. E. M. Marsh (Forestry Department, Gold Coast), Mr. A. P. G. Michelmore (Department of Agriculture, Uganda), Dr. H. K. Munro (Department of Agriculture, Pretoria), Mr. D. G. Pollard (formerly of the Ministry of Agriculture, Anglo-Egyptian Sudan), Mr. R. C. H. Sweeney (formerly of Pest Control, Ltd., Tanga, Tanganyika) and Mr. A. L. H. Townsend (Nakuru, Kenya).

Among other entomologists whose assistance in furnishing bionomic information has been gratefully received, mention must be made of Mr. P. Cantin (Mauritius), Dr. G. A. North Coombes (Department of Agriculture, Mauritius), Mr. N. S. Stevenson (Chief Conservator of Forests (Eastern Region, Nigeria) and Mr. G. Watkins (Forest Ranger School, Arusha, Tanganyika).

The author wishes particularly to acknowledge his indebtedness to Dr. W. J. Hall, C.M.G., M.C., Director of the Commonwealth Institute of Entomology, for kindly permitting this study to be undertaken as part of official duties, and to Mr. E. O. Pearson, Assistant Director, for his continual interest and much helpful criticism.

For the verification and correction of the host-plant catalogue, the author is indebted to Sir Edward Salisbury, Director of the Royal Botanic Gardens, Kew, and to various members of his staff, particularly Mr. E. Milne-Redhead.

Thanks are also due to Mr. S. Parkes and Miss J. Minton for furnishing lists of African timber merchants and to the librarians Mr. B. Clifton, Mrs. F. F. Sprague and Miss B. A. Trott for their efficient and untiring assistance in locating obscure publications.

The burden of proof reading has been lightened through the kind help of Dr. W. E. China.

To his wife, the author is again most grateful for the typing of part of the manuscript.

When this monograph was nearing completion, it was felt that a brief visit to a timber-producing region in Africa would be desirable in order to obtain additional material and biological information.

The Colonial Office, after consultation with Dr. R. C. Fisher (Forest Products Research Laboratory, Princes Risborough), who favoured this project and felt that

[1] Material has also kindly been sent on loan by Prof. Dr. H. Wiedner (Zoologisches Museum, Hamburg), but unfortunately it arrived too late to be dealt with in this work. All the species represented, however, had already been seen from other sources.

association with the West African Timber Borer Research Unit would prove to be of mutual benefit, approached the Government of the Gold Coast and the Government of Nigeria, who readily granted permission for the visit to be made and generously offered to defray all expenses. The Executive Council of the Commonwealth Agricultural Bureaux very kindly granted the necessary leave of three months' absence from the author's routine duties with the Commonwealth Institute of Entomology.

The first two months (Feb. 16th–Apr. 16th, 1955) of this visit were spent in the Gold Coast. The headquarters were at the West African Timber Borer Research Unit, Kumasi, but during this period several visits were made to other places, such as Sunyani, Wenchi, Tamale, Offinsu, Mampong and the high wet forests at Dwinasi (Awaso) and Samreboi in order to gain acquaintance with as many different vegetation zones as possible (Pl. X, figs. 1, 4 and 5).

The last month (Apr. 17th–May 15th, 1955), except for a few days at Ibadan, was spent in the Sapele district, with short visits to Sapobar, Nikrowa and Cowan Estate.

This tour proved highly successful, not only because of the insects and biological information obtained but because it afforded a unique opportunity of gaining a vivid comprehension of the many aspects relating to a characteristic timber-producing region in the tropics.

It was intended not merely to collect specimens but rather to obtain additional data concerning known species, such as host plants, emergence periods, conditions of trees most susceptible to attack and so forth. Nevertheless, in this comparatively short time many species not previously recorded in this monograph were obtained. In each case, not only the larva but the adult and sometimes the pupa were either collected or reared in the insectary. This was usually a slow and laborious procedure entailing many hours of chiselling into two- or three-ton logs. Numerous photographs were taken depicting characteristic damage by various timber pests which should be a valuable aid to identification, as so often damaged timber is submitted without the insect responsible. All this material has been presented to the British Museum (N.H.).

In the high wet forests of Nigeria and the Gold Coast the most noticeable and widespread damage undoubtedly was caused by *Cordylomera spinicornis* F. and *Monochamus centralis* Duvivier to *Khaya* and *Combretodendron*, respectively. In some yards, numerous logs of *Chlorophora excelsa* had been completely ruined by the enormous galleries of *Phryneta leprosa* (F.) which extend deep into the heartwood. Other species responsible for severe damage were *Macrotoma serripes* (F.) (in *Parkia*), *Batocera wyllei* Chev. (in standing *Guarea* and *Alstonia*) and *Mallodon downesi* Hope (in logs of *Triplochiton scleroxylon* and *Bosqueia angolensis*). As larvae of all these species are at least four inches long and one inch in diameter, the damage that can be caused by fifty or more larvae in a single tree is considerable, especially as they are heartwood borers.

Daniellia olivieri was found to be severely attacked in some districts. It was infested with the large cerambycid *Pachydissus camerunicus* Aurivillius, particularly in the derived savannah near Enugu and also near Sunyani.

It would appear that the cultivation of certain economic plants as pure crops in intensive compact blocks has created an essentially artificial supply of host plants and has thus favoured the increase of some of the more serious pests such as *Bixadus*

sierricola (White). During the war years comparatively little was able to be done in the way of control, with the result that vast numbers of beetles could breed uninterrupted. Moreover, during these periods when financial assistance was drastically reduced, severely damaged trees were allowed to remain to become sources of future infestation.

It is also quite clear that the post-war exploitation of so-called secondary species of timber trees has revealed many unsuspected pests and renewed efforts must be made to increase our present scanty knowledge of their hosts and distribution.

The author's thanks are due to the Government of the Gold Coast and the Government of Nigeria for making this visit possible and to the officials of the two Governments and of the West African Inter-Territorial Secretariat who facilitated his travel.

Sincere appreciation is expressed for the hospitality and material assistance received while in West Africa from many persons, in particular to Messrs. A. Foggie, W. E. Webb, J. Bowden and D. E. M. Marsh in the Gold Coast, and Mr. J. D. Scott and Mr. J. E. King in Nigeria. The author is also grateful to the Directors of African Timber & Plywood, Ltd., Messrs. Gliksten (West Africa), Ltd., and to Mr. M. Kewley and Mr. F. H. Rae (United Africa Company) for their kind co-operation.

Finally, the author is deeply grateful to Dr. R. C. Fisher, Dr. W. J. Hall, Mr. E. O. Pearson and Mr. F. S. Collier, without whose interest and help this tour would not have been possible.

AFRICAN CERAMBYCID LARVAE

FAMILY CHARACTERS

Form elongate, usually subcylindrical, occasionally cylindrical or strongly depressed. Cuticle thin, often rather leathery, especially on prothorax; never deeply pigmented or extensively sclerotised; usually greyish or milky white or pale testaceous; pubescent, especially on lateral regions.

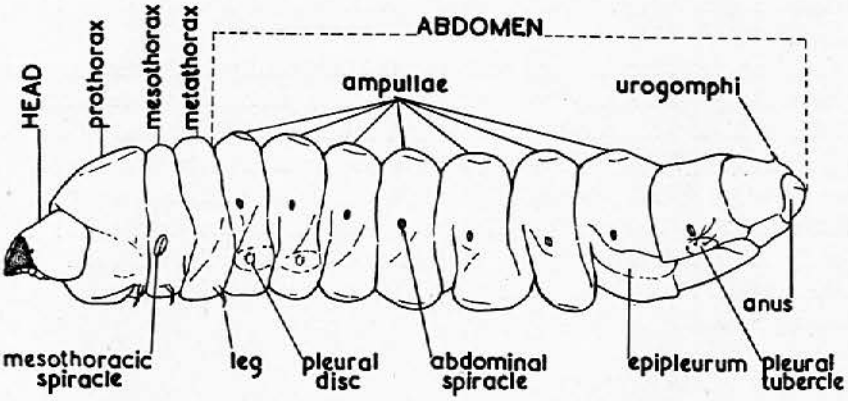


Fig. 1. Diagrammatic figure of a cerambycid larva. Lateral aspect. (Duffy, 1953a)

Head extensible, usually deeply invaginated into prothorax; occiput large, occipital foramen very large, ventral and often divided into two portions by the tentorial bridge. Ventral surface with a broad transverse bridge formed completely or mainly by the large hypostoma, the front margin of which is never strongly curved or retracted. Clypeus distinct, membranous, usually glabrous. Mandibles short, cutting edge either oblique or gouge-like; never with molar part or prostheca. Antennae usually strongly retractile; segment 2 usually bearing a tapering hyaline process; generally 3- but sometimes only 2-segmented (see p. 9); basal membrane often large and conspicuous. Maxillae protracted but compact; maxillary stipes movable only in one plane; maxillary articulating area distinct, generally fleshy. Labial palpi distinct, conical.

Prothorax large, with a wide collar; mesothorax, metathorax and abdomen narrower; never with hypopleural sclerites; always with a rectangular, sclerotised dorsal plate which is generally more or less glabrous posteriorly but sometimes pubescent, spiculate or asperate.

Abdomen extended; dorsally, and usually ventrally, bearing fleshy ambulatory ampullae on segments 1–6 or 1–7; segment 9 often with a sclerotised plate or process or with rigid unsegmented urogomphi. Anal region nearly always trilobate, exserted.

Legs often vestigial or absent; if present, then widely separated; never more than 4-segmented (excluding unguiculus).

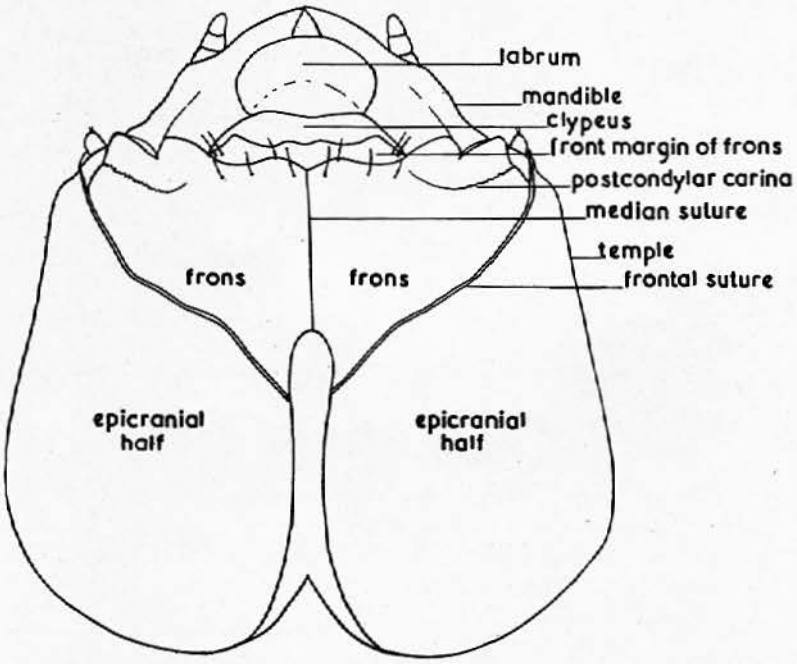


Fig. 2. Diagrammatic figure of a cerambycid larval head. Dorsal aspect. (Duffy, 1953a)

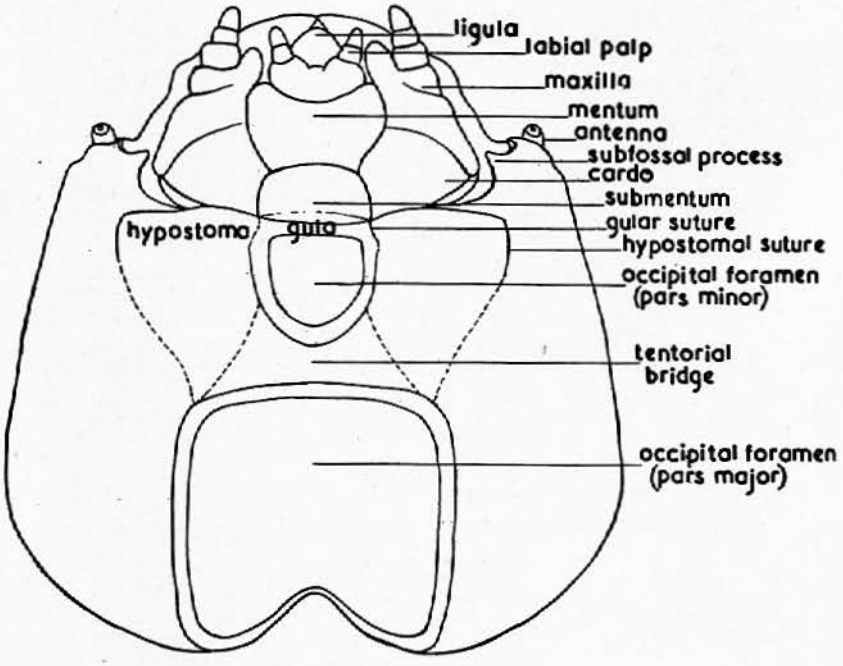


Fig. 3. Diagrammatic figure of a cerambycid larval head. Ventral aspect. (Duffy, 1953a)

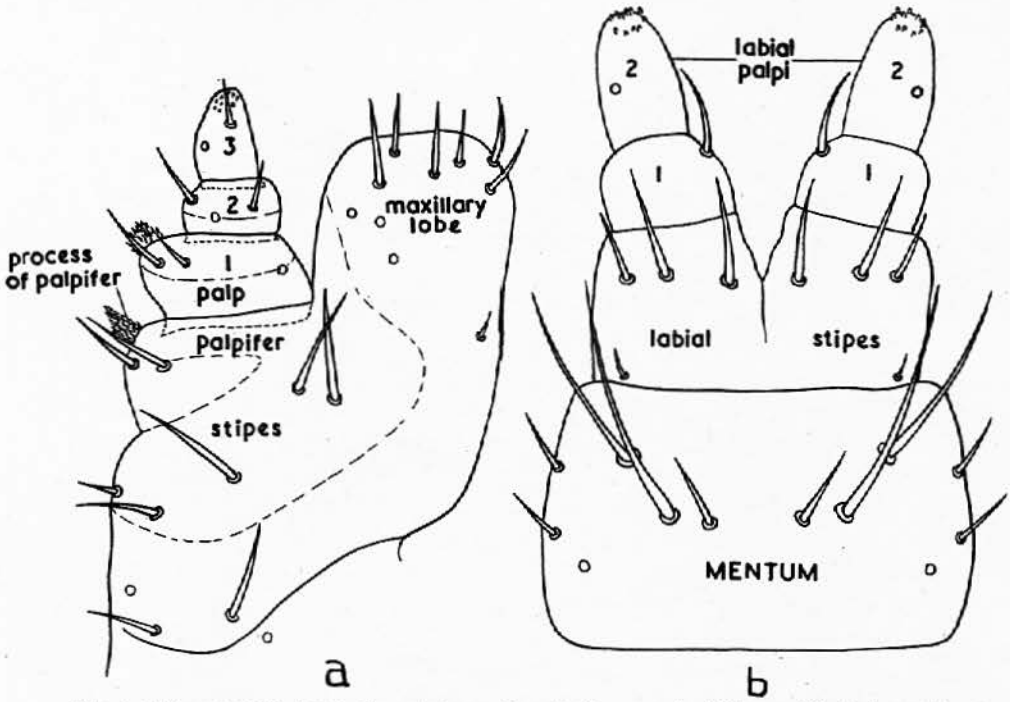


Fig. 4. Diagrammatic figure of ventral mouthparts of a cerambycid larva. Ventral aspect. (*a*) maxillary palp, (*b*) labial palpi. (Duffy, 1953a)

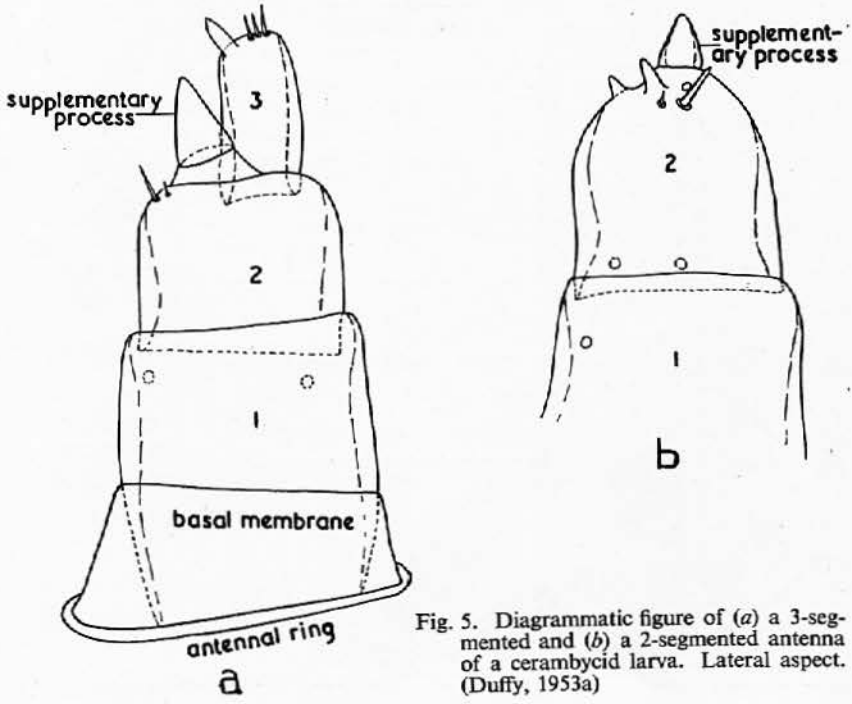


Fig. 5. Diagrammatic figure of (*a*) a 3-segmented and (*b*) a 2-segmented antenna of a cerambycid larva. Lateral aspect. (Duffy, 1953a)

Spiracles annular, bilabiate, with respiratory opening narrow; lips membranous, clothed with setigerous tubercles; peritreme often with marginal chambers.

The morphology of cerambycid larvae has already been dealt with in the author's previous volume (1953a), but for the benefit of those readers who are not fully acquainted with the terminology or to whom this work is not available, the accompanying figures (figs. 1–8) are reproduced as a guide to the interpretation of the keys and descriptions.

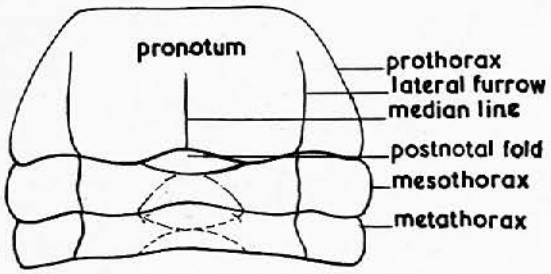


Fig. 6. Diagrammatic figure of pro-, meso- and metathorax of a cerambycid larva. Dorsal aspect. (Duffy, 1953a)

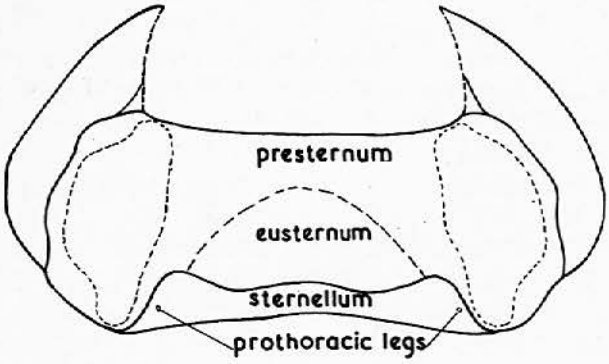


Fig. 7. Diagrammatic figure of prothorax of a cerambycid larva. Ventral aspect. (Duffy, 1953a)

A brief explanation concerning the segmentation of the antenna is perhaps desirable. Owing to its small size, little use had been made of its diagnostic value until the present author's examination of this structure in the British species. It was then found to be of major significance and has again been used to advantage in the present work. It is now evident that there are many genera and at least several tribes in which the antenna is only 2-segmented, the "third segment" being minute, hyaline, conical and devoid of setae (fig. 5) and now regarded merely as a supplementary process. It is in fact the presence or absence of the third segment which is of great diagnostic importance. This segment is invariably cylindrical, strongly sclerotised and setose apically and is thus quite distinct from the accompanying supplementary process which is usually much shorter and is always tapering, hyaline and devoid of setae (fig. 5).

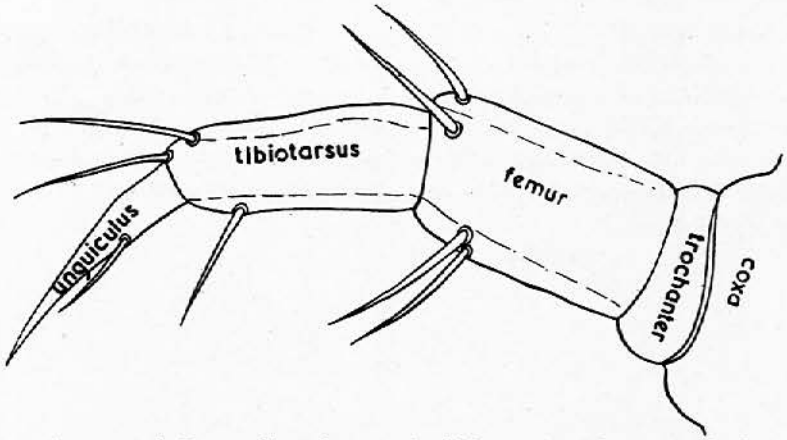


Fig. 8. Diagrammatic figure of leg of a cerambycid larva. Lateral aspect. (Duffy, 1953a)

The third antennal segment is absent in certain tribes of the PRIONINAE, ASEMINAE, LEPTURINAE and LAMIINAE, but no reduction in segmentation has yet been found in the PARANDRINAE and CERAMBYCINAE.

KEY TO SUBFAMILIES

The following keys are based on mature or at least half-grown larvae. Scarcely anything is known of the earlier instars of African species of this family, but a recent study of those of British species has shown that, in the majority of cases, first-instar larvae differ appreciably from those of later instars, particularly in the structure of the antennae and spiracles and in the presence of egg-bursting spines (fig. 103). Moreover, such taxonomically useful characters as terminal processes and urogomphi are almost invariably undeveloped.

In the preparation of these keys attempts have been made to place the subfamilies and genera in a phylogenetic sequence rather than in an artificial order, and whenever this has proved to be at variance with the generally accepted sequence of the adults, an explanation has been given under the appropriate subfamily, tribal or generic heading of the section dealing with descriptions and bionomics.

The examination of larvae is best carried out in shallow glass receptacles filled with 80 per cent alcohol. It is often essential to examine critically the antennae or ventral mouthparts, in which case, if very small, they should be detached by means of a dissecting needle and made into a slide preparation. The technique adopted by the author was as follows. Firstly, the dissected parts were transferred to 95 per cent and then to absolute alcohol, in both cases for periods varying from 15 to 60 minutes, according to size. This was followed by immersion in clove oil for approximately 24 hours. The dissected parts were then transferred to a slide, the superfluous fluid being absorbed by means of a piece of filter paper and then covered with a few drops of Canada balsam on to which a cover glass was gently lowered, care being taken to ensure that the desired position of the dissected part was not disturbed. In the case of antennae this was not at all easy, for as they are cylindrical, they tend to revolve. This may be discouraged by using a reasonably thick balsam and by slightly raising and lowering the cover glass from one side until the required position is obtained.

As a rule it is not necessary to remove the head capsule. The position of the tentorial cross-arm may be ascertained without dissection from the membranous connection between the anterior foramen and the prothorax; for example, in the ASEMINAE and LEPTURINAE the gula is exposed or can be exposed merely by pushing back the front part of the prothorax, whereas in the PRIONINAE and CERAMBYCINAE a skinfold, which is attached to the front margin of the gula, is revealed when the gula is pushed back. In order to see whether the postero-lateral area of the head capsule is pigmented and sclerotised, the lateral area of the prothorax may easily be pressed back with a needle.

The dorso-external process of the palpifer, which is often concealed between the maxilla and the mandible, may easily be exposed by slightly raising the maxilla with a needle.

The critical examination of many larvae demands the temporary transference from spirit on to filter paper. By absorbing the excess fluid in this manner, minute structures such as pleural discs, asperities, spicules and setae become more conspicuous, as they are often indiscernible when the larva is wet. Care must be taken, however, not to keep the specimen out of spirit for more than a few minutes at a time, otherwise shrinkage and distortion will occur.

1. Legs absent or vestigial and mandible with an oblique cutting edge (figs. 115, 129). Head distinctly oblong, with sides parallel or converging posteriorly (figs. 131, 141). Maxillae rigid, only movable from stipes; cardo, maxillary articulating area and submentum fused. Pleural tubercle often bearing a sclerotised pit at each extremity (fig. 116). [Occipital foramen undivided (fig. 141). At least six epistomal setae present (fig. 129). Pronotum and/or ampullae often asperate or spiculate.] . . . . 7. LAMIINAE, p. 22

— Legs usually present and well developed (figs. 1, 40), but if absent or vestigial, then mandible with a gouge-like cutting edge (figs. 59, 60). Head transverse to subquadrate, with sides diverging posteriorly (figs. 19, 86). Maxillae movable; cardo, maxillary articulating area and submentum distinct. Pleural tubercle never with sclerotised pits 2

2. Occipital foramen postero-dorsad. Prothoracic skin attached ventrally directly to submentum (Craighead, 1923) . . . . . 4. DISTENIINAE, p. 78

— Occipital foramen ventral (figs. 49, 71). Prothoracic skin not attached to the submentum 3

3. Occipital foramen divided into a small anterior and a larger posterior portion by the tentorial bridge which is in the same plane as the hypostoma (fig. 3). Ventral mouthparts attached to hypostoma by little more than width of gula. Maxillary palpifer with outer margin strongly rounded and protuberant (fig. 20); maxillary lobe apparently borne on stipes. Epipleurum strongly protuberant on last three segments only. Four to six epistomal setae present. Postnotal fold usually present 4

— Occipital foramen not divided into two portions, as the tentorial cross-arm is internal. Ventral mouthparts attached to hypostoma for nearly its entire breadth. Maxillary palpifer with outer margin not strongly rounded and protuberant; maxillary lobe apparently borne on palpifer. Epipleurum slightly protuberant on all abdominal segments; seldom strongly protuberant on last three only, but if so, then tergite 9 with urogomphi. From six to twenty epistomal setae present. Postnotal fold absent . 6

4. Mandible with an oblique cutting edge (figs. 13, 19, 32). Clypeus wide (figs. 13, 19), filling space between dorsal articulations of mandibles. Front margin of frons with the lower boundary usually projecting over the clypeus and the upper boundary dentate or carinate (except *Macrotoma* and *Anoeme*), but if not, then pronotum asperate posteriorly.

Maxillae with palpi and lobes in same plane as cardo; lobe slender, subcylindrical and densely setose on inner margin. Abdominal segment 9 long, extended (fig. 26). Legs present, well developed and at least as long as maxillary palpi; unguiculus stout and straight. Six epistomal setae present. Antenna (figs. 13, 30, 36, 37) with or without a sclerotised, setose, third segment. Prothoracic coxae almost meeting medially. Pronotum sometimes asperate (fig. 16). Dorsal ampullae with two very distinct transverse impressions. Pleural discs present or absent 5

— Mandible with a gouge-like cutting edge (figs. 59, 60). Clypeus narrow, not filling space between dorsal articulations of mandibles (figs. 86, 92). Front margin of frons with the lower boundary never projecting over clypeus and upper boundary never dentate or carinate (figs. 60, 86). Maxillae with palpi and lobes curved upward against ventral surfaces of mandibles; lobe broad and flat, with inner margin glabrous or almost so (fig. 87). Abdominal segment 9 never long and extended (fig. 85). Legs smaller, seldom as long as maxillary palpi (fig. 85) and sometimes absent; unguiculus slender, usually flagelliform (fig. 82). Four epistomal setae present. Antenna always with a strongly sclerotised, setose, third segment (figs. 88, 101). Prothoracic coxae widely separated. Pronotum never asperate. Dorsal ampullae with posterior transverse impression generally rather indistinct. Pleural discs present. Palpifer and/or first palpal segment often with a dorso-external process (fig. 4*a*) . . . 6. CERAMBYCINAE, p. 15

5. Posterior area of pronotum non-asperate. Front margin of frons with lower boundary projecting over clypeus (except Macrotomini and *Anoeme*) (figs. 19, 34). Postcondylar carina and subfossal process usually present (figs. 19, 34), but if absent (*Anoeme*), then pronotum transversely plicate (fig. 38). Pleural discs present (fig. 33). Antenna sometimes with a strongly sclerotised, setose, third segment (fig. 36). Spiracles with marginal chambers, if present, very small and not extending beyond outer margin of peritreme. 2. PRIONINAE, p. 12

— Posterior area of pronotum asperate (fig. 16). Front margin of frons with lower boundary never projecting over clypeus. Postcondylar carina and subfossal process absent (fig. 13). Pleural discs absent. Antenna always with a strongly sclerotised, setose, third segment (fig. 14). Spiracles with marginal chambers large and extending well beyond outer margin of peritreme 1. PARANDRINAE (**Parandra** (s.g. **Parandra**) **gabonica** Thomson, p. 48)

6. Posterior emargination of head deep, often extending to frons. Prothorax with pronotum never velvety spiculate. Ampullae always tuberculate (fig. 43) and sometimes spiculate. Maxillary palp with segment 1 small, only slightly larger than segment 2. Prothoracic coxae almost meeting medially. Unguiculus with a very short, stout seta near base. Tergite 9 sometimes with a terminal spine (fig. 45), very seldom with urogomphi but usually unarmed. Ligula longer than labial palpi. Antenna with or without a strongly sclerotised, setose, third segment. General form moderately to strongly depressed (except *Vesperus*) . . . . . 3. LEPTURINAE, p. 14

— Posterior emargination of head very shallow (figs. 49, 50). Prothorax with pronotum velvety spiculate, except *Oxypleurus*, but then hypostoma with anterior region steeply sloping down to anterior margin. Ampullae never tuberculate, usually micro-spiculate. Maxillary palp with segment 1 large, about twice size of segment 2. Prothoracic coxae widely separated. Unguiculus never with a basal seta. Tergite 9 with a pair of short, often blunt, urogomphi (fig. 53). Ligula shorter than labial palpi. Antenna always with a strongly sclerotised, setose, third segment. General form subcylindrical. [Predominantly in Coniferae.] . . . . . 5. ASEMINAE, p. 15

KEYS TO GENERA AND SPECIES

2. PRIONINAE

1. Front margin of frons with upper boundary projecting in four large teeth (fig. 39) . 2

— Front margin of frons with upper boundary not dentate (figs. 19, 34) . . . 3

2. Prosternum (fig. 39) with sides produced anteriorly into a pair of elongate fleshy tubercles which project beyond anterior margin and are thus visible from above.
Eudianodes swanzyi Pascoe, p. 329
— Prosternum not produced . . **Ergates** (s.g. **Ergates**) **faber** (Linnaeus), p. 61
3. Front margin of frons roundly declivous; without a complete transverse ridge on upper boundary and lower boundary not produced over clypeus. Antennal basal membrane strongly produced beyond foramen, the latter smooth, evenly rounded and closely surrounding the membrane but not concealing the inner face 4
— Front margin of frons with a complete transverse ridge on upper boundary and lower boundary irregularly produced over clypeus (fig. 34). Antennal basal membrane not or only slightly produced beyond inner margin of foramen, the latter carinate and unevenly rounded, the inner margin somewhat produced thus concealing inner face of membrane 5
4. Posterior half of pronotum coarsely and deeply transversely plicate (fig. 38). Ampullae densely micro-spiculate. Antenna 3-segmented (fig. 37). [Postcondylar carina absent.]
Anoeme sp., p. 67
— Posterior half of pronotum not transversely plicate. Ampullae glabrous. Antenna 2-segmented (figs. 28, 30) . . . **Macrotoma, Aulacopus** and **Hovatoma**, p. 13
5. Antenna 3-segmented (fig. 36); segment 2 subquadrate; segment 3 small but distinct and strongly sclerotised. Ocelli indiscernible 6
— Antenna 2-segmented; segment 2 strongly elongate and obliquely truncate apically (fig. 21). Three pairs of ocelli present (sometimes obscured by sclerotisation of gena) 7
6. Antennal segment 3 transverse and obliquely truncate.
Prionus (s.g. **Prionus**) **coriarius** (Linnaeus), p. 67
— Antennal segment 3 slightly elongate and dome-shaped (fig. 36).
Dorysthenes (s.g. **Opisognathus**) **forficatus** (Fabricius), p. 65
7. Prosternum bearing numerous conical, teat-like tubercles which are acutely pointed and sclerotised apically (fig. 23) . . Stenodontini. **Mallodon downesi** Hope, p. 51
— Prosternum non-tuberculate . . . . . **Acanthophorus**, p. 13

Acanthophorus

1. Front margin of lower boundary of frons serrate (fig. 34). Cuticle of abdominal segments surrounding pleural discs dark testaceous, much darker than discs and distinctly sclerotised (fig. 33). Pleural discs present on segments 1–8. Mandible with a conspicuous sub-basal tooth (fig. 32). Gena with a distinct subantennal projection. Length up to 160 mm. 2
— Front margin of lower boundary of frons more or less evenly curved. Cuticle surrounding pleural discs pale testaceous, not darker than discs and soft and fleshy. Pleural discs present on segments 1–6 only. Mandible without a sub-basal tooth. Gena without a subantennal projection. Length up to 90 mm.
A. (s.g. **Ceratocentrus**) **spinicornis** (Fabricius), p. 64
2. Front margin of frons narrowly pitchy, the breadth much less than length of labrum; ferruginous posteriorly (fig. 34). Sub-basal tooth of mandible blunt, almost right-angled apically . . . . . **A.** (s.g. **Tithoes**) **maculatus** (Fabricius), p. 62
— Front margin of frons very broadly pitchy, the breadth greater than length of labrum. Sub-basal tooth of mandible sharp, acutely-angled apically (fig. 32).
A. (s.g. **Acanthophorus**) **capensis** White, p. 61

Macrotoma, Aulacopus and **Hovatoma**

1. Upper boundary of frons with a distinct sclerotised, ferruginous tooth opposite basal angle of clypeus . . . . **M.** (s.g. **Navosomopsis**) **foveolata** Kolbe, p. 56
— Upper boundary of frons unarmed 2

2. Postcondylar carina absent or feebly defined, testaceous 3
— Postcondylar carina present, distinctly defined and ferruginous. Length up to at least 60 mm.; maximum breadth at least 24 mm. 5
3. Gena with a distinct vertical, oval protuberance immediately in front of ocelli (which are almost entirely concealed by sclerotisation of gena). Postcondylar carina absent 4
— Gena without a vertical, oval protuberance in front of ocelli. Postcondylar carina present, feebly defined and testaceous . . . . . **H. micros** (White), p. 55
4. Subfossal process attenuated, acutely conical. Apical segment of antenna very elongate, at least three times as long as basal width. Length up to 36 mm.
M. (s.g. **Navosomopsis**) **dohertyi** Lameere, p. 56
— Subfossal process short, obtusely conical. Apical segment of antenna short, less than three times as long as basal width. Length up to 55 mm. **A. reticulatum** Serville, p. 56
5. Front margin of frons oblique, the upper boundary roundly declivous.
M. (s.g. **Macrotoma**) **palmata** (Fabricius), p. 57
— Front margin of frons subvertical, the upper boundary angled and feebly transversely carinate 6
6. Antennal segment 2 moderately elongate, not attenuated apically, the oblique sensory area round (fig. 30). Front margin of frons testaceous and feebly sclerotised, at least paramedially . . . . . **M.** (s.g. **Macrotoma**) **natala** J. Thomson, p. 60
— Antennal segment 2 more strongly elongate, attenuated apically, the oblique sensory area oval (fig. 28). Front margin of frons entirely ferruginous and strongly sclerotised.
M. (s.g. **Macrotoma**) **serripes** (Fabricius), p. 58

3. LEPTURINAE

1. Form short and extremely robust; abdomen densely pubescent laterally and enlarged and truncate posteriorly (fig. 40). Antenna (fig. 41) extremely long, at least half length of mandible. Ocelli absent. Clypeus (fig. 41) strongly produced anteriorly and bearing lateral setae. Hypostomal sutures and gular region undefined . **Vesperus** spp., p. 70
— Form slender or strongly depressed; abdomen not densely pubescent laterally and not enlarged or truncate posteriorly. Antenna minute. From one to three pairs of ocelli present. Clypeus not strongly produced; setae absent. Hypostomal sutures and gular region distinct 2
2. Abdominal segments 1–8 each with a pair of rigid lateral projections which resemble legs (fig. 43). Head strongly angulate laterally (fig. 43). Anus ventral (used as pseudopod?). Form extremely depressed . . . **Apiocephalus punctipennis** Gahan, p. 72
— Abdominal segments without lateral projections. Head rounded laterally. Anus caudal. Form cylindrical or subcylindrical 3
3. Abdominal tergite 9 bearing a long terminal spine which is bifurcated apically and as long as this segment (fig. 45). Front margin of head with a prominent conical, sclerotised tubercle on ventral acetabulum in which the *condylus mandibulae* rotates.
Rhamnusium, p. 74
— Abdominal tergite 9 unarmed. Front margin of head without ventral tubercles on acetabulum 4
4. Head strongly transverse, appreciably wider at prothorax (in mature larvae) and very strongly depressed. Temple with a distinct longitudinal keel behind antenna. Mandible very slender and strongly produced. About twenty epistomal setae present. Maxilla with palpal segment 1 broadened apically. Antenna apparently 2-segmented, segment 2 bearing a single hyaline process. [One pair of ocelli present. In coniferous timbers only.]
Rhagium (s.g. **Hargium**) **inquisitor** (Linnaeus), p. 75
— Head less transverse, not wider than prothorax and seldom strongly depressed, but if so (*Grammoptera*), then three pairs of ocelli present. Temples not keeled. Mandible shorter and stouter. Six epistomal setae present. Maxilla with palpal segment 1 not broadened

apically. Antenna usually 3-segmented, but if only apparently 2-segmented, then segment 2 bearing one stout and one very slender hyaline process 5

5. Antenna apparently 2-segmented, segment 2 bearing one stout and one slender hyaline process. Tibiotarsus distinctly longer than femur. Maxillary palp with segment 3 elongate, longer than segment 2. Length up to 15 mm. [Three pairs of ocelli present.] **Grammoptera ruficornis** (Fabricius), p. 77

— Antenna distinctly 3-segmented, segment 3 strongly sclerotised and with a few stout setae; segment 2 bearing a supplementary hyaline process. Tibiotarsus not or scarcely longer than femur. Maxillary palp with segment 3 quadrate to elongate, not longer than segment 2. Length up to 63 mm. 6

6. Dorsal ampullae with tubercles arranged more or less in four transverse rows, one row on each side of the two transverse furrows. One pair of ocelli present. Length up to 40 mm. . . . . **Leptura, Strangalia,** p. 15

— Dorsal ampullae with the area between the two transverse furrows entirely covered with tubercles. Three pairs of ocelli present. Length up to 63 mm. **Dorcasomus gigas** Aurivillius, p. 77

Leptura, Strangalia

1. Mandible with an oblique dull, sculptured plate on cutting edge. Proeusternum entirely micro-reticulate and with a small, triangular, pubescent area near each basal angle. **L. (s.g. Leptura) rubra** (Linnaeus), p. 75

— Mandible without a sculptured plate on cutting edge. Proeusternum not entirely micro-reticulate 2

2. Proeusternum shining, coarsely rugose, without spicules or pubescence. Hypostoma with anterior margin black to pitchy . **L. (s.g. Leptura) scutellata** Fabricius, p. 76

— Proeusternum dull, entirely covered with very short microscopical pubescence. Hypostoma with anterior margin ferruginous. **S. (s.g. Strangalia) aurulenta** (Fabricius), p. 76

5. ASEMINAE

1. Ocelli present. Pronotum glabrous. 2

— Ocelli absent. Pronotum micro-spiculate . . . . . **Arhopalus,** p. 15

2. One pair of ocelli present. Hypostoma with anterior region steeply sloping down to anterior margin (fig. 50). Inner part of dorsal surface of mandible with an oblique striate plate . . . . . **Oxypleurus nodieri** Mulsant, p. 80

— Two pairs of ocelli present. Hypostoma flat or very slightly convex. Inner part of dorsal surface of mandible without a striate plate . **Pectoctenus scalabrii** Fairmaire, p. 79

Arhopalus[1]

1. Supplementary process of antenna distinctly shorter than its basal width. Urogomphi small and separated by two or three times their basal width. Genal setae not distributed beyond level of posterior end of frontal sutures. Prothorax with lateral setae pale yellow; posterior part of pronotum pale yellow . . . . **A. rusticus** (Linnaeus), p. 80

— Supplementary process of antenna at least as long as its basal width. Urogomphi longer, seldom separated by more than their basal width, usually less. Genal setae distributed beyond level of posterior end of frontal sutures. Prothorax with lateral setae ferruginous; posterior part of pronotum orange-yellow . . . **A. ferus** (Mulsant), p. 80

6. CERAMBYCINAE

1. Three pairs of large subcontiguous ocelli present and head capsule rectangular (with sides not or scarcely diverging behind middle). Temple usually with a distinct postocular carina, but if without (*Plocaederus* and *Bolbotritus*), then ampullae spiculate (fig. 65). Dorsal

[1] As larvae of this genus are variable and only a single larva of *A. rusticus* is available, this key should be regarded as only provisional.

ampullae usually either with large flat tubercles or spiculate, but if non-tuberculate and glabrous (*Pachydissus*), then anal lobes encircled by a fringe of short reddish setae (fig. 66); always with two distinct transverse impressions. Length up to at least 40 mm.
Cerambycini 2

— Usually none or less than three pairs of ocelli present, but if three pairs present (*Hylotrupes* and Clytini (pars)), then head capsule distinctly trapezoidal, with sides strongly diverging behind middle. Temples without postocular carina. Dorsal ampullae never distinctly tuberculate or spiculate (except *Plocaederus* (pars) and *Oxyprosopus*); posterior transverse impression indistinct (except Callichromini). Length seldom exceeding 30 mm., usually much less 5

2. Ampullae spiculate (fig. 65). Temples without carinae or weals. Antenna with segment 3 about four times as long as basal width 3

— Ampullae not spiculate. Temples with a transverse carina immediately behind ocelli and a raised, elongate-oval area at posterior end of sclerotised part. Antenna with segment 3 not more than three times as long as basal width 4

3. Posterior area of pronotum and abdominal ampullae micro-spiculate, the spicules not individually distinguishable with a ×15 lens. Abdominal ampullae non-tuberculate.
Plocaederus (pars), p. 21

— Posterior area of pronotum and abdominal ampullae (fig. 65) macro-spiculate, the spicules very coarse and clearly individually distinguishable with a ×15 lens. Abdominal ampullae coarsely tuberculate (fig. 65) . . . **Bolbotritus bainesi** Bates, p. 99

4. Dorsal ampullae bearing four rows of large, flat, oval tubercles. Anal lobes rather sparsely setose. Temples with raised area at posterior end of sclerotised part not more protuberant than postocular carina. Dorsal boundary of antennal foramen produced.
Cerambyx, p. 21

— Dorsal ampullae non-tuberculate. Anal lobes encircled by a fringe of short reddsh setae, behind which are scattered longer setae (fig. 66). Temples with raised ridge at posterior end of sclerotised part much more protuberant than postocular carina. Dorsal boundary of antennal foramen scarcely produced and not raised. **Pachydissus**, p. 21

5. Posterior part of pronotum and ampullae micro-spiculate. [One pair of ocelli present. Temples broadly ferruginous. Anal lobes fringed with rather dense reddish setae.]
Plocaederus viridipennis (Hope), p. 95

— Posterior part of pronotum not spiculate except Callichromini (pars), but then spiracles with peritreme distinctly crenulate (fig. 97). Ampullae not spiculate (except *Xystrocera* (pars)) 6

6. Hypostoma distinctly tuberculate anteriorly (figs. 72, 76). Antenna with a very long basal membrane (fig. 71). [Legs 4-segmented, long. Gula narrow, with raised sutures.]
Hesperophanini and allied genera 7

— Hypostoma without tubercles. Antenna with basal membrane much shorter (except Psebiini (pars), but then two pairs of ocelli present). 10

7. Posterior margin of submentum slightly and evenly produced and overlapping front margin of hypostoma; hypostoma broadly tuberculate on each side of produced submentum (fig. 76). Ocellus distinct; lens strongly protuberant.
Stromatium fulvum (Villers),[1] p. 111

— Posterior margin of submentum not produced posteriorly to overlap hypostoma; hypostoma not broadly tuberculate on each side of submentum (fig. 72). Ocellus indistinct; lens oval, feebly protuberant 8

8. Hypostoma bearing at least five tubercles on each side of gula, the tubercules elongate-oval and placed on front margin (fig. 72) 9

— Hypostoma with only two tubercles on each side of gula, the tubercles conical, dark brown and placed posterior to front margin (fig. 77). [Dorsal ampullae micro-granulate.]
Gnatholea lituriferr Walker, p. 112

[1] The larvae of *S. fulvum* and *S. barbatum* are so fundamentally distinct that they are here treated individually instead of together in a separate generic key.

9. Dorsal ampullae micro-granulate. Thoracic and abdominal setae pale ferruginous. Temple immediately behind ocellus broadly and strongly sclerotised and ferruginous.
Cerasphorus hirticornis Serville, p. 113
— Dorsal ampullae vermiculately rugose. Thoracic and abdominal setae pale testaceous. Temple immediately behind ocellus feebly sclerotised and pale testaceous.
Stromatium barbatum (Fabricius), p. 107
10. Temple with one to three well-marked transverse impressions or one to three small oval corneous weals behind ocellus (fig. 79). Genae shouldered. Lateral regions of prothorax velvety micro-pubescent or with very dense reddish setae. [Legs rather short but clearly 4-segmented. Head with sides strongly diverging posteriorly.] . Phoracanthini 11
— Temples without transverse impressions or tubercles behind ocellus (when present). Genae seldom shouldered, but if so, then sides of head never strongly diverging posteriorly. Lateral regions of prothorax never velvety pubescent or with dense reddish setae . 12
11. Genae narrowly ferruginous, the region behind ocellus entirely testaceous and with a transverse row of three small oval tubercles (sometimes contiguous, forming a single tubercle) about the size of the ocellus (fig. 81). Antenna with segment 3 about four times as long as basal width. Prothorax with lateral regions micro-granulate and bearing numerous short, reddish setae.
Cordylomera spinicornis (Fabricius) and varieties, p. 117
— Genae broadly ferruginous, the region behind ocellus entirely ferruginous and with at least one deep vertical impression (fig. 79). Antenna with segment 3 about twice as long as basal width. Prothorax with lateral regions not granulate but microscopically velvety pubescent. [Introduced from Australia.]
Phoracantha (s.g. **Phoracantha**) **semipunctata** (Fabricius), p. 113
12. Genal setae arising from ferruginous basal discs which give the gena a spotted appearance (fig. 59) and ventral front margin of mouthframe with a distinct conical tubercle on acetabulum in which the *condylus mandibulae* rotates. [Legs present but minute. One pair of ocelli present. Spiracles broadly oval.]
Oemini (pars). **Nosoeme clavipes** Kolbe, p. 91
— Without the first two characters combined 13
13. Ocelli absent. Abdomen with segment 8 distinctly broader than segment 7; segment 9 extremely short, less than half length of segment 8 (fig. 55). Intersegmental skin never long and annulated . . . . . Oemini (pars) 14
— Ocelli nearly always present, but if absent, then head capsule strongly sclerotised and pigmented postero-laterally (fig. 86). Abdomen with segment 8 not distinctly broader than segment 7; segment 9 at least half as long as segment 8 (fig. 85). Intersegmental skin sometimes long and annulate (fig. 90) 19
14. Postero-lateral area of head capsule strongly sclerotised and broadly ferruginous (as in *Oemida*, fig. 86). Form extremely slender (maximum breadth at prothorax 2·1 mm.). Legs indiscernible. [Genae bearing a few fine, pale, curved setae. Length not exceeding 10 mm.] . . . . . **Psathyrissa brunnea** Aurivillius, p. 91
— Postero-lateral area of head capsule not strongly sclerotised and pigmented. Form rather slender to robust (minimum breadth at prothorax 3·5 mm.). Legs very small but distinct 15
15. Mouthframe feebly sclerotised, entirely testaceous and not darker than remainder of head capsule. Basal half of mandible testaceous 16
— Mouthframe strongly sclerotised and distinctly darker than remainder of head capsule. Basal half of mandible ferruginous to pitchy 17
16. Apical segment of maxillary palpi distinctly more slender than apical segment of labial palpi . . . . . **? Parandroeme brunnea** Aurivillius, p. 90
— Apical segment of maxillary palp not or scarcely more slender than apical segment of labial palpi . . . . . **Androeme plagiata** Aurivillius, p. 90
17. Submentum either with a striate sclerite (fig. 56) or with a pair of longitudinal, parallel, corneous ridges. Form robust. Ampullae, if micro-granulate, then also micro-spiculate.

Genae with setae short and scarcely curved. Spiracles narrowly oval. Length at least 20 mm. . . . . **Xystrocera**, p. 21

— Submentum without a striate sclerite or corneous ridges. Form more slender. Ampullae micro-granulate and glabrous. Length not exceeding 16 mm. 18

18. Spiracles broadly oval to subcircular. Genae bearing numerous long curved setae. **Alloeme rubra** Thomson, p. 89

— Spiracles narrowly oval. Genae bearing only a few short setae. **Coptoeme pallidum** Lepesme, p. 89

19. Two pairs of very distinct ocelli present. Anterior half of pronotum with a longitudinal, parallel-sided, broad, raised, median area. Labial stipes extremely elongate (fig. 91) and extensible through blood pressure. Psebiini (pars) . . **Pseudobottegia** sp., p. 126

— Ocelli absent or one or three pairs present. Anterior half of pronotum simple. Labial stipes short, not extensible 20

20. Head strongly transverse with sides strongly rounded and widest at or just beyond middle; strongly sclerotised and pigmented postero-laterally (fig. 86) (except *Gracilia*).[1] Legs vestigial or absent. Genae bearing numerous long, slightly curved setae (fig. 86). Ocelli absent or one pair present. Eusternum distinctly triangular. Form very slender. Molorchini and allied genera 21

— Head subquadrate to trapezoidal, with sides feebly rounded and widest posteriorly; not strongly sclerotised and pigmented postero-laterally. Legs present (except Clytini (pars), but then form more robust and eusternum with a pair of paramedian, oval, shining, glabrous areas). Genae with short, straight setae or glabrous. One or three pairs of ocelli present. Eusternum indistinct and usually with a pair of oval, glabrous, shining areas (except *Hylotrupes*). Form more robust 24

21. Ampullae only moderately bilobed and protuberant, the ventral ampullae not visible from above; intersegmental skin short, not annulate 22

— Ampullae deeply bilobed and very strongly protuberant, the lateral areas of ventral ampullae visible from above (fig. 90); intersegmental skin long to very long and annulate 23

22. One pair of distinct ocelli present. Head capsule strongly transverse. Mouthframe distinctly sclerotised, ferruginous; postero-lateral area of head capsule not pigmented. Form very slender; maximum breadth at prothorax not exceeding 1·5 mm. [In slender dead or decaying stems.] . . . . **Gracilia minuta** (Fabricius), p. 120

— Ocelli absent. Head capsule less strongly transverse (fig. 86). Mouthframe feebly sclerotised, testaceous; postero-lateral area of head capsule extensively pigmented (fig. 86). Form more robust; maximum breadth at prothorax up to 5·5 mm. **Oemida gahani** (Distant),[2] p. 121

23. Dorsal ampullae strongly bilobed, teat-like and as strongly developed as ventral ampullae (fig. 90). Postero-lateral sclerotisation of head capsule narrow and linear. **Falsallophyton gardneri** Lepesme, p. 125

— Dorsal ampullae less strongly bilobed and not as strongly developed as ventral ampullae. Postero-lateral sclerotisation of head capsule broad and oval (as in *Oemida*, fig. 86). **Nathrius brevipennis** (Mulsant), p. 126

24. Mandible with a deep longitudinal impression on outer face (shallow in *Semanotus*, but then ocelli absent). Dorso-external process of palpifer as long or almost as long as segment 3 of maxillary palp. Legs usually 3- or 4-segmented, as long as maxillary palp and with femur and tibiotarsus quadrate to elongate. Pleural discs distinct (except *Hylotrupes*) . . . . . Saphanini, Callidiini, Callidiopini 25

— Mandible without a longitudinal impression on outer face. Dorso-external process of

[1] This character may be seen without dissection merely by pressing back the lateral area of the prothorax with a needle.

[2] Although the adult according to Junk belongs to the Oemini, this larva shows strong affinities towards the Molorchini, Obriini and allied genera (Duffy, 1953a), particularly in the possession of bilobed ampullae, vestigial legs and long curved genal setae, etc.).

palpifer very much shorter than segment 3 of maxillary palp, sometimes absent. Legs absent or vestigial (except Callichromini (pars)), but then mandible with basal part pale and much lighter than apical part (fig. 92) or spiracles with marginal chambers (*Eulitopus*) or ocellar lens large, oval and strongly protuberant (*Philematium*, *Oxyprosopus*, *Chromacilla*). Pleural discs indistinct 31

25. Proeusternum finely but distinctly longitudinally striate. Abdominal ampullae strongly bilobed . . . . . Callidiopini. **Ceresium unicolor** (Fabricius), p. 135
— Proeusternum not striate. Abdominal ampullae not strongly bilobed . . 26
26. Pronotum with anterior third pale brown. Prothorax rather sparsely setose laterally, [One pair of ocelli present.] . . . Saphanini. **Zamium incultum** Pascoe, p. 136
— Pronotum with anterior third testaceous or orange-testaceous. Prothorax densely setose laterally . . . . . Callidiini 27
27. Three pairs of distinct ocelli present in a row laterad and ventrad of antenna (fig. 102). Dorsal ampullae with two very distinct transverse furrows (fig. 100). Pleural discs indistinct. Eusternum of prothorax distinct, triangular. [In dry seasoned, coniferous timber, especially rafters, posts, dead branches, etc. Cosmopolitan species.]
Hylotrupes bajulus (Linnaeus), p. 136
— Ocelli absent or only one pair present. Dorsal ampullae with posterior transverse furrow very indistinct. Pleural discs distinct. Eusternum of prothorax indistinct . . 28
28. Ocelli absent. Mandible with longitudinal impression very shallow. [Segment 3 of maxillary palp about as long as segment 2. Mouthframe completely sclerotised beneath antennae. In *Juniperus*] . . . . . **Semanotus**, p. 149
— One pair of ocelli present. Mandible with longitudinal impression deep . . 29
29. Legs with femur and tibiotarsus dark brown, the former elongate. Gena with ferruginous area enclosing ocellus. Ventral margin of head with a distinct tubercle (subfossal process?) on acetabulum. Maxilla with segment 3 of palp not longer than segment 2. Mouthframe completely sclerotised beneath antennae . . **Callidium**, p. 150
— Legs with femur and tibiotarsus pale, the former quadrate to transverse. Gena with ferruginous area not enclosing ocellus. Ventral margin of head without a tubercle on acetabulum. Maxilla with segment 3 of palp about one and one-half times as long as segment 2. Mouthframe interrupted by a pale narrow line beneath antennae . 30
30. Head with front margin of hypostoma distinctly longitudinally to slightly obliquely striate and broadly ferruginous. Pronotum with anterior third orange-yellow and distinctly darker than posterior area which is pale testaceous.
Pyrrhidium sanguineum (Linnaeus), p. 150
— Head with front margin of hypostoma smooth and narrowly ferruginous. Pronotum with anterior third testaceous and scarcely darker than posterior area.
Phymatodes testaceus (Linnaeus) p. 150
31. Legs moderately long, at least almost as long as entire maxillary palp and with tibiotarsus quadrate to elongate. Maxillary palp with segment 3 seldom as long as and usually shorter than segment 2. Hypostoma bearing numerous short, bristly setae (except *Colobizus*). Dorsal ampullae with two distinct transverse impressions. Antenna with segment 2 bearing at least six apical setae. One pair of ocelli present; lens large and oval (except *Euporus* and *Colobizus*) . . . . . Callichromini 32
— Legs usually minute or absent, never as long as entire maxillary palp, but if nearly so (Cleomenini), then posterior margin of pronotum strongly retracted medially (fig. 106). Maxillary palp with segment 3 at least as long as and usually longer than segment 2. Hypostoma glabrous. Dorsal ampullae with posterior transverse impression incomplete or absent. Antenna with segment 2 bearing only two or three setae. One or three pairs of ocelli present; lens small, round 39
32. Posterior area of pronotum and proeusternum micro-spiculate. Spiracles with peritreme crenulate (fig. 97) . . . . . **Oxyprosopus** sp., p. 132
— Posterior area of pronotum and proeusternum devoid of spicules. Spiracles with peritreme evenly rounded 33

33. Eusternum of prothorax distinct, milky white, contrasting with the presternum which is brown. Spiracles with peritreme round. [Ampullae smooth, dull, finely micro-granulate, the granules not individually distinguishable with a ×15 lens. Spiracles with marginal chambers.] . . . . . **Litomeces** sp., p. 132
— Eusternum of prothorax not clearly defined and not strongly contrasting in colour with presternum. Spiracles with peritreme oval 34
34. Spiracles with peritreme bearing several marginal chambers on posterior half. [Form slender: length up to 20 mm.; maximum breadth (at prothorax) 3 mm. Posterior half of pronotum finely longitudinally striate.] . **Phrosyne brevicornis** (Fabricius), p. 134
— Spiracles without marginal chambers 35
35. Tibiotarsus slightly longer than broad. Segment 3 of maxillary palp slightly shorter than segment 2 36
— Tibiotarsus not longer than broad. Segment 3 of maxillary palp at least as long as segment 2 . . . . . **Euporus ignicollis** Pascoe, p. 132
36. Pronotum with a broad, transverse, pale ferruginous band bearing stout setae (each arising from a pigmented basal disc) near front margin (fig. 96) . . . 37
— Pronotum with all setae fine and not arising from pigmented basal discs . . 38
37. Propresternum smooth, testaceous, with setae arising from pigmented basal discs as on pronotum; sternellum shining, glabrous . . . . **Chromacilla** sp., p. 131
— Propresternum with numerous transversely oval, ferruginous, lenticulate pits and with setae simple basally; sternellum dull, micro-pubescent.
Chromalizus barbiventre (Bates), p. 133
38. Abdominal ampullae shining and either vermiculately rugose or distinctly macro-granulate, the granules individually distinguishable with a ×15 lens. Legs longer than maxillary palp. Length up to at least 25 mm. . . **Philematium, Aromia**, p. 22
— Abdominal ampullae dull, faintly micro-granulate, the granules not individually distinguishable with a ×15 lens. Legs not longer than maxillary palp. Length up to 13 mm.
Colobizus tibiotarsalis Schmidt, p. 131
39. Posterior margin of pronotum strongly retracted medially revealing a triangular skinfold ("pre-postnotal fold") (fig. 106) . . . . . Cleomenini. **Dere** sp., p. 156
— Posterior margin of pronotum straight or at most slightly sinuate medially; "pre-postnotal fold" absent . . . . . Clytini 40
40. Three pairs of ocelli present. Segment 3 of maxillary palp shorter than segment 2. [Ampullae with rather coarse reticulation. Front margin of hypostoma with fine transverse rugae.] . . . . . **Plagionotus arcuatus** (Linnaeus), p. 152
— One pair of ocelli present. Segment 3 of maxillary palp at least as long as segment 2. [Legs minute or absent.] 41
41. Legs at least half as long as maxillary palpi (distinctly visible when viewed laterally with a ×15 lens). Genae rather strongly shouldered 42
— Legs either minute (less than half as long as maxillary palpi and not visible with a ×15 lens) or absent. Genae never shouldered, the head being gradually narrowed up to base of mandible 44
42. Front margin of hypostoma broadly ferruginous, transversely striate and protuberant near gula. Gena broadly ferruginous . **Chlorophorus carinatus** Aurivillius, p. 153
— Front margin of hypostoma pale or very narrowly ferruginous and never transversely striate or protuberant. Gena pale testaceous or ferruginous 43
43. Temple with a small protuberant testaceous area immediately behind ocellus. Legs at least two-thirds as long as maxillary palp. Hypostoma testaceous and glabrous.
Anaglyptus, p. 153
— Temple not protuberant or testaceous behind ocellus. Legs at most half as long as maxillary palp. Hypostoma milky white and with several fine pale setae **Isotomus**, p. 156
44. Posterior part of pronotum finely and regularly micro-granulate **Xylotrechus**, p. 22
— Posterior part of pronotum not micro-granulate but either smooth or longitudinally striate 45

45. Hypostoma with front margin distinctly longitudinally striate. Legs absent. [Palaearctic region.] . . . . . **Clytus**, p. 152
— Hypostoma with front margin not longitudinally striate. Legs present but minute. [Ethiopian region.] . . . . . **Chlorophorus carinatus** Aurivillius, p. 153

Cerambyx

1. Front margin of head broadly ferruginous, the pigmented band being at least as wide as length of labrum. Front margin of frons with upper boundary distinctly cariniform in each lateral third. Temple with the elongate-oval area at posterior end of sclerotised part strongly raised. Dorsal boundary of antennal foramen slightly raised. Sutures and front margin of hypostoma ferruginous. Length up to 50 mm.; maximum breadth 7·5 mm.
C. scopolii Füessly, p. 104
— Front margin of head less broadly ferruginous, the pigmented band being two-thirds as wide as length of labrum. Front margin of frons with upper boundary not cariniform. Temple with the elongate-oval area at posterior end of sclerotised part scarcely raised. Dorsal boundary of antennal foramen not raised. Sutures and front margin of hypostoma black to pitchy. Length up to 100 mm.; maximum breadth 13 mm.
C. cerdo Linnaeus, p. 103

Pachydissus

1. Temples behind postocular carina strongly transversely and coarsely striate. Posterior area of pronotum shining, coarsely rugose. Front margin of hypostoma slightly swollen at extremities. Length up to 45 mm. . . . . **P. hector** Kolbe, p. 100
— Temples behind postocular carina feebly rugose. Posterior area of pronotum dull, finely micro-granulate. Front margin of hypostoma strongly swollen at extremities. Length up to 98 mm. . . . . **P. camerunicus** Aurivillius, p. 102

Plocaederus (pars)

1. Temple with a small oval ocelliform protuberance (vestigial ocellus?) which is placed outward and dorsad of the antennal foramen. Unguiculus stout, pitchy.
P. frenatus Fåhraeus, p. 98
— Temple without an ocelliform protuberance behind antennal foramen. Unguiculus slender, ferruginous 2
2. Ocelli with each of the three pigmented spots covered with a small round cornea (fig. 60) 3
— Ocelli with the three pigmented spots covered with a single large oval cornea (the individual corneae having become fused?) . . **P. nitidicollis** Atkinson, p. 97
3. Abdominal spiracles subobliquely placed, the anterior margin appreciably raised above general level of cuticle 4
— Abdominal spiracles vertically placed, the anterior margin not raised. [Setae on prothorax and anal lobes ferruginous.] . . . . . **P. spinicornis** (Fabricius), p. 97
4. Setae on prothorax and anal lobes pale yellow . . **P. basalis** Gahan, p. 93
— Setae on prothorax and anal lobes distinctly ferruginous.
P. viridescens Atkinson, p. 99

Xystrocera

1. Submentum bearing a large oval, sclerotised, ferruginous, transversely striate plate (fig. 56). Proeusternum with a pair of paramedian orange spots.
X. devittata Kolbe, p. 87
— Submentum without a striate plate. Proeusternum without orange spots . . 2
2. Ampullae micro-spiculate. Genal setae numerous . . **X. globosa** (Olivier), p. 84
— Ampullae glabrous or granulate. Genal setae sparse 3
3. Front margin of hypostoma broadly pitchy . . . **X. nigrita** Serville, p. 88
— Front margin of hypostoma rather narrowly pale testaceous to ferruginous. . 4
4. Pronotum pale testaceous anteriorly. Legs fleshy, white. Setae on lateral areas of prothorax and anal lobes pale yellow 5

— Pronotum darkly ferruginous anteriorly. Legs distinctly sclerotised, testaceous. Setae on lateral areas of prothorax and anal lobes distinctly reddish.
X. ansorgei Gahan, p. 88

5. Mouthframe ferruginous. Submentum with longitudinal corneous ridges ferruginous. Spiracles very elongate, at least four times as long as broad.
X. femorata Chevrolat, p. 89

— Mouthframe pitchy. Submentum with longitudinal corneous ridges pale testaceous. Spiracles less elongate, less than four times as long as broad.
X. vittata (Fabricius), p. 86

Philematium, Aromia

1. Mouthframe and basal half of mandible feebly sclerotised, pale testaceous (fig. 92). Dorsal ampullae strongly shining and coarsely rugose 2
— Mouthframe and basal half of mandible strongly sclerotised, ferruginous to pitchy. Dorsal ampullae less strongly shining and macro-granulate **P. virens** (Linnaeus), p. 129
2. Gena bearing not more than about twenty-five setae which are pale testaceous. Ocellus with pigmented spot very distinct. Palaearctic region. **A. moschata** (Linnaeus), p. 134
— Gena bearing at least 100 ferruginous setae (fig. 92). Ocellus with pigmented spot indistinct. Ethiopian region . . . . . **P. natalense** Bates, p. 128

Xylotrechus

1. Front margin of hypostoma broadly ferruginous, this pigmented band abruptly delimited posteriorly. Ethiopian species . . . . **X. oculicollis** Fairmaire, p. 152
— Front margin of hypostoma orange-testaceous, this pigmented band not abruptly delimited posteriorly. Palaearctic species . . . **X. arvicola** Olivier, p. 153

7. LAMIINAE

1. Antenna 3-segmented, segment 3 being distinctly sclerotised and bearing a few setae or processes (figs. 117, 128). Dorsal ampullae generally with two conspicuous transverse furrows, but if with only one, then anterior part of hypostoma steeply sloping down to anterior margin (Mesosini, Dorcaschematini) or abdominal tergite 9 bearing a keel-shaped process (Sternotomini, fig. 145); generally with two to four rows of conspicuous tubercles, but if non-tuberculate (Lamiini, Dorcadionini (pars)), then pronotum without spicules and tergite 9 without a sclerotised process. Spiracles broadly oval (figs. 116, 118). Hypostomal sutures straight 2
— Antenna apparently 2-segmented, segment 2 bearing a tapering glabrous, hyaline process (fig. 178). Dorsal ampullae, if with two transverse furrows, seldom tuberculate, but if so, then tubercles never arranged simply in two or four rows except when pronotum is spiculate (Ancylonotini and Monochamini (pars)) or when urogomphi are present; if with a single furrow, then hypostoma never with front part steeply sloping (except *Stenidea*); if very feebly or non-tuberculate, then pronotum asperate or tergite 9 bearing a sclerotised process. Spiracles variable in form. Hypostomal sutures curved . 23
2. Anus a transverse cleft (as in *Phryneta*, fig. 179) . Dorcadionini, Batocerini 3
— Anus trilobate 4
3. Pronotum smooth, shining and very sparsely setose; postnotal fold undeveloped. Epicranium simple behind antennal foramen. Legs indiscernible. Length not exceeding 20 mm. . . . . Dorcadionini. **Dorcadion** sp., p. 160
— Pronotum dull, very coarsely asperate; postnotal fold well developed, asperate (fig. 123). Epicranium bearing a distinct dentate tubercle behind antennal foramen. Legs distinctly visible with a $\times 15$ lens. Length up to at least 70 mm. Batocerini. **Batocera**, p. 29
4. Tergite 9 with a pair of paramedian, peg-shaped, sclerotised tubercles (fig. 108). [Segment 9 short, transverse and bearing numerous very long setae. Pronotum micro-granulate. One pair of ocelli present.] . . . . . Parmenini. **Parmena** sp., p. 160
— Tergite 9 without paired tubercles 5
5. Posterior area of pronotum dull, finely velvety micro-pubescent or spiculate. Pleural

tubercles each with a pair of distinct sclerotised pits (fig. 116). Antennal foramen closed posteriorly. Frontal sutures indiscernible. [Tergite 9 unarmed. Hypostoma flat. Dorsal ampullae with two transverse furrows.] . . . . . Monochamini (pars) 6

— Posterior area of pronotum shining, not pubescent or spiculate (except *Olenecamptus* (pars)). Pleural tubercles often without sclerotised pits. Antennal foramen open posteriorly (except *Olenecamptus*). Frontal sutures angled about half-way across frons and usually very distinct (fig. 129), but if indistinct, then tergite 9 bearing a sclerotised process or hypostoma with anterior region steeply sloping down to front margin . . 7

6. Abdominal segment 8 transverse, about half as long as broad . **Monochamus**, p. 29

— Abdominal segment 8 subquadrate to slightly elongate, about as long as broad.
Opepharus spectabilis (Perroud), p. 179

7. Abdominal tergite 9 bearing a minute median spine-like tubercle near posterior margin, anterior to which is a pair of paramedian, flat, sclerotised plates (fig. 138).
Acmocerini (pars). **Acmocera**, p. 30

— Abdominal tergite 9 without both these processes combined 8

8. Abdominal tergite 9 bearing a single large round, smooth, median, sclerotised plate (fig. 139) . . . Acmocerini (pars). **Acridoschema isidori** Chevrolat, p. 201

— Abdominal tergite 9 without a smooth sclerotised plate 9

9. One pair of ocelli present; lens large and distinct (except *Olenecamptus*). Hypostoma (viewed laterally) with anterior region steeply (rather feebly in Niphonini (pars)) sloping down to anterior margin, the front margin being in a lower plane than that of hind margin. Segment 3 of antenna strongly elongate, as long as segment 2.
Mesosini, Prosopocerini, Dorcaschematini, Niphonini 10

— Two pairs of large distinct ocelli present, the lower pair laterad of upper pair. Hypostoma flat or slightly convex, the front margin in same plane as hind margin. Segment 3 of antenna not or scarcely elongate, shorter than segment 2.
Tragocephalini, Sternotomini 16

10. Abdominal tergite 9 bearing a small median spine. Hypostoma with a pair of paramedian setiferous pores. Frons entirely ferruginous, longitudinally striate or with setiferous pores longitudinally impressed (fig. 129). Pleural tubercles each with a distinct ventral sclerotised pit. [Six stout epistomal setae present.] . . . . Mesosini 11

— Abdominal tergite 9 without a spine but sometimes with an oval sclerotised plate or urogomphi. Hypostoma bearing scattered setae (fig. 141). Frons testaceous and smooth (except front margin) and with setiferous pores simple. Pleural tubercles without sclerotised pits 12

11. Frons distinctly longitudinally striate, with eight setiferous pores. Hypostoma with a transverse median ridge. Antenna with segment 3 dome-shaped, only slightly longer than broad; supplementary process as long as segment 3. Spiracles with about six marginal chambers. Length up to 23 mm.; maximum breadth 5 mm. Palaearctic region.
Mesosa nebulosa (Fabricius), p. 188

— Frons not longitudinally striate but with setiferous pores feebly longitudinally impressed (fig. 129). Hypostoma with an abrupt widely curved ridge across middle. Antenna with segment 3 cylindrical, three times as long as broad; supplementary process shorter than segment 3 (fig. 128). Spiracles with about twenty-four marginal chambers. Length up to 36 mm.; maximum breadth 7·5 mm. Ethiopian region.
Coptops aedificator (Fabricius), p. 188

12. Numerous (12–24) long fine epistomal setae present. Frontal sutures angled about halfway across frons; very distinct and bisecting posteriorly the antennal foramen. Ocellus large, distinct . . . . . Prosopocerini 15

— Only six epistomal setae present. Frontal sutures indiscernible, the antennal foramen entire. Ocellus small, indistinct . . . Niphonini, Dorcaschematini 13

13. Abdominal tergite 9 bearing a pair of long slender urogomphi (fig. 140). Hypostoma distinctly convex and protuberant but anterior region only feebly sloping.
Niphonini (pars). **Pterolophia biarcuata** Thomson, p. 202

— Abdominal tergite 9 unarmed. Hypostoma with anterior region steeply (*i.e.* obliquely) sloping down to front margin 14

14. Dorsal abdominal ampullae on segments 3–6 each with a single transverse furrow and two rows of moniliform tubercles. Hypostoma entirely ferruginous. Temple testaceous behind ocellus which is rather indistinct . . Dorcaschematini. **Olenecamptus**, p. 30

— Dorsal abdominal ampullae on segments 3–6 each with two transverse furrows and three rows of moniliform tubercles. Hypostoma testaceous anteriorly and ferruginous for the greater part posteriorly. Temple ferruginous behind ocellus which is distinct.
Niphonini (pars). **Niphona picticornis** Mulsant, p. 203

15. Abdominal tergite 9 unarmed. Hypostoma with setiferous pores shallow (fig. 141).
Prosopocera, p. 31

— Abdominal tergite 9 bearing a small median oval, sclerotised disc which is sometimes subconical (fig. 143). Hypostoma with setiferous pores deep.
Protomocerus gregorii Gahan, p. 207

16. Abdominal tergite 9 bearing posteriorly a transverse sclerotised carina or dentated process (figs. 145, 148). Abdominal segments 8 and 9 subcylindrical. Anal lobes not sclerotised. Head strongly depressed; temples carinate behind antennae (fig. 144). [Hypostoma entirely ferruginous, with posterior margin thick and strongly raised.]
Sternotomini 17

— Abdominal tergite 9 unarmed or with a subvertical, subtriangular, sclerotised process (figs. 157, 158). Abdominal segments 8 and 9 cylindrical (fig. 154). Anal lobes distinctly sclerotised, testaceous (fig. 157) (except *Charieslhes*). Head very slightly depressed, temple not carinate . . . . . Tragocephalini 19

17. Tergite 9 with transverse carina tridentate, the teeth being of equal size (fig. 163). Head without conical projections behind antennal foramen. Epistoma bearing six to eight setae. Maxillary palp with segment 3 at least as long as segment 2. Length up to 17 mm.
Pseudocharieslhes nigroguttata (Aurivillius), p. 224

— Tergite 9 with transverse carina unidentate or not dentate (figs. 149, 150). Head with conical projections behind antennal foramen (except *Pterochaos*) (fig. 144). Epistoma bearing twelve to twenty-four setae. Maxillary palp with segment 3 shorter than segment 2. Length up to at least 30 mm. 18

18. Head with a conical projection behind antennal foramen (fig. 144). Epistoma with not more than sixteen setae. Length less than 50 mm.
Sternotomis and **Cylindrothorax**, p. 30

— Head without a conical projection behind antennal foramen. Epistoma with at least twenty setae. Length up to more than 50 mm. **Pterochaos nebulosus** (Voet), p. 215

19. Abdominal tergite 9 bearing a conspicuous subvertical, subtriangular, sclerotised process (fig. 162) 20

— Abdominal tergite 9 unarmed 22

20. Sclerotised process on tergite 9 longer than basal breadth (fig. 162). Anal lobes not pigmented or sclerotised. Length up to 18 mm.; maximum breadth (at prothorax) 4 mm.
Charieslhes bella (Dalman), p. 223

— Sclerotised process on tergite 9 shorter than basal breadth (figs. 156, 157). Anal lobes sclerotised and pale testaceous (figs. 156, 157). Length up to 55 mm.; maximum breadth (at prothorax) 9·1 mm. 21

21. Sclerotised process (fig. 156) on tergite 9 small and angulate apically; postero-median testaceous area absent (only a small group of setae present).
Paraphosphorus bipunctatus (Gahan), p. 218

— Sclerotised process on tergite 9 broad and rounded apically (fig. 160); postero-median testaceous area present and protuberant (fig. 160).
Tragocephala formosa (Olivier), p. 221

22. Front margin of hypostoma with a pair of small median tubercles. Abdominal tergite 9 with postero-median testaceous area bearing a group of twelve to twenty stout setae. Dorsal anal lobe bearing six to ten stout setae . . **Tragocephala** (pars), p. 31

— Front margin of hypostoma not tuberculate medially. Abdominal tergite 9 with posteromedian testaceous area bearing only four to six widely separated, stout setae (and with a very feebly developed transverse carina indicated by a narrow transverse, ferruginous area). Dorsal anal lobe bearing two to four setae. [Lower ocellar lens less than twice as large as upper lens.] . . . . . **Phosphorus virescens** (Olivier), p. 216

23. Abdominal tergite 9 bearing a pair of paramedian oval or conical tubercles which are usually feebly sclerotised (figs. 165, 168). Dorsal ampullae with three distinct rows of large shining tubercles. [Frontal sutures indistinct.] . . . Ceroplesini 24

— Abdominal tergite 9 without paired tubercles (except *Frea* (pars), but then front margin of frons sparsely striate); sometimes with spine-like or conical urogomphi. Dorsal ampullae if tuberculate, then tubercles never arranged in three distinct rows 28

24. Paired tubercles on tergite 9 bun-shaped, very strongly protuberant and not sclerotised or pigmented (fig. 164). Spiracles broadly oval, without marginal chambers. . 27

— Paired tubercles on tergite 9 conical and distinctly though sometimes feebly sclerotised and testaceous to ferruginous apically (figs. 165, 168). Spiracles subcircular to broadly oval, with chambers on posterior margin (except *Pycnopsis*) 25

25. Paired tubercles peg-shaped, entirely ferruginous. Spiracles without marginal chambers. **Pycnopsis brachyptera** Thomson, p. 233

— Paired tubercles subconical, not entirely ferruginous. Spiracles with marginal chambers 26

26. Hypostoma very strongly sclerotised and ferruginous; anterior region (viewed laterally) steeply sloping down to anterior margin, the front margin being in a lower plane than that of hind margin . . . . . **Titoceres jaspideus** Serville, p. 232

— Hypostoma feebly sclerotised, testaceous; flat or feebly convex, the front margin being in the same plane as hind margin . . . . **Ceroplesis** and **Gnathoenia**, p. 32

27. Paired tubercles on tergite 9 large, oval and moderately convex (fig. 164). **Paranaleptes reticulata** (Thomson), p. 225

— Paired tubercles on tergite 9 smaller, almost round and more strongly convex. **Analeptes trifasciata** (Fabricius), p. 227

28. Abdominal tergite 9 bearing a minute median spine near posterior margin. [Proeusternum and posterior area of pronotum slightly raised above surrounding cuticle, milky white and longitudinally striate.] 29

— Abdominal tergite 9 without a median spine but sometimes with a stout curved spine (fig. 179) or an extremely long spine-like tubercle (fig. 192) arising from beneath posterior margin 30

29. Maxillary palpi 3-segmented. Each dorsal ampulla bilobed, comprising a pair of widely separated, round, fleshy protuberances. Phrissomini. **Falsovelleda congolensis** (Hintz), p. 161

— Maxillary palpi 2-segmented. Dorsal ampullae not or scarcely protuberant. Ocullariini. **Ocularia brunnea** Jordan, p. 163

30. Anus a simple transverse cleft (fig. 179). Pronotum very coarsely asperate (fig. 188) or with ferruginous ridges (fig. 180). [Form large, robust; length 45–85 mm.] . . 31

— Anus trilobate. Pronotum sometimes finely asperate but never ridged. . . 33

31. Pronotum with posterior third bearing a pair of paramedian curved, glabrous, ferruginous ridges (fig. 187) which merge medially into three or four finer ridges. Tergite 9 unarmed. Gen. et sp. incog., p. 250

— Pronotum, if with ferruginous ridges, then ridges spiculate, numerous and arranged to form a network (fig. 180). Tergite 9 usually armed 32

32. Pronotum (fig. 180) with posterior area at least partly covered with a network of ferruginous spiculate ridges which branch out from the oblique sublateral impressions. Tergite 9 (figs. 179, 183, 184) bearing a very stout curved spine, the base of which is concealed beneath posterior margin. Segment 10 (fig. 179) distinctly sclerotised and pigmented. Dorsal ampullae micro-spiculate or pubescent. Pleural tubercles without sclerotised pits . . . . . Phrynetini. **Phryneta, Phrynetopsis**, p. 31

— Pronotum (fig. 188) extremely coarsely asperate. Tergite 9 without a spine arising from beneath posterior margin. Segment 10 not sclerotised or pigmented but densely setose and micro-spiculate. Dorsal ampullae each with four transverse rows of coarse erect spines, with scattered spines in between. Pleural tubercles each with a pair of sclerotised pits. [Form very robust; maximum width at prothorax 22 mm. Spiracles with peritreme extremely thick and strongly raised above general level of cuticle.]
Petrognathini. **Petrognatha gigas** (Fabricius), p. 251

33. Sternellum of prothorax dull, micro-spiculate. [Posterior area of pronotum micro-spiculate. Ampullae tuberculate.] 34
— Sternellum of prothorax never spiculate but sometimes with a transverse row of asperities 42
34. Labrum with a distinct ferruginous sclerotised band extending across at least basal third (fig. 214). Spiracles circular. Tubercles of dorsal ampullae smooth and shining but with surrounding cuticle dull and micro-spiculate.
?Tetraopini (pars). **Hecphora testator** Fabricius, p. 285
— Labrum without a broad ferruginous basal band. Spiracles at most broadly oval. Tubercles of dorsal ampullae, if smooth and shining, then surrounding cuticle devoid of spicules 35
35. Pleural tubercles without sclerotised pits. Anterior part of gena as dark as mandible (fig. 131). Eusternum of prothorax indistinctly defined. Ancylonotini and Metonini 36
— Pleural tubercles each with a distinct pair of sclerotised pits. Anterior part of gena not as dark as mandible. Eusternum of prothorax distinct, triangular.
Monochamini (pars) 41
36. At least twelve epistomal setae present; setae very fine, silky and as long as clypeus.
Latisternum strandi Breuning and **L. macropus** Jordan, pp. 196, 197
— Only six epistomal setae present; setae coarse, bristly and much shorter than clypeus 37
37. Spicules on posterior area of pronotum very short and sparse, the whole spiculate area pale testaceous and lighter than the anterior, smooth, ferruginous area. Dorsal ampullae each with two transverse furrows. Segment 2 of antenna elongate, about twice as long as basal width . . . . . **Ancylonotus tribulus** (Fabricius), p. 191
— Spicules on posterior area of pronotum long and dense, the whole spiculate area ferruginous and much darker than the anterior testaceous area (fig. 136). Dorsal ampullae each with only one rather indistinct transverse furrow. Segment 2 of antenna subquadrate, only slightly longer than broad 38
38. Dorsal ampullae without small moniliform tubercles. Anterior margin of spiculate area of pronotum interrupted medially (figs. 136, 137) . . . . . **Oeax**, p. 31
— Dorsal ampullae with small moniliform tubercles (figs. 133, 135). Anterior margin of spiculate area of pronotum not interrupted medially 39
39. Abdominal spiracles very narrowly oval to slot-like. Length not exceeding 15 mm.; maximum breadth 3 mm. [Tubercles of dorsal ampullae glabrous.]
Aderpas albomarmoratus Breuning, p. 191
— Abdominal spiracles broadly oval to subcircular. Length at least 20 mm.; minimum breadth 5 mm. 40
40. Tubercles of dorsal ampullae (viewed laterally) scarcely raised, somewhat flattened, rugose and shining (fig. 135) . . . . . **Lasiopezus**, p. 32
— Tubercles of dorsal ampullae (viewed laterally) strongly protuberant, dome-shaped and densely spiculate (fig. 133) . . . . . **Idactus ellioti** Gahan, p. 193
41. Pronotum (fig. 110) with a large posterior, velvety-spiculate area, anterior to which are two small sublateral, spiculate areas; lateral lobes of former more than two-thirds length of median lobe. Hypostoma transversely strigose.
Anthores leuconotus Pascoe, p. 163
— Pronotum with spicules confined to one large posterior area; lateral lobes less than two-thirds length of median lobe. Hypostoma smooth.
Bixadus sierricola (White), p. 169

42. Abdominal tergite 9 bearing a pair of paramedian urogomphi (figs. 173, 174). [Pleural tubercles without sclerotised pits. Maxillary palpi 3-segmented.] . . . 43
— Abdominal tergite 9 without urogomphi (except *Sophronica*, but then maxillary palpi 2-segmented) 47
43. Front margin of head conspicuously longitudinally striate sublaterally (fig. 171). Gin-traps present between meso- and metathorax, metathorax and abdominal segment 1 and also between segments 2–3, 3–4, 4–5, 5–6 and 6–7 (feebly defined in *Crossotus*). Ampullae bearing three rows of tubercles . . . . . Crossotini 44
— Head not longitudinally striate sublaterally. Gin-traps feebly defined. Ampullae bearing four rows of tubercles.
Morimopsini. **Monoxenus** (s.g. **Dityloderus**) **fuliginosus** Gahan, p. 233
44. Urogomphi extremely long and arising from long cylindrical basal tubercles (fig. 174).
Hecyra terrea (Bertol), p. 237
— Urogomphi very short or minute and not arising from cylindrical basal tubercles (fig. 172) 45
45. Urogomphi minute, ferruginous (fig. 172). Tubercles of dorsal ampullae (viewed laterally) rugose, feebly defined and scarcely protuberant. Front margin of frons narrowly ferruginous, the ferruginous band equal in width to about half length of clypeus (fig. 171). [Length up to 17 mm.] . . . **Dichostathes quadripunctatus** (Chevrolat), p. 235
— Urogomphi large, conical or oval, and often pitchy apically (figs. 175, 176). Tubercles of dorsal ampullae smooth, shining, distinctly defined and strongly protuberant. Front margin of frons broadly ferruginous, the ferruginous band equal in width to at least length of clypeus 46
46. Urogomphi (viewed caudally) distinctly separated by their own basal width (fig. 175) and not arising from a basal tubercle. Ventral front margin of head with a strong acutely-pointed tubercle (subfossal process?) on acetabulum . **Frea** (s.g. **Frea**), p. 32
— Urogomphi (viewed caudally) contiguous (fig. 176), and arising from a single large basal tubercle. Ventral front margin of head without a tubercle on acetabulum.
Crossotus molossus (Duvivier), p. 239
47. Abdominal tergite 9 with a distinctly sclerotised plate, the centre of which is produced into a short spine. [Epipleurum strongly protuberant on last three segments only.]
Pogonocherini. **Pogonocherus hispidus** (Linnaeus), p. 253
— Abdominal tergite 9 without a sclerotised plate 48
48. Pronotum with posterior area velvety spiculate or pubescent (fig. 190). Head strongly depressed; gena with a conspicuous vertical groove immediately in front of ocellus. Epipleurum strongly protuberant on last three segments only. Pleural tubercle with a pair of distinct sclerotised pits. [Head very elongate. Spiracles with marginal chambers.]
Acanthocinini 49
— Pronotum never spiculate or pubescent but sometimes bearing coarse asperities (fig. 193), which are individually distinguishable with a $\times 15$ lens. Head less depressed; gena without a vertical groove. Epipleurum protuberant on all segments. Pleural tubercle without sclerotised pits 50
49. Ocellus slightly smaller than metathoracic spiracle which is round. Anterior margin of micro-spiculate area of pronotum deeply divided into six regular lobes (fig. 190).
Exocentrus sp., p. 255
— Ocellus as large as metathoracic spiracle which is subcircular or very broadly oval. Anterior margin of micro-spiculate area of pronotum with six or more irregular lobes.
Leiopus africanus Jordan, p. 257
50. Abdominal tergite 9 with an extremely long, horizontal, spine-like tubercle (fig. 192). Posterior part of pronotum extremely finely longitudinally striate. [Pronotum with sublateral linear impressions. Spiracles round.]
Cloniocerini. **Cloniocerus kraussi** (White), p. 258
— Abdominal tergite 9 without a spine-like process. Posterior part of pronotum not finely longitudinally striate 51

51. Pronotum (fig. 195) with sublateral impressions and asperities. Ampullae generally spiculate, but if not, then strongly protuberant and bilobed; tubercles absent. Spiracles rather narrowly to extremely narrowly oval 52
— Pronotum without sublateral impressions and asperities. Ampullae glabrous, each with two or three transverse rows of tubercles. Spiracles round 58
52. Pronotum (fig. 193) with sublateral impressions transverse, semicircular and pale. Abdomen with dorsal ampullae bearing two transverse furrows; asperate. Spiracles with peritreme at most rather narrowly oval. Head depressed, with sides subparallel and broadly rounded posteriorly. Clypeus with two to six pairs of minute lateral setae. Abdominal segment 10 strongly protuberant. Eusternum usually asperate.
Saperdini, Gleneini. **Saperda, Glenea**, p. 32
— Pronotum (fig. 195) with sublateral impressions linear, straight and brownish. Abdomen with dorsal ampullae with a single transverse furrow (except *Oberea* (pars)) which is sometimes callose; generally glabrous, but if spiculate, then one or more pairs of secondary ocelli present. Spiracles with peritreme extremely narrowly oval to slot-like. Head not or scarcely depressed; thick, with sides strongly converging posteriorly. Clypeus glabrous (except *Nupserha*). Abdominal segment 10 not strongly protuberant. Eusternum not asperate . . . . . Phytoeciini 53
53. Abdominal segment 9 obliquely truncate apically; dorsal anal lobe produced dorsally (fig. 196). Abdominal segments 4–7 quadrate to elongate. Pronotal asperities regularly placed (fig. 195). Two pairs of true ocelli present . . . . . **Dirphya**, p. 33
— Abdominal segment 9 not obliquely truncate apically; dorsal anal lobe not produced dorsally. Abdominal segments transverse. Pronotal asperities somewhat irregularly distributed (fig. 201). One pair of true ocelli present 54
54. Pronotum with asperities decreasing in size towards posterior margin. One to three pairs of vestigial ocelli[1] present. Length up to 27 mm. [In living stems and twigs of trees.] 55
— Pronotum with asperities increasing in size posteriorly. Vestigial ocelli absent. Length up to 20 mm. [Ampullae glabrous, micro-reticulate and very strongly protuberant and bilobed. In stems of herbaceous plants, especially Umbelliferae.] **Phytoecia**, p. 273
55. Head with two, or sometimes three, pairs of vestigial ocelli.
Oberea oculata (Linnaeus), p. 272
— Head with only one pair of vestigial ocelli 56
56. Tergite 9 with a median dome-shaped area which is more strongly sclerotised and slightly more darkly pigmented than surrounding cuticle (fig. 204). Legs present; small, 3-segmented but distinctly visible with a × 15 lens. Mandibles truncate apically. Clypeus with a few lateral setae . . . . . **Nupserha apicalis** Fåhraeus, p. 271
— Tergite 9 without a dome-shaped contrasting area. Legs absent. Mandibles sinuate and acutely produced apically. Clypeus glabrous 57
57. Asperities of pronotum very sparsely and irregularly distributed (fig. 201).
Synnupserha homeyeri (Harold), p. 269
— Asperities of pronotum almost as densely as but not quite so regularly placed as in *Dirphya* (fig. 195) . . . . . **Oberea trigonifera** Aurivillius, p. 272
58. Head salient, almost entirely uniformly sclerotised and pigmented; occipital foramen postero-ventral (fig. 206). At least twelve epistomal setae present (fig. 206). Abdominal segment 9 swollen, densely setose and as wide and high as apex of segment 8; truncate posteriorly (fig. 205). Spiracles with about thirty chambers which occupy the entire inner margin of the peritreme. [In stems of herbaceous plants.]
Agapanthiini and Hippopsini 59
— Head retracted in prothorax, not entirely uniformly sclerotised and pigmented; occipital foramen ventral. Six epistomal setae present. Abdominal segment 9 smaller than

[1] Larvae of this group, besides having the usual ocellus outward and ventrad of antenna, have from one to three vestigial ocelli behind it; each consists of a greyish pigmented spot without a distinct lens.

segment 8, less densely setose; rounded posteriorly. Spiracles with marginal chambers less numerous and not occupying more than half the inner margin of peritreme.
Tetraopini, Apomecynini, Apodasyini (pars) 60

59. Dorsal ampullae present on abdominal segments 1–3 and 7 only. Abdominal segment 7 strongly and abruptly broadened medially, this segment distinctly broader medially than the remaining segments (fig. 207), and with tubercles of ampullae strongly developed. Ocellus comprising a distinct pigmented spot but without a distinct lens.
Hyllisia stenideoides Pascoe, p. 278
— Dorsal ampullae present on abdominal segments 1–7 (fig. 205). Abdominal segment 7 not broader than remaining segments (fig. 205). Ocellus comprising a distinct lens but with pigmented spot indiscernible . . . **Agapanthia asphodeli** (Latreille), p. 275
60. Abdominal tergite 9 bearing a pair of urogomphi (fig. 210). [Maxillary palpi 2-segmented.] . . . . . Apodasyini (pars). **Sophronica**, p. 33
— Abdominal segment 9 without urogomphi 61
61. Hypostoma with anterior half steeply sloping down to anterior margin.
Apodasyini (pars). **Stenidea**, p. 283
— Hypostoma flat or very slightly convex . . . Apomecynini, Tetraopini 62
62. Maxillary palpi 2-segmented. Spiracles with inner margin produced into a crescentic membrane . . . . . Tetraopini 63
— Maxillary palpi 3-segmented. Spiracles not produced into a crescentic membrane.
Apomecynini 64
63. Spiracle with inner margin produced into a simple crescentic membrane. Abdominal segments devoid of spicules. In seed pods of *Acacia*.
Enaretta castelnaudi Thomson, p. 284
— Spiracle with inner margin produced into a crescentic membrane which is strengthened with several digitiform processes. Abdominal segments 4–7 with postero-dorsal and dorso-lateral regions bearing scattered spicules. In twigs and slender branches.
Tetrops praeusta (Linnaeus) p. 285
64. Proeusternum at most faintly granulate and bearing several setae. Hypostoma entirely ferruginous 65
— Proeusternum finely but distinctly longitudinally striate (as on pronotum) and glabrous. Hypostoma (except sometimes front margin) entirely testaceous . . **Eunidia**, p. 33
65. Epipleurum strongly protuberant on abdominal segments 7–9. Segment 9 rather sparsely setose. Frons testaceous . . . **Tetraulax albofasciatus** Breuning, p. 292
— Epipleurum only feebly protuberant on all segments. Segment 9 densely setose. Frons entirely ferruginous . . . . . **Apomecyna binubila** Pascoe, p. 286

Batocera (s.g. **Batocera**)

1. Postnotal fold with asperities of anterior row distinctly larger than those of remaining rows which become gradually smaller posteriorly (fig. 125).
B. (B.) rufomaculata (Degeer), p. 184
— Postnotal fold with asperities of anterior row slightly smaller than those of rows 2–4 (fig. 123) . . . . . **B. (B.) wyllei** Chevrolat, p. 181

Monochamus

1. Tubercles of dorsal ampullae (viewed laterally) strongly convex, protuberant and regular in shape. Thoracic setae fine 2
— Tubercles of dorsal ampullae (viewed laterally) strongly flattened apically, scarcely protuberant and rather irregular in shape. Thoracic setae coarse . . . 6
2. Segment 3 of antenna slightly to strongly elongate (fig. 117). Ethiopian region . 3
— Segment 3 of antenna quadrate to slightly transverse. Palaearctic region.
M. galloprovincialis (Olivier), p. 178

3. Tubercles (viewed at ×60–100) of dorsal ampullae entirely smooth, glabrous and shining 4
— Tubercles (viewed at ×60–100) of dorsal ampullae sparsely but distinctly micro-spiculate and/or densely micro-granulate 5
4. Abdominal spiracles more than three times as long as broad. Spiculate area of pronotum pale testaceous . . . . . **M. x-fulvum** Bates, p. 177
— Abdominal spiracles less than three times as long as broad. Spiculate area of pronotum pale ferruginous . . . . . **M. lepesmei** Breuning, p. 177
5. Tubercles (viewed at ×60–100) of dorsal ampullae sparsely but distinctly micro-spiculate and densely micro-granulate . . . . . **M. ruspator** (Fabricius), p. 172
— Tubercles (viewed at ×60–100) of dorsal ampullae micro-granulate but devoid of spicules . . . . . **M. plumbeus** Gahan, p. 178
6. Dorsal anal lobe bearing at least twenty stout setae. Hypostoma almost entirely ferruginous 7
— Dorsal anal lobe bearing at most twelve rather fine setae. Hypostoma (except front margin) testaceous . . . . . **M. variegator** Aurivillius, p. 175
7. Spiculate area of pronotum with at least front margin distinctly ferruginous, contrasting with the remainder which is testaceous 8
— Spiculate area of pronotum entirely testaceous . **M. triangularis** Breuning, p. 175
8. Abdominal spiracles very narrowly oval (fig. 118) . **M. centralis** Duvivier, p. 174
— Abdominal spiracles rather broadly oval (fig. 118) **M. griseoplagiatus** Thomson, p. 176

Olenecamptus

1. Pronotum with posterior half micro-granulate and feebly shining. Ethiopian region. **O. macari** Lameere and **O. hofmanni** var. **elegans** Aurivillius, pp. 198, 199
— Pronotum with posterior half micro-pubescent and matt. Madagascan and Oriental regions . . . . . **O. bilobus** (Fabricius),[1] p. 199

Acmocera

1. Abdominal tergite 9 with the postero-median tubercle conical and slightly attenuated and with the paramedian sclerotised plates transversely oval (fig. 138). **A. olympiana** Thomson, p. 200
— Abdominal tergite 9 with the postero-median tubercle blunt and shorter and with the paramedian sclerotised plates subcircular . . **A. compressa** (Fabricius), p. 201

Sternotomis and Cylindrothorax

1. Sclerotised process on tergite 9 subvertical, very narrow, the anal lobes visible from above (figs. 145, 151). Lateral longitudinal carina on temple feeble and indistinct 2
— Sclerotised process on tergite 9 horizontal, salient, almost entirely concealing the anal lobes from above (figs. 148, 149). Lateral longitudinal carina on temple distinct and protuberant. [Sublateral conical projections very feebly defined.] . . . 3
2. Sclerotised process on tergite 9 pitchy, linear, not broadened medially and with a minute blunt median tooth (fig. 151). Sublateral conical projections feebly defined. **S. callais** Fairmaire, p. 211
— Sclerotised process on tergite 9 ferruginous, sublinear, slightly broadened medially and with a distinct median triangular tooth (fig. 145). Sublateral conical projections salient and well defined (fig. 144) . . . . . **S. amabilis** Hope, p. 207
3. Sclerotised process on tergite 9 with apical margin produced medially into a minute but distinct spine (fig. 148) . . . . . **S. variabilis** Quedenfeldt, p. 210
— Sclerotised process on tergite 9 with apical margin not produced medially (figs. 149, 150) 4
4. Process on tergite 9 feebly rounded and rather narrowly sclerotised and ferruginous apically (fig. 150) . . . . . **S. andrewesi** Breuning, p. 211

[1] Based on a larval description by Gardner (1927).

— Process on tergite 9 produced and broadly sclerotised and pitchy apically (figs. 149, 153 5

5. Process on tergite 9 strongly produced and rather narrow (fig. 153).
C. balteatus (Heath), p. 214

— Process on tergite 9 less strongly produced and broader (fig. 149).
S. bohemanni Chevrolat, p. 211

Phryneta and Phrynetopsis

1. Median area of dorsal anal lobe bearing a conspicuous tubercle (figs. 184, 185) . 2
— Median area of dorsal anal lobe without a tubercle (fig. 182) 6
2. Anterior margin of pigmented region of pronotum pale ferruginous with at least one pair of small oval, fleshy, non-pigmented, setose areas 3
— Anterior margin of pigmented region of pronotum pale testaceous, without a pair of small oval, fleshy, non-pigmented, setose areas. Pleural tubercles bearing at least twenty setae. Spiracles broadly oval (fig. 186) . **Phrynetopsis fuscicornis** (Chevrolat), p. 249
3. Abdominal segment 9 only about two-thirds length of segment 8. Pleural tubercles each bearing less than ten setae . . . . **Phrynetopsis loveni** Aurivillius, p. 248
— Abdominal segment 9 as long as segment 8. Pleural tubercles each bearing at least twenty setae 4
4. Tubercle on dorsal anal lobe ferruginous to pitchy and irregular or subcarinate apically (fig. 184) . . . . . **Phryneta coeca** (Chevrolat), p. 246
— Tubercle on dorsal anal lobe pale testaceous, smooth, and almost dome-shaped . 5
5. Tubercle on dorsal anal lobe (viewed laterally) large, evenly rounded and feebly protuberant, the protuberant area extending anteriorly almost to anterior margin of lobe.
Phrynetopsis variegata (Reiche), p. 249
— Tubercle on dorsal anal lobe (viewed laterally) small, abruptly rounded and strongly protuberant, the protuberant area not extending anteriorly much beyond middle of lobe . . . . . **Phryneta hecphora** (Thomson), p. 247
6. Spine on tergite 9 with apical half strongly curved upward and bluntly pointed (fig. 182). Ferruginous area of dorsal anal lobe finely longitudinally striate (fig. 179).
Phryneta leprosa (Fabricius), p. 241
— Spine on tergite 9 with apical half straight and distinctly acuminate (fig. 183). Sclerotised ferruginous area of dorsal anal lobe smooth (fig. 183).
Phryneta spinator (Fabricius), p. 245

Prosopocera (s.g. Prosopocera)

1. Labrum bearing very dense, fine, soft setae. Inner margin of antennal foramen strongly produced beyond basal membrane 2
— Labrum bearing stiff, bristle-like setae which are widely separated and which arise from ferruginous basal discs (fig. 142). Inner margin of antennal foramen not produced beyond basal membrane . . . . . **P. lactator** (Fabricius), p. 206
2. Hypostoma testaceous, sparsely setose . . . . **P. bioculata** Hintz, p. 206
— Hypostoma ferruginous, densely setose . . . **P. bipunctata** (Drury), p. 204

Tragocephala (pars)

1. Abdominal tergite 9 with a feebly developed but distinct transverse carina posterior to the group of stout setae (fig. 158) . . . . . **T. guerini** White, p. 220
— Abdominal tergite 9 without a transverse carina and bearing setae only (fig. 157).
T. nobilis (Fabricius) and **T. variegata** Bertol, pp. 218, 219

Oeax

1. Anterior margin of spiculate area interrupted medially by a broad, oval, glabrous area (fig. 136). Thoracic and abdominal segments without minute, lateral, spine-like processes.
O. lichenea Duvivier, p. 197

— Anterior margin of spiculate area interrupted medially only by a narrow, irregular, glabrous area (fig. 137). Thoracic and most abdominal segments bearing laterally one or more minute, spine-like, ferruginous processes (fig. 137).
O. triangularis (White), p. 197

Lasiopezus

1. Labrum with anterior half densely setose but with a conspicuous, glabrous, longitudinal, median furrow . . . . . **L. longimanus** (Thomson), p. 195
— Labrum entirely densely setose and without a glabrous furrow 2
2. Posterior region of eusternum with a pair of paramedian, transversely oval, pale ferruginous, micro-spiculate areas which are as distinct as the micro-spiculate sternellum.
L. marmoratus (Olivier), p. 196
— Posterior region of eusternum without a distinct pair of median spiculate areas.
L. sordidus (Olivier), p. 195

Ceroplesis and **Gnathoenia**

1. Paired tubercles on tergite 9 (viewed caudally) subcontiguous, arising from a basal protuberance (as in *Crossotus* (fig. 176)) . . **C. calabarica** Chevrolat, p. 229
— Paired tubercles on tergite 9 (viewed caudally) widely separated and not arising from a basal protuberance 2
2. Paired tubercles on tergite 9 long, acutely conical and with at least apical halves strongly sclerotised and ferruginous (fig. 165) 3
— Paired tubercles on tergite 9 short, obtusely conical (fig. 168) 4
3. Paired tubercles on tergite 9 separated at least by the basal width of one tubercle (fig. 165). Frons with front margin rather narrowly ferruginous **C. intermedia** Aurivillius, p. 227
— Paired tubercles on tergite 9 separated by less than the basal width of one tubercle. Frons with at least anterior half ferruginous . **G. flavovariegata** Breuning, p. 232
4. Dorsal anal lobe bearing not more than ten setae 5
— Dorsal anal lobe bearing at least eighteen setae (fig. 168). [Hypostoma with at least four stout setae on each side of gula.] . . . . **C. militaris** Gerstaeker, p. 229
5. Spiracles with peritreme subcircular and very thick. Hypostoma without setae (?).
C. signata Waterhouse, p. 227
— Spiracles with peritreme broadly oval and rather thin. Hypostoma with three stout setae on each side of gula . . . . . **C. buttneri** (Kolbe), p. 231

Frea (s.g. Frea)

1. Front margin of frons with numerous (at least twelve) fine striae above each dorsal mandibular condyle. Urogomphi conical, pitchy or ferruginous apically (fig. 175).
F. marshalli Breuning, p. 238
— Front margin of frons with only five or six very coarse striae above each dorsal mandibular condyle. Urogomphi oval, pale testaceous . . . **F. uniformis** (Hintz), p. 239

Glenea, Saperda

1. Asperities of ampullae extremely fine and dense; not individually distinguishable with a $\times 15$ lens. Pronotum with asperities on anterior half of asperate area small, almost uniform in size. Eusternum with posterior part not asperate. [Presternum very finely spiculate and rather densely setose.] 2
— Asperities of ampullae coarser, rather sparse and individually distinguishable with a $\times 15$ lens. Pronotum with asperities on anterior half of asperate area of varying size and distinctly larger on lateral portions. Eusternum with posterior part coarsely asperate 3
2. Pronotum with asperities distinctly smaller on posterior half.
S. scalaris (Linnaeus), p. 261
— Pronotum with asperities almost equal in size on anterior four-fifths.
S. perforata (Pallas), p. 261

3. Anal lobes strongly protuberant, forming a short cylinder. Posterior part of eusternum with asperities fine and arranged more or less in two transverse rows. [Larvae inhabiting conspicuous galls in *Salix*, *Populus* and *Betula*. Palaearctic region.]
S. populnea (Linnaeus), p. 260
— Anal lobes compact, dome-shaped. Posterior part of eusternum with asperities coarse and arranged more or less in five transverse rows 4
4. Abdominal setae very pale testaceous, fine and silky.
G. (s.g. **Glenea**) **giraffa** (Dalman), p. 261
— Abdominal setae distinctly ferruginous, stout and bristle-like 5
5. Form rather slender. Abdominal segment 8 quadrate to slightly transverse, not more than three times as broad as long . **G.** (s.g. **Glenea**) **fasciata** (Fabricius), p. 263
— Form rather robust. Abdominal segment 8 strongly transverse, at least four times as broad as long . . . . . **G.** (s.g. **Volumnia**) **apicalis** (Chevrolat), p. 263

Dirphya

1. Abdominal segments 4–7 longer than broad. Dorsal anal lobe (viewed dorsally) only slightly protuberant . . . . . **D. princeps** (Jordan), p. 264
— Abdominal segments 4–7 not longer than broad. Dorsal anal lobe (viewed dorsally) strongly protuberant (fig. 197) . . . . . **D. nigricornis** (Olivier), p. 267

Sophronica

1. Urogomphi short, stout, conical. Dorsal ampullae on segments 6 and 7 with four large moniliform tubercles behind the transverse furrow . **S. amplipennis** Pascoe, p. 282
— Urogomphi attenuated, spine-like (fig. 210). Dorsal ampullae on segments 6 and 7 with at least six smaller tubercles behind the transverse furrow 2
2. Urogomphi slender, slightly curved and slightly convergent (fig. 210) 3
— Urogomphi stouter, straight and very slightly divergent **S. rufulescens** Breuning, p. 283
3. Hypostoma entirely dark ferruginous. Segment 1 of maxillary palpi quadrate to slightly transverse . . . . . **S. ventralis** Aurivillius, p. 282
— Hypostoma pale ferruginous anteriorly, becoming testaceous posteriorly. Segment 1 of maxillary palpi distinctly elongate . . . . . **S. grisea** Aurivillius, p. 280

Eunidia

1. Head capsule very elongate (fig. 217), at least almost half as long again as anterior breadth 2
— Head capsule at most slightly longer than broad . **E. ruficornis** Breuning, p. 291
2. Sides of head only feebly constricted medially and the posterior margin only slightly narrower than front margin (fig. 217) 3
— Sides of head rather strongly constricted medially, the posterior margin much narrower than front margin. Mouthframe smooth above dorsal mandibular condyle.
E. picta Franz, p. 291
3. Mouthframe transversely to slightly obliquely striate above dorsal mandibular condyle.
E. fuscostictica Breuning, p. 290
— Mouthframe smooth above dorsal mandibular condyle . **E. duffyi** Breuning, p. 291

AFRICAN CERAMBYCID PUPAE

FAMILY CHARACTERS

CERAMBYCID pupae may, in general, be characterised as follows: *Form.* Body closely resembling form of adult both in size and shape and in the proportions of the cephalic and thoracic appendages. Secondary sexual differences in the adults, such as the proportions of certain appendages, are generally evident also in the pupae. *Cuticle* exarate, weakly to moderately strongly sclerotised but sometimes very strongly in parts (*e.g.* urogomphi, gin-traps, etc.); colour usually waxy or milky white to testaceous but occasionally orange or brown; usually with scattered setae or spinose areas or combinations of each. *Head* nearly always strongly bent beneath prothorax so that the mouthparts are directed posteriorly. Antennae extending at least as far as mesothorax (where they terminate between front and middle femora), but generally much longer, extending to abdominal segments (sometimes as far as segment 7 or 8), where they are nearly always curved downward beneath body and arranged characteristically as follows: (i) slightly curved inward and terminating near hind femora (*Prionus*, *Phymatodes*); (ii) more strongly curved inward and crossed (*Plocaederus*, *Pachydissus*); (iii) arranged in a single or in several coils on top of each elytron (Batocerini, Monochamini); (iv) directed anteriorly to terminate near front or middle coxae (Mesosini, Saperdini); or (v) directed anteriorly for a considerable distance to terminate alongside or on top of head (Phytoeciini, Agapanthiini) or strongly recurved and directed posteriorly to abdominal segment 7, where they are again recurved to terminate near apices of elytra (Acanthocinini (males)). Elytra nearly always glabrous except Acanthocinini and Cleomenini. *Abdomen* usually with nine movable segments, the tenth, and occasionally the ninth, being telescoped within the preceding segments; segments 7 and 8 usually more elongate than the preceding ones and sometimes considerably produced (Acanthocinini). Segments 7, 8 and 9, either continuous laterally or segments 8 and 9 explanate laterally; segment 9 often terminating in a vertical or horizontal spine or process or with incurved or outwardly curved urogomphi. Paired gin-traps sometimes present, being paramedian in the Macrotomini and Callipogonini and sublateral in the Phrynetini. Functional ampullae absent, although in certain herbaceous plant-feeding lamiids there are cushioned spinose areas which appear to be analogous to larval ampullae. *Legs* often with subapical setae on the femur and sometimes with one or two setae on the tarsi. *Spiracles* of mesothorax functional, large, oval and placed ventro-laterally; spiracles of abdominal segments 1–5 always functional, as are sometimes those on segments 6 or 6 and 7.

A study of the abdominal spiracles has shown them to be of little value as subfamily characters and no satisfactory correlation between the number present and the pupal environment could be found. Although the number of functional spiracles appears to be constant in the subfamilies LEPTURINAE and ASEMINAE (in which they number five and seven pairs respectively), the number present in species of the subfamilies CERAMBYCINAE and LAMIINAE varies interspecifically from five to seven pairs.

In the PRIONINAE the number of functional spiracles is usually six, but in the PARANDRINAE the seventh pair appear to be functional. The spiracular peritreme, as in many larvae, sometimes bears subcontiguous marginal chambers (Tragocephalini, Sternotomini).

Sexual differences. Generally speaking, a transverse rectangular protuberance is present posterior to the eighth sternite in the male, whereas in the female this is represented by a pair of subcontiguous rounded lobes which often bear one or more pairs of setae. A secondary sexual characteristic is the proportion and arrangement of the antennae, which, in the male, are often considerably longer and more elaborately arranged.

A detailed account of the morphology of the pupa is not considered necessary, as all the structures referred to in the keys and descriptions are indicated in the following figures (figs. 9 and 10).

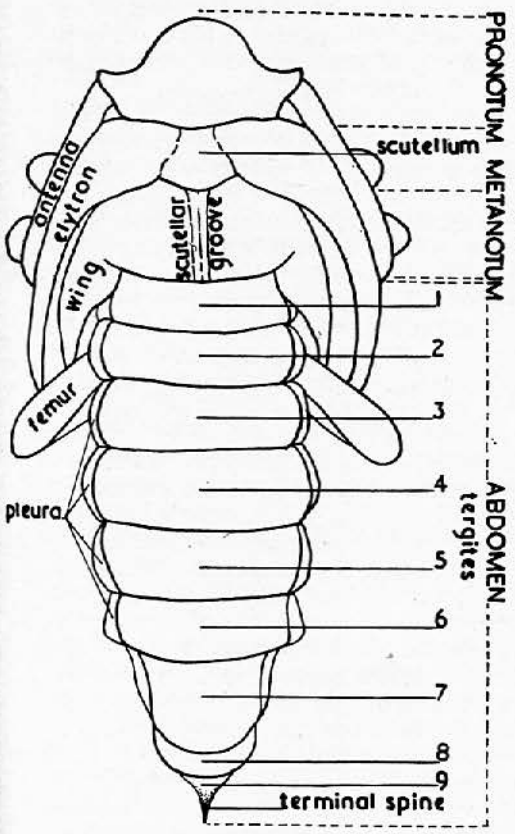


Fig. 9

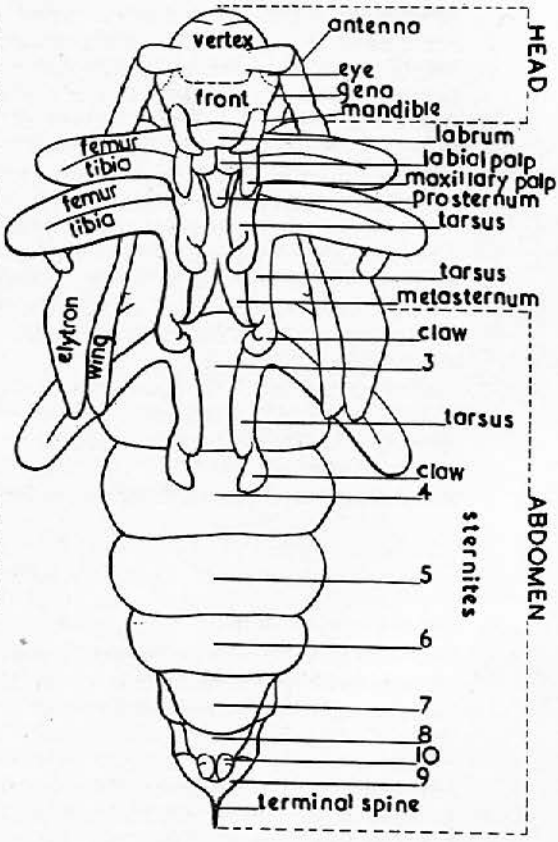


Fig. 10

Fig. 9. Diagrammatic figure of a cerambycid pupa. Dorsal aspect. (Duffy, 1953a)
Fig. 10. Diagrammatic figure of a cerambycid pupa. Ventral aspect. (Duffy, 1953a)

KEY TO SUBFAMILIES

In the following keys it has proved necessary, particularly in the case of subfamily diagnosis, to follow an artificial rather than a phylogenetic sequence and to use what are in fact adult characteristics instead of truly pupal ones, as the pupa presents comparatively few characters other than those directly derived from the external structure of the contained imago. Indeed, it is only the various spines and setae, both simple and modified, and the arrangement rather than the form of the antennae which can be regarded as constituting truly independent pupal characters.

1. Head without conspicuous spines or setae (occasionally with a few scattered spinules or papillae) and abdominal spiracles narrowly oval (fig. 17). Prothorax either with three pairs of lateral tubercles or none, never one pair only. Prosternum produced behind coxae into a rounded or truncate process (fig. 35). [Femora without spines or setae. Abdominal tergites sometimes with gin-traps (fig. 29). Functional spiracles present on abdominal segments 1–6 or 1–7; peritreme very thick.] 2
— Head usually bearing conspicuous spines or setae, but if without, then abdominal spiracles broadly oval (fig. 83). Prothorax either with a single pair of lateral tubercles (fig. 181) or none; never three pairs. Prosternum seldom produced beyond coxae, but if so, never simply rounded or truncate but either tapering or confluent with mesosternum (ASEMINAE) or enlarged into a T-shaped process (LAMIINAE (pars)) 3
2. Abdominal segment 9 bearing a pair of outwardly curved or divergent urogomphi (fig. 17). Antennae short, extending to between front and middle femora; segments subquadrate, moniliform (fig. 17), never serrate or pectinate. Pronotum without lateral tubercles and abdomen without gin-traps.
1. PARANDRINAE (**Parandra** (s.g. **Parandra**) **gabonica** Thomson, p. 48)
— Abdominal segment 9 usually unarmed but occasionally either with incurved urogomphi or a pair of short vertical tubercles. Antennae longer, extending to at least abdominal segment 1 and often recurved beneath body; segments elongate and sometimes serrate or pectinate (fig. 35). Pronotum often with lateral tubercles and abdomen often with gin-traps (fig. 24) . . . . . 2. PRIONINAE, p. 37
3. Abdominal segment 9 either with a horizontal spine (fig. 10) or with outwardly curved or parallel urogomphi. Tarsi each bearing one or a pair of setae (fig. 10). Hind tibiae with long apical tuberculate spurs. Labrum transverse, rectangular. Functional spiracles absent on segments 6 and 7. [Femora with subapical setae. Head triangular and usually rather elongate. Clypeus usually with a deep impression and a row of setae across base.]
3. LEPTURINAE, p. 37
— Abdominal segment 9 usually unarmed but sometimes with either a vertical spine (fig. 146) or with strongly incurved urogomphi (ASEMINAE). Tarsi nearly always without setae, but if with setae, then antennae coiled. Hind tibiae never with long apical tuberculate spurs. Labrum seldom transverse, but if so, never rectangular; usually triangular or cordate (fig. 61). Functional spiracles usually present on abdominal segments 1–6 or 1–7. 4
4. Antennae with several conspicuous spines at or near apex of basal segment, the remaining segments entirely microscopically spiculate. Abdominal segment 9 bearing strongly incurved urogomphi; never with a vertical spine. Abdominal sternites 4–8 with paired sublateral groups of spines. Apices of femora with spines (each with a subapical seta). Functional spiracles present on abdominal segments 1–7 . . 5. ASEMINAE, p. 38
— Antennae without spines on basal segment, the remaining segments non-spiculate (except *Dere*, but then elytra spiculate also). Abdominal segment 9 without urogomphi; occasionally with a vertical spine or carina. Abdominal sternites never with paired groups of numerous spines but sometimes with two or three very small spines. Apices of femora usually glabrous or with setae only, but if spinose, then each spine with a basal seta. Functional spiracles often restricted to segments 1–5 or 1–6 5

5. Head strongly bent beneath prothorax so that the vertex is totally or for the greater part concealed from above; vertex convex (sometimes dome-shaped); never flat or excavate between bases of antennae (fig. 83). Mandibles without setae (fig. 61). Clypeus without setae (fig. 61) except *Oemida*. Femora without setae (except *Dere*, but then elytra spiculate). Pleura strongly protuberant (fig. 61). Abdominal segments 7, 8 and 9 continuous laterally. Eyes moderately convex (fig. 61). Maxillary palpi not tapering apically, often enlarged. Prosternum never produced behind coxae into a T-shaped process.
6. CERAMBYCINAE, p. 38

— Head less strongly bent beneath prothorax so that the vertex is entirely or for the greater part visible from above (fig. 146); vertex between bases of antennae either deeply excavate (fig. 121) or flat, never convex. Mandibles each with one to six or more setae near middle of outer face (fig. 216). Clypeus with several setae across base (fig. 216). Femora nearly always with subapical spines or setae, but if without, then abdomen either cylindrical and parallel-sided or tergite 9 with a vertical spine. Pleura never strongly protuberant. Abdominal segment 8 or 9 obliquely explanate laterally, the latter often deeply divided beneath (fig. 121). Eyes at most feebly convex, generally flat (fig. 198). Maxillary palpi gradually to strongly tapering; never truncate or enlarged apically (fig. 198). Prosternum often produced beyond coxae into a T-shaped process . . 7. LAMIINAE, p. 41

KEYS TO GENERA AND SPECIES

2. PRIONINAE

1. Abdominal gin-traps present (fig. 24). Antennae filiform. Pronotum without lateral tubercles 2
— Abdominal gin-traps absent. Antennae strongly serrate or pectinate (fig. 35). Pronotum bearing three pairs of lateral tubercles 4
2. Abdominal gin-traps cup-shaped (fig. 29). Three (occasionally four) pairs present (on segments 3–4, 4–5, 5–6 and occasionally 6–7) . . . . **Macrotoma**, p. 37
— Abdominal gin-traps labiate (fig. 24). At least four pairs present . . . 3
3. Gin-traps present on segments 2–3, 3–4 and 5–6. Antennae short, not recurved ventrally. **Mallodon downesi** Hope, p. 51
— Gin-traps present on segments 1–2, 2–3, 3–4, 4–5, 5–6 and 6–7. Antennae long, slender and recurved ventrally . . . **Ergates** (s.g. **Ergates**) **faber** (Linnaeus), p. 61
4. Abdominal tergites bearing numerous scattered short spinules. Mandibles large, salient, directed anteriorly (fig. 35). Antennae extending as far as abdominal segment 4 or 5 (fig. 35) . . **Acanthophorus** (s.g. **Ceratocentrus**) **spinicornis** (Fabricius), p. 64
— Abdominal tergites bearing scattered pale papillae. Mandibles smaller, directed posteroventrally. Antennae not extending beyond abdominal segment 1. [Usually in an earthen cocoon near roots of mature trees.] **Prionus** (s.g. **Prionus**) **coriarius** (Linnaeus), p. 67

Macrotoma

1. Length up to 30 mm. Gin-traps with anterior projection feebly developed, the margin straight . . . . . **M.** (s.g. **Navosomopsis**) **dohertyi** Lameere, p. 56
— Length up to 61 mm. Gin-traps with anterior projection strongly developed, the margin dentate (fig. 29) . . . . . **M.** (s.g. **Macrotoma**) 2
2. Gin-traps absent on tergites 6–7 . **M.** (s.g. **Macrotoma**) **serripes** (Fabricius), p. 58
— Gin-traps present on tergites 6–7, the pair on tergite 7 very feebly developed. **M.** (s.g. **Macrotoma**) **natala** J. Thomson, p. 60

3. LEPTURINAE

1. Abdominal tergites with all setae long, slender and pale; never stout and spine-like. Abdominal segment 9 without a terminal spine; urogomphi long, slender and tapering.

Femora bearing several long fine setae near apices; each tarsal claw with a single long seta. Length up to 12 mm. . . . . **Grammoptera ruficornis** (Fabricius), p. 77

— Abdominal tergites with short, stout, spine-like setae or spines as well as slender setae of varying length. Abdominal segment 9 either with a terminal spine or with stout urogomphi. Femora bearing a row of short, stout setae near apex; each tarsal claw with one or a pair of setae 2

2. Abdominal segment 9 bearing a stout terminal spine. Lateral prothoracic tubercles present. Tarsi each with a pair of stout setae.
Rhagium (s.g. **Hargium**) **inquisitor** (Linnaeus), p. 75

— Abdominal segment 9 bearing urogomphi. Lateral prothoracic tubercles absent. Tarsi each with a single seta . . . . . **Leptura, Strangalia**, p. 38

Leptura, Strangalia

1. Front margin of pronotum with a conspicuous pair of paramedian tuberculate processes, each with four to six stout setae; basal half of pronotum more or less flat. Urogomphi curved downwards . . . . . **L.** (s.g. **Leptura**) **scutellata** Fabricius, p. 76

— Front margin of pronotum simple or with only a single median tuberculate process; basal half of pronotum usually with a pair of raised setose areas. Urogomphi slightly curved upwards 2

2. Urogomphi very slender, scarcely, if at all, larger than accompanying spines on posterior margin of tergite 9. Head bearing three to four setae opposite base of each antenna. Femora with a transverse row of short setae near apex only.
L. (s.g. **Leptura**) **rubra** (Linnaeus), p. 75

— Urogomphi very stout, at least twice as large as accompanying spines on posterior margin of tergite 9. Head with at least ten setae opposite base of each antenna. Femora with a transverse row of short setae near apex and with several scattered (usually smaller) setae behind. [Clypeus with a row of six setae across base.]
S. (s.g. **Strangalia**) **aurulenta** (Fabricius), p. 76

5. ASEMINAE

Arhopalus[1]

1. Sublateral spinose areas of abdominal sternites with numerous long ferruginous setae and short spines (the latter with a long apical seta). Dorsal surface of eyes with numerous (at least twenty) very short, ferruginous spines (each bearing a long, ferruginous, apical seta). Spiracles with peritreme narrowly oval, rather thick, strongly sclerotised and ferruginous. Basal segment of antenna with at least six stout ferruginous spines near apex and several short scattered spines distributed nearly to base; remaining segments with shorter scattered spines. Mesosternum at least twice as long as minimum width, with hind margin broadly rounded . . . **A. rusticus** (Linnaeus), p. 80

— Sublateral spinose areas without long setae. Dorsal surface of eyes with at most a few pale spines (each bearing a short, pale, apical seta). Spiracles with peritreme broadly oval, thinner, less strongly sclerotised and pale testaceous. Basal segment of antenna with at most six shorter spines near apex, seldom with any shorter scattered spines, the basal half being without spines; remaining segments with pale papillae. Mesosternum at most one and one-half times as long as minimum width, the hind margin almost straight . . . . . **A. ferus** (Mulsant), p. 80

6. CERAMBYCINAE

1. Prothorax with a pair of lateral tubercles (fig. 94) which are usually long and acutely pointed, but if short and feebly developed, then hind femora petiolate. Head with vertex dome-shaped (fig. 61) and usually with a deep transverse impression immediately above

[1] As pupae of this genus are apparently unusually variable in the nature and distribution of spines, etc., and only one pupa of *A. rusticus* is available, this key should be regarded as provisional.

bases of antennae; base of clypeus with a similar impression. Abdominal tergite 7 with hind margin strongly rounded; sometimes with a single or a pair of oval, spinose, tuberculate protuberances but never with stout recurved spines or scattered spinules. Abdominal spiracles with peritreme narrowly oval. [Antennae recurved beneath body.] 2

— Prothorax without lateral tubercles. Head never with vertex dome-shaped (except *Dere*, but then elytra spiculate) or with a deep transverse impression above antennae; clypeus without a deep impression. Abdominal tergite 7 with hind margin feebly rounded; without spinose protuberances but often with a row of stout curved spines or numerous scattered spinules. Abdominal spiracles with peritreme broadly oval or subcircular. [Hind femora never petiolate.] 10

2. Antennae filiform or feebly serrate and sometimes crossed beneath body. Pronotum without papillae on raised tuberculate areas near base 3

— Antennae strongly pectinate and recurved but not crossed beneath body. Pronotum with a pair of paramedian, raised, tuberculate areas (each bearing numerous setose papillae) near base (fig. 83). [Hind femora strongly clavate. Abdominal tergite 7 either with a pair of oval tuberculate protuberances (each bearing a few spines) or with a single median spinose protuberance.] . . . . . Phoracanthini 9

3. Hind femora strongly petiolate (fig. 95). Antennae very long and extending as far as abdominal segment 9 before they are recurved, but not crossed, ventrally (fig. 95). Front margin of pronotum bearing a median conical setose tubercle (fig. 95).
Callichromini (pars). **Colobizus tibiotarsalis** Schmidt, p. 131

— Hind femora not petiolate. Antennae shorter, not extending as far as abdominal segment 9 before they are recurved 4

4. Antennae not crossed beneath body. Pronotum with lateral tubercles acutely pointed and strongly protuberant or front margin strongly produced and conical medially . 5

— Antennae crossed beneath body. Pronotum with lateral tubercles blunt, only slightly protuberant; front margin not produced medially. [Abdominal tergite 7 without stout curved spines. Pupal cell with calcareous lining or operculum] Cerambycini 7

5. Front margin of pronotum strongly produced and conical medially (fig. 94). Abdominal tergites 8 and 9 glabrous. Length up to 33 mm. 6

— Front margin of pronotum not produced; evenly rounded. Abdominal tergites 8 and 9 bearing numerous stout spines. Length up to 45 mm.
Dorcasomus gigas Aurivillius,[1] p. 77

6. Spines on abdominal tergites 1–6 mostly inclined anteriorly. Maxillary palpi not strongly produced . . . . . **Aromia moschata** (Linnaeus), p. 134

— Spines on abdominal tergites 1–6 mostly inclined posteriorly. Maxillary palpi very strongly produced (fig. 93) . . . . **Philematium virens** (Linnaeus), p. 129

7. Tergite 8 with posterior angles rounded and explanate; a few ferruginous spines present. Tergite 9 strongly bilobed and protuberant; not concealed from above by tergite 8.
Pachydissus hector Kolbe, p. 100

— Tergite 8, if with posterior angles rounded, then only a few pale papillae present. Tergite 9 only slightly bilobed and concealed from above by tergite 8 8

8. Tergite 8 with posterior angles rounded and explanate; a few pale papillae present. Tergite 9 without spinules. Antennae filiform. Abdominal tergites 2–6 with spines each arising from a conical papillate base. Functional spiracles present on abdominal segments 1–7 . . . . . **Cerambyx**, p. 41

— Tergite 8 acutely produced posteriorly; a few ferruginous spines present. Tergite 9 with a few scattered ferruginous spinules. Antennae slightly pectinate on outer margin. Abdominal tergites 2–6 with spines simple at base. Functional spiracles present on abdominal segments 1–5 . . . . . **Plocaederus viridipennis** (Hope), p. 95

[1] As already pointed out (p. 15), the larva of this species shows unquestionable lepturine characteristics, but the pupa is without any of the usual lepturine characters and can be included only in this section of the key.

9. Abdominal tergite 7 bearing a single tuberculate spinose protuberance. Abdominal tergite 8 with spines very much smaller than those on tergite 7. Abdominal tergites 1–6 each with numerous spines which are closely set (separated by about their own basal width) and arranged in a single almost straight row (fig. 83). Functional spiracles present on segments 1–6. Hind femora without a tuberculate process near base.
Cordylomera spinicornis (Fabricius), p. 117

— Abdominal tergite 7 bearing paired tuberculate spinose protuberances. Abdominal tergite 8 with two small groups of spines which are as large as those on tergite 7. Abdominal tergites 1–6 each with spines more widely set (separated by at least twice their own basal width) and irregularly arranged on a slightly raised area. Functional spiracles present on abdominal segments 1–5. Hind femora each with a tapering tuberculate process near base. [Introduced from Australia in *Eucalyptus*.]
Phoracantha (s.g. **Phoracantha**) **semipunctata** (Fabricius), p. 113

10. Head with a conical tubercle alongside base of antenna. Segment 1 of antenna acutely produced apically (fig. 57). [In calcareous cocoon.] **Xystrocera nigrita** Serville, p. 88

— Head without tubercles. Segment 1 of antenna not acutely produced . . 11

11. Head bearing setae on front, near antennal bases. Pronotum with conspicuous groups of pale papillae (each with a basal seta). [Pronotum elongate. Eyes strongly convex. Antennae recurved but not crossed beneath body. Abdominal tergite 7 with three or four anteriorly-curved spines arising from tuberculate bases.]
Molorchini, Obriini and allied genera 12

— Head glabrous. Pronotum without conspicuous groups of setae; either glabrous or sparsely setose or papillate 13

12. Pronotum bearing scattered fine setae only. Head with vertex glabrous; front with a pair of stout ferruginous spines near base of each antenna (fig. 89).
Oemida gahani (Distant), p. 121

— Pronotum bearing scattered pale papillae (each with a long, fine, basal seta). Head with vertex bearing about six papillae (each with a long, fine, subapical seta) on each side of disc; front with two or three minute setae near base of each antenna.
Gracilia minuta (Fabricius), p. 120

13. Basal segments of antennae and elytra bearing numerous papillae or spinules (fig. 107).
Cleomenini. **Dere** sp., p. 156

— Basal segments of antennae and elytra without papillae or spinules . . . 14

14. Abdominal tergite 7 without a row of anteriorly-curved spines or tubercles (fig. 104). Pronotum never with stout spines or papillae; usually glabrous. Antennae long, extending at least as far as abdominal segment 2, where they are curved beneath body. Eyes feebly convex. Hind femora short, stout and lying rather obliquely to longitudinal axis of body and extending to abdominal segment 4 or 5. Segment 9 very short but visible from above . . . . . Callidiini 15

— Abdominal tergite 7 with a transverse row of four to eight stout spines which are curved anteriorly or inwards. Pronotum bearing some rather stout spines or papillae along front and lateral margins. Antennae short, not extending beyond abdominal segment 3. Eyes strongly convex. Hind femora long and slender, lying more or less parallel to longitudinal axis of body and extending to abdominal segment 5 or 6. Segment 9 retracted in segment 8 and not visible from above. [Pronotum slightly transverse, with sides strongly rounded.] . . . Clytini. **Plagionotus arcuatus** (Linnaeus), p. 152

15. Tergite 8 with a longitudinal median groove on each side of which are numerous spines (fig. 104). Mesonotum with several fine pale setae on each side of scutellum and metanotum with numerous similar setae. Abdominal tergites 1–6 each with numerous short ferruginous spines which are arranged in a row across anterior and posterior margins and in a broad semi-oval group near each lateral margin. Tergite 7 very elongate, with hind margin narrowly rounded (fig. 104). Segment 9 bilobed, each lobe bearing a fine seta. [Functional spiracles present on abdominal segments 1–5.]
Hylotrupes bajulus (Linnaeus), p. 136

— Tergite 8 without a median groove, and with at least four short spines near centre. Mesonotum and metanotum usually without setae but sometimes with a few short testaceous spines. Abdominal tergites 1–6 each with only a few spines which are arranged in a row across posterior margin only and never formed into sublateral groups. Tergite 7 less elongate and with hind margin either rather sharply angled medially or broadly rounded. Segment 9 not bilobed 16

16. Pronotum with a conspicuous median tuberculate protuberance (which is covered with a few wart-like, setose papillae) near front margin. [Maxillary palpi scarcely enlarged apically. Functional spiracles present on abdominal segments 1–7; peritreme moderately thick and very strongly raised above general level of cuticle.]
Pyrrhidium sanguineum (Linnaeus), p. 150

— Pronotum without a conspicuous protuberance but sometimes with a short conical glabrous tubercle 17

17. Pronotum with a few conical papillae above middle of posterior margin. Mesonotum and metanotum bearing a few short testaceous spines. Tergite 7 with hind margin produced and rather sharply angled medially. Tergite 8 slightly elongate and with about four short spines near centre. Functional spiracles present on abdominal segments 1–5; peritreme thin and very strongly raised above general level of cuticle **Callidium**, p. 150

— Pronotum without papillae. Mesonotum and metanotum without spines. Tergite 7 with hind margin simple. Tergite 8 transverse and without spines. Spiracles present on abdominal segments 1–7. [Pronotum bearing a short conical, glabrous tubercle just behind middle of front margin.] . . **Phymatodes testaceus** (Linnaeus), p. 150

Cerambyx

1. Length 18–30 mm. Abdominal tergites 2–6 each bearing a transverse group of short, stout spines which arise from pale papillate bases. Metanotum with two small conical protuberances near base. Pronotum elongate . . . **C. scopolii** Füessly, p. 104

— Length 30–35 mm. Abdominal tergites 2–6 each bearing paired oval groups of much stouter spines which arise from ferruginous papillate bases which are each surrounded by a pigmented disc. Metanotum without protuberances. Pronotum slightly transverse.
C. cerdo Linnaeus, p. 103

7. LAMIINAE

1. Abdominal tergite 9 produced into a long vertical or horizontal spine-like process which is sclerotised apically (fig. 121). [Pronotum bearing a pair of stout lateral tubercles.] 2

— Abdominal tergite 9 seldom with a vertical spine-like process, but if so (Pogonocherini, Apomecynini (pars), then body length not exceeding 12 mm. 12

2. Antennae arranged in two or more coils, at least in male (fig. 121). Apical segments of tarsi each with a single seta (fig. 121) 3

— Antennae arranged to form a single coil. Tarsi without setae (except *Idactus*, but then pronotum with a median conical tubercle on disc) 6

3. Terminal spine bifurcate or T-shaped at apex and with a conical subapical tubercle on posterior face (fig. 121) Monochamini (pars). **Opepharus spectabilis** (Perroud), p. 179

— Terminal spine tapering to apex and without a subapical tubercle . . . 4

4. Posterior margin of tergite 9 with several short, stout spines (each with a basal seta) on each side of the median, vertical, spine-like process. Spiracles with peritreme regular and narrowly oval; without marginal chambers . . . Monochamini 5

— Posterior margin of tergite 9 without spines or setae on each side of spine-like process (fig. 146). Spiracles with peritreme irregularly shaped, subreniform and strongly constricted at lower end; posterior margin bearing numerous subcontiguous chambers (fig. 147) . . . . . Sternotomini. **Sternotomis amabilis** Hope, p. 207

5. Setae on abdominal tergite 7 stout, widely separated and arranged in a transverse row (fig. 120) . . . . . **Monochamus** spp., p. 44

— Setae on abdominal tergite 7 fine, closely placed and arranged in two groups (fig. 111). **Anthores leuconotus** Pascoe, p. 163

6. Abdominal tergites 2–5 each with a transverse band of long dense setae. Batocerini, Phrynetini 7

— Abdominal tergites 2–5 each with two transverse rows of stout closely-set spines (fig. 132). Ancylonotini, Tragocephalini 8

7. Sublateral gin-traps present on abdominal tergites 1–2, 2–3, 3–4 and 4–5 (fig. 181). Mandibles each with a pair of stout setae . . . Phrynetini. **Phryneta**, p. 44

— Sublateral gin-traps absent. Mandibles each with numerous setae. Batocerini. **Batocera wyllei** Chevrolat, p. 181

8. Pronotum with disc bearing one or a pair of large conical protuberances. Elytra each with two protuberances near base. Femora with numerous subapical setae. Spiracles with peritreme regularly oval. [Length up to 27 mm.] . . Ancylonotini 9

— Pronotum and elytra without conical protuberances. Femora bearing a few short subapical spines. Spiracles with peritreme constricted at lower end (except *Charieslhes*) and with marginal chambers (as in *Sternotomis* (fig. 147)) . . Tragocephalini 10

9. Disc of pronotum bearing a single median conical protuberance (fig. 134). Abdomen with tergites 2–5 with spines of anterior row sparse and irregularly arranged (fig. 134). **Idactus ellioti** Gahan, p. 193

— Disc of pronotum bearing a pair of paramedian conical protuberances (fig. 132). Abdomen with tergites 2–5 with spines of anterior row numerous and regularly placed (fig. 132). **Ancylonotus tribulus** (Fabricius), p. 191

10. Spiracles subcircular. Length up to 13 mm. . **Charieslhes bella** (Dalman), p. 223

— Spiracles elongate-oval and constricted at lower end (as in *Sternotomis* (fig. 147)). Length at least 25 mm. 11

11. Pleural area beneath spiracle bearing several stout spines. Length up to 50 mm. **Phosphorus virescens** (Olivier), p. 216

— Pleural area beneath spiracle bearing long setae only. Length up to 30 mm. **Tragocephala guerini** White, p. 220

12. Vertex of head with a pair of conical sclerotised processes near inner margins of antennal bases (fig. 170). Tergite 9 bearing a pair of acutely pointed urogomphi which extend posteriorly. Abdominal tergites bearing stout curved spines. Dorcadionini. **Monoxenus** (s.g. **Dityloderus**) **fuliginosus** Gahan, p. 233

— Vertex of head unarmed. Tergite 9 usually without urogomphi, but if present, then tergites bearing fine setae (*Sophronica*) or short straight spines (Acanthocinini) or antennae coiled (Ceroplesini) 13

13. Labrum strongly protuberant and with a very dense group of long fine setae across base (frontispiece). Abdominal spiracles with peritreme reniform. Abdominal tergites 1–6 each with two more or less complete transverse rows of long, stout, curved spines (each with a fine basal seta). Clypeus with a pair of setae at each end of basal margin. [Pronotum with short ferruginous spines. Femora with subapical setae.] Mesosini, Niphonini 14

— Labrum not strongly protuberant, generally glabrous. Peritreme of abdominal spiracles never reniform. Abdominal tergites with spines, if present, not arranged in two transverse rows. Clypeus usually with at least six setae across basal margin, but if with only four, then femora without setae or with both spines and setae 16

14. Prothorax without lateral tubercles. Elytra placed almost parallel to abdomen. Length up to 14 mm. . . . . **Pterolophia biarcuata** Thomson, p. 202

— Prothorax with a pair of blunt lateral tubercles (frontispiece). Elytra placed obliquely to abdomen (frontispiece). Length at least 17 mm. 15

15. Spines on tergite 9 slightly smaller than those on tergite 7 and pale ferruginous. Pleura bearing three spines . . . . . **Mesosa nebulosa** (Fabricius), p. 188

— Spines on tergite 9 slightly larger than those on tergite 7 and dark ferruginous. Pleura bearing five spines . . . . . **Coptops aedificator** Fabricius, p. 188

16. Tergite 9 rounded and bun-shaped posteriorly, the caudal area finely longitudinally striate and with a deep median longitudinal cleft (fig. 173).
Dichostathes quadripunctatus (Chevrolat), p. 235
— Tergite 9 not rounded or longitudinally striate 17
17. Abdominal tergite 7 truncate posteriorly, the hind angles right-angled, strongly sclerotised, ferruginous and asperate; postero-median area densely setose (fig. 161). Abdominal sternite 9 densely covered with very stout setae on lateral lobes (fig. 161). [Madagascan region.] . Tragocephalini (pars). **Callimation venustum** Guérin-Menéville, p. 222
— Abdominal tergite 7 not truncate or sclerotised posteriorly. Abdominal sternite 9 not densely covered with stout setae 18
18. Antennae coiled beneath body. Abdominal tergite 9 bearing urogomphi and several stout spines (each with a subapical seta). [Urogomphi long, slender and curved postero-ventrally.] . . . . . Ceroplesini. **Ceroplesis**, p. 44
— Antennae not coiled beneath body. Abdominal tergite 9 without urogomphi (except *Sophronica* and Acanthocinini) 19
19. Abdominal tergite 9 with a median conical process which bears a long, stout, vertical spine. Abdominal tergites 1–6 with a few long fine setae only. [Prothorax with lateral tubercles.] . . . . Pogonocherini. **Pogonocherus hispidus** (Linnaeus), p. 253
— Abdominal tergite 9 without a conical process (except *Eunidia*, but then prothorax unarmed). Abdominal tergites 1–6 bearing both spines and setae (except *Eunidia*) 20
20. Antennae extending to well beyond hind femora, where they are recurved beneath body (fig. 191). Middle and hind femora each with a very long tapering, tuberculate process near base (fig. 191). [Pronotum spinose and with a pair of lateral tubercles near base. Sternites glabrous.] . . . . . Acanthocinini 21
— Antennae never extending beyond middle femora before being recurved beneath body (fig. 198). Middle and hind femora generally simple but sometimes with a very short tuberculate process which is less than one-fourth length of tarsus 22
21. Vertex of head bearing a few long pale setae near bases of antennal tubercles; front bearing a few pairs of similar setae. Antennae very long, recurved twice beneath body (fig. 191). Femora bearing subapical setae only; tibiae without spines. Abdominal segment 7 not attenuated . . . . . **Exocentrus** sp., p. 255
— Vertex of head bearing three or four short spines near base of each antennal tubercle; front bearing four or five short spines near mesal margin of each eye. Antennae shorter, recurved only once beneath body. Femora bearing subapical spines and setae; tibiae each with a single stout spine. Abdominal segment 7 attenuated.
Leiopus africanus Jordan, p. 257
22. Abdominal tergites 2–6 with bilobed ampullae which bear groups of curved, hook-like spines (fig. 208). Antennae very long, extending ventrally as far as head, where they are curled over on to vertex (fig. 208). Clypeus with about twelve setae across base. Sternites 4–8 with numerous scattered very fine setae. Pleura bearing several fine setae. [In stems of herbaceous plants and shrubs.] . . . Agapanthiini, Hippopsini 23
— Abdominal tergites 2–6 with ampullae, if present, less strongly protuberant and with spines, if present, straight. Tergite 7 simple. Antennae shorter (figs. 198, 216), never recurved over head. Clypeus with at most six setae at base. Vertex of head with only two to three pairs of stout setae or spines. Sternites 4–8 without setae or with a few minute spinules or setae. Pleura either without setae or with two or three short spines 24
23. Abdominal tergite 7 with a conspicuous bifurcated, tuberculate protuberance at base. Femora each with a few fine subapical setae.
Agapanthia (based on **A. villosoviridescens** Degeer), p. 275
— Abdominal tergite 7 without a bifurcated protuberance but with several stout slightly curved spines (fig. 208). Femora glabrous . **Hyllisia stenideoides** Pascoe, p. 278
24. Abdominal tergite 9 bearing short stout urogomphi (fig. 211).
Apodasyini. **Sophronica**, p. 45
— Abdominal tergite 9 without urogomphi 25

25. Vertex of head densely setose, almost pubescent (fig. 216). Segment 9 bearing numerous very stout, modified setae which are swollen and truncate apically (fig. 216). Tarsal claws each with at least ten long stout setae (fig. 216).
Apomecynini (pars). **Apomecyna binubila** Pascoe, p. 286
— Vertex of head either with only a few widely separated setae or glabrous. Segment 9 without modified setae. Tarsal claws each with a single seta or glabrous . . 26
26. Tergite 9 with a long vertical, spine-like process which is sclerotised apically.
Apomecynini (pars). **Eunidia fuscostictica** Breuning, p. 290
— Tergite 9 without a vertical process 27
27. Disc of pronotum (fig. 194) bearing numerous short spines, each with a long basal seta (except *Saperda populnea*). Hind femora extending at least to abdominal segment 5. [Apices of hind tarsi extending posteriorly beyond apices of elytra. Sternites 4–8 without setae.] . . . . . Saperdini, Gleneini. **Saperda, Glenea**, p. 44
— Disc of pronotum bearing setae only. Hind femora extending only as far as abdominal segment 3 or 4 28
28. Antennae long, recurved and extending ventrally at least as far as maxillary palpi. [Disc of pronotum bearing a few fine setae which are simple basally.] . . 29
— Antennae shorter, extending ventrally as far as middle tarsi or front tibiae . . 30
29. Mandibles each with a single seta on outer face (fig. 198). Tergites 1–7 without protuberant ampullae. Sternites 4–6 each with a median, oval, protuberant tubercle (fig. 198). Hind femora extending to abdominal segment 4. Length up to 32 mm.
Dirphya nigricornis (Olivier), p. 267
— Mandibles each with a pair of setae on outer face. Tergites 1–7 with protuberant ampullae. Sternites without median tubercles. Hind femora extending to abdominal segment 3. Length up to 11 mm. [In dead stems of herbaceous plants.]
Phytoecia spp., p. 273
30. Pronotum with setae each arising from papillate bases. Ethiopian region.
Synnupserha homeyeri (Harold), p. 269
— Pronotum with setae simple basally. Palaearctic region.
Oberea (s.g. **Oberea**) **oculata** (Linnaeus), p. 272

Monochamus

1. Pronotum bearing numerous setae (fig. 119). Caudal spine arising from a short tubercle (fig. 120). Length up to 20 mm. . . . . **M. dentipes** (Gyllenhal), p. 176
— Pronotum bearing only a few setae. Caudal spine arising from a longer tubercle. Length up to 28 mm. . . . . **M. griseoplagiatus** Thomson, p. 176

Ceroplesis

1. Urogomphi long, slender, strongly divergent (fig. 166).
C. intermedia Aurivillius, p. 227
— Urogomphi shorter, stouter, less strongly divergent (fig. 167).
C. calabarica Chevrolat, p. 229

Phryneta

1. Pronotum with a distinctly raised oval, median tubercle on disc.
P. hecphora (Thomson), p. 247
— Pronotum without a median tubercle on disc (fig. 181) **P. leprosa** (Fabricius), p. 241

Saperda, Glenea

1. Pronotum and tergite 9 bearing fine pale setae only. [In slender stems immediately above or below the larval gall.] . . . . . **S. populnea** (Linnaeus), p. 260
— Pronotum and tergite 9 bearing stout spines as well as setae 2

2. Spines on pronotum each arising from an elongate, pale, basal tubercle.
S. scalaris (Linnaeus), p. 261

— Spines on pronotum simple basally (fig. 194).
G. (s.g. **Glenea**) **fasciata** (Fabricius), p. 263

Sophronica

1. Abdominal tergites each with a transverse carina (interrupted medially) near posterior margin (fig. 212) . . . . . **S. ventralis** Aurivillius, p. 282

— Abdominal tergites without carinae (fig. 211) . . **S. grisea** Aurivillius, p. 280

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DESCRIPTIONS AND BIONOMICS OF THE IMMATURE STAGES

OWING to the economic importance of numerous species of this family a brief account of the adult characteristics seems desirable.

The general form of these beetles is rather elongate, more or less flattened, subcylindrical and often somewhat narrowed posteriorly. Many species are well known for their cryptic coloration and mimicry of other beetles as well as bees, wasps, ants, crickets and so forth. Their characteristic antennae, which have gained them the name of "Longhorns", arise from conspicuous tubercles on the front of the head and are generally more or less filiform (occasionally pectinate, tufted or clubbed) and usually as long as, though often considerably longer than, the body. But this peculiarity by no means applies to them all. Another characteristic is the formation of the tarsi, which although always 5-segmented have, with few exceptions, segment 4 considerably reduced so that they appear to be only 4-segmented. Segment 3 is always strongly bilobed. In general structure many resemble members of the Chrysomelidae or "Leaf Beetles", from which they may usually be distinguished by the more elongate form and the pubescent elytra; moreover, there is a tendency for the epimera of the metathorax to extend to the sides of the ventral segments, while in the latter family the first abdominal sternite is prolonged forward at the sides to meet the metathorax.

The family Cerambycidae may conveniently be divided on immature characters into six subfamilies, namely the PARANDRINAE, PRIONINAE, LEPTURINAE, ASEMINAE, CERAMBYCINAE and LAMIINAE. To these may be added the ANOPLODERMINAE, which is confined exclusively to South America, and the DISTENIINAE, which is represented mainly in Madagascar (see p. 78). Unfortunately nothing is known of the biology of the latter subfamily and no immature material is available from Africa or Madagascar.

Although an attempt has been made to adhere as closely as possible to the sequence of tribal and generic classification as cited in the *Coleopterorum Catalogus* of Junk and Schenkling (1912–1923), a number of exceptions have had to be made. In each case, however, the original position has been indicated, together with a cross-reference to the proposed taxonomic position where reasons for the transference are discussed.

In the interests of brevity, full synonomy has not been included except under exceptional circumstances or where it is considered there may be obvious confusion. Vernacular names have been given whenever possible.

The distribution given for each species comprises a list of countries arranged alphabetically under their respective regions, but it should be pointed out that these lists are not necessarily complete, for they are based mainly on collections in the British Museum (Natural History) and on various catalogues. They are, in fact, provided merely to give a general picture of distribution. The countries listed have been segregated into regions, namely, Palaearctic (Mediterranean), Ethiopian, Madagascan and Oriental, the boundaries of which are shown in the map (fig. 11).

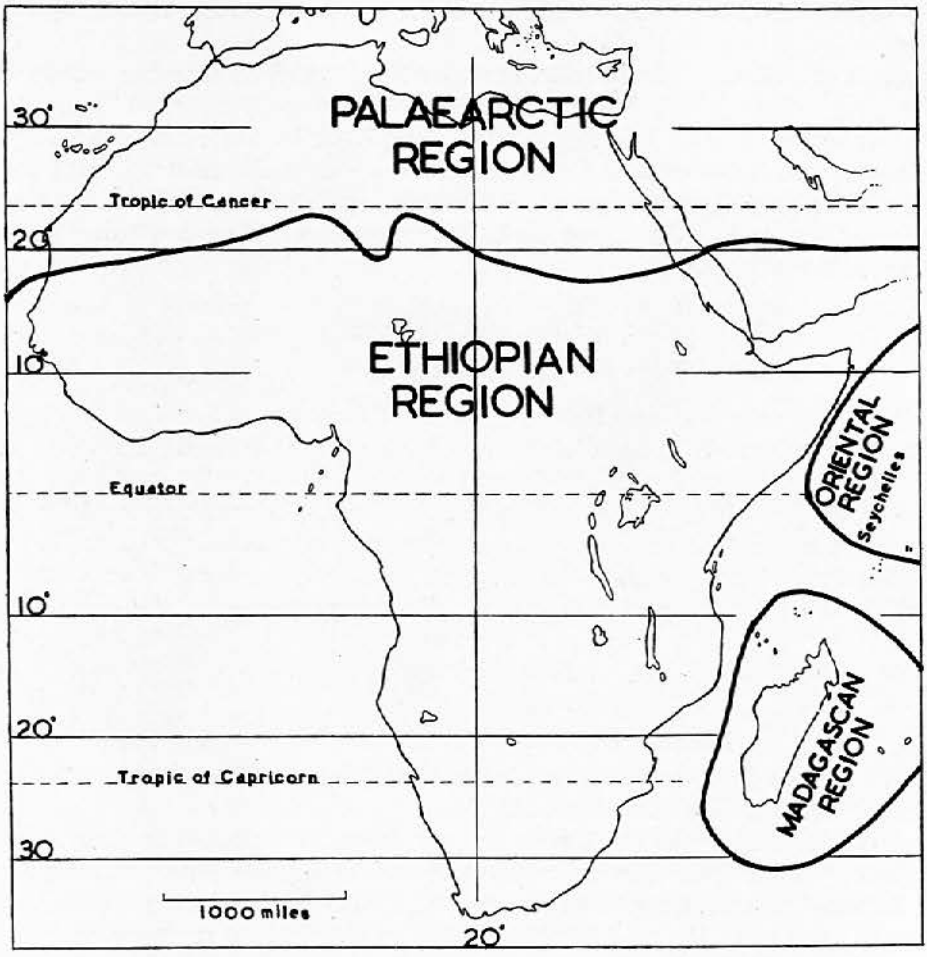


Fig. 11. Outline map of Africa showing boundaries of zoogeographical regions.

In listing the references to each species and the material examined, the following abbreviations have been adopted:

In coll. B.M.	In the collection of the British Museum (N.H.), London.
„ „ G.H.T.	In the collection of Mr. G. H. Thompson, Imperial Forestry Institute, Oxford.
„ „ F.I.E.	In the collection of Dr. F. I. van Emden, Commonwealth Institute of Entomology, London.
„ „ N.H.P.	In the collection of the Muséum National d'Histoire Naturelle, Paris.
„ „ M.R.C.B.	In the collection of the Musée Royal du Congo Belge, Tervuren.
„ „ U.S.N.M.	In the collection of the United States National Museum, Washington.

In coll. U.Z.M.C. In the collection of the Universitetets Zoologiske Museum, Copenhagen.

„ „ F.P.R.L. In the collection of the Forest Products Research Laboratory, Princes Risborough.

Leg.=collected by; J.C.M.G. leg.=collected by J. C. M. Gardner; G.H.T. leg.=collected by G. H. Thompson; E.A.J.D. leg.=collected by the author; E=egg, eggs; L=larva, larvae; P=pupa, pupae; I=imago, imagines (adults); Biol.=biology; Physiol.=physiology; Contr.=control; Fig.=figured or photographed; Paras.=parasites or predators.

1. PARANDRINAE

Larval Characters

Form cylindrical. *Head* with front margin of frons not projecting over clypeus (fig. 13). Antenna 3-segmented, segment 3 elongate, cylindrical (fig. 14). Postcondylar carina absent (fig. 13). Subfossal process absent. Ocelli absent. Maxillary palpifer with outer margin rounded (fig. 15). *Prothorax* with posterior area of pronotum asperate (fig. 16). *Abdomen* with ampullae asperate; each dorsal ampulla with two transverse furrows, each ventral ampulla with one. Segment 9 long, extended; anal lobes glabrous and compact. Pleural discs absent. *Legs* with unguiculus imbricately spinose apically. *Spiracles* with posterior margin of peritreme with about twelve chambers which give it a crescentic appearance.

Parandra (s.g. **Parandra**) **gabonica** Thomson

Distribution. ETHIOPIAN REGION: Cameroons, Fernando Póo, Gold Coast, Ivory Coast, Principe I., São Tomé, Uganda.

Adult (fig. 12). Length 12–22 mm. Entirely glabrous, castaneous to pitchy.

Head with antennae moniliform, not extending beyond posterior margin of prothorax. Front with a median depression. *Prothorax* margined posteriorly and laterally, the anterior angles slightly acute; disc very finely and rather sparsely punctate. *Elytra* finely and sparsely punctate, the lateral margins evenly reflexed.

Mature larva (figs. 13–16). Length up to 35 mm.; breadth (at prothorax) 6·5 mm. Form cylindrical, rather slender, gradually tapering posteriorly to abdominal segment 9. *Head* (fig. 13) slightly depressed, quadrate to slightly transverse (maximum head-width 4·5 mm.), sides feebly rounded. Gena with shallow constriction behind middle and bearing a few fine pale setae. Front margin of frons roundly declivous, almost straight. Antenna (fig. 14) long, fleshy, scarcely retractile, segment 2 the longest and bearing segment 3 and a supplementary process; segment 3 strongly elongate. Mandible robust, wedge-shaped, pitchy and shining; apex acutely pointed and slightly curved downwards; molar area flattened into a striate trapezoidal plate. Clypeus trapezoidal, leathery, as wide at base as epistoma. Labrum elongate, cordate, slightly ferruginous and setose apically. Maxilla (fig. 15) with shape and setae as figured; lobe rather slender, cylindrical and sparsely setose. *Prothorax* with posterior area of pronotum (fig. 16) and lateral posterior angles of presternum asperate; eusternum distinctly separated from presternum. *Abdomen* with dorsal ampullae present on segments 1–7;

each ampulla abruptly and strongly protuberant and densely spiculate. Pleural tubercles distinct and epipleura slightly protuberant on last three segments. Anal lobes compact, the dorsal lobe slightly protuberant. *Legs* pale, testaceous, slender, rather long; unguiculus attenuated, imbricately spinose; abdominal spiracles with peritreme broadly oval, rather thin; marginal chambers forming a crescent.

Pupa (fig. 17). No pupae of this species are available. The following description



Fig 12

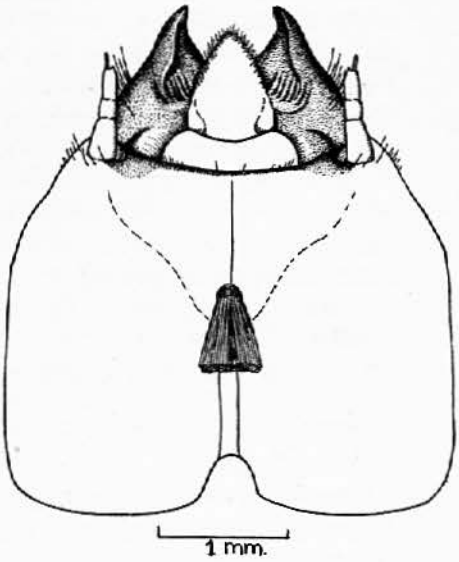


Fig. 13



Fig. 14

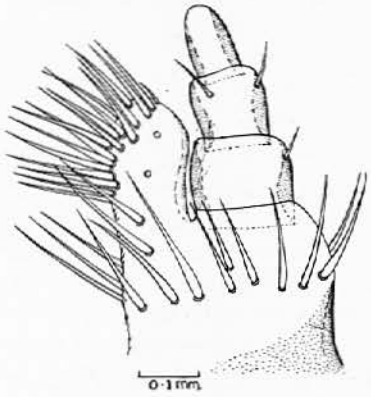


Fig. 15

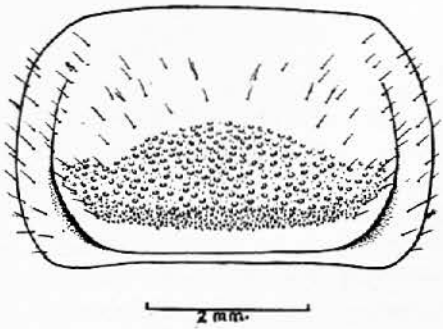


Fig. 16

Fig. 12. *Parandra gabonica* Thomson. Adult. (Eidmann, 1943)

Figs. 13–16. *Parandra gabonica* Thomson. Mature larva. Fig. 13. Head. Dorsal aspect. Fig. 14. Apical part of antenna. Lateral aspect. Fig. 15. Apical part of left maxilla. Ventral aspect. Fig. 16. Prothorax. Dorsal aspect.

is of an undetermined species of this genus: Length 19–35 mm.; breadth 7–11 mm. *Head* strongly bent beneath prothorax; quadrate, rounded, glabrous. Antennae rather thick, moniliform and short, extending to at most hind coxae. Labrum triangular, glabrous. *Pronotum* transverse, with short spines, especially on lateral margins. *Mesonotum* and *metanotum* usually with a few short, scattered, stout spines; scutellum prominent, fleshy, glabrous; scutellar groove shallow, inconspicuous. Elytra and wings extending as far as abdominal segment 3 or 4. *Abdomen* with tergites 1–7 and pleura, bearing numerous short, rather stout, ferruginous spines (each with a fine basal seta). Tergite 8 glabrous. Tergite 9 glabrous, with stout urogomphi which are widely separated at the base and extend postero-laterally. Sternites slightly rugose, glabrous. *Legs* with hind femora extending as far as abdominal segment 3, and hind tibiae almost at right angles to longitudinal axis of body. *Functional spiracles* present on first six or seven abdominal segments, the seventh pair being closed and probably non-functional in some species; peritreme narrowly oval, thick and appreciably raised above the general level of cuticle.

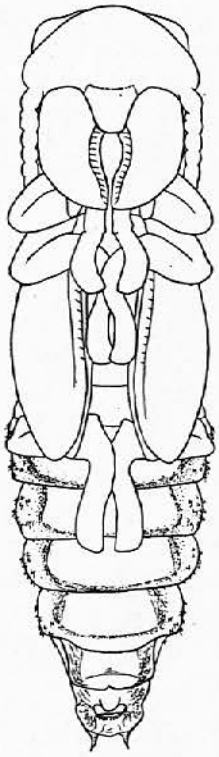


Fig. 17. *Parandra* sp. Pupa. Ventral aspect. (Duffy, 1953a)

Host plants: *Schefflera mannii* (Eidmann, 1943); *Funtumia elastica* (G.H.T.).

Biology. Larvae infest felled trunks and decaying logs.

Material studied. 2 L, São Tomé 4.xi.1932, W. H. T. Tams, leg., in coll. B.M.

References. Duffy, 1953a (L fig., P fig. of *P. brunnea* Fabricius); Eidmann, 1943 (L fig., P fig., I fig., Biol.); Lepesme, 1953 (I fig., Biol.).

2. PRIONINAE

Larval Characters

Form robust, subcylindrical and tapering posteriorly. *Head* usually slightly transverse but slightly elongate in certain tropical species; widest behind middle; dorsal margins of epicranial halves fused behind frons but sometimes separating near the base; tentorial cross-arm in same plane as hypostoma, forming a bridge behind it, which divides the occipital foramen into an anterior and a posterior portion. Front margin of frons nearly always abruptly sloping, very strongly sclerotised, its lower boundary projecting over clypeus, its upper boundary dentate or carinate (except in *Macrotoma*); six epistomal setae present. Clypeus thick, trapezoidal, as wide at base as front margin of frons. Labrum thick and lanceolate, cordate, transversely elliptical or orbicular. Mandibles wedge-shaped (fig. 32), cutting edge broadly emarginate; apex produced, acute. Ocelli present or absent. Antenna (figs. 21, 36) 2- or 3-segmented, conical, partly retractile; segment 2 barrel-shaped or cylindrical, obliquely

truncate, hollowed at tip and often bearing a small third segment. Subfossal process and postcondylar carina present (figs. 19, 34). Ventral mouthparts attached to hypostoma by slightly more than width of gula. Maxillae movable; cardo distinct; palpifer with outer margin rounded; lobe borne on stipes; maxillary palpi short, conical, robust, 3-segmented, segment 3 relatively short and cylindrical, blunt or conical, the tip being truncate and bearing a sensory impression. Ligula large, fleshy and densely covered with short, stout setae. *Prothorax* with eusternum partially or entirely, and lateral zone distinct. *Abdomen* with dorsal ampullae with two transverse impressions; ventral ampullae with one. Epipleura protuberant only on last three segments; segment 9 large, elongate, extended. *Legs* distinct, stout, conical; unguiculus imbricately spinose. *Spiracles* of mesothorax protruding into prothorax; abdominal spiracles with small marginal chambers occasionally present.

First-instar larvae of this subfamily are exceptional in that they do not usually possess egg-bursting spines (see Duffy, 1953a, p. 61). A notable exception is *Mallodon downesi* Hope.

Macrotomini

Mallodon downesi Hope

Distribution. Widely distributed throughout the ETHIOPIAN and MADAGASCAN REGIONS.

Adult (fig. 18). Length 35–62 mm. Entirely ferruginous to pitchy, smooth and shining. *Head* with mandibles very robust, strongly curved and produced anteriorly. Antenna filiform, short, not extending beyond basal third of elytra. *Prothorax* very strongly transverse, parallel-sided; sides explanate, finely margined, broadly and strongly punctate and serrate; disc for the greater part smooth and glabrous. *Elytra* smooth, shining, with margins strongly reflexed. *Legs* with anterior coxae strongly transverse.

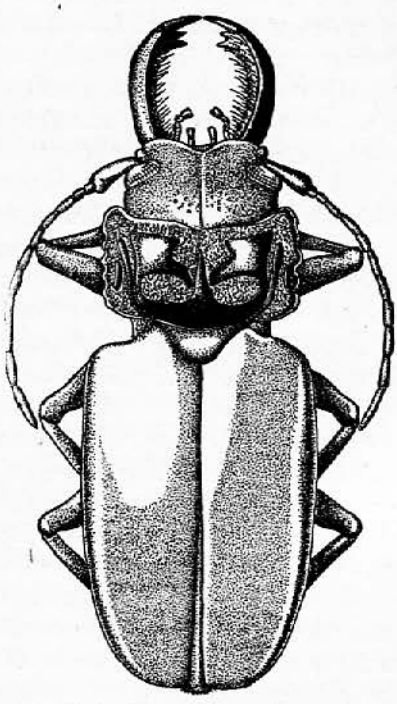


Fig. 18. *Mallodon downesi* Hope. Adult.

Mature larva (figs. 19–23). Length up to 85 mm.; breadth (at prothorax) 18 mm. Form subcylindrical, very robust, slightly tapering posteriorly to segment 9. *Head* (fig. 19) moderately depressed, slightly transverse (maximum head-width 10·6 mm.). Genae very strongly shouldered, rugose, pitchy and bearing a few pale setae. Mouth-frame strongly sclerotised rugose, broadly pitchy. Frons with a broad, pitchy anterior margin comprising a heavily sclerotised ridge which is abruptly sloping; upper boundary varying from straight to slightly crenulate, keel-shaped, notched medially and produced beyond lower boundary in two paramedian lobes; lower boundary with a pair of broadly

triangular lobes projecting over each side of clypeus. Postcondylar carina distinct. Subfossal process large, acutely conical. Antenna 2-segmented; segment 2 obliquely truncate apically and bearing sensory pores and setae (fig. 21). Three pairs of ocelli present which are sometimes partly obscured by the heavy sclerotisation of gena. Mandible very robust, pitchy, shining, with outer face strongly rugose. Labrum oval, leathery, partly ferruginous and coarsely and densely setose anteriorly. Gula extremely short, with sutures diverging to meet anterior portion of occipital foramen. Maxillary lobe and palpi with shape and setae as figured (fig. 20). *Prothorax* moderately depressed, obliquely inclined, about twice as broad as long; pronotum rectangular, delimited laterally by a pair of grooves; median cleavage line shallow; rather indistinct; anterior area rugose and bearing numerous scattered reddish setae; posterior area coarsely and irregularly rugose and sparsely setose. Eusternum incompletely separated from presternum. Presternum (fig. 23) with lateral areas each bearing a group of teat-like tubercles (which are strongly sclerotised apically) and a large conical, fleshy protuberance, possibly of a sensory nature. *Mesonotum* and *metanotum* smooth, almost glabrous. *Abdomen* with dorsal and ventral ampullae on segments 1–7; each ampulla with two distinct transverse furrows, faintly rugose, glabrous. Pleural discs present on segments 1–7; indistinct, slightly wrinkled, feebly sclerotised and testaceous. Segments 8 and 9 feebly rugose, the latter large, slightly extended, with scattered fine setae. Anus trilobed, each lobe strongly protuberant and bearing scattered long fine setae. *Legs* rather short, slightly longer than maxillary palpi, ferruginous, setose; unguiculus attenuated. *Spiracles* of mesothorax broadly oval; metathoracic pair minute; abdominal spiracles with peritreme broadly oval, thick and slightly raised above general level of cuticle.

This larva possesses a well-developed proventriculus which is equipped internally with a strong, stout, subquadrate sclerite (fig. 22).

First-instar larva. In this instar only, abdominal segments 3 and 4 are each equipped with a pair of egg-bursting spines. Each spine is straight, needle-like and arises from a bulbous basal tubercle.

Pupa (figs. 24, 25). Length (excluding mandibles) up to 51 mm.; maximum breadth 16 mm. *Head* (fig. 25) salient, not concealed from above by prothorax; vertex longitudinally strigose, with a deep median, longitudinal impression, on each side of which is a group of setose papillae. Mandibles extending anteriorly, robust, sickle-shaped (in male) and spiculate. Antennae thick, extending as far as abdominal segment 2. *Pronotum* strongly transverse; sides parallel, slightly crenulate; disc transversely strigose, with a narrow, smooth, longitudinal, median impression and scattered setose papillae. *Mesonotum* with similar striae and papillae; scutellum prominent, fleshy, papillate. *Metanotum* transversely striate with papillae mainly grouped in an arc, and with a fleshy subconical tubercle near each anterior angle. Elytra and wings extending as far as abdominal segment 3. *Abdomen* with tergites rugose and bearing numerous scattered ferruginous spinules; gin-traps present on segments 2–3, 3–4, 4–5, 5–6 and 6–7; each consisting of two transverse subcarinate, labiate protuberances (fig. 24). Sternites with spinules less numerous. *Legs* with hind femora extending only as far as abdominal segment 3. *Functional spiracles* present on abdominal segments 1–6, the seventh pair being closed and probably non-functional; peritreme narrowly oval and rather thick.

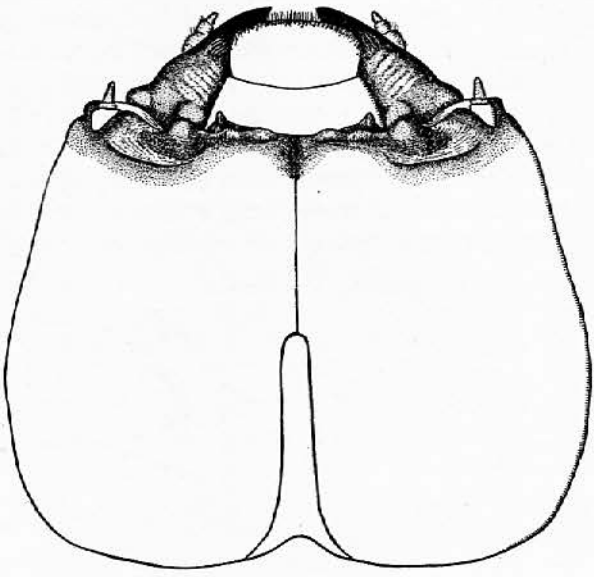


Fig. 19

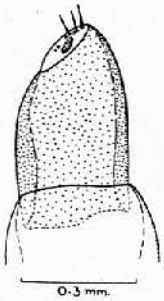


Fig. 21

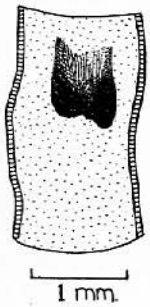


Fig. 22

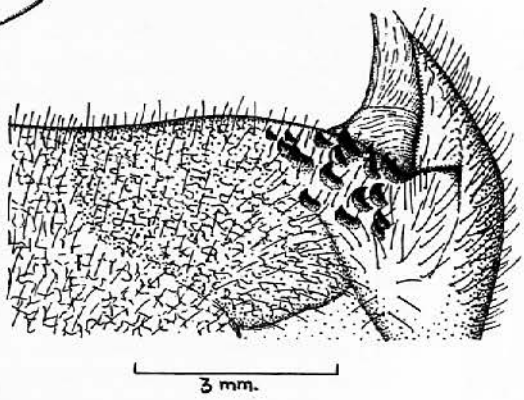


Fig. 23

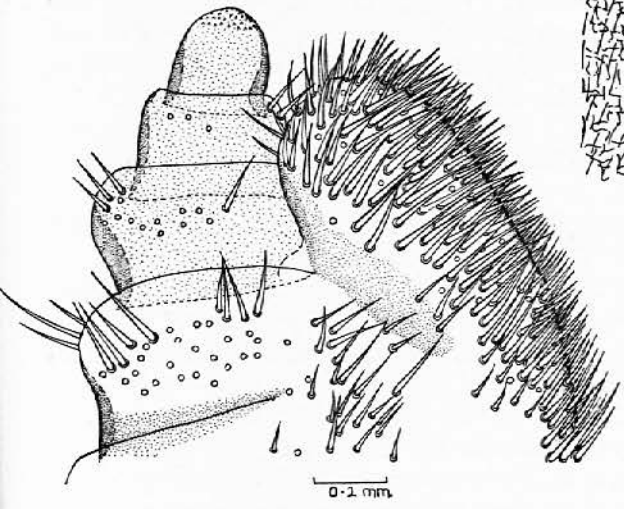


Fig. 20

Figs. 19–23. *Mallodon downesi* Hope. Mature larva. Fig. 19. Head. Dorsal aspect. Fig. 20. Apical part of right maxilla. Ventral aspect. Fig. 21. Apical part of antenna. Lateral aspect (Duffy, 1953a). Fig. 22. Cross-section of proventriculus showing sclerite. Fig. 23. Right half of prothoracic presternum (Duffy, 1953a).

Egg. Length 3·25 mm.; breadth 1·5 mm. Form ovoid, with one end bluntly tapering and the other more strongly tapering and truncate apically. Chorion light brown, covered with dark brown coarse reticulation; micropylar area distinct, pitchy.

Host plants: *Ekebergia capensis* (Distant, 1904); *Ceiba, Hevea* (Ghesquière, 1927); *Coffea, Theobroma* (Zacher, 1921, Lepesme, 1947); *Manihot glaziovii, Mangifera, Poinciana regia* (Mayné, 1914); *Persea americana, Cananga odorata* (Báguena Corella, 1942); *Cleistopholis patens, Combretodendron africanum, Discoglypremna caloneura, Piptadenia africana, Spondia mombin, Sterculia tragacantha, Turraeanthus africana* (Jover, 1954); *Antiaris africana, Pycnanthus angolensis, Pycnocoma macrophylla*

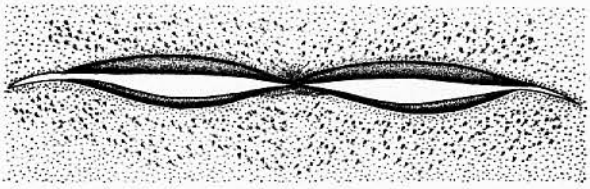


Fig. 24

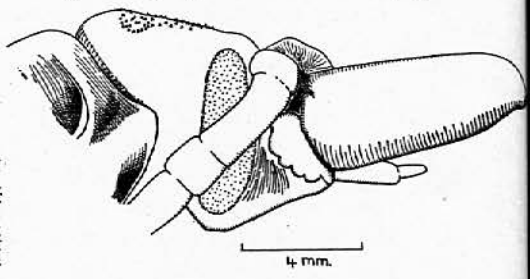


Fig. 25

Figs. 24–25. *Mallodon downesi* Hope. Pupa. Fig. 24. Second pair of gin-traps. Dorsal aspect. Fig. 25. Head and pronotum. Lateral aspect.

(G.H.T.); *Daniellia oliveri* (D. E. M. Marsh); *Croton macrostachys, Parinari excelsa, Albizia* sp. (J.C.M.G.); *Ekebergia rueppelliana* (G. Watkins); *Mansonia altissima, Triplochiton scleroxylon, Bosqueia angolensis* (E.A.J.D.). Also in *Lophira alata* var. *procera* and *Cynometra alexandri,* but *Hevea brasiliensis* is the preferred host (Duffy, 1953a).

Biology. Oviposition usually takes place in crevices under the bark of either dead or decaying stumps or exposed roots. The young larvae feed in the sapwood (which is usually decaying) but later penetrate the heartwood. Pupation takes place in an enlarged chamber containing a hard "*Cossus*"-like cocoon just beneath the bark.

Adults are to be found all the year round, although the maximum longevity under laboratory conditions is twenty days (Mayné, 1914; Báguena Corella, 1942).

According to Distant (1904), the natives eat the young larvae after roasting them on twigs.

Recent observations by G. H. Thompson are as follows: The immature stages of this species are passed in the sapwood and heartwood of old rotting trees. The wood is often sufficiently rotten and moist to be pulled out in handfuls. As the larvae increase in size they bore deeper into the tree; the maximum penetration observed was nine inches. The depth of penetration probably depends on the degree to which the tree has rotted. Larval galleries are packed with coarse fibres. The pupal cells are situated at a depth of four to six inches in the wood; they are broadly oval and parallel to the grain and are blocked with coarse wooden fibres. Pupae and newly emerged adults were taken in July. The former are attacked by a large black and yellow elaterid larva. Adults are commonly found beneath the loose bark of dead trees. The life-cycle

is probably annual. Jover (1954), however, states that in the Ivory Coast it is completed within three or four months.

Predators. Two species of unidentified ants are predatory on the larvae, often penetrating where insecticides do not reach (Mayné, 1914).

Economic importance. According to Lepesme (1947) this species, although abundant and polyphagous, is of little economic importance, since it infests only decaying wood. But there are recent reports of sound wood of *Hevea brasiliensis* being attacked and also stumps of the extremely hard *Cynometra alexandri* (Duffy, 1953a). Healthy trees, however, are apparently seldom attacked, although injured trees are easily blown down by storms and consequently furnish most favourable breeding places.

In the Gold Coast, several relatively sound logs of *Triplochiton*, both in felling yards and in sawmills, were found to be severely damaged by larvae of this species. A typical infested log is shown on Pl. X, fig. 2 (E.A.J.D.).

Control. Methods suggested by Mayné (1914) are as follows. The destruction of all dead wood and stumps and the scraping of all wounds, followed by painting with coal tar. A mixture of two parts chloroform and one part creolin may be injected into the galleries in order to kill the larvae. Mayné also recommends the injection of a mixture of kerosene and carbon bisulphide.

Material studied. 1 L (adult reared), Tanganyika, Arusha, 1953, from decayed wood, J.C.M.G. leg., in coll. B.M.; 2 L, 1 I, Gold Coast, 1945, from *Antiaris*, *Pycnanthus kombo*, *Pycnocoma macrophylla*, G.H.T. leg., in col. G.H.T.; 12 L, 2 P, Zambi, 26.iii.1914, from *Hevea*, R. Mayné leg., in coll. M.R.C.B.; 2 L, 1 P, 1 I, Boma, 10.x.1909, from *Manihot*, Brixhe leg., in coll. M.R.C.B.; 6 L, Kibao, 28.x.1911, from dead trunk, in coll. M.R.C.B.; 6 L, 2 I, Gold Coast, Sunyani, 22.ii.1955, from *Triplochiton scleroxylon*, E.A.J.D. leg., in coll. B.M.

References. Aulmann, 1913 (Biol., Contr.); Báguena Corella, 1942 (L fig., Biol. fig.); Cotterell, 1927 (Biol.); De Seabra, 1921 (Biol.); Distant, 1904 (P fig., Biol.); Duffy, 1953a (L fig., P, Biol.); Eichelbaum, 1913 (L fig.); Ghesquière, 1927 (Biol.); Harris, 1937 (Biol.); Jover, 1954 (Biol.); Lepesme, 1947 (Biol.), 1948 (Biol.), 1953 (I fig., Biol.); Lepesme and Villiers, 1944 (Biol.); Mayné, 1914 (Biol. fig., Contr.), 1927 (Biol.); Morstatt, 1913b (Biol.), 1942 (I fig., Biol.); Mühlmann, 1954 (Biol.); Zacher, 1914 (Biol.), 1921 (Biol.).[1]

Hovatoma micros (White)

Distribution. ETHIOPIAN REGION: Kenya, Mozambique, South Africa, Zanzibar.

Mature larva. Not generically distinct from those of *Macrotoma* but closely resembling that of *M.* (*Navosomposis*) *dohertyi* Lameere, from which it may be distinguished by the absence of a vertical oval protuberance on the gena.

Material studied. 2 L, 1 I, Kenya, Ngong, from firewood, J.C.M.G. leg., in coll. B.M.

References. None available.

Hovatoma cinnamomea (Olivier)

Distribution. MADAGASCAN REGION: Madagascar.

Mature larva. No material available.

[1] See also Báguena Corella, 1949 (L fig., I fig., Biol. fig., Contr.).

Biology. In Madagascar larvae of this species are cooked with rice and eaten by the natives (Coquerel, 1856).

Parasites. Hymenoptera: *Agathis crudelis* Coqu.

References. Coquerel, 1856 (Biol., Paras.), 1862 (L fig.); Duffy, 1953a (Biol.).

Hovatoma wrighti (C. O. Waterhouse)

Distribution. ORIENTAL REGION: Seychelles.

Mature larva. No material available.

Host plant: *Cedrus* (Vayssière, 1935).

Economic importance. Vayssière (1935) states that this species is a serious pest of *Cedrus* in the Seychelles.

References. Vayssière, 1935 (Biol.).

Aulacopus thoracicalis Jordan

Distribution. ETHIOPIAN REGION: Cameroons, Gold Coast.

Host plant: *Ficus exasperata* (G.H.T.).

References. None available.

Aulacopus reticulatum Serville

Distribution. ETHIOPIAN REGION: French Congo, Gold Coast, Senegal.

Mature larva. Similar to that of *Macrotoma dohertyi* Lameere but differing in having a stouter subfossal process and a shorter apical segment to the antenna.

Host plant: *Sterculia rhinopetala* (E.A.J.D.).

Biology. The larvae excavate short straight galleries which they pack with coarse shredded wooden fibres (Pl. IX, fig. 4). Pupation takes place deep in the sapwood. Adults emerge in April.

Material studied. 5 L, 3 I, Gold Coast, near Wenchi, 6.iii.1955, from bole of dead standing *Sterculia rhinopetala*, E.A.J.D. leg., in coll. B.M.

References. None available.

Macrotoma (s.g. **Navosomopsis) foveolata** Kolbe

Distribution. ETHIOPIAN REGION: Tanganyika.

Mature larva. Length up to 66 mm.; maximum breadth (at prothorax) 14 mm. Distinguishable from all other known larvae of this genus by the presence of a pair of sclerotised teeth on the upper boundary of the frons, one opposite each basal angle of the clypeus.

Host plant: *Ocotea usambarensis* (J.C.M.G.).

Material studied. 2 L, 1 I, Tanganyika, 1955, from stump of *Ocotea usambarensis*, J.C.M.G. leg., in col. B.M.

References. None available.

Macrotoma (s.g. **Navosomopsis) dohertyi** Lameere

Distribution. ETHIOPIAN REGION: Kenya.

Mature larva (fig. 26). Similar to those of the subgenus *Macrotoma*, from which it may be separated as follows. Length up to 36 mm.; maximum breadth (at prothorax)

9·1 mm. *Head* with postocular carina absent. *Abdomen* with segment 9 extended, quadrate (fig. 26).

Pupa. Similar to that of *M.* (*M.*) *serripes*, from which it may be distinguished as follows. Length up to 30 mm. *Abdomen* with anterior projection of gin-traps feebly developed, the margin straight.

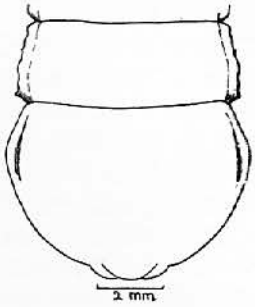


Fig. 26. *Macrotoma dohertyi* Lameere. Mature larva. Abdominal tergites 8 and 9.

Host plant: *Olea hochstetteri* (J.C.M.G.).

Economic importance. According to J. C. M. Gardner this species is very common in the Kenya highlands where it infests *Olea*. There is reason to suspect that the trees become susceptible to attack after a slight change in environment, for example, when surrounding trees of other species are felled. Larvae have been found in apparently sound sawn timber and should therefore be regarded as being of decided economic importance.

Material studied. 1 L, 1 P, 1 I, Kenya, Nairobi, 1953, from unknown tree, J.C.M.G. leg., in coll. B.M.

References. None available.

Macrotoma (s.g. **Sarothrogastra**) **edulis** Karsch

Distribution. ETHIOPIAN REGION: São Tomé.

Mature larva. No material available. The description by Karsch (1887) is not sufficiently detailed for taxonomic purposes.

Host plant: *Theobroma* (De Seabra, 1921).

Biology. According to Karsch (1887) larvae of this species are sold in the markets and eaten by the natives.

References. De Seabra, 1921 (Biol.); Duffy, 1953a (Biol.); Karsch, 1887 (L fig., Biol.).

Macrotoma (s.g. **Prinobius**) **scutellaris** (Germar)

Distribution. PALAEARCTIC REGION: Algeria, Morocco, Tunisia.

Mature larva. No material available.

Egg. Length 3 mm. Form elongate oval, one pole tapering but truncate, the other rounded. Chorion ivory white, finely reticulate (Fairmaire, 1859).

Host plants: *Quercus ilex*, *Q. suber*, *Fraxinus dimorpha*, *Morus* and *Pinus* (?).

Biology. The adult is nocturnal and is attracted to light during June and July (Villiers, 1946).

Parasites. Hymenoptera: *Doryctes longicaudis* Gir. (Picard, 1929).

References. Caillol, 1914 (Biol.); Fairmaire, 1859 (E, Biol.); Lallement, 1864 (Biol.); Mulsant, E. and Revelière, 1859 (L); Perris, 1877 (P); Picard, 1929 (Paras.); Villiers, 1946 (I fig., Biol.); Xambeu, 1898–1902 (E, L, P, Biol.).

Macrotoma (s.g. **Macrotoma**) **palmata** (Fabricius)

Distribution. ETHIOPIAN REGION: Angola, Bechuanaland, Belgian Congo, British Somaliland, Ethiopia, Kenya, Natal, Nigeria, Rhodesia, São Tomé, Senegal, Sierra Leone, Uganda, Zanzibar. PALAEARCTIC REGION: Arabia, Egypt, Sahara.

Mature larva. Closely resembling those of *M. natala* and *M. serripes*, from which it may be distinguished as follows. Length up to 62 mm.; maximum breadth (at prothorax) 18 mm. *Head* with front margin of frons oblique, the upper boundary roundly declivous.

Host plants: *Acacia raddiana, A. seyal* (Mateu, 1954); *Mangifera* (Mansfield-Aders, 1920); *Acacia nilotica, A. tortilis, Tamarix, Prunus armeniaca* and *Eucalyptus* (Vayssière, 1935); *Citrus* (Mayné, 1927); *Cinnamomum, Salix, Acer, Platanus, Pyrus communis* (Lepesme, 1948); *Ficus* (Villiers, 1942); *Fagaropsis angolensis, Parinari excelsa* and *Calodendrum capense* (J.C.M.G.). Adair (1917) points out that in Egypt *M. palmata* feeds on *Eucalyptus* and not on *Cinnamomum*, as previously stated.

Biology. Larvae of this species possess an enzyme hydrolysing cellulose.

Economic importance. This is a serious pest in mangrove-wood rafters in native huts in Zanzibar and is frequently found in old mango stumps. On one occasion several larvae were extracted from a piano case (Mansfield-Aders, 1920).

Material studied. 3 L (adults reared), Kenya, Nyeri, 1953, from *Fagaropsis angolensis*, J.C.M.G. leg., in coll. B.M.; 2 L, 1 I, Belgian Congo, Banara, x.1920, in coll. M.R.C.B.

References. Adair, 1917 (Biol.); Alfieri, 1911 (L fig., P fig., Biol.); Clainpanain, 1917 (Biol.); Duffy, 1953a (Biol.); Lameere, 1885 (L fig.); Lepesme, 1948 (Biol.); Mansfield-Aders, 1920 (Biol.); Mansour and Mansour-Bek, 1934 (Physiol.); Mateu, 1954 (Biol.); Mayné, 1927 (Biol.); Petroff, 1920 (Biol.); Vayssière, 1935 (Biol.); Villiers, 1942 (Biol.), 1946 (Biol.); Zacher, 1921 (Biol.).

Macrotoma (s.g. **Macrotoma**) **serripes** (Fabricius)

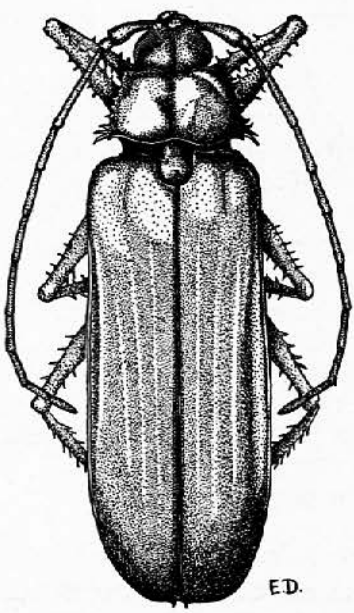


Fig. 27. *Macrotoma serripes* (Fabricius). Adult.

Distribution. ETHIOPIAN REGION: Belgian Congo, Cameroons, Fernando Póo, Gold Coast, Ivory Coast, Rio Muni, Sierra Leone.

Adult (fig. 27). Length 40–80 mm. Entirely castaneous. *Head* with antennae filiform, extending almost to apices of elytra in female and slightly beyond them in male. *Prothorax* margined and serrate laterally, with a strong basal tooth; disc smooth, shining, with one posterior and two anterior feeble depressions. *Elytra* coriaraceous, feebly vermiculately rugose. *Legs* with femora and tibiae strongly spined on both margins; anterior coxae strongly transverse.

Mature larva (fig. 28 and Pl. IX, fig. 3). Rather similar to that of *Mallodon downesi* Hope but differing as follows. Length up to 105 mm.; maximum breadth (at prothorax) 29 mm. *Head* with frons pale testaceous and feebly sclerotised, except extreme front margin which in some specimens is pitchy; front margin without a well-defined transverse sclerotised ridge on upper boundary; lower

boundary not projecting over clypeus. Subfossal process feebly developed. Antenna with segment 2 more strongly elongate (fig. 28). Ocelli indiscernible owing to strong sclerotisation of gena. *Prothorax* with presternum devoid of tubercles and protuberances. Pleural discs indistinct. *Legs* shorter than maxillary palpi; unguiculus short, conical.

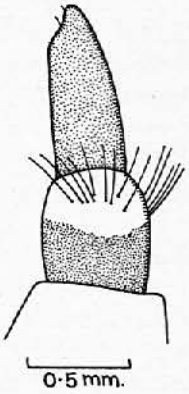


Fig. 28

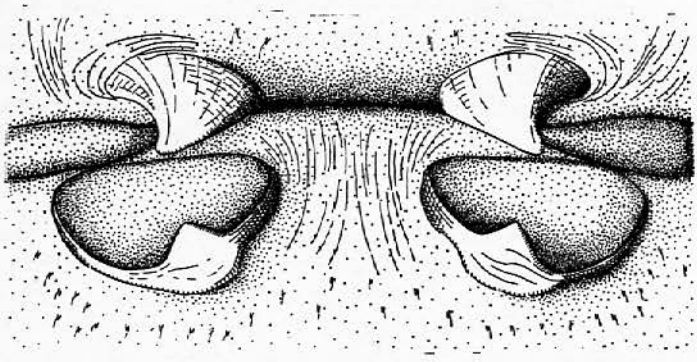


Fig. 29

Fig. 28. *Macrotoma serripes* (Fabricius). Mature larva. Antenna. Lateral aspect.
Fig. 29. *Macrotoma serripes* (Fabricius). Pupa. Penultimate gin-traps. Dorsal aspect.

Pupa (fig. 29). Length up to 81 mm.; maximum breadth 16 mm. *Head* salient, not concealed from above by prothorax; smooth, except for a median, longitudinal, striate groove. Mandibles extending antero-ventrally, short, robust, non-spiculate. Antennae thick, extending as far as abdominal segment 2, where they are slightly incurved to terminate near mid-tarsi. *Pronotum* strongly transverse, with sides diverging posteriorly, the hind angles acutely protuberant; disc transversely strigose, with scattered setose papillae. *Mesonotum* with scattered setose papillae and scutellum fleshy, transversely striate and very strongly protuberant. *Metanotum* with a median longitudinal, striate groove, in the middle of which is a group of papillae. Elytra and wings extending as far as abdominal segment 3. *Abdomen* with tergites rugose and bearing numerous scattered, ferruginous, setose spinules; gin-traps (fig. 29) present on segments 3–4, 4–5 and 5–6; each consisting of an anterior dentate, sclerotised projection and a posterior cup-shaped structure (the upper ridge of the latter slides over the anterior process when the abdomen is bent upwards). Sternites with spinules less numerous. *Legs* with hind femora extending to abdominal segment 4. *Functional spiracles* present on abdominal segments 1–6, the seventh pair being closed and probably non-functional; peritreme very narrowly oval and rather thick.

Host plants: *Theobroma* and *Sterculia tragacantha* (Ghesquière, 1927); *Cola acuminata* (Vayssière, 1935); *Albizia gummifera* and *Celtis soyauxii* (G.H.T.); *Parkia filicoidea* (E.A.J.D.).

Biology. The early larval life is spent in the sapwood, but ultimately the heartwood is extensively excavated. Damage is considerable, as the tunnels of mature larvae are about one inch in diameter. In addition, infestation tends to be concentrated

so that certain areas may be completely riddled with tunnels. These tunnels are closely packed with coarse frass. In a dead stump of *Celtis* the borings extended to near the ground and the pupal cells were situated at ground level. The pupal cells are excavated at varying depths within the wood but they are usually about 2 inches from the surface of the sapwood. Before pupation, the larva bores an oval exit hole leading to the surface of the sapwood but not penetrating the bark (Pl. III, fig. 4). The pupal cell is broadly oval and much larger than the pupa itself; it is situated in the direction of the wood fibres. The tunnel leading to the preformed exit hole is blocked in the region of the pupal cell with numerous tightly packed, coarse fibres. Approximately one month is spent in the pupal stage but adults remain in their cells some time before emerging from the timber. They are usually to be found during March, April and May and November, when they are readily attracted to light. The life-cycle is probably annual (G.H.T.).

The author has recently seen infestations by this species in *Parkia* logs which had been felled about three months. Here the damage was considerable, for some of the galleries were 3 inches at their greatest diameter and some of the larvae obtained were over 4 inches long and 1 inch broad. Before pupating, some of these larvae had gnawed out a small perforation in the bark and tightly packed the entrance to the sapwood with a plug of coarse fibres.

On the living larvae were found numerous mites; these have been identified as a new species of *Coleolaelaps* (Laelapidae) by Dr. G. O. Evans.

Material studied. 2 L, 1 I, Gold Coast, 1947, from *Albizia gummifera* and *Celtis soyauxii*, G.H.T. leg., in coll. G.H.T.; 3 L, 1 P, Gold Coast, Accra, 30.xi.1922, J. W. Macfie leg., in coll. B.M.; 3 L, 1 P, 1 I, Gold Coast, Wenchi, 5.iii.1955, from rotten log of *Parkia filicoidea*, E.A.J.D. leg., in col. B.M.

References. Ghesquière, 1927 (Biol.); Lepesme, 1948 (Biol.), 1953 (I fig., Biol.); Vayssière, 1935 (L fig., P fig., I fig., Biol. fig.).

Macrotoma (s.g. **Macrotoma**) **natala** J. Thomson

Distribution. ETHIOPIAN REGION: Cameroons, Ethiopia, Kenya, Natal, Rhodesia, Uganda.

Mature larva (fig. 30). Extremely similar to that of *M. serripes* (Fabricius), from which it may be distinguished as follows. *Head* with antennal segment 2 moderately elongate and not attenuated apically, the oblique sensory area round (fig. 30).

Pupa. Resembles that of *M. serripes* (Fabricius), from which it differs in having an additional pair of gin-traps (see key, p. 37).

First-instar larva. Length up to 4·2 mm. Differs from the mature larva mainly in the form of the antenna, the micro-pubescent posterior half of the pronotum, the micro-spiculate abdominal segments and the long lateral setae.

Egg (fig. 31). Length 3·9 mm.; breadth 1·5 mm. Form ovoid, with one end rather bluntly tapering, the other more strongly tapering. Chorion white, smooth, except for scattered digitiform tubercles which are more numerous around the anterior end.

Host plants: *Ficus aspera* (Distant, 1904); *Acacia* sp., *Albizia coriaria* (J.C.M.G.).

Biology. According to Distant (1904) *M. natala* is common in *Ficus* grooves and comes to light. Eggs are deposited near the roots of the host.

An adult beetle reared in the laboratory lived for thirty-eight days (J.C.M.G.).

Material studied. 1 L, 1 P, 1 1, Kenya, Malindi, 1953, from dead wood, J.C.M.G. leg., in coll. B.M.

References. Distant, 1904 (E fig., Biol.).

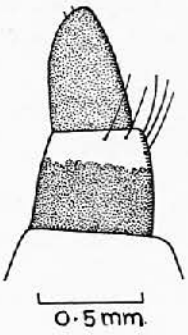


Fig. 30

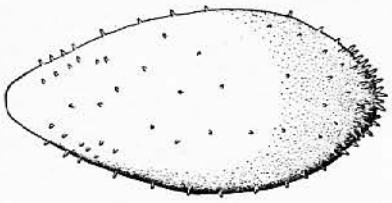


Fig. 31

Fig. 30. *Macrotoma natala* J. Thomson. Mature lava. Apical part of antenna. Lateral aspect.

Fig. 31. *Macrotoma natala* J. Thomson. Egg.

Callipogonini

Ergates (s.g. **Ergates**) **faber** (Linnaeus)

Illustrated descriptions of the immature stages and a full account of the biology of this species have recently been published (Duffy, 1953a).

Distribution. PALAEARCTIC REGION: Morocco.

Mature larva. See key, p. 13.

Pupa. See key, p. 37.

Host plants: *Pinus halepensis*, *Abies numidica* (Villiers, 1946).

Parasites. Fungi: *Metarrhizium anisopliae.* All stages of *E. faber* have been observed to have been killed by this fungus which appears to be able to penetrate the larval galleries (Friederichs, 1919). Under laboratory conditions it has proved possible to infect larvae with this parasite, but in the field the host has proved to be more or less immune unless a particularly virulent form of the fungus is produced (Friederichs, 1920).

Additional references. Caillol, 1914 (Biol.); Friederichs, 1919 (Paras.), 1920 (Paras.).

Megopis (s.g. **Megopis**) **mutica** Serville

Distribution. MADAGASCAN REGION: Mauritius.

Mature larva. No material available. For generic characters see Duffy (1953a).

Host plants: *Casuarina* and *Eucalyptus* (A. J. E. Orian).

References. None available.

Prionini

Acanthophorus (s.g. **Acanthophorus**) **capensis** White

Distribution. ETHIOPIAN REGION: Angola, Bechuanaland, Cape of Good Hope, Rhodesia.

Mature larva (fig. 32). Distinguishable from that of *A. (Tithoes) maculatus*

(Fabricius) by the more broadly pitchy frons and the sharper sub-basal tooth of mandible (fig. 32).

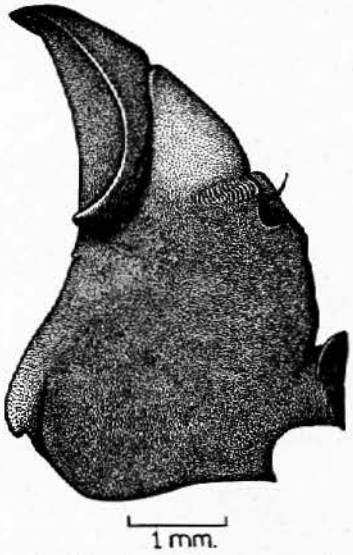


Fig. 32. *Acanthophorus capensis* White. Mature larva. Right mandible. Dorsal aspect.

Host plants: *Acacia horrida; Brachystegia boehmii* (J. Whellan).

Material studied. 1 L, 1 I, Bechuanaland, Kalahari, L. Schultze leg. in coll. Senckenberg Museum, Frankfurt-on-Main.

References. None available.

Acanthophorus (s.g. **Acanthophorus**) **arabicus** Thomson

Distribution. ETHIOPIAN REGION: Ethiopia, Republic of the Sudan. PALAEARCTIC REGION: Arabia.

Mature larva. No material available. For generic characters see key, p. 13.

Host plant: *Ficus*.

References. Villiers, 1946 (I fig., Biol.).

Acanthophorus (s.g. **Tithoes**) **maculatus** (Fabricius)

Distribution. ETHIOPIAN REGION: Belgian Congo, British Somaliland, Cameroons, Gold Coast, Ivory Coast, Kenya, Liberia, Natal, Nigeria, Senegal, Sierra Leone, Tanganyika, Uganda. PALAEARCTIC REGION: Egypt.

Mature larva (Pl. I, fig. 1 and figs. 33, 34). Length up to 160 mm.; maximum breadth (at prothorax) 28 mm. Form cylindrical, very robust, gradually tapering posteriorly. *Head* (fig. 34) moderately depressed, slightly transverse (maximum width 17 mm.). Gena very strongly shouldered, rugose, broadly pitchy and with a deep longitudinal carina beneath ocelli and acutely pointed beneath antennal foramen. Mouthframe extremely strongly sclerotised, broadly pitchy; setal punctures very deep. Front margin of frons (fig. 34) pitchy, very heavily sclerotised, flattened; upper boundary flattened, slightly produced above clypeus, with front margin straight but with edge crenate; lower boundary produced over clypeus, more strongly so laterally, with front margin curved and strongly pectinate. Postcondylar carina deep, with upper boundary straight. Subfossal process acutely conical. Antenna salient, 2-segmented; segment 2 elongate, gradually narrowed to apex where it is obliquely truncate. Mandible very robust, pitchy, shining, with outer face very strongly rugose and bearing numerous scattered short setae on basal half of outer face. Labrum oval, leathery, ferruginous, with anterior

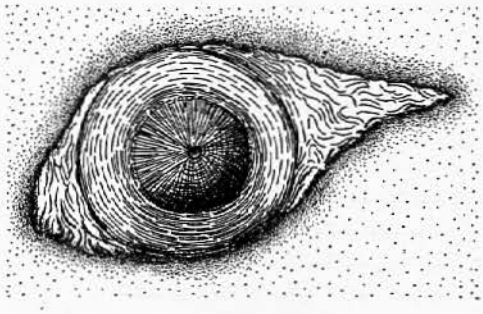


Fig. 33. *Acanthophorus maculatus* (Fabricius). Mature larva. Pleural disc.

margin very densely fringed with short bristle-like setae; posterior margin with a deep fovea medially. Three pairs of ocelli present beneath antennal foramen (possibly indistinct in some specimens); ocellar lens strongly convex; pigmented spot indiscernible owing to strong sclerotisation of lens. Ventral mouthparts strongly sclerotised and ferruginous to pitchy for the greater part, particularly the ligula, mentum, submentum and part of the maxillary stipes. *Prothorax* slightly obliquely sloping anteriorly, about twice as broad as long. Pronotum rectangular, delimited laterally by a pair of shallow grooves; median cleavage line

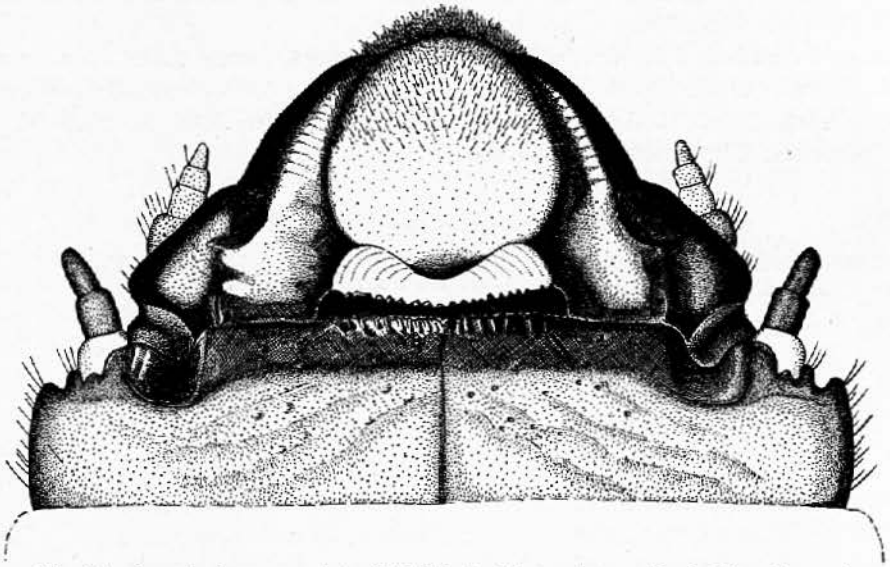


Fig. 34. *Acanthophorus maculatus* (Fabricius). Mature larva. Head. Dorsal aspect.

indistinct, strongly rugose, sparsely setose and with a transverse, somewhat irregular, broad, pitchy band. Eusternum separated from presternum by a distinct W-shaped suture; presternum bearing numerous scattered setal punctures, eusternum sclerotised, ferruginous to pitchy in large specimens, the greater part covered with corneous tubercles. *Mesonotum* and *metanotum* rugose, very sparsely setose. *Abdomen* almost entirely moderately strongly sclerotised, varying from pale testaceous to castaneous; ampullae present on segments 1–7; each with two transverse furrows and sometimes corneous or callose, particularly around furrows. Pleural discs present and distinct on segments 1–8; each radially striate, with a deep pore (fig. 33), pale testaceous, thus contrasting with the surrounding cuticle which is more or less ferruginous. Segments 8 and 9 smooth, glabrous, the latter slightly extended. Segment 10 trilobed, the cleft very deep and bearing a few pale short setae. *Legs* shorter than maxillary palpi, ferruginous, setose. *Spiracles* with peritreme rather narrowly oval, very thick and scarcely raised above general level of cuticle.

This larva possesses several unusual features, of which the most striking is the comparatively strong and very extensive sclerotisation of the mouthparts and abdominal segments in larger specimens of over 120 mm. in length. Another peculiarity,

apparently so far unique in the Cerambycidae, is the presence of eight pairs of very distinct pleural discs; previously only six pairs, at the most, have been observed, the posterior pairs usually being rather indistinct. The pectinate frons and presence of a sub-antennal process are also striking modifications.

Host plants: *Croton*, *Cupressus*, *Pittosporum abyssinicum* (J.C.M.G.); *Theobroma* (Ghesquière, 1921).

Biology. According to J. C. M. Gardner the adults of this species are remarkably resistant to paradichlorobenzene. A beetle was found to be still alive after having been placed in this chemical for fifteen days, and could even manage to move its legs until about ten days after.

Material studied. 1 L, Kenya, Limuru, 1953, from *Croton*, J.C.M.G. leg., in coll. B.M.; larval exuviae (adult reared), Kenya, Eldoret, 1953, from decayed stem, J.C.M.G. leg., in coll. B.M.; 1 L, Gold Coast, Ashanti, Sefwi, 1903, in coll. B.M.

References. Ghesquière, 1921 (Biol.).

Acanthophorus (s.g. **Tithoes**) **confinis** Castelnau

Distribution. ETHIOPIAN REGION: throughout tropical and South Africa.

Host plant: *Anacardium occidentale* (J.C.M.G.).

References. None available.

Acanthophorus (s.g. **Ceratocentrus**) **spinicornis** (Fabricius) (=**Dorycera spinicornis** (Fabricius))

Distribution. ETHIOPIAN REGION: Gold Coast, Fernando Póo, Ivory Coast, Kenya, Nigeria, Sierra Leone, Uganda.

Mature larva. Length up to 90 mm.; maximum breadth (at prothorax) 15 mm. Form cylindrical, moderately robust, slightly tapering posteriorly. *Head* moderately depressed, slightly transverse (maximum head-width 7·3 mm.). Gena strongly shouldered, smooth, testaceous to ferruginous, with a distinct vertical carina beneath ocelli. Mouthframe moderately sclerotised, ferruginous; setal punctures shallow. Front margin of frons ferruginous, moderately strongly sclerotised; upper boundary flattened, slightly produced above clypeus, with front margin regular; lower boundary produced over clypeus (more strongly so laterally), with front margin curved but regular. Postcondylar carina shallow. Subfossal process conical. Antennae partly retracted, 2-segmented, segment 2 elongate, gradually narrowed to apex where it is obliquely truncate and bears a few sensory setae. Labrum transversely oval. Three pairs of ocelli present beneath antennal foramen; ocellar lens convex; pigmented spot indiscernible owing to strong sclerotisation of lens. Ventral mouthparts moderately strongly sclerotised, testaceous to ferruginous for greater part. *Prothorax* scarcely sloping anteriorly. Pronotum with a transverse ferruginous band. Prosternum rugose but not tuberculate. *Abdomen* not sclerotised, milky-white, fleshy; ampullae not callose. Pleural discs not contrasting in colour with surrounding cuticle; indiscernible on segments 7 and 8.

Pupa (fig. 35). Length up to 46 mm.; maximum breadth 11 mm. *Head* salient, not concealed from above by prothorax, smooth, glabrous. Mandibles extending anteriorly,

very stout and bearing a few very fine, scattered, pale setae on outer face. Antennae robust, segments strongly pectinate apically, slightly curved (but not recurved ventrally) and terminating near abdominal sternite 5. *Pronotum* strongly transverse, with sides each bearing three large spine-like tubercles, the middle one the longest and curved posteriorly; disc with a median fovea around which it is protuberant, strigose, and bears subconical tubercles which are spinose apically. *Mesonotum* transversely strigose and with a few spinules on the protuberant scutellum. *Metanotum* smooth, with numerous scattered spinules. Elytra and wings extending as far as abdominal segment 5. *Abdomen* with tergites bearing numerous scattered, short spinules, each with a subapical seta; gin-traps absent. Sternites glabrous or almost so. *Legs* with hind femora extending to abdominal segment 6. *Functional spiracles* present on abdominal segments 1–6; peritreme narrowly oval, pale, rather thick and raised above general level of cuticle.

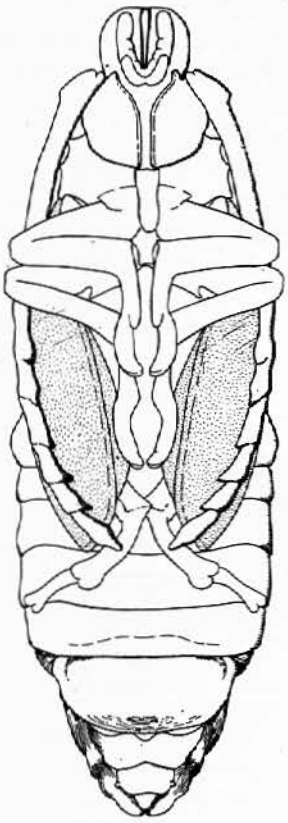


Fig. 35. *Acanthophorus spinicornis* (Fabricius). Pupa. Ventral aspect.

Host plants: *Antiaris africana* (G.H.T.); *Sapium ellipticum* (J.C.M.G.); *Phialodiscus bancoensis*, *Lophira procera* (Jover, 1954).

Biology. The following observations have been made by G. H. Thompson. Oviposition takes place on dead trees and pupation occurs in the sapwood. Adults readily fly to light during the months of July and September. According to Jover (1954), adults have been observed to feed on leaves of a liane.

Material studied. 1 L (I reared), Kenya, 1953, from rotten *Sapium ellipticum*, J.C.M.G. leg., in coll. B.M.; 1 L, 1 P, 1 I, Gold Coast, 20.vii.1945, from *Antiaris africana*, G.H.T. leg., in coll. G.H.T.

References. Jover, 1954 (Biol.).

Dorysthenes (s.g. **Opisognathus**) **forficatus** (Fabricius)

Distribution. PALAEARCTIC REGION: Morocco.

Mature larva (fig. 36). Length up to 90 mm.; maximum breadth (at prothorax) 15 mm. Form subcylindrical, robust, gradually tapering posteriorly to segment 9. *Head* moderately depressed, slightly transverse (maximum head-width 10·1 mm.). Genae strongly shouldered, rugose, broadly ferruginous to pitchy and bearing a few pale setae. Mouthframe strongly sclerotised, rugose, broadly pitchy. Front margin of frons comprising a heavily sclerotised, pitchy ridge which is abruptly sloping; upper boundary varying from straight to very feebly bilobed, keel-shaped and notched medially; lower boundary produced over clypeus as an evenly curved flange which is

broadest laterally (in some specimens the anterior margin is slightly notched paramedially). Postcondylar carina distinct; subfossal process acutely conical. Antenna (fig. 36) 3-segmented; segment 2 subquadrate, barrel-shaped, obliquely truncate apically and bearing a minute oval sensory organ and a slightly elongate, distinctly sclerotised apical segment. Mandible very robust, pitchy, shining, with outer face strongly rugose and bearing a few stout setae. Labrum transversely oval, leathery, with front margin densely setose. Ocelli indiscernible. *Prothorax* moderately depressed, about twice as broad as long, with an orange-brown, transverse band near front margin. Pronotum with lateral groove deep, complete; median cleavage line indistinct; posterior area of pronotum vermiculately rugose and sparsely setose. Eusternum distinct, triangular, vermiculately rugose and sparsely setose. *Mesonotum* and *metanotum* finely rugose, glabrous. *Abdomen* with dorsal and ventral ampullae on segments 1–7; ampullae smooth and very sparsely setose. Pleural discs present on segments 1–6; each radially striate, with a deep pore. Segment 9 smooth, somewhat extended. Segment 10 trilobed, the lobes compact and strongly protuberant. *Legs* slightly shorter than maxillary palpi, ferruginous, densely setose. *Spiracles* with peritreme broadly oval, rather thick and slightly raised above general level of cuticle.

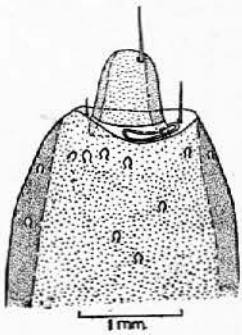


Fig. 36. *Dorysthenes forficatus* (Fabricius). Mature larva. Apical part of antenna. Lateral aspect.

Egg. Length 3·5–4·5 mm.; breadth 1·5 mm. Form elongate-oval, sometimes slightly curved, rounded at both ends. Chorion hard, yellowish white, densely micropunctate (Bouhélier and Hudault, 1936; Rotrou, 1936).

Host plants: *Chamaerops humilis*, *Vitis* (Bouhélier and Hudault, 1936).

Biology. Before oviposition, the female excavates a pit about 2 to 4 cm. deep in the soil with the aid of its mandibles and front legs; this operation lasts about an hour. According to Bouhélier and Hudault (1936) eggs are laid either singly or in batches of two to five, but Rotrou (1936) states that about thirty eggs are deposited in a single pit, forming a sticky mass. After oviposition the pit is filled up again. The number of eggs produced by a single female is about sixty and the incubation period is twenty to twenty-five days.

The larvae feed on the underground portions of the host plants either externally or, which is more usual, internally; in the latter case, vertical galleries are excavated. Larvae frequently pass from one plant to another by tunnelling through the soil. They sometimes attack the roots of dwarf palm but usually girdle the base of the main stem sufficiently deeply to cause the withering of the plant. In the case of vines they sometimes gnaw at part of the cortex but usually excavate a vertical gallery, either upward or downward. The resulting damage weakens the plant so that it is easily broken and cannot form fruit. The pupal cocoon, which is 6 to 7 cm. long by 3 to 4 cm. broad, is formed from compressed particles of wood and soil. The pupal period is about twenty-five days. Adults emerge from early June to late August, those in captivity having lived only eighteen to twenty days. Copulation takes place a few days after emergence and is repeated several times during oviposition,

each act lasting only a few seconds. Adults apparently do not feed; their flight is heavy and they are essentially crepuscular and during the daytime they seclude themselves under stones or in crevices. Females are much rarer than males, but the latter are ferocious fighters and severely mutilate one another (Bouhélier and Hudault, 1936; Rotrou, 1936).

Parasites. Many larvae are killed by the parasitic fungus *Beauvaria* sp., which also attacks the eggs, pupae and adults. Eggs and larvae are also destroyed by *Oospora* sp. (Bouhélier and Hudault, 1936).

Economic importance. This species is fairly common in Morocco on dwarf palm and has recently caused considerable damage to vines. Infestation does not, however, spread very rapidly to vineyards from neighbouring palms. Natives, to whom the larvae are known as "Korta Hlima", consume them when other food is scarce.

Control. Proposed control measures include the uprooting of withered plants in summer and the destruction of the larvae, and similar action in winter when the plants are being pruned, followed by the exposure of the bases of the plants as far as the roots and the destruction of all larvae found in the surrounding soil (Bouhélier and Hudault, 1936.)

Material studied. 10 L, Morocco, Casablanca, 1938, R. Bouhélier leg., in coll. B.M.

References. Bouhélier and Hudault, 1936 (E, L fig., I fig., Biol. fig., Paras., Contr.); Duffy, 1953a (Biol.); Lepesme, 1947 (Biol.); Mendizabal, 1943 (I fig., Biol.); Rotrou, 1936 (E, Biol.); Théry, 1919 (Biol., fig.); Villiers, 1946 (I fig., Biol.).

Prionus (s.g. **Prionus**) **coriarius** (Linnaeus)

Illustrated descriptions of the immature stages and a comprehensive account of the biology of this species have recently been published (Duffy, 1953a).

Distribution. PALAEARCTIC REGION: Algeria, Tunisia.

Mature larva. See key, p. 13.

Pupa. See key, p. 37.

Host plants: *Quercus ilex*, *Q. afares*, *Alnus glutinosa*, *Abies numidica* and many other trees (Villiers, 1946); *Ficus* (Hagan, 1921).

Additional references. Caillol, 1914 (Biol.); Hagan, 1921 (Biol.); Mühlmann, 1954 (L fig., I fig., Biol.); Villiers, 1946 (I fig., Biol.).

Prionus (s.g. **Polyarthron**) **pectinicornis** Fabricius

Distribution. ETHIOPIAN REGION: Republic of the Sudan, Senegal. PALAEARCTIC REGION: Algeria, Morocco.

Mature larva. No material available. For generic characters see key, p. 13.

Host plants: *Phoenix dactylifera*, *Acacia*.

References. Lepesme, 1947 (Biol.); Villiers, 1946 (I fig., Biol.).

Anacolini

Anoeme sp.

This larva would seem to form a connecting link between the PARANDRINAE and the PRIONINAE, as it possesses certain primary characters of both subfamilies.[1] For

[1] The characters relating to the larva of this species as given in the key (p. 13) serve to corroborate Crowson's contention (1953) that species of this genus are true prionids. *Anoeme* larvae may perhaps have closer affinities with the Philinae than with the Parandrinae, but so far larvae of the former subfamily are unknown.

example, the postcondylar carina and subfossal process characteristic of the PRIONINAE are absent and the ampullae, as in all larvae of the PARANDRINAE so far examined, are densely spiculate. On the other hand, the pronotum is not asperate, neither are the marginal chambers of the spiracles distinct.

Mature larva (figs. 37, 38). Length up to 24 mm.; breadth (at prothorax) 4·2 mm. Form cylindrical, rather slender and slightly tapering posteriorly. *Head* scarcely depressed, slightly transverse (maximum head-width 2·9 mm.). Genae not strongly shouldered. Mouthframe moderately strongly sclerotised, ferruginous. Front margin of frons roundly declivous (as in *Macrotoma*), without a sclerotised ridge on upper boundary; lower boundary not projecting over clypeus. Postcondylar carina and

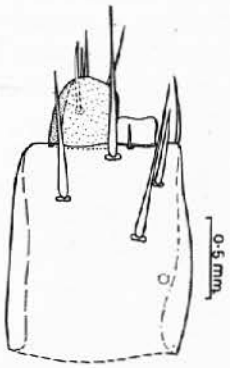


Fig. 37

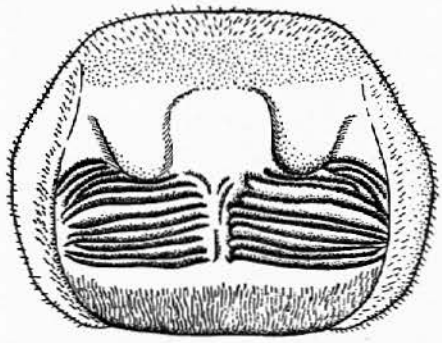


Fig. 38

Figs. 37–38. *Anoeme* sp. Mature larva. Fig. 37. Apical part of antenna. Lateral aspect. Fig. 38. Pronotum.

subfossal process absent. Antennae 3-segmented, segment 3 elongate and strongly sclerotised (fig. 37). Ocelli indiscernible (absent?). Mandible robust, pitchy, with outer face smooth. Labrum strongly transversely oval, ferruginous posteriorly and densely fringed anteriorly with pale setae. Gula extremely short, with sutures diverging to meet anterior portion of occipital foramen. Maxillary palpi with segment 3 stoutly conical, about as long as segment 2. Labial palpi with segment 2 conical, much shorter than segment 1. *Prothorax* scarcely depressed, obliquely inclined and about twice as broad as long. Pronotum sparsely setose, with a testaceous, transverse band near front margin; posterior area coarsely and transversely plicate (fig. 38), the ridges rather strongly sclerotised, testaceous. Eusternum distinct from presternum, the latter transversely striate as in pronotum. *Mesonotum* and *metanotum* densely micro-spiculate. *Abdomen* with dorsal and ventral ampullae densely micro-spiculate. Pleural discs indistinct. Segment 9 short, not extended. Anus trilobed, each lobe sparsely setose. *Legs* about as long as maxillary palpi, fleshy, pale; unguiculus attenuated, imbricately spinose. *Abdominal spiracles* with peritreme subcircular, thin, pale, testaceous and not raised above general level of cuticle.

Material studied. 3 L, 1 I, Kenya, Londiani, 1953, from rotten stump, J.C.M.G. leg., in coll. B.M.

Gen. et sp. indet.

Mature larva (fig. 39). Owing to the unusual structure of the prosternum of this larva, it has been illustrated here (fig. 39) despite the fact that its identity is not yet known. The prosternal processes are so conspicuous that larvae should readily be recognised in the field and, it is hoped, eventually associated with adults. (See *Eudianodes swanzyi* Pascoe, p. 329.)

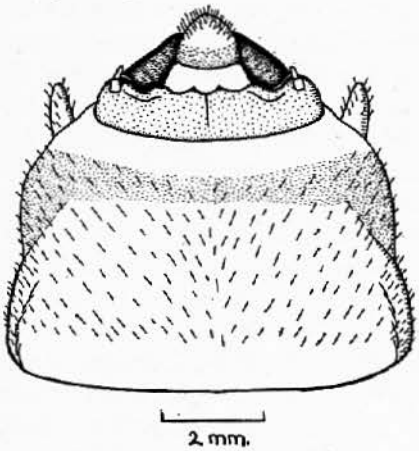


Fig. 39. Gen et sp. indet. Mature larva. Head and prothorax. Dorsal aspect.

Material studied. 2 L, Uganda, from dead *Lasiodiscus*, 1953, J.C.M.G. leg., in coll. B.M.

3. LEPTURINAE

Larval Characters

Form subcylindrical to strongly depressed (except *Vesperus*, fig. 40). *Head* slightly to strongly transverse; epicranial halves entirely separated behind frons (except in a few exotic species); occipital foramen not divided into an anterior and posterior portion, as the tentorial cross-arm is internal; postero-dorsal emargination very strong, extending to frons; front margin of frons never steeply declivous or projecting over clypeus and with six to ten (occasionally as many as twenty) epistomal setae. Clypeus trapezoidal, as wide at base as front margin of frons. Labrum transverse, semicircular or cordate. Mandibles with an oblique cutting edge, apex acutely produced. Ocelli absent or one to six pairs present. Antennae very small, retractile; 2- or 3-segmented. Maxillae movable; palpifer with outer margin straight and bearing lobe. Ligula larger than labial palpi. *Prothorax* with eusternum distinct, triangular. *Abdomen* with ampullae tuberculate; epipleurum strongly protuberant on all segments but region surrounding spiracle not protuberant; pleural discs absent; segment 9 sometimes with a terminal spine or urogomphi. *Legs* slender and rather long; coxae large, almost touching inwardly between eusternum and sternellum; unguiculus with a long stout seta arising near base. *Spiracles* of mesothorax not protruding into prothorax; all spiracles with small, nearly contiguous marginal chambers.

Vesperus flaveolus Mulsant and Rey

Distribution. PALAEARCTIC REGION: Algeria, Tunisia.

Mature larva (figs. 40–41). The larva of this species is not available. The following description is based on that of *V. xatarti* Duftschmidt, which should be very similar. Length up to 20 mm.; maximum breadth (at prothorax) 11 mm. Form short, less than twice as long as broad, extremely plump and robust, with abdomen slightly enlarged and truncate posteriorly. *Head* (fig. 41) much narrower than prothorax, quadrate, very slightly depressed, with sides slightly converging posteriorly; frontal sutures indiscernible; mouthframe very feebly sclerotised, almost entirely testaceous. Frons testaceous, with numerous scattered, deep pores bearing coarse setae. Clypeus very strongly produced anteriorly and fused basally with frons; strongly sclerotised, subcarinate and setose laterally. Labrum transversely oval and fringed with coarse setae. Ocelli absent. Hypostoma flat, testaceous, with sutures undefined; gular region undefined. Antennae extremely long, about half length of mandible, 3-segmented, with basal membrane greatly enlarged; segment 1 extremely elongate; segment 2 about half length of segment 1; segment 3 minute, elongate, cylindrical, accompanied by a minute supplementary process. Maxilla with palpal segment 3 elongate, conical, as long as segment 2. Labial palpi with segment 2 elongate, conical, as long as segment 1. Mentum distinct from submentum. *Prothorax* with pronotum densely covered with reddish setae (except for a transverse median, glabrous area), especially across front margin; prosternum similar. *Abdomen* (fig. 40) with each tergite flat, without ampullae or tubercles; covered with rather dense spinules except posterior margin which is fringed with long fine setae. Segments 9–10 strongly retracted. Sternites with spinules and setae as on tergites. Epipleurum strongly protuberant on all segments. *Legs* well developed, 4-segmented, densely setose. *Spiracles* with peritreme rather thick and broadly oval.

First-instar larva (fig. 42). No material available, but the accompanying illustration of *V. xatarti* Duftschmidt (after Mayet, 1890) shows that it is very different in form from the mature larva.

Egg. Length 3 mm.; breadth 1 mm. Chorion white (Balachas, 1903).

Pupa. No material available. It has been briefly described and figured by Mayet (1890).

Host plants: *Vitis*, *Olea* (Caillol, 1914). The European *V. xatarti* attacks *Vitis*, and all species, so far as are known, feed at roots of plants.

Biology. Scarcely anything is known of the biology of this species. According to Balachas (1903) the female lays between 300 and 400 eggs around the bases of stems and roots of *Olea.* The eggs are laid in more or less triangular masses, stuck one to another with a secretion. The incubation period is three months. The first-instar larva soon starts to bury itself in the soil. The larval stage usually lasts about thirty-six months, the pupal stage three months, the adult living for only six to eight weeks. Balachowsky and Mesnil (1935–1936) give the following information concerning related species. Adults are crepuscular and oviposit in the spring in bark or under stones; sometimes eggs are scattered about with no protection. Pupation takes place in the soil, the cocoon being made of particles of earth stuck together with a secretion. Larvae undergo hypermetamorphosis.

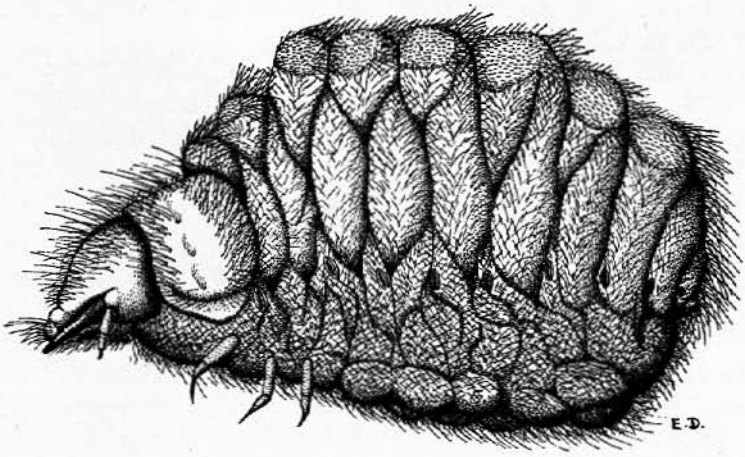


Fig. 40

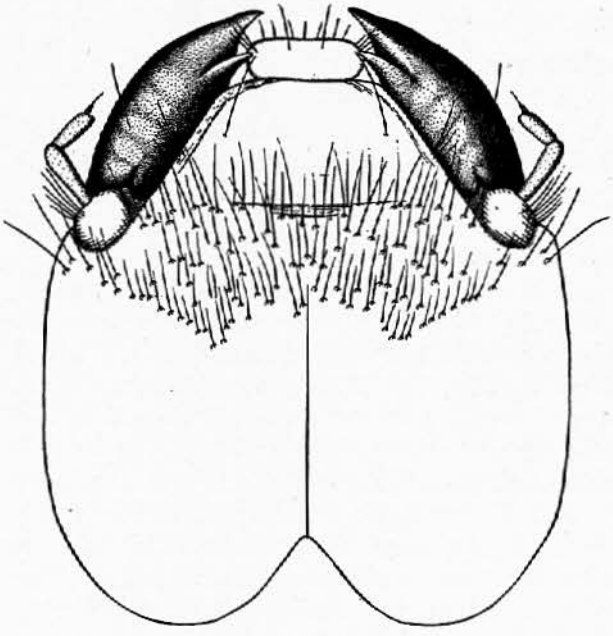


Fig. 41

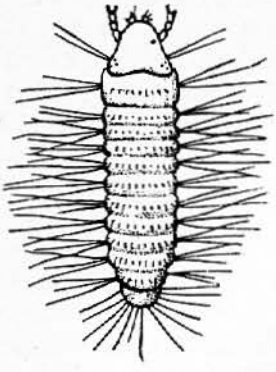


Fig. 42

Figs. 40–41. *Vesperus xatarti* Duftschmidt. Mature larva. Fig. 40. Lateral aspect. Fig. 41. Head. Dorsal aspect.

Fig. 42. *Vesperus xatarti* Duftschmidt. First-instar larva. Dorsal aspect (after Mayet, 1890)

Material studied. 2 L, Spain, Morata del Talou, xi.1951, in coll. F.I.E.; 1 L, France, Banyals, xi.1951, in coll. F.I.E.

References. Balachas, 1903 (Biol.); Balachowsky and Mesnil, 1935–1936 (Biol.); Caillol, 1914 (Biol.); Lucciani, 1845 (Biol.); Mayet, 1890 (L fig., Biol. of *V. xatarti*); Mühlmann, 1954 (Biol.); Perris, 1877 (L); Villiers, 1946 (I fig., Biol.); Xambeu, 1898–1902 (L).

Apatophysis barbara Lucas

Distribution. PALAEARCTIC REGION: Algeria, Tunisia.

Host plants: *Limoniastrum guyonianum* (Peyerimhoff, 1926); *Phoenix* (Surcouf, 1923).

Biology. Larvae infest dead wood, either just above or in the sand, and take up to seven years to attain maturity. During winter the larvae often leave the wood and burrow through the sand in search of fresh wood. Pupation may occur either in the wood or in the sand. Emergence takes place during May and June. Males fly at dusk, the females resting on branches (Peyerimhoff, 1926).

Predators. Acarina: *Pediculoides ventricosus* Newp. These mites have been observed to kill *Apatophysis* larvae when they are in the sand.

References. Peyerimhoff, 1926 (Biol.); Surcouf, 1923 (Biol.); Villiers, 1946 (I fig., Biol.).

Apiocephalus punctipennis Gahan

Distribution. ETHIOPIAN REGION: East Africa.

Larva (not mature) (figs. 43, 44). Length 17 mm.; maximum breadth (at prothorax) 4 mm. Form rather stout, extremely depressed and parallel-sided. *Head* strongly and entirely sclerotised, ferruginous, with long lateral setae, sides widely produced and angulate, the antero-lateral margins each with two acute projections, the inner pair bearing the minute antennae. Front margin of frons straight and produced paramedially into a pair of large conical, strongly sclerotised, tooth-like projections; six epistomal setae present. Antenna (fig. 44) minute, 3-segmented; segment 3 subquadrate; supplementary process acutely conical, strongly attenuated, at least as long as segment 3. Mandible very slender, outer face strongly angulate medially and bearing two stout setae. Three pairs of ocelli present, one near external basal angle of antennal projection, another similarly placed on the outer projection, and one pair placed ventrally; lens strongly protuberant, pigmented spot distinct. Hypostoma flat, with sutures ferruginous, straight and divergent. Gular sutures and cleavage line indiscernible. Maxilla with segment 3 of palp longer than segment 2, lobe slender, cylindrical. *Prothorax* with strongly transverse pronotum, lateral margins subparallel, distinctly sclerotised and with six pairs of lateral teeth, the posterior pair bifurcate and strongly curved ventrally; with a well-defined sternal plate and a narrow longitudinal sclerotised area on each side sublaterally. *Abdomen* (fig. 43) very strongly depressed, with segments 1–8 bearing lateral peg-like tuberculate processes; each process bearing apically a pair of slender spines, a pair of blunt teeth and four long setae. Ampullae scarcely protuberant, tuberculate, glabrous, shining and with a shallow transverse furrow. Segment 9 large, extended, with bifurcate marginal teeth as figured. Anus ventral, bilobed. Pleural areas densely covered with corneous

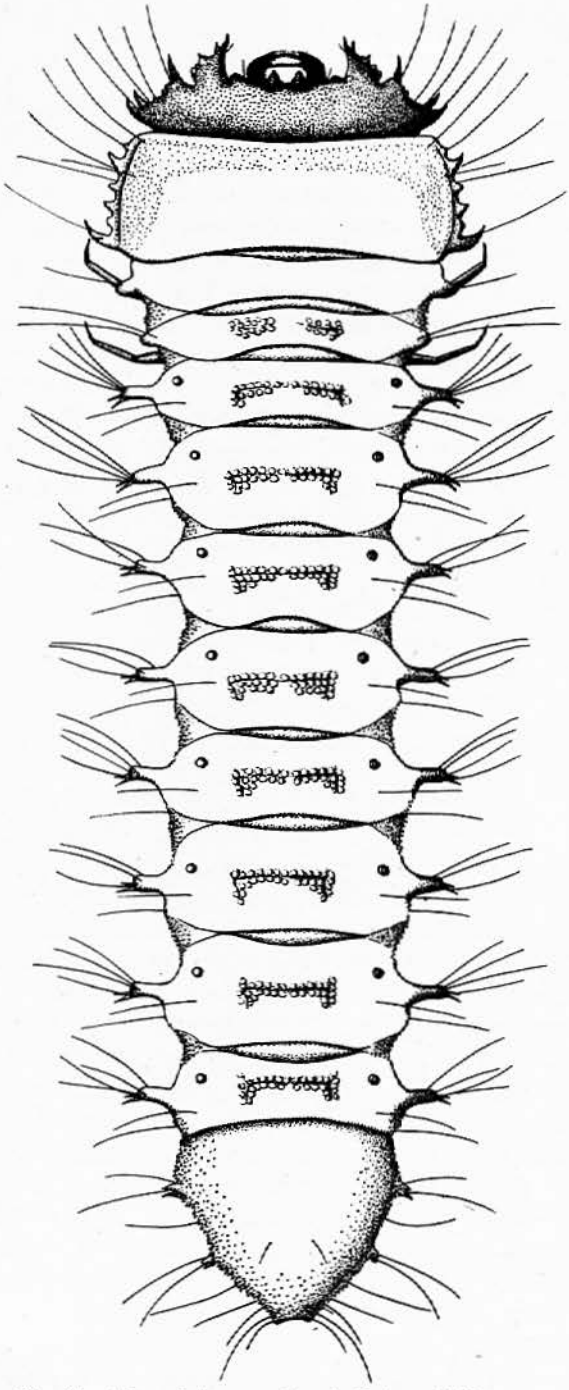


Fig. 43. *Apiocephalus punctipennis* Gahan. Half-grown larva. Dorsal aspect.

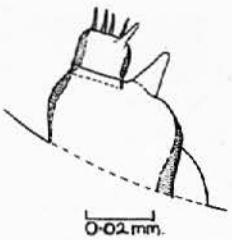


Fig. 44. *Apiocephalus punctipennis* Gahan. Half-grown larva. Apical part of antenna. Lateral aspect.

dentiform granules. *Legs* slender, strongly sclerotised, extremely long, protruding laterally and visible from above. *Spiracles* placed dorsally, with peritreme round, thick and lined on inner margin with subcontiguous chambers.

As pointed out in a previous work (Duffy, 1953a), larvae of this group bear striking affinities towards the European lepturid *Acmaeops collaris* (Linnaeus).

The extremely depressed form of this larva suggests a strict subcortical existence and the fact that locomotion is facilitated by means of the unusual lateral processes (the ampullae being scarcely raised) would suggest that the larval galleries are excavated in trees when the bark is firm and not decayed.

Host plant: *Sterculia rhynchocarpa* (J.C.M.G.).

Material studied. 1 L, Ntito Ndei, 1952, from stems of *Sterculia rhynchocarpa*, J.C.M.G. leg., in coll. B.M. 1 L, German East Africa, Lulanguru, 10.xi.1917, under bark, G. D. Hale Carpenter leg., in coll. B.M.

References. None available.

Rhamnusium algericum Pic

Distribution. PALAEARCTIC REGION: Algeria.

Mature larva. The larva of this species is not available, but it should be essentially similar to that of *R. bicolor* Schrank (fig. 45) which is here described. Length up to 22 mm.; breadth (at prothorax) 5·1 mm. Form subcylindrical, parallel-sided. *Head* slightly narrower than prothorax, scarcely depressed, strongly transverse with sides strongly rounded; testaceous, shining, rather strongly sclerotised and sparsely covered with fine setae. Temples feebly vertically strigose, bearing several long fine setae; mouthframe strongly sclerotised, rugose, ferruginous; front margin of head ventrally with a prominent, conical, sclerotised tubercle on acetabulum in which the *condylus mandibulae* rotates. Frons triangular, without a transverse suture, at least ten epistomal setae present. Antenna minute, 3-segmented; segment 3 elongate, strongly sclerotised and bearing a few apical setae; supplementary process elongate, conical, as long as segment 3. Mandible with an oblique, micro-granulate, striate plate. One pair of ocelli present; lens large, oval, protuberant; pigmented spot indistinct. Hypostoma at least four times as wide as median length, bearing several fine setae; sutures ferruginous, scarcely curved. Gula broad, sutures strongly raised. Maxilla with segment 3 of palp slightly shorter than segment 2. Labial palpi with segment 2 slightly shorter than segment 1. *Prothorax* scarcely depressed, nearly three times as wide as long; sclerotised, testaceous, with a ferruginous band across front margin; lateral grooves distinct only for basal third; posterior half of pronotum coarsely vermiculately rugose. Proeusternum, mesonotum, metanotum and sterna dull, velvety spiculate. *Abdomen* with ampullae present on tergites 1–7; each dorsal ampulla with two transverse furrows and four transverse rows of moniliform, micro-spiculate tubercles. Pleural tubercle elongate-oval and bearing two very long and several much shorter setae. Tergite 9 (fig. 45) produced posteriorly into a large, robust, tapering tubercle which is sclerotised and bifid apically and as long as the segment itself. Anus trilobate, the lobes compact and setose. *Legs* well developed, longer than maxillary palpi, slender, testaceous; femur and tibiotarsus elongate, equal in length; unguiculus attenuated, strongly sclerotised. *Spiracles* with peritreme rather narrowly oval, strongly sclerotised, and slightly raised above general level of cuticle; a row of small, subcontiguous, marginal chambers present on posterior half.

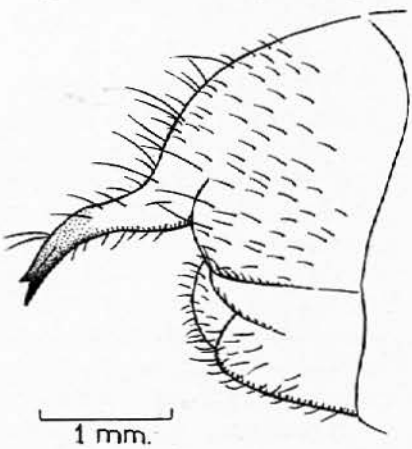


Fig. 45. *Rhamnusium bicolor* Schrank. Mature larva. Abdominal segment 9. Lateral aspect.

Host plant: *Quercus.*

Material studied. 2 L (*R. bicolor*), Paris, 30.v.1938, A. Villiers leg., in coll. N.H.P.

References. Emden, 1939–1940 (L of *R. bicolor*); Villiers, 1946 (L fig. (of *R. bicolor*), I fig., Biol.).

Rhagium (s.g. **Hargium) inquisitor** (Linnaeus)

Illustrated descriptions of the immature stages and an account of the biology of this species have recently been published (Duffy, 1953a).

Distribution. PALAEARCTIC REGION: Algeria.

Mature larva. See key, p. 14.

Pupa. See key, p. 38.

Host plants: *Cedrus atlantica, Abies numidica* (see also Duffy, 1953a).

Additional references. Caillol, 1914 (Biol.); Mühlmann, 1954 (Biol.); Villiers, 1946 (I fig., Biol.).

Leptura (s.g. **Leptura) fontenayi** Mulsant

Distribution. PALAEARCTIC REGION: Algeria, Morocco, Tunisia.

Mature larva. No material available. For generic characters see key, p. 15.

Host plants: *Cedrus, Acer obtusatum, Eucalyptus globulus, Quercus, Ulmus, Ficus* (Villiers, 1946).

References. Mühlmann, 1954 (Biol.); Picard, 1929 (Biol.); Villiers, 1946 (I fig., Biol.); Xambeu, 1898–1902 (Biol.).

Leptura (s.g. **Leptura) rubra** (Linnaeus)

Illustrated descriptions of the immature stages and a biological account of this species have recently been published (Duffy, 1953a).

Distribution. PALAEARCTIC REGION: Algeria, Morocco.

Mature larva. See key, p. 15.

Pupa. See key, p. 38.

Additional references. Caillol, 1914 (Biol.); Villiers, 1946 (I fig., Biol.).

Leptura (s.g. **Leptura) suberis** Chobaut

Distribution. PALAEARCTIC REGION: Algeria.

Mature larva. No material available. For generic characters see key, p. 15.

Host plant: *Quercus suber.*

Biology. Adults emerge in June.

References. Villiers, 1946 (I fig., Biol.).

Leptura (s.g. **Leptura) dubia** Scopoli

Distribution. PALAEARCTIC REGION: Algeria.

Mature larva. No material available. For generic characters see key, p. 15.

Host plant: *Abies numidica* (Villiers, 1946).

Biology. Larvae infest roots of Coniferae. Adults emerge from April to June.

References. Perris, 1877 (L fig., Biol.); Villiers, 1946 (I fig., Biol.); Xambeu, 1898 (P, Biol.), 1898–1902 (L, Biol.).

Leptura (s.g. **Leptura**) **scutellata** Fabricius

Illustrated descriptions of the immature stages and a biological account of this species have recently been published (Duffy, 1953a).

Distribution. PALAEARCTIC REGION: Algeria, Tunisia.

Mature larva. See key, p. 15.

Pupa. See key, p. 38.

Additional host plants: *Quercus afares*, *Q. ilex* (Villiers, 1946).

Additional references. Caillol, 1914 (Biol.); Mühlmann, 1954 (Biol.); Villiers, 1946 (I fig., Biol.).

Leptura (s.g. **Leptura**) **tangerina** Tournier

Distribution. PALAEARCTIC REGION: Morocco.

Mature larva. No material available. For generic characters see key, p. 15.

Host plant: *Quercus suber*.

References. Villiers, 1946 (I fig., Biol.).

Leptura (s.g. **Vadonia**) **unipunctata** Fabricius

Distribution. PALAEARCTIC REGION: Algeria, Morocco.

Mature larva. No material available. For generic characters see key, p. 15.

Egg. Length 2 mm.; breadth 0·5 mm. Elongate, fusiform, rounded at both ends. Chorion white, finely punctured and shining (Xambeu, 1898).

Host plant: *Prunus spinosa* (Xambeu, 1893).

Biology. The larvae infest small branches and when nearly mature they tunnel down as far as the roots, where they turn round and pupate. Pupae are very active and are capable of moving up and down their cells. Adults appear during July and often assemble on flowers (Xambeu, 1893; Villiers, 1946).

Parasites. Hymenoptera: *Astatus boops* Schrank (Xambeu, 1898–1902).

References. Caillol, 1914 (Biol.); Villiers, 1946 (I fig., Biol.); Xambeu, 1893 (L, P, Biol.), 1898 (E, Biol.), 1898–1902 (L, P, Biol.).

Strangalia (s.g. **Strangalia**) **aurulenta** (Fabricius)

Illustrated descriptions of the immature stages and a biological account of this species have recently been published (Duffy, 1953a).

Distribution. PALAEARCTIC REGION: Algeria.

Mature larva. See key, p. 15.

Pupa. See key, p. 38.

Additional references. Mühlmann, 1954 (Biol.); Villiers, 1946 (II fig., Biol.).

Strangalia (s.g. **Strangalia**) **distigma** (Charpentier)

Distribution. PALAEARCTIC REGION: Algeria, Morocco, Tunisia.

Mature larva. No material available. For generic characters see key, p. 15.

Host plant: *Quercus* (Villiers, 1946).

Biology. Adults assemble on flowers, especially those of Umbelliferae, in May and June.

References. Villiers, 1946 (I fig., Biol.).

Grammoptera ruficornis (Fabricius)

Illustrated descriptions of the immature stages and a biological account of this species have recently been published (Duffy, 1953a).

Distribution. PALAEARCTIC REGION: Algeria.

Mature larva. See key, p. 15.

Pupa. See key, p. 37.

Additional references. Caillol, 1914 (Biol.); Mühlmann, 1954 (Biol.); Villiers, 1946 (I fig., Biol.).

Dorcasomini

Dorcasomus gigas Aurivillius

Distribution. ETHIOPIAN REGION: Uganda.

Mature larva (fig. 46). Length up to 63 mm.; breadth (at prothorax) 12 mm. Form elongate, subcylindrical, robust and slightly tapering posteriorly. *Head* distinctly narrower than prothorax, trapezoidal (maximum head-width 6·9 mm.), slightly depressed, with sides almost straight and diverging posteriorly. Genae ferruginous, with a deep vertical impression near front margin. Mouthframe rugose, strongly sclerotised and pitchy. Frons not transversely divided; apparently only four epistomal setae present. Antenna (fig. 46) 3-segmented. Mandible very short and robust, less than twice as long as basal width; pitchy, strongly shining; ventral apical angle acutely pointed; dorsal angle of inner margin a flattened, striate plate. Labrum transversely oval, testaceous, with fine dense setae. Three pairs of small, round, subcontiguous ocelli present; pigmented spot rather indistinct; posterior to these ocelli is a larger, oval weal which may possibly be another ocellus (vestigial?). Hypostoma smooth, testaceous, except front margin which is narrowly pitchy. Gular sutures parallel, very strongly raised, almost carinate. Maxilla well extended, movable; palpus slender; segment 3 shorter than segment 2; lobe short, robust. *Prothorax* about twice as broad as long; dorsally obliquely sloping, testaceous. Anterior part of pronotum smooth, posterior area coarsely, vermiculately rugose; lateral grooves deep, very distinct; a short pair of longitudinal, sublateral grooves also present, the posterior margin thus being trilobed. *Mesonotum, metanotum* and prosternum vermiculately rugose. *Abdomen* with ampullae present on segments 1–7; each dorsal ampulla with two transverse furrows, the area between and around them densely tuberculate. Abdominal tergite 9 smooth, sparsely setose, unarmed. *Legs* proportionately short; unguiculus slender, testaceous.

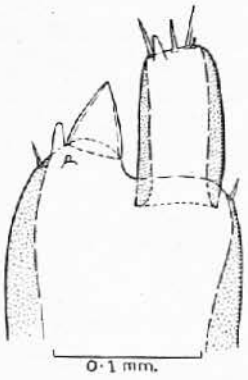


Fig. 46. *Dorcasomus gigas* Aurivillius. Mature larva. Apical part of antenna. Lateral aspect.

Pupa. Length up to 44 mm.; maximum breadth 18 mm. *Head* elongate, with vertex dome-shaped, glabrous and concealed from above by prothorax; front and clypeus smooth, glabrous. Antennae pectinate, extending as far as abdominal segment 1, where they are strongly curved downward to terminate near apices of mid-tibiae. Eyes and mandibles glabrous. Labrum small, trapezoidal, glabrous. *Pronotum* slightly transverse, with sides very strongly and acutely tuberculate; front margin strongly rounded; disc transversely striate, with scattered setose papillae. *Mesonotum* and *metanotum* with a pair of paramedian groups of pale papillae. Elytra and wings extending to abdominal segment 4. *Abdomen* with tergites 1–8 each bearing a transverse group (interrupted medially) of short, ferruginous spines (each with a subapical seta). Tergite 9 with a median group of slightly larger, stronger spines, which are slightly incurved. Sternites glabrous. Pleura strongly protuberant, each with a pair of short spines. *Legs* completely glabrous; hind tibiae with apical spurs very short; tarsi shorter than tibiae; hind femora extending to abdominal segment 4.

Functional spiracles present on segments 1–5; peritreme narrowly oval, thick, strongly raised above general level of cuticle.

The pupa, unlike the larva of this species, can only with difficulty be included in the LEPTURINAE, as all main characters (i.e. presence of urogomphi on segment 9 and setae on femora, tarsi, etc.) are absent. The larva, however, is unquestionably lepturine.

Host plant: *Bersama.*

Biology. Larvae infest stems and branches of living trees, in which they excavate wide galleries along centre (J.C.M.G.).

Material studied. 2 L (adult reared), Uganda, 1953, from *Bersama* sp., J.C.M.G. leg., in coll. B.M.; 4 L, 4 P, 1 I, Uganda, 1919, Sells leg., in coll. B.M.

References. None available.

4. DISTENIINAE

Unfortunately nothing is known of the biology of the Old World DISTENIINAE and no immature material is available. According to Craighead (1923) this subfamily, on the basis of two North American species of *Distenia*, possesses a peculiar combination of lepturine and cerambycine characters, the latter predominating. They appear to be unique in that the occipital foramen is postero-dorsad, the prothoracic skin being attached directly to the submentum. Gardner (1931) has found that these characteristics are also exhibited by the Indian *Distenia dravidiana* Gahan.

5. ASEMINAE

Larval Characters

Form subcylindrical, with caudal urogomphi. *Head* transverse, with posterior margin nearly straight or, at most, very slightly emarginate; dorsal margins of epicranial halves fused behind frons almost to base and rounded behind; tentorial cross-arm internal, in a plane at right angles to hypostoma (the occipital foramen not apparently divided); front margin of frons never projecting or carinate. Epistoma

never produced over clypeus; at least ten epistomal setae present (except *Oxypleurus*). Clypeus trapezoidal, as broad at base as epistoma. Labrum transverse, semicircular or subcordate. Mandibles wedge-shaped, with cutting edge oblique, broadly emarginate and apex acutely produced; outer face bearing numerous setae. Ocelli present or absent. Antennae frail, short and very retractile and 3-segmented; antennal ring distinctly open to frontal suture. Ventral mouthparts attached to hypostoma for nearly its entire breadth. Maxillae movable; cardo visible, maxillary articulating area swollen; palpifer bearing lobe and with outer margin straight. *Prothorax* with transverse and sublateral grooves very distinct; posterior region either glabrous or dull, microscopically spiculate (except *Oxypleurus*); eusternum distinct, triangular; presternum and epipleurum fused; coxal lobe small, opposite sternellum. *Abdomen* with ampullae either glabrous or dull, microscopically spiculate, never tuberculate (except *Oxypleurus*) and with two lateral impressions on each side; regions bearing spiracles distinctly defined, elliptical; epipleurum protuberant on segments 7, 8 and 9 only; segment 9 with a pair of very short urogomphi; pleural discs absent. *Legs* moderately long, slender. *Spiracles* of mesothorax not protruding into prothorax; abdominal spiracles with two or more small marginal chambers.

Pectoctenus scalabrii Fairmaire

Distribution. ETHIOPIAN REGION: Belgian Congo, Ivory Coast, Kenya, Tanganyika. MADAGASCAN REGION: Madagascar.

Mature larva. Length up to 17 mm.; breadth (at prothorax) 4·1 mm. Form rather slender, slightly depressed anteriorly. *Head* scarcely depressed, transverse (maximum head-width 2·6 mm.), widest behind middle, with sides moderately strongly rounded; frons smooth, testaceous, shining, moderately strongly sclerotised; frontal sutures indiscernible; median suture complete, distinct; genae testaceous and bearing a few bristly, reddish setae. Mouthframe ferruginous. Front margin of frons very slightly curved and roundly declivous; six epistomal setae present. Antenna with segment 2 bearing an acutely conical supplementary process which is distinctly elongate. Mandible pitchy, shining, distinctly micro-granulate and bearing two stout setae near middle of outer face; inner part of dorsal surface without a striate plate. Labrum transversely oval, very pale and fringed with pale golden setae. Two pairs of ocelli present; lens strongly convex; pigmented spot distinct. Gula very broad, with sutures parallel and strongly raised. Hypostoma faintly micro-granulate, testaceous, very slightly convex. Maxillary palpi with segment 3 about as long as segment 2; lobe rather slender, cylindrical. Labial palpi with segment 2 about half length of segment 1. *Prothorax* slightly depressed, trapezoidal, widest posteriorly; lateral setae sparse and pale. Pronotum very sparsely setose, pale, shining and non-spiculate; faintly micro-granulate but not striate posteriorly. Eusternum and sternellum micro-granulate, sparsely setose. Abdomen with ampullae present on segments 1–7; each ampulla subtuberculate, glabrous, shining. Tergite 9 bearing a pair of vertical, spine-like urogomphi. *Legs* well developed, 3-segmented; unguiculus long, attenuated, imbricately spinose. *Spiracles* subcircular, with peritreme pale and bearing subcontiguous chambers on posterior margin.

On the basis of adult classification, Lepesme (1948b) suggests that this species may

not be correctly placed in the ASEMINAE, but examination of the larva has shown it to possess all the fundamental characters of this subfamily.

Host plant: *Psidium guajava* (J.C.M.G.).

Material studied. 3 L, Kenya, Nairobi, xii.1950, from dead part of living stem of *Psidium guajava*, J.C.M.G. leg., in coll. B.M.

References. Lepesme, 1948b (I fig.).

Arhopalus (=Criocephalus) rusticus (Linnaeus)

Illustrated descriptions of the immature stages and an account of the biology of this species have recently been published (Duffy, 1953a).

Distribution. PALAEARCTIC REGION: Tunisia.

Mature larva. See key, p. 15.

Pupa. See key, p. 38.

Additional references. Caillol, 1914 (Biol.); Madel, 1940–1941 (Biol.); Mühlmann, 1954 (Biol.); Villiers, 1946 (Biol.).

Arhopalus (=Criocephalus) ferus (Mulsant)

Illustrated descriptions of the immature stages and an account of the biology of this species have recently been published (Duffy, 1953a).

Distribution. PALAEARCTIC REGION: Algeria, Morocco, Tunisia.

Mature larva. See key, p. 15.

Pupa. See key, p. 38.

Additional references. Caillol, 1914 (Biol.); Harris, 1952 (Biol.); Villiers, 1946 (I fig., Biol.); Wallace, 1953 (Biol.).

Oxypleurus nodieri Mulsant

Distribution. PALAEARCTIC REGION: Algeria, Morocco, Tunisia. ETHIOPIAN REGION: Western Cape Province (Port Elizabeth and Uitenhage). This species was first recorded in South Africa (Cape Town) in 1883.

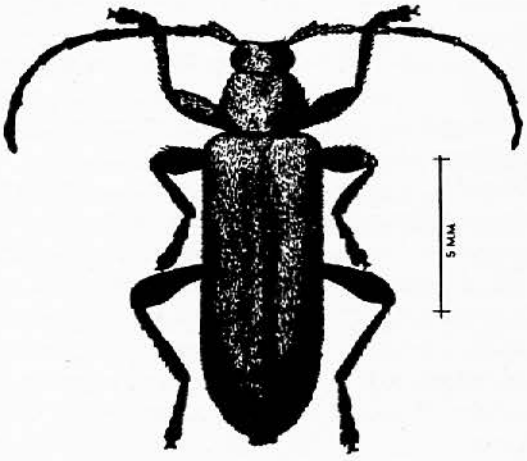


Fig. 47. *Oxypleurus nodieri* Mulsant. Adult. (Dürr, 1952)

Adult (fig. 47). Length 10–14 mm. Entirely castaneous. *Head* with antennae short, thickened medially and extending almost to apices of elytra in male but not beyond basal two-thirds in female. Apical segment of palpi securiform. *Prothorax* with a pair of median, lateral spines. Scutellum densely covered with white pubescence. Elytra densely punctate, the punctures large, round, shallow, and each bearing a decumbent white seta.

Mature larva (figs. 48–54). Length up to 17·7 mm.; breadth (at prothorax) 4·2 mm. Form rather slender, slightly depressed anteriorly. *Head* (figs. 49, 50) slightly depressed, transverse (maximum head-width 3·1 mm.), widest behind middle, with sides moderately strongly rounded; smooth, orange-testaceous, shining, moderately strongly sclerotised. Genae testaceous, with dense, stiff, curved, reddish setae, which are not distributed beyond posterior end of frontal sutures. Frontal sutures distinct as very pale lines, each entering the antennal foramen; median suture complete and very distinct. Mouthframe strongly sclerotised, pitchy. Front margin of frons very slightly curved and roundly declivous; six epistomal setae present. Antenna with segment 2 bearing an acutely conical supplementary process which is longer than its basal width (fig. 51); segment 3 about four times as long as basal width. Mandible pitchy, shining, with a row of two to four setae across middle of outer face; inner part of dorsal surface with an oblique striate plate. Labrum cordate, about as long as wide, ferruginous and bearing dense marginal setae. Gula indistinct owing to sclerotisation of hypostoma. Hypostoma strongly sclerotised, ferruginous, with anterior region steeply sloping down to front margin, the latter being in a lower plane than that of hind margin; numerous setiferous pores present on each side of gula. Maxillary palpi with segment 3 about as long as segment 2; lobe rather slender, cylindrical, with setae as figured. Labial palpi with segment 2 distinctly shorter than segment 1. *Prothorax* slightly depressed, trapezoidal, widest posteriorly; lateral setae sparse and pale. Pronotum very sparsely setose, pale, shining and devoid of spicules; longitudinally striate posteriorly. Eusternum and sternellum micro-granulate, sparcely setose. Abdomen with ampullae present on segments 1–7; each ampulla subtuberculate, glabrous, shining. Tergite 9 bearing a pair of spine-like urogomphi which are inclined forward (fig. 53). *Legs* well developed, 3-segmented; unguiculus very long, attenuated and imbricately spinose (fig. 52). *Spiracles* (fig. 54) subcircular, with peritreme pale and bearing subcontiguous chambers on posterior margin.

This larva is not at all typical of the ASEMINAE, as the pronotum and ampullae are glabrous and the epistomal setae are reduced to six in number. It does, however, possess most of the fundamental characters of this subfamily, namely, caudal urogomphi, wedge-shaped mandibles, an undivided occipital foramen and dense genal setae. For these reasons this species has been placed in this subfamily instead of in the CERAMBYCINAE for the purposes of the present study (see also Saphanini, p. 135).

Egg. Length 1·5 mm.; breadth 0·8 mm. Fusiform, rounded at both ends. Chorion yellowish white, feebly punctate and reticulate (Xambeu, 1898–1902).

Host plants: *Pinus halepensis* (Villiers, 1946); *P. maritima* and *P. radiata* (Dürr, 1952).

Biology. *O. nodieri* Mulsant is mainly a forest insect which infests dying branches and dead stumps in pine plantations. The larval period varies considerably from at

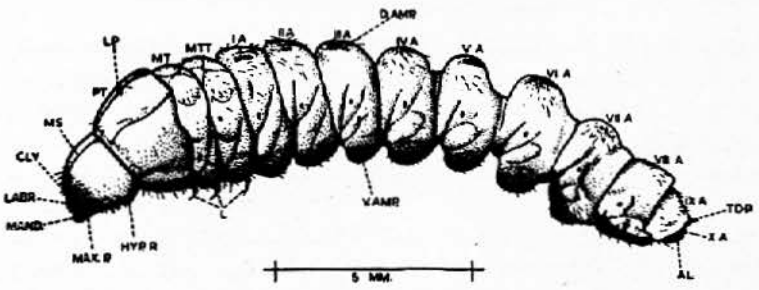


Fig. 48

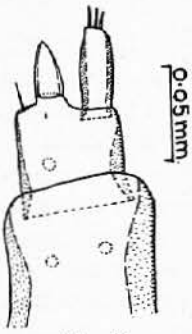


Fig. 51

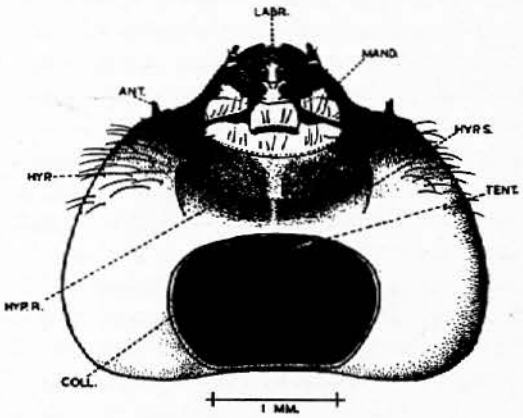


Fig. 49

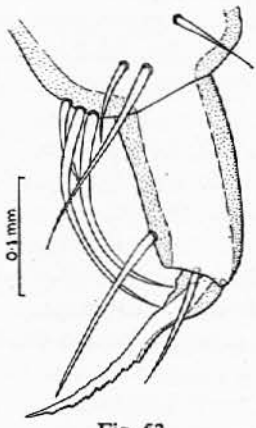


Fig. 52

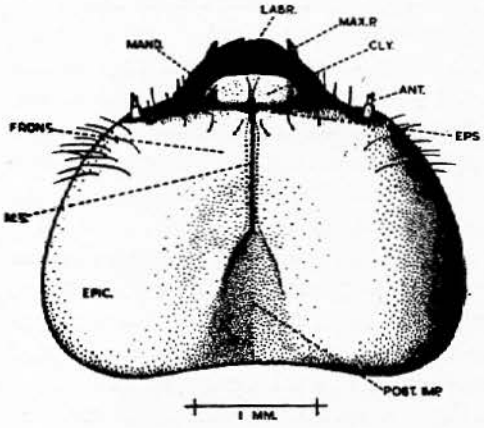


Fig. 50

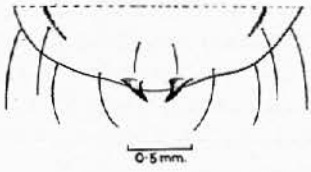


Fig. 53

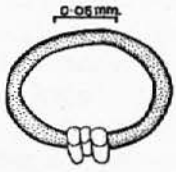


Fig. 54

Figs. 48–54. *Oxypleurus nodieri* Mulsant. Mature larva. Fig. 48. Lateral aspect (Dürr, 1952). Fig. 49. Head. Dorsal aspect (Dürr, 1952). Fig. 50. Head. Ventral aspect (Dürr, 1952). Fig. 51. Apical part of antenna. Lateral aspect. Fig. 52. Apical part of mesothoracic leg. Lateral aspect. Fig. 53. Apical part of abdominal tergite 9. Dorsal aspect. Fig. 54. Peritreme of abdominal spiracle.

least two to six years or more. Pupation takes place in the autumn. Adults emerge throughout the winter, especially during June and July, and live for about a fortnight. The emergence holes are slightly smaller than those of *Hylotrupes bajulus* (Linnaeus) and are filled with thread-like frass. It is probable that wood with a high moisture content is required for oviposition (Dürr, 1952). According to Villiers (1946) adults are nocturnal and in North Africa are frequently attracted to light during October and November.

Parasites. Hymenoptera: Larvae of this species are parasitised by *Scleroderma domesticum* Latr. (Picard, 1929).

Economic importance. This species would seem to be of minor importance economically. According to Dürr (1952) its damage to structural timber is frequently mistaken for that of *Hylotrupes bajulus* (Linnaeus), but it is strongly suspected that in nearly all such infestations the timber has already been infested at the time of sawing.

On the other hand, Tooke (1949) maintains that this species is causing some concern in that it has frequently been taken emerging from the woodwork of houses in Cape Town, and a strong suspicion exists that it is invading houses and infesting woodwork *in situ.*

Material studied. 5 L, near Cape Town, 1950, from *Pinus*, H. J. R. Dürr leg., in coll. B.M.

References. Caillol, 1914 (Biol.); Dürr, 1952 (L fig., I fig., Biol.); Mühlmann, 1954 (Biol.); Mulsant and Mulsant, 1855 (L); Peyerimhoff, 1919 (Biol.); Picard, 1929 (Paras.); Saunders and André, 1881 (Biol.); Tooke, 1949 (Biol.); Villiers, 1946 (I fig., Biol.); Xambeu, 1898–1902 (E, L, Biol.).

Tetropiopsis numidica Chobaut

Distribution. PALAEARCTIC REGION: Morocco, Tunisia.
Host plant: *Ficus carica* (Peyerimhoff, 1943).
References. Peyerimhoff, 1943 (I fig., Biol.); Villiers, 1946 (I fig., Biol.).

Tetropiopsis major Pic

Distribution. PALAEARCTIC REGION: Egypt.
Host plant: *Acacia*?
References. Peyerimhoff, 1943 (I fig., Biol.); Villiers, 1946 (Biol.).

6. CERAMBYCINAE

Larval Characters

Form subcylindrical. *Head* transverse to subquadrate, wider behind middle; dorsal margins of epicranial halves fused for some distance behind frons; tentorial bridge (i.e. cross-arm) in same plane as hypostoma, the occipital foramen thus apparently divided into an anterior and posterior position. Epistoma not produced over clypeus (except in a few tropical species); four epistomal setae present. Clypeus narrow, not as wide at base as epistoma and never filling space between dorsal articulations of mandibles. Labrum small, narrow, usually more or less circular.

Antennae salient, rarely entirely retractile; distinctly 3-segmented. Mandible short, trapezoidal, with cutting edge gouge-like, never with apex of dorsal angle produced. Ocelli absent or one, two or three pairs present. Maxillae movable; cardo distinct; maxillary articulating area swollen. Ventral mouthparts attached to hypostoma by little more than width of gula; maxillae with palpi and lobes curved upward against ventral part of mandibles; palpifer small, with outer margin strongly rounded; lobe borne on stipes and often setose on inner margin; labial palpi narrowly separated at base. *Prothorax* having presternum and epipleurum often fused but sometimes distinctly separated; eusternum rarely distinct. Postnotal fold usually present. *Abdomen* having elliptical region surrounding spiracle protruding and well defined; epipleurum protuberant only on last three segments; pleural discs present. *Legs* small or absent. *Spiracles* of mesothorax not protruding into prothorax.

Saphanini

This tribe, for the purpose of the present study, has been placed next to the Callidiini, see p. 135.

Oemini

Larvae of this tribe are characterised by the unusual truncate appearance of the posterior part of the abdomen. This is due to the posterior broadening of segment 8 and the shortening of segment 9 (fig. 55). From larvae of the Obriini, which some species superficially resemble, they may further be distinguished by the head capsule which, except in *Psathyrissa*, is not strongly sclerotised and pigmented postero-laterally.

Oemida gahani Distant

This species has been dealt with under the Obriini, see p. 121.

Xystrocera globosa (Olivier)

Distribution. PALAEARCTIC REGION: Egypt. MADAGASCAN REGION: Madagascar, Rodriguez, Mauritius. ORIENTAL REGION: Seychelles. This species is widely distributed throughout southern Asia, China, India, Burma, Java and the Philippines.

Adult. Length 15–32 mm. Ferruginous; prothorax with all margins metallic blue or green; elytra brownish testaceous, the outer apical margins and, on each, a median longitudinal band, which anteriorly is directed obliquely towards the shoulder, also metallic blue or green. *Head* with antennal segment 1 asperate, with outer apical angle acutely produced. Eyes coarsely faceted. *Mesosternum* with coxal cavities open externally. *Elytra* densely and strongly punctured; each with three rather faint longitudinal carinae.

Mature larva (fig. 55). Length up to 44 mm.; maximum breadth (at prothorax) 7·1 mm. *Head* trapezoidal, with maximum head-width 4·9 mm. Genae strongly shouldered. Temples narrowly ferruginous ventrad of antennae and bearing numerous short, bristly setae. Sclerotisation of mouthframe ferruginous and narrowly interrupted beneath antennae. Antenna with segment 2 about one and one-half times as long as basal width; supplementary process conical, about one-fourth length of segment 3. Mandibles short, broad, entirely pitchy. Labrum transversely oval, with anterior

margin very densely fringed with short, pale setae. Ocelli indiscernible, probably absent. Hypostoma with front margin broadly and very strongly sclerotised and very faintly transversely striate; sutures distinct, slightly incurved. Gula slightly raised; sutures concave, distinct. Maxillary palpi with segment 3 not longer than segment 2; dorso-external process of palpifer distinctly attenuated. Labial palpi with segment 2 shorter than segment 1. *Prothorax* transverse, slightly wider posteriorly, with numerous very short, pale setae and interspersed glabrous spots on lateral regions; pronotum with median cleavage line distinctly impressed; anteriorly testaceous, shining; median area rather coarsely punctate and bearing short setae; posteriorly finely and closely longitudinally striate. Prosternum with a pair of triangular, shining, slightly rugose areas. *Abdomen* with ampullae dull, reticulate, rugose and microscopically spiculate; strongly bilobed, especially those on posterior segments. Pleura microscopically pubescent, with a few longer setae. *Legs* distinctly 4-segmented, pale (Duffy, 1953b). The characteristic broadening of abdominal segment 8 and the shortening of segment 9 is shown in fig. 55.

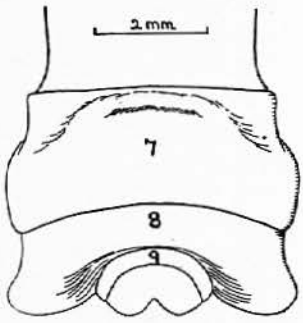


Fig. 55. *Xystrocera globosa* (Olivier). Mature larva. Outline of posterior part of abdomen showing caudal truncature. Dorsal aspect.

Pupa. No pupae of this species are available, but the calcareous cocoon is shown on Pl. V, fig. 1. Gardner (1927) gives the following description: "Antennae long, recurved near the 7th abdominal segment, the apical joint reaching to near the head in the male. Pronotum with a number of soft, erect papillae, each papilla with a short cephalad seta. Abdominal tergites 1 to 6 without papillae or setae; 7th tergite with a posterior group of papillae similar to those on the pronotum but smaller; 8th tergite with a slight median posterior projection and with a few papillae."

Host plants: *Acacia catechu, A. modesta, Acrocarpus fraxinifolius, Albizia falcara, A. lebbeck, A. lucida, A. odoratissima, A. procera, Bauhinia acuminata, Bombax malabaricum, Grewia tiliifolia, Xylia xylocarpa* (Beeson, 1941); *Theobroma* (De Haan, 1933); *Acacia mollissima* (Miwa, 1939); *Albizia chinensis, Adenanthera pavonina, Acacia confusa, Cassia glauca, Prunus persica* (Gressit, 1942).

Biology. The following account has been abstracted from that by Beeson (1941): "The larval tunnels run in the inner bark mainly but also groove the sapwood superficially. In trees with thick bark a heavy infestation reduces more than half the thickness of the bark to dust so that the bark readily separates from the wood. The prepupal tunnel is made at a right angle or an obtuse angle to the surface of the sapwood and then turns downwards or upwards to terminate in a pupal chamber parallel to the long axis of the log. The chamber is lined throughout with a fine deposit of calcium carbonate, very thin so that the inequalities and minor projections on its walls are hardly concealed; the lining is white with some yellowish discolouration, especially at the lower end where the larval exuviae rest. The upper end is closed by a thin, smooth, ellipsoidal dome of calcium carbonate about $\frac{1}{4}$ inch high and $\frac{7}{16}$ inch wide. The calcium carbonate is produced in two of the four Malpighian tubules. The pupal period lasts about three weeks."

"The digestive juice of the larvae contains amylase, saccharase and maltase but does not contain cellulase and consequently it does not digest cellulose. There are no mycetocytes in any part of the body. The principal food supply is from other carbohydrates and soluble sugars in the sapwood. The heartwood of *Albizia lebbeck* contains only small traces of starch and sugar and this fact explains why the larval tunnels do not penetrate the heartwood.

"Emergence occurs in every month of the year but mainly in May, June and September. The larval life is variable and in some individuals of the same brood may develop in less than a year."

According to Coquerel (1848) larvae of this species are eaten by natives in Madagascar. Gressit (1942) states that adults are nocturnal and may be attracted to lights. In China there are two or three generations a year.

Parasites. Hymenoptera: *Sclerodermus immigrans* Bridw. (Thompson, 1943).

Economic importance. In Egypt this species has been reported to cause severe damage to *Albizia lebbeck*, which is extensively used for ornament and shade. Sometimes felled timber is attacked, but the resulting adults are much smaller in size (Willcocks, 1909).

Control. Gressit (1942) recommends that infested dead trees or logs should be disposed of promptly or the bark should be removed and the larvae destroyed (the latter method will not necessarily result in exterminating those in the pupal stage). For living trees, infested branches should be trimmed off and destroyed and the bark removed from affected areas of the trunks, the larvae killed and the wood treated with tar. Rau (1939) recommends the injection of a 10 per cent solution of paradichlorobenzene under the bark. Willcocks (1909) suggests the covering of all wounds in the bark with tar, the felling of heavily infested trees and the immersion of all cut logs in water for several months.

Material studied. 1 L, Hawaii, Honolulu, 11.vi.1945, from "monkey-pod" tree, in coll. U.S.N.M.

References. Anderlind, 1888 (Biol.); Beeson, 1919a (Biol.), 1941 (Biol.); Beeson and Bhatia, 1939 (I fig., Biol. fig.); Clainpanain, 1917 (Biol.); Coquerel, 1848 (I fig., P fig., Biol.); De Haan, 1933 (Biol.); Duffy, 1953a (Biol.), 1953b (L, P, Biol.); Gardner, 1927 (L, P fig.); Gressit, 1942 (L fig., P fig., Biol. fig.); Hoffmann, 1934 (Biol., Contr.); Kolbe, 1888 (Biol.); Mansour and Mansour Bek, 1934a (L fig., Physiol.), 1934b (Physiol.); Miwa, 1939 (Biol.); Mühlmann, 1954 (Biol.); Petroff, 1920 (Biol.); Rau, 1939 (Biol.); Schiödte, 1876 (L fig.); Stebbing, 1914 (I fig., Biol. fig.); Thompson, 1943 (Paras.); Ultee, 1931 (Biol.); Willcocks, 1909 (L fig., P fig., I fig., Biol., Contr.).

Xystrocera vittata (Fabricius)

(=**dispar** (Fåhraeus)=**marginalis** (Goldfuss)=**senegalensis** Klug)

Distribution. ETHIOPIAN REGION: British Somaliland, Gold Coast, Ivory Coast, Kenya, Nigeria, Nyasaland, Tanganyika, Uganda, Zululand.

Mature larva. Length up to 42 mm.; maximum breadth (at prothorax) 7·2 mm. Form subcylindrical, rather robust and slightly tapering posteriorly. *Head* strongly transverse, widest behind middle (maximum head-width 5·9 mm.), with sides strongly converging anteriorly; smooth and testaceous. Genae bearing a few short, pale setae.

Mouthframe strongly sclerotised, pitchy. Antenna with segment 2 elongate; segment 3 strongly elongate, at least three times as long as basal width; supplementary process conical, less than half length of segment 3. Mandible robust, entirely pitchy, with outer face smooth, granulate. Labrum white, fleshy, transversely oval; front margin fringed with pale golden setae. Ocelli absent. Hypostoma testaceous, with front margin narrowly ferruginous, subtuberculate and transversely striate paramedially. Sutures ferruginous, feebly incurved. Gular sutures distinct. Maxilla with segment 3 of palp cylindrical, shorter than segment 2. Segment 2 of labial palpi cylindrical, shorter than segment 1. *Prothorax* with pronotum sparsely setose and testaceous anteriorly, milky white and finely longitudinally striate posteriorly. Median cleavage line very distinct posteriorly. Lateral areas sparsely setose and micro-granulate, with numerous rather deep lenticulate pits. Postnotal fold very distinct. Prosternum vermiculately rugose. *Mesonotum* and *metanotum* micro-granulate. *Abdomen* with dorsal ampullae broad, flat, shining, faintly aciculate and micro-granulate in part. Epipleura forming a protuberant ridge on last three segments. Anal lobes compact, each lobe bearing a dense linear fringe of long pale brown setae. *Legs* distinct but rather small, about half length of maxillary palpi. *Spiracles* of abdomen with peritreme rather thin, pale, narrowly oval and not raised above general level of cuticle.

Host plants: *Acacia drepanolobium* (J.C.M.G.).

Material studied. 3 L (adults reared), Kenya, 1953, from *Acacia* sp., J.C.M.G. leg., in coll. B.M.

References. None available.

Xystrocera devittata Kolbe

Distribution. ETHIOPIAN REGION: Kenya, Uganda.

Mature larva (fig. 56). Readily distinguishable from other species of this genus by the strongly sclerotised, striate submentum (fig. 56) and by the presence of a pair of orange spots on the proeusternum.

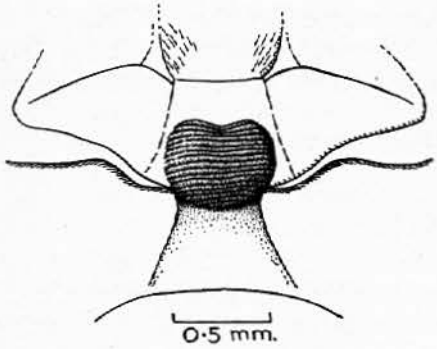


Fig. 56. *Xystrocera devittata* Kolbe. Mature larva. Submentum and gula. Ventral aspect.

Host plants: *Bosqueia* sp., *Isoberlinia scheffleri* (J.C.M.G.).

Material studied. 1 L, 1 I, Uganda, Kalinzu, 1954, J.C.M.G. leg., in coll. B.M.; 1 L, Uganda, 1955, from dry *Bosqueia* sp., J.C.M.G. leg., in coll. B.M.

References. None available.

Xystrocera nitidiventris Fairmaire

Distribution. ETHIOPIAN REGION: Cameroons, South Africa, Uganda.

Host plant: *Celtis soyauxii* (J.C.M.G.).

References. None available.

Xystrocera nigrita Serville

Distribution. ETHIOPIAN REGION: Belgian Congo, Nigeria, Senegal, Tanganyika, Uganda.

Mature larva. Closely resembling those of *X. vittata* and *X. ansorgei*, from which it may be distinguished by the characters given in the key, p. 21.

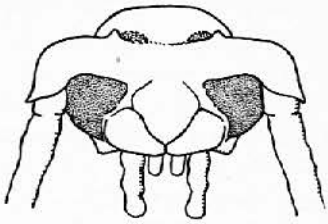


Fig. 57. *Xystrocera nigrita* Serville. Pupa. Head. Ventral aspect.

Pupa (fig. 57). Length up to 27 mm.; breadth 7 mm. *Head* (fig. 57) entirely smooth and glabrous, but with a small conical tubercle alongside base of each antenna. Antenna with segment 1 acutely produced apically; long, extending as far as abdominal segment 3, where they are recurved ventrally to terminate about half-way along and beneath mid femora. *Pronotum* quadrate; disc depressed and bearing a few scattered pale papillae. *Mesonotum* and *metanotum* glabrous. *Abdomen* with tergites 1–9 glabrous except for a very few scattered pale papillae. Sternites glabrous. *Legs* with hind femora extending to anterior margin of abdominal segment 5. *Functional spiracles* present on abdominal segments 1–7; peritreme thin, ferruginous, narrowly oval and slightly raised above general level of cuticle.

Host plants: *Samanea saman* (Ghesquière, 1927); *Albizia coriaria* (J.C.M.G.).

Material studied. 2 L, 1 P, Uganda, 1953, from *Albizia coriaria*, J.C.M.G. leg., in coll. B.M.

References. Ghesquière, 1927 (Biol.).

Xystrocera ansorgei Gahan

Distribution. ETHIOPIAN REGION: Kenya, Uganda.

Mature larva. Very similar to that of *X. vittata*, from which it differs as follows. *Prothorax* with pronotum darkly ferruginous anteriorly; lateral areas with setae distinctly reddish. *Abdomen* with setae on anal lobes distinctly reddish. *Legs* distinctly sclerotised, testaceous.

Host plants: *Acacia melanoxylon, Acrocarpus fraxinifolius, Artocarpus integer, Celtis africana, C. durandii, Lagunaria patersoni, Schinus molle* (J.C.M.G.).

Material studied. 3 L, 1 I, Kenya, Londiani, 1953, from *Celtis africana*, J.C.M.G. leg., in coll. B.M.

References. None available.

Xystrocera metallica Quedenfeldt

Distribution. ETHIOPIAN REGION: Belgian Congo.

Host plant: *Coffea* (Bredo, 1939).

References. Bredo, 1939 (I fig., Biol.); Lepesme, 1948 (Biol.).

Xystrocera interrupta Jordan

Distribution. ETHIOPIAN REGION: São Tomé, Uganda.

Host plant: *Bosqueia* sp. (J.C.M.G.).

References. None available.

Xystrocera femorata Chevrolat

Distribution. ETHIOPIAN REGION: Gold Coast, Ivory Coast, Nigeria, Senegal, Sierra Leone.

Mature larva. Very similar to that of *X. vittata* (Fabricius), from which it differs in having the mouthframe and submentum ferruginous and the spiracles more strongly elongate.

Host plant: *Daniellia olivieri* (E.A.J.D.).

Biology. Larvae and pupae, the latter in calcareous cocoons, were found about two inches deep in the punky sapwood of an old log. Adults emerge in March.

Material studied. 2 L, 2 P, 2 I, Gold Coast, Ejura, 8.iii.1955, from *Daniellia oliveri*, E.A.J.D. leg., in coll. B.M.

References. None available.

Alloeme rubra Thomson

Distribution. ETHIOPIAN REGION: Cameroons, Fernando Póo, Gold Coast, Ivory Coast, Sierra Leone, Uganda.

Mature larva. Similar to those of *Xystrocera* species, from which it differs as follows. Length up to 15 mm.; maximum breadth (at prothorax) 3·6 mm. *Head* with genae bearing numerous long, strongly curved setae (as in *Nosoeme clavipes* Kolbe (fig. 59)). *Abdomen* with ampullae entirely and very evenly micro-granulate. *Spiracles* with peritreme broadly oval, almost circular.

Host plant: *Piptadenia* sp. (J.C.M.G.); *Albizia warnecki* (E.A.J.D.).

Material studied. 1 L, Uganda, Katabalu Forest, 1952, from *Piptadenia* sp., J.C.M.G. leg., in coll. B.M.; 2 L, 2 I, Gold Coast, Kumasi, 29.iii.1955, from *Albizia warnecki*, E.A.J.D. leg., in coll. B.M.

References. None available.

Coptoeme pallidum Lepesme

Distribution. ETHIOPIAN REGION: Gold Coast, Sierra Leone.

Mature larva. Very similar to that of *Alloeme rubra*, but differing as follows. Length up to 16 mm.; maximum breadth (at prothorax) 3·75 mm. *Head* with genal setae sparse and short. *Abdomen* with spiracles narrowly oval.

Material studied. 6 L, 8 I, Gold Coast, Samreboi, Adjum, 24.iii.1955, from woody creeper, E.A.J.D. leg., in coll. B.M.

References. None available.

Antennoeme quadriplagiata Hintz

Distribution. ETHIOPIAN REGION: Uganda.

Mature larva. No material available. Larvae suspected of being this species proved to be too large and could not be distinguished from those of *Xystrocera* spp.

Host plant: *Maba abyssinica* (J.C.M.G.).

Material studied. 1 L (adult reared), Uganda, W. Mabira Forest, from fallen dry *Maba abyssinica*, J.C.M.G. leg., in coll. B.M.

References. None available.

Androeme plagiata Aurivillius

Distribution. ETHIOPIAN REGION: Tanganyika.

Mature larva (fig. 58). Resembling those of *Xystrocera* species, from which it differs as follows. Length up to 35 mm.; maximum breadth (at prothorax) 6 mm.

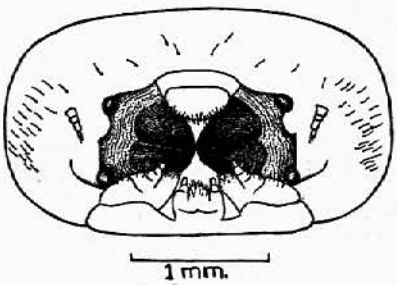


Fig. 58. *Androeme plagiata* Aurivillius. Mature larva. Head. Frontal aspect.

Head (fig. 58) with mouthframe feebly sclerotised, entirely testaceous. Genal setae very sparse. Mandible with basal half distinctly paler than apical half, testaceous. *Abdomen* with ampullae faintly wrinkled, not micro-spiculate or micro-granulate. *Spiracles* with peritreme broadly oval.

Host plants: *Cupressus*, *Juniperus* (J.C.M.G.).

Material studied. 1 L, Tanganyika, Lushoto, 1953, from *Cupressus*, J.C.M.G. leg., in coll. B.M.

References. None available.

? **Parandroeme brunnea** Aurivillius[1]

Distribution. ETHIOPIAN REGION: Kenya, Uganda.

Mature larva. Extremely similar to that of *Androeme plagiata* Aurivillius, from which it differs in having a more slender apical segment of the maxillary palpi.

Host plants: *Entandrophragma angolense* (J.C.M.G.).

Economic importance. This species has recently been found to have caused serious technical damage to valuable logs which had probably been lying in the forest for more than a year. Larvae tunnel up to about six inches into the heartwood (J.C.M.G.).

[1] Although this species is now regarded as a synonym of *Zamium laevicolle* Jordan (see Müller, 1941), the larva presumed to be of this species is quite characteristic of the Oemini and bears no resemblance to the larva of *Z. incultum* Pascoe.

Material studied. 3 L, 2 I, Kenya, Nairobi, 1955, from logs of *Entandrophragma angolense*, J.C.M.G. leg., in coll. B.M.

References. None available.

Paroeme verrucifer Bates

Distribution. ETHIOPIAN REGION: Belgian Congo, Uganda.

Host plant: *Sapium ellipticum* (J.C.M.G.).

References. None available.

Nosoeme clavipes Kolbe

Distribution. ETHIOPIAN REGION: Eritrea, Kenya, Republic of the Sudan, Uganda.

Mature larva (fig. 59). Similar to those of *Xystrocera* species, from which it may be separated as follows. Length up to 12 mm.; maximum breadth (at prothorax) 4·1 mm. *Head* (fig. 59) with genae bearing numerous long, curved, reddish setae

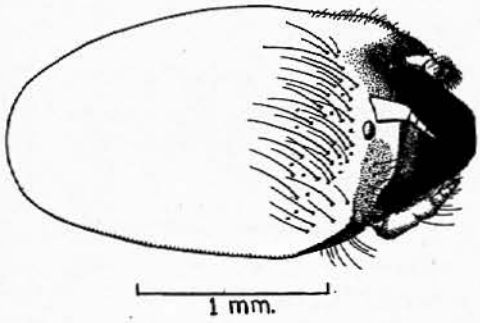


Fig. 59. *Nosoeme clavipes* Kolbe. Mature larva. Head. Lateral aspect.

which arise from ferruginous basal discs giving the genae a spotted appearance. Mouthframe ferruginous. One pair of ocelli present; lens large, distinct but pigmented spot very faint. *Prothorax* with lateral areas without lenticulate pits. *Abdomen* with anal lobes sparsely setose. *Spiracles* with peritreme broadly oval.

Host plants: *Celtis soyauxii*, *Acacia lahai* (J.C.M.G.).

Material studied. 1 L, 2 I, Uganda, Budongo Forest, 1953, from dry rafters of *Celtis soyauxii*, J.C.M.G. leg., in coll. B.M.

References. None available.

Psathyrissa brunnea Aurivillius

Distribution. ETHIOPIAN REGION: Kenya, Tanganyika.

Mature larva. Length up to 8·9 mm.; maximum breadth (at prothorax) 2·1 mm. Form subcylindrical, very slender and slightly tapering posteriorly. *Head* transverse, widest posteriorly. Genae bearing several fine, pale, silky, backwardly-curved setae. Mouthframe smooth, very feebly sclerotised. Antenna 3-segmented; segment 3 cylindrical, almost as long as segment 2. Ocelli absent. Hypostoma smooth, testaceous and bearing a transverse row of fine pale setae. Maxilla with segment 3 of palp as long as segment 2. *Prothorax* with posterior half of pronotum micro-granulate

and faintly longitudinally striate. Eusternum feebly defined, micro-granulate. *Abdomen* subtruncate posteriorly, with dorsal ampullae scarcely protuberant (not bilobed) and micro-granulate. Intersegmental skin short. Tergite 9 unarmed; segment 8 broader than segment 7; segment 9 very short, parallel-sided. *Legs* indiscernible. *Spiracles* with peritreme broadly oval, pale and not raised above general level of cuticle.

Although this larva will conveniently run down to the couplet in the key referring to the Oemini, it should be pointed out that it also exhibits, with the exception of "ocelli present", some of the fundamental characters of the Obriini, including "postero-lateral area of head capsule strongly sclerotised and ferruginous".

Host plant: *Acacia mollissima* (J.C.M.G.).

Biology. Larvae of this species make subcortical galleries in slender branches of dead trees (J.C.M.G.).

Material studied. 6 L, 1 I, Kenya, Nairobi, 1953, from dead *Acacia mollissima*, J.C.M.G. leg., in coll. B.M.

References. None available.

Psathyrus aeolis Thomson

Distribution. ETHIOPIAN REGION: Kenya, South Africa.

Host plant: *Acacia* sp. (J.C.M.G.).

References. None available.

Hypomares brunneus Thomson

Distribution. ETHIOPIAN REGION: French West Africa, Uganda.

Host plant: *Celtis soyauxii* (J.C.M.G.).

References. None available.

Neomarius gandolphei Fairmaire

Distribution. PALAEARCTIC REGION: Algeria.

Host plants: *Abies numidica* (Peyerimhoff, 1919); *Cedrus* (Villiers, 1946).

Biology. Larvae feed subcortically until the autumn, when they tunnel into the heartwood to pupate. The emergence period is from March to June (Villiers, 1946).

References. Peyerimhoff, 1919 (Biol.); Villiers, 1946 (I fig., Biol.).

Achrysonini

Icosium tomentosum Lucas

Distribution. PALAEARCTIC REGION: Algeria, Morocco, Tunisia.

Mature larva. No material available. The description by Perris (1877) is inadequate.

Host plants: *Juniperus lycia*, *J. oxycedrus*, *J. phoenicea* (Peyerimhoff, 1919, Villiers, 1946).

Biology. Larvae feed subcortically, later penetrating the heartwood in order to pupate. Adults are crepuscular and nocturnal and appear during June and July (Villiers, 1946).

References. Perris, 1877 (L fig., Biol.); Peyerimhoff, 1919 (Biol.); Villiers, 1946 (I fig., Biol.); Xambeu, 1898–1902 (L, Biol.).

Cerambycini
Larval Characters

Head rectangular or only slightly narrowed anteriorly; posteriorly straight or only very slightly emarginate. Three pairs of ocelli present (except *Plocaederus* (pars)). Labrum transverse. Ligula wide. Labial palpi distinctly separated. Palpifer and segment 1 of maxillary palp each with a small rounded process; lobe with several stout setae on inner margin. *Prothorax* with eusternum triangular (the apex often being fused with presternum); hypopleurum distinct, triangular; postnotal fold present. *Abdomen* with dorsal ampullae having two distinct, transverse furrows. *Legs* distinctly 4-segmented. *Spiracles* sometimes with distinct marginal chambers.

Plocaederus basalis Gahan (=**chloropterus** Murray)

Distribution. ETHIOPIAN REGION: including Angola, Cameroons, Gold Coast, Ivory Coast, Nigeria, Tanganyika and Uganda.

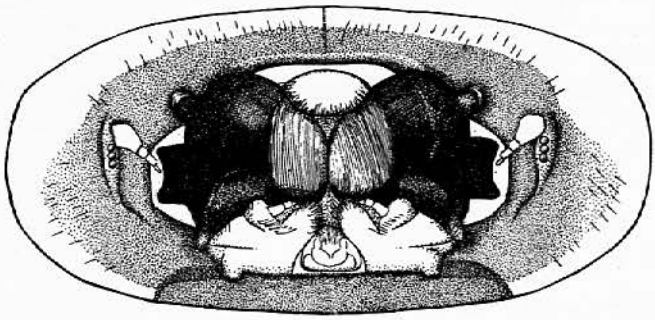


Fig. 60. *Plocaederus basalis* Gahan. Mature larva. Head. Frontal aspect.

Adult (Pl. II, fig. 2). Length 21–32 mm. Similar to *P. viridipennis* (Hope), but with plicae of pronotum much less regular and with elytral punctures very much stronger on basal third than on remainder.

Mature larva (fig. 60). Length up to 58 mm.; breadth (at prothorax) 11 mm. Form elongate, subcylindrical, rather slender (but short and robust after calcium has been secreted). *Head* (fig. 60) with genae ferruginous, rugose; temples smooth, without carinae or weals; dorsal boundary of antennal foramen not raised, scarcely produced, ferruginous; front margin of frons with upper boundary rounded, straight and smooth. Antenna with segment 3 about four times as long as basal width and nearly half as long as segment 2 which is elongate; supplementary process very short, less than one-fourth length of segment 3. Mandibles pitchy, rugose, with four to six stout setae on basal half of outer face. Labrum transversely oval and fringed with coarse golden setae. Three pairs of subcontiguous ocelli present; arranged in a straight vertical row laterad and ventrad of antenna; ocellar lens round, convex, strongly protuberant; pigmented spot indistinct owing to sclerotisation of lens. Hypostoma feebly strigose, ferruginous, with front margin more darkly so, and abruptly swollen at extremities; sutures dark, incurved; gular sutures distinctly raised. Maxilla with

segment 3 of palp tapering, about two-thirds length of segment 2. Labial palpi with segment 2 about one-third length of segment 1, which is elongate. *Prothorax* rather sparsely setose laterally; front margin rather densely fringed with reddish setae; posterior part of pronotum dull, micro-spiculate, longitudinally rugose and sparsely setose. *Abdomen* with dorsal ampullae each with two transverse furrows, and a broad, shallow, median furrow; non-tuberculate but densely spiculate. Tergite 9 unarmed. Anal lobes rugose and glabrous but surrounded by very dense, pale, silky setae. Pleural discs rather indistinct. *Legs* with unguiculus long, slender, pale and imbricately spinose. *Spiracles* with peritreme broadly oval, thick, pale and without marginal chambers.

In mature larvae the milky white calcium fluid is visible through the integument. Larvae which have already constructed their calcareous cocoons will have become reduced to about half their original length.

Pupa (fig. 61). Length up to 30 mm.; maximum breadth 10·5 mm. *Head* entirely smooth and glabrous; vertex almost concealed from above by pronotum. Antennae with segments slightly pectinate apically on outer margin extending to abdominal segment 4 where they are incurved ventrally to terminate near apical third of opposite elytra. Eyes feebly convex, glabrous. *Pronotum* quadrate, with front margin broadly rounded; sided with a pair of conical tubercles; disc faintly transversely rugose, with two very shallow, paramedian, oval foveae and numerous scattered spines (each with

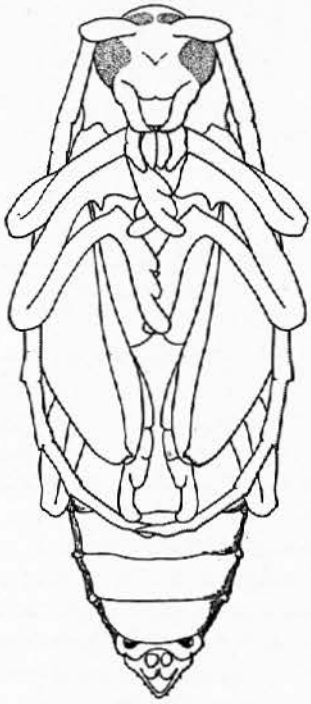


Fig. 61

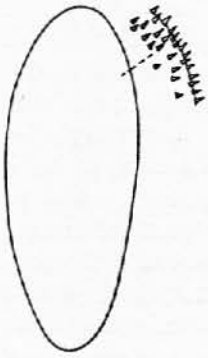


Fig. 62

Fig. 61. *Plocaederus basalis* Gahan. Pupa. Ventral aspect.
Fig. 62. *Plocaederus obesus* Gahan. Egg.

a basal seta). *Mesonotum* and *metanotum* with a few scattered spinules. Elytra and wings extending as far as abdominal segment 4. *Abdomen* with tergites 2–6 each bearing two to three transverse groups of short, stout spines (each with a basal seta). Tergite 7 quadrate with sides strongly converging posteriorly, the hind margin angled medially; bearing numerous scattered, short, stout spines. Tergite 8 similar but more strongly angled posteriorly. Tergite 9 retracted. Sternites glabrous. *Legs* with hind femora extending to abdominal segment 4. *Functional spiracles* present on abdominal segments 1–5, the sixth pair being partly closed; peritreme narrowly oval, thick, pale and strongly raised above general level of cuticle.

Egg (fig. 62). No eggs are available, but they are probably very similar to those of *P. obesus* Gahan, described by Gardner (1925) as follows: "Length 4·1 mm. Elongate, rounded, curved at each end, stouter towards one end, with no distinct terminal prominences; surface dull, covered with minute spines."

Host plants: *Aucoumea klaineana* (Duffy, 1953a); *Terminalia ivorensis* (G.H.T.); *Canarium schweinfurthii* (J.C.M.G.).

Biology. Adults oviposit in the bark of living or recently felled trees. The larvae tunnel beneath the bark until mature and then enter the sapwood to pupate. The prepupal gallery, which is packed with wood fibres projecting as a plug on the surface of the wood, enters the wood at right angles and, having penetrated the required distance, turns sharply downwards and is enlarged to form an elongate-oval pupal chamber in the plane of the wood fibres. This chamber is excavated 1 to 1½ inches within the wood at the junction of sapwood and heartwood; it is completely lined with a calcareous deposit which invests the chamber closely (Pl. V, fig. 2), yet is readily separate and could be detached as a complete entity were it not so delicate. The pupal period is about three weeks. Newly emerged adults are dull velvety brown and ten days elapse before the elytra harden fully and the characteristic metallic green coloration appears. Adults are readily attracted to light (G.H.T.).

Predators. Both larvae and pupae are devoured by a large species of elaterid larva which also destroys larvae of *Phryneta leprosa* (Fabricius) and *Mallodon downesi* Hope.

Economic importance. This species has been seen to cause severe damage to the cambium of living *Canarium* (J.C.M.G.).

Material studied. 6 L, 1 P, 1 I, Gold Coast, iv.1945, from *Terminalia ivorensis*, G.H.T. leg., in coll. G.H.T.

References. Duffy, 1953a (Biol.); Lepesme, 1948 (Biol.).

Plocaederus viridipennis (Hope) (=**chloropterus** (Chevrolat))

Distribution. ETHIOPIAN REGION: Ivory Coast, Nigeria, Uganda.

Adult (fig. 63). Length 18–22 mm. Head and prothorax black; antennae and legs reddish brown; elytra shining metallic blue or green. *Head* with dorsal lobes of eyes subcontiguous, separated by a narrow longitudinal carina; antennae serrate, extending as far as apices of elytra in female and beyond apices in male. Eyes coarsely faceted. *Prothorax* with pronotum smooth, shining, strongly transversely plicate. Intercoxal process wide, broadened distally. *Elytra* finely and sparsely punctate, each puncture bearing a minute seta; apices truncate, the outer angle strongly dentate.

Mature larva. Distinguishable from that of *P. basalis* Gahan as follows. Length

up to 30 mm.; maximum breadth (at prothorax) 8·1 mm. *Head* with only a single pair of ocelli.

Larvae of the tribe Cerambycini have always been known to possess three pairs of ocelli. Apparently only this species of the genus *Plocaederus* is an exception.

Host plants: *Khaya*, *Chlorophora excelsa* (Fraser, 1949c); *Terminalia superba* (Duffy, 1953a); *Phyllanthus discoideus*, *Pseudospondias microcarpa* (J.C.M.G.); *Hevea* (Vrijdagh, 1930); *Theobroma* (Aulmann and la Baume, 1912). Mayné (1917), however, maintains that there is no definite evidence that *Theobroma* is attacked.

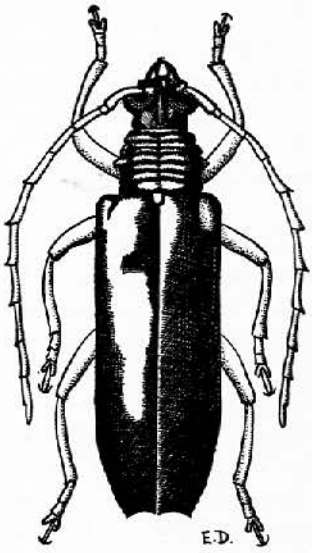


Fig. 63

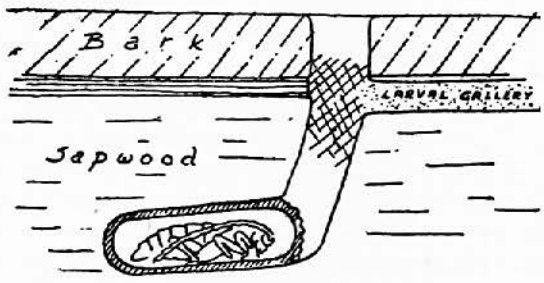


Fig 64

Fig. 63. *Plocaederus viridipennis* (Hope). Adult.
Fig. 64. *Plocaederus viridipennis* (Hope). Pupal cell and cocoon. (Fraser, 1949)

Biology. The larva feeds subcortically for its entire existence in the boles of mature trees. The broad, tortuous galleries are in the outer sapwood and are packed with loose powdery frass, the inner bark being untouched. Several small holes in the bark are made at intervals along the larval gallery; these are always kept entirely clear of debris. The larva appears to have little resistance to excessive moisture. When molested, it ejects from the anus a liberal quantity of dark brown fluid of an acid nature. In making its cocoon (Pl. III, fig. 1), the larva undergoes a marked change; eventually it is reduced to about half its original size, having lost its transparency, and become creamy yellow and opaque (Fraser, 1949c).

The larva pupates from July to September, usually in the sapwood but sometimes in the heartwood. The gallery, which is tightly packed with shavings, extends through the wood at right angles to the surface and turns more or less abruptly towards the base of the bole; the depth at which this bend is made varies considerably. The gallery is then slightly enlarged and kept free from debris. Here a lozenge-shaped calcareous cocoon, which is rough and white externally and smooth and light brown internally, is cemented to the walls of the pupal cell (fig. 64). This cocoon is about 4 cm. long

and 1·5 cm. broad; it is fragile and porous (Pl. III, fig. 1). A considerable time elapses between the completion of the cocoon and pupation.

Economic importance. This species is of decided economic importance, despite the fact that the heartwood is seldom attacked. Boles are frequently heavily infested for their entire length.

Material studied. 2 L, 2 P, England, Lancashire, viii.1948, under bark of *Khaya* imported from West Africa, M.G.F. leg., in coll. B.M.; 2 L, 1 P, 1 I, Uganda, 1953, from *Pseudospondias microcarpa*, J.C.M.G. leg., in coll. B.M.

References. Aulmann and la Baume, 1912 (Biol.); Blair, 1948 (Biol.); Duffy, 1949b (Biol. fig.), 1953a (E, L, P, Biol. fig.); Fraser, 1949 (Biol. fig.); Gahan, 1906 (Biol.); Lepesme, 1948 (Biol.); Mayné, 1917 (Biol., Contr.); Vrijdagh, 1917 (Biol., Contr.).

Plocaederus spinicornis (Fabricius) (=**denticornis** (Olivier))

Distribution. ETHIOPIAN REGION: Gold Coast, Ivory Coast, Kenya, Nigeria, Nyasaland, Senegal, Sierra Leone, Tanganyika, Uganda.

Adult. Length 25–34 mm. Entirely chocolate-brown with greyish pubescence. *Head* with antennal segments 3–8 strongly spined on outer apical angle; extending as far as apices of elytra in female and well beyond apices in male. Eyes coarsely faceted. *Prothorax* with sides bearing a pair of median spine-like tubercles; disc strongly and irregularly plicate. Intercoxal process of prosternum wide, broadened distally. *Elytra* dull micro-granulate and rather densely covered with decumbent pubescence; apices truncate, the outer angle strongly dentate and the sutural angle spined.

Mature larva. Very similar to that of *P. basalis* Gahan, from which it may be distinguished as follows. Length up to 31 mm. (after secretion?); maximum breadth (at prothorax) 13 mm. *Prothorax* with setae distinctly ferruginous. *Abdomen* with setae on anal lobes distinctly ferruginous. *Spiracles* of abdomen vertically placed, the anterior margin not raised above general level of cuticle.

Living larvae of this species were on one occasion killed and preserved in Pampel's Fluid (Duffy, 1953a, p. 308). On removing the cork of the tube a few hours later, the fluid effervesced and spurted out. The calcium inside the larval Malpighian tubules had obviously reacted with the small quantity of acetic acid in the fluid. Larvae of this genus may thus be identified by chemical means as well as morphological! A similar reaction is also produced, of course, by larvae of *Xystrocera* (Oemini) and by certain genera of the Prionidae.

Host plants: *Lannea kerstingii*, *L. stuhlmanni* (J.C.M.G.); *Lannea welwitschii* (E.A.J.D.).

Material studied. 1 L (I reared), Kenya, Malindi, 1953, from dead wood, J.C.M.G. leg., in coll. B.M.; 3 L, 1 P, 2 I, Gold Coast, Trumiso, 4.iv.1955, from logs of *Lannea walwichii*, E.A.J.D. leg., in coll. B.M.

References. None available.

Plocaederus nitidicollis Atkinson

Distribution. ETHIOPIAN REGION: Belgian Congo, Kenya, Uganda.

Mature larva. Separable from other species of this genus by the single large cornea covering the three pigmented spots.

Host plant: *Sapium ellipticum* (J.C.M.G.).

Biology. Living trees are attacked by this species. The larva constructs a calcareous cocoon before pupation (J.C.M.G.).

Material studied. 1 L, Kenya, Kwale, 1954, J.C.M.G. leg., in coll. B.M.

References. None available.

Plocaederus fucatus Thomson

Distribution. ETHIOPIAN REGION: French Equatorial Africa, Nigeria, Uganda.

Mature larva. No material available.

Host plant: *Lovoa klaineana* (Duffy, 1953a).

References. Duffy, 1953a (Biol.).

Plocaederus bennigseni Kolbe

Distribution. ETHIOPIAN REGION: Kenya.

Host plant: *Commiphora* sp. (J.C.M.G.).

References. None available.

Plocaederus frenatus Fåhraeus

Distribution. ETHIOPIAN REGION: Mozambique, Natal, Nyasaland.

Mature larva. Very similar to those of *P. basalis* Gahan and *P. spinicornis* (Fabricius), but recognisable by the presence of a small oval, ocelliform protuberance on the temple outward and dorsad of the antennal foramen and by the stouter, pitchy unguiculus.

Host plant: *Bombax rhodognaphalon* (from records of F.P.R.L.).

Biology. The calcareous cocoon is shown on Pl. VII, fig. 1.

Material studied. 1 L, England, Princes Risborough, 2.viii.1951, from log of imported *Bombax*, in coll. F.P.R.L.

References. None available.

Plocaederus denticornis (Fabricius)

Distribution. ETHIOPIAN REGION: Angola, Belgian Congo, Cameroons, Gold Coast, Ivory Coast, Mozambique, Senegal, Sierra Leone, Tanganyika, Transvaal.

Host plant: *Coffea* (Aulmann and la Baume, 1911).

References. Aulmann and la Baume, 1911 (Biol.); Lepesme and Villiers, 1941 (Biol.), 1944 (Biol.); Mühlmann, 1954 (Biol.).

Plocaederus caroli Leprieur

Distribution. PALAEARCTIC REGION: Sahara.

Host plants: *Calligonum comosum* (Peyerimhoff, 1926). Reymond (1950), however, believes *Tamarix aphylla* to be the true host.

Biology. Adults emerge from March to July and are frequently attracted to artificial light (Reymond, 1950).

References. Peyerimhoff, 1926 (Biol.); Reymond, 1950 (Biol.); Villiers, 1946 (I fig., Biol.).

Plocaederus viridescens Atkinson

Distribution. ETHIOPIAN REGION: Belgian Congo, Gold Coast, Senegal, Sierra Leone.

Mature larva. Extremely similar to that of *P. basalis*, from which it may be distinguished by the distinctly ferruginous thoracic and abdominal setae.

Host plant: *Terminalia ivorensis* (E.A.J.D.).

Biology. The larvae feed subcortically, making broad, shallow galleries. When mature, they tunnel into the sapwood to a depth of about one inch where the pupal cells are formed. Adults emerge in February (E.A.J.D.).

Material studied. 3 L, 1 I, Gold Coast, Kumasi, 25.ii.1955, from logs of *Terminalia ivorensis*, E.A.J.D. leg., in coll. B.M.

References. None available.

Taurotagus klugi Lacordaire

Distribution. ETHIOPIAN REGION: South Africa.

Host plants: *Acacia* spp.

Biology. According to J. W. Hunt, adults of this species seclude themselves during the daytime in boles of *Acacia* in which they gnaw cavities.

References. None available.

Bolbotritus bainesi Bates

Distribution. ETHIOPIAN REGION: Kenya, Matabeleland.

Mature larva (fig. 65). Resembling those of *Plocaederus* spp., from which it may be distinguished as follows. Length up to 56 mm.; maximum breadth (at prothorax) 15·5 mm. *Head* with mouthframe almost entirely pitchy. Hypostoma strongly rugose and subtuberculate. *Prothorax* with posterior area of pronotum macro-spiculate. *Abdomen* with ampullae (fig. 65) coarsely tuberculate and macro-spiculate, the spicules very coarse and ferruginous. *Legs* with unguiculus stout and pitchy.

Host plant: *Acacia drepanolobium.*

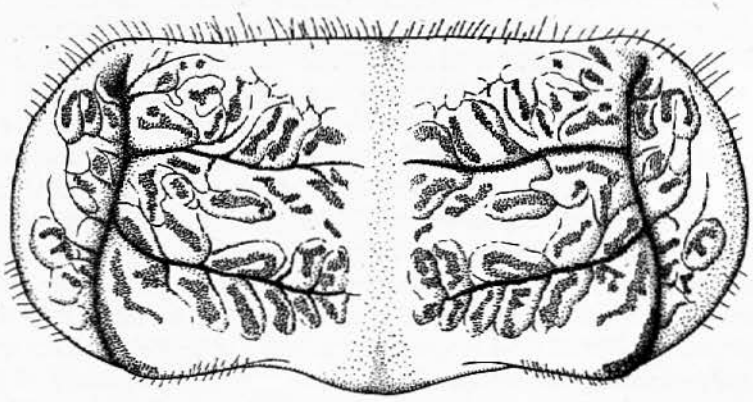


Fig. 65. *Bolbotritus bainesi* Bates. Mature larva. Abdominal ampulla. Dorsal aspect.

Material studied. 1 L, Kenya, Ngobit, 1952, from *Acacia drepanolobium*, J.C.M.G. leg., in coll. B.M.

References. None available.

Pachydissus hector Kolbe

Distribution. ETHIOPIAN REGION: Mozambique, Tanganyika.

Adult. Length 34–42 mm. Ferruginous, entirely covered with dense, decumbent, silvery pubescence except for two transverse bands on the elytra. *Head* with antennae extending to posterior third of elytra in female and beyond apices in male. Eyes coarsely faceted. *Prothorax* with disc of pronotum strongly transversely plicate and

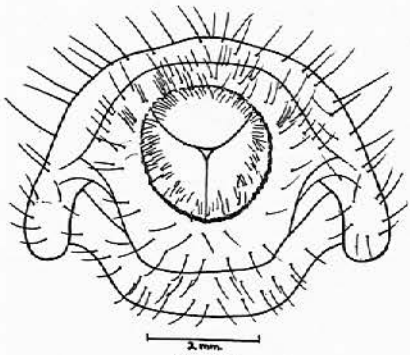


Fig. 66



Fig. 67

Figs. 66–67. *Pachydissus hector* Kolbe. Mature larva. Fig. 66. Abdominal segments 9 and 10. Caudal aspect (Duffy, 1953a). Fig. 67. Peritreme of abdominal spiracle (Duffy, 1953a).

with a pair of paramedian, longitudinal impressions which converge anteriorly. Middle coxal cavities open. *Elytra* impunctate and with apices truncate, the marginal and sutural angles spined.

Mature larva (figs. 66, 67). Length up to 45 mm.; maximum breadth (at prothorax) 13 mm. Form elongate, subcylindrical, very robust. *Head* slightly transverse (maximum head-width 7·1 mm.) with sides slightly rounded and diverging posteriorly; testaceous, shining, with genae rugose, ferruginous, temples with a transverse protuberant carina immediately behind ocelli (postocular carina), behind which they are strongly striate; dorsal boundary of antennal foramen scarcely produced, ferruginous. Frons broadly ferruginous anteriorly. Antenna with segment 3 cylindrical, elongate, about two and one-half times as long as basal width; segment 2 elongate; supplementary process conical, less than one-third length of segment 3. Mandibles robust, smooth, bearing several short setae on basal half of outer face. Labrum transversely oval, densely fringed with golden setae. Three pairs of ocelli present; subcontiguous and arranged in a straight row laterad and ventrad of antenna; lens oval, convex, sclerotised; pigmented spot indistinct. Hypostoma ferruginous, with front margin pitchy, rugose and slightly swollen at extremities; sutures pitchy, incurved; gula strongly raised. Maxilla with segment 3 conical, slightly shorter than segment 2. *Prothorax* rather sparsely setose laterally; posterior part of pronotum shining and vermiculately to slightly longitudinally rugose, glabrous. *Abdomen* with ampullae

rugose, non-tuberculate and glabrous. Anal lobes encircled by a fringe of short reddish setae, behind which are scattered, longer setae (fig. 66). *Spiracles* with about nine distinct marginal chambers (fig. 67).

Pupa (fig. 68). Length 36 mm.; maximum breadth 9·5 mm. *Head* with vertex not visible from above; elongate, moderately rugose and glabrous. Antennae extending (in female) as far as abdominal segment 5, where they are slightly incurved ventrally to terminate near posterior tarsal claws. Eyes feebly convex, glabrous. Labrum semicircular, bearing a few scattered, minute setae. *Pronotum* quadrate, with sides feebly tuberculate, disc rugose, with a few scattered conical papillae (each with a subapical seta). *Mesonotum* transversely striate, glabrous; scutellum strongly pro-

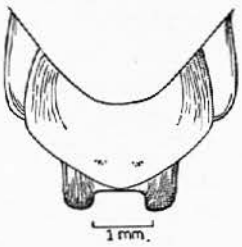


Fig. 68

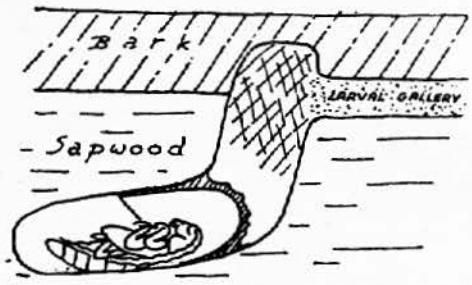


Fig. 69

Fig. 68. *Pachydissus hector* Kolbe. Pupa. Abdominal tergites 8 and 9. Dorsal aspect.
Fig. 69. *Pachydissus hector* Kolbe. Pupal cell and operculum. (Fraser, 1949)

tuberant, glabrous. *Metanotum* with a few papillae (each with a subapical seta) on each side of scutellar groove which is very faintly striate. Elytra and wings extending as far as abdominal segment 4. *Abdomen* with tergites 1–6 each with a transverse group of short, stout, ferruginous spines (each arising from a papillate base and bearing a subapical seta). Tergite 7 with a pair of small, paramedian, oval protuberances (each bearing numerous stout spines) near posterior margin. Tergite 8 bearing a few smaller spines. Tergite 9 strongly bilobed and protuberant, not concealed from above by segment 8. Sternites glabrous. *Legs* glabrous, with hind femora extending to abdominal segment 4. *Functional spiracles* present on abdominal segments 1–5; peritreme thick, narrowly oval, subreniform.

Host plants: *Afzelia africana* (Duffy, 1953a); *Coffea* (Morstatt, 1913).

Biology. The larva feeds subcortically in the boles of mature trees until ready to pupate. The pupal cell (fig. 69) is deep in the sapwood or heartwood; it is about 5 cm. long and 1·5 cm. broad and is parallel to the grain of the wood. The entrance to the cell itself is closed by a calcareous operculum. This is built out from the walls of the cell (which are not completely lined as in *Plocaederus*) in the form of a dome-shaped cap. Pupation takes place during July and August and the adults emerge about a month later (Duffy, 1953a).

Economic importance. Recently several imported hardwood logs have been seen by the author to be heavily infested with this species, the sapwood and heartwood in some cases being so severely damaged as to be no longer of any commercial value.

Material studied. 2 L, 1 P, 1 I, England, Lancashire, viii.1948, under bark of *Afzelia* logs imported from Portuguese East Africa, M.G.F. leg., in coll. B.M.

References. Duffy, 1953a (L fig., Biol. fig.); Eichelbaum, 1913 (L, P); Fraser, 1949 (Biol. fig.); Lepesme and Villiers, 1944 (Biol.); Morstatt, 1913b (Biol.), 1935 (I fig., Biol.); Mühlmann, 1954 (Biol.).

Pachydissus camerunicus Aurivillius

Distribution. ETHIOPIAN REGION: Cameroons, Gold Coast, Ivory Coast, Nigeria.

Mature larva. Distinguishable from that of *P. hector* Kolbe by the characters given in the key, p. 21.

Host plants: *Antrocaryon micraster*, *Lannea acidissima* (G.H.T.); *Daniellia olivieri* (E.A.J.D.).

Biology. Oviposition was noted 11th March, 1947, on the scorched basal area of two large trees standing in a native farm. The trees had been fired at the base by the farmer to kill them, but they were still green and unattacked by insects except where burnt and scorched. The eggs are deposited in slits gnawed by the female. Fairly advanced larvae were present under bark on 25th April, 1947. The larvae tunnel in the cambial region, scoring the inner bark and sapwood surface, until mature. They then enter the sapwood for a short distance, half-inch or so, and construct an elongate-oval pupal chamber, sited parallel to the wood fibres and with the prepupal tunnel entering at the upper end. The chamber is lined with wood splinters and the larva then secretes an entire calcareous shell around itself. The opaque oval shell can be extracted quite easily, together with adhering wood fibres, as a complete entity, with the prepupal larva or pupa concealed within. Pupae were found on 23rd May, 1947, but the majority of cells contained prepupal larvae. The pupa is upright in the cell, standing on the apex of the abdomen (G.H.T.).

N. S. Stevenson has kindly provided additional information which has been summarised as follows. Infestation of this species in *Daniellia olivieri* seems to start in the branches, spreading downwards and upwards along the bole. As the population increases, attack spreads right round and down the trunk and up into the higher branches. Attack on a tree is apparently built up progressively into a heavy concentration of these beetles until the tree has become completely girdled, when it quickly dies. The ring-girdling of the cambium by the larvae is accompanied by a gum flow down the bole and the frass ejected is brown and mixed with gum. As the larva grows and starts to penetrate the sapwood the ejected frass is in the form of fine white wood dust with the admixture of gum. After a time the larva bores into the heart of the tree, making a large vertical slot; the frass is now in the form of long shreds. Pupation takes place in the heartwood.

The beetles are very well camouflaged, and it is difficult to detect their presence when they are stationary, despite their large size. Copulation has been observed to take place both on the surface of the trunk and under the flakes of bark. They are presumably diurnal and none has been attracted to artificial light. Dead trees are usually pitted all round the trunk (Pl. X, fig. 3) with emergence holes, and it is presumed that attack continues at an increasing rate until the death of the tree. A considerable pile of frass accumulates around the bases of infested trees.

Two observations of Stevenson's are at variance with those of Thompson. Firstly, the depth of penetration into the heartwood is at least 6 or 7 inches and may often be up to 12 inches. This may perhaps be due to the fact that a different host plant is evolved. Secondly, calcareous opercula, not calcareous cocoons, were present in the pupal cells examined.

Predators. Larvae of a large species of elaterid had destroyed several of the cerambycid larvae, apparently before the secretion of the shelly cocoon. Termites were seen in the pupal chambers but none had penetrated the calcareous shell.

Economic importance. Apparently healthy trees of *Daniellia olivieri* in the "derived savannah" near Enugu (Nigeria) have recently been attacked and killed. Infestation was first noticed in trees in the housing reservation, especially those growing in the compounds where they were no longer subject to fire and promiscuous damage. These particular trees are on the fringe of their natural habitat, since fire alone maintains the balance against high forest species and permits the growth of savannah species. Infestation here has been reported only in *Daniellia* and these trees may be attacked whether growing in groups or isolated (N. S. Stevenson).

Extensive damage to *Daniellia* by this species has also recently been observed near Sunyani (Gold Coast) by D. E. M. Marsh. Enormous slot-like excisions, measuring on an average 4¼ inches by 1 inch, are made by the larvae in the bark before pupation (Pl. VIII, figs. 3 and 4).

Material studied. 8 L, Gold Coast, 1945, from *Antrocaryon micraster*, G.H.T. leg., in coll. G.H.T.; 2 L, 2 I, Nigeria, Enugu, ii. 1955, from *Daniellia olivieri*, N. S. Stevenson leg., in coll. B.M.

References. None available.

Pachydissus regius Aurivillius

Distribution. ETHIOPIAN REGION: Cameroons, Nigeria.

Host plants: *Tectona grandis* (E.A.J.D.); *Baikiaea plurijuga* (F.P.R.L.).

References. Duffy, 1953a (Biol.).

Derolus mauritanicus (Buquet)

Distribution. PALAEARCTIC REGION: Algeria, Morocco, Sahara, Tunisia.

Host plants: *Nerium oleander*; also *Ficus* and *Calotropis procera* (Villiers, 1946).

Biology. Larvae infest slender living roots. Pupation takes place in September in a cylindrical pupal cell which is closed with a plug of shredded fibres stuck together with the larval secretion. Adults overwinter and emerge between March and June.

References. Villiers, 1946 (I fig., Biol.).

Cerambyx cerdo Linnaeus, s. sp. **mirbecki** Lucas

Descriptions of the immature stages and a biological account of this species have recently been published (Duffy, 1953a).

Distribution. PALAEARCTIC REGION: Algeria, Morocco, Tunisia.

Mature larva. See key, p. 21.

Pupa. See key, p. 41.

Additional host plants: *Juglans* and *Ceratonia siliqua*. (Dept. Agric., Cyprus, 1922); *Quercus ilex*, *Q. suber*, *Q. afares*, *Q. mirbecki* (Villiers, 1946).

Control. Systematic and careful pruning should be carried out so that no rough edges or cracks are left to harbour eggs. The trunks and main branches should be lime-washed and pieces of cotton wool soaked in benzine or turpentine should be placed in the holes and crevices and covered with mud or clay in order to kill the insects by fumigation (Dept. Agric., Cyprus, 1922).

Additional references. Caillol, 1914 (Biol.); Dept. Agric., Cyprus, 1922 (Biol., Contr.); Mühlmann, 1954 (L fig., I fig., Biol. fig.); Villiers, 1946 (I fig., Biol.).

Cerambyx scopolii Füessly, s. sp. **paludivagus** Lucas

Illustrated descriptions of the immature stages and a biological account of this species have recently been published (Duffy, 1953a).

Distribution. PALAEARCTIC REGION: Algeria, Tunisia.

Mature larva. See key, p. 21.

Pupa. See key, p. 41.

Additional references. Caillol, 1914 (Biol.); Mühlmann, 1954 (Biol.); Villiers, 1946 (Biol.).

Cerambyx miles Bonelli

Distribution. PALAEARCTIC REGION: Morocco.

Mature larva. No material available. For generic characters see key, p. 16.

Egg. Length 3 mm.; breadth 1·7 mm. Elongate-oval, attenuated towards the ends, one of which is rounded, the other truncate and with a micropylar area. Chorion yellow but white at ends and very finely punctate (Xambeu, 1898).

Host plants: *Vitis* (Feytaud, 1920); *Quercus ilex* and various fruit trees.

Economic importance. In Malta this species has caused severe damage to apple and pear trees.

Control. Infestations in Malta have been dealt with by plugging the larval galleries with cotton wool soaked in carbon bisulphide (Borg, 1930). An alternative method is the painting of the trunk up to about 18 inches from the ground with a strong milk of lime from March to April and August to September, when the adults are on the wing (Borg, 1936).

References. Borg, 1930 (Biol., Contr.), 1936 (Biol., Contr.); Caillol, 1914 (Biol.); Feytaud, 1920 (Biol.); Horváth, 1884 (L fig., Biol.); Mühlmann, 1954 (Biol.); Picard, 1929 (Biol.); Plavil'shchikov, 1940 (Biol.); Stellwaag, 1928 (I fig., Biol.); Villiers, 1946 (I, Biol.); Xambeu, 1898 (E, Biol.), 1898–1902 (L, Biol.).

Cerambyx velutinus Brullé

Distribution. PALAEARCTIC REGION: Morocco, Tunisia.

Mature larva. No material available. For generic characters see key, p. 16.

Host plants: *Quercus*, *Platanus* (Xambeu, 1895); *Ceratonia siliqua* (Anonymous, 1938).

Biology. Larvae infest living trees in which they feed for about two years before pupating. The pupal period lasts about a month, but the adult remains in the pupal

cell sometimes up to seven months before emerging. Adults are crepuscular (Xambeu, 1895).

References. Anonymous, 1938 (Biol.); Escherich, 1923 (Biol.); Mühlmann, 1954 (Biol.); Plavil'shchikov, 1940 (Biol.); Villiers, 1946 (I, Biol.); Xambeu, 1895 (L, P, Biol.), 1898–1902 (L).

Hesperophanini

Hesperophanes griseus (Fabricius)

Distribution. PALAEARCTIC REGION: Algeria, Morocco, Tunisia.

Mature larva. A description of what may possibly be this larva has been given by Paulian and Villiers (1939), but it is not sufficiently detailed for the purposes of the present study.

Egg. Length 2 mm. Form cylindrical, attenuated at both ends. Chorion milky white (Picard, 1919).

Host plants: *Ficus.* According to Picard (1919), records from *Acacia, Cytisus, Populus* and *Salix* are apparently unreliable (see also Kunckel d'Herculaise, 1904), Lucas (1848), Fauvel (1884) and Duffy (1953a).

Biology. Adults emerge during the hottest part of the summer (about July) and are nocturnal, seldom being found in daylight. Eggs are laid in cracks or under loose bark or lichens. Oviposition occurs on branches of all sizes except the very smallest, but mainly on the trunk and larger branches. The incubation period is twelve days. Adults do not feed and are short-lived, males living only six or seven days.

Parasites. Hymenoptera: *Iphiaulax flavator* F., *Xylonomus propinquus* Tschk., *Sycophrurus hesperophanis* Picard (Picard 1919b); *Doryctes leucogaster* Nees (Thompson, 1943).

Control. Picard (1919a) advises the rubbing of bark to remove lichens and the cutting off of all dead branches.

References. Balachowsky and Mesnil, 1935–1936 (Biol., Contr.); Caillol, 1914 (Biol.); Cotty, 1866 (Biol.); Duffy, 1953a (Biol.); Kunckel d'Herculaise, 1904 (Biol.); Lucas, 1848 (Biol.); Mendizabal, 1943 (Biol.); Mühlmann, 1954 (Biol.); Petroff, 1920 (Biol.); Peyerimhoff, 1919 (Biol.); Picard, 1919a (E, L fig., P fig., Biol. fig., Contr.), 1919b (Paras.), 1929 (Biol.); Thompson, 1943 (Paras.); Trabut, 1923 (Biol., Contr.); Villiers, 1946 (Biol.); Widiez, 1932 (Biol., Contr.); Xambeu, 1894–1897 (L, P, Biol.), 1898–1902 (Biol.).

Hesperophanes fasciculatus (Falderman) (=**affinis** Lucas)

Distribution. PALAEARCTIC REGION: Algeria.

Host plants: *Sorbus domestica* (Xambeu, 1894–1897); *Ficus, Cytisus, Quercus, Punica granatum, Ceratonia siliqua, Pistacia, Ziziphus vulgaris, Acer obtusatum, Nerium oleander, Taxus baccata, Anthyllis numidica, Acacia tortilis* (Picard, 1919); *Eucalyptus globulus* (Peyerimhoff, 1919); *Robinia pseudoacacia, Prunus amygdalus, Morus, Juglans* (Mendizabal, 1943).

Biology. According to Balachowsky (1929), oviposition in Algeria occurs immediately after adult emergence. The larvae tunnel through the branches, confining themselves at first to the sapwood and penetrating the heartwood in the winter. By the time the larvae are mature (about July) the galleries are nearly a foot long. The

pupal period lasts two to three weeks, the adult emerging through a circular hole in the bark. The infested branches dry up and break off at the slightest wind and in cases of severe infestation the tree (*Ficus*) bears no fruit and almost ceases to grow. Balachowsky and Mesnil (1935–1936) maintain that attack is usually confined to one-year-old branches (1 to 3 cm. in diameter), although older branches are sometimes infested. Pupation occurs in July. The life-cycle is completed in a year. Picard (1919) states that adults are nocturnal and are attracted to light.

Parasites. Hymenoptera: *Dinarmus regnieri* Masi (Masi, 1943).

Predators. Coleoptera: Larvae of *Lebia* and *Clerus* (Xambeu, 1894–1897).

Economic importance. In Algeria *H. fasciculatus* (Falderman) is very injurious to figs besides attacking living and dead wood of many other trees.

Control. Balachowsky (1929) suggests the cutting off and burning of infested branches, preferably during winter when there is no foliage.

References. Balachowsky, 1929 (Biol., Contr.); Balachowsky and Mesnil, 1935–1936 (I fig., Biol., Contr.); Masi, 1943 (Paras.); Mendizabal, 1943 (Biol.); Mühlmann, 1954 (Biol.); Picard, 1919 (Biol.); Villiers, 1946 (Biol.); Xambeu, 1894–1897 (L, Biol.), 1900 (P, Biol.).

Hesperophanes sericeus (Fabricius)

Distribution. PALAEARCTIC REGION: Algeria, Egypt, Morocco, Tunisia.

Host plants: *Ficus*, *Pistacia*, *Vitis* (Picard, 1919); *Halocnemum strobilaceum* (dry roots) (Petroff, 1920).

References. Balachowsky and Mesnil, 1935–1936 (Biol.); Caillol, 1914 (Biol.); Mendizabal, 1943 (Biol.); Mühlmann, 1954 (Biol.); Petroff, 1920 (Biol.); Picard, 1919 (Biol.); Plavil'shchikov, 1940 (Biol.); Villiers, 1946 (I fig.); Widiez, 1932 (Biol., Contr.); Xambeu, 1898–1902 (L).

Hesperophanes gayi Plavil'shchikov (=**cinereus** Villers)

Distribution. PALAEARCTIC REGION: Algeria, Morocco.

Host plants: Various deciduous trees including *Juglans*, *Ficus*, *Prunus amygdalus* and *Quercus* (Villiers, 1946). Bargagli (1878) lists *Robinia*, *Castanea* and *Fagus*.

Parasites. Hymenoptera: *Ephialtes manifestator* L. (Girard, 1880).

Economic importance. According to Girard (1880, 1881), this species is a pest of structural timbers. He gives an account of a heavy infestation in the attic of a house in which seasoned oak beams have been damaged.

References. Balachowsky and Mesnil, 1935–1936 (Biol.); Bargagli, 1878 (Biol.); Caillol, 1914 (Biol.); Carret, 1876 (Biol.); Della Beffa, 1915 (L fig., P fig., I fig., Biol. fig.); Girard, 1879 (Biol.), 1880 (Biol., Paras.), 1881 (Biol.); Mendizabal, 1943 (Biol.); Mühlmann, 1954 (Biol.); Mulsant and Mulsant, 1855 (L, Biol.); Perris, 1877 (P); Picard, 1919 (Biol.); Ruiz Castro, 1943 (L, I fig., Biol., Contr.); Widiez, 1932 (Biol., Contr.); Villiers, 1946 (Biol.); Xambeu, 1898–1902 (L, P, Biol.).

Hypoeschrus strigosus Gyllenhal (=**Tibestia dallonii** Peyerimhoff)

Distribution. PALAEARCTIC REGION: Algeria, Morocco, Sahara. ETHIOPIAN REGION: Sierra Leone.

Host plant: *Acacia* (*tortilis*?).

References. Mateu, 1954 (Biol.); Villiers, 1946 (I fig., Biol.).

Stromatium barbatum (Fabricius)

Distribution. MADAGASCAN REGION: Madagascar, Rodriguez, Mauritius, Réunion. ORIENTAL REGION: Seychelles. This species is also widely distributed throughout India, Ceylon and Burma.

Adult. Length 12–29 mm. Colour varying from reddish brown to brownish black; sparsely covered with tawny pubescence. *Head* with antennae about one-third longer than body in male, scarcely longer than body in female; ciliate beneath. Eyes coarsely faceted. *Prothorax* densely covered with coarse punctures; disc bearing five feebly defined tubercles. Middle coxal cavities open externally. *Elytra* coarsely and densely punctured; each with two pairs of costae and with a sutural tooth at apex.

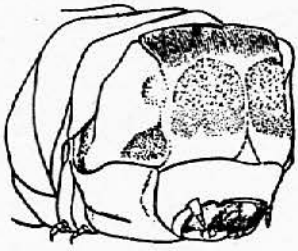


Fig. 70

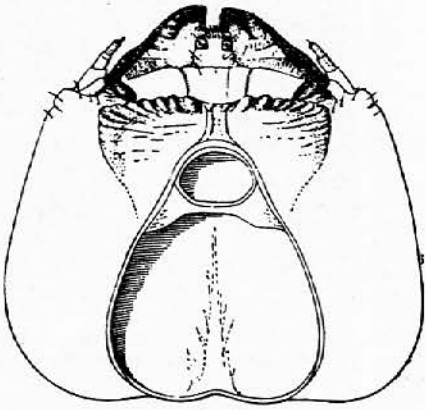


Fig. 71

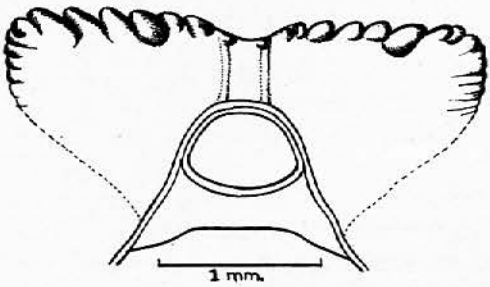


Fig. 72

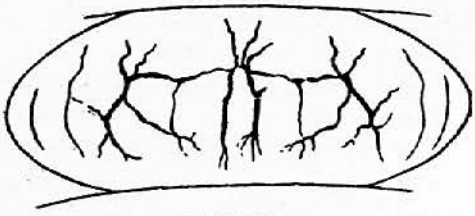


Fig. 73

Figs. 70–73. *Stromatium barbatum* (Fabricius). Mature larva. Fig. 70. Anterior portion. Oblique aspect (Gardner, 1927). Fig. 71. Head. Ventral aspect (Gardner, 1927). Fig. 72. Hypostoma (Duffy, 1953a). Fig. 73. Abdominal ampulla. Dorsal aspect (Gardner, 1927).

Mature larva (figs. 70–73). Length up to 38 mm.; breadth (at prothorax) 9·5 mm. *Head* (fig. 71) subquadrate, somewhat wider behind middle, the posterior margin with a very slight median emargination; shouldered behind each antenna. Genae with setae short and sparse. Front margin of frons weakly concave and not strongly pigmented. Hypostoma (fig. 72) with front margin distinctly tuberculate, the tubercles oval and often brownish. Gula narrow, not raised. One pair of ocelli present; lens oval, indistinct; pigmented spot usually indiscernible. Antenna strongly protuberant, with a long basal membrane; segment 2 cylindrical, more than one and a half times as

long as segment 3; segment 3 wider in basal half, tapering apically; supplementary process elongate, conical. Labrum moderately transverse, with anterior margin straight medially and with numerous setae. Maxilla and labium with brownish sclerotisation basally to the segment; lobe of maxilla broad, fleshy. *Prothorax* (fig. 70) with pronotum subrectangular, with anterior area narrowly yellowish, shining; posterior area elevated, soft, striate, except for a posterior, finely reticulate area. Postnotal fold present. Eusternum not distinctly limited; shining, rugulose, with a weak, oblique depression on each side. *Abdomen* with ampullae non-tuberculate and with surface reticulate and wrinkled; transverse furrows indistinct (fig. 73). *Legs* well developed. *Spiracles* with peritreme oval and pale.

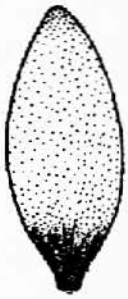


Fig. 74

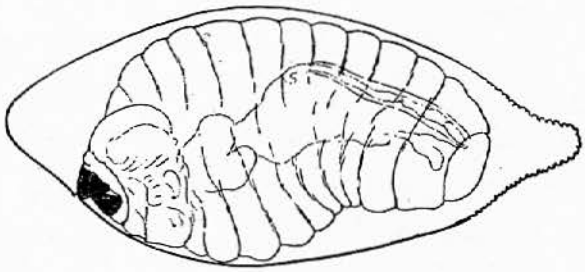


Fig. 75

Figs. 74–75. *Stromatium barbatum* (Fabricius). Fig. 74. Egg (Gardner, 1927). Fig. 75. Showing larva just about to hatch (Beeson and Bhatia, 1939).

Egg (figs. 74, 75). Gardner (1927) gives the following description: "Average length 2·1 mm.; width about 0·8 mm. Elongate ovoid, one end with a slight blunt thickening, the opposite end with a more distinct blunt prominence. White, the surface minutely granulate, except towards the more prominent end where the granules are much coarser and more closely placed."

Host plants: INDIA: *Abies webbiana*, *Acacia arabica* (sapwood), *A. caesia*, *A. catechu* (sapwood), *A. dealbata*, *A. eburnea*, *A. farnesiana*, *A. jacquemontii* (sapwood), *A. latronum*, *A. leucophloea* (sapwood), *A. modesta*, *A. pennata*, *A. senegal*, *Acer campbellii*, *A. caudatum*, *A. cultratum*, *Acrocarpus fraxinifolius*, *Aegle marmelos*, *Aesculus indica*, *Alangium salviifolium*, *Albizia chinensis*, *A. distachya*, *A. julibrissin*, *A. lebbeckoides*, *A. lophantha*, *A. procera*, *Alnus nepalensis*, *A. nitida*, *Anogeissus latifolia*, *A. pendula*, *A. sericea*, *Annona squamosa*, *Anthocephalus cadamba*, *Ardisia solanacea*, *Artocarpus calophylla*, *A. lakoocha*, *Averrhoa carambola*, *Balanites roxburghii*, *Bambusa*, *Bauhinia foveolata*, *B. purpurea*, *B. racemosa*, *B. retusa*, *B. vahlii*, *B. variegata*, *Beaumontia grandiflora*, *Betula alnoides*, *B. utilis*, *Bischofia javanica*, *Bombax malabaricum*, *Boswellia serrata*, *Bridelia tomentosa*, *Broussonetia papyrifera*, *Butea monosperma*, *Canarium strictum*, *Carallia integerrima*, *Carapa moluccensis*, *Carpinus viminea*, *Cassia auriculata*, *C. fistula*, *C. nodosa*, *C. siamea*, *Casuarina equisetifolia*, *Cedrela toona*, *Cedrus deodara*, *Celtis australis*, *Chloroxylon swietenia*, *Cinnamomum glanduliferum*, *C. tamala*, *Citrus aurantium*, *C. grandis*, *C. medica*, *Clausena lansium*, *Clerodendrum colebrookianum*, *Coffea arabica*, *Cordia myxa*,

Cornus macrophylla, Corylus colurna, C. ferox, Cotoneaster bacillaris, C. microphylla, Crataegus oxyacantha, Cryptomeria japonica, Cudrania javanensis, Cupressus torulosa, Dalbergia kurzii, D. lanceolaria, D. latifolia (sapwood only), *D. ovata, D. paniculata, D. rimosa, D. sericea, D. sissoo, D. stipulacea, D. volubilis, Debregeasia hypoleuca, Dendrocalamus strictus, Desmodium tiliifolium, Deutzia corymbosa, D. staminea, Diospyros chloroxylon, D. embryopteris, D. humilis, D. kaki, D. melanoxylon* (sapwood), *D. microphylla, D. montana, D. tomentosa, Dipterocarpus macrocarpus, Elaeagnus conferta, Elaeocarpus lanceaefolius, Eriobotrya dubia, E. japonica, E. petiolata, Eriolobus indica, Erythrina suberosa, Eucalyptus calophylla, E. globulus, E. tereticornis, Eugenia bracteata, E. laeta, Euonymus frigidus, E. hamiltonianus, E. lacerus, Eurya symplocina, Excoecaria agallocha, Feronia elephantum, Ficus carica, F. glaberrima, F. hispida, F. nemoralis, F. retusa, F. scandens, Fraxinus floribunda, Gamblea ciliata, Garcinia indica, G. wightii, Gardenia obtusifolia, G. turgida, Garuga pinnata, Glochidion lanceolarium, Gmelina arborea, Gouania leptostachya, Grevillea robusta, Grewia disperma, G. elastica, G. hainesiana, G. oppositifolia, G. subinaequalis, G. tiliifolia, Gynocardia odorata, Hedera helix, Helicia robusta, Helicteres isora, Heritiera fomes, Heteropanax fragrans, Hiptage madablota, Holigarna arnottiana, Holmskioldia sanguinea, Holoptelea integrifolia, Hopea wightiana, Hypericum mysorense, Ilex dipyrena, I. sikkimensis, I. wightiana, Indigofera heterantha, I. pulchella, Juglans regia, Kydia calycina, Lagerstroemia lanceolata, L. villosa, Lannea grandis, Larix griffithii, Lasiosiphon eriocephalus, Leucomeris spectabilis, Litsea wightiana, Machilus bombycina, M. duthiei, M. odoratissima, Malus baccata, Madhuca butyracea, Magnolia campbellii, Mallotus nepalensis, M. philippinensis, Mangifera indica, Mappia foetida, Meliosma dilleniifolia, M. pungens, M. thomsoni, Michelia excelsa, M. champaca, M. nilagirica, Millettia brandisiana, M. pulchra, M. racemosa, Mimusops elengi, Morus alba, M. indica, Murraya exotica, Myrica nagi, Myrsine semiserrata, Ougeinia dalbergioides, Oxyspora paniculata, Parkinsonia aculeata, Parrotiopsis jacquemontiana, Pentacme suavis, Phlogacanthus thyrsiflorus, Photinia notoniana, Picea smithiana, Pinus wallichiana, Piptadenia oudhensis, Piptanthus nepalensis, Pistacia integerrima, Pithecellobium bigeminum, Pittosporum eriocarpum, P. floribundum, Plecospermum spinosum, Poinciana elata, P. regia, Polygala arillata, Pongamia glabra, Populus ciliata, Premna serratifolia, Prinsepia utilis, Prosopis juliflora, P. spicigera, Prunus eburnea, P. microcarpa, P. persica, P. racemosa, Pterocarpus marsupium, Pterygota alata, Pyracantha crenulata, Pyrus communis, P. lanata, P. pashia, P. ursina, Quercus dealbata, Q. dilatata, Q. ilex, Q. incana, Q. pubescens, Q. semecarpifolia, Q. semiserrata, Q. serrata, Randia dumetorum, R. uliginosa, Rhamnus persicus, Rhododendron argenteum, R. campanulatum, R. falconeri, Rhus insignis, R. punjabensis, R. wallichii, Ribes rubrum, Rosa macrophylla, R. moschata, R. sericea, Rubus lasiocarpus, Salix babylonica, S. daphnoides, S. elegans, Salvadora persica, Sapium sebiferum, Saurauja napaulensis, Semecarpus anacardium, Sesbania aegyptiaca, Shorea obtusa, S. robusta, Siphonodon celastrineus, Sonneratia apetala, Sorbus foliolosa, Spatholobus roxburghii, Spiraea canescens, Spondias axillaris, S. pinnata, Staphylea emodi, Styrax serrulatum, Syzygium cumini, S. hemisphericum, Tectona grandis* (sapwood), *Terminalia bellirica, T. tomentosa, Toddalia asiatica, Torricellia tiliaefolia, Trewia nudiflora, Turpinia nepalensis, Ulmus wallichii, Viburnum cylindricum, V. cotinifolium, V. erubescens, V. grandiflorum,*

V. nervosum, Woodfordia floribunda, Wrightia tinctoria, Xylosoma longifolium, Ziziphus nummularia, Z. xylopyrus.

EUROPE: *Acer pseudoplatanus, Aesculus hippocastanum, Alnus glutinosa, Betula verrucosa, Carpinus betulus, Fagus sylvatica, Populus tremula, Tilia cordata, Ulmus* sp.

NEW ZEALAND: *Cordyline australis, Hoheria lyallii, Olearia avicenniifolia, Pittosporum eugenioides, Rapanea urvillei* (Beeson and Bhatia, 1939).

As this insect is exceptionally polyphagous and is so easily transportable in packing-cases, it has been considered advisable to enumerate all known host plants despite the fact that many of them are oriental.

Biology. The eggs are deposited in small holes and cracks in wood (with or without bark) and in thin battens, planks and plywood; other sites are fissures formed by imperfect carpentry joints and rough, splintery surfaces. They may be laid singly or in batches of about half a dozen. The extrusion of each egg takes on an average twenty-five seconds. The maximum number known to have been laid by a single female is 246, the average being about 100. The incubation period is from five to thirteen days (Beeson and Bhatia, 1939).

The larval tunnels (Pl. VII, figs. 3 and 4), which are tightly packed with very fine powdery frass, extend into the wood very irregularly without conforming to any particular pattern or direction. If the wood is heavily infested, the galleries cross and interlace so that almost all the interior of the wood is reduced to powder, the external surfaces only being left intact as thin protective sheets.

The essential constituents of the larval food have apparently not yet been isolated. The larval gut probably contains the enzyme cellulase (which has been found present in *S. fulvum* Villers), and may thus have the capacity for digesting cellulose (Beeson and Bhatia, 1939).

No special cell appears to be constructed for pupation, which occurs at various depths in the wood. Adults excavate separate tunnels to the surface. Pupation takes place during May and June and adults emerge during June and July. The life-cycle is completed in from one to several years, the maximum period recorded being ten years.

Economic importance. This species is of considerable economic importance, not only on account of its extremely polyphagous nature, but also because of its preference for seasoned timbers. It is perhaps most notorious as a pest of plywood packing-cases and is also known readily to attack furniture, wooden structures, rafters, door- and window-frames, shelves, panels, wooden tent-pins, museum wood specimens, etc. Sometimes several years elapse before the concealed depredations are noticed.

In woodland areas this species will usually oviposit only on dry wood, such as the dead crowns of trees. There are apparently no authentic records of this species attacking living, healthy trees, except that by Khare (1916), who reports that living trees of *Citrus aurantium* have been attacked by this species.

No records or observations are available to the author indicating that this species is established in Africa, although it is frequently imported in packing-cases. In Mauritius, however, it has become widely established, particularly in coastal areas, and has seriously infested railway sheds, sleepers and other structures. According to A. J. E. Orian, it is recognised also as a pest of *Casuarina equisetifolia, Eucalyptus* spp. and

Bambusa. E. S. Brown has informed the author that *Casuarina* is the preferred host in the Seychelles.

Control. The usual methods of impregnating timber with solutions of naphthalene in benzine and zinc chloride in water have proved totally inadequate. The most effective means of control, so far as wooden structures are concerned, would appear to be the meticulous avoidance of rough surfaces and roughly constructed joints and a thorough varnishing of all surfaces. As this species can develop in culms that have been immersed in water for long periods, Gardner (1945) recommends the impregnation of culms with preservatives for protection against attack; a coating of creosote and oil affords temporary protection.

Material studied. 3 L, 1 I, Scotland, Glasgow, 13.x.1928, D. Ellis leg., in coll. B.M.; 5 L, 1 I, England, London, 10.xi.1936, in wood of Indian tea-cases, in coll. B.M.

References. Beeson, 1919b (Biol.), 1941 (L fig., Biol., Contr.); Beeson and Bhatia, 1939 (E fig., Biol. fig.); Duffy, 1949b (Biol.), 1952 (I), 1953a (E fig., L fig., Biol., Contr.); Emden, 1937 (Biol. fig.), 1939–1940 (L); Gardner, 1927 (E, L fig.), 1945 (Contr.); Khare, 1916 (Biol.); Saalas, 1939 (L fig., Biol.); Stebbing, 1914 (Biol.).

Stromatium fulvum (Villers) (=**unicolor** (Olivier))

Distribution. PALAEARCTIC REGION: Algeria, Morocco, Tunisia. This species is also widely distributed throughout South America.

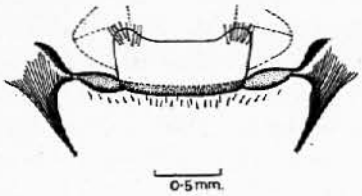


Fig. 76. *Stromatium fulvum* (Villers). Mature larva. Hypostoma and submentum.

Mature larva (fig. 76). Similar to that of *S. barbatum* (Fabricius), but differing in at least one fundamental character as follows. *Head* (fig. 76) with posterior margin of submentum produced posteriorly and overlapping front margin of hypostoma; hypostoma broadly tuberculate on each side of produced submentum. Ocellus distinct; lens round, strongly protuberant.

The fundamental dissimilarity between larvae of *S. fulvum* and *S. barbatum* would seem to indicate at least subgeneric status.

Host plants: *Carya* sp. (from records of F.P.R.L.); *Ulmus* (Lichtenstein, 1918); *Cytisus spinosus*, *Pistacia lentiscus*, *Quercus* (Silantjev, 1908); *Juglans*, *Fagus*, *Morus*, *Cassia* (Shafik, 1938); *Prunus armeniaca*, *Ficus* (Mendizabal, 1943); *Corylus*, *Platanus*, *Cedrus* (Villiers, 1946).

Biology. Similar to that of *S. barbatum* (Fabricius). Linsley (1938) records the presence of larvae in furniture at least thirteen years old.

Parasites. Hymenoptera: *Sclerodermus domesticus* Latr. (Shafik, 1938).

Economic importance. There have been very many records of *S. fulvum* infesting furniture and structural timbers. According to Shafik (1938), this species was first

recorded in Egypt in 1916 on railway sleepers, then later in a walnut case at the Egyptian Museum. In 1935 it was obtained from dead *Morus* and *Cassia* wood around Dessouk, which indicates that it may now have become established.

Control. In 1932 a severe infestation was discovered in furniture and other woodwork (mainly Turkish walnut) in the Ras-El-Tin Palace and control measures were undertaken the following year. When infested pieces of wood were treated with different fumigants under experimental conditions, the best results (100 per cent mortality of larvae in forty-eight hours) were obtained with hydrocyanic acid gas generated from Xyklon, at a concentration of 10·3 oz. per 1,000 cu. ft., a humidity of 76 per cent and a temperature above 22° C. [71·6° F.]. For the practical work, the concentration used was 12 oz. HCN per 1,000 cu. ft. with an exposure of forty-eight hours. The holes in two infested doors and their frames were filled by injecting, three times at intervals of two to five minutes, a saturated solution of paradichlorobenzene in carbon bisulphide. They were then blocked with a special paste prepared from fine shavings mixed with glue and the surface polished. No further infestation was reported from the palace during the three years following treatment (Shafik, 1938).

Material studied. 2 L, 1 I, Belgian Congo, Flandria, 1931, in coll. M.R.C.B.

References. Caillol, 1914 (Biol.); Duffy, 1953a (Biol.); Fabre, 1891 (Biol.); Lichtenstein, 1918 (Biol.); Linsley, 1938 (Biol.); Mendizabal, 1943 (Biol.); Mulsant and Mayet, 1873 (L); Perris, 1877 (L, P, Biol.); Reĭkhardt and others, 1930 (Biol., Contr.); Ruiz Castro, 1943 (E fig., L fig., I fig., Biol. fig., Contr.); Schiödte,, 1876 (L fig.); Shafik, 1938 (L fig., P fig., I fig., Biol. fig., Contr.); Silantjev, 1908 (E fig., L fig., P fig., Biol. fig.); Villiers, 1946 (I fig., Biol.); Xambeu, 1898–1902 (L, P, Biol.).

Hololeprus variolosus Gerstaeker

Distribution. ETHIOPIAN REGION: Kenya, Zanzibar.

Mature larva. In the larvae available no characters are evident whereby they can be distinguished from young larvae of *Stromatium barbatum* (Fabricius).

Host plant: *Acacia* sp. (J.C.M.G.).

Material studied. 2 L, 1 I, Kenya, Kampi-ya-Moto, from *Acacia*, J.C.M.G. leg., in coll. B.M.

Gnatholea liturifer Walker

Distribution. ETHIOPIAN REGION: Ethiopia, Kenya. PALAEARCTIC REGION: Arabia, Egypt.

Mature larva (fig. 77). Similar to that of *Stromatium barbatum* (Fabricius), but separable as follows. *Head* with genal setae long and fine. Hypostoma (fig. 77) with

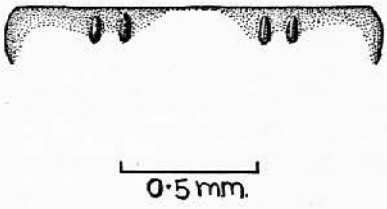


Fig. 77. *Gnatholea liturifer* Walker. Mature larva. Hypostoma.

only two pairs of tubercles which are longitudinally subcarinate and ferruginous. Antenna with segment 2 not or scarcely longer than segment 3. *Abdomen* with dorsal ampullae micro-granulate.

Host plant: *Acacia.*

Material studied. 1 L, Kenya, Athi River, Clayton's Estate, 3,500 ft., 5.iv.1937, from dead branch of *Acacia*, H. Wilkinson leg., in coll. B.M.

References. None available.

Cerasphorus hirticornis Serville

Distribution. ETHIOPIAN REGION: Angola, Belgian Congo, Cameroons, Gold Coast, Ivory Coast, Senegal, Sierra Leone, Uganda.

Mature larva. Very similar to that of *Stromatium barbatum* (Fabricius), from which it differs as follows. *Head* with temples immediately behind ocellus broadly and strongly sclerotised and ferruginous (but probably pale in young larvae). *Abdomen* with dorsal ampullae micro-granulate. Thoracic and abdominal setae pale ferruginous.

Host plants: *Albizia, Ficus brachypoda* (J.C.M.G.).

Material studied. 3 L, 2 I, Uganda, 1953, from *Albizia* sp., J.C.M.G. leg., in coll. B.M.

References. None available.

Chlorida festiva (Linnaeus)

Distribution. ETHIOPIAN REGION: São Tomé.

Host plants: *Theobroma* (*Solanum melongena* in Jamaica).

References. Dash, 1917 (Biol.); Edwards, 1938 (Biol.); Mühlmann, 1954 (Biol.).

Phoracanthini

Larval Characters

Head rather depressed, with sides rather strongly diverging posteriorly. Genae shouldered; temples without postocular carinae. Front margin of frons evenly rounded, upper boundary indistinct. Antennal foramen with upper boundary not raised or produced. Mouthframe entirely sclerotised beneath antennae. Antennae salient. Labrum cordate. Ocelli absent or one or two pairs present. Hypostoma with front margin transversely striate; sutures very short. Gular sutures well defined, raised. Process of palpifer indistinct. *Prothorax* depressed, moderately setose, lateral regions with scattered glabrous spots; postnotal fold present; presternal plates absent. *Abdomen* with ampullae microscopically alutaceous, glabrous. Pleural discs indistinct. Anal lobe sparsely setose. *Legs* short but clearly 4-segmented; femur and tibiotarsus strongly sclerotised; unguiculus flagelliform, usually feebly sclerotised and imbricately tuberculate or spinose.

Phoracantha (s.g. **Phoracantha**) **semipunctata** (Fabricius)

Distribution. ETHIOPIAN REGION: Cape Province, Orange Free State, Pretoria. PALAEARCTIC REGION: Egypt, Palestine. MADAGASCAN REGION: Mauritius, Rodriguez.

This species is of Australian origin, but has become widely distributed and is now established in New Zealand and South America.

Adult (fig. 78). Length 16–30 mm. Entirely reddish brown except elytra which have a straw-coloured, transverse median band and an apical spot. *Head* with antennal segments 3–7 strongly spined apically on inner angle; extending to at least as far as elytral apices in female and well beyond apices in male. Eyes coarsely

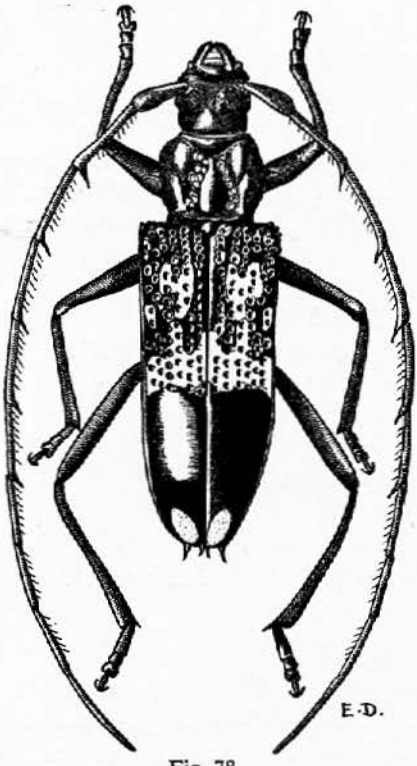


Fig. 78

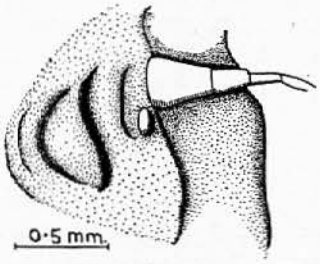


Fig. 79

Fig. 78. *Phoracantha semipunctata* (Fabricius). Adult.
Fig. 79. *Phoracantha semipunctata* (Fabricius). Mature larva. Head showing impressions on temple. Lateral aspect.

faceted. *Prothorax* slightly elongate, with sides bearing a pair of median spine-like tubercles. Middle coxal cavities closed externally. *Elytra* very coarsely punctured for basal half, apical half smooth; apices with outer and sutural angles strongly spined.

Mature larva (fig. 79). Length up to 32 mm.; maximum breadth (at prothorax) 10·5 mm. Form robust and rather strongly depressed. *Head* slightly transverse (maximum head-width 6·5 mm.). Temples (fig. 79) with broad ferruginous band behind antenna rather protuberant and bisected by a well-defined vertical impression on each side of which are one or two shallower impressions. Mouthframe broadly pitchy. Labrum semicircular. One pair of ocelli present laterad and ventrad of

antenna; lens large, oval; pigmented spot indistinct. Hypostoma ferruginous with front margin more darkly so and very feebly transversely striate; gular sutures strongly raised. Maxilla with segment 3 of palp cylindrical, as long as segment 2. Labial palpi with segment 2 cylindrical, as long as segment 1. *Prothorax* with conspicuous scattered, dark, glabrous spots on lateral regions; posterior part of pronotum very finely longitudinally striate. *Abdomen* with ampullae micro-reticulate, glabrous, non-tuberculate. *Legs* with unguiculus slender, flagelliform and imbricately tuberculate. *Spiracles* with peritreme oval, thin, pale, testaceous, without marginal chambers and not raised above general level of cuticle.

Pupa. Length 25 mm.; maximum breadth 6 mm. *Head* with vertex dome-shaped, smooth, glabrous and partly visible from above; front feebly rugose, glabrous. Antennae with segments 3–6 (at least) strongly pectinate at apex of inner margin, extending to between abdominal segments 3 and 4, where they are strongly recurved to terminate between the middle and front coxae. Eyes feebly convex, glabrous. *Pronotum* quadrate, with front margin feebly rounded; bearing scattered short, curved, testaceous spines, especially around front angles; lateral tubercles acute and strongly produced. *Mesonotum* transversely striate, glabrous; scutellum slightly protuberant and glabrous. *Metanotum* smooth and bearing a few minute spines on each side of scutellar groove which is distinct. Elytra and wings extending as far as abdominal segment 4, the former with an apical spine-like tubercle. *Abdomen* with tergites 1–6 each with paired oval areas bearing about six to eight short, stout spines. Tergite 7 elongate, with a pair of oval tubercles each bearing four to six stouter spines which are inclined anteriorly. Tergite 8 elongate, with two groups of about four more slender spines which are inclined posteriorly. Tergite 9 extremely short, bearing a few short, stout spines. Sternites glabrous. *Legs* with femora clavate; hind femora with a tuberculate process near base; extending to abdominal segment 5. *Functional spiracles* present on abdominal segments 1–5; peritreme broadly oval, moderately thick and slightly raised above general level of cuticle.

Egg. Length 2·6 mm. Form elongate, subcylindrical, spindle-shaped. Chorion pale yellow, soft, gelatinous (Tooke, 1935a).

Host plants: *Eucalyptus* spp., especially *E. globulus* and *E. viminalis*; it has also been recorded from *E. longifolia*, *E. robusta*, *E. saligna*, *E. diversicolor*, *E. sideroxylon*, *E. leucoxylon*, *E. salubris*, *E. tereticornis*, *E. triantha* and *E. crebra* (Tooke, 1935a). In Israel it attacks *E. camaldulensis* (Neumark, 1953).

Biology. Oviposition takes place on dead or sickly trees and cut logs, especially felled timber with the bark on. The eggs are deposited beneath the thin strips of dry bark which are loosely attached to the smooth green bark of the boles and main branches. The incubation period is ten to fourteen days. The larvae feed for about four to six months subcortically, making regular galleries which are packed tightly with frass; these may either extend for several feet in a straight line or twist and turn in all directions. When mature, the larvae bore obliquely into the wood, where they pupate at a depth of several inches from the surface. The pupal period lasts about ten days. Emergence (in South Africa) occurs from September to April (Tooke, 1935a). According to Lepesme (1950) many first-instar larvae are killed by the copious flow of "gum".

The habits of this species in Palestine, as recorded by Bytinski-Salz and Neumark (1953), have been summarised as follows. The beetles are chiefly active during the night, hiding in daytime under the dry bark or in crevices. Longevity of the adults is about forty days in summer and up to 180 days during the colder season. Oviposition occurs practically uninterruptedly from March to November and eggs are deposited in batches of 10 to 110 (average 43·5). The maximum number of eggs laid by a single captive female was about 300.

Predators. Coleoptera: *Pelonium amoenum* Guér. and *Temnochilia steinheili* Reitter (De Santis, 1945).

Economic importance. P. semipunctata (Fabricius) often causes considerable damage to sickly trees, irrespective of age, and felled timber; but dry wood, even with the bark intact, is not attacked (Duffy, 1953a).

It is interesting to note that, according to Bytinski-Salz and Neumark (1953), standing living trees are attacked and often completely girdled in Palestine. Trees up to twelve years old usually succumb to attack owing to the complete destruction of the cambium and phloem, but older trees, which are not entirely girdled, may survive the primary attack but are weakened and therefore attacked with preference by later generations.

Brain (1929) suggests that this species was probably introduced in wooden sleepers from Australia about 1896. It was first found about 1900 in bluegum trees growing along a railway line near Cape Town. Lounsbury (1918) states that it has been transported far and wide throughout the Union by traffic of *Eucalyptus* logs which are used as mine props.

A. J. E. Orian has informed the author that this insect is a serious pest of *Eucalyptus* in Mauritius.

Control. Tooke (1935a) suggests the placing of trap trees (trees of little economic value) in clearings during the emergence period; these should subsequently be burned. Stripping the bark off trees as soon as they are felled and allowing the timber to dry out as soon as possible, discourages oviposition.

An effective method of protecting *Eucalyptus* poles against attack by this species has been described by Neumark (1953). It consists of the impregnation, immediately after felling, by injecting an aqueous solution of zinc chloride into the sapwood under a pressure of 5 atmospheres by capping one end of the cut pole. At this pressure the speed of flow averages 1 litre per 102 seconds in poles 6·5–20·3 feet long and containing 0·4–4·3 cubic feet of sapwood. *Phoracantha* larvae were found not to enter the bark or wood of poles containing 0·4 lb. zinc chloride per cubic foot sapwood, and it has been shown that poles containing 1 lb. per cu. ft. sapwood should have an average life of at least twenty-two years.

Material studied. 3 L, 1 P, 1 I, Orange River Colony, from *Eucalyptus* in coll. B.M.

References. Brain, 1929 (Biol.); Bruch, 1918 (Biol.); Bytinski-Salz, 1952 (Biol., Contr.); Bytinski-Salz and Neumark, 1953 (Biol., Contr.); De Santis, 1945 (L fig., P fig., Biol. fig., Contr.); Duffy, 1953a (E, L, P, Biol., Contr.); Lepesme, 1950 (Biol.); Lounsbury, 1918 (L fig., I fig., Biol. fig.); Molinari, 1923 (Biol.); Mühlmann, 1954 (Biol.); Neumark, 1953 (Biol., Contr.); Schiödte, 1876 (L); Tooke, 1928 (Biol., Contr.), 1935a (L fig., Biol., Contr.), 1949 (Biol.).

Phoracantha (s.g. **Phoracantha**) **recurva** Newman

Distribution. ETHIOPIAN REGION: Cape Province. This species has been introduced from Australia.

Egg. Froggatt (1923) gives the following description: ". . . pale yellow, elongate, spindle-shaped in form but flattened on the upper and lower surface when deposited (as is usually the case) in a shallow depression between the dry scaly and green bark. They are composed of a soft gelatinous matter without any definite structure or skin and a very large percentage appear to be infertile or shrivelled up by the heat without any larvae emerging. The average length of each egg is about one-tenth of an inch. Before the emergence of the larvae the eggs swell out and are almost cylindrical in form."

Host plants: Numerous species of *Eucalyptus*, including *E. nova-anglica* and *E. camaldulensis* (Froggatt, 1923).

Biology. The larval habitat is in the trunk and main branches. The young larvae feed for about six months under the bark, where they make irregular galleries which are tightly packed with frass; a single gallery may be several feet in length. When nearly mature the larva tunnels into the sapwood and then, usually, into the heartwood, where it pupates several inches from the surface (Froggatt, 1923).

Parasites. Hymenoptera: *Iphiaulax rubriceps* Frogg., *I. phoracanthae* Frogg. and *I. morleyi* Frogg. (Froggatt, 1923).

Predators. Coleoptera: *Trogodendron fasciculatum* Schreiber.

Economic importance. Similar to preceding species.

References. Clark, 1938 (Biol.); Duffy, 1953a (E, Biol.); Froggatt, 1923 (E, Biol.); Schiödte, 1876 (L fig.); Tooke, 1949 (Biol.).

Cordylomera spinicornis (Fabricius) and varieties
[Ver de Brousse]

It should be pointed out that *C. suturalis* Chevrolat, *C. nitidipennis* Serville, *C. testacea* Buquet and *C. sansibarica* Kolbe are now regarded as colour varieties of *C. spinicornis* (Fabricius) (see Duffy, 1952).

Distribution. ETHIOPIAN REGION: Gambia, Gold Coast, Ivory Coast, Mozambique, Nigeria, Nyasaland, Republic of the Sudan, Senegal, Sierra Leone, Uganda, Zanzibar.

Adult (fig. 80 and Pl. I, fig. 3). Length 13–25 mm. Colour very variable, but elytra always shining and with at least a faint metallic reflection. Legs entirely black or with femora red. *Head* with antennae extending as far as apices of elytra in female and well beyond apices in male; segments 3–7 strongly spined at inner apical angle. Eyes coarsely faceted. *Prothorax* with a pair of rounded, lateral tubercles; disc smooth, sparsely punctate, with a pair of sublateral tubercles near base. Middle coxal cavities closed externally. *Elytra* strongly punctate, tapering posteriorly and each produced apically into a long spine.

Mature larva (figs. 81, 82). Closely resembling that of *Phoracantha semipunctata* (Fabricius), from which it may be distinguished as follows. Length up to 32 mm.; maximum breadth (at prothorax) 7·75 mm. *Head* (fig. 81) with genae narrowly ferruginous; area behind ocellus entirely testaceous and with a transverse row of three small oval tubercles (weals), each about the size of ocellus and which in some

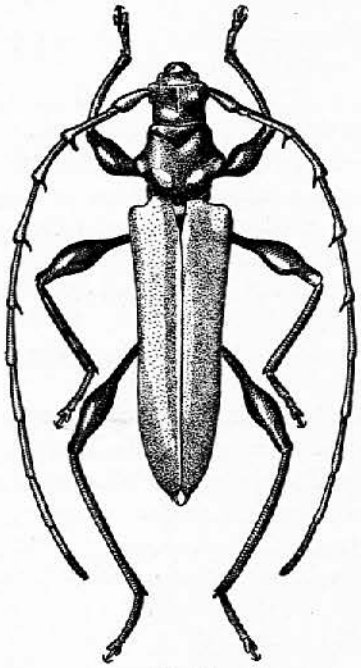


Fig. 80

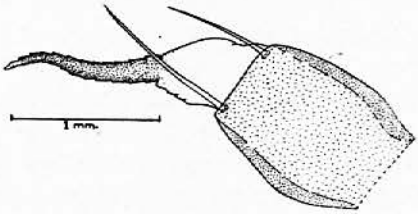


Fig. 82

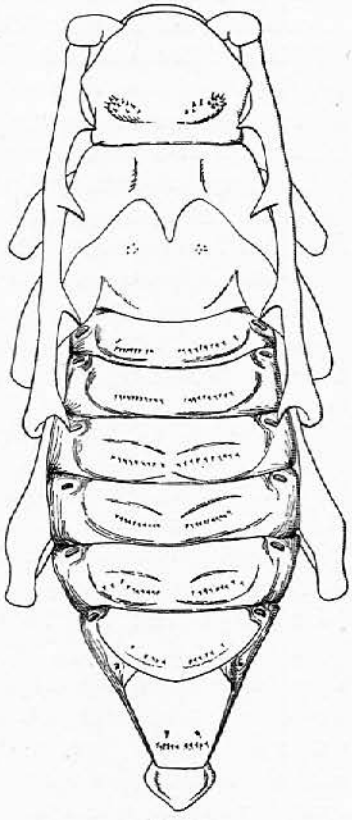


Fig. 83

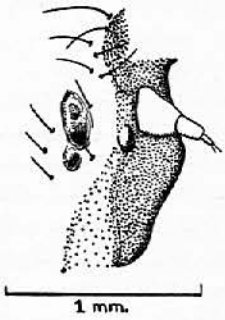


Fig. 81

Fig. 80. *Cordylomera spinicornis* (Fabricius). Adult.

Figs. 81–82. *Cordylomera spinicornis* (Fabricius). Mature larva. Fig. 81. Head, showing position of ocellus and sclerotised areas. Lateral aspect (Duffy, 1953a). Fig. 82. Apical part of mesothoracic leg. Lateral aspect (Duffy, 1953a).

Fig. 83. *Cordylomera spinicornis* (Fabricius). Pupa. Dorsal aspect.

specimens are contiguous, forming a single large tubercle. *Prothorax* with lateral regions micro-reticulate and bearing numerous short, reddish setae and with rather inconspicuous lenticulate, glabrous spots; posterior part of pronotum longitudinally rugose. *Legs* as figured (fig. 82).

Pupa (fig. 83). Rather similar to that of *Phoracantha semipunctata* (Fabricius), from which it differs as follows. Length up to 23 mm.; maximum breadth 5 mm. *Pronotum* with lateral tubercles obtuse, blunt and feebly defined. Scutellum acutely and strongly produced posteriorly. *Abdomen* with tergites 1–6 each bearing numerous spines which are closely set and arranged in a single, almost straight, row. Tergite 7 with a row of spines arranged to form a semicircle. *Legs* with all femora strongly petiolate; hind femora simple at base. *Functional spiracles* present on segments 1–6; peritreme rather narrowly oval and very strongly raised above general level of cuticle.

Host plants: *Khaya* and other West African mahoganies (Fraser, 1949c); *Acacia* (Lepesme, 1950); *Khaya grandifoliola* (G.H.T.); *K. senegalensis* (Risbec, 1946); *Entandrophragma cylindrica* (E.A.J.D.); *Khaya anthotheca, Entandrophragma angolense, E. utile, Lovoa* sp., *Teclea nobilis*? (J.C.M.G.); *Celtis soyauxii, Guarea cedrata* (E.A.J.D.); *Baphia nitida, Funtumia latifolia, Turraenthus africana* (Jover, 1953).

Biology. According to Risbec (1946), the eggs are laid in groups of about thirty and are tightly packed in fissures in the bark. The young larvae enter the wood, gnawing first the sapwood and later, when nearly full-grown, the heartwood, in which they pupate in an axial chamber. Development probably lasts several years.

G. H. Thompson has made the following observations. This species attacks mature living trees and causes a slight gumflow from the bark. The larvae tunnel in the cambial region, grooving the sapwood slightly, until mature; they then enter the sapwood at right angles and pupate at the junction of the sapwood and heartwood at a depth of 1 to 1½ inches from the wood surface. Pupal cells are elongate-oval, situated in the plane of the wood fibres, with a prepupal tunnel entering dorsally; the latter is empty except for coarse fibres used to block the entrance to the cell. Adults emerge during January and February (Pl. I, fig. 3).

Economic importance. Exported timber is frequently heavily infested when logs have not been decorticated (Duffy, 1953a). Avenues of *Khaya* in Senegal have been severely damaged by this species (Risbec, 1946).

In the high, wet forests of Nigeria and the Gold Coast, perhaps the most noticeable and widespread damage to recently felled logs is caused by this species. It apparently attacks felled timber just as readily as standing trees: moreover, in timber loading yards, felling areas and sawmills enormous populations of this species are built up in the artificial environment which such centres provide. The beetles were often seen to fly from one pile of logs to another, copulating and ovipositing in the full sun. Eventually, the logs become so heavily infested that the loosened bark, dried out by the sun, falls away, revealing the innumerable broad, shallow, meandering galleries on the surface of the sapwood so characteristic of this species. Despite the usually high density of population, however, the damage is relatively superficial, being confined almost entirely to the outer 2 inches of sapwood (E.A.J.D.).

Control. It is recommended that all logs be decorticated as soon as possible after felling. Risbec (1946) suggests that all infested branches should be destroyed.

Material studied. 8 L, 2 P, England, Lancashire, viii.1948, in West African *Khaya*, M.G.F. leg., in coll. B.M.; 1 L, England, from East African *Khaya*, 13.vi.1947, in coll. F.P.R.L.; 4 L, 2 P (adults reared), Uganda, from *Khaya*, J.C.M.G. leg., in coll. B.M.; 20 L, 3 P, Gold Coast, from *Khaya*, G.H.T. leg., in coll. G.H.T.; 1 L, 1 P, 4 I, Gabon, 1904, from *Acacia*, J. Miguet leg., in coll. N.H.P.; 40 L, 18 P, 10 I, Gold Coast, Sunyani, 21.ii.1955, from *Guarea cedrata*, E.A.J.D. leg., in coll. B.M.

References. Champion, 1913 (Biol.); Duffy, 1952 (I fig., Biol.), 1953a (L fig., Bio,. fig.); Fraser, 1948 (Biol.), 1949 (Biol.); Heqvist, 1955 (L fig., P fig., I fig., Biol.); Jover, 1953 (Biol.); Lepesme, 1950 (Biol.), 1953 (I fig., Biol.); Risbec, 1946 (Biol., Contr.).

Molorchini and allied genera

Larval Characters

Larvae of the genera *Molorchus*, *Obrium*, *Gracilia* and *Nathrius* appear to form so natural and homogeneous a group that they are dealt with here as one tribe instead of being segregated into the tribes Molorchini, Obriini, Graciliini and Psebiini respectively.

Form small, slender, seldom as much as 17 mm. in length. *Head* depressed, strongly transverse, widest at just behind middle. Gena not shouldered but gradually narrowed up to base of mandible and bearing numerous long, slightly curved setae. Mouthframe interrupted beneath antennae. Ocelli usually absent but sometimes one pair present. Antenna with segments 1 and 2 very short, about half as long as segment 3. Maxillary palp with segment 3 much longer than segment 2; process of palpifer rather large. Labial palp with segment 2 much longer than segment 1. *Prothorax* with pronotum striate posteriorly (except *Nathrius*); median suture inconspicuous (except *Obrium*). Postnotal fold present. Eusternum usually distinct. *Abdomen* with ampullae granulate, often bilobed. Pleural discs indistinct. *Legs* extremely small or absent. *Spiracles* very small, with peritreme below general level of cuticle.

[Graciliini]

Gracilia minuta (Fabricius)

Descriptions of the immature stages and a biological account of this species have recently been published (Duffy, 1953a).

Distribution. PALAEARCTIC REGION: Algeria, Morocco, Tunisia.

Mature larva. See key, p. 18.

Pupa. See key, p. 40.

Host plants: *Ulmus*, *Ficus*, *Citrus aurantium*, *Malus pumila* (see also Duffy, 1953a).

Parasites. Hymenoptera: *Cleonymus depressus* F. (Lichtenstein, 1919).

Additional references. Caillol, 1914 (Biol.); Lichtenstein, 1919 (Paras.); Villiers, 1946 (I fig., Biol.).

Penichroa fasciata (Stephens)

Distribution. PALAEARCTIC REGION: Algeria, Morocco, Tunisia.

Host plants: *Glycyrrhiza glabra* (Duffy, 1953a); *Ceratonia siliqua*, *Pistacea lentiscus*, *Eucalyptus globulus*, *Ficus*, *Pinus halepensis* (Villiers, 1946); *Cercis siliquastrum*, *Cytisus* (Caillol, 1914).

Biology. Larvae infest dead, dry wood; also roots and bark. The adult is nocturnal and emerges during the period June to August.

References. Caillol, 1914 (Biol.); Duffy, 1953a (Biol.); Mühlmann, 1954 (Biol.); Plavil'shchikov, 1940 (Biol.); Villiers, 1946 (I fig., Biol.).

[Obriini]

Oemida (=Paroeme) gahani (Distant)

Distribution. ETHIOPIAN REGION: Kenya, Pretoria, Shilouvane, Tanganyika, Transvaal, Uganda, Zoutpansberg. Distant's record from the Transvaal is considered to be questionable.

Adult (fig. 84). Length 10–17 mm. Brownish testaceous; legs ochraceous, apices of anterior femora, apical halves of middle and posterior femora, apices of tibiae and apices of tarsal segments dark castaneous. *Head* with eyes coarsely faceted, rather deeply emarginate. Antennae longer than body in male, scarcely longer than body in female; segment 1 with a cicatrix almost completely limited by a black carina. *Prothorax* with a pair of short, obtuse, lateral tubercles. Middle coxal cavities open externally. *Legs* with femora clavate and with front coxae subcontiguous, the prosternal process extremely narrow. *Elytra* extremely elongate, rather sparsely punctate and each with a pair of longitudinal carinae.

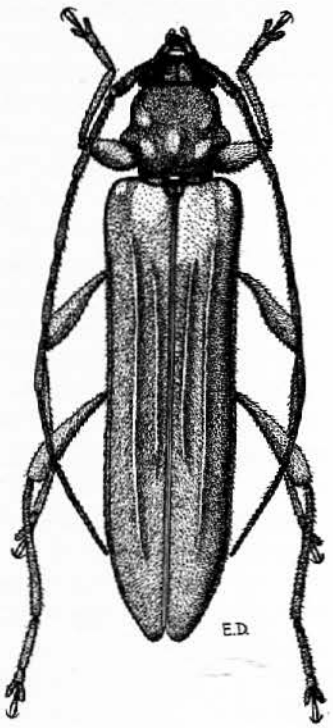


Fig. 84. *Oemida gahani* (Distant). Adult.

Mature larva (figs. 85–88). Length 20–42 mm.; maximum breadth (at prothorax) 5·5 mm. Form subcylindrical, slender, tapering posteriorly. *Head* (fig. 86) slightly transverse (maximum head-width 2·8 mm.), widest just behind middle, entirely pale testaceous, shining. Genae with several long, rather stout, pale setae, which are slightly curved backwards. Mouthframe smooth, very feebly sclerotised, testaceous. Antenna (fig. 88) 3-segmented; segment 2 elongate and bearing a spine-like supplementary process which is raised basally; segment 3 elongate, bearing one very long and two much shorter setae. Mandible robust, shining, basal part reddish brown, apical part pitchy. Labrum transversely oval, broadly rounded in front and bearing numerous fine pale setae. Ocelli absent. Hypostoma smooth, entirely pale testaceous. Maxilla (fig. 87) with segment 3 of palp elongate, conical, longer than segment 2; lobe broad, truncate apically. Labial palpi with segment 2 slightly longer than segment 1. *Prothorax* slightly depressed and transverse; pronotum with anterior half smooth, with a transverse group of fine pale setae posteriorly; posterior half finely longitudinally striate, except extreme base which is micro-granulate; median cleavage line

unusually deep. Sternum strongly vermiculately rugose and rather densely covered with fine golden setae; eusternum distinct, triangular. *Mesonotum* and *metanotum* finely granulate. *Abdomen* (fig. 85) with dorsal ampullae distinctly bilobed, shining and covered with more or less longitudinal elongate, subcontiguous tubercles; intersegmental skin becoming gradually longer posteriorly, micro-granulate. Tergite 9 unarmed; anal lobes rather protuberant. *Legs* minute, 3-segmented. *Spiracles* of abdomen with peritreme broadly oval, testaceous, feebly sclerotised and placed slightly below general level of cuticle.

This larva shows strong affinities to the Obriini grouped under the Molorchini in recent larval classification (Duffy, 1953a). The characters in common are (i) bilobed ampullae, (ii) long intersegmental skin, (iii) head strongly transverse, the posterolateral areas strongly sclerotised and pigmented, (iv) vestigial legs, (v) long curved genal setae and (vi) the very slender form.

Pupa (fig. 89). Length up to 14 mm.; maximum breadth 3·2 mm. Form elongate, slender. *Head* (fig. 89) with vertex visible from above, smooth, glabrous; front with a pair of stout ferruginous spines at base of each antenna and two to four minute setae across base of clypeus. Antennae extending as far as abdominal segment 3, where they are strongly recurved to terminate alongside front coxae. Eyes moderately convex, with a fine seta near mesal margin. Labrum transverse, with front margin bearing a few very fine pale setae. Mandibles each with a fine seta near middle of outer face. *Pronotum* bearing several scattered pale setae which become slightly stouter towards basal margin; lateral margins subtuberculate. *Mesonotum* smooth with about four pairs of fine setae; scutellum moderately protuberant. *Metanotum* with three long setae (and sometimes three or four shorter setae) on each side of scutellar groove which is smooth and shallow. Elytra and wings extending to abdominal segment 3. *Abdomen* with tergites 2–6 distinctly micro-granulate and each with a transverse row (near posterior margin) of six to twelve short, stout spines (each with an apical seta); tergite 7 tapering posteriorly and bearing near posterior margin a pair of paramedian, oval tubercles, each bearing two to four short, stout spines which are curved anteriorly. Tergite 8 bearing a pair of similar but smaller tubercles, each bearing only a single spine. Tergite 9 short, transverse, glabrous and produced posteriorly into a median rostiform process (in female only?). Sternites glabrous. Pleura moderately protuberant. *Legs* with hind femora lying almost parallel to longitudinal axis of body. *Functional spiracles* present on abdominal segments 1–6; peritreme oval, thin, pale, with anterior margin distinctly raised above general level of cuticle.

Egg. Length (mean) 1·3 mm. Form elliptical, rounded at each end. Chorion white, granulate (Gardner and Evans, 1953).

Host plants: Living trees of *Cupressus* spp., and *Juniperus procera*. Dead trees, stumps and logs of *Allophylus mastersi*, *Artocarpus integer*, *Cupressus lusitanica*, *C. macrocarpa*, *Dombeya mastersi*, *Eucalyptus* sp., *Fagaropsis angolensis*, *Gymnosporia luteola*, *Juniperus procera*, *Lagunaria patersonii*, *Olea chrysophylla*, *O. hochstetteri*, *Pinus radiata*, *Podocarpus gracilior*, *Polyscias kikuyuensis*, *Pygeum africanum*, *Rapanea rhododendroides*, *Trichocladus malosanus*. Seasoned wood of *Podocarpus* (heavy beams, flooring, shelving; plywood (Oregon pine?) imported from Europe (Gardner and Evans, 1953). *Randia* sp. (E.A.J.D.).



Fig. 85

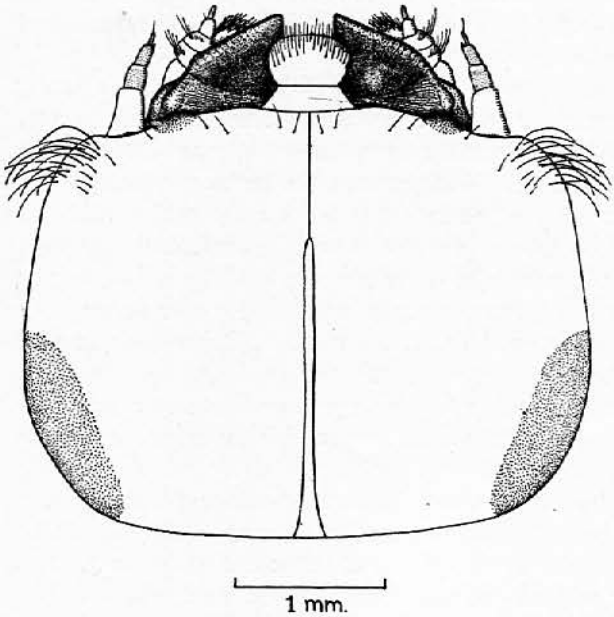


Fig. 86

Figs. 85–88. *Oemida gahani* (Distant). Mature larva. Fig. 85. Lateral aspect. Fig. 86. Head. Dorsal aspect. Fig. 87. Apical half of maxilla. Ventral aspect. Fig. 88. Apical part of antenna. Lateral aspect.

Fig. 89. *Oemida gahani* (Distant). Pupa. Head. Ventral aspect.

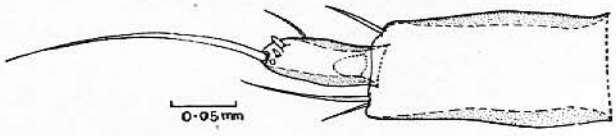


Fig. 88

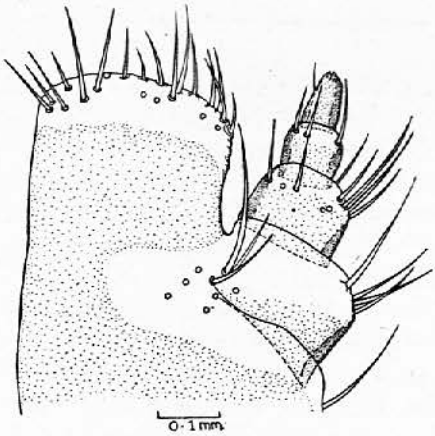


Fig. 87

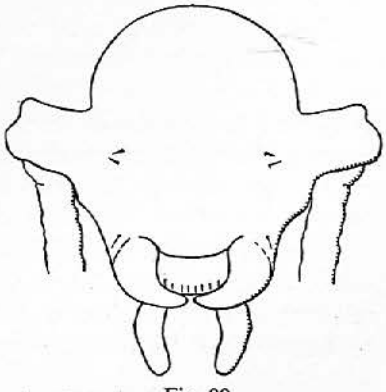


Fig. 89

Biology. Eggs are laid in batches, often of about twenty, in crevices and small depressions on the surfaces of dead wood, but in structural timbers old emergence holes are often used. In living trees the site of oviposition is dead wood, such as is caused either by pruning or abrasion by elephant, buffalo, etc. The eggs are held together by a gummy secretion, which, if excreted inside an emergence hole, forms a covering level with the surface of the wood. The incubation periods varied from thirty-six to fifty-seven days, thirty-eight days being the most frequent. The maximum number of eggs dissected from a female was 131.

Where oviposition has occurred on pruning scars in living cypress, the newly hatched larvae tunnel along the enclosed branch stem towards the centre of the tree, where they bore up and down the main stem; the living sapwood is avoided and the health of the tree is apparently unaffected. When mature, the larvae pupate near the perimeter of the dead area, the adult later emerging through a distinctly oval hole. In the case of dead trees and felled timber the galleries vary in depth and may even be merely subcortical. In structural timber, however, the whole of the inside may be honeycombed with only the surface left intact except sometimes for a few emergence holes (Pl. VIII, figs. 1 and 2). Adults from dry, seasoned wood are appreciably smaller than those from wood with a higher moisture content.

Under laboratory conditions the duration of the life-cycle was found to be approximately two years. The period is possibly less in living trees, and in the case of structural timbers it is possibly considerably prolonged.

Laboratory experiments would seem to indicate that maximum emergence increases with the number of rainy days. In dead wood the population is unusually high. For example, a dead stem of *Lagunaria* with a volume of 3·25 cubic feet has so far yielded 1,354 adults; the total emergence will no doubt be proved to be much greater. The adult beetle is nocturnal and a strong flier. Its life is comparatively short, usually twelve to fifteen days, the maximum recorded duration being thirty-one days (Gardner and Evans, 1953).

Parasites. Hymenoptera: *Neostephanus* sp., *Biphymaphorus* sp.,[1] *Metapelma* sp. (Gardner and Evans, 1953).

Predators. Coleoptera: *Alindria* sp., *Isocymatodera* sp. and *Bothrideres* sp. (Gardner and Evans, 1953).

Economic importance. Oemida gahani causes serious damage, not only to structural timbers but also to living trees. According to Wilkinson (1939), this species is becoming a serious menace to the structure of many of the earlier buildings in Nairobi; in one hotel, its damage has necessitated structural alterations costing several thousand pounds. Recent investigations, however (Gardner and Evans, 1953), have shown that pruned cypress trees in plantations are especially liable to attack. Present reports indicate that infestation in local buildings is spreading rapidly.

Control. Wilkinson (1939) states that the injection of a small amount of paradichlorobenzene, followed by the plugging of exit holes with putty, has proved relatively successful.[2] Among the numerous control measures tentatively suggested by Gardner and Evans (1953) are (i) the abolition of pruning for susceptible species

[1] *Biphymaphorus gardneri* Nixon (Nixon, 1954).
[2] This method is now considered dangerous and unreliable.

and the improvement of pruning technique, (ii) the protective chemical treatment of scars, (iii) the disposal and destruction of infested logs and dead trees and (iv), in the case of structural timbers, pressure impregnation. These suggestions, however, are to receive further consideration.

Material studied. 56 L, 3 P, 2 I, Kenya, Londiani, 1953, from *Cupressus lusitanica*, J.C.M.G. leg., in coll. B.M.; 20 L, 1 I, Kenya, Nairobi, 3.iii.1937, from *Podocarpus gracilior*, H. Wilkinson leg., in coll. B.M.

References. Distant, 1904 (Biol.); Evans, 1952 (Biol.); Gardner and Evans, 1953 (E, L, I, Biol., Contr.).

Falsallophyton gardneri Lepesme

Distribution. ETHIOPIAN REGION: Kenya.

Mature larva (fig. 90). Length up to 11 mm.; maximum breadth (at prothorax) 1·6 mm. Form cylindrical, extremely slender and slightly tapering posteriorly.

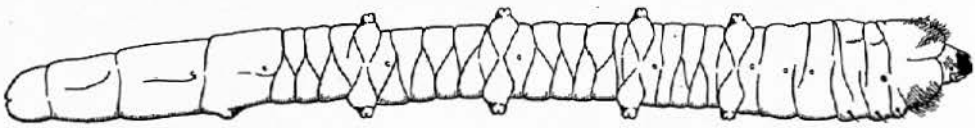


Fig. 90. *Falsallophyton gardneri* Lepesme. Mature larva. Lateral aspect.

Head very strongly transverse, with sides rounded and widest posteriorly (maximum head-width 1·05 mm.); postero-lateral area with a narrow linear, sclerotised, ferruginous area. Genae pale testaceous and bearing numerous long, fine, pale setae, which are curved backward. Mouthframe moderately strongly sclerotised, pale ferruginous. Antenna minute, conical, 3-segmented. Mandible with basal part reddish brown, apical part pitchy. Labrum transversely oval and fringed anteriorly with fine pale setae. One pair of ocelli present; lens round; pigmented spot very large and distinct. Hypostoma smooth, pale testaceous; sutures indistinct. *Prothorax* with anterior area of pronotum pale testaceous and sparsely setose; posterior area finely longitudinally striate; prosternum micro-granulate. *Abdomen* (fig. 90) with ampullae on segments 3–7 deeply bilobed and very strongly protuberant, the intersegmental skin very long and trianulate. Segments 8 and 9 slightly elongate, cylindrical. Epipleura scarcely protuberant on last three segments. Anal lobes compact, finely setose. *Legs* minute; unguiculus attenuated. *Spiracles* of abdomen minute with peritreme broadly oval, pale and feebly sclerotised.

Host plant: *Croton*.

Material studied. 6 L (adult reared), Kenya, Nairobi, 1953, from *Croton* sp., J.C.M.G. leg., in coll. B.M.

References. None available.

[Dorcasomini]

Dorcasomus gigas Aurivillius

This species, for the purposes of the present work, has been dealt with in the LEPTURINAE, see p. 77.

[Psebiini]

Nathrius (=Leptideella) brevipennis (Mulsant)

An illustrated description of the larva and a biological account of this species have recently been published (Duffy, 1953a).

Distribution. PALAEARCTIC REGION: Algeria, Morocco, Tunisia.

Mature larva. See key, p. 18.

Host plants: *Ceratonia siliqua, Quercus mirbecki, Pinus halepensis, Pistacia lentiscus, Ziziphus lotus* (Villiers, 1946); see also Duffy (1953a).

Additional references. Caillol, 1914 (Biol.); Mühlmann, 1954 (Biol.), Villiers, 1946 (I fig., Biol.).

Pseudobottegia sp.

Distribution. ETHIOPIAN REGION: Belgian Congo, Tanganyika.

Mature larva (fig. 91). Length up to 36 mm., maximum breadth (at prothorax) 4·1 mm. Form cylindrical, very slender. *Head* slightly elongate, with sides feebly

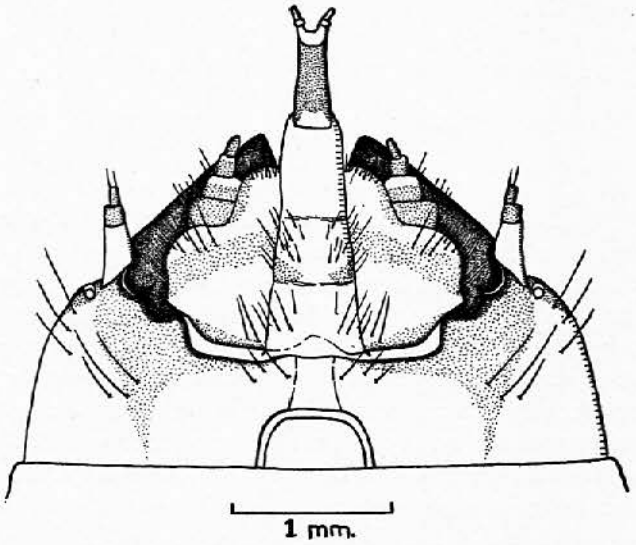


Fig. 91. *Pseudobottegia* sp. Mature larva. Head. Ventral aspect.

rounded, widest at middle. Mouthframe strongly sclerotised ferruginous. Antenna 3-segmented, with basal membrane unusually long. Labrum longer than broad and bearing several coarse marginal setae. Two pairs of very distinct subcontiguous ocelli present; lens round, very strongly protuberant; pigmented spot very large, distinct and conical. Hypostoma smooth, pale testaceous; sutures indistinct. Labial palpi 2-segmented, the stipes fused and extremely elongate and attached to the mentum by a fleshy extension of the intersegmental skin (fig. 91), which is extensible through blood pressure. *Prothorax* with anterior half of pronotum ferruginous, rather densely setose and with a longitudinal parallel-sided, broad, raised, median area; posterior half testaceous, glabrous and coarsely longitudinally striate; eusternum very distinct,

setose, and micro-granulate. *Abdomen* with ampullae deeply bilobed and very strongly protuberant, the intersegmental skin very long. Epipleura scarcely protuberant. Anal lobes compact. *Legs* well developed, 3-segmented. *Spiracles* with peritreme subcircular.

This larva is apparently unique in the Cerambycidae in that it possesses extensible labial palpi. Other unusual modifications are the raised area on the pronotum and the pigmented spots of the ocelli which are conical in lateral view. Beyond the fact that the abdominal ampullae are strongly protuberant and the intersegmental skin is long, there remains no character by which this larva can be associated with the Psebiini. As, however, the head is slightly elongate and bears two pairs of ocelli and the legs are well developed, it is impossible at this juncture to suggest to which tribe it is most closely related.

Host plant: *Syzygium* sp. (J.C.M.G.).

Biology. The larvae attack mainly the shoots, which soon die off from the point of attack. The galleries are mostly in the heartwood.

Material studied. 2 L, 3 I, Tanganyika, Lushoto, 1955, from *Syzygium* sp., J.C.M.G. leg., in coll. B.M.

References. None available.

[Molorchini]

Callimellum (=Callimus) angulatum (Schrank)

Distribution. PALAEARCTIC REGION: Algeria, Morocco.

Host plant: *Quercus*.

Biology. Adults assemble on flowers, especially those of Umbelliferae.

References. Caillol, 1914 (Biol.); Villiers, 1946 (I fig., Biol.).

Stenopterus mauritanicus Lucas

Distribution. PALAEARCTIC REGION: Algeria, Morocco, Tunisia.

Host plants: *Pistacia lentiscus*, *Cytisus*, *Prunus japonica* (Villiers, 1946).

Biology. Adults assemble on flowers from May to July.

References. Duffy, 1953a (Biol.); Lucas, 1848 (Biol.); Villiers, 1946 (I fig., Biol.).

Stenopterus ater (Linnaeus)

Distribution. PALAEARCTIC REGION: Algeria, Morocco, Tunisia.

Host plants: *Pistacia lentiscus*, *Acacia tortilis* (Villiers, 1946); *Pistacia terebinthus* (Caillol, 1914); *Prunus armeniaca* (Delanoue, 1946).

Biology. Adults occur on flowers of Umbelliferae during early summer. In Tunis this species appears to have one generation a year. Adults emerge between the end of April and the beginning of June and the females oviposit on the young branches of healthy apricot trees. The larvae bore into the wood and apparently prevent the transmission of sufficient sap when the fruit has set (Delanoue, 1946).

Economic importance. Injury to apricot trees, consisting of withering of the leaves and drying of the wood, has been caused by this species for some years in Tunis, but injury has appeared only sporadically on trees sixteen to twenty-five years old (Delanoue, 1946).

References. Caillol, 1914 (Biol.); Delanoue, 1946 (Biol.); Mendizabal, 1943 (Biol.); Mühlmann, 1954 (Biol.); Villiers, 1946 (I fig., Biol.).

[Pytheini]

Cartallum ebulinum (Linnaeus)

Distribution. PALAEARCTIC REGION: Libya, Morocco.

Mature larva. No material available. The description by Xambeu (1893) is inadequate.

Egg. Length 0·7 mm.; breadth 0·4 mm. Form oval with rounded ends, one less rounded than the other. Chorion rather soft, white, transversely striate (Xambeu, 1898).

Host plants: *Raphanus raphanistrum* (Xambeu, 1890); *Raphanistrum arvense* (Caillol, 1914).

Biology. Eggs are laid singly on the stems of the host plant and are covered with a sticky secretion. The incubation period is about fifteen days (Xambeu, 1898). Villiers (1946) states that adults assemble on flowers during April and May.

References. Caillol, 1914 (Biol.); Mendizabal, 1943 (Biol.); Villiers, 1946 (I fig., Biol.); Xambeu, 1890 (L, P, Biol.), 1893 (L, P, Biol.), 1897 (E, Biol.), 1898–1902 (L, P, Biol.).

[Deilini]

Deilus fugax (Olivier)

Distribution. PALAEARCTIC REGION: Morocco, Tunisia.

Egg. Length 1 mm.; breadth 0·3 mm. Fusiform, one pole attenuated, the other rounded. Chorion white, finely punctured (Xambeu, 1898).

Host plants: *Calycotome spinosa, C. battandieri, C. supinus, Spartium junceum, Sarothamnus scoparius* (Xambeu, 1898–1902); *Genista* (Chobaut, 1903).

Biology. Copulation lasts one or two days, after which the male dies and the female oviposits on *Genista* branches which have been dead for about a year. About thirty eggs are laid, the incubation period being ten to twelve days (Xambeu, 1898). Larvae feed subcortically in dead branches, later penetrating the wood to pupate (Xambeu, 1898–1902).

References. Caillol, 1914 (Biol.); Chobaut, 1903 (Biol.); Perris, 1877 (L fig., Biol.); Villiers, 1946 (I fig., Biol.); Xambeu, 1898 (E, Biol.), 1898–1902 (L, Biol.).

Callichromini

Philematium natalense Bates

Distribution. ETHIOPIAN REGION: Mozambique, South Africa.

Mature larva (fig. 92). Length up to 25 mm.; maximum breadth (at prothorax) 7 mm. *Head* pale testaceous, strongly rugose, with rounded divergent sides (fig. 92); frontal sutures indistinct; front margin of frons very strongly sinuate medially, swollen and pale testaceous; genae pale, testaceous and bearing numerous short, ferruginous, bristly setae. Labrum quadrate, with front margin strongly rounded and densely fringed with reddish setae. Mandible with basal part testaceous, separated from

apical, pitchy part by a transverse impression. Antenna small, salient; segment 3 cylindrical, about four times as long as basal width; supplementary process very short. One pair of ocelli present just behind and ventrad of antenna; lens convex, narrowly oval; pigmented spot indiscernible. Maxilla with segment 3 of palp shorter than segment 2; dorso-external process of palpifer extremely small. Labial palpi with segment 2 cylindrical, much shorter than segment 1. Hypostoma entirely testaceous, transversely strigose and sparsely setose; sutures strongly curved. Gula broad, strongly raised. *Prothorax* with anterior part of pronotum strongly rugose and bearing scattered reddish setae; posterior part coarsely and longitudinally strigose. *Abdomen* with each dorsal ampulla bearing two deep, transverse furrows; shining, coarsely vermi-

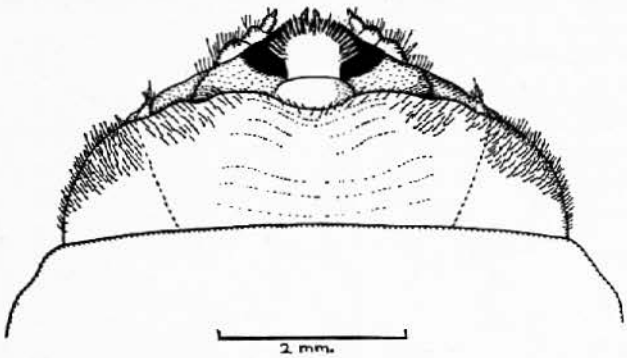


Fig. 92. *Philematium natalense* Bates. Mature larva. Head. Dorsal aspect. (Duffy, 1953a)

culately rugose. Anal lobes sparsely setose. Pleural discs indistinct. *Legs* 4-segmented, longer than maxillary palp. *Spiracles* with peritreme testaceous, very thin, broadly oval and without marginal chambers.

Host plant: *Mimusops africana* (M. G. Fraser).

Biology. Larvae feed in both sapwood and heartwood and cause severe damage. The pupal cells are unusual in that they are formed at random, as far as longitudinal direction is concerned, being as commonly across the grain as parallel to it. One gallery was found to extend fully 9 inches into the tree, 6 inches of which was in the heartwood. The pupal cell is closed with a calcareous operculum (Duffy, 1953a).

Material studied. 2 L, 1 I, England, Lancashire, Lydiate, x.1949, in imported *Mimusops africana*, M. G. Fraser leg., in coll. B.M.

References. Duffy, 1953a (L fig., Biol.).

Philematium virens (Linnaeus) and s. sp. **femorale** Olivier

Distribution. ETHIOPIAN REGION: Mozambique, South Africa. MADAGASCAN REGION: Madagascar, Mauritius.

Mature larva. Resembling that of *P. natalense* Bates, from which it differs as follows. Length up to 42 mm.; maximum breadth (at prothorax) 8·2 mm. *Head* with mouthframe and basal half of mandible strongly sclerotised, ferruginous to pitchy. *Abdomen* with setae pale golden yellow. Dorsal ampullae less strongly shining and distinctly granulate.

Pupa (figs. 93, 94). Length up to 23 mm.; maximum breadth 6·5 mm. *Head* (fig. 93) entirely concealed from above; elongate, triangular; vertex dome-shaped, smooth and glabrous; front smooth and glabrous; clypeus with a deep transverse impression at base, glabrous. Antennae extending as far as abdominal segment 3, where they are recurved ventrally. Eyes moderately convex, glabrous. Labrum elongate, trapezoidal, glabrous. *Pronotum* (fig. 94) with sides produced into a pair of strong, acutely pointed, glabrous tubercles; front margin strongly produced and acutely angled medially; disc with a pair of paramedian, sub-basal, transverse, tuberculate ridges bearing fine scattered setae. *Mesonotum* bearing a few short setae; scutellum strongly produced, acutely pointed posteriorly and glabrous. *Metanotum* bearing a few fine short setae on each side of scutellar groove

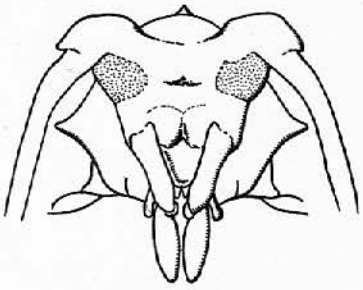


Fig. 93

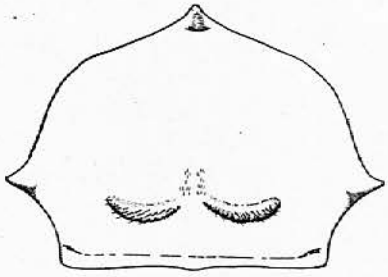


Fig. 94

Figs. 93–94. *Philematium virens* (Linnaeus). Pupa. Fig. 93. Head. Ventral aspect. Fig. 94. Pronotum.

which is rather indistinct. Elytra and wings extending as far as abdominal segment 4. *Abdomen* with tergites 1–6 with paired, transversely oval tuberculate areas, each bearing numerous short, stout, ferruginous spines (each with a basal seta), some of which are inclined forward. Tergite 7 less transverse, the hind margin produced, V-shaped and bearing numerous similar spines. Tergite 8 with hind margin more broadly rounded than tergite 7 and bearing a few fine setae. Segment 9 partly retracted in segment 8. Sternites smooth and glabrous. *Legs* with hind femora extending as far as abdominal segment 7 and lying parallel to longitudinal axis of body. *Functional spiracles* present on abdominal segments 1–7; peritreme very narrowly oval, thick, pale and distinctly raised above general level of cuticle.

Host plants: *Manilkara cuneifolia* (J.C.M.G.); in Mauritius, *Casuarina* is attacked by *P. virens*, s. sp. *femorale* Olivier (A. J. E. Orian).

Material studied. 3 L, 1 P (adult reared), Kenya, Gazi (coast), 1953, from *Manilkara cuneifolia*, J.C.M.G. leg., in coll. B.M.

References. None available.

Philematium currori (White)

Distribution. ETHIOPIAN REGION: Belgian Congo, Uganda.

Host plant: *Chailletia* sp. (E.A.J.D.).

References. None available.

Colobizus tibiotarsalis Schmidt

Distribution. ETHIOPIAN REGION: Kenya.

Mature larva. Separable from those of *Philematium* spp. as follows. Length up to 13 mm.; maximum breadth (at prothorax) 2·6 mm. *Abdomen* with ampullae dull, faintly microgranulate, the granules not individually distinguishable with a ×15 lens. *Legs* slightly shorter than maxillary palp.

Pupa (fig. 95). Rather similar to that of *Philematium virens* (Linnaeus), from which it differs as follows. Length up to 9·2 mm.; maximum breadth 3·1 mm. *Head* with antennae extending as far as abdominal segment 9, where they are recurved ventrally. *Pronotum* feebly tuberculate laterally, the tubercles blunt and rounded; front margin bearing a median, conical, setose tubercle. *Legs* with hind femora strongly petiolate and extending slightly beyond abdominal segment 9.

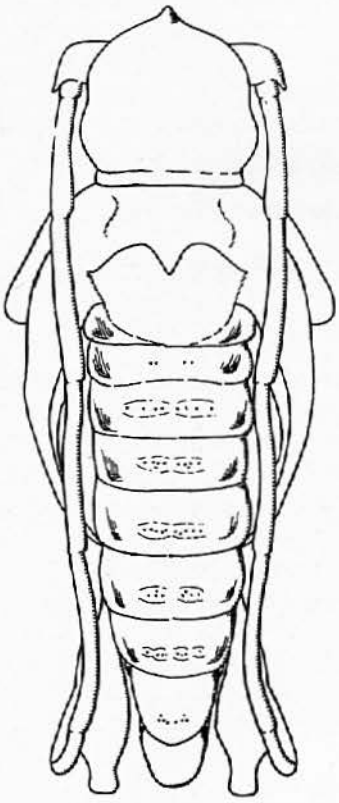


Fig. 95. *Colobizus tibiotarsalis* Schmidt. Pupa. Dorsal aspect.

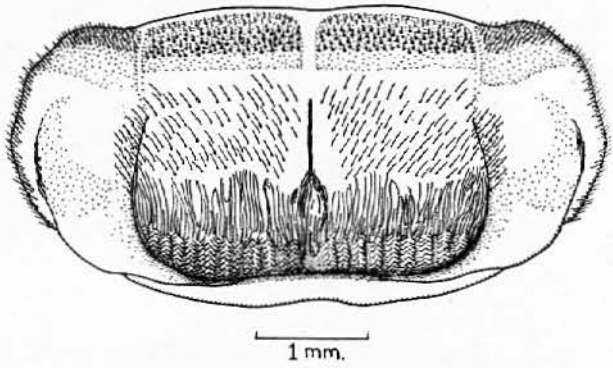


Fig. 96. *Chromacilla* sp. Mature larva. Prothorax. Dorsal aspect.

Host plant: ?*Oldfieldia* sp. (J.C.M.G.).

Material studied. 1 L, 1 P (adult reared), Kenya, Malindi, 1952, from unknown tree, J.C.M.G. leg., in coll. B.M.

References. None available.

Chromacilla sp.

Mature larva (fig. 96). Resembling those of *Philematium* spp., from which it may be separated as follows. Length up to 24 mm.; maximum breadth (at prothorax) 6 mm. *Prothorax* (fig. 96) with pronotum bearing a transverse band of stout ferruginous setae (each arising from a ferruginous basal disc) near front margin; setae on remainder of pronotum longer, finer, pale and not arising from large, ferruginous, basal discs.

Host plant: *Lasiodiscus mildbraedii.*

Material studied. 1 L, 1 I, Uganda, 1953, from *Lasiodiscus mildbraedii*, J.C.M.G. leg., in coll. B.M.

Chromacilla purpureocinctum Aurivillius

Distribution. ETHIOPIAN REGION: Uganda.

Host plant: *Blighia unijugata* (J.C.M.G.).

References. None available.

Chromacilla collare (Jordan) (=**Callichroma collare** Jordan)

Distribution. ETHIOPIAN REGION: Belgian Congo, Cameroons, Rio Muni.

Host plant: *Coffea.*

References. Aulmann and la Baume, 1911 (Biol.); Lepesme and Villiers, 1944 (Biol.); Mühlmann, 1954 (Biol.).

Oxyprosopus sp.

Mature larva (fig. 97). Distinguishable from those of *Philematium* as follows. Length up to 37 mm.; maximum breadth (at prothorax) 8·2 mm. *Head* with mandible entirely pitchy. Base of maxillary stipes broadly sclerotised, ferruginous and bearing two or three distinct, testaceous, setal pores which strongly contrast with surrounding cuticle. Hypostoma with front margin ferruginous. *Prothorax* with posterior half of pronotum dull, micro-spiculate. *Abdomen* with ampullae dull, micro-spiculate. *Spiracles* with peritreme distinctly crenulate (fig. 97).



Fig. 97. *Oxyprosopus* sp. Mature larva. Peritreme of abdominal spiracle.

Biology. Larvae are believed to have been obtained from a living tree in which they had constructed calcareous cocoons.

Material studied. 2 L, Uganda, 1954, J.C.M.G. leg., in coll. B.M.

Hypargyra albilateris Harold

Distribution. ETHIOPIAN REGION: Kenya, Zanzibar.

Host plant: *Grewia* sp. (J.C.M.G.).

References. None available.

Litomeces (=Eulitopus) sp.

Mature larva. Rather similar to those of *Philematium* spp., from which it differs as follows. Length up to 33 mm.; maximum breadth (at prothorax) 6 mm. *Prothorax* with eusternum distinct, milky white, contrasting with the presternum which is brown. *Abdomen* with dorsal ampullae smooth, dull, finely micro-granulate. *Spiracles* of abdomen with peritreme round; posterior half bearing marginal chambers.

Material studied. 5 L, 1 I, Gold Coast, from unknown tree, G.H.T. leg., in coll. G.H.T.

Euporus ignicollis Pascoe

Distribution. ETHIOPIAN REGION: Kenya, South Africa.

Mature larva. Very similar to those of *Philematium* spp., from which it may be

distinguished as follows. *Head* with segment 3 of maxillary palp at least as long as segment 2. *Legs* with tibiotarsus quadrate.

Host plant: *Teclea nobilis* (J.C.M.G.).

Biology. Healthy living stems are attacked by this species. The galleries are deep in the wood, never subcortical (J.C.M.G.).

Material studied. 3 L (adult reared), Kenya, Ngong, 1953, from living *Teclea nobilis*, J.C.M.G. leg., in coll. B.M.

References. None available.

Chromalizus barbiventre (Bates)

Distribution. ETHIOPIAN REGION: Belgian Congo, Uganda.

Mature larva. In general as in *Chromacilla* sp., but differing in having lenticulate pits on the propresternum and a dull, micro-pubescent sternellum.

Host plants: *Aningeria altissima* (J.C.M.G.).

Material studied. 3 L, Uganda, 1953, from *Aningeria altissima*, J.C.M.G. leg., in coll. B.M.

References. None available.

Chromalizus fragrans Dalman, s. sp. **cranchi** (White) (=**Callichroma cranchi** White)

Distribution. ETHIOPIAN REGION: Angola, Belgian Congo, Cameroons, Gold Coast, Rio Muni.

Host plant: *Coffea robusta* (Bredo, 1939); *Teclea viridis* (J.C.M.G.).

References. Bredo, 1939 (I, Biol.); Lepesme, 1948 (Biol.); Lepesme and Villiers, 1944 (Biol.).

Chromalizus concentricale Jordan, var. **iturícum** Kolbe

Distribution. ETHIOPIAN REGION: Belgian Congo, Cameroons, Gold Coast, Fernando Póo, Rio Muni, São Tomé, Senegal, Sierra Leone, Uganda.

Host plant: *Chrysophyllum albidum* (J.C.M.G.).

Biology. Larval galleries are confined to the sapwood.

References. None available.

Chromalizus afer (Linnaeus)

Distribution. ETHIOPIAN REGION: Angola, Belgian Congo, Dahomey, Fernando Póo, French Cameroons, French Guinea, French Sudan, Gold Coast, Ivory Coast, Liberia, Rio Muni, São Tomé, Senegal, Sierra Leone, Togo.

Host plants: *Baphia nitida, Guarea thompsoni, Lophira procera, Macrolobium heudelotianum, Millettia stapfiana, Musanga smithii, Phialodiscus bancoensis, Parkia bicolor, Sterculia tragacantha, Trichilia heudelotii* (Jover, 1953).

References. Jover, 1953 (Biol.).

Litopus dispar Thomson

Distribution. ETHIOPIAN REGION: South Africa.

Biology. Adults have been observed emerging in large numbers from old posts. The scent of the female is slightly stronger than that of the male (Distant, 1904).

References. Distant, 1904 (Biol.).

Metameces suturalis (Harold)

Distribution. ETHIOPIAN REGION: Kenya, Zanzibar.

Host plant: *Croton macrostachys*, *Maba abyssinica* (J.C.M.G.).

References. None available.

Aromia moschata (Linnaeus)

Illustrated descriptions of the immature stages and a comprehensive account of the biology of this species have recently been published (Duffy, 1949, 1953a).

Distribution. PALAEARCTIC REGION: Algeria, Morocco, Tunisia.

Mature larva. See key, p. 20.

Pupa. See key, p. 39.

Additional references. Caillol, 1914 (Biol.); Ministry of Agriculture and Fisheries, 1931 (Biol.); Mühlmann, 1954 (Biol.); Villiers, 1946 (I fig., Biol.).

Phrosyne brevicornis (Fabricius)

Distribution. ETHIOPIAN REGION: Belgian Congo, Cameroons, Gold Coast, Ivory Coast, Nigeria, Sierra Leone, Uganda.

Mature larva. Similar to those of *Philematium* spp., from which it differs as follows. Length up to 20 mm.; maximum breadth (at prothorax) 3 mm. *Head* with basal part of mandible pale ferruginous. Ocellar lens rather broadly oval. *Prothorax* with posterior area very finely longitudinally striate. *Abdomen* with dorsal ampullae very feebly bilobed. *Spiracles* with posterior half of peritreme bearing several marginal chambers.

Host plant: *Harungana madagascariensis* (J.C.M.G.); *Afzelia bella*, *Albizia sassa*, *Berlinia acuminata*, *Haronga paniculata*, *Rauwolfia vomitoria*, *Xylopia rubescens* (Jover, 1954).

Parasites. Hymenoptera: *Lophogaster levis* Szepe (Jover, 1954).

Material studied. 6 L, 2 I, Uganda, 1954, from dead standing *Harungana madagascariensis*, J.C.M.G. leg., in coll. B.M.; 6 L, 1 I, French Cameroons, Réserve Forestière du Nyong, 28.xi.1949, from dry wood, J. Dahl leg., in coll. U.Z.M.C.

References. Jover, 1954 (Biol.).

Phrosyne viridis Serville

Distribution. ETHIOPIAN REGION: Nyasaland, Uganda. MADAGASCAN REGION: Madagascar.

Host plant: *Maba* sp. (J.C.M.G.).

References. None available.

Eulitopus glabricollis Murray

Distribution. ETHIOPIAN REGION: Belgian Congo, Cameroons, Fernando Póo, Gold Coast, Nigeria, Rio Muni, Togo.

Host plant: *Teclea grandifolia* (G.H.T.).

References. None available.

Callidiopini

Ceresium unicolor (Fabricius)

Distribution. MADAGASCAN REGION: Mauritius (introduced?). ETHIOPIAN REGION: Kenya (imported). This species is widely distributed throughout the Oriental and Australasian regions.

Mature larva. Length up to 25 mm.; breadth (at prothorax) 4·1 mm. *Head* with genae strongly sclerotised and ferruginous behind antennae and bearing only a few short, bristly setae. Front margin of frons narrowly ferruginous. One pair of ocelli present laterad and ventrad of antennae. *Prothorax* with posterior half of pronotum shining, longitudinally striate; proeusternum shining and longitudinally striate as on pronotum. *Abdomen* with both dorsal and ventral ampullae very strongly protuberant on segments 1–6; segments 4–7 strongly elongate. *Legs* appreciably longer than segment 3 of maxillary palp.

Host plants: *Pipturus* sp., *Acacia* sp. (Duffy, 1953b); *Heritiera littoralis* (J.C.M.G.).

Biology. The larval galleries are subcortical and the pupal cell only penetrates the sapwood superficially.

Material studied. 1 L, Kenya, 1954, under bark of *Heritiera littoralis* (imported), J.C.M.G. leg., in coll. B.M.

References. Duffy, 1953b (L fig., Biol.).

Arrhytmus fenestratus (Belon)

Distribution. ETHIOPIAN REGION: Belgian Congo, Cameroons, Ivory Coast, Uganda.

Host plants: *Tetrapleura tetraptera, Maba abyssinica* (J.C.M.G.).

References. None available.

Saphanini

It has already been pointed out (Duffy, 1953a) that it has been suggested that *Zamium incultum* Pascoe should be transferred to the ASEMINAE (Lepesme, 1948). Examination of the larva, however, proved conclusively that this species clearly belongs to the CERAMBYCINAE and that no characteristics of the ASEMINAE, such as the wedge-shaped mandibles and the internal tentorial cross-arm, are evident. Moreover, the larva appears to possess several characters in common with the Callidiini, near which tribe it has been placed for the purposes of the present study.

On the other hand, the larva of *Oxypleurus nodieri* Mulsant possesses more fundamental characters in common with the ASEMINAE than with the CERAMBYCINAE and has been dealt with under the former subfamily (see p. 80).

Zamium incultum Pascoe

Distribution. ETHIOPIAN REGION: Natal, Nyasaland, Southern Rhodesia, Transvaal.

Mature larva (fig. 98). Resembling those of the Callidiini, from which it may be separated as follows. *Head* with antenna as figured (fig. 98). *Prothorax* rather sparsely setose laterally. Pronotum with a broad, pale brown band near front margin, which is distinctly darker than posterior area. *Abdomen* with pleural discs indiscernible.

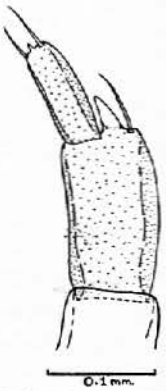


Fig. 98. *Zamium incultum* Pascoe. Mature larva. Apical part of antenna. Lateral aspect. (Duffy, 1953a)

Host plant: *Baikiaea plurijuga* (from records of F.P.R.L.).

Biology. Timber damaged by this species is shown on Plate VII, fig. 2.

Material studied. 6 L, vi.1945, from imported *Baikiaea plurijuga*, in coll. F.P.R.L.

References. Duffy, 1953a (L fig., Biol.); Lepesme, 1948 (I fig.).

Lucasianus levaillanti Lucas

Distribution. PALAEARCTIC REGION: Algeria, Morocco.

Host plants. *Cupressus sempervirens* (Mayet, 1905); *Tetraclinis articulata* (Peyerimhoff, 1919); *Juniperus* (Villiers, 1946).

Biology. The adult, which is crepuscular, appears from July to October.

References. Mayet, 1905 (Biol.); Peyerimhoff, 1919 (Biol.); Villiers, 1946 (I fig., Biol.).

Callidiini

Larval Characters

Form robust and of a contracted appearance. *Head* subtrapezoidal, widest well behind middle; with three pairs, one pair or no ocelli. Mandible with a deep longitudinal impression on outer face (shallow in *Semanotus*). Maxilla with lobe glabrous on entire inner margin; process of palpifer nearly as long as or longer than segment 3 of maxillary palp (if smaller, then three ocelli present). Antenna with segments 1 and 2 quadrate to strongly elongate. Gula distinct, raised. *Prothorax* densely setose laterally, the setae being more or less equal in length; pronotum not more than twice as wide as long; median cleavage line incomplete (except *Hylotrupes bajulus*), though often deep; posterior half lightly reticulate (except *H. bajulus*) and with some rather coarse longitudinal striae. Postnotal fold present. Sternum with two paramedian or one median oval, glabrous area, the eusternum not clearly defined (except *H. bajulus*). *Abdomen* with ampullae broad, often finely reticulate, with a distinct but shallow longitudinal, median impression; posterior transverse impression incomplete (except *H. bajulus*). Pleural discs distinct on segments 3–6 (except *H. bajulus*); each disc a deep pore surrounded by a reticulate area. *Legs* 2- or 3-segmented; at least as long as maxillary palp; segments more or less globular; unguiculus imbricately spinose.

Hylotrupes bajulus (Linnaeus)

[The House Longhorn, the European House Borer or the Italian Beetle]

Distribution. PALAEARCTIC REGION: Algeria, Egypt, Morocco, Tunisia. ETHIOPIAN REGION: Cape Province.

This species occurs throughout Scandinavia, the British Isles, Europe, Italy, Syria, China, Australia, New Zealand and North and South America.

Adult (fig. 99). Length 14–20 mm. Colour varying from testaceous to castaneous, sometimes almost pitchy, particularly the pronotum. *Head* with antennae short, not extending beyond basal third of elytra. *Prothorax* transverse, with sides strongly rounded and bearing dense, outstanding pubescence; disc with a pair of paramedian, shining, glabrous tubercles. Anterior coxal cavities rounded and open posteriorly.

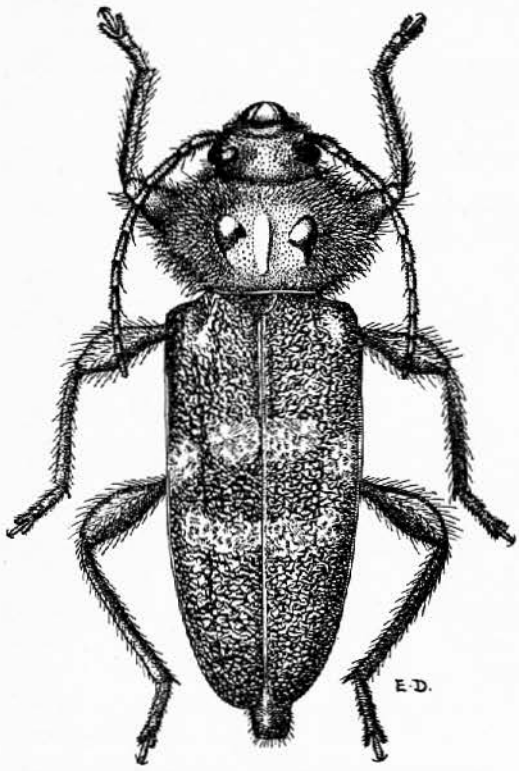


Fig. 99. *Hylotrupes bajulus* (Linnaeus). Adult.

Elytra depressed, rugose, with an interrupted band of pale pubescence before middle, often forming four distinct patches.

Mature larva (figs. 100–102). Length up to 24 mm.; maximum breadth (at prothorax) 7·5 mm. Form rather robust, slightly depressed. *Head* (fig. 102) subtrapezoidal, widest well behind middle (maximum head-width 4·25 mm.). Gena somewhat shouldered, pale, smooth and with a few short, pale setae. Front margin of head pale ferruginous, rugose. Front margin of frons rather swollen. Mouthframe completely, though rather weakly, sclerotised beneath antennae. Antenna (fig. 101) testaceous, with segment 2 three times as long as segment 3, which is cylindrical and twice as long as broad; supplementary process rather attenuated, at least two-thirds as long as segment 3. Mandible broad, with basal part ferruginous; apical part pitchy, shining

and with a deep longitudinal, median impression. Labrum fleshy, transversely oval and with numerous long fine setae. Epipharynx setose only on sides. Three distinct ocelli present close together in a straight row laterad and ventrad of antenna[1] (fig. 102); ocellar lens strongly protuberant; pigmented spot distinct. Hypostoma rugose, with front margin not or scarcely darker than remainder; sutures curved. Gula rather

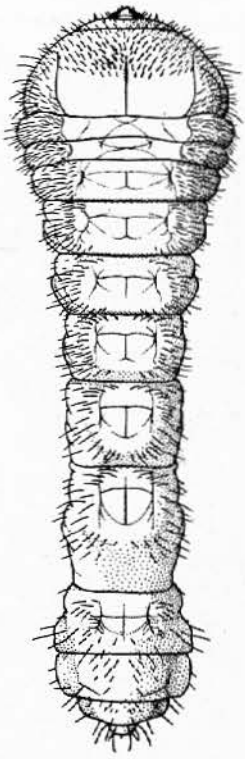


Fig. 100

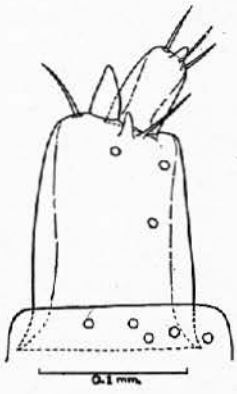


Fig. 101

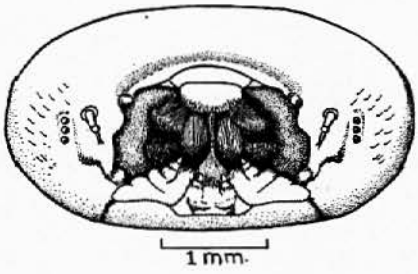


Fig. 102

Figs. 100–102. *Hylotrupes bajulus* (Linnaeus). Mature larva. Fig. 100. Dorsal aspect (Duffy, 1953a). Fig. 101. Apical part of antenna. Lateral aspect (Duffy, 1953a). Fig. 102. Head. Frontal aspect.

broad, slightly raised, with concave sutures. Maxilla with lobe entirely glabrous on inner margin; maxillary palp with segment 3 shorter than segment 2 and shorter than segment 2 of labial palpi; dorso-external process of palpifer slightly shorter than segment 3 of maxillary palp. Labial palpi with segments 1 and 2 equal in length. *Prothorax* rectangular, depressed, with numerous long fine setae; posterior half smooth, shining, with a few irregular coarse striae; median cleavage line deeply impressed. Eusternum distinct, triangular, shining, rugose and almost glabrous. *Abdomen* with dorsal ampullae shining, coarsely rugose (even slightly tuberculate), with posterior transverse impression distinct; median furrow rather shallow. Anal lobes sparsely

[1] Behind these, three widely separated, vestigial ocelli are usually visible.

setose. Pleural discs indistinct or absent. *Legs* with femur wider than long; femur and tibiotarsus testaceous; unguiculus ferruginous for at least apical two-thirds and strongly imbricately spinose. *Spiracles* with peritreme broadly oval, very thin and pale.

Although there seems no doubt that this species has been correctly placed in the Callidiini according to adult and pupal characters, the larva does not conform at all satisfactorily to what would appear to be the true larval characteristics of this tribe. On the other hand, larvae of certain other species of *Hylotrupes* approximate much more closely to the tribal characters.

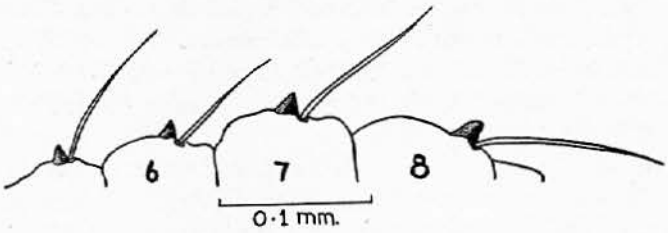


Fig. 103

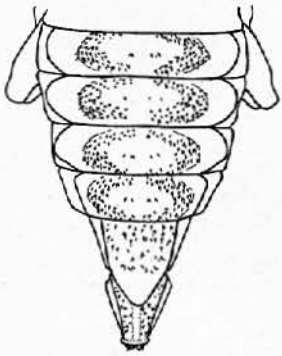


Fig. 104

Fig. 103. *Hylotrupes bajulus* (Linnaeus). First-instar larva. Egg-bursting spines of abdominal segments 5–8. Dorsal aspect.
Fig. 104. *Hylotrupes bajulus* (Linnaeus). Pupa. Posterior part of abdomen. Dorsal aspect. (Duffy, 1953a)

First-instar larva (fig. 103). Length up to 1·2 mm.; maximum breadth 0·65 mm. Cuticle milky white, waxy. Egg-bursting spines situated in pairs dorso-laterally on abdominal segments 1–8; spines short, stout, blunt and becoming larger posteriorly. Spiracles biforous.

Pupa (fig. 104). Length 14–25 mm.; maximum breadth 7 mm. *Head* quadrate, glabrous. *Mesonotum* with several long, fine, pale setae directed backward on each side of scutellum, which is depressed. *Metanotum* with numerous similar setae on each side of scutellar groove which is slightly depressed. Elytra and wings extending to abdominal segment 4. *Abdomen* with tergites 1–6 each with short ferruginous spines (each bearing a fine basal seta) arranged in a transverse row along anterior and posterior margins and in a broad semi-oval group near each lateral margin. Tergite 7 very elongate and strongly tapering posteriorly; anterior two-thirds with numerous scattered, slightly stouter spines directed posteriorly; posterior third glabrous. Tergite 8 elongate, subparallel-sided and bearing numerous spines on each side of a longitudinal median groove. Tergite 9 extremely short, rugose, slightly bilobed, each lobe bearing a fine seta. Sternites smooth and glabrous. Pleura protuberant, rugose and glabrous. *Legs* with hind femora extending as far as abdominal segment 4. *Functional spiracles* present on abdominal segments 1–5; peritreme broadly oval, moderately thick and slightly raised above general level of cuticle.

Egg (fig. 105). Length 1·2–2 mm.; breadth 0·5 mm. Form elongate, spindle-shaped, very variable in outline, but one pole usually more attenuated than the other. Chorion white, dull, smooth. According to Weidner (1936b), eggs laid at the beginning of the oviposition period are much more slender than those laid later on.

Host plants: *Pinus*, *Picea*, *Abies*. Feytaud (1939) states that this species is not entirely confined to conifers, since *Populus*, *Alnus*, *Corylus* and even *Quercus* have been infested by it. Chobaut (1904) records it from *Genista scorpius*, Riley (1880) from *Conium maculatum* and Caillol (1914) from *Tamarix*. Petroff (1920) has found specimens in branches of *Acacia nilotica* in Egypt. Conifers, however, are undoubtedly its preferred hosts, and in South Africa, at any rate, it has never been found in any others. The following Coniferae have been found to be infested in South Africa: *Pinus canariensis*, *P. caribaea*, *P. halepensis*, *P. palustris*, *P. maritima*, *P. pinaster*, *P. pinea*, *P. ponderosa*, *P. radiata*, *P. sylvestris*, *P. taeda* and possibly *Pseudotsuga taxifolia* (Tooke, 1949).

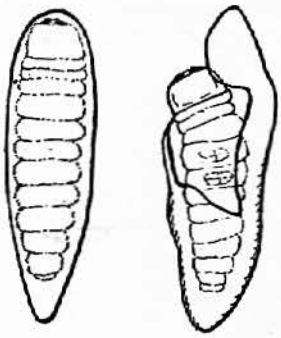


Fig. 105. *Hylotrupes bajulus* (Linnaeus). Eggs, showing emerging larvae. (Duffy, 1953a)

It should also be mentioned that there have recently been several reports, mainly from France, of this species infesting *Quercus* (Benoit and Jacquoit, 1953), and it would appear possible that some strains of *H. bajulus* have become resistant to oak sapwood. As, however, the present author (1954) has recently found oak to be infested by other species hitherto associated exclusively with Coniferae, this is perhaps not so surprising as it first seemed.

Biology. The eggs are deposited in batches in cracks and crevices about 0·2–9·6 mm. wide; rough surfaces are preferred. Estimates of the maximum number of eggs laid by a single female are extremely variable; Eckstein (1935a) records 200, Kaufmann (1936) 300 and Becker (1942a) 400, although estimates of most other authors lie between 30 and 100. The incubation period is usually from one to three weeks. Steiner (1937) found that the shortest period was 5·9 days at 31·5° C. (89° F.) and 90–95 per cent humidity, and that the longest period was 48 days at 16·6° C. (62° F.) and 18 per cent humidity. The upper temperature limit for incubation was 101·66° F. at which all eggs were killed, irrespective of humidity. Increased humidity accelerated development, but with 100 per cent humidity many eggs were killed by moulds. The most favourable humidity was 90–95 per cent, which is understandable when it is remembered that this species flourishes in maritime regions. High temperatures (31·5° C. (89° F.) and 26·3° C. (79° F.)) reduced mortality by accelerating development and retarding the growth of moulds. Tooke (1949) maintains that *H. bajulus* can exist and breed under a wide range of humidities and that the effect of low humidity is to lengthen the incubation period of the eggs and to shorten the life of both sexes. Becker (1942a) found that oviposition could be induced experimentally by treating wooden blocks with the terpines α-pinene and β-pinene or an oil (turpentine) containing them.

The larval habitat is generally in the sapwood and, to a lesser extent, the heartwood

of dry, seasoned, coniferous timber such as telegraph posts, fencing and structural timbers in buildings, especially those of roofs and attics. Infestation usually starts in the attic (particularly around a chimney) and gradually spreads downward. In an infestation recently seen by the author, however, the entire first floor of a twenty-five-year-old council house had become infested and yet the attic above was perfectly sound. Although in recent years this insect has become adapted to a truly domestic environment, there is no doubt that the original habitat was, and probably still is in many areas, confined to woodland and forest. In South Africa, according to Tooke and Scott (1944), this species breeds in old logs and stumps and even in dead branches high up on living trees. It has also been found breeding in a dead standing tree near Paris and also recently in an old pine stump in England.

After emerging from the egg, the first-instar larva usually crawls about for a short period before starting to enter the wood. The larval galleries, which extend parallel to the grain of the wood (Pl. II, fig. 4), are tightly packed with fine powdery particles of wood and frass; the frass is characteristic, being in the form of short cylinders, which, according to Eckstein (1936a), later break up into approximately two spherical portions (probably due to desiccation?). In heavy infestations the wood is almost entirely reduced to tightly packed powder, only a thin "veneer" of sound wood and sometimes a central core of heartwood being left untouched. Often the skin-like "veneer", which is about 0·5 mm. thick, splits or bursts under the pressure of the frass, and it is only under these circumstances or through the emergence of adults that frass is ejected. It is due to the unusual absence of tell-tale "boring dust" that infestations are so difficult to detect, although blister-like swellings on the surface of the wood indicate that it is or has been infested. The larvae feed mainly in the sapwood and infestation decreases as soon as the heartwood is reached. There are several instances recorded in literature of both larvae and adults of this species boring through metal sheeting covering wooden structures and even lead cables (Horn, 1933, 1934; Laing, 1919, 1920; Westwood, 1839). After tunnelling for several years and doing considerable damage, the larva usually bores to just beneath the surface of the wood and then turns back to excavate a pupal cell often at some depth and usually parallel to the grain of the wood.

Although intracellular micro-organisms are known to occur in the gut of many species of cerambycid larvae, they are apparently absent in that of *H. bajulus*. According to Mansour (1934), *Hylotrupes* larvae are able only to digest seasoned wood through their ability to secrete cellulase, a cellulose-splitting enzyme. Falck (1930) has found through a comparative analysis of the frass and sound timber that larvae remove about 21 per cent of the total cellulose and hemicellulose content of seasoned coniferous wood. Parkin (1940) suggests that although *Hylotrupes* appears to be confined to coniferous woods, the enzymes present in the larval gut would apparently enable it to digest deciduous wood with equal facility. Kaltwasser (1941a) discovered that larvae were able to develop satisfactorily in deciduous wood and in coniferous heartwood, providing such substances as resin, which are harmful to them, were first removed. This was corroborated by Becker (1944), who found that larvae could survive in deciduous wood providing the latter was first soaked for twenty-four to forty-eight hours in 1 or 5 per cent sodium hydroxide, and then for seventeen days in

distilled water. The larvae increased somewhat in weight—probably due to the removal of pentosans.

Numerous experiments have been made in an attempt to accelerate larval growth. Schuch (1937a) has shown that some constituent of the cell contents of the wood is necessary to rapid growth, since larvae increase in weight more rapidly when feeding in the outer sapwood than in the inner zone or in the heartwood. The same author (1937c) has shown experimentally that larval growth at a given temperature increases with a rise in humidity, and at a given humidity with a rise in temperature. Becker (1938a) observed considerable acceleration of growth in larvae which had been inserted in wood impregnated with peptone solution. The same author maintains that albumin, which is present in dead wood in minute quantities, is essential for larval growth and that increased amounts of it greatly accelerate their development, thereby reducing the amount of wood destroyed. Gösswald (1939) accelerated larval development through increasing the nutritive value of pine by impregnating blocks under pressure with a 5 per cent suspension of diastase; this was more satisfactory than with peptone or other ferments. Later, Kaltwasser (1941), by adopting a similar technique, succeeded in reducing the total larval period to fourteen months.

The mature larvae tunnel to a point just beneath the surface and then turn back and pupate at some depth, although sometimes the larva itself penetrates to the exterior and plugs the orifice with frass before turning back to pupate. The time of pupation is extremely variable in this species, as its environment is subject to considerable changes in atmospheric conditions. Usually it takes place in the spring, although sometimes it occurs in the autumn or even in the winter. The pupal period is of two to three weeks' duration. Eckstein (1928) states that adults remain in their pupal cells for five to seven months after eclosion before attempting to emerge, whereas certain other authors contend that adults do not always attempt to emerge, and have been known to copulate and oviposit in excavated portions often deep in the wood. According to Tooke (1949) the emergence period in South Africa begins in November, the peak of emergence being from December to January. The following table from Tooke (loc. cit.) clearly shows that males tend to live considerably longer than females (Table I).

TABLE I

DURATION OF LIFE IN DAYS

Temp. 0° F.	*Rel. Hum. Per Cent*	*Individual Maximum*		*Individual Minimum*		*Average for all Individuals*	
		Male	*Female*	*Male*	*Female*	*Male*	*Female*
85·4	61	59	21	7	2	21·0	9·0
51·8	80	108	84	7	5	37·8	34·6
68·0	74	32	23	22	7	22·5	14·4
Normal	Normal	36	21	3	2	15·08	9·3

An experiment has also been undertaken by Tooke to determine the effect of various humidities on adult life. This experiment was conducted under normal room conditions (71 F.°–78° F.), with the following results (Table II):

TABLE II

Humidity	*Average Age in Days*		*Minimum Age*		*Maximum Age*		*Total No. of Beetles*	
	Females	*Males*	*Females*	*Males*	*Females*	*Males*	*Females*	*Males*
Normal Room 48–71% R.H.	9·1	11·3	2	3	19	34	53	34
10% R.H. ..	7·8	9·3	3	3	14	20	13	11
25% R.H. ..	6·2	9·3	2	3	12	19	15	9
35% R.H. ..	8·6	9·6	6	3	15	20	16	13
65% R.H. ..	7·7	12·0	5	5	12	21	9	8
75% R.H. ..	9·1	12·3	4	4	15	26	11	8

In European countries adults usually eclode during June and July. The duration of the life-cycle varies considerably but would seem usually to be three or four years, although Tooke (1949) shows that in South Africa development is usually considerably accelerated (see Table III).

TABLE III

Date Inoculated	*Type of Wood*	*Emergence Date*	*Length of Larval and Pupal Period*	
			Years	*Days*
26.xii.46 C.T.[1]	S.A. Pine ..	17.xii.46	2	22
26.xii.43 C.T.	S.A. Pine ..	20. i.47	2	351
26.xii.43 C.T.	S.A. Pine ..	14. i.47	2	19
1. iii.45 C.T.	P. radiata ..	30.xii.45	—	363
26. i.45 C.T.	P. radiata ..	3. i.47	1	311
26. i.45 C.T.	P. radiata ..	25. i.47	1	333
26. i.45 C.T.	P. radiata ..	10. i.47	1	318
26. i.45 C.T.	P. radiata ..	25. i.47	1	333
26. i.45 C.T.	P. radiata ..	31.xii.47	1	308
26. i.45 C.T.	P. radiata ..	8. i.47	1	316
26. i.45 C.T.	P. radiata ..	71. iii.47	1	384
26. i.45 C.T.	P. radiata ..	28.xii.47	1	305
26. i.45 C.T.	P. radiata ..	17.xii.47	1	295
26. i.45 C.T.	P. radiata ..	2. i.47	1	310

[1] C.T.=Cape Town. P.E.=Port Elizabeth. Pta.=Pretoria.
Average for Cape Town .. 1 year 320 days.
Average for Port Elizabeth .. 1 year 336 days.

TABLE III (*continued*)

Date Inoculated	*Type of Wood*	*Emergence Date*	*Length of Larval and Pupal Period*	
			Years	*Days*
26. i.45 C.T.	P. radiata ..	24.xii.46	1	201
26. i.45 C.T.	P. radiata ..	28.xii.46	1	305
26. i.45 C.T.	P. radiata ..	31.xii.46	1	308
26. i.45 C.T.	P. radiata ..	25. i.47	1	333
26. i.45 C.T.	P. radiata ..	24.xii.46	1	201
26. i.45 C.T.	P. radiata ..	30.xii.46	1	307
26. i.45 C.T.	P. radiata ..	25. i.47	1	333
26. i.45 C.T.	P. radiata ..	17.xii.47	1	294
26. i.45 C.T.	P. radiata ..	2. i.47	1	310
26. i.45 C.T.	P. radiata ..	25. i.47	1	333
26. i.45 C.T.	P. radiata ..	2. i.47	1	310
26. i.45 C.T.	P. radiata ..	7. i.47	1	315
26. i.45 C.T.	P. radiata ..	28.xii.46	1	305
31. i.45 C.T.	P. radiata ..	25. i.47	1	359
1. ii.45 C.T.	P. radiata ..	17.xii.46	1	320
1. ii.45 C.T.	P. radiata ..	7. i.47	1	341
12. ii.45 C.T.	P. radiata ..	4. i.47	1	325
12. ii.45	P. radiata ..	21. i.47	1	343
12. ii.45	P. radiata ..	20. i.47	1	343
2. ii.45 C.T.	P. radiata ..	17.xii.46	1	318
5. ii.45 C.T.	P. radiata ..	17.xii.46	1	315
5. ii.45 C.T.	P. radiata ..	17.xii.46	1	316
5. ii.45 C.T.	P. radiata ..	20.xii.46	1	318
5. ii.45 C.T.	P. radiata ..	17.xii.46	1	315
7. ii.45 C.T.	P. radiata ..	17.xii.46	1	313
7. ii.45 C.T.	P. radiata ..	2. i.47	1	329
7. ii.45 C.T.	P. radiata ..	2. i.47	1	329
8. ii.45 C.T.	P. radiata ..	24.xii.46	1	329
8. ii.45 C.T.	P. radiata ..	24.xii.46	1	329
10. ii.45 C.T.	P. radiata ..	8. i.47	1	332
12. ii.45 C.T.	P. radiata ..	28.xii.46	1	350
1. i.46 P.E.	S.A. Pine ..	27.xii.47	1	361
1. i.46 P.E.	S.A. Pine ..	2. i.48	2	1
1. i.46 P.E.	S.A. Pine ..	12. i.48	2	11
1. i.46 P.E.	S.A. Pine ..	26. i.48	2	25
1. i.46 P.E.	S.A. Pine ..	27.xii.47	1	361
1. i.46 P.E.	S.A. Pine ..	12. i.48	2	11
16. i.46 P.E.	S.A. Pine ..	19. i.48	2	3
16. i.46 P.E.	S.A. Pine ..	29.xii.47	1	347
16. i.46 P.E.	S.A. Pine ..	2. i.48	1	351
16. i.46 P.E.	S.A. Pine ..	9. i.48	1	358
16. i.46 P.E.	S.A. Pine ..	12. i.48	1	361
16. i.46 P.E.	S.A. Pine ..	12. i.48	1	361
16. i.46 P.E.	P. radiata	27. i.47	1	11
16. i.46 P.E.	P. radiata ..	2. i.48	1	351

TABLE III (*continued*)

Date Inoculated	*Type of Wood*	*Emergence Date*	*Length of Larval and Pupal Period*	
			Years	*Days*
16. i.46 P.E.	P. radiata ..	5. i.48	1	354
16. i.46 P.E.	P. radiata ..	12. i.48	1	361
16. i.46 P.E.	P. radiata ..	26. i.48	2	10
16. i.46 P.E.	P. radiata ..	24.xii.47	1	342
16. i.46 P.E.	P. radiata ..	29.xii.47	1	347
16. i.46 P.E.	P. radiata ..	19. i.48	2	3
19. i.46 P.E.	S.A. Pine ..	29.xii.47	1	344
19. i.46 P.E.	S.A. Pine ..	19. i.48	2	0
17. i.46 P.E.	P. radiata ..	22.xii.47	1	349
9.ii.46 P.E.	P. apachica ..	2. ii.48	1	358
16.ii.46 P.E.	P. pinaster ..	13. ii.48	1	362
19.ii.46 P.E.	P. palastria ..	4. ii.48	1	350
15.x.43 Pta.	P. taeda ..	1.xii.47	4	46
15.x.43 Pta.	P. canariensis ..	2.xii.47	4	47

Records of from six to eleven years are not uncommon and there are several accounts of prolonged larval life, notably by Bayford (1938), who discusses a larva estimated to be at least seventeen years old.

Parasites. Hymenoptera: *Cryptus minator* Grav., *C. seticornis* Ratz., *Ephialtes manifestator* L. (Reineck, 1919); *Doryctes leucogaster* Nees (Xambeu, 1898–1902); *Ephialtes tuberculatus* Frc. (Rudow, 1912); *Rhoptrocentrus* sp. (Thompson, 1943); *Atanycolus longifemoralis* Shenefelt (1943).

Predators. Coleoptera: *Opilo domesticus* L. (Steiner, 1938).

Economic importance. Although originally a forest insect, this beetle has now become one of the few truly domestic species, and the material damage it does in many countries to structural timbers, especially to roofs and rafters, is enormous. During the past twenty years damage has increased considerably, and many costly measures have been adopted in combating this species on the Continent. In 1935 over a million marks were spent on control measures in Hamburg alone. In Sweden hundreds of houses have been severely infested, while in Denmark buildings have been insured against attack. In certain German districts before the war, assurance companies levied an increase in the premium to cover risk of infestation (Fisher, 1938). The final statistics of a survey of buildings in Germany discussed at a meeting in 1938 of the Association for the Scientific Advancement of Measures against *H. bajulus*, showed that infestation had been recorded in 41·46 per cent of the 132,377 buildings examined and that the percentage in some regions was 70 to 80. Another survey of the same year revealed that the attics of about 40 per cent of all German houses were infested. Although the establishment of this species in South Africa is comparatively recent (probably not more than fifty years), large-scale infestation has already taken place.

According to Tooke (loc. cit.), infestation of buildings in South Cape Town may prove to be nearly 90 per cent.[1] It has been calculated that an infested house would collapse within twenty-five to thirty years providing the insect could spread undisturbed. In England the possibility of this species spreading and causing extensive and serious damage cannot be lightly disregarded. Already breeding has increased in a number of buildings, and infestations have recently been recorded from Surrey, Essex and Sussex (Duffy, 1949b). Hickin (1947a) gives an account of a forty-year-old house in Camberley, and points out that if infested timber had been used in its construction, the insect must have maintained itself for at least four, or more probably eight, generations.

This recent increase is apparently due to forms of construction which promote exceptionally warm conditions in roof spaces during the summer months. This not only accelerates larval development but causes the wood to crack, thus providing additional oviposition sites. But by far the greatest cause is the widespread use of fast-grown imperfectly seasoned softwoods as roof timbers. Although the rafters become air-dried, they still contain an appreciable quantity of water, and where the humidity is highest, the damage, owing to the accelerated growth of the larvae, is greatest. Another contributing factor to the recent increase of this insect is the selection of timbers more closely related to the strain involved than was previously the case, with the result that they break up more readily (Larsson, 1945). The recent succession of hot summers, at least on the Continent, may also have caused an increase in the population of this insect.

According to Schuch (1939), recently built houses are most liable to attack, there being comparatively little damage to timber over fifty years old. Topp and Jensen-Storch (1927) have estimated that structural timbers are not usually damaged until they are about twenty or thirty years old. The considerable amount of damage that can be caused by only a few larvae is explained by the long larval period. When this insect is well established, it appears that infestation is more likely to spread through adults flying to fresh sites than by the importation of infested timber. In England, adults have recently been observed to be extremely active in hot, sunny weather and to engage frequently in short, rapid, wheeling flights around infested houses; this clearly demonstrates the ease with which this longhorn is able to spread of its own accord (Duffy, 1954). In certain districts on the Continent telegraph posts have been heavily attacked (Blair, 1947), and Donisthorpe (1947) records the emergence of this beetle from telegraph posts and fences in Surrey. In South Africa (Tooke, 1949), attack is by no means confined to roof timbers, for it readily attacks flooring, doors, window-frames, picture rails and even "deal" furniture. Imported packing-cases, too, have recently been found to be infested and the danger of *Hylotrupes* spreading by this means should not be overlooked. Recently a large quantity of *Pinus maritima* was imported from Europe for building purposes in Australia: this timber has since proved to be infested and *Hylotrupes* is now established in yet another country (Brimblecombe, 1953; Duffy, 1954).

Although this species would appear to flourish mainly in maritime climates, recent

[1] For further details of the severity of infestation in South Africa, see the comprehensive accounts by the National Building Research Institute (1950) and Dürr (1954).

experiments in South Africa (Tooke, 1949) have proved that eggs will hatch at a constant humidity of 10 per cent, and that larvae are capable of completing their development under Pretoria conditions, where the moisture content of the wood drops as low as 6 per cent and does not rise above 9 per cent. Hence the spread of *Hylotrupes* into inland countries is by no means improbable.

Control. In cases where structural timbers have become very heavily infested they should be removed and burned, as even if it were possible to kill off the larvae they would be a source of danger, having become weakened through the larval damage. As a treatment for floors which are only moderately infested, Feytaud (1939) suggests the removal of the most heavily attacked boards and either the introduction of a volatile fluid into holes drilled at intervals in the remaining boards or the application of a solution of paradichlorobenzene in carbon tetrachloride[1] by means of a stiff brush. For major infestations, Jensen-Storch and Henriksen (1932) found that the application of carbon bisulphide[2] at the rate of 25 fluid oz. per 1,000 cubic feet completely killed off the larvae and that hydrocyanic acid gas[2] produced by Zyklon B at the rate of 30 oz. per 1,000 cubic feet proved quite effective in summer, though less so in winter owing to the reduction in larval respiration. Hahmann (1932) experimented with the application of dry heat produced by a generator of the type commonly used for drying out newly built houses. After one hour an air-temperature of 80°–87° C. (176°–188·6° F.) was attained, which later rose from 88°–100° C. (190·4°–212° F.), at which it was maintained for seven hours. All larvae and adults were killed inside the beams in which temperatures of 63°–74° C. (145·4°–165·2° F.) were recorded.

According to Eckstein (1936b) a proprietary liquid known as "Imprägnier Lasolineum H" killed larvae in telegraph posts to a depth of 4 inches; it acts as both a contact and a respiratory poison. Kaltwasser (1941b), however, maintains that larvae are not harmed by boring short distances through heavily impregnated wood. A comprehensive account of chemical preventive and eradication measures for combating *Hylotrupes* in South Africa is given by Tooke (loc. cit.), to which the reader is referred.

Sieke (1936) describes an electrical sound detector designed to amplify the rhythmic sound produced by larvae scraping off thin wooden shavings with their mandibles. This apparatus has proved useful in the examination of treated timber to ascertain the efficiency of insecticides. It is sometimes necessary to warm the timber to induce feeding.

Trägardh (1937) maintains that infestation is commonest through adults flying from place to place on sunny days and recommends the placing of gauze over open windows in attics.

As a result of experiments with certain essential oils, Becker (1942a) suggests that they could be used to induce oviposition in a given place to prevent extensive oviposition on other timber.

Experiments have recently been carried out by Krough and Tooke (1946) in which the efficacy of pentachlorophenol as a timber preservative against borers has been tested. In Australia, it has been recommended (Brimblecombe, 1953) that infested

[1] It is now thought inadvisable to use carbon tetrachloride as the health hazard is too great.
[2] Both these methods are now considered too dangerous to adopt.

timbers either be removed and destroyed or given a liberal application of 5 per cent pentachlorophenol in dieseline oil.

Dürr (1954), after very thorough investigations concerning the relative toxicity of wood preservatives and insecticides to *H. bajulus*, recommends either 5 per cent zinc naphthenate in power paraffin or 3 per cent zinc naphthenate + 2 per cent pentachlorophenol in power paraffin. It was later found, however, that white spirit or a 50 : 50 mixture of white spirit and power paraffin was more effective as a solvent for metallic naphthenates, especially if the wood is to be painted after treatment. Both these solutions can be applied by immersing the seasoned timber in the solution for 10–15 minutes.

There appears to have been no serious attempt at biological control measures, although Deckert (1929b) states that the large-scale breeding of the predacious clerid *Opilo domesticus* L. has been considered. Despite earlier assumption, blue-stained timber (i.e. timber attacked by the fungus *Ceratostomella*) is not protected against attack by *Hylotrupes* (Steiner, 1939).

According to Tooke (loc. cit.), the possibilities of complete and effective control in South Africa (especially the Western Cape) are even less hopeful than in European countries. It is due to the fact that this insect breeds as readily in dead timbers out of doors as in structural timbers indoors. Hence, whatever efforts are made in eradicating this pest from buildings, there will always remain a high population breeding "wild" in and around forested areas and constituting a constant threat to housing. The task of clearing such large areas of stumps and dead branches *in situ* is humanly impossible. In view of this constant threat to houses and property in South Africa, the Department of Agriculture has issued certain regulations, which enforce the treatment of all coniferous timbers in those areas where the beetle is known to exist at the owner's own expense, unless special exemption be granted by the Minister. Any person failing to comply with the requirements imposed by those regulations may be liable to a fine not exceeding twenty pounds or to imprisonment with or without hard labour for a period not exceeding two months.

Material studied. 7 L, Germany, near Berlin, K. Eckstein leg., in coll. B.M.; 14 L, 1 P, Essex, near Grays, vii.1949, in infested floorboards, E.A.J.D. leg., in coll. B.M.; 1 L, London, Balham, vi.1955, from infested crate, A.E.J.D. leg., in coll. B.M.

References. Altum, 1881 (Biol.), 1886 (Biol.), 1923 (Biol.); Barbey, 1913 (Biol. fig.); Bayford, 1938 (Biol.); Becker, 1938a (Biol.), 1938b (Contr.), 1941 (Biol., Contr.), 1942a (Biol.), 1942b (Physiol.), 1942c (Biol.), 1944a (L, Biol., Physiol.), 1944b (not seen), 1949a (L, Biol., Physiol.), 1949b (L, Biol., Physiol.), 1950a (Contr.), 1950b (Physiol.), 1953 (E, Biol.); Blair, 1947 (Biol.); Blanc, 1907 (Biol.); Boas, 1923 (Biol. fig.); Bouthery, 1879 (Biol.); Brammanis, 1944 (Biol., Contr.); Brimblecombe, 1953 (L fig., I fig., Biol. fig., Contr.); British Museum (Natural History), 1954 (L fig., I fig., Biol.); Butovitsch, 1939 (Biol.); Caillol, 1914 (Biol.); Craighead, 1923 (L, Biol.), 1950 (Biol. fig., Contr.); Deckert, 1928a (Biol.), 1928b (Biol.), 1929a (Biol.), 1929b (Biol.), 1930 (Biol.), 1933 (Biol.); Della Beffa, 1931 (Biol. fig.); Department of Scientific and Industrial Research, 1938 (L fig., Biol. fig., Contr.); Donisthorpe, 1947 (Biol.); Duffy, 1949 (Biol. fig.), 1953a (E fig., L fig., P fig., Biol. fig., Contr.), 1954 (Biol.); Dürr, 1951 (L. Physiol., Contr.), 1954 (L fig., I fig., Biol. fig., Contr.); Eckstein,

1920a (Biol.), 1920b (Biol.), 1921 (Biol.), 1926 (Biol.), 1928 (Biol.), 1929 (Biol.), 1932a (Biol.), 1932b (Biol.), 1934 (Biol.), 1935 (Biol.), 1936a (L, Biol. fig.), 1936b (Contr.), 1936c (Biol.); Eckstein and Butovitsch, 1931 (Biol.); Emden, 1939–1940 (L fig.); Escherich, 1923 (Biol. fig.); Falck, 1930 (Biol.), 1933 (Biol.); Feytaud, 1939 (Biol., Contr.); Fisher, 1938 (Insurance), 1945 (Biol.), 1949, (L fig., Biol. fig., Contr.); Fisher and Harris, 1949 (Biol.); Gemignani and Rodriguez, 1940 (Biol.); Girard, 1881 (Biol.); Grösswald, 1939 (Biol.); Guse, 1893 (Biol.); Hahmann, 1932 (Contr.); Heeger, 1857 (E fig., L fig., P fig., Biol.); Heidenreich, 1939 (Biol. fig., Contr.); Heitz, 1927 (Biol.); Henriksen, 1914 (L fig.); Henry, 1907 (Biol., Contr.), 1909 (Biol.); Hespeler, 1934 (Biol.), 1939 (Contr.); Hickin, 1947 (Biol.); Horn, 1933 (Biol.), 1934 (Biol.); Houlbert and Monnot, 1908 (L fig., Biol.); Jarvis, 1947 (Biol.); Jensen, 1931 (Biol.), 1933 (Biol.); Jensen-Haarup and Henriksen, 1914 (L fig.); Jensen-Storch, 1932 (Biol. fig.); Jensen-Storch and Henriksen, 1932 (Contr.); Judeich and Nitsche, 1889 (Biol.); Kaltwasser, 1941a (Biol.), 1941b (Biol., Contr.); Kaufmann, 1936 (Biol.), 1938 (Contr.); Krough and Tooke, 1946 (Contr.); Kunike, 1936 (L fig., Biol. fig.); Laing, 1919 (Biol.), 1920 (Biol.); Lakowitz, 1937 (Biol. fig.); Larsson, 1945 (Biol. fig.); Määr, 1933a (Biol.), 1933b (Biol.), 1933c (Biol.), 1935 (Biol.); Mansour, 1934 (Biol.); Mansour and Mansour-Bek, 1934a (Biol.), 1937 (Biol.); Moll, 1926 (Biol.); National Building Research Institute, 1950 (L fig., I fig., Biol. fig., Contr.); Nördlinger, 1848 (Biol.); Nüsslin, 1905 (Biol.); Parkin, 1934 (Biol.), 1940 (Biol.); Pavel, 1886 (Biol.); Perris, 1856 (L fig.), 1877 (L); Petroff, 1920 (Biol.); Peyerimhoff, 1919 (Biol.); Reineck, 1919 (Biol.); Riley, 1880 (Biol.); Rudow, 1912 (Biol.); Ruiz Castro, 1943 (Biol.); Saalas, 1923 (Biol.); Schedl, 1935 (Biol.); Scheel, 1930 (Biol.); Schiödte, 1876 (L fig.); Schlottke and Becker, 1942 (Physiol.); Schmitz, 1926 (Biol.); Schomann, 1936 (Biol.); Schuch, 1937a (Biol., Contr.), 1937b (Biol., Contr.), 1937c (Biol., Contr.), 1939 (Biol.); Schwarz, 1935 (Biol.); Schwerdtfeger, 1932 (Biol.); Shenefelt, 1943 (Paras.); Sieke, 1936 (Contr., fig.); Snyder, 1927 (Biol. fig.); Steiner, 1937 (Biol. fig.), 1938 (Biol.), 1939 (Contr.); Steyer, 1928a (Biol.), 1928b (Biol.); Thompson, 1943 (Paras.); Tooke, 1949 (Biol., Contr.); Tooke and Scott, 1944 (Biol.); Topp and Jensen-Storch, 1927 (Biol.); Trägårdh, 1927 (Biol.), 1937 (Contr.), 1939 (Biol. fig.), 1940 (Biol.); Villiers, 1946 (I fig., Biol.); Vité, 1953 (L fig., I fig., Biol.); Weidner, 1936a (Biol. fig.), 1936b (E fig., L fig., P fig., Biol.); Westwood, 1839 (Biol.); White, 1954 (Biol.); Wichmaud, 1931 (Biol. fig.); Xambeu, 1898–1902 (L, P, Biol.); Zillig, 1925a (Biol.), 1925b (Biol.); Zumpt, 1947 (Biol., Contr.).

Semanotus (=Sympiezocera) laurasi Lucas

Distribution. PALAEARCTIC REGION: Algeria.

Mature larva. No material available. The larva and pupa have been described by Perris (1887), but the descriptions are not sufficiently detailed for inclusion in the present keys to species. For generic characters of the larva see key, p. 19.

Host plants: *Juniperus phoenicea, J. communis, J. virginiana, J. oxycedrus, J. thurifera* (Peyerimhoff, 1919). Also recorded from *Cupressus* (Villiers, 1946).

Biology. According to Cheron (1890), copulation takes place at night, each act lasting about forty minutes. He observed that under laboratory conditions eggs were always deposited singly in old emergence holes of a scolytid (*Phloeosinus*). The larva

feeds under the bark until mature and then pupates in the wood in an oval cell which is closed with a plug of wooden fibres, and he maintains that this barricade sometimes prevents adults from being able to emerge and they are forced to remain in their pupal cells, where they soon die. Villiers (1946) states that the larval galleries resemble those of certain buprestids. The leaves of infested branches of *Juniperus* turn reddish. Adults eclode in autumn and overwinter in their pupal cells. They are nocturnal, and in North Africa appear from April to September. Both living and dying trees are attacked.

References. Caillol, 1914 (Biol.); Cheron, 1890 (Biol.); Léveillé, 1872a (Biol.), 1872b (Biol.), 1886 (Biol.); Martin, 1878 (L); Perris, 1877 (L, P, Biol.); Peyerimhoff, 1919 (Biol.); Villiers, 1946 (I fig., Biol.); Xambeu, 1898–1902 (L, P, Biol.), 1900 (Biol.).

Semanotus (=Sympiezocera) russicus (Fabricius) s. sp. **algiricus** Pic

Distribution. PALAEARCTIC REGION: Algeria, Morocco.

Mature larva. No material available. Only generic characters are available (see key, p. 19).

Host plants: *Cedrus*. The typical form in Europe, however, infests also *Juniperus* and *Quercus robur* (Villiers, 1946).

Biology. Infestation occurs only in slender dead or dying branches in which the larvae feed subcortically. At the beginning of August a longitudinal pupal cell about 2 cm. in length is excavated in the wood, the entrance being plugged with a wad of wooden fibres (Villiers, 1946).

References. Assmuss, 1858 (Biol.); Kollar, 1857 (Biol.); Peyerimhoff, 1919 (Biol.); Villiers, 1946 (I fig., Biol.); Xambeu, 1898–1902 (Biol.).

Pyrrhidium sanguineum (Linnaeus)

Illustrated descriptions of the immature stages and a biological account of this species have recently been published (Duffy, 1953a).

Distribution. PALAEARCTIC REGION: Algeria, Tunisia.

Mature larva. See key, p. 19.

Pupa. See key, p. 41.

Additional references. Caillol, 1914 (Biol.); Mühlmann, 1954 (Biol.); Seurat, 1900 (L fig., Biol. fig.); Villiers, 1946 (I, Biol.).

Callidium cedri Peyerimhoff

Distribution. PALAEARCTIC REGION: Algeria, Morocco.

Mature larva. No material available. For generic characters see key, p. 19.

Host plant: *Cedrus* (Peyerimhoff, 1919).

References. Peyerimhoff, 1919 (Biol.); Villiers, 1946 (I fig., Biol.).

Phymatodes testaceus (Linnaeus)

Illustrated descriptions of the immature stages and a biological account of this species have recently been published (Duffy, 1953a).

Distribution. PALAEARCTIC REGION: Algeria, Morocco, Tunisia.

Mature larva. See key, p. 19.

Pupa. See key, p. 41.

Additional references. Caillol, 1914 (Biol.); Duffy, 1953c (L fig., Biol.); Mühlmann, 1954 (Biol.); Seurat, 1900 (L fig., Biol. fig.); Villiers, 1946 (I fig., Biol.).

Phymatodes glabratus (Charpentier)

Distribution. PALAEARCTIC REGION: Algeria.

Mature larva. No material available. For generic characters see key, p. 19.

Host plants: *Juniperus thurifera* (Peyerimhoff, 1915); *J. oxycedrus*, *Cupressus* sp. (Villiers, 1946); *Castanea*? (Mendizabal, 1943).

Biology. Adults may be found from April to October.

References. Caillol, 1914 (Biol.); Marmottan, 1868 (Biol.); Mendizabal, 1943 (Biol.); Peyerimhoff, 1915 (Biol.); Villiers, 1946 (I fig., Biol.); Xambeu, 1890 (L, P, Biol.).

Phymatodes lividus (Rossi)

An account of the biology of this species has recently been published (Duffy, 1953a).

Distribution. PALAEARCTIC REGION: Algeria, Morocco.

Mature larva. No material available. For generic characters see key, p. 19.

Additional references. Caillol, 1914 (Biol.); Mühlmann, 1954 (Biol.); Villiers, 1946 (I, Biol.).

Rhopalopus insubricus (Germar)

Distribution. PALAEARCTIC REGION: Algeria.

Mature larva. No material available. Peyerimhoff (1919) states that this larva is remarkable in possessing a large pair of subcontiguous tubercles on sternite 6.

Host plants: *Acer obtusatum* (Altum, 1881). In Europe *Alnus* and *Fagus* are attacked (Villiers, 1946).

Biology. Larvae feed subcortically and apparently make perforations in the bark for the ejection of frass. Pupation takes place in the wood, the cell being of the "indirect" kind (see Duffy, 1953a, p. 44). Emergence begins at the end of May (Villiers, 1946).

References. Altum, 1881 (L fig., P fig., I fig., Biol. fig.); Caillol, 1914 (Biol.); Escherich, 1923 (Biol.); Mühlmann, 1954 (Biol.); Peyerimhoff, 1919 (Biol.); Plavil'shchikov, 1940 (Biol.); Villiers, 1946 (I fig., Biol.); Vité, 1953 (I fig., Biol.).

Clytini

Larval Characters

Form robust, contracted, rather strongly tapering but last two or three segments conspicuously enlarged. *Head* trapezoidal, slightly widened posteriorly. Gena hardly ever shouldered; setae present. One, two or three pairs of ocelli present. Labrum quadrate to transverse, fleshy. Mandible without a deep longitudinal impression on outer face. Hypostoma usually either rugose or longitudinally striate. Subfossal spine absent (except in certain North American species). Dorso-external process of palpifer much shorter than segment 3 of palp. *Prothorax* with distinct proalar plates

and short lateral setae; pronotum slightly inclined anteriorly; glabrous or velvety pubescent, seldom striate, although often longitudinally rugose; median cleavage line absent or impressed. Eusternum indistinct, marked by two round, glabrous, shining areas. *Abdomen* with ampullae broad, oval, flat and with two lateral and one transverse impressions (often indistinct). Pleural discs indistinct, sometimes reticulate. *Legs* absent or very small; femur wider than long.

Clytus ambigenus Chevrolat

Distribution. PALAEARCTIC REGION: Algeria.

Mature larva. No material available. For generic characters see key, p. 21.

Host plants: *Quercus ilex*, *Q. mirbecki*.

References. Villiers, 1946 (I fig., Biol.).

Plagionotus arcuatus (Linnaeus)

Descriptions of the immature stages and an account of the biology of this species have already been published (Duffy, 1953a).

Distribution. PALAEARCTIC REGION: Algeria, Morocco, Tunisia.

Mature larva. See key, p. 20.

Pupa. See key, p. 40.

Host plants: *Quercus ilex*, *Q. suber*, *Q. mirbecki* (Villiers, 1946).

Additional references. Caillol, 1914 (Biol.); Mühlmann, 1954 (Biol.); Scheidter, 1926 (Biol.); Seurat, 1900 (Biol. fig.); Villiers, 1946 (I fig., Biol.).

Plagionotus scalaris (Brullé)

Distribution. PALAEARCTIC REGION: Morocco, Tunisia.

Mature larva. No material available. For generic characters see key, p. 20.

Host plants: *Malva silvestris*, *Lavatera stenopetala*.

Biology. Infestation occurs only in roots, adults emerge in May.

References. Villiers, 1946 (I fig., Biol.).

Xylotrechus oculicollis Fairmaire

Distribution. ETHIOPIAN REGION: Tanganyika.

Mature larva. Similar to that of *X. arvicola*, from which it differs by the character given in the key, p. 22.

Host plant: *Trachylobium* sp. (J.C.M.G.).

Biology. The larval galleries in *Trachylobium* are about one inch deep in the sapwood, there being no subcortical galleries. The pupal cell is parallel to the longitudinal axis of the stem and the emergence hole is circular.

One log had previously been dipped in Gammexane two days after felling, but this treatment did not apparently prevent successful oviposition (J.C.M.G.).

Material studied. 4 L, 1 I, Tanganyika, Mashi, 1954, from *Trachylobium* poles, J.C.M.G. leg., in coll. B.M.

References. None available.

Xylotrechus arvicola (Olivier)

Distribution. PALAEARCTIC REGION: Algeria, Morocco.

Mature larva. Similar to that of *Chlorophorus carinatus* Aurivillius, from which it may be distinguished by the micro-granulate pronotum.

Host plants: *Populus tremula, Tilia, Morus* (Perris, 1877); *Sorbus terminalis, Crataegus, Quercus, Cydonia vulgaris* (Villiers, 1946); *Prunus cerasus.*

Biology. Adults appear in June on flowers.

Material studied. 5 L, Germany, Schladebach, xii.1949, from *Prunus cerasus*, Haal leg., in coll. F.I.E.

References. Caillol, 1914 (Biol.); Mühlmann, 1954 (Biol.); Perris, 1877 (Biol.); Villiers, 1946 (I fig., Biol.); Xambeu, 1898 (P, Biol.).

Xylotrechus antilope (Schönhauer)

Distribution. PALAEARCTIC REGION: Algeria, Morocco, Tunisia.

Mature larva. No material available. For generic characters see key, p. 20.

Host plant: *Quercus suber* (Rungs, 1937).

Biology. Adults copulate during the hottest part of the day on the side of the tree exposed to the sun and oviposition starts six to eight days later. Eggs are laid three to four at a time in cracks or rough places in the bark. Pupation takes place in the young wood (Rungs, 1937).

Economic importance. In Morocco damage to infested *Quercus* has been considerable, as the galleries penetrate the heartwood.

References. Mühlmann, 1954 (Biol.); Plavil'shchikov, 1940 (Biol.); Rungs, 1937 (Biol.); Villiers, 1946 (I fig., Biol.); Xambeu, 1898–1902 (Biol.).

Xylotrechus fragilis Jordan

Distribution. ETHIOPIAN REGION: Cameroons, Gold Coast.

Host plant: *Cistanthera papaverifer* (G.H.T.).

References. None available.

Anaglyptus gibbosus Fabricius

Distribution. PALAEARCTIC REGION: Algeria, Morocco.

Mature larva. No material available. For generic characters see key, p. 20.

Host plants: *Sorbus aria, Crataegus laciniata, Ilex aquifolium, Acer obtusatum.*

Biology. Adults assemble on flowers, especially those of *Crataegus*, in June.

References. Caillol, 1914 (Biol.); Villiers, 1946 (I fig., Biol.).

Chlorophorus carinatus Aurivillius

Distribution. ETHIOPIAN REGION: Kenya, Uganda.

Mature larva. Length up to 21 mm.; maximum breadth (at prothorax) 5·2 mm. *Head* subtrapezoidal, with sides almost straight, slightly diverging posteriorly (maximum head-width 3·2 mm.). Gena somewhat shouldered, pale, smooth, bearing several fine setae. Frons smooth, pale testaceous, with a transverse row of fine setae near

front margin. Mouthframe rather strongly sclerotised, ferruginous; sclerotisation complete beneath antenna and enclosing ocellus. Antenna with segment 3 cylindrical, about four times as long as broad and slightly more than half length of segment 2; supplementary process very short. Labrum semicircular, fringed with fine silky setae. One pair of ocelli present; lens round, protuberant; pigmented spot rather indistinct. Hypostoma testaceous, with front margin broadly ferruginous and rugose (mainly transversely) and bearing a few fine setae; sutures slightly curved, ferruginous. Gula rather broad, distinctly raised. Maxilla with segment 3 of palp as long as segment 2; dorso-external process of palpifer much shorter than segment 3 of palp. Labial palpi with segments 1 and 2 equal in length. *Prothorax* orange-testaceous anteriorly; rather coarsely longitudinally striate posteriorly; median cleavage line deeply impressed. Eusternum with a pair of paramedian, oval, glabrous, shining areas. *Abdomen* with dorsal ampullae extremely finely micro-granulate. Anal lobes sparsely setose. Pleural discs indistinct. *Legs* minute, about as long as segment 3 of maxillary palp. *Spiracles* with peritreme rather broadly oval, thin and pale.

As the comparative length of the legs of this larva is rather difficult to estimate (couplet 41 of key), the key has been constructed so as to make identification possible by using alternative characters (couplets 42 and 45).

Host plants: *Theobroma* (Ritchie, 1936); *Acacia mollissima, A. melanoxylon, A. decurrens, Allophylus abyssinicus, Cupressus lusitanica, C. benthami, Dombeya mastersi, Eucalyptus microcorys, Fagaropsis angolensis, Hagenia* sp., *Juniperus* sp., *Lagunaria patersoni, Pinus radiata, P. halepensis, Podocarpus milanjianus, Premna maxima* (J.C.M.G.).

Biology. According to Gardner and Evans (1953) this species attacks dying trees and felled logs of many species and is very common in cypress. The larva makes tortuous galleries under bark (Pl. IV, fig. 3) and later pupates within an inch of the external surface of the wood. In poles, penetration is sometimes quite deep.

Material studied. 20 L, 3 I, Kenya, Muguga, 1953, from *Acacia mollissima,* J.C.M.G. leg., in coll. B.M.

References. Gardner and Evans, 1953 (L, Biol.); Mühlmann, 1954 (Biol.); Ritchie, 1936 (Biol.).

Chlorophorus pilosus (Förster)

Distribution. PALAEARCTIC REGION: Algeria, Morocco, Tunisia.

Mature larva. No material available. For generic characters see key, p. 20.

Host plants: *Acer obtusatum* (Villiers, 1946); *Vitis* (Carpentier, 1878); *Diospyros, Acer pseudoplatanus* (Waterhouse, 1875); *Juglans* (Mendizabal, 1943).

Biology. Adults emerge in June and may sometimes be found on flowers.

Parasites. Hymenoptera: *Pristaulacus chlapovskii* Kieff (Lichtenstein and Picard, 1918); *Doryctes leucogaster* Nees (Lichtenstein and Picard, 1919).

Economic importance. This species has been reported to have attacked dry oak wood in France (Benoit and Jacquiot, 1953).

References. Benoit and Jacquiot, 1953 (Biol.); Carpentier, 1878 (Biol.); Duffy, 1953a (Biol.); Lichtenstein and Picard, 1918 (Paras.), 1919 (Paras.); Mendizabal, 1943 (Biol.); Perris, 1877 (L fig., P, Biol.); Romand, 1846 (Biol.); Villiers, 1946 (I fig., (Biol.); Waterhouse, 1875 (L, Biol.); Xambeu, 1898–1902 (E, L, P, Biol.).

Chlorophorus deterrens (Pascoe)

Distribution. ETHIOPIAN REGION: Kenya.
Mature larva. No material available. For generic characters see key, p. 20.
Host plant: *Acacia* (J.C.M.G.).
References. None available.

Chlorophorus capensis Castelnau and Gory

Distribution. ETHIOPIAN REGION: Kenya and South Africa.
Mature larva. No material available. For generic characters see key, p. 20.
Host plant: *Acacia* (J.C.M.G.).
References. None available.

Chlorophorus varius Müller (=**verbasci** (Linnaeus))

Distribution. PALAEARCTIC REGION: Egypt.
Mature larva. No material available. For generic characters see key, p. 20.
Egg. Length 1 mm.; breadth 0·3 mm. Form broadly elongate. Chorion creamy white (El Zoheiry, 1950).

Host plants: *Vitis vinifera, Ficus, Malus pumila, Sesbania aculeata, S. aegyptiaca, Prunus persica, P. armeniaca, Pyrus malus, Robinia, Morus* (El Zoheiry, 1950); *Castanea* (Perris, 1877).

Biology. The eggs are deposited singly in cracks or crevices beneath the bark. The incubation period has proved to be seven to ten days. In the course of excavating their galleries, the larvae tunnel through the pith and later, when about to pupate, they construct a cell by building up a barrier of frass.

These excavations loosen the bark, which peels readily, thus allowing moisture and mould to reach the wood. Under laboratory conditions pupation occurred in late April and adults emerged in May, but in the field the emergence period was from April to July. Copulation between paired adults bred in the laboratory took place one day after emergence and continued from two to five days, being repeated five to eight times a day. Each act lasted from twenty to ninety minutes. The adult longevity of males was fifteen days and that of the females thirteen to fifteen days. Oviposition began three to six days after the last act of copulation. Adults are frequently to be found congregating on flowers of Umbelliferae (*Ammi* spp.) (El Zoheiry, 1950).

Economic importance. Chlorophorus varius Müller has for some time been a recognised secondary pest of various orchard trees, but only comparatively recently (i.e. since 1946) has it been known to infest grape vines in many scattered plantations in Lower Egypt. In those areas, hedges of *Sesbania* are also attacked. Heavy infestation can be responsible for the death of trees.

Control. Experiments were carried out by injection of carbon bisulphide, benzine or orthodichlorobenzine into the wood of infested canes by using a syringe during the dormant period of the trees. Results of these experiments have shown that carbon bisulphide injections were harmless to the trees and killed 100 per cent of the larvae. Soaking of the infested parts with the same material, followed immediately by coating the part soaked with carbon bisulphide with a layer of moist earth, killed all the

larvae just under the bark. From 1 to 10 cm.^{3} were sufficient for treating an infested cane. Carbon bisulphide was not tested during the growing period.

Benzine was equally effective and was easily applicable in treating infested bases of pruned canes. It was also harmless to trees even when used during the growing period. Orthodichlorobenzine gave only a 75 per cent kill of larvae treated just under the bark. Larvae were killed in twenty-four hours by injection with carbon bisulphide or benzine. Direct contact with either of these chemicals, by the process of soaking, killed the larvae in four hours.

References. Caillol, 1914 (Biol.); El Zoheiry, 1950 (E fig., L fig., I fig., Biol. fig., Contr.); Mayet, 1890 (L, P, Biol.); Mühlmann, 1954 (Biol.); Perris, 1877 (L fig., P, Biol.); Petroff, 1920 (Biol.); Xambeu, 1898–1902 (L, P, Biol.).

Chlorophorus trifasciatus (Fabricius)

Distribution. PALAEARCTIC REGION: Algeria, Tunisia.

Mature larva. No material available. For generic characters see key, p. 20.

Host plant: *Ononis natrix.*

Biology. Adults assemble on flowers of Umbelliferae during May and June.

References. Caillol, 1914 (Biol.); Lucas, 1849 (Biol.); Villiers, 1946 (I fig., Biol.); Xambeu, 1898 (L, Biol.).

Chlorophorus sexguttatus (Lucas)

Distribution. PALAEARCTIC REGION: Algeria, Morocco.

Mature larva. No material available. For generic characters see key, p. 20.

Host plant: *Ebenus pinnata.*

Biology. Adults assemble on flowers during May and June.

References. Villiers, 1946 (I fig., Biol.).

Isotomus theresae Pic

Distribution. PALAEARCTIC REGION: Algeria, Tunisia.

Mature larva. No material available. For generic characters see key, p. 20.

Host plant: *Quercus mirbecki.*

References. Villiers, 1946 (I fig., Biol.).

Pseudomyrmecion ramalium Bedel

Distribution. PALAEARCTIC REGION: Algeria.

Host plant: *Quercus mirbecki.*

Biology. Adults occur from May to July, usually on dead branches. They are often found in the company of ants, which they superficially resemble.

References. Villiers, 1946 (I fig., Biol.).

Cleomenini

Dere sp.

Mature larva (fig. 106). Length up to 14 mm.; maximum breadth (at prothorax) 3·6 mm. *Head* not depressed; genae roundly narrowed up to mouthframe and bearing several rather long, fine, pale setae; maximum head-width 2·1 mm.; temples (behind ocellus) pale testaceous. Antenna with segment 2 twice as long as broad; segment 3

more than three times as long as broad and just over half length of segment 2; supplementary process conical, short, about one-fourth length of segment 3. Mandible with basal part ferruginous, apical part pitchy; longitudinal impression absent. Labrum transversely oval, fringed with pale setae. One pair of ocelli present; lens round, convex; pigmented spot rather indistinct. Hypostoma slightly rounded, smooth, glabrous, testaceous, with front margin ferruginous; sutures strongly incurved,

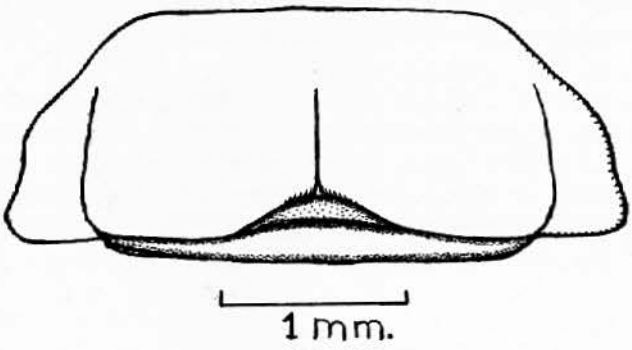


Fig. 106

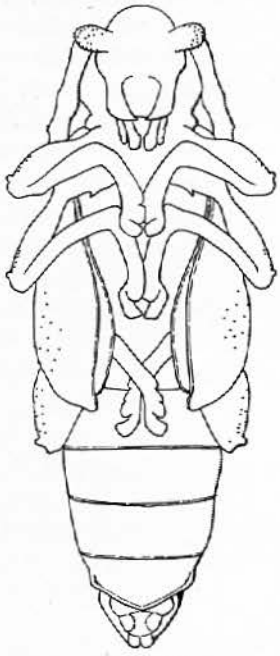


Fig. 107

Fig. 106. *Dere* sp. Mature larva. Prothorax. Dorsal aspect.
Fig. 107. *Dere* sp. Pupa. Ventral aspect.

ferruginous; gular sutures concave, distinct. Maxilla with segment 3 of palp cylindrical, almost as long as segment 2; dorso-external process of palpifer much shorter than segment 3 of palp. Labial palpi with segment 2 rather stout and almost as long as segment 1. *Prothorax* (fig. 106) with anterior area of pronotum darkly testaceous, feebly rugose, with a transverse row of fine pale setae across front margin; posterior area dull, micro-granulate; posterior margin strongly retracted medially, revealing a triangular skinfold ("prepostnotal fold"); median cleavage line exceptionally strongly impressed. Prosternum shining, coarsely rugose, except eusternum which is dull and micro-granulate. *Abdomen* with ampullae bearing two transverse furrows, the posterior one less distinct; median longitudinal furrow narrow, distinct; entire surface glabrous, dull, and densely micro-granulate. Pleural discs indistinct. *Legs* 2-segmented, pale, distinct but much shorter than maxillary palpi. *Spiracles* with peritreme rather broadly oval, thin, pale and without marginal chambers.

Pupa (fig. 107). Length 10–11·5 mm.; maximum breadth 3·2 mm. *Head* with

vertex visible from above, dome-shaped, smooth, glabrous; front smooth, glabrous. Antennae feebly clubbed, with all segments sparsely but conspicuously spiculate, straight, extending as far as abdominal segment 3, where they terminate between middle and hind femora. Eyes strongly convex, glabrous. Labrum triangular, glabrous. *Pronotum* elongate, with sides strongly rounded, disc with groups of short ferruginous spines (each with a basal seta) as figured. *Mesonotum* with a pair of minute lateral spines. *Metanotum* with about three small spines on each side of scutellar groove which is indistinct. Elytra and wings extending to abdominal segment 4. *Abdomen* with tergites 1–6 each with a transverse row of short spines (each with a basal seta). Tergite 7 elongate, with sides strongly converging posteriorly; median area produced into a pair of subcontiguous oval tuberculate protuberances, each bearing four to six stout spines. Tergite 8 bearing two to four stouter spines and with antero-median area very deeply excavate. Tergite 9 retracted in tergite 8. Sternites glabrous. Pleura moderately protuberant, longitudinally rugose and glabrous. *Legs* with femora and tibiae sparsely but conspicuously spiculate; hind femora extending nearly as far as abdominal segment 5 and lying parallel to longitudinal axis of body. *Functional spiracles* present on abdominal segments 1–6; peritreme rather narrowly oval, reniform, thin, pale and slightly raised above general level of cuticle.

Host plant: *Albizia gummifera.*

Biology. Oviposition takes place on dead trees. The larvae tunnel subcortically until mature and then enter the sapwood at right angles for a distance of 1 to 1½ inches to pupate. The pupal cell, which is elongate-oval, is in the plane of the wood fibres, with the prepupal tunnel entering dorsally; a calcareous operculum blocks the entrance. Emergence is affected through the prepupal tunnel during February (G.H.T.).

Material studied. 5 L, 7 P, 1 I, Gold Coast, 8.v.1947, from *Albizia gummifera*, G.H.T. leg., in coll. G.H.T.

Dere nigrita Gahan

Distribution. ETHIOPIAN REGION: Gold Coast, Transvaal.

Host plant: *Antiaris africana* (G.H.T.).

References. None available.

Zoocosmius viridicinctus Aurivillius

Distribution. ETHIOPIAN REGION: Belgian Congo, Gold Coast.

Host plants: *Albizia zygia, Piptadenia africana* (G.H.T.).

References. None available.

Apiogaster rufiventris Perroud

Distribution. French West Africa, Kenya.

Host plant: *Bosqueia* (J.C.M.G.).

References. None available.

Pteroplatini

Amphidesmus apicalis Westwood and **A. theorini** Aurivillius

Distribution. ETHIOPIAN REGION: Belgian Congo, Ivory Coast.

Host plants: *Baphia nitida, Bridelia micrantha, Ficus polita, F. exasperata, Musanga smithii, Vernonia confuta* (Jover, 1953).

References. Jover, 1953 (Biol.).

Stenaspini

Purpuricenus (=Philagathes) laetus Thomson

Distribution. ETHIOPIAN REGION: Belgian Congo, Natal, Rhodesia, Tanganyika, Uganda.

Economic importance. This species has been reported damaging peaches in South Africa (Gunn, 1916). Only ripening or ripened fruit are attacked. The beetle is likely to escape notice, as it has the habit of burrowing into the fruit until only the end of its abdomen is visible. It is sluggish when feeding and is not readily disturbed. Adults emerge from mid-December to mid-January. Nothing is known of the life-history.

Control. Adults may be easily caught and destroyed.

References. Evans, 1952 (Biol.); Gunn, 1916 (Biol., Contr.).

Purpuricenus barbarus Lucas

Distribution. PALAEARCTIC REGION: Algeria, Morocco, Tunisia.

Host plant: *Pistacia.*

Biology. Adults appear during May and June on flowers, especially those of *Carduus.*

References. Villiers, 1946 (I, Biol.).

Purpuricenus sexmaculatus Pic

Distribution. PALAEARCTIC REGION: Algeria, Morocco, Tunisia.

Host plant: *Quercus mirbecki* (Villiers, 1946).

Biology. Adults appear on flowers during May and June.

References. Villiers, 1946 (I fig., Biol.).

Eremoceras surcoufi Peyerimhoff

Distribution. PALAEARCTIC REGION: Algeria.

Host plant: *Calligonum comosum* (Villiers, 1946).

Biology. Adults emerge during July and are often taken at light.

References. Villiers, 1946 (I fig., Biol.).

7. LAMIINAE

Larval Characters

Head elongate (except *Sternotomis*), with sides parallel or converging posteriorly; dorsal margins of epicranial halves behind frons fused for their entire length; tentorial cross-arm internal, at right angles to hypostoma (i.e. occipital foramen not divided). Mandible elongate, with cutting edge oblique and apex rounded. Lower boundary of frons not produced over clypeus; six (occasionally more) epistomal setae present. Clypeus trapezoidal, wide, filling space between mandibles. Labrum transverse to cordate. Ocelli, if present, never more than two pairs (although there may be one to three vestigial ocelli comprising a pigmented spot without a distinct lens), usually one pair. Gula usually broad. Maxillae rigid (only movable from stipes), cardo,

maxillary articulating area and submentum fused and attached for entire distance between ventral articulations of mandibles; palpifer large, distinct, bearing lobe and with outer margin straight; process of palpifer absent. Antennae very short and retractile, 2- or 3-segmented. *Prothorax* having presternum and epipleurum usually distinctly separated; eusternum sometimes indistinct. Postnotal fold absent. *Abdomen* with region surrounding spiracle not protruding; epipleurum protuberant on from three to all segments; pleural discs absent; hypopleurum small; coxal lobe large. *Legs* absent or occasionally present, but then vestigial. *Spiracles* of mesothorax protruding into prothorax.

Dorcadionini

Larval Characters

Head with antennae 3-segmented. *Abdomen* with pleural tubercles each with a pair of distinct sclerotised pits. Tergite 9 unarmed. Anus a transverse cleft.

Dorcadion atlantis Bedel

Distribution. PALAEARCTIC REGION: Morocco.

Mature larva. The following description is based on an unknown species of *Dorcadion*. Length up to 20 mm.; maximum breadth (at prothorax) 6 mm. *Head* elongate, moderately depressed, widest at anterior third, sides feebly constricted at middle, slightly converging posteriorly; frontal sutures indistinct; antennal foramen closed behind; mouthframe moderately strongly sclerotised, ferruginous. Frons broadly ferruginous, smooth, with eight setiferous pores; six epistomal setae present. One pair of ocelli present; ocellar lens round, flat; pigmented spot partly obscured by sclerotisation of gena. Hypostoma flat, mainly testaceous, sutures distinct, incurved; gular region undefined. Antenna 3-segmented. Maxilla with palpal segment 3 elongate, as long as segment 2. Labial palpi with segment 2 cylindrical, about half length of segment 1. Mentum distinct from submentum. *Prothorax* with pronotum pale testaceous and bearing scattered reddish setae which are more numerous across front margin; posterior area sparsely setose, feebly rugose, shining and non-spiculate. Prosternum with eusternum distinct; triangular and bearing several reddish setae, sternellum glabrous. *Abdomen* with each dorsal ampulla bearing two distinct transverse furrows which are very feebly tuberculate externally. Tergite 9 unarmed. Epipleurum slightly protuberant on all segments; pleural tubercles bearing several long, fine setae and each with a pair of distinct, sclerotised pits. Anus a transverse cleft. *Spiracles* broadly oval, without marginal chambers.

Biology. Adults emerge during April and May. Larvae of *Dorcadion* species are subterranean, feeding on roots of various herbaceous plants (Villiers, 1946).

Material studied. 4 L (*Dorcadion* sp.), Turkey, Ushak, in beet-fields, P. Steiner leg., in coll. F.I.E. and B.M.

References. Mayet, 1882 (Biol.); Villiers, 1946 (I fig., Biol.).

Parmenini

Parmena pubescens (Dalman), s. sp. **algirica** Castelnau

Distribution. PALAEARCTIC REGION: Algeria, Morocco, Tunisia.

Mature larva. The larva of this species is not available, but it should be essentially

similar to that of an unknown European species (fig. 108) which is here described. Length up to 13 mm.; breadth (at prothorax) 3·1 mm. *Head* slightly elongate, moderately depressed, widest at anterior third, sides feebly constricted at middle and slightly converging posteriorly. Antennal foramen narrowly open posteriorly; mouthframe strongly sclerotised, ferruginous. Frons entirely ferruginous, micro-granulate, with a row of eight setiferous pores; six epistomal setae present. One pair of ocelli present; lens round, flat; pigmented spot large, very distinct. Hypostoma flat, ferruginous, conspicuously micro-granulate; gular region a pale median line. Antenna 3-segmented; supplementary process as long as segment 3. Maxilla with segment 3 of palp elongate, longer than segment 2. Labial palpi with segment 2 at least as long as segment 1. Mentum distinct from submentum. *Prothorax* with pronotum pale

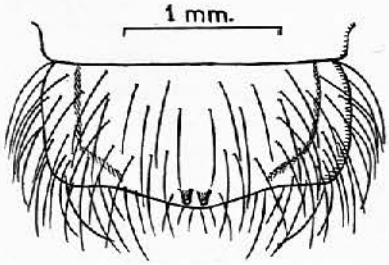


Fig. 108. *Parmena* sp. Mature larva. Abdominal segment 9. Dorsal aspect.

testaceous, faintly micro-granulate posteriorly. *Abdomen* with each dorsal ampulla bearing two transverse furrows bordered with moniliform tubercles. Tergite 9 with a pair of paramedian, elongate, sclerotised tubercles (fig. 108). Epipleurum slightly protuberant on all segments. Pleural tubercles without sclerotised pits. Anus trilobate, the lobes micro-granulate and setose. *Spiracles* with peritreme round, thick, testaceous, with about eight subcontiguous marginal chambers on posterior half.

Host plants: *Ferula communis* (Peyerimhoff, 1911); *Nerium oleander* (Villiers, 1946).

Biology. Larvae infest thick dead stems of herbaceous plants. Adults appear in May and are to be found beneath stones.

Material studied. 10 L (*Parmena* sp.), Mustapha, i.1893, in stems of *Ferula*, in coll. H.N.P.

References. Peyerimhoff, 1911 (Biol.); Rambur, 1838 (Biol.); Schiödte, 1876 (L fig.); Villiers, 1946 (I fig., Biol.).

Morimopsini

See p. 233.

Phrissomini

Falsovelleda congolensis (Hintz)

Distribution. ETHIOPIAN REGION: Belgian Congo, Gold Coast.

Mature larva. Form elongate, very slender, subcylindrical. Length up to 10·05 mm.; maximum breadth (at prothorax) 2·6 mm. *Head* slightly depressed, strongly elongate, with sides subparallel (maximum head-width 1·8 mm.); frontal sutures indistinct; antennal foramen closed behind; mouthframe rather narrowly and feebly sclerotised; six epistomal setae present. Mandible slender, about twice as long as basal

width, basal part micro-granulate and with two fine setae on outer face. Ocelli indiscernible. Hypostoma testaceous, glabrous; sutures pale, straight, subparallel. Gula indiscernible. Antenna minute, strongly retracted, 2-segmented, segment 2 bearing a stout, conical, hyaline process. Labrum strongly transverse, densely fringed with pale setae; ventral mouthparts feebly sclerotised. Maxilla with palpal segment 3 elongate, longer than segment 2. Mentum distinct from submentum. *Prothorax* with anterior part of pronotum finely rugose, micro-granulate, sparsely setose and testaceous; posterior area slightly raised, milky white, shining and longitudinally striate. *Mesonotum* and *metanotum* granulate, sparsely setose. Proeusternum slightly raised, milky white, shining and longitudinally striate. *Abdomen* with dorsal ampullae on segments 1–3 oval, with median furrow narrow; ampullae on segments 4–7 each comprising a pair of distinctly separated round, fleshy protuberances, the median furrow very broad; all ampullae glabrous, micro-granulate, shining. Tergite 9 bearing a minute spine which is inclined in a posterior direction. Anus trilobed, the dorsal lobe slightly protuberant. Epipleurum more strongly protuberant on last three segments. Pleural tubercle round, very strongly convex; sclerotised pits absent. *Legs* absent. *Spiracles* with peritreme round, pale and with marginal chambers.

Pupa. Length 9 mm.; maximum breadth 2·2 mm. *Head* with vertex entirely visible from above, shallowly excavated and with about eight fine setae around inner margin of each antennal base; front with a seta near inner margin of each eye and a group of four setae above clypeus. Clypeus with a shallow, transverse impression and bearing four setae. Antennae extending nearly to abdominal segment 3, where they are recurved ventrally to form a single almost complete coil which terminates near front coxae. Eyes flat, glabrous. Mandibles each with a pair of fine setae on outer face. *Pronotum* bluntly tuberculate laterally; disc with several scattered fine pale setae. *Mesonotum* and *metanotum* sparsely setose. Elytra and wings extending to abdominal segment 4. *Abdomen* with tergites 1–6 each densely micro-granulate and bearing two to three pairs of long fine setae only. Tergites 7 and 8 with numerous scattered similar setae. Tergite 9 with posterior margin bearing a long vertical median spine, below which on each side is a row of five to six slightly shorter, inwardly curved spines. Sternites each with two to three pairs of pale sublateral setae. *Legs* each with a transverse row of long fine setae near apex of each femur; tibiae each with a row of six to eight similar setae; tarsi each with a pair of setae on basal segment and also a pair on claws; middle and hind femora each with an acutely pointed, tuberculate process near base; all femora and tibiae placed at right angles to longitudinal axis of body. *Functional spiracles* present on abdominal segments 1–5; peritreme oval, pale and slightly raised above general level of cuticle.

Host plant: *Cola* sp.

Biology. G. H. Thompson has made the following observations. Numerous adults were seen cutting egg-niches in the bark of a small tree killed by basal fire. This lamiid greatly resembles a certain species of ant in superficial appearance. It also runs very rapidly, seldom taking to flight.

Material studied. 12 L, 2 P, 2 I, Gold Coast, 1946, from *Cola* sp., G.H.T. leg., in coll. G.H.T.

References. None available.

Ocullariini

Ocularia brunnea Jordan

Distribution. ETHIOPIAN REGION: French Equatorial Africa, Uganda.

Mature larva. Very similar to that of *Falsovelleda congolensis* (Hintz), from which it differs mainly in having a 2-segmented palp and non-protuberant ampullae. No characters relating to the Prosopocerini are evident in the larval stage.

Host plant: *Celtis soyauxii* (J.C.M.G.).

Material studied. 1 L, Uganda, from *Celtis soyauxii*, J.C.M.G. leg., in coll. B.M.

References. None available.

Ocularia ashantica Breuning

Distribution. ETHIOPIAN REGION: Gold Coast.

Host plant: *Cola caricifolia* (G.H.T.).

References. None available.

Ocularia grisescens Breuning

Distribution. ETHIOPIAN REGION: Uganda.

Host plant: *Celtis durandi* (J.C.M.G.).

References. None available.

Monochamini

Breuning (1943), in his tribal revision, has placed both the Monochamini and the Lamiini in the tribe Agniini. For the purposes of the present study, however, the first two tribes have been dealt with separately as the larvae of the Monochamini are readily distinguishable from those of the Lamiini.

Larval Characters

Head depressed; antenna 2- or 3-segmented; antennal foramen closed behind. One pair of ocelli present. Gula distinct, protuberant. *Prothorax* with posterior area of pronotum finely velvety pubescent or spiculate. *Abdomen* with dorsal ampullae with two distinct transverse furrows, and four transverse rows of tubercles, which are usually spiculate. Epipleurum strongly protuberant on all segments, except sometimes the first two. *Spiracles* without marginal chambers.

Anthores (=Herpetophygas) leuconotus Pascoe (=fasciatus Fåhraeus)

[The White Stem Coffee Borer]

Breuning (1943) regards *Anthores* as a synonym of *Monochamus*. The larvae of these two genera, however, are quite distinct, as the antenna is 2-segmented in the former and 3-segmented in the latter.

Distribution. ETHIOPIAN REGION: throughout Central, East and South Africa, especially Angola, Belgian Congo, Cameroons, Kenya, Mozambique, Natal, Northern Rhodesia, Nyasaland, Southern Rhodesia, Tanganyika, Transvaal, Uganda and Zanzibar. Apparently not yet established in West Africa. According to Kolbe (1897) this species was first found in 1877 in *Coffea* in Zanzibar.

Adult (fig. 109). Length 17–32 mm. Colour entirely dark brown, except for apical segments of antennae and an extensive area of dense white pubescence on elytra. *Head* deeply excavate between antennal tubercles; male antennae twice as long as body, female antennae slightly longer than body; segment 1 with a distinct apical cicatrix. *Prothorax* slightly transverse and bearing laterally a pair of spine-like tubercles; disc with a pair of paramedian tubercles near middle. *Elytra* densely pubescent; base bearing numerous moniliform granules and a pair of rounded tubercles near scutellum.

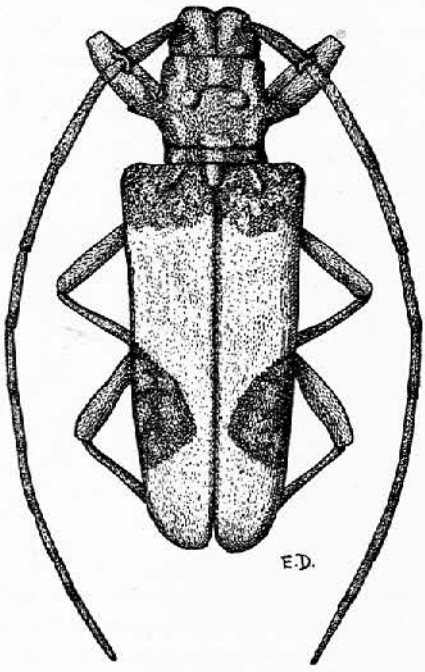


Fig. 109. *Anthores leuconotus* Pascoe. Adult.

Mature larva (fig. 110). Form elongate, rather slender, slightly depressed. Length up to 50 mm.; maximum breadth (at prothorax) 11 mm. *Head* strongly depressed, slightly wider before middle and slightly constricted behind middle (maximum head-width 4·9 mm.); frontal sutures indistinct; antennal foramen closed behind; mouth-frame very strongly and broadly sclerotised, with the dorsal transverse, ferruginous band broader than length of clypeus. Epistoma with six setae. Mandibles slender, about twice as long as basal width, cutting edge broadly emarginate. One pair of ocelli present; lens small, round, corneous; pigmented spot indistinct. Hypostoma ferruginous, with front margin narrowly pitchy and delimited by one or more transverse striae from which arise a few coarse setae; sutures pitchy, feebly incurved. Gular sutures indistinct. Antenna minute, 2-segmented; segment 2 bearing a large, tapering, hyaline process and about six much smaller similar processes. Labrum transversely oval and densely setose anteriorly. Ventral mouthparts with strongly sclerotised, ferruginous areas. Maxilla with segment 3 of palp acutely conical, as long as segment 2. Labial palpi with segment 2 cylindrical, about half length of segment 1. Mentum distinct from submentum, about two and one-half times as wide as long. *Prothorax* (fig. 110) depressed, rectangular; posterior area of pronotum broadly velvety spiculate (spotted with lenticulate setal pores), anterior to which is a small pair of isolated, sublateral, spiculate areas. *Mesonotum* and *metanotum* rugose, devoid of spicules or pubescence but bearing scattered, coarse, reddish setae. Prosternum with numerous lenticulate depressions laterally; eusternum distinctly triangular, with similar lenticulate depressions laterally; sternellum narrowly transverse and densely spiculate. *Abdomen* with each dorsal ampulla with two distinct transverse furrows and four rows of rather feebly defined, moniliform, contiguous tubercles which are partly micro-spiculate. Ventral ampullae with two rows of tubercles. Segment 9 without a sclerotised process. Anus trilobed, the dorsal lobe bearing three to six long,

coarse, reddish setae. Epipleurum protuberant on all segments. Pleural tubercle elongate, with a distinct sclerotised pit at each extremity and bearing a pair of long, coarse setae. *Legs* vestigial, each consisting of a minute setose tubercle. *Spiracles* with peritreme rather broadly oval and without marginal chambers.

Pupa (fig. 111). Length up to 27 mm.; maximum breadth 7·2 mm. *Head* with vertex almost entirely visible from above, very deeply excavated and bearing several

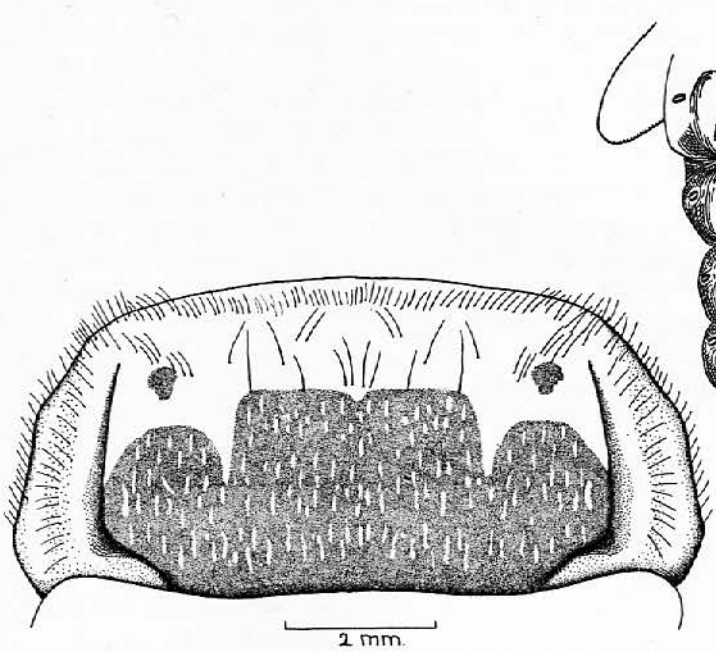


Fig. 110

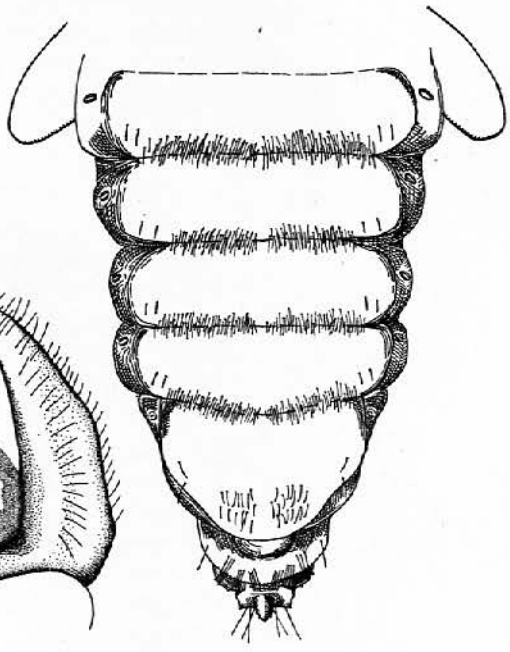


Fig. 111

Fig. 110. *Anthores leuconotus* Pascoe. Mature larva. Prothorax. Dorsal aspect.
Fig. 111. *Anthores leuconotus* Pascoe. Pupa. Posterior part of abdomen. Dorsal aspect.

stout setae around bases of antennal tubercles; front with a transverse row of long, stout setae; base of clypeus with similar setae. Antennae extending to between abdominal segments 2 and 3, where they are strongly incurved and each arranged in a single coil on top of each elytron. Eyes feebly convex, glabrous. Mandibles each with two to three stout setae near middle of outer face. Labrum bearing at least fifteen stout setae along front and lateral margins. *Pronotum* strongly tuberculate laterally; several scattered setae present, especially around lateral margins. *Mesonotum* smooth, with two oblique rows of similar setae; scutellum slightly protuberant. *Metanotum* with a pair of converging rows of similar setae. Elytra and wings extending to between abdominal segments 4 and 5. *Abdomen* with tergites 1–6 with a transverse band (interrupted medially) of closely set, long, fine setae on posterior half. Tergite 7 subquadrate, slightly tapering posteriorly and bearing a group of setae near hind margin. Tergite 8 very short, transverse, with a row of setae across hind margin. Segment 9 short and produced dorsally into a long, vertical, spine-like process which is

sclerotised apically; ventrally it is deeply divided and spinose. Sternites glabrous or almost so. Pleura scarcely protuberant. *Legs* with a transverse row of short, stout setae near apex of each femur; mid and hind femora each with a blunt tuberculate process near base; hind femora extending to abdominal segment 4; tibiae placed obliquely to longitudinal axis of body. *Functional spiracles* present on segments 1–6, with a vestigial pair on segment 7; peritreme oval, moderately thick and slightly raised above general level of cuticle.

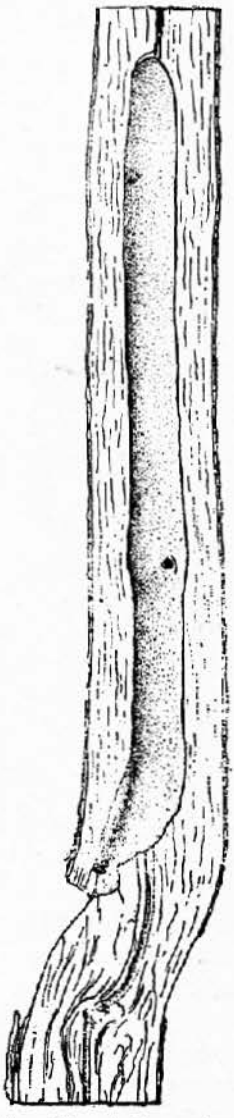


Fig. 112. *Anthores leuconotus* Pascoe. Larval gallery in *Coffea*. (Morstatt, 1912)

Egg. Length 5·5 mm.; breadth 2 mm. Creamy white and rather attenuated at posterior pole (Knight, 1939).

Host plants: *Coffea* (all species), but especially *C. arabica*. Also in the following wild host plants: *Oxyanthus speciosus*, *Randia* sp., *Pavetta oliveriana*, *Rytigynia schumanii* (Davies, 1937, Lepesme and Villiers, 1944); *Gardenia urcelliformis*, *Vangueria linearisepala*, *Canthium* sp.? (Knight, 1939); *Erythroxylon emarginatum* (Smee, 1936).

Biology. Oviposition generally occurs on the main stem above ground-level, sometimes quite high up and even on the primaries. Eggs are inserted under the bark, the posterior pole uppermost. The only external sign of the presence of an egg is a minute depression (usually made horizontally) in the bark about 1·5–2 mm. by 1 mm., in which is a dark brown, shiny secretion which seals the egg cavity. The incubation period is apparently less than ten days. Upon emerging, the young larva tunnels subcortically and about thirty days later minute wooden shavings may be seen protruding from the egg cavities. For at least the next two months boring is rather slow, the larva averaging only about a quarter of an inch a day. It usually descends spirally towards the roots. At the base of the stem, where the wood is hard, a larva may travel as much as 18 to 20 inches before penetrating the wood. When the larva is three or four months old, penetration usually takes place under a primary root where this joins the main stem. For the next twenty months or so the larva slowly tunnels upwards (Pl. I, fig. 2). Periodically it constructs frass-ejection holes by diverting its tunnel to the bark which is eaten. Larvae have been found as much as 2 inches away from these holes, to which they presumably return. Before pupation the terminus of the gallery (fig. 112) is enlarged, so that only a thin layer of wood remains under the bark to facilitate the emergence of the adult. This forms the pupal cell and it is barricaded off from the larval gallery by a wad of coarse wooden shavings (Knight, 1939). According to Wilkinson (1929), the pupal period lasts from thirty-eight to forty-two days, but Moffat and Allan (1934) state that it is probably only twenty to

thirty days. Emergence occurs during the rains. In Northern Rhodesia it is from mid-November to mid-December and oviposition from 20th December until mid-February. The following table (Table IV, Knight, 1939) shows the number of adults on an estate in the Makuyu district during the rainy seasons from 1935 to 1938.

TABLE IV

Year	*March–April–May Rains*	*November–December Rains*
1935	846	401
1936	1,242	220[1]
1937	5,336	649
1938	816	—

[1]Rainfall below average.

The weekly rainfall and captures of adult beetles on an estate during the long rains in 1937 is shown in Table V (Knight, 1939).

TABLE V

Week Ending	*Rainfall in Inches*	*Beetles Collected*
3rd April	2·60	—
10th April	2·55	902
17th April	3·12	1,772
24th April	2·03	1,026
1st May	0·81	440
8th May	0·00	225
15th May	1·40	21
22nd May	1·85	20

Adults do not fly readily, and if molested they usually drop to the ground and remain motionless. They are most active in bright sunlight. Feeding consists of nibbling young tender shoots or the skin of green coffee berries. Ten females confined on a mature coffee tree laid a total of forty eggs in four days. Copulation may take up to one and one-half hours to complete. Male specimens are very pugnacious amongst themselves. The duration of the life-cycle is at least two years (Knight, 1939; Mayné, 1923; Moffat and Allan, 1934).

Parasites. Hymenoptera: *Iphiaulax varipalpis* Cary. The eggs of this braconid are deposited singly in the larval galleries and the emerging larvae travel along until they reach young larvae of their host on which they are ectoparasitic (Knight, 1939).

Predators. The ant *Odontomachus haematodes* devours larvae in their galleries (Warburg, 1895; Mayné, 1923).

Natural enemies. According to Knight (1939), considerable numbers of larvae are destroyed by woodpeckers.

Economic importance. This species is a major pest in most coffee-growing districts, particularly those of low altitudes (i.e. below 4,500 feet). In Northern Rhodesia, however, serious damage has been caused at altitudes up to 5,400 feet (Moffat and Allan, 1934). Healthy trees are seldom attacked, excepting, apparently, in Tanganyika; neither are those in very poor condition. Hence the coffee most severely attacked is that growing in poor, eroded or otherwise impoverished soil. Usually only trees with rough bark are selected for oviposition. According to Ritchie (1936) this species is not likely to become so serious a pest in north-western Tanganyika as it is in Kilimanjaro as, owing to the higher rainfall, oviposition takes place well above ground-level.

An indication of the severity of attack by this species has been given by Davies (1937) as follows:

TABLE VI

Period of Operations	*No. of Adults Caught*	*No. of Larvae Extracted*
During part of first year ..	5,014	41,397
During whole of second year ..	5,482	12,592
During whole of third year ..	513	5,076
During part of fourth year ..	28	390

These figures are from a census of a block of 31,000 coffee trees. It appears that after several consecutive seasons of attack, the host plant rapidly dies, but if the attacks are not renewed, fresh roots may be formed and the plant may recover or other insects or fungi may attack the tree through the larval galleries and thus cause its death.

Control. Suggested measures include cultural practices to improve the condition of the soil and plants. In experiments, tar-distillate emulsions and a mixture of 5 lb. lime and $1\frac{1}{4}$ lb. sodium hydroxide in 6 gallons of water were painted on the upper stems as repellents, but these proved totally ineffective. The larva is particularly vulnerable when it is feeding in the bark and at this stage the bark should be rubbed vigorously with some rough material such as hessian cloth; this will reveal the larval gallery and any larvae can then easily be located and destroyed. This should be done about three or four months after the oviposition period (August–September and March–April). Only the lower 9–12 inches of the stem need be treated, as eggs are mostly laid at ground-level. In the case of the larvae which have already entered the sapwood, a different procedure is necessary. First, the soil should be removed from around the roots near the stem, making an inverted cone-shaped depression about 9 inches deep. After about three days of this exposure, many of the larvae will have ejected frass from their borings by which their presence is revealed. They may then be removed by means of a hooked wire. As soon as this is done, the soil should be replaced so that future oviposition may not occur below ground-level. The hand collection of adult beetles by children is also considered of great value. On one estate, nearly 6,000 beetles were caught in one season (Knight, 1939).

Davies (1937) maintains that it is important that the exact period of adult emergence should be known in each district so that hand-grubbing operations may start at a time so related to this period that the resulting larvae will be of sufficient size to be detected by the inspectors. For example, if the adult flight occurs in May, grubbing should start from September onwards. This author also suggests the removal and destruction of all wild host plants when growing in close proximity to coffee plantations.

According to Smee (1932), larvae of this species are not killed if infested coffee bushes are merely uprooted and discarded; in fact, beetles have been reared in captivity from eggs laid in portions of stems having no roots or foliage. Fiedler (1950) has recently described a control method that has proved effective against larvae and pupae of this species. It consists of injecting Xylamon into the larval galleries with a syringe, the entrances then being sealed with clay. About 1 cc. should be squirted as far into the gallery as possible. This fluid has no adverse effect on the tree.

Material studied. 1 L, Tanganyika, 1951, from *Coffea*, R. C. H. Sweeney leg., in coll. B.M.; 5 L, Kenya, Makuyu, 27.viii.1937, from *Coffea*, C. D. Knight leg., in coll. B.M.; 1 L, 2 P, Belgian Congo, 1913, from *Coffea arabica*, R. Mayné leg., in coll. B.M.; 20 L, 20 P, Belgian Congo, Limba, from *Coffea*, R. Mayné leg., in coll. M.R.B.C.

References.[1] Anderson, 1914 (Biol.), 1921 (Biol., Contr.); Aulmann and la Baume, 1911 (L fig., P fig., Biol. fig., Contr.); Bredo, 1939 (I fig., Biol.); Chevalier, 1947 (Biol.); Davies, 1937 (Biol., Contr.); Distant, 1904 (Biol.); Evans, 1952 (Biol.); Fiedler, 1950 (Biol., Contr.); Gardner, 1934 (L); Knight, 1939 (E, L, P, I, Biol.); Kolbe, 1897 (L, P, Biol.), 1911 (L, P, Biol.); Lepesme and Villiers, 1944 (I fig., Biol., Contr.); Lewin, 1936 (Biol.); Mayné, 1923 (I fig., Biol. fig., Contr.); Moffat and Allan, 1934 (Biol., Contr.); Morstatt, 1912 (L fig., P fig., I fig., Biol. fig.), 1913b (Biol.), 1935 (L fig., P fig., I fig., Biol. fig., Contr.), 1942 (I fig., Biol. fig., Contr.); Mühlmann, 1954 (Biol.); Ritchie, 1933 (Biol.), 1935 (Biol.), 1936 (Biol.); Sadebeck, 1899 (Biol.); Smee, 1932 (Biol.), 1936 (Biol.); Stuhlmann, 1902 (L fig., P fig., I fig., Biol. fig.); Warburg, 1895 (L fig., P fig., I fig., Biol. fig.); Wilkinson, 1929 (Biol., Contr.); Wisser and Lesne, 1899 (Biol.); Zacher, 1914 (L fig., P fig., I fig., Biol. fig.); Zimmermann, 1903 (Biol.).

Bixadus sierricola (White)

Distribution. ETHIOPIAN REGION: Angola, Belgian Congo, Cameroons, Dahomey, French Guinea, French Equatorial Africa, Gabon, Gambia, Gold Coast, Ivory Coast, Nigeria, Portuguese Guinea, Sierra Leone, Uganda.

Adult (fig. 113). Length 20–30 mm. Mainly greyish white. Antenna with segmental grey on outer face, dark brown on inner face; cicatrix present. *Thorax* with disc of pronotum with a broad, transverse, dark brown band which becomes yellowish posteriorly; lateral tubercles faintly orange. *Elytra* extensively covered with greyish white pubescence but with shoulders faintly orange; just before middle there is a subquadrate, dark brown area which is margined with orange; apical fourth completely or for the greater part dark brown.

Mature larva. Extremely similar to that of *Anthores leuconotus* Pascoe, from which it may be distinguished as follows. *Head* with hypostoma smooth. *Pronotum* with

[1] See also Tordo, 1952 (L fig., P fig., Biol.).

spicules confined to one large posterior area; lateral lobes of this area less than two-thirds the length of median lobe.

Host plants: *Coffea* spp., especially *C. canephora*, *C. arabica*, *C. robusta*, *C. excelsa* and *C. liberica*. Also *Musanga cecroplioides* and *Terenna pavettoides* (T. R. Hayes). Mayné maintains that *C. liberica* is the preferred host. According to Lepesme

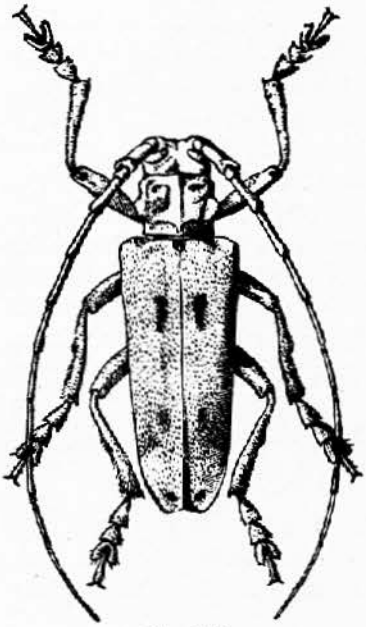


Fig. 113



Fig. 114

Fig. 113. *Bixadus sierricola* (White). Adult. (Dagron, 1930)
Fig. 114. *Bixadus sierricola* (White). Larval galleries in *Coffea*. (Dagron, 1930)

and Villiers (1944) this species is polyphagous (Aulmann and la Baume, 1911; Bredo, 1939; Chevalier, 1947; Lepesme and Villiers, 1941, 1944; Mayné, 1923).

Biology. Eggs are usually laid singly (rarely in batches) in crevices, cracks or wounds in the bark of the stem, usually 15–20 cm. from the collar. One female lays about fifty or sixty eggs. The incubation period is six to seven days. The larval gallery (fig. 114) sometimes runs the whole length of the trunk and is often multiple and frequently passes downwards as far as 12 inches below the root collar to the

level of the second bundle of secondary roots. As many as five to ten larvae may be found in the stems of a tree six to ten years old. Often larvae leave their galleries and establish themselves subcortically in the sapwood, in which they excavate more or less regular circular bands 1 to 2 inches wide which may kill the tree within a few days by interrupting the flow of sap.

After five to six months, the larva is full grown and excavates a pupal chamber 4 to 5 cm. long, in which it remains seven to eight days before pupating. The pupal stage lasts eleven to twelve days.

On emerging, the adults gnaw through the bark, leaving circular holes about 7 to 9 mm. in diameter. During the daytime the beetles seclude themselves in cracks and crevices, but at dusk they become active and they fly rather slowly and clumsily and only for short distances, which explains why at each fresh emergence infestation increases very slowly and is localised. Sometimes, however, they will fly for more than a mile if attracted by artificial light. They have not been observed to feed, but they often drink drops of dew on leaves. Pairing takes place soon after emergence and the adult life is fifteen to twenty days (Báguena Corella, 1942; Lepesme and Villiers, 1944; Mallamaire, 1933, 1935).

According to Mallamaire (1935) there are two generations a year in the Ivory Coast, the first from February to September (peak emergence, end of August to beginning of September) and from September to February (peak emergence, end of January to beginning of February). In East Africa and the Belgian Congo, however, only one generation a year has been observed (Lepesme and Villiers, 1944).

Parasites. Hymenoptera: *Gabunia ruficoxis* Kriechb. (Báguena Corella, 1942). Diptera: *Phorostoma* sp. (Lepesme and Paulian, 1943).

Economic importance. This species is frequently mistaken for *Anthores leuconotus* Pascoe, which it closely resembles, but its distribution is less widespread and appears to be limited to equatorial regions, being chiefly found deep in forests. Authors disagree as to which of these two species is the more serious pest of coffee.

According to Mallamaire (1935) healthy trees of all ages are attacked and not merely old and dying ones, as previously believed. In certain plantations in the Cameroons, however, trees under five years old are preferred. In large trees attack is less serious, as the larval galleries do not completely cut off the supply of sap, but in small trees it is usually fatal. On one plantation in the Cameroons over 50 per cent of the young trees were killed by this beetle within a few months. Infested trees are often broken by wind or attacked by termites or fungi.

Control. It is recommended that coffee trees should be planted 8 to 10 feet apart and about 30 to 40 yards from the edge of the forest, the intervening space being used for food crops. All heavily infested trees should be uprooted and burned. Adults should be caught by means of light-traps.

Larvae may be killed in their galleries by means of a wire or by injecting each gallery with kerosene or petrol and immediately sealing it with putty. The grooves on girdled trunks should be painted with pitch or coal tar (Mallamaire, 1933, 1935). Dagron (1930) suggests the injection of the galleries with a mixture of one part carbolineum to two parts of petrol, and Bredo (1939) recommends the use of paradichlorobenzene.

Material studied. 2 L, Uganda, Makuyu, 8.vii.1940, from stem of *Terenna pavettoides*, T. R. Hayes leg., in coll. B.M.; 1 L, Belgian Congo, Rutsharu, xii.1937, from *Coffea*, J. Ghesquière leg., in coll. B.M.; 5 L, 3 I, Belgian Congo, 1898, from *Coffea*, M. Wisser leg., in coll. N.H.P.

References. Aulmann and la Baume, 1911 (Biol. fig., Contr.); Báguena Corella, 1942 (I fig., Biol. fig.); Blandford, 1897 (Biol., Contr.); Bredo, 1939 (Biol., Contr.); Chevalier, 1947 (Biol.); Dagron, 1930 (I fig., Biol. fig., Contr.); Gardner, 1934 (L fig.); Kolbe, 1911 (L, Biol.); Kurtz, 1897 (Biol.); Lepesme, 1953 (Paras.); Lepesme and Paulian, 1943 (Paras.); Lepesme and Villiers, 1941 (L fig., P, Biol.), 1944 (L fig., P fig., I fig., Biol., Contr.); Mallamaire, 1933 (L fig., P fig., I fig., Biol. fig.), 1935 (L, P, I, Biol. fig., Contr.); Mancion and Alibert, 1936 (Biol.); Mayné, 1923 (Biol., Contr.), 1927 (Biol.); Morstatt, 1935 (I fig., Biol. fig., Contr.), 1942 (Biol.); Mühlmann, 1954 (Biol.); Preufs, 1899 (Biol.), 1903 (I fig., Biol.); Seeger, 1896 (Biol.); Wisser and Lesne, 1899 (Biol.); Zacher, 1914 (Biol.).[1]

Monochamus ruspator (Fabricius)

Distribution. ETHIOPIAN REGION: Cameroons, Gold Coast, Gulf of Guinea, Ivory Coast, Nigeria, Uganda.

Adult. Length 14–26 mm. Similar to *M. griseoplagiatus*, except elytra, which have two transverse bands of greyish white pubescence.

Mature larva (figs. 115–117). Length up to 30 mm.; maximum breadth (at prothorax) 6·2 mm. Form very elongate, slender, slightly depressed. *Head* (fig. 115) strongly depressed, slightly wider before middle and abruptly constricted behind middle (maximum head-width 3·9 mm.); frontal sutures indistinct; antennal foramen closed behind; mouthframe strongly and broadly sclerotised, with the dorsal transverse, ferruginous band as broad as length of clypeus. Six epistomal setae present. Mandible slender, about twice as long as basal width; cutting edge broadly emarginate. One pair of ocelli present; lens round, convex, sclerotised; pigmented spot rather indistinct. Hypostoma ferruginous with front margin more darkly so; sutures distinct, incurved; gular sutures slightly raised and with a deep setiferous pore on each side. Antenna (fig. 117) minute, 3-segmented; segment 2 transverse; segment 3 distinctly elongate, less than one-third length of segment 2; supplementary process conical, nearly as long as segment 3. Labrum transversely oval and densely setose along front margin. Maxilla with segment 3 of palp conical, shorter than segment 2. Labial palpi with segment 2 cylindrical, nearly as long as segment 1. Mentum distinct from submentum. *Prothorax* depressed, subrectangular; posterior area of pronotum finely velvety spiculate, spotted with longitudinally placed, lenticulate, glabrous areas; sublateral impressions feebly defined. *Mesonotum* dull and spiculate anteriorly, shining and glabrous posteriorly. *Metanotum* with a single transverse furrow and two rows of shining moniliform tubercles. Prosternum with eusternum semicircular, rugose and sparsely setose. *Abdomen* with each dorsal ampulla with two transverse furrows and four rows of regular, shining, almost glabrous, moniliform tubercles which are strongly convex. Ventral ampullae with a single transverse furrow and two rows of tubercles. Tergite 9 unarmed. Anus trilobed, the dorsal lobe not protruding beyond

[1] See also Báguena Corella, 1949 (L fig., I fig., Biol. fig., Contr.).

the ventral lobes. Epipleurum protuberant on all segments. Pleural tubercle (fig. 116) rectangular, strongly elongate on abdominal segments 1 and 2 and subquadrate on remaining segments; each with a pair of distinct sclerotised pits and bearing two long setae. *Legs* vestigial, consisting of a minute tubercle bearing several setae. Spiracles with peritreme narrowly oval, pale testaceous and not raised above general level of cuticle; marginal chambers absent.

Host plants: *Citrus* (Duffy, 1953a); *Coffea liberica* (Aulmann and la Baume, 1911); *Theobroma* (Aulmann and la Baume, 1912; Aulmann, 1913); *Khaya grandifoliola*,

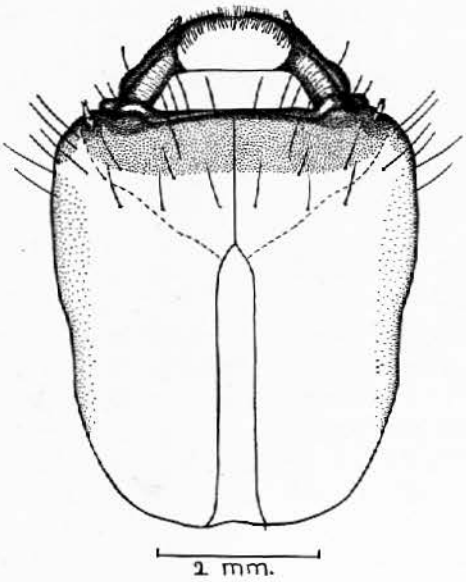


Fig. 115

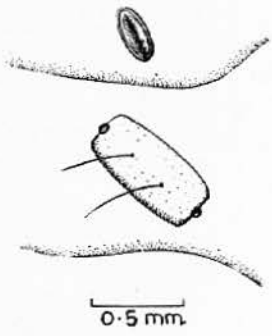


Fig. 116



Fig. 117

Figs. 115–117. *Monochamus ruspator* (Fabricius). Mature larva. Fig. 115. Head. Dorsal aspect. Fig. 116. Spiracle and pleural tubercle of abdominal segment. Fig. 117. Apical part of antenna. Lateral aspect. (Duffy, 1953a)

Trichilia heudelotii, *Triplochiton scleroxylon* (G.H.T.); *Manihot* (Hargreaves, 1936); *Entandrophragma cylindrica*, *E. angolense*, *Khaya anthotheca* (J.C.M.G.).

Biology. Dead trees of all sizes, from fully mature to poles 2 inches in diameter, are attacked by this species. The eggs are laid singly in niches carved in them by the female with her mandibles. Larvae at first tunnel beneath the bark, but soon enter the sapwood, where they carve irregular tunnels until mature. The pupal cell is oval, parallel to the wood fibres and usually sited at a depth of half an inch within the sapwood (Pl. V, fig. 4). The prepupal tunnel is packed with coarse fibres which project as a plug on the sapwood surface. The distal end of the pupal chamber is also lined with fibres. Emergence, which takes place through the prepupal tunnel, occurs during March, April and November. The duration of the life-cycle is approximately four months (G.H.T.).

Material studied. 6 L, Uganda, Kampala, vi.1933, H. Hargreaves leg., in coll. B.M.; 9 L, Gold Coast, 10.iii.1946, from *Khaya grandifoliola*, *Trichelia heudelotii*, *Triplochiton scleroxylon*, G.H.T. leg., in coll. G.H.T.; 5 L, 1 P, 1 I, Gold Coast, Bobiri, 24.xi.1955, from *Entandrophragma utile*, E.A.J.D. leg., in coll. B.M.

References. Aulmann, 1913 (Biol., Contr.); Aulmann and la Baume, 1911 (Biol.), 1912 (Biol.); Duffy, 1953a (L fig., Biol.); von Faber, 1909 (I fig., Biol.); Hargreaves, 1936 (Biol.); Lepesme and Villiers, 1944 (Biol.); Mühlmann, 1954 (Biol.); Zacher, 1921 (Biol.).

Monochamus centralis Duvivier

Distribution. ETHIOPIAN REGION: Belgian Congo, Cameroons, French Equatorial Africa, Gold Coast, Nigeria, Uganda.

Adult. Resembling *M. griseoplagiatus* Thomson, except the elytra which are light brown, each bearing areas of very dark brown pubescence in the form of a narrow, irregular transverse band at base, a group of small spots near anterior third and a single, large, sublateral area near apical third.

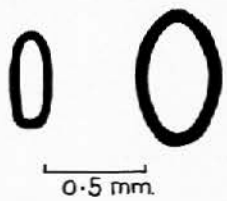


Fig. 118. *Monochamus centralis* Duvivier (left) and *M. griseoplagiatus* Thomson (right). Mature larva. Spiracular peritreme of abdominal segment 3.

Mature larva (fig. 118). Similar to that of *M. ruspator* (Fabricius), from which it differs as follows. Length up to 50 mm.; maximum breadth (at prothorax) 9·5 mm. *Prothorax* with setae coarser. *Abdomen* with tubercles of ampullae strongly flattened, scarcely protuberant and rather irregular in shape. *Spiracles* with peritreme narrowly oval (fig. 118).

Host plants: *Maesopsis eminii* (J.C.M.G.); *Combretodendron africanum* (G.H.T.); *Coffea liberica* (Lepesme and Villiers, 1944). *Combretodendron africanum* is undoubtedly the preferred host.

Biology. The larva excavates shallow galleries beneath the bark until almost mature and then makes a circular excision of about 2 inches in diameter in the bark; this disc of bark eventually falls to the ground, thus exposing the sapwood and the broadly oval entrance to the pupal cell which is plugged with wooden fibres (Pl. IX, fig. 1). The pupal cell is broadly oval in cross-section, curved and about 1–1½ inches deep in the sapwood and lies parallel to the grain of the wood. Similar but much larger characteristic incisions are made by *Batocera wyllei* Chevrolat (see p. 183). The duration of the life-cycle is about four to five months (E.A.J.D.).

Predators. Some infested logs were split open, revealing many dozens of pupal cells, over 50 per cent of which were occupied by the large striped larvae of *Calais* sp. (Elateridae), which are obviously responsible for controlling this longhorn to a considerable extent.

Economic importance. With the possible exception of *Cordylomera spinicornis* F., by far the most noticeable and widespread damage to standing timber recently seen both in the Gold Coast and in Nigeria is caused by this species. In some felling areas in the high, wet forest very many trees had been attacked. Owing to the unusual excisions made in the bark by the larvae, the damage is most conspicuous and can be recognised at a distance of several yards.

This longhorn infests *Combretodendron africanum* almost exclusively. Standing trees of all ages and sizes are attacked, even very young ones with branches of not more than 3 or 4 inches in diameter. In some cases the trees had been partly burned through native farming or had been mechanically injured, but the vast majority were apparently healthy and sound when attacked. Recently felled logs are also susceptible to infestation, especially when piled in the partial shade.

Control. Prompt decortication within a week or so of felling is essential in order to remove the larvae before they have had time to penetrate the sapwood. If discs have already been excised and the timber is small in diameter it should be burned.

Material studied. 2 L (adults reared), Uganda, 1953, from *Maesopsis eminii*, J.C.M.G. leg., in coll. B.M.; 5 L, Gold Coast, 8.v.1947, from *Combretodendron africanum*, G.H.T. leg., in coll. G.H.T.; 4 L, 1 P, 1 I, Belgian Congo, Eala, 23.iii.1932, H. J. Bredo leg., in coll. M.R.C.B.; 4 L, 1 P, 3 I, Gold Coast, Samreboi, Adjum, 22.iii.1955, from *Combretodendron africanum*, E.A.J.D. leg., in coll. B.M. 8 L, 2 I, Nigeria, Nikrowa, 8.v.1955, from *Combretodendron africanum*, E.A.J.D. leg., in coll. B.M.

References. Lepesme and Villiers, 1944 (Biol.); Mühlmann, 1954 (Biol.).

Monochamus triangularis Breuning

Distribution. ETHIOPIAN REGION: Kenya.

Adult. Resembling *M. griseoplagiatus* Thomson, except the elytra which have a large, very much darker brown, triangular area at base, the transverse bands of light pubescence being absent.

Mature larva. Similar to that of *M. ruspator* (Fabricius), from which it may be distinguished as follows. Length up to 41 mm.; maximum breadth (at prothorax) 8·2 mm. *Prothorax* with setae coarser. *Abdomen* with tubercles of ampullae strongly flattened, scarcely protuberant and rather irregular in shape.

From the larva of *M. centralis* Duvivier it may be distinguished by the unicolorous spiculate area of pronotum and from the larva of *M. variegator* Aurivillius by the dorsal anal lobe, which bears at least twenty setae, and the hypostoma which is almost entirely ferruginous.

Host plant: *Premna maxima* (J.C.M.G.).

Material studied. 1 L, 1 I, Kenya, Regati, 1953, from *Premna maxima*, J.C.M.G. leg., in coll. B.M.

References. None available.

Monochamus variegator Aurivillius

Distribution. ETHIOPIAN REGION: Belgian Congo, Ivory Coast, Sierra Leone.

Mature larva. Distinguishable from that of *M. ruspator* (Fabricius) as follows. Length up to 38 mm.; maximum breadth (at prothorax) 8 mm. *Prothorax* with setae coarser. *Abdomen* with tubercles of ampullae strongly flattened, scarcely protuberant and rather irregular in shape.

From the larvae of *M. centralis* Duvivier and *M. triangularis* Breuning it may be distinguished by the dorsal anal lobe, which bears at most twelve setae, and by the hypostoma which is almost entirely testaceous.

Material studied. 2 L, Kenya, Kinale, 1953, from dead wood, J.C.M.G. leg., in coll. B.M.

References. Jover, 1953 (Biol.).

Monochamus dentipes (Gyllenhal)

Distribution. ETHIOPIAN REGION: Belgian Congo, Ivory Coast, Sierra Leone.

Mature larva. No material available. For generic characters see key, p. 23.

Pupa (figs. 119, 120). Resembling those of *Anthores* and *Opepharus* species. From the former it may be distinguished by the setae on tergite 7 which are stouter and arranged in a transverse row (fig. 120). From *Opepharus* it differs in having the terminal spine tapering to apex and without a subapical tubercle. This pupa may be

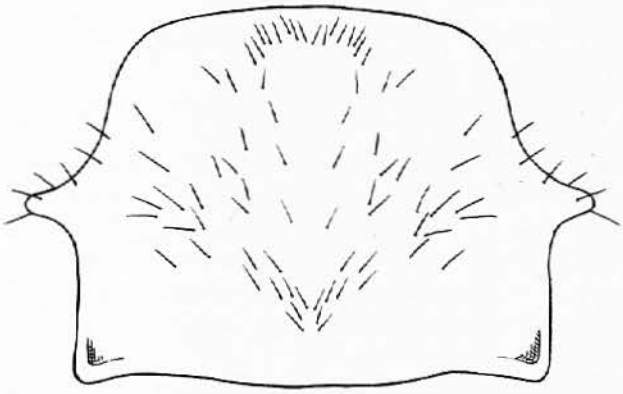


Fig. 119

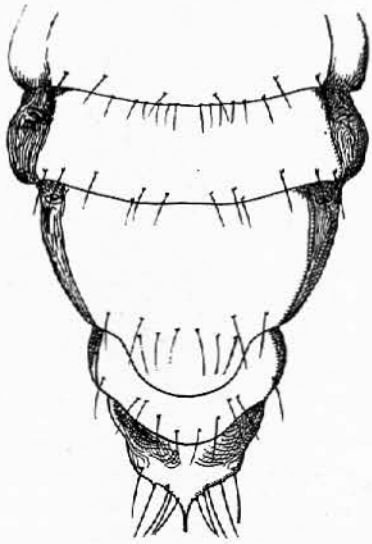


Fig. 120

Fig. 119–120. *Monochamus dentipes* (Gyllenhal). Pupa. Fig. 119. Pronotum. Fig. 120. Posterior part of abdomen. Dorsal aspect.

distinguished from that of *M. griseoplagiatus* Thomson by the presence of more numerous setae near the front margin of the pronotum (fig. 119), the shorter caudal tubercle and its smaller size (length up to 20 mm.).

Host plants: *Anthostema aubryanum, Citrus aurantium, Cleistopholis patens, Entandrophragma angolense, Macrolobium heudelotianum, Rauwolfia vomitoria, Rhyzophora racemosa, Sterculia tragacantha, Turraeanthus africana* (Jover, 1953).

Material studied. 2 P, 2 I, Belgian Congo, Eala, x.1936, J. Ghesquière leg., in coll. M.R.C.B.

References. Jover, 1953 (Biol.).

Monochamus griseoplagiatus Thomson

Distribution. ETHIOPIAN REGION: Belgian Congo, Gold Coast, Uganda.

Adult. Length 19–35 mm. Entirely light to dark brown, except elytra which bear a broad transverse band of white pubescence extending from near base to middle and

with a small area of similar pubescence on apical third. *Head* strongly excavate between antennal tubercles which are salient. Antennae filiform, very long; slightly longer than body in female and more than twice as long as body in male; segment 1 with a conspicuous cicatrix at apex. *Prothorax* slightly transverse and bearing a pair of spine-like lateral tubercles; disc pubescent, punctate, and with a pair of feebly raised, paramedian tubercles. *Elytra* pubescent, sparsely punctate and truncate apically.

Mature larva (fig. 118). Closely resembling those of *M. ruspator* (Fabricius) and *M. centralis* Duvivier but with appreciably broader spiracles (fig. 118).

Pupa. This pupa may be distinguished from that of *M. dentipes* (Gyllenhal) by the less numerous setae near the front margin of the pronotum, the longer caudal tubercle and its larger size (length up to 28 mm.).

Host plants: *Coffea robusta* (Bredo, 1939); *Khaya anthotheca, Entandrophragma utile, E. angolense, E. cylindricum, Lovoa brownii* (E. Kaye).

Material studied. 3 L, 1 P, 2 I, Uganda, Budongo, i.1953, from dead butt log of *Khaya anthotheca*, E. Kaye leg., in coll. B.M.

References. None available.

Monochamus x-fulvum Bates

Distribution. ETHIOPIAN REGION: Angola, Belgian Congo, French Guinea, Uganda.

Mature larva. Very similar to that of *M. ruspator* (Fabricius), from which it may be distinguished under high power by the entirely smooth, glabrous, shining tubercles of the dorsal abdominal ampullae.

Host plants: *Funtumia* (Vrijdagh, 1930); *Lovoa brownii, Pseudospondias microcarpa, Piptadenia africana, Khaya anthotheca, Teclea nobilis* (J.C.M.G.).

Material studied. 4 L, 3 P (taken with adults), Uganda, from *Piptadenia africana*, J.C.M.G. leg., in coll. B.M.; 6 L, Uganda, from *Lovoa* sp., J.C.M.G. leg., in coll. B.M.

References. Lepesme, 1948 (Biol.); Vrijdagh, 1930 (Biol.).

Monochamus lepesmei Breuning

Distribution. ETHIOPIAN REGION: Gold Coast, Ivory Coast.

Mature larva. Very similar to that of *M. x-fulvum* Bates, from which it differs in having the abdominal spiracles broader and the spiculate area of the pronotum pale ferruginous.

Host plant: *Chrysophyllum* (E.A.J.D.).

Biology. The larval gallery is subcortical and the pupal cell is excavated $\frac{1}{2}$ to 1 inch deep in the sapwood. Adults emerge in March and April.

Material studied. 1 L, 3 I, Gold Coast, Dwinasi, 17.iii.1955, from felled log of *Chrysophyllum*, E.A.J.D. leg., in coll. B.M.

References. None available.

Monochamus tuberosa (Bates) (=**Noserocera tuberosa** Bates)

Distribution. ETHIOPIAN REGION: Uganda.

Host plant: *Khaya anthotheca* (J.C.M.G.).

References. None available.

Monochamus thomsoni Chevrolat

Distribution. ETHIOPIAN REGION: Cameroons, French Equatorial Africa, French Guinea, Nigeria.

Host plant: *Coffea* (Lepesme and Villiers, 1944).

References. Lepesme and Villiers, 1944 (Biol.).

Monochamus plumbeus Gahan

Distribution. ETHIOPIAN REGION: Belgian Congo, Uganda.

Mature larva. Differs from that of *M. ruspator* (Fabricius) in that the tubercles of the dorsal ampullae are entirely devoid of spicules.

Pupa. In the two pupae available, which closely resemble that of *M. dentipes* (Gyllenhal), the caudal spines have been mutilated.

Host plant: *Polyscias fulva* (J.C.M.G.).

Material studied. 1 L, 2 P, Uganda, from *Polyscias fulva*, J.C.M.G. leg., in coll. B.M.

References. None available.

Monochamus galloprovincialis (Olivier)

A description of the larva of this species has recently been published (Duffy, 1953a).

Distribution. PALAEARCTIC REGION: Algeria, Morocco, Tunisia.

Mature larva. See key, p. 29.

Biology. The eggs are laid in the bast (almost or directly in the cambium) of recently felled or standing coniferous trees; exposed roots of a diameter up to $1\frac{3}{4}$ inches may also be selected. The incubation period is seven to fifteen days. About two weeks after emergence, the young larvae penetrate the sapwood, in which they make tortuous galleries which sometimes reach the heartwood.

Adults are attracted to freshly felled trees within fifteen to twenty minutes, and they are even more readily attracted to trap-trees in the shade. Healthy trees attacked in the spring start to wither by the autumn. The adults are on the wing from about June to late September. As many as 2,000 egg niches have been found on a square metre of a trunk. Damage is also caused by the adults which girdle the branches of the crown (Polozhentzev, 1926). The epidermis of green cones is also damaged (Berezina and Kurentzov, 1935).

In Russia it has been observed that trees tapped for resin are weakened and are thus more susceptible to attack by this species (Yatzentkovskiĭ, 1934).

Additional references. Berezina and Kurentzov, 1935 (Biol.); Caillol, 1914 (Biol.); Mühlmann, 1954 (Biol.); Perris, 1863 (L fig., P, Biol.); Polozhentzev, 1926 (Biol., Contr.); Polubojarinoff, 1929 (Biol.); Sokanovskiĭ, 1929 (Biol.); Villiers, 1946 (I fig., Biol.); Xambeu, 1898–1902 (L, P); Yatzentkovskiĭ, 1934 (Biol., Contr.).

Monochamus scabiosus Quedenfeldt

Distribution. ETHIOPIAN REGION: Angola, Belgian Congo, Cameroons, Gold Coast, Ivory Coast.

Host plants: *Combretodendron africanum* (Ghesquière, 1927); *Maesopsis eminii* (Bredo, 1933); *Ceiba pentandra, Macrolobium heudelotianum, Pycnanthus kombo* (Jover, 1953).

Biology. Trunks of *Maesopsis* in the botanical gardens at Eala (Belgian Congo) were found to have been broken off at a uniform height of 13–16 feet as the result of damage by this species.

The eggs are laid in May in crevices in bark, apparently only on healthy trees with trunks at least 4–8 inches in diameter. The young larvae penetrate beneath the bark, where they bore through into the sapwood. The accumulation of frass beneath the bark causes noticeable swellings which give rise to vertical cracks. Having hollowed out the bark over two-thirds of the circumference at a height of 13–16 feet, the larva enters the core of the trunk and there excavates an ascending gallery terminating in a pupal cell. The affected region becomes weakened and is eventually broken off by the wind. In April 1932, 70·2 per cent of the trees were infested and 38·6 per cent had been broken off.

The life-cycle lasts about a year, the trees usually breaking in December or January. Pupation occurs during March or April, the adults emerging between mid-April and mid-May (Bredo, 1933).

Control. Control measures include preventive treatment of the trunks with liquid insecticides and the hand-collection of adults during April and May. Broken trunks should be burned before the adults can emerge. Where swellings are observed the entrance holes should be exposed by scraping the bark and carbon tetrachloride or carbon bisulphide should be poured into them and the opening closed with clay. The adjacent parts should be treated with tar, which hastens the healing of the bark (Bredo, 1933).

References. Bredo, 1933 (L fig., I fig., Biol., Contr.); Ghesquière, 1927 (Biol.); Jover, 1953 (Biol.); Mühlmann, 1954 (Biol.).

Monochamus (=Penhammus) pauper (Kolbe)

Distribution. ETHIOPIAN REGION: Tanganyika.

Host plant: *Coffea* (Morstatt, 1913b).

References. Morstatt, 1913b (Biol.), 1935 (I fig., Biol.).

Domitia cervina Hintz

Distribution. ETHIOPIAN REGION: Angola, Belgian Congo.

Host plant: *Coffea* sp. (Lepesme and Villiers, 1944).

References. Lepesme and Villiers, 1944 (Biol.).

Opepharus (=Lophoptera) spectabilis (Perroud) (=**asperula** (White))

Opepharus has been regarded as a synonym of *Monochamus* by Breuning (1943), but the larvae of the former are readily distinguishable by the proportionately longer abdominal segment 8.

Distribution. ETHIOPIAN REGION: Belgian Congo, Kenya, Natal, Nyasaland.

Mature larva. Distinguishable from those of *Monochamus* spp. by the abdominal segment 8 which is at least almost as long as broad.

Pupa (fig. 121). Length up to 28 mm.; maximum breadth 8·5 mm. *Head* with vertex almost entirely visible from above and very deeply excavated between bases of antennae; front with numerous short setae as figured. Clypeus with a deep transverse

impression and four to six setae across base. Antennae extending to between abdominal segments 3 and 4, where they are strongly curved downward and each arranged in three coils (at least in the male) on top of each elytron. Eyes feebly convex and with a single median seta. Mandibles each with a pair of stout setae near middle of outer face. Labrum bearing numerous setae along front and lateral margins. *Pronotum* with sides bearing a pair of very large, stout tubercles and sparsely setose. *Mesonotum* smooth, with a pair of paramedian groups of setae; scutellum strongly protuberant, wrinkled and setose. *Metanotum* with two converging rows of similar setae; scutellar groove distinct and bearing a short longitudinal row of minute tubercles. Elytra and wings extending to abdominal segment. 4. *Abdomen* with tergites 1–6 with a transverse band (interrupted medially) of closely set, stout setae on posterior half. Tergite 7 with a few setea across hind margin. Tergite 8 short, strongly transverse and with a row of finer setae across hind margin. Tergite 9 (fig. 121) short and produced dorsally into a long, vertical, spinelike process, which is strongly sclerotised and bifid with a transverse row of fine setae near apex of apically; the posterior face bears a conical, sclerotised tubercle about one-third from the apex; ventrally it is deeply divided and spinose. Sternites glabrous. Pleura scarcely protuberant. *Legs* with a transverse row of fine setae near apex of each femur; middle and hind femora each with a blunt, tuberculate process near base; hind femora extending to abdominal segment 4; hind tibiae directed posteriorly. *Functional spiracles* present on abdominal segments 1–5, but vestigial pairs present on segments 6 and 7; peritreme rather broadly oval, thick and raised above general level of cuticle.

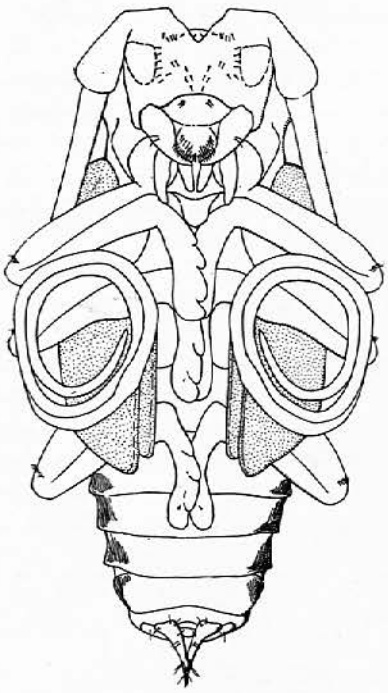


Fig. 121. *Opepharus spectabilis* (Perroud). Pupa. Ventral aspect.

Host plants: *Croton megalocarpus*,? *Sterculia* sp. (J.C.M.G.).

Biology. On one occasion a standing tree (*Croton*) was found to be completely girdled on the basal 4 feet by larval galleries which resemble those of *Monochamus* (J.C.M.G.).

Material studied. 1 L, 1 P, 1 I, Kenya, 1953, from unknown living tree, J.C.M.G. leg., in coll. B.M.

References. Ritchie, 1935 (Biol.).

Agniini

Acridocephala bistriata Chevrolat

Distribution. ETHIOPIAN REGION: Cameroons, Nigeria.

Host plant: *Kickxia elastica*.

References. Mühlmann, 1954 (Biol.).

Batocerini

Larval Characters

Head with antennal foramen closed posteriorly. One pair of ocelli present. Gular sutures indistinct. *Prothorax* with posterior area of pronotum coarsely asperate. Postnotal fold well developed, asperate. *Abdomen* with pleural tubercles each with a pair of sclerotised pits. Segment 9 unarmed. Anus a transverse cleft.

Batocera (s.g. **Batocera**) **wyllei** Chevrolat

Distribution. ETHIOPIAN REGION: Angola, Belgian Congo, Cameroons, French Equatorial Africa, Gold Coast, Ivory Coast, Nigeria, Uganda.

Adult (fig. 122). Length 52–70 mm. Head and thorax black, extensively covered with dark orange pubescence. Elytra, except basal fifth which is black, dark brown to ferruginous; near middle is a large irregular patch of white pubescence with a much smaller rounded spot on apical fourth. Scutellum orange-brown. *Head* with antennae, in male, about one and one-half times as long as body; in female, only slightly longer than body; segment 1 with a narrow, deep, oblique groove near base; apical cicatrix large but feebly defined; segments 3–6 spinose. *Prothorax* slightly transverse and bearing a pair of spine-like lateral tubercles; disc with two raised, smooth tubercles anteriorly. *Elytra* with humeral angles each bearing a conspicuous spine; basal third covered with shining glabrous tubercles; apices broadly rounded, the sutural angle bearing a sharp, stout spine.

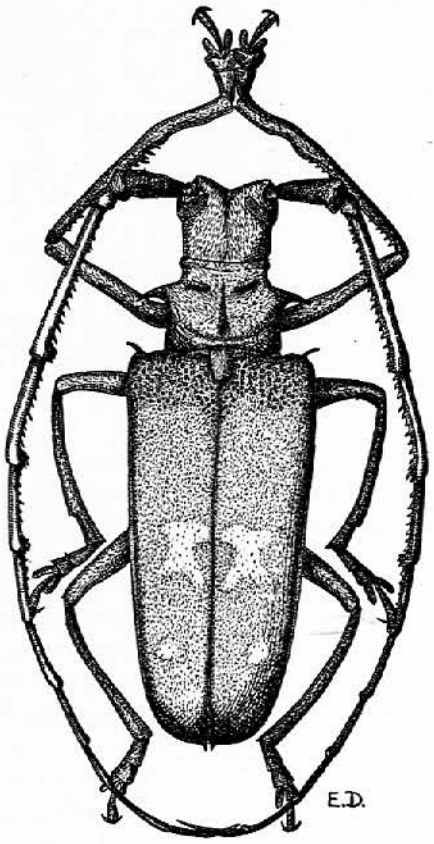


Fig. 122. *Batocera wyllei* Chevrolat. Adult.

Mature larva (fig. 123). Length up to 115 mm.; maximum breadth (at prothorax) 23 mm. *Head* elongate, rather strongly depressed, widest at anterior third and strongly converging posteriorly. Frontal sutures indistinct; antennal foramen closed behind; mouthframe extremely strongly and very broadly sclerotised, pitchy; frons pitchy anteriorly, ferruginous posteriorly and with numerous setiferous pores; six epistomal setae present. One pair of ocelli present; lens round, feebly convex, pale, sharply contrasting with surrounding sclerotised cuticle; pigmented spot indistinct. Hypostoma flat, ferruginous, with a few transverse rugae; sutures distinct, curved; gular region undefined. Clypeus bearing a few lateral setae. Labrum transversely oval, bearing

coarse setae. Antenna 3-segmented; basal membrane long, fleshy; segment 2 about twice as long as basal width; segment 3 small but distinct, slightly elongate and bearing a few apical setae; supplementary process about half length of segment 3. Maxilla with segment 3 of palp conical, much shorter than segment 2. Labial palpi with segment 2 much shorter than segment 1. Mentum distinct from submentum. *Prothorax* (fig. 123) with pronotum ferruginous and smooth except front margin which is narrowly testaceous with a transverse fringe of short dense setae; posterior two-thirds extremely coarsely asperate, the asperities transverse and larger towards lateral grooves; postnotal fold well developed, bearing about five transverse rows of elongate, subcylindrical, subvertical asperities. Prosternum with a pair of lateral, sclerotised, ferruginous

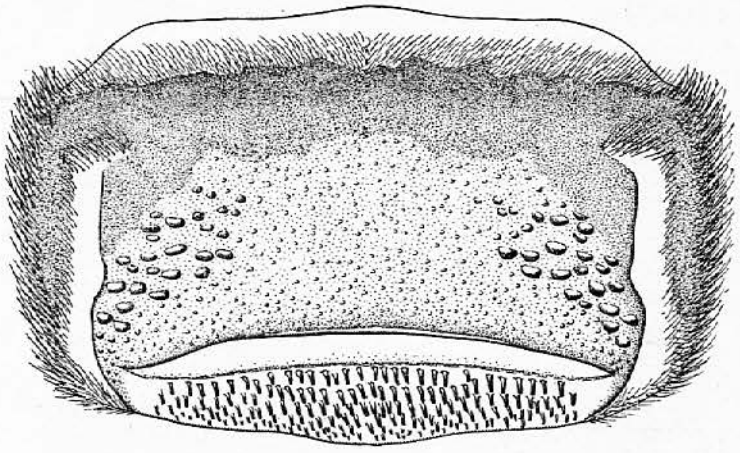


Fig. 123. *Batocera wyllei* Chevrolat. Mature larva. Prothorax. Dorsal aspect.

plates; eusternum, sternellum and lateral plates nearly as coarsely asperate as median part of pronotum. Mesonotum and metanotum non-asperate, densely setose laterally, the latter with two transverse rows of tubercles. *Abdomen* with each dorsal ampulla bearing two transverse furrows and four rows of moniliform, spiculate tubercles. Tergite 9 unarmed. Epipleurum slightly protuberant on all segments; pleural tubercles bearing two long, coarse setae and numerous shorter setae; each with a pair of large sclerotised pits. Anus a transverse cleft. *Legs* minute but visible with a $\times 15$ lens. *Spiracles* broadly oval, without marginal chambers.

Pupa. Length up to 70 mm.; maximum breadth 23 mm. *Head* with vertex entirely visible from above and shallowly excavate between bases of antennae; front with numerous scattered short, ferruginous setae. Clypeus with a shallow transverse impression and bearing four to six setae across base. Antennae extending to between abdominal segments 2 and 3, where they are strongly curved downward and each arranged in a single coil on top of each elytron. Eyes plane, glabrous. Mandibles very robust and each with about twenty stout setae near middle of outer face. Labrum bearing numerous stout ferruginous setae along front and lateral margins. *Pronotum* with disc bearing a pair of paramedian groups of stout setae and sides with a pair of stout tubercles. *Mesonotum* almost glabrous; scutellum very strongly protuberant

and setose. *Metanotum* with a pair of paramedian oval discs which are densely covered with coarse ferruginous setae; scutellar groove rather indistinct. Elytra and wings extending to abdominal segment 4. *Abdomen* with tergites 1–4 each with a transverse band (interrupted medially) of closely set stout setae on posterior half. Tergites 5 and 6 with these areas smaller and less conspicuous. Tergite 7 faintly transversely striate, sparsely setose. Tergite 8 extremely short and glabrous. Tergite 9 short and produced dorsally into a long, vertical, spine-like process which is strongly sclerotised and attenuated apically; ventrally it is deeply divided and densely covered with coarse, blunt, pitchy spines. Sternites glabrous. Pleura scarcely protuberant. *Legs* with a transverse row of fine setae near apex of each femur; hind femora extending to abdominal segment 4. *Functional spiracles* present on abdominal segments 1–5; peritreme thick, narrowly oval and raised above general level of cuticle.

Host plants: *Aucoumea klaineana* (Eidmann and Schlüter, 1944); *Alstonia congensis* (J.C.M.G., E.A.J.D.).

Biology. Oviposition occurs usually in forest clearings where trees have recently been felled. Trunks lying in shady places are most prone to attack. Oviposition takes place usually on the underside of the log nearest the ground or, in the case of standing trees, on the side most in the shade. Before depositing its eggs the beetle gnaws deep crescentic incisions in the bark approximately 10 mm. long; these incisions are usually several inches apart.

The larva feeds subcortically until nearly mature, its gallery being packed with extremely coarse wooden fibres. It then excises a circular disc of bark between 4 and 6 inches in diameter (Pl. IV, figs. 1 and 2) before starting to bore into the sapwood.[1] Eidmann and Schlüter (1944) infer that this habit is characteristic of the genus as a whole, but this is certainly not the case in so far as certain Indian species are concerned. It is difficult to conjecture the reason for this unusual behaviour on the part of the larva, unless it be to promote a more rapid drying out of the pupal cell in order to discourage fungoid growths, for the galleries are exceptionally large and the frass rather loosely packed, both factors conducive to the growth of fungi. The comparatively enormous area excised can in no way facilitate the ejection of frass or shavings, for the diameter far exceeds that of the entrance hole of the larva in the sapwood; neither can it facilitate the emergence of the adult which takes place at a point well beyond (approximately 5 inches) the extent of the excision. These excised discs fall to the ground.

On one occasion the author picked up a pile of thirty-four of these plate-like discs of bark at the base of a standing *Alstonia*. The tree had recently died and the numerous and comparatively enormous excisions in the bark, which extended from the base of the tree up to a height of over 60 feet, made a very impressive sight (Pl. IV, figs. 1 and 2). At the base of this tree was a pile of frass sufficient to fill at least two large sacs.

During the process of excision the larva must obviously be almost completely exposed to parasites and predators, especially when starting to enter the sapwood. Perhaps further observations will clarify this seemingly pointless and suicidal habit

[1] Similar excisions in the bark are apparently also made by *Lagochirus araneiformis* Sloane (Beard, 1942), but in this case, according to the author, the excavation is performed by the adult. See also Becker (1953b) and page 174 of this monograph.

of the larva. While the larva penetrates the sapwood to pupate, it pushes behind it coarsely shredded particles of wood with which it plugs the entrance hole.

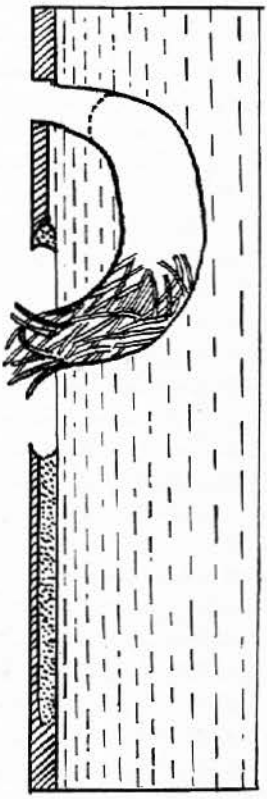


Fig. 124. *Batocera wyllei* Chevrolat. Pupal cell. (Eidmann, 1943)

The pupal cell (fig. 124), which is about 5 cm. beneath the surface of the sapwood, is short, stout, curved and about 5 cm. in diameter. As the larva does not reverse its position to pupate, the adult is forced to gnaw through the end of the pupal cell right up to and through the bark in order to make its escape. In Nigeria, pupation occurs in May and the adult emerges in June.

When molested, the beetle stridulates very loudly and is capable of inflicting quite a painful bite with its sturdy mandibles (E.A.J.D.).

Material studied. 1 L, Uganda, Budongo Forest, 1953, from *Alstonia congensis*, J.C.M.G. leg., in coll. B.M.; 8 L, 2 P, 2 I, Nigeria, Nikrowa, 8.v.1955, from standing and recently felled *Alstonia congensis*, E.A.J.D. leg., in coll. B.M.

References. Duffy, 1953a (Biol. fig.); Eidmann, 1943 (L fig., P fig., Biol. fig); Eidmann and Schlüter, 1944 (L fig., P fig., Biol. fig.).

Batocera (s.g. **Batocera**) **rufomaculata** (Degeer)

(=**rubra** Maxwell-Lefroy)

[The Mango Tree Borer or Violin]

Distribution. ETHIOPIAN REGION: East Africa. MADAGASCAN REGION: Madagascar, Rodriguez, La Réunion, and Mauritius. PALAEARCTIC REGION: Palestine. This species is also widely distributed throughout India, Ceylon, Malaya, and the West Indies.

Adult. Length 25–52 mm. Similar to *B. wyllei* Chevrolat and differing mainly as follows. *Head* with antennae only about one-third longer than body in male. *Prothorax* with disc of pronotum bearing two large orange-yellow marks. Scutellum conspicuously covered with white pubescence. *Elytra* densely pubescent, variably marked with rather small, round, orange or yellow spots, usually with six on each.

Mature larva (fig. 125). Resembling that of *B. wyllei* Chevrolat, from which it differs in having the anterior row of asperities on the postnotal fold distinctly larger than those on the remaining rows, which become gradually smaller posteriorly (fig. 125).

Miller (1936) records the maximum length of this larva to be 100 mm.

First-instar larva (fig. 126). According to Miller (1936) egg-bursting spines are present on abdominal segments 1–8; the apex of each spine is dentate (fig. 126). The spiracles are biforous (fig. 126). The duration of this instar is two days.

Pupa. The pupa of this species is not available, but that of an unknown species of

Batocera is here figured (fig. 127). Gardner (1927) gives the following description: "Robust, about 80 mm. in length. A few short reddish setae on labrum, base of mandibles and base of antennae. Prothorax with a strong lateral tubercle on each side. First four abdominal segments dorsally with a transverse interrupted band of densely-set reddish hairs; next three segments with sparse setae. Last segment with a

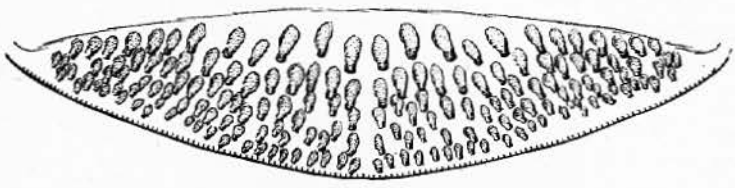


Fig. 125

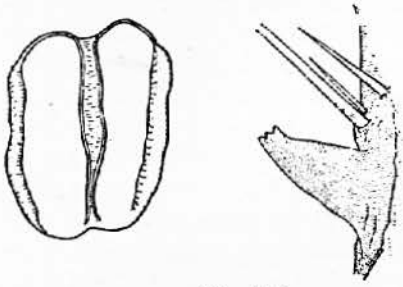


Fig. 126

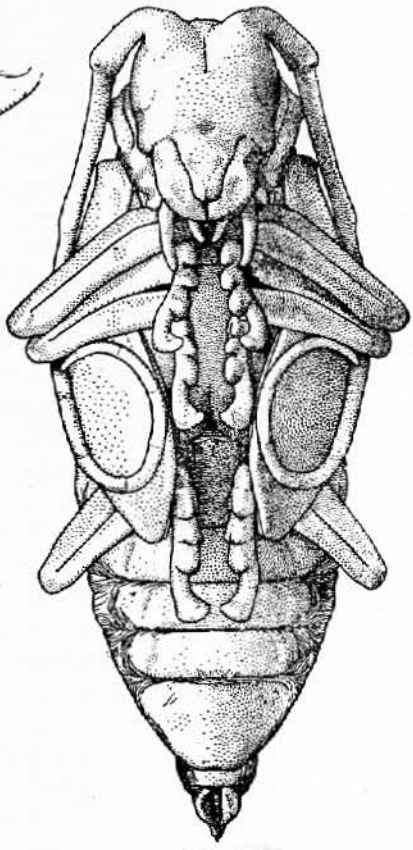


Fig. 127

Fig. 125. *Batocera rufomaculata* (Degeer). Mature larva. Postnotal fold.

Fig. 126. *Batocera rufomaculata* (Degeer). First-instar larva showing (left) spiracle and (right) egg-bursting spine. (Miller, 1936)

Fig. 127. *Batocera* sp. Pupa. Ventral aspect. (Duffy, 1953a)

strong subvertical acute prominence ending in a chitinous spine; this prominence bilobed ventrally, each lobe more or less carinate, and armed with chitinous spines."

Egg. Length 6·4 mm.; breadth 2 mm. Form cylindrical, feebly curved, slightly narrower at one end, ends narrowly rounded; chorion brownish white, smooth, coriaceous, with some feeble, irregular punctures (Miller, 1936).

Host plants: No records of African host plants are available, but Beeson (1941) gives the following Indian hosts, some of which occur in Africa: *Adina cordifolia,*

Albizia lebbeck, Artocarpus integer, Barringtonia acutangula, Bauhinia acuminata, Bombax malabaricum, Broussonetia papyrifera, Carica papaya, Ceiba pentandra, Cocos nucifera, Dalbergia sissoo, Dyera costulata, Erythrina indica, Eugenia jambolana, Ficus benghalensis, F. carica, F. elastica, F. glomerata, F. infectoria, F. religiosa, F. tjakela, Garuga pinnata, Hevea brasiliensis, Lannea grandis, Mangifera indica, Moringa pterygosperma, Morus indica, Platanus orientalis, Semecarpus anacardium, Shorea robusta, Spondias pinnata, Sterculia colorata, S. villosa and *Syzygium cumini.*

In Mauritius: *Mangifera indica, Acacia, Ficus benghalensis, Artocarpus altilis, Spondias dulcis* (Department of Agriculture, Mauritius, 1918).

Biology. Beeson (1941) gives the following account of this insect in India: "The beetles are nocturnal and feed to some extent by gnawing the bark of living twigs or eating the green tips particularly of *Ficus* spp. The female lays up to 200 eggs placed one by one in incisions cut in the bark with the mandibles. Oviposition normally takes place on dead trees but also on the branches and trunks of living trees that are not in good health and on the roots of trees exposed by erosion, etc. Blazes and wounds and panels produced on rubber trees and *Dyera costulata* (in Malaya) by tapping for latex are sites of successful oviposition. Living trees such as figs, rubber and semul may be attacked year after year at the margins of earlier borings and the area of injury is gradually extended till the tree succumbs; often a branch breaks or the trunk gives way, weakened by numerous tunnels."

"The egg is a brownish-white cylinder, 6×2 mm., with narrowly rounded ends. The newly hatched larva is about 10 mm. long; it feeds at first in the meristem and later penetrates deeper. The larval excavations in the early stages are extensive, irregular and deep in the sapwood. They are packed with very coarse chips and fibres of wood and bark; the bark is often completely hollowed out so that it splits and breaks away, leaving the packing of the tunnels exposed. The tunnels in the depth of the wood are irregular and one or more inches in cross section. The pupal chamber is a 2 to 3 inch cavity in a widened extension of part of the larval gallery and is surrounded by long interlaced fibres. This chamber is prepared in the cold weather and occupied by the larva in a resting condition until about March or April; in this stage the larva is bright yellow without any food in the alimentary canal. The pupal period lasts from three to four weeks and is followed by an immature beetle stage of variable duration. The beetle emerges by a short tunnel running direct to the exterior and ending in a circular exit hole. The emergence period in North India is from March to August; 50 per cent of the beetles emerge in May and 30 per cent in June. The life-cycle is thus annual. The life of the beetle is considerable and the maximum life recorded at Dehra Dun is eight months."

"Browne and Foenander (1937) consider the life-cycle in Malaya may be completed in six months. This would be possible in view of the long adult life without excluding an annual cycle as normal."

Adults fly considerable distances at night, making a great noise, and are readily attracted to artificial light. When molested, the beetle stridulates loudly, a habit which, in Mauritius, has gained it the name of "violin" (Bytinski-Salz, 1952).

Parasites. Hymenoptera: *Louricia ovivora* Ferrière and *Ooencyrtus batocerae* Ferrière. Both are egg parasites (Miller, 1936).

Economic importance. No reports are available concerning the economic importance, if any, of this species in Africa. In Mauritius, however, it is responsible for considerable damage to certain trees (see "Host plants"), and here it is due to this beetle that the cultivation of the kapok tree is apparently no longer practicable (Department of Agriculture, Mauritius, 1918). In Palestine, according to Bytinski-Salz (1952), this species can attack perfectly healthy trees. The beetle continues to oviposit on infested trees, which usually die within two to three years.

Browne and Foenander (1937) state that in Malaya the mortality of tapped *Dyera costulata* is high, mainly due to *B. rufomaculata* Degeer. Infestation is correlated with reduced vigour of the tree which is usually brought about by age, supression, disease or injury. Sound trees, irrespective, are apparently resistant to infestation, but tapping eventually brings them within the zone of susceptibility.

Control. Trees which are severely infested often contain hundreds of larvae and should be felled and split into sections to kill off as many larvae as possible, the logs being later burnt. In slightly infested trees, however, the larvae may be removed with the aid of a short-bladed knife before the sapwood is penetrated. The hand-picking by children is also suggested (Department of Agriculture, Mauritius, 1918). Biological control and the use of trap logs of alternative hosts have also been suggested (Browne and Foenander, 1937). Rahman (1939) suggests that wire gauze ($\frac{1}{16}$ inch mesh) should be wrapped loosely round the stems during the egg-laying period. In addition, larval galleries should be cleared of frass with a wire and a small quantity of kerosene or one to two grains of potassium cyanide[1] introduced, the orifice then being closed with mud.

Material studied. 1 L, England, Princes Risborough, 26.iv.1933, from log imported from Andaman Is., in coll. F.P.R.L.

References. Beeson, 1941 (I fig., Biol. fig.); Beeson and Bhatia, 1939 (E, I fig., Biol. fig.); Blanchard, 1845 (L fig., P fig., I fig.); Browne and Foenander, 1937 (Biol. fig., Contr.); Bytinski-Salz, 1952 (Biol., Contr.); Department of Agriculture, Mauritius, 1918 (L fig., P fig., I fig.); Gardner, 1927 (L fig., P fig., Biol.); Green, 1913 (L fig., I fig., Biol. fig., Contr.); Husain and Khan, 1941 (E fig., L fig., P fig.); Miller, 1936 (E fig., L fig., P fig., I fig.); Mühlmann, 1954 (Biol.); Pearson, 1837 (Biol.); Quaintance, 1913 (Biol.); Rahman, 1939 (Biol., Contr.); Saunders, 1834 (Biol.); Schiödte, 1876 (L); Stebbing, 1907 (L fig., I fig., Biol. fig.), 1914 (L fig., I fig., Biol. fig.); Tennent, 1861 (L fig., P fig., I fig.); Westermann, 1821 (Biol.).

Mesosini

Larval Characters

Head abruptly and strongly constricted near posterior third; strongly sclerotised and front with eight setiferous pores. Antennal foramen open behind and entered by frontal suture. One pair of ocelli present. Antenna with segment 3 elongate; supplementary process strongly tapering. Hypostoma ferruginous, with anterior region steeply sloping down to anterior margin; a pair of paramedian setiferous pores present. Gular sutures indiscernible, but a pale median, ventral, cleavage line present. *Abdomen* with ampullae with one transverse furrow and two transverse rows of smooth glabrous

[1] This method is considered too dangerous to adopt.

tubercles, anterior to which are a few irregularly arranged ones; the two rows are interrupted by a median longitudinal furrow. Tergite 9 with a small median spine which has no basal pigmented zone. *Spiracles* with marginal chambers.

Mesosa nebulosa (Fabricius), var. **algerica** Pic

Illustrated descriptions and a biological account of this species have recently been published (Duffy, 1953a).

Distribution. PALAEARCTIC REGION: Algeria, Tunisia.

Mature larva. See key, p. 23.

Pupa. See key, p. 42.

Additional host plants: *Ilex aquifolium*, *Alnus glutinosa.*

Additional references. Villiers, 1946 (I fig., Biol.).

Coptops aedificator (Fabricius)

Distribution. ETHIOPIAN REGION: Angola, Cameroons, Fernando Póo, Gold Coast, Ivory Coast, Kenya, Natal, Nigeria, Nyasaland, Sierra Leone, Tanganyika, Uganda. MADAGASCAN REGION: Madagascar, Mauritius, Rodriguez. ORIENTAL REGION: Seychelles. This species is also widely distributed through India and Ceylon.

Mature larva (figs. 128–129). Length up to 36 mm.; maximum breadth (at prothorax) 7·5 mm. *Head* (fig. 129) moderately depressed, slightly elongate, widest at middle and abruptly and strongly constricted near posterior third behind which it is appreciably narrower; frontal sutures distinct for entire length; antennal foramen open behind; mouthframe broadly and strongly sclerotised. Frons entirely ferruginous with eight setiferous pores which are longitudinally impressed; six epistomal setae present. One pair of ocelli present; lens round, feebly convex; pigmented spot rather indistinct. Hypostoma ferruginous, with an abrupt, widely curved ridge across middle; anterior half steeply sloping down to front margin; one pair of distinct setiferous pores present; sutures distinct, pitchy and slightly incurved. Gular region with a pale median ventral cleavage line. Antenna (fig. 128) with segment 2 slightly transverse, segment 3 cylindrical, three times as long as broad and as long as segment 2; supplementary process shorter than segment 3. Maxilla with segment 3 of palp acutely conical, as long as segment 2. Labial palpi with segment 2 acutely conical, as long as segment 1. Mentum not distinct from submentum. *Prothorax* with pronotum very faintly striate and glabrous. *Abdomen* with each dorsal ampulla with a single transverse, curved furrow and two transverse rows of glabrous tubercles, anterior to which are a few irregularly arranged ones; the two rows are interrupted by a median longitudinal furrow. Ventral ampullae with two rows of tubercles. Segment 9 with a small erect spine (which is simple basally) on middle of posterior margin. Epipleurum protuberant on all segments. Pleural tubercle rather small, with ventral sclerotised pit rather large and very distinct. *Legs* absent. *Spiracles* with peritreme broadly oval and with about twenty-four marginal chambers.

Pupa (frontispiece). Length up to 18 mm.; maximum breadth 6·75 mm. *Head* with vertex entirely visible from above, rather deeply excavated between bases of antennae and bearing a few minute scattered setae; front with setae as figured. Clypeus

with a transverse impression and two pairs of short setae near basal margin. Antennae extending as far as abdominal segment 3, where they are strongly recurved to terminate near hind coxae. Eyes scarcely convex, each with a single seta. Mandibles long, slender, each with a pair of setae near middle of outer face. Labrum thick, fleshy, strongly protuberant and densely setose along front margin and base. *Pronotum*



Fig. 128

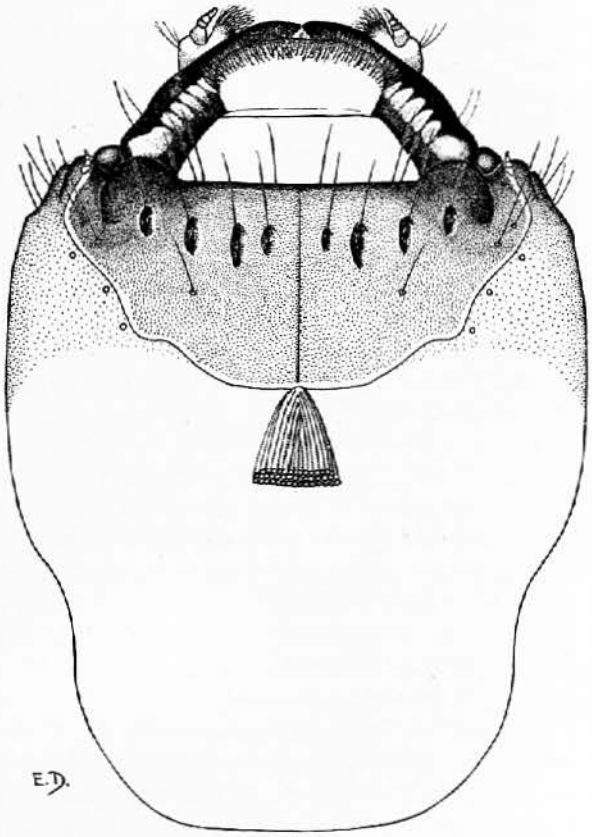


Fig. 129

Figs. 128–129. *Coptops aedificator* (Fabricius). Mature larva. Fig. 128. Apical part of antenna. Lateral aspect (Duffy, 1953a). Fig. 129. Head. Dorsal aspect.

rugose; front margin bearing numerous short spines (each with a basal seta); disc with a longitudinal median impression across the middle of which is a row of similar spines. *Mesonotum* rugose, with a few short setae on each side of scutellum which is slightly protuberant and spinose laterally. *Metanotum* smooth, with a small group of spines on each side of scutellar groove which is distinct. Elytra and wings extending as far as abdominal segment 4. *Abdomen* with tergites 1–4 each with two more or less complete transverse rows of short, curved, ferruginous spines (each with a basal seta) which are all inclined posteriorly; tergites 5–6 with similar spines but with those of posterior row inclined anteriorly. Tergite 7 slightly elongate, with sides converging posteriorly and bearing numerous slightly stouter spines which are inclined posteriorly.

Tergite 8 short, transverse, with a row of similar spines. Tergite 9 very short, with hind margin bearing a transverse group of distinctly stouter spines. Sternites glabrous. Pleura moderately protuberant, each with five or more spines. *Legs* with femora each with a transverse row of four to six stout setae near apex and three to four similar setae along apical half of outer margin; hind femora extending to abdominal segment 5; all tibiae more or less at right angles to longitudinal axis of body. *Functional spiracles* present on abdominal segments 1–6; peritreme narrowly oval, reniform and slightly raised above general level of cuticle.

Host plants: *Antiaris toxicaria, Celtis soyauxi, Adansonia digitata, Anacardium occidentale* (J.C.M.G.); *Afzelia* sp., *Artocarpus* sp. (Duffy, 1953a); *Coffea arabica, C. canephora, C. excelsa, Theobroma, Funtumia, Citrus* (Lepesme and Villiers, 1941); *Albizia sassa, Baphia nitida, Berlinia acuminata, Chlorophora excelsa, Cleistopholis patens, Discoglypremna caloneura, Entandrophragma angolense, Ficus polita, Macrolobium heudolotianum, Hevea brasiliensis, Millettia stapfiana, Piptadenia aubrevillei, Spondias mombin, Strombosia pustufata, Turraeanthus africana* (Jover, 1953); *Ficus* sp., *Albizia zygia, Triplochiton scleroxylon, Acacia pennata* (E.A.J.D.). Indian hosts are as follows: *Acacia arabica, Acacia* sp., *Acrocarpus fraxinifolius, Aegle marmelos, Albizia lebbeck, Bauhinia purpurea, B. retusa, B. vahlii, B. variegata, Bombax malabaricum, Buchanania latifolia, Butea monosperma, Careya arborea, Cassia siamea, Coffea, Cudrania javanensis, Dalbergia paniculata, Excoecaria agallocha, Ficus glomerata, F. religiosa, Ficus* sp., *Garuga pinnata, Hevea brasiliensis, Holoptelea integrifolia, Lannea grandis, Manihot glaziovii, Millettia auriculata, Mucuna imbricata, Pavetta indica, Pongamia glabra, Pterocarpus marsupium, Pueraria tuberosa, Semecarpus anacardium, Shorea robusta, Spatholobus roxburghii, Terminalia belerica, T. tomentosa, Wrightia tinctoria* (Beeson and Bhatia, 1939).

Biology. According to Beeson and Bhatia (1939) larvae of this species feed either subcortically or actually in the inner bark, and the damage they do to the sapwood is only superficial, for even the pupal cells are constructed almost entirely in the bark. Fraser (1949c) confirms this, although he noticed that three larvae under observation had burrowed deeply into the sapwood to pupate; but this change of habit, as he points out, was probably occasioned by the excessive drying-out of the wooden block. The emergence hole is circular but usually somewhat ragged (owing to the thinness of the bark?). Emergence occurs more or less throughout the year, but usually in March, although the main period in India is in June. The life-cycle normally lasts a year.

Parasites. Hymenoptera: *Sclerodermus immigrans* Bridw. (Bridwell, 1920).

Economic importance. Although sometimes abundant, the damage this species causes is too superficial for it to be regarded as a serious pest.

Material studied. 4 L, 1 P, 1 I, Tanganyika, Tanga, 27.xii.1951, R. C. H. Sweeney leg., in coll. B.M.; 4 L, 2 I, England, Liverpool, viii.1948, in *Afzelia* from East Africa, M. G. Fraser leg., in coll. B.M.; 4 L, 1 I, Gold Coast, Dwinasi, Kwapong, 15.iii.1955, from *Triplochiton scleroxylon*, E.A.J.D. leg., in coll. B.M.; 4 L, 2 P, 2 I, Gold Coast, Bosumkese reserve, 21.ii.1955, from *Celtis soyauxi*, E.A.J.D. leg., in coll. B.M.; 6 L, 2 P, 2 I, Gold Coast, Samreboi, 21.iii.1955, from *Acacia pennata*, E.A.J.D. leg., in coll. B.M.

References. Aulmann and la Baume, 1911 (Biol.); Beeson, 1935 (Biol.), 1941 (I fig., Biol.); Beeson and Bhatia, 1939 (Biol.); Bredo, 1939 (Biol.); Bridwell, 1920 (Paras.); Duffy, 1953a (L, Biol.); Fraser, 1949 (Biol.); Hutson, 1926 (Biol.); Jover, 1953 (Biol.); Lepesme, 1948 (Biol.), 1953 (I fig., Biol.); Lepesme and Villiers, 1941 (Biol.), 1944 (Biol.); Morstatt, 1913b (Biol.); Mühlmann, 1954 (Biol.); Thompson, 1943 (Paras.); Wisser and Lesne, 1899 (Biol.); Zacher, 1921 (Biol.).

Metonini

Aderpas albomarmoratus Breuning

Distribution. ETHIOPIAN REGION: Belgian Congo, Gold Coast.

Mature larva. Separable from those of the Ancylonotini by its much narrower, slot-like spiracles. No true tribal differences are evident.

Host plant: *Musanga cecropioides* (E.A.J.D.).

Biology. Larvae feed entirely subcortically. The pupal cell is an oval concavity in the bark. Adults emerge in March.

Material studied. 4 L, 1 I, Gold Coast, Samreboi, Adjum, 24.iii.1955, E.A.J.D. leg., in coll. B.M.

References. None available.

Aderpas lesnei Breuning

Distribution. ETHIOPIAN REGION: Kenya, Mozambique, Nyasaland, Tanganiyka.

Host plant: *Acacia* sp. (J.C.M.G.).

References. None available.

Ancylonotini

Ancylonotus tribulus (Fabricius)

Distribution. ETHIOPIAN REGION: Angola, Belgian Congo, Gold Coast, Ivory Coast, Kenya, Nigeria, Nyasaland, Senegal, Tanganyika, Uganda. MADAGASCAN REGION: Madagascar.

Adult (fig. 130). Length 17–38 mm. Colour variable, usually with greenish grey or brownish variegation. Antennal segments white basally, brown or black apically. *Head* deeply excavate between antennal tubercles which are salient; antennae filiform, three times as long as body in male, about one and one-quarter times as long as body in female. Mesosternum with coxal cavities open externally. Scutellum with a pair of vertical spines.

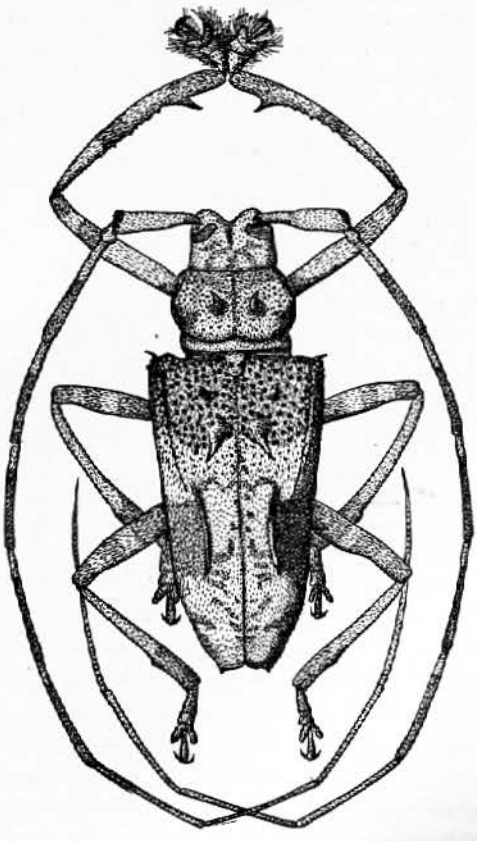


Fig. 130. *Ancylonotus tribulus* (Fabricius). Adult.

Elytra depressed on disc, narrowed posteriorly, the apices truncate and dentate; each elytron with a pair of vertical, spine-like tubercles on basal third and with a longitudinal carina terminating in a spine-like process near apical third. *Legs* with front tarsi broadened and densely setose in male; middle tibiae grooved; tarsal claws simple basally.

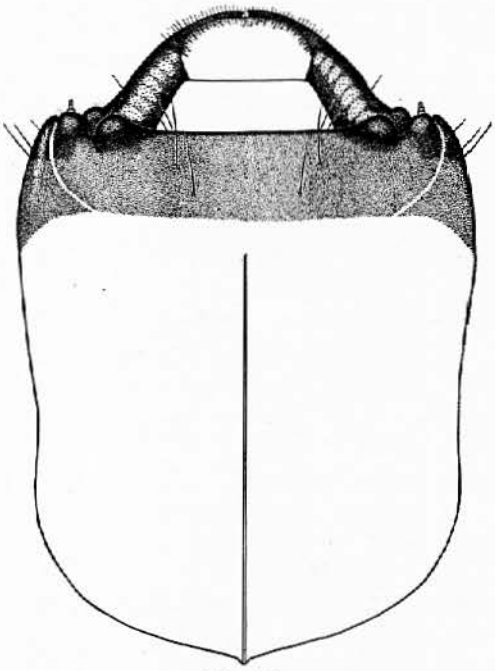


Fig. 131

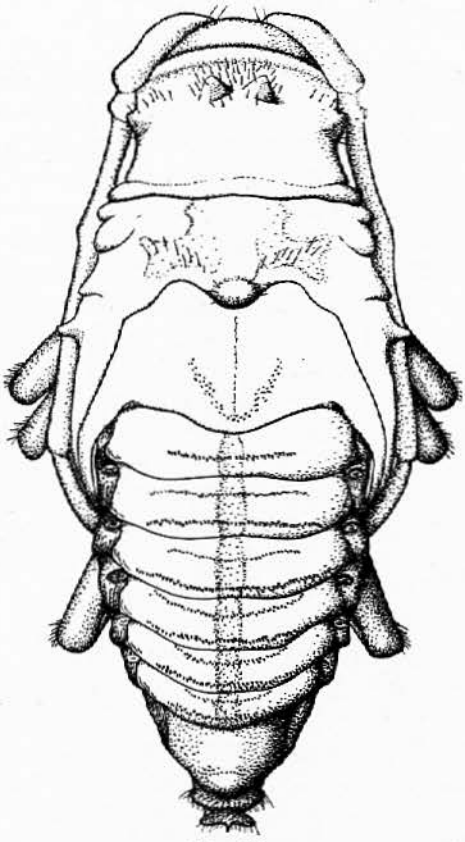


Fig. 132

Fig. 131. *Ancylonotus tribulus* (Fabricius). Mature larva. Head. Dorsal aspect.
Fig. 132. *Ancylonotus tribulus* (Fabricius). Pupa. Dorsal aspect. (Duffy, 1953a)

Mature larva (fig. 131). Length up to 43 mm.; maximum breadth (at prothorax) 12·5 mm. *Head* (fig. 131) moderately depressed, slightly elongate, subparallel-sided, widest before middle (maximum head-width 5·5 mm.) and slightly constricted at middle. Frontal sutures distinct for entire length; antennal foramen open behind; mouthframe strongly and broadly sclerotised. Anterior half of frons ferruginous and smooth. Gena very strongly sclerotised and pitchy. Ocelli indiscernible. Hypostoma slightly convex, ferruginous, with front margin narrowly pitchy; setiferous pores absent; sutures straight, strongly converging posteriorly, pitchy. Gular region with a very thin, pale, median cleavage line. Antenna 2-segmented; segment 2 about twice as long as broad and bearing a minute hyaline process. Maxilla with palpal segment 3

acutely conical, shorter than segment 2. Labial palpi with segment 2 less than half length of segment 1. Mentum distinct from submentum. Clypeus glabrous. *Prothorax* depressed, with posterior half of pronotum micro-spiculate and with scattered coarse setae. *Abdomen* with each dorsal ampulla with two transverse furrows and entirely covered with small oval spiculate tubercles. Tergite 9 unarmed. Anus trilobate. *Legs* absent. *Spiracles* with peritreme thick and broadly oval.

Pupa (fig. 132). Readily distinguishable from those of *Batocera* spp. by the following characters. Length not exceeding 27 mm.; maximum breadth not exceeding 10 mm. *Head* with front sparsely setose. Mandibles with only two to three setae on middle of outer face. *Pronotum* with a pair of paramedian, tuberculate, conical protuberances. Elytra each with a pair of tuberculate protuberances near base. *Abdomen* with tergites 2–5 bearing two transverse rows of stout, closely set spines.

Host plants: *Triplochiton scleroxylon* (Duffy, 1953a); *Coffea, Eriodendron, Ceiba pentandra* (Lepesme and Villiers, 1941); *Theobroma* (De Seabra, 1921); *Anopyxis ealaensis, Anthostema aubryanum, Discoglypremna caloneura, Sterculia tragacantha* (Jover, 1953).

Biology. The following observations are those of G. H. Thompson. In the only infestation seen, attack was confined to broken branches in which the wood was partly seasoned, the bole still being fairly fresh and unattacked. The larvae tunnel subcortically until mature and then enter the sapwood to pupate. The pupal cells are oval and are situated about ½ inch within the sapwood. The prepupal tunnel is plugged with coarse wooden fibres. About three weeks are passed in the pupal stage and adults emerge during February and March. There is probably one generation per annum. According to Netolitzky (1920) larvae of this species are eaten by natives in West Africa.

Economic importance. This beetle is one of the commonest to be found in African timbers, particularly *Triplochiton scleroxylon.* Although large numbers of larvae are often found in recently felled logs, the damage that they cause is relatively superficial (E.A.J.D.).

Material studied. 2 L, Gold Coast, 9.i.1946, from *Ceiba pentandra*, G.H.T. leg., in coll. G.H.T.; 2 L, 3 P, 1 I, Belgian Congo, Lemba, 6.vii.1912, R. Mayné leg., in coll. M.R.C.B.; 8 L, 2 P, 2 I, Gold Coast, Kumasi, 1.iii.1955, from *Triplochiton scleroxylon*, E.A.J.D. leg., in coll. B.M.

References. Aulmann and la Baume, 1911 (Biol.); Bredo, 1939 (Biol.); De Seabra, 1921 (Biol.); Duffy, 1953a (L, P fig., Biol.); Ghesquière, 1927 (Biol.); Jover, 1953 (Biol.); Lepesme, 1948 (Biol.), 1953 (I fig., Biol.); Lepesme and Villiers, 1941 (Biol.), 1944 (I fig., Biol.); Mühlmann, 1954 (Biol.); Netolitzky, 1920 (Biol.); Zacher, 1921 (Biol.).

Idactus ellioti Gahan

Distribution. ETHIOPIAN REGION: Gold Coast, Nyasaland, Tanganyika, Uganda. MADAGASCAN REGION: Madagascar.

Mature larvae (fig. 133). Similar to that of *Ancylonotus tribulus* (Fabricius), from which it differs as follows. Length up to 32 mm.; maximum breadth (at prothorax) 6·5 mm. *Head* with sides more strongly rounded anteriorly (maximum head-width

4·1 mm.). Ocelli usually discernible, but in some specimens obscured by sclerotisation of gena. Hypostoma with a pair of paramedian foveae or transverse impressions. Antenna with segment 2 only slightly longer than broad. Labial palpi with segment 2 at least half length of segment 1. *Prothorax* with spicules on posterior part of pronotum longer and denser, the whole spiculate area ferruginous and much darker than anterior testaceous area. *Abdomen* with dorsal ampullae bearing only a single transverse (posterior) furrow.

Pupa (fig. 134). Resembling that of *Ancylonotus tribulus*, from which it differs as follows. Length up to 16 mm.; maximum breadth 7 mm. *Pronotum* with only a single tuberculate conical protuberance which is situated medially on disc. *Abdomen* with tergites 2–5 with anterior row of spines very incomplete.

Host plants: *Polyscias fulva* (J.C.M.G.); *Hevea* (R. C. H. Sweeney); *Cussonia longissima* (G. H. Thompson); *Cussonia nigerica* (E.A.J.D.).

Biology. Dead trees of all dimensions are attacked, from the main bole down to small branches 2 inches in diameter, and the observed degree of infestation has always been high. Dry areas of wood appear to be preferred to moister zones.

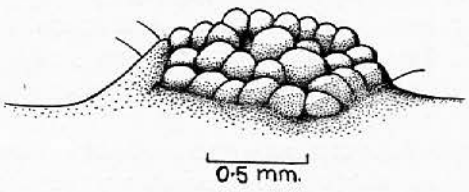


Fig. 133

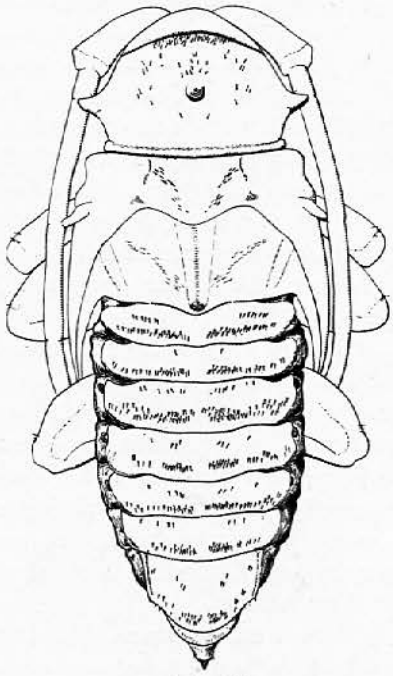


Fig. 134

Fig. 133. *Idactus ellioti* Gahan. Mature larva. Ampulla of abdominal tergite 2. Lateral aspect.

Fig. 134. *Idactus ellioti* Gahan. Pupa. Dorsal aspect.

The larvae tunnel in the inner bark and cambium until mature, and enter the sapwood to pupate at a depth of ½ to 1 inch. In small branches of a diameter of about 2 inches the pupal cell may be next to the central pith.

The pupal cell is oval and parallel to the wood fibres. The prepupal tunnel is empty except for the last ½ inch leading to the cell, in which region it is tightly packed with coarse fibres and lined with fine fibres (Pl. III, fig. 2); the pupal cell also has a lining of fine fibres.

Before pupating, the larva makes an almost complete circular excision ¾ to 1 inch in diameter in the thick corky bark opposite the prepupal tunnel (Pl. VI, fig. 1). The adult may or may not emerge by the prepupal tunnel: it sometimes excavates an independent exit hole from the distal end of the cell, but this tunnel always comes to the surface beneath the prepared excision in the bark. If present, the bark

plug is pushed out by the beetle, but usually it falls off before the beetle emerges. The pupal period is about ten days and the life-cycle approximately three months (G.H.T.).

Recent observations made by the author correspond very closely to those made by G. H. Thompson. It was the author's experience, however, in the dry savannah around Wenchi, that trees which had been severely burned or scorched by fire were far more susceptible to attack than those which had not. In some instances the bark had been charred to such an extent that it was extremely brittle and had become almost entirely loosened from the wood; yet, beneath the loose bark there were numerous larvae.

In addition to the circular excisions in the bark, it was also noticed that the larvae, before pupating, had built up an inverted, subconical, nest-like barrier of wooden fibres and frass (Pl. IX, fig. 2), presumably in order to effect contact between the sapwood and the loose bark, thereby gaining more protection against birds and insect predators.

Material studied. 3 L, 2 P (adults reared), Uganda, 1953, from *Polyscias fulva*, J.C.M.G. leg., in coll. B.M.; 6 L, 2 P, 1 I, Tanganyika, Tanga, xi.1951, from *Hevea*, R. C. H. Sweeney leg., in coll. B.M.; 8 L, 2 P, 1 I, Gold Coast, 9.iii.1945, from *Cussonia longissima*, G. H. T. Thompson leg., in coll. G.H.T.; 12 L, 2 P, 3 I, Gold Coast, Sawsaw, 6.iii.1955, from *Cussonia nigerica*, E.A.J.D. leg., in coll. B.M.

References. None available.

Lasiopezus sordidus (Olivier)

Distribution. ETHIOPIAN REGION: Gold Coast, Ivory Coast, Senegal, Uganda.

Mature larva (fig. 135). Differs from that of *Idactus ellioti* Gahan in having a more robust form (length up to 35 mm.; maximum breadth (at prothorax) 10·5 mm.) and

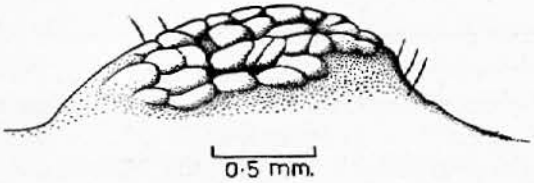


Fig. 135. *Lasiopezus sordidus* (Olivier). Mature larva. Ampulla of abdominal tergite 2. Lateral aspect.

tubercles on the dorsal ampullae which are only feebly raised, somewhat flattened, rugose, shining and non-spiculate (fig. 135). In addition, the front margin of the prothorax is more densely setose and the spiculate area of the pronotum is distinctly orange-brown.

Host plant: *Lannea stuhlmannii* (J.C.M.G.).

Material studied. 2 L, 1 I, Uganda, from *Lannea*, J.C.M.G. leg., in coll. B.M.

References. None available.

Lasiopezus longimanus (Thomson)

Distribution. ETHIOPIAN REGION: Angola, Belgian Congo, Ivory Coast, Natal, Senegal, Tanganyika.

Adult. Length 18–30 mm. Almost entirely covered with brown pubescence, except

pronotum and apical fourth of elytra which are white. *Head* with antennae twice as long as body in male, slightly longer than body in female. *Prothorax* with a pair of stout lateral tubercles; disc bearing five small tubercles. Mesosternum with coxal cavities open externally. *Elytra* each with an elongate longitudinal tubercle on basal fourth. *Legs* with front tarsi broadened and densely setose in male; middle tibiae grooved; tarsal claws simple basally.

Mature larva. Extremely similar to that of *L. sordidus* (Olivier), from which it differs in having a glabrous, longitudinal, median furrow on labrum. In addition, the spiracles are more broadly oval.

Host plants: *Coffea* (Bredo, 1939); *Lannea kerstingii* (J.C.M.G.).

Material studied. 1 L, Uganda, 1953, from *Lannea kerstingii*, J.C.M.G. leg., in coll. B.M.

References. Bredo, 1939 (Biol.); Lepesme and Villiers, 1944 (Biol.).

Lasiopezus marmoratus (Olivier)

Distribution. ETHIOPIAN REGION: Belgian Congo, Gold Coast, Kenya, Republic of the Sudan, Rhodesia, Senegal, Transvaal.

Mature larva. Very similar to that of *L. sordidus* (Olivier), from which it may be distinguished by the presence of paramedian micro-spiculate areas on the posterior region of the eusternum.

Host plant: *Lannea welwitschii* (E.A.J.D.).

Material studied. 4 L, 3 I, Gold Coast, Trumiso, 4.iv.1955, from *Lannea welwitschii*, E.A.J.D. leg., in coll. B.M.

References. None available.

Lasiopezus nigromaculatus Quedenfeldt (=**marmoratus** Distant)

Distribution. ETHIOPIAN REGION: Angola, Belgian Congo, Ethiopia, Natal, Senegal.

Mature larva. No material available. For generic characters see key, p. 26.

Host plant: *Coffea caenphora* (Lepesme and Villiers, 1944).

References. Bredo, 1939 (Biol.); Lepesme and Villiers, 1944 (Biol.); Morstatt, 1937 (Biol.); Mühlmann, 1954 (Biol.).

Lasiopezus variegator (Fabricius)

Distribution. ETHIOPIAN REGION: Belgian Congo, Cameroons, French Guinea, Senegal.

Mature larva. No material available. For generic characters see p. 26.

Host plant: *Coffea kouilensis* (Lepesme and Villiers, 1941).

References. Lepesme and Villiers, 1941 (Biol.), 1944 (Biol.); Morstatt, 1937 (Biol.); Mühlmann, 1954 (Biol.).

Latisternum strandi Breuning

Distribution. ETHIOPIAN REGION: Kenya.

Mature larva. Similar to that of *Idactus ellioti* Gahan, from which it may readily be distinguished by the numerous long, fine epistomal setae and the testaceous hypostoma.

Host plant: *Manilkara cuneifolia* (J.C.M.G.).

Material studied. 1 L (adult reared), Kenya, Kwale (coast), 1954, from felled log of *Manilkara cuneifolia*, J.C.M.G. leg., in coll. B.M.

References. None available.

Latisternum macropus Jordan

Distribution. ETHIOPIAN REGION: Belgian Congo, Gold Coast, Uganda.

Mature larva. Until a longer series of larvae is available the larva of this species cannot be distinguished from that of *L. strandi* Breuning.

Host plant: *Trichilia prieuriana* (E.A.J.D.).

Material studied. 1 L, 1 I, Gold Coast, Offinsu, 11.iii.1955, from log of *Trichilia prieuriana*, E.A.J.D. leg., in coll. B.M.

References. None available.

Oeax lichenea Duvivier

Distribution. ETHIOPIAN REGION: Cameroons, Gold Coast, Uganda.

Mature larva (fig. 136). This larva may be distinguished from those of the remaining genera of the Ancylonotini by the absence of moniliform tubercles on the dorsal

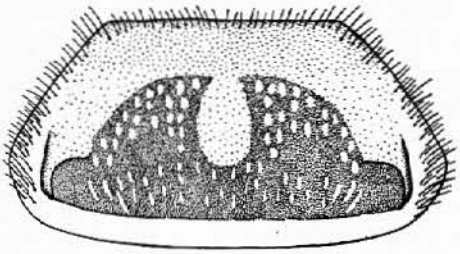


Fig. 136. *Oeax lichenea* Duvivier. Mature larva. Prothorax. Dorsal aspect.

ampullae and by the spiculate area of the pronotum (fig. 136) which is broadly interrupted medially by an oval glabrous area.

Host plant: *Bosqueia phoberos* (J.C.M.G.).

Material studied. 1 L, Uganda, W. Mabria, 1954, from *Bosqueia phoberos*, J.C.M.G. leg., in coll. B.M.

References. None available.

Oeax triangularis (White)

Distribution. ETHIOPIAN REGION: South Africa, Tanganyika, Uganda.

Mature larva (fig. 137). Similar to that of *O. lichenea* Duvivier, from which it differs in having the spiculate area of the pronotum only narrowly and irregularly interrupted medially and in being equipped with spine-like, ferruginous processes above the spiracles (fig. 137). [Length up to 22 mm.; maximum breadth (at prothorax) 4·75 mm.]

These minute sclerotised processes, which appear to be highly modified setae, are somewhat variable in number, being most numerous on the prothorax (six to twelve

pairs), whereas the body segments bear only one or two pairs. They appear to be of a sensory nature and their position, particularly on the prothorax, suggests that it is unlikely that they are instrumental in locomotion. These processes have not been observed in larvae of any other cerambycid so far examined.

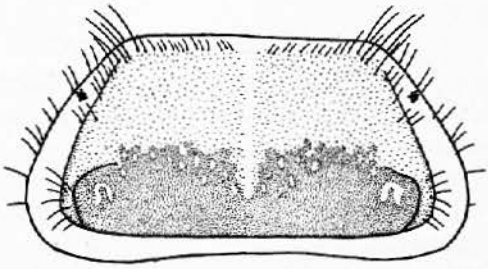


Fig. 137. *Oeax triangularis* (White). Mature larva. Prothorax. Dorsal aspect.

Host plants: *Bosqueia* sp., *Croton macrostachys* (J.C.M.G.).

Material studied. 3 L, 1 I, Tanganyika, 1955, from log of *Croton macrostachys*, J.C.M.G. leg., in coll. B.M.

References. None available.

Dorcaschematini

Olenecamptus macari Lameere

Distribution. ETHIOPIAN REGION: Belgian Congo, Uganda.

Mature larva. Length up to 30 mm.; maximum breadth (at prothorax) 6 mm. *Head* moderately depressed, slightly elongate, widest at middle and narrowed and slightly constricted posteriorly. Frontal sutures indistinct; antennal foramen closed behind. Mouthframe rather broadly sclerotised, ferruginous. Frons smooth, testaceous behind front margin; six epistomal setae present. One pair of ocelli present; lens rather indistinct, obscured by sclerotisation of gena; pigmented spot indistinct. Hypostoma pale ferruginous, posterior half convex, anterior half steeply sloping down to front margin; several rather long, scattered setae present; sutures distinct, ferruginous. Gular region indiscernible. Antenna 3-segmented; segment 3 elongate. Maxilla with segments 2 and 3 subequal. Labial palpi with segment 2 less than half length of segment 1. Mentum not distinct from submentum. *Prothorax* with pronotum microgranulate and shining on posterior half. *Abdomen* with each dorsal ampulla bearing a single transverse furrow and two transverse rows of glabrous, elongate tubercles. Tergite 9 unarmed. Anus trilobate. Epipleurum protuberant on all segments. Pleural tubercle without sclerotised pits. *Legs* absent. *Spiracles* with peritreme broadly oval and without marginal chambers. Larvae of this tribe appear to be very closely related to those of the Prosopocerini, particularly in the modification of the hypostoma, but the absence of distinct frontal sutures and the complete antennal foramen suggests that this tribe should be placed, as has here been done, between the Monochamini and the Prosopocerini.

Host plant: *Bosqueia* sp. (J.C.M.G.).

Material studied. 3 L, Uganda, from *Bosqueia*, J.C.M.G. leg., in coll. B.M.

References. None available.

Olenecamptus bilobus (Fabricius)

Distribution. MADAGASCAN REGION: Mauritius. ORIENTAL REGION: Seychelles. This species is also widely distributed throughout India, Ceylon, Siam, Burma, New Guinea and China.

Mature larva. No material available. Gardner (1927) gives the following description: "Head capsule depressed, with sides diverging slightly to near middle and constricted on posterior half. Gula distinct, elevated, narrow posteriorly. Hypostoma raised into a posterior transverse ridge. Without distinct ocelli. Antennal ring not bisected by frontal suture. Posterior zone of pronotum velured, with a nearly straight anterior margin. Abdominal ampullae with only one distinct transverse line dorsally, the tubercles smooth, somewhat irregular and arranged for the most part in two transverse lines. No caudal spine. Anus trilobed. Spiracles small, broadly oval. Length of larva about 23 mm. Body slender and elongate."

Pupa. No material available. Gardner (1927) gives the following description: "Thoracic tergites with sparse short scattered setae. Abdominal tergites with scattered sharp spinules. Caudal segment with an erect, slightly curved spine."

Host plants: *Artocarpus blumei, A. chaplasha, A. hirsuta, A. integer, Bauhinia, Ficus benghalensis, F. carica, F. elastica, F. glomerata, F. infectoria, F. laccifera, F. religiosa, F. roxburghii, F. rumphii, F. tjakela, Litsea polyantha, Mangifera indica, Morus indica* (Beeson and Bhatia, 1939); *Ficus lacor, F. retusa* (Gressitt, 1942).

Biology. Adults are active by day and feed by gnawing the green bark of shoots or by eating holes in the blade of large leaves such as those of *Ficus religiosa.* In North India the life-cycle is annual with an extended emergence period from May to November; a portion of the brood may be prolonged to the second year, but if the wood dries out considerably, these belated individuals do not survive (Beeson and Bhatia, 1939). Dammerman (1913) gives the life-cycle as being only two months.

According to Gressitt (1942) the larval galleries extend through both the bark and the sapwood, the pupal cell, which is long and curved, being in the solid wood. Adults are active both during the daytime and at night and are attracted to artificial light.

Economic importance. Olenecamptus bilobus (Fabricius) mainly attacks species of *Ficus*, breeding in dead wood, but also attacking living branches. It is an occasional pest of cultivated fig.

Control. Gressitt (1942) suggests the burning of dead branches and infested living parts, or the extraction of larvae from the latter. Also the killing of mating adults on branches at night.

References. Beeson, 1941 (Biol.); Beeson and Bhatia, 1939 (Biol.); Dammerman, 1913 (Biol.); Gardner, 1927 (L fig., P, Biol.), 1931 (L); Gressitt, 1942 (Biol.); Maxwell-Lefroy, 1909 (Biol.).

Olenecamptus hofmanni Qued, var. **elegans** Aurivillius

Distribution. ETHIOPIAN REGION: Angola, Belgian Congo, Gold Coast, Nyasaland, Tanganyika, Transvaal.

Mature larva. Indistinguishable from that of *O. macari* Lameere, at least until additional material has been obtained.

Host plant: *Celtis soyauxii* (E.A.J.D.).

Biology. Before pupating, the larva excavates a right-angled pupal cell about 1 inch deep in the sapwood. Adults emerge in February and March.

Material studied. 2 L, 3 I, Gold Coast, near Sunyani, Bosumkese reserve, 21.ii.1955, from *Celtis soyauxii*, E.A.J.D. leg., in coll. B.M.

References. None available.

Acmocerini

Acmocera olympiana Thomson

Distribution. ETHIOPIAN REGION: Angola, French Cameroons, Gold Coast, Uganda.

Mature larva (fig. 138). Length up to 23 mm.; maximum breadth (at prothorax) 6·5 mm. *Head* moderately depressed and elongate, subparallel-sided and very slightly

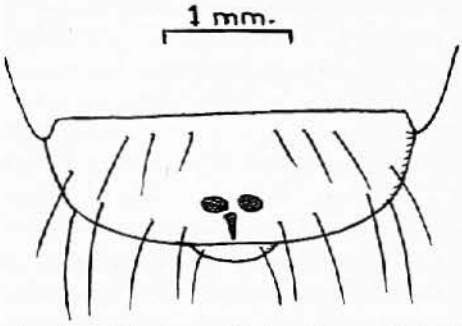


Fig. 138. *Acmocera olympiana* Thomson. Mature larva. Abdominal tergite 9. Dorsal aspect.

constricted at middle. Frontal sutures indistinct; antennal foramen closed posteriorly. Mouthframe very broadly sclerotised, ferruginous. Frons smooth, testaceous behind front margin; six epistomal setae present. One pair of ocelli present; lens round, strongly convex and partly obscured by sclerotisation of gena; pigmented spot indistinct. Hypostoma largely testaceous but broadly and irregularly ferruginous anteriorly; entirely flat and bearing two to three pairs of setae on each side of gula. Gular region a pale median line. Antenna 3-segmented; segment 3 elongate. Labial palpi with segment 2 about half length of segment 1. Mentum distinct from submentum. *Prothorax* with pronotum entirely smooth, glabrous and pale testaceous on posterior half; sternellum devoid of spicules, asperities and pubescence. *Abdomen* with each dorsal ampulla bearing two transverse furrows, the posterior one bordered with elongate glabrous tubercles. Tergite 9 bearing a minute, median, vertical, spine-like tubercle near posterior margin, anterior to which is a pair of paramedian, flat, oval, ferruginous sclerotised plates (fig. 138). Anus trilobate. Epipleurum protuberant on all segments. Pleural tubercle with a pair of sclerotised pits which are rather indistinct. *Legs* absent. *Spiracles* with peritreme thin, broadly oval and without marginal chambers.

Host plants: *Celtis, Triplochiton scleroxylon* (E.A.J.D.).

Biology. The larva feeds subcortically, but when mature it tunnels for about

1 inch straight into the sapwood and then turns at right angles to the grain of the wood where the pupal cell is constructed. Adults emerge in February and March (E.A.J.D.).

Material studied. 2 L, 1 I, Gold Coast, Bosumkese reserve near Sunyani, 22.ii.1955, from *Celtis*, E.A.J.D. leg., in coll. B.M.; 4 L, Gold Coast, Dwinasi, Kwapong, 15.iii.1955, from *Triplochiton scleroxylon*, E.A.J.D. leg., in coll. B.M.

References. None available.

Acmocera compressa (Fabricius)

Distribution. ETHIOPIAN REGION: Angola, Belgian Congo, French Guinea, Gold Coast, Ivory Coast, Nigeria.

Mature larva. Extremely similar to that of *A. olympiana* Thomson, from which it may be distinguished as follows. *Abdomen* with tergite 9 with the postero-median tubercle shorter and less conical and the paramedian sclerotised plates subcircular.

Host plants: *Coffea excelsa* (Lepesme, 1939); *Sterculia* sp. (E.A.J.D.); *Celtis soyauxii* (J.C.M.G.); *Afzelia bella, Albizia sassa, Combretodendron africanum, Discoglypremna caloneura, Pentaclethra macrophylla, Phyalodiscus bancoensis, Piptadenia africana* (Jover, 1953).

Material studied. 1 L, 1 I, Gold Coast, near Kumasi, 1.iii.1955, from *Sterculia* sp., E.A.J.D. leg., in coll. B.M.

References. Jover, 1953 (Biol.); Lepesme, 1939 (Biol.); Lepesme and Villiers, 1941 (Biol.), 1944 (Biol.); Mühlmann, 1954 (Biol.).

Acmocera conjux Thomson

Distribution. ETHIOPIAN REGION: Belgian Congo, French Equatorial Africa, Gold Coast, Ivory Coast, Uganda.

Host plants: *Celtis soyauxii, Cistanthera papaverifer, Cleidion gabonicum, Hymenostegia afzelii* (G.H.T.); *Afzelia bella, Albizia sassa, Berlinia acuminata, Theobroma, Cleistopholis patens, Discoglypremna caloneura, Ficus polita, Funtumia latifolia, Musanga smithii, Turraenthus africana, Xylopia rubescens* (Jover, 1953).

Predators. Hemiptera: *Rhinocoris nitidulus* F.

References. Jover, 1953 (Biol.).

Acridoschema isidori Chevrolat

Distribution. ETHIOPIAN REGION: Angola, Gold Coast, Ivory Coast.

Mature larva (fig. 139). Similar to those of *Acmocera* species, from which it may be distinguished by the abdominal tergite 9 which bears only a single large, round, smooth, median, feebly concave, sclerotised plate (fig. 139).

Host plants: *Celtis soyauxii, Ficus* sp. (E.A.J.D.).

Biology. The larvae feed subcortically and when mature they excavate a shallow oval concavity in the bark in which they pupate; this concavity is surrounded by a barrier of interlaced wooden fibres. Adults emerge in February and March (E.A.J.D.).

Material studied. 5 L, 1 I, Gold Coast, Sunyani, 23.ii.1955, from logs of *Celtis*

soyauxii, E.A.J.D. leg., in coll. B.M.; 5 L, Gold Coast, Kumasi, 1.iii.1955, from logs of *Ficus* sp., E.A.J.D. leg., in coll. B.M.

References. None available.

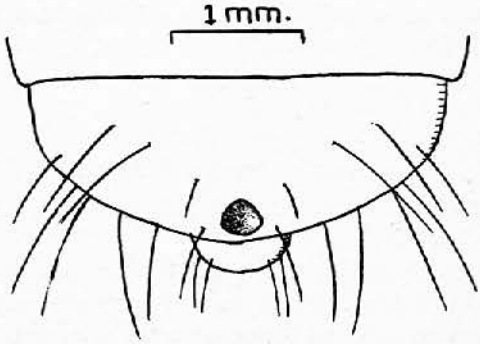


Fig. 139. *Acridoschema isidori* Chevrolat. Mature larva. Abdominal tergite 9. Dorsal aspect.

Niphonini
Larval Characters

Head moderately depressed; antenna 3-segmented; antennal foramen closed posteriorly. One pair of ocelli present. Hypostoma with anterior region steeply (only rather feebly in *Pterolophia*) sloping down to anterior margin, the front margin in a lower plane than that of hind margin. *Prothorax* with pronotum and sternellum devoid of asperities and spicules. *Abdomen* with tergite 9 either with urogomphi (fig. 140) or unarmed. Pleural tubercles without sclerotised pits. Anus trilobate.

Pterolophia (=**Theticus**) **biarcuata** Thomson

Distribution. ETHIOPIAN REGION: Belgian Congo, Gold Coast, Ivory Coast, Nigeria, Sierra Leone.

Mature larva (fig. 140). Length up to 16 mm.; maximum breadth (at prothorax) 3·1 mm. *Head* moderately depressed and elongate, with sides converging for posterior fourth. Frontal sutures indistinct; antennal foramen closed posteriorly; mouthframe rather strongly and broadly sclerotised; anterior half of frons ferruginous and smooth. One pair of ocelli present; lens convex, protuberant but partly obscured by sclerotisation of gena; pigmented spot indiscernible. Hypostoma convex but with anterior region only feebly sloping; a pair of paramedian setae present; gular region with a thin, pale, median cleavage line. Antenna 3-segmented, with a well-developed hyaline supplementary process. Maxilla with palpal segment 3 acutely conical, almost as long as segment 2. Labial palpi with segment 2 only half length of segment 1. Clypeus glabrous. *Prothorax* with posterior part of pronotum glabrous and smooth. *Abdomen* with each dorsal ampulla with two transverse furrows and three rows of glabrous moniliform tubercles. Tergite 9 (fig. 140) bearing a pair of slender urogomphi which are placed caudally. Epipleurum slightly protuberant on all segments; pleural tubercle without sclerotised pits. Anus trilobate. *Legs* absent. *Spiracles* subcircular, the peritreme thick and without marginal chambers.

Pupa. Similar to those of the Mesosini, from which it differs as follows. Length

up to 14 mm.; maximum breadth 3·9 mm. *Prothorax* without lateral tubercles. *Elytra* placed almost parallel to abdomen. *Abdomen* with spines on tergites proportionately stouter and straight.

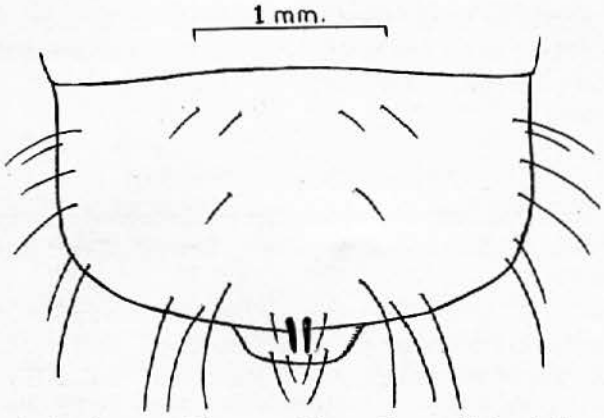


Fig. 140. *Pterolophia biarcuata* Thomson. Mature larva. Abdominal tergite 9. Dorsal aspect.

Host plant: *Millettia* sp. (E.A.J.D.).

Material studied. 24 L, 5 P, 3 I, Gold Coast, Samreboi, Adjum, 24.iii.1955, from *Millettia* sp., E.A.J.D. leg., in coll. B.M.

References. None available.

Niphona picticornis Mulsant

Distribution. PALAEARCTIC REGION: Algeria, Egypt, Morocco, Tunisia.

Mature larva. Similar to that of *Pterolophia biarcuata* Thomson, from which it may be distinguished as follows. Length up to 23 mm.; maximum breadth (at prothorax) 4·8 mm. *Head* with temples ferruginous behind ocelli which are distinct. Hypostoma testaceous anteriorly and ferruginous for the greater part posteriorly, the anterior region steeply sloping down to front margin. *Abdomen* with tergite 9 unarmed.

Host plants: *Pistacia lentiscus, P. terebinthus, Ficus, Rhamnus alaternus, Laurus nobilis* (Peyerimhoff, 1919); *Ulmus, Quercus, Punica granatum* (Picard, 1919); *Spartium, Calycotome, Phoenix* (Balachowsky and Mesnil, 1935–1936); *Genista* and *Pinus* (Alfieri, 1916).

Biology. Larvae feed in dead boles and branches. Adults are to be found from spring to autumn on host plants or under stones (Villiers, 1946).

Predators. Diptera: Larvae are attacked by *Laphria maroccana* F. (Mulsant and Revelière, 1860).

Material studied. 2 L, 1 I, Corsica, 1955, from *Genista*, in coll. B.M.

References. Alfieri, 1916 (Biol.); Ancey, 1870 (Biol.); Balachowsky and Mesnil, 1935–1936 (I fig., Biol.); Caillol, 1914 (Biol.); Lepesme, 1947 (I fig., Biol.); Mendizabal, 1943 (Biol.); Mühlmann, 1954 (Biol.); Mulsant and Revelière, 1860 (L, Biol., Paras.); Perris, 1877 (P); Petroff, 1920 (Biol.); Peyerimhoff, 1919 (Biol.); Picard, 1919 (L fig.,

P fig., Biol.); Villiers, 1946 (I fig., Biol.); Widiez, 1932 (Biol., Contr.); Xambeu, 1898–1902 (L, P, Biol.).

Niphona cylindracea White

Distribution. MADAGASCAN REGION: Mauritius and La Réunion.

Mature larva. No material available. For generic characters see key, p. 24.

Host plant: *Casuarina* (A. J. E. Orian).

References. None available.

Sthenias cylindrator (Fabricius)

Distribution. ETHIOPIAN REGION: Belgian Congo, Cameroons, Ivory Coast, Nigeria, Nyasaland, Republic of the Sudan, Rhodesia, Senegal, Sierra Leone, Swaziland, Tanganyika, Uganda.

Adult. Length 15–22 mm. Elongate, cylindrical, covered with greyish white pubescence, with black, brown or yellowish markings. Prothorax almost entirely covered with white pubescence except for two black basal marks. Elytra greyish white except for base and apex, which are broadly orange-brown with several tufts of long orange pubescence. *Head* with antennae lacking a cicatrix. *Thorax* with mesosternum with coxal cavities open externally. *Elytra* broadly rounded and explanate apically. *Legs* with middle tibiae entire; tarsal claws divergent, simple basally.

Host plants: *Aleurites* (E. W. John); *Coffea robusta* (Lepesme and Villiers, 1941); *Nerium oleander* (Harris, 1939).

Economic importance. Adults of this species cause serious damage to branches of *Nerium oleander* which they girdle and gnaw through with their mandibles. In the case of *Coffea* (Gowdey, 1916), twigs up to $\frac{3}{4}$ inch in diameter are completely girdled, with the result that the part of the branch beyond the girdle dies. Stems of young *Aleurites* are sometimes girdled by adults of this species (Ritchie, 1935). According to E. W. John (Tung Oils (Pty.) Ltd.), the beetles gnaw right through branches up to an inch thick, and often select growth a year old (i.e. last season's growth on the healthiest trees). They then lay their eggs in the branch they have cut off.

Control. All twigs and dead wood should be burned.

References. Bredo, 1939 (Biol.); Gowdey, 1916 (Biol.); Harris, 1939 (Biol.); Lepesme, 1939 (Biol.), 1948 (Biol.); Lepesme and Villiers, 1941 (Biol.), 1944 (Biol.); Mayné, 1923 (Biol.); Mühlmann, 1954 (Biol.); Ritchie, 1935 (Biol.); Vrijdagh, 1930 (Biol.).

Pseudoalbana lameerei Pic

Distribution. PALAEARCTIC REGION: Arabia, Egypt.

Host plant: *Colocynthis citrullus.*

Biology. Adults emerge in mid-April.

References. Adair, 1917 (Biol.).

Prosopocerini

Prosopocera (s.g. **Prosopocera**) **bipunctata** (Drury) (=**fronticornis** (Fabricius))

Distribution. ETHIOPIAN REGION: Fernando Póo, Gold Coast, Gulf of Guinea, Ivory Coast, Nigeria, Sierra Leone.

Mature larva (fig. 141). Form very elongate, rather slender, subcylindrical. Length up to 47 mm.; maximum breadth (at prothorax) 9 mm. *Head* (fig. 141) scarcely depressed, widest at middle (maximum head-width 5·2 mm.) and distinctly constricted near posterior third. Antennal foramen open behind; inner margin strongly produced beyond basal membrane of antenna. Mouthframe moderately sclerotised. Frons entirely testaceous except extreme anterior margin, with setiferous pores numerous, simple and not longitudinally impressed. Epistoma bearing from twelve to twenty-four long fine setae. One pair of ocelli present; lens large, round, convex; pigmented spot distinct. Hypostoma (fig. 141) pale ferruginous, convex; anterior half rather steeply sloping down to front margin, the front margin in a lower plane than hind margin; anterior slope bearing numerous scattered, very long, fine setae; sutures distinct, darkly ferruginous and slightly incurved. Gula region with a pale median cleavage line. Antenna with segment 2 slightly transverse; segment 3 slender, very elongate, as long as segment 2; supplementary process less than one-fourth length of segment 3. Labrum bearing very dense, fine, soft setae. Maxilla with segment 3 of palp conical, shorter than segment 2. Labial palpi with segment 2 cylindrical, elongate, as long as segment 1. Mentum not distinct from submentum. *Prothorax* with posterior half of pronotum milky white and faintly and coarsely longitudinally striate; a pair of deep sublateral impressions present. Prosternum smooth, with scattered long fine setae. *Abdomen* with dorsal ampullae each with two transverse furrows and four (at least medially) rows of glabrous moniliform tubercles which are not interrupted by a median furrow. Ventral ampullae with two rows of tubercles. Segment 9 unarmed. Epipleurum protuberant on all segments. Pleural tubercle without sclerotised pits. *Legs* vestigial. *Spiracles* with peritreme broadly oval and with numerous marginal chambers which occupy the entire posterior margin.

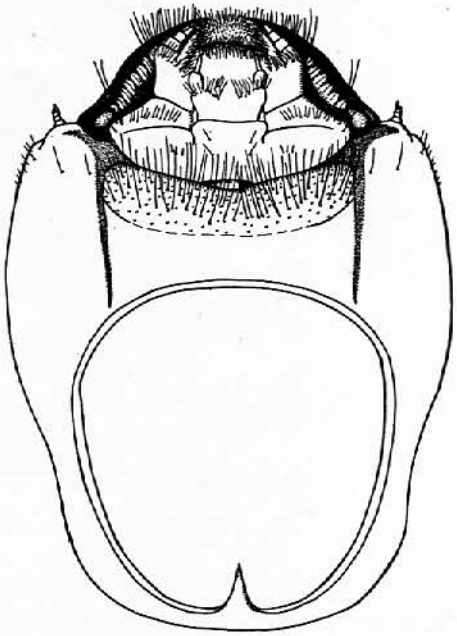


Fig. 141. *Prosopocera bipunctata* (Drury). Mature larva. Head. Ventral aspect.

Host plants: *Baphia pubescens* (G.H.T.); *Baphia nitida, Berlinia acuminata, Macrolobium heudelotianum, Tarrietia utilis* (Jover, 1953).

Biology. The larvae tunnel beneath the bark until about half-grown before entering the wood. In a small pole they had tunnelled mostly near the centre (Pl. III, fig. 3). The oval pupal cell is also situated near the centre of the stem in small material, and the prepupal tunnel as well as the distal end of the cell is lined with fibres. Emergence is affected through the prepupal tunnel during March. The duration of the life-cycle is apparently three months (G.H.T.).

Predators. Larvae of the trogositid *Gymnochilia squamosum* Murray are predatory on larvae and pupae of *P. bipunctata.*

Material studied. 5 L, Gold Coast, 18.i.1946, from *Baphia pubescens*, G.H.T. leg., in coll. G.H.T.

References. Schiödte, 1876 (P); Jover, 1953 (Biol.).

Prosopocera (s.g. **Prosopocera**) **lactator** (Fabricius)

Distribution. ETHIOPIAN REGION: Angola, Belgian Congo, Ethiopia, Ivory Coast, Kenya, Natal, Nigeria, Nyasaland, Senegal, Uganda.

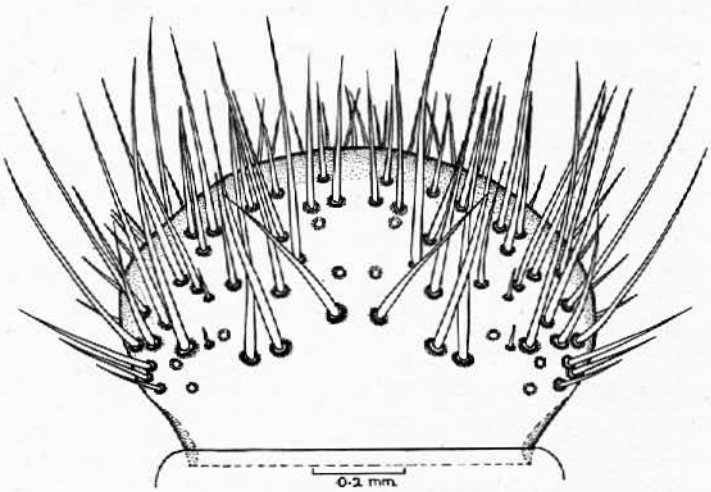


Fig. 142. *Prosopocera lactator* (Fabricius). Mature larva. Labrum. Dorsal aspect.

Mature larva (fig. 142). Similar to that of *P. bipunctata* Drury, from which it differs as follows. Length up to 35 mm.; maximum breadth (at prothorax) 6·1 mm. *Head* with labrum bearing stiff, bristle-like setae which are widely separated and which arise from ferruginous basal discs (fig. 142). Inner margin of antennal foramen not produced beyond basal membrane.

Host plant: *Gelonium* (J.C.M.G.).

Material studied. 1 L, Kenya, Ngong, 1953, from living *Gelonium*, J.C.M.G. leg., in coll. B.M.

References. None available.

Prosopocera (s.g. **Prosopocera**) **bioculata** Hintz

Distribution. ETHIOPIAN REGION: Angola, Belgian Congo, Cameroons, French Equatorial Africa, Uganda.

Mature larva. Similar to that of *P. bipunctata* (Drury), from which it may be distinguished by the testaceous, sparsely setose hypostoma.

Host plant: *Funtumia* (Vrijdagh, 1930).

Material studied. 1 L, 1 I, Uganda, Kalinzu, 1955, J.C.M.G. leg., in coll. B.M.

References. Lepesme, 1948 (Biol.); Vrijdagh, 1930 (Biol.).

Prosopocera (s.g. **Prosopocera**) **cylindrica** Aurivillius

Distribution. ETHIOPIAN REGION: Belgian Congo, Cameroons, Uganda.
Host plant: *Acalypha neptunica* (J.C.M.G.).
References. None available.

Protomocerus gregorii Gahan

Distribution. ETHIOPIAN REGION: British East Africa, Kenya.

Mature larva (fig. 143). Distinguishable from that of *Prosopocera bipunctata* (Drury) as follows. Length 34 mm.; maximum breadth (at prothorax) 6·1 mm. *Head* with hypostomal setiferous pores very deep. *Abdomen* (fig. 143) with tergite 9 bearing a small, median, oval, sclerotised, ferruginous disc which is sometimes subconical.

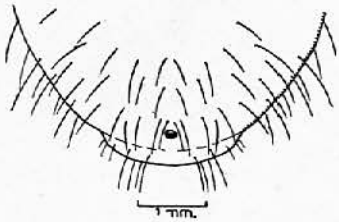


Fig. 143. *Protomocerus gregorii* Gahan. Mature larva. Abdominal segment 9. Dorsal aspect.

Material studied. 3 L (adult reared), Kenya, 1953, from unknown stem, J.C.M.G. leg., in coll. B.M.
References. None available.

Ochropyga lepesmei Villiers

Distribution. ETHIOPIAN REGION: Lower Congo.
Host plant: *Coffea robusta* (Lepesme, 1939).
References. Lepesme, 1939 (Biol.); Lepesme and Villiers, 1941 (Biol.), 1944 (Biol.); Mühlmann, 1954 (Biol.).

Alphitopola maculosa Pascoe

Distribution. ETHIOPIAN REGION: Cape Province, Natal, Transvaal.
Host plants: *Citrus auriantium* and *C. nobilis*.
References. Distant, 1904 (Biol.); Ormerod, 1889 (Biol.).

Oculariini

Larvae of this tribe show closer affinities towards the Dorcadionini, next to which this tribe has here been placed.

Sternotomini

Sternotomis amabilis Hope and var. **submaculata** Kolbe

Distribution. ETHIOPIAN REGION: Angola, Cameroons, Gold Coast, Ivory Coast, Liberia, Togo.

Mature larva (figs. 144, 145). Form elongate, rather slender, subcylindrical, scarcely tapering posteriorly. Length up to 44 mm.; maximum breadth (at prothorax)

8·75 mm. *Head* (fig. 144) strongly depressed, with sides parallel for anterior two-thirds and very strongly converging for posterior third (maximum head-width 5·2 mm.); frons broadly and darkly ferruginous; frontal sutures distinct and abruptly angled; antennal foramen very narrowly open posteriorly. Temples with a conspicuous conical projection some distance behind antennal foramen. Mouthframe very strongly and broadly sclerotised and ferruginous; twelve to sixteen epistomal setae present.

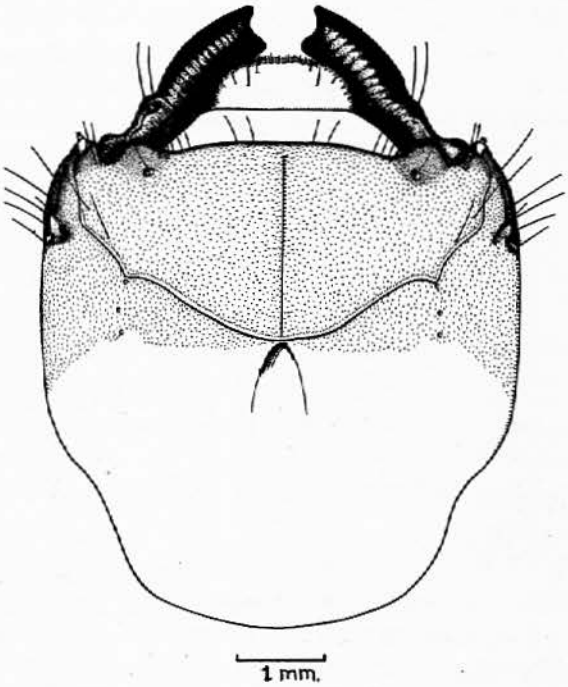


Fig. 144. *Sternotomis amabilis* Hope. Mature larva. Head. Dorsal aspect.

Mandible slender, about two and one-half times as long as basal width, with cutting edge broadly emarginate and bearing two long setae on middle of outer face. Two pairs of widely separated ocelli present; lens oval, strongly protuberant; pigmented spot indistinct. Hypostoma entirely and darkly ferruginous, smooth and with at least eight scattered setiferous pores; posterior margin very thick and raised; sutures dark, slightly curved. Gular sutures indistinct but a pale median cleavage line present. Antenna small, 3-segmented; segment 2 slightly transverse; segment 3 slightly elongate, less than half length of segment 2; supplementary process extremely short. Labrum transversely oval, densely fringed with setae anteriorly. Ventral mouthparts with strongly sclerotised ferruginous areas. Maxilla with segment 3 elongate, conical about half length of segment 2. Labial palpi with segment 2 elongate, conical, about half length of segment 1. *Prothorax* depressed subrectangular; pronotum entirely faintly rugose, bearing a few scattered pale setae; anterior third with a broad transverse pale ferruginous band; sublateral impressions distinct, ferruginous; posterior area testaceous, glabrous. *Mesonotum* smooth, glabrous. *Metanotum* with a single transverse

furrow and two rows of glabrous shining, moniliform tubercles. Prosternum rugose, sparsely setose, extensively ferruginous sublaterally. *Abdomen* with each dorsal ampulla bearing a single transverse furrow, the extremities of which are curved anteriorly and surrounded by large, round, glabrous, shining tubercles which become smaller

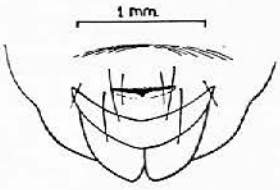


Fig. 145

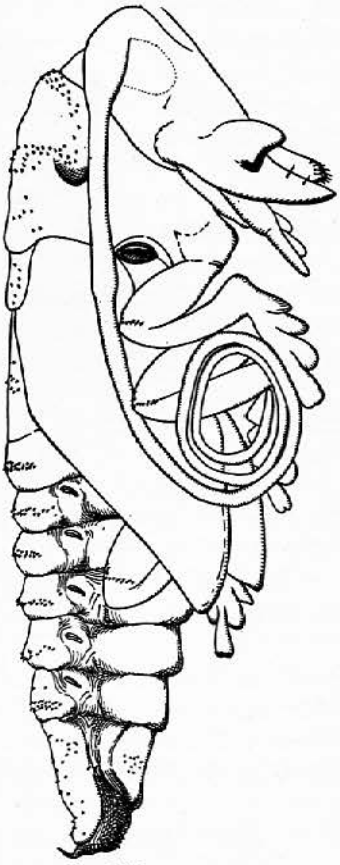


Fig. 146

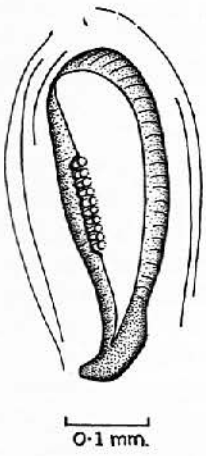


Fig. 147

Fig. 145. *Sternotomis amabilis* Hope. Mature larva. Abdominal segment 9. Dorsal aspect.
Fig. 146. *Sternotomis amabilis* Hope. Pupa. Lateral aspect.
Fig. 147. *Sternotomis amabilis* Hope. Pupa. Peritreme of abdominal spiracle.

medially. Ventral ampullae with two transverse rows of tubercles. Tergite 9 (fig. 145) bearing a narrow, transverse, ferruginous carina near posterior margin. Anus trilobed, the dorsal lobe slightly protuberant. Epipleurum protuberant on all segments. Pleural tubercle oval, without sclerotised pits; each bearing two very long setae and several minute setae. *Legs* vestigial, densely setose. *Spiracles* with peritreme broadly oval, moderately thick, ferruginous, the posterior half bearing a row of chambers.

Pupa (figs. 146, 147). Length 26 mm.; maximum breadth 8·5 mm. *Head* almost entirely visible from above, with vertex excavate between antennal tubercles and bearing two pairs of short setae; front with two pairs of stout spines between the inner

margins of the eyes; clypeus with a pair of stout setae near basal margin. Antennae extending to abdominal segments 2 or 3, where they are strongly curved ventrally to form one to three coils, the apices terminating near middle coxae. Eyes feebly convex, with one or two stout setae. Mandibles strongly curved, each with two stout setae near middle of outer face; in male specimens there is a stout, strongly protuberant tubercle on the dorsal face near the base. Labrum bearing several (at least twelve) stout setae along outer margin. *Pronotum* strongly tuberculate laterally, bearing numerous spiniform setae, especially around apices of lateral tubercles. *Mesonotum* smooth, with a few scattered similar setae on scutellum which is slightly protuberant. *Metanotum* with two converging rows of spines which are tuberculate basally; scutellar groove distinct. Elytra and wings extending to abdominal segment 4 or 5. *Abdomen* with tergites 1–6 each with a transverse row (interrupted medially) of stout spines (each tuberculate basally), anterior to which is a second but very incomplete row of similar spines. Tergites 7 and 8 with scattered similar spines subapically. Tergite 9 very short and produced posteriorly into a subvertical, curved, spine-like tubercle which is strongly sclerotised apically. Sternites bearing a few scattered setae. Pleura scarcely protuberant, each with at least three slender setae. *Legs* with a transverse row of stout setae near apex of each femur; hind femora extending to abdominal segment 5; tibiae placed at right angles to longitudinal axis of body. *Functional spiracles* present on abdominal segments 1–6, but vestigial pairs present on segments 7 and 8; peritreme narrow, almost reniform, the anterior margin slightly enlarged and the posterior margin bearing at least ten subcontiguous chambers (fig. 147).

This is the first time that marginal chambers have been observed in the spiracles of cerambycid pupae, although in certain groups of larvae they are not infrequent.

Host plant: *Ficus* sp. (G.H.T.).

Biology. G. H. Thompson has made the following observations. Recently dead or felled trees are attacked by this species. Oviposition takes place through a niche carved in the bark by the female. The site of the larval tunnel, site and construction of pupal chamber (including a circular preformed exit hole) are exactly similar to the other two species, *S. chrysoporas* Voet and *S. pulchra* Drury (Pl. VI, fig. 5).

The life-cycle is approximately three months and adults emerge during January and February.

Material studied. 3 L, 2 P, 1 I, Gold Coast, 14.xii.1945, from *Ficus*, G.H.T. leg., in coll. G.H.T.

References. None available.

Sternotomis variabilis Quedenfeldt

Distribution. ETHIOPIAN REGION: Angola, Belgian Congo, Uganda.

Mature larva (fig. 148). Separable from that of *S. amabilis* Hope by the characters given in the key, p. 30.

Host plants: *Hevea*, *Castilloa*, *Ficus*, *Manihot* (Vrijdagh, 1930); *Antiaris toxicaria*, *Bosqueia phoberos* (J.C.M.G.).

Material studied. 3 L, 3 P, Uganda, L. Victoria, Damba I., xi.1911, G. D. Hale Carpenter leg., in coll. B.M.

References. Lepesme, 1948 (Biol.); Vrijdagh, 1930 (Biol.).

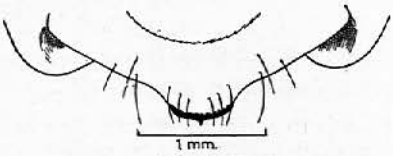


Fig. 148



Fig. 149

Fig. 148. *Sternotomis variabilis* Quedenfeldt. Mature larva. Abdominal segment 9. Dorsal aspect.

Fig. 149. *Sternotomis bohemanni* Chevrolat. Mature larva. Abdominal segment 9. Dorsal aspect.

Sternotomis bohemanni Chevrolat

Distribution. ETHIOPIAN REGION: Angola, Belgian Congo, Cameroons, Ethiopia, Kenya, Natal, Tanganyika, Transvaal, Zanzibar.

Mature larva (fig. 149). This larva may be distinguished from those of other known species by the acutely produced and strongly sclerotised process on tergite 9 (fig. 149).

Host plants: *Ficus elastica* (Aulmann, 1913); *Coffea arabica* (Lepesme and Villiers, 1941); *Antiaris toxicaria* (J.C.M.G.).

Material studied. 3 L, Kenya, Kwale, 1953, from log of *Antiaris toxicaria*, J.C.M.G. leg., in coll. B.M.

References. Aulmann, 1913 (Biol.); Distant, 1904 (Biol.); Lepesme, 1948 (Biol.); Lepesme and Villiers, 1941 (Biol.), 1944 (I fig., Biol.); Mühlmann, 1954 (Biol.).

Sternotomis andrewesi Breuning

Distribution. ETHIOPIAN REGION: Kenya, Tanganyika.

Mature larva (fig. 150). The larva of this species may be distinguished from those of other known species by the feebly rounded and narrowly sclerotised process on tergite 9 (fig. 150).

Host plant: *Ficus* (J.C.M.G.).

Material studied. 3 L (adult reared), Kenya, Ngong, 1953, from dead *Ficus*, J.C.M.G. leg., in coll. B.M.

References. None available.



Fig. 150

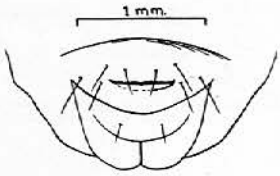


Fig. 151

Fig. 150. *Sternotomis andrewesi* Breuning. Mature larva. Abdominal segment 9. Dorsal aspect.

Fig. 151. *Sternotomis callais* Fairmaire. Mature larva. Abdominal segment 9. Dorsal aspect.

Sternotomis callais Fairmaire

Distribution. ETHIOPIAN REGION: Angola, Belgian Congo, Cameroons, French Equatorial Africa, Rio Muni.

Mature larva (fig. 151). Similar to that of *S. amabilis* Hope, from which it may be distinguished by the character given in the key, p. 30.

Host plants: *Coffea excelsa* (Lepesme and Villiers, 1941); *Musanga cecropioides* (J. Dahl).

Biology. The pupal cell, a pencil drawing of which was sent to the author by J. Dahl, appears to be essentially similar in construction to that of *S. amabilis* Hope.

Material studied. 3 L, 1 I, French Cameroons, Réserve Forestière du Nyong, 14.xii.1949, from dry wood of *Musanga cecropioides*, J. Dahl leg., in coll. U.Z.M.C.

References. Lepesme and Villiers, 1941 (Biol.), 1944 (Biol.); Mühlmann, 1954 (Biol.).

Sternotomis chrysopras (Voet)

Distribution. ETHIOPIAN REGION: Angola, Cameroons, Fernando Póo, French Guinea, Gold Coast, Ivory Coast, Senegal, Togo.

Mature larva. No material available. For generic characters see key, p. 24.

Host plants: *Coffea robusta, C. liberica* (Aulmann and la Baume, 1911); *Artocarpus altilis* (Lucas, 1879); *Theobroma* (Zacher, 1921); *Bosqueia angolensis, Ficus* sp. (G.H.T.); *Ficus polita, Phialodiscus bancoensis* (Jover, 1953).

Biology. This species attacks recently dead or felled trees. Both the tree species in which *S. chrysopras* Voet breeds produce a copious milky white latex when slashed. This latex probably protects the living tree from attack, whilst the diminished flow in a felled tree allows the beetle to attack successfully.

The larvae tunnel beneath the bark, only grazing the sapwood slightly. When mature they enter the sapwood to pupate.

The pupal chamber is oval and parallel to the wood fibres. It is usually excavated at a depth of about 1 inch within the wood and the prepupal tunnel is packed with coarse fibres which project as a plug on the surface. At the distal end of the chamber the larva excavates a circular exit hole reaching to within a quarter of an inch or less of the surface; the pupa lies with its head towards this tunnel. The emerging adults excavate the remainder of the preformed exit tunnel.

It is interesting to note that although the larval prepupal tunnel is of the normal compressed oval shape in section, the exit tunnel which it carves is of a circular section suitable for accommodating the adult.

The life-cycle is approximately three months and adults emerge from February to April (G.H.T.).

References. Aulmann and la Baume, 1911 (Biol.); Jover, 1953 (Biol.); Lepesme, 1948 (Biol.); Lucas, 1879 (Biol.); Mühlmann, 1954 (Biol.); Zacher, 1921 (Biol.).

Sternotomis pulchra (Drury)

Distribution. ETHIOPIAN REGION: Angola, Belgian Congo, Cameroons, Ivory Coast, Nigeria, Senegal, Uganda.

Adult (fig. 152). Length 15–25 mm. Almost entirely orange-brown, except for postero-lateral areas of prothorax, legs and a reticulate design on elytra and elytral sutures which are green. This species is extremely variable in colour, as are all members of this genus: in some varieties the orange-brown is largely replaced by green or blue. *Head* with mandibles very robust; antennae filiform, slightly longer than body in female, nearly twice as long as body in male. *Prothorax* with a deep

transverse furrow near base, and sides bearing a pair of stout, blunt tubercles. Prosternal process very broad, subvertical and bifid or truncate apically. *Elytra* with humeral angles obliquely truncate and crenulate, strongly tapering posteriorly, the apices rounded. *Legs* with middle tibiae grooved; tarsi simple basally.

Mature larva. No material available. For generic characters see key, p. 24.

Host plants: *Artocarpus altilis* (Lucas, 1879); *Coffea liberica* (Aulmann and la Baume, 1911); *Bosqueia angolensis* (G.H.T.); *Harungana madagascariensis, Antiaris toxicaria* (J.C.M.G.); *Afzelia bella, Anthostema aubryanum, Chlorophora excelsa, Ficus exasperata, F. polita, Haronga paniculata, Musanga smithii, Pachylobus deliosa, Phialodiscus bancoensis, Sterculia tragacantha* (Jover, 1953).

Biology. This species is of exactly similar habits to *S. chrysopras* Voet and is the most common species to attack felled or recently dead *Bosqueia.*

Pairing, oviposition, site of larval tunnel and method of construction of pupal chamber are all as for *S. chrysopras.* A circular preformed exit hole reaching to within a quarter of an inch of the sapwood surface from the distal end of the pupal chamber is also carved.

The life-cycle is approximately three months and adults emerge from February to May.

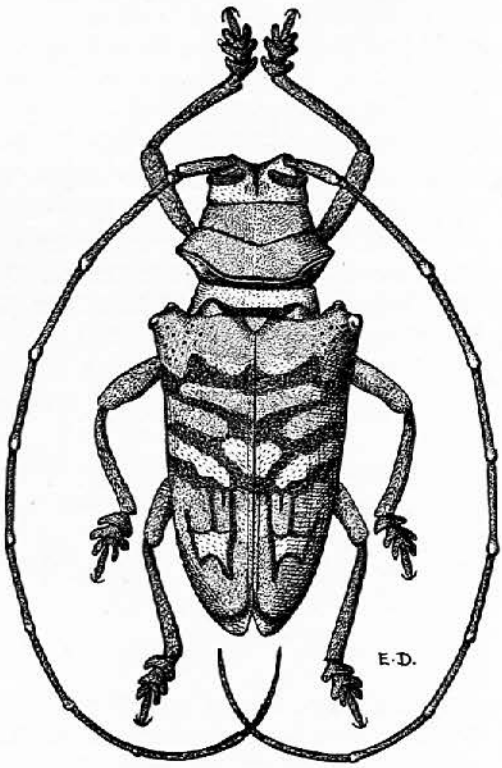


Fig. 152. *Sternotomis pulchra* (Drury). Adult.

Detailed observations were also made of mating and oviposition for both *S. chrysopras* and *S. pulchra.* Their habits are identical and the following account refers to both species.

The beetles congregate on newly felled or fallen trees of *Bosqueia angolensis* and pairing takes place on the bole. Unmated females are often observed biting out egg niches, but they are quickly joined by lone males which actively explore the bole and branches. When unmated males approach mated pairs they are quickly repulsed by the other male; no conflicts between males have been noted such as occur in the case of many prionids.

In the pairing position the male places his forelegs on the female elytra, his midlegs grasp her hind legs above the tarsi and his hind legs are stretched behind resting on the bark. The male stridulates by rubbing the pronotum against the scutellum as a preliminary to copulation. The female explores the bark, dragging the male with her.

When she has found a suitable site for oviposition she accepts coitus passively (the act lasts only a few seconds), and then commences to excavate an egg niche with her mandibles, the male remaining mounted in the amplexus position. The egg niche is excavated through the bark to the cambium, a depth of about $\frac{1}{8}$ inch. This operation lasts about ten minutes.

The act of oviposition averages about four minutes, the egg being laid, not directly at the bottom of the niche, but inserted laterally between the inner bark and cambium about $\frac{1}{4}$ inch distant. When the ovipositor is withdrawn the female pinches the lips of the egg niche together, presumably to prevent the entrance of predators.

The male often commences to stridulate and to titillate the female by tapping her elytra with his forelegs before oviposition is completed, and reinsemination may take place as soon as the egg has been laid or the female may drag the male away and choose a new site for oviposition. In any case copulation appears to take place before each egg is laid. The beetles are active throughout the day until dusk (G.H.T.).

References. Aulmann and la Baume, 1911 (Biol.); Jover, 1953 (Biol.); Lepesme, 1948 (Biol.); Lepesme and Villiers, 1944 (Biol.); Lucas, 1879 (Biol.); Preufs, 1903 (I fig., Biol.).

Sternotomis virescens Westwood

Distribution. ETHIOPIAN REGION: Angola, Belgian Congo, Cameroons, Gold Coast, Sierra Leone, Togo.

Mature larva. No material available. For generic characters see key, p. 24.

Host plants: *Ficus*, *Manihot* (Vrijdagh, 1930); *Coffea robusta* (Lepesme and Villiers, 1941).

References. Lepesme and Villiers, 1944 (Biol.); Morstatt, 1937 (Biol.); Mühlmann, 1954 (Biol.); Vrijdagh, 1930 (Biol.).

Sternotomis cornutor (Fabricius)

Distribution. MADAGASCAN REGION: Madagascar.

Mature larva. No material available. For generic characters see key, p. 24.

Host plants: Rataceae (Frappa, 1931).

References. Frappa, 1931 (Biol.); Mühlmann, 1954 (Biol.).

Zographus regalis (Brown)

Distribution. ETHIOPIAN REGION: Angola, Belgian Congo, Cameroons, Ivory Coast, Senegal.

Host plants: *Afzelia bella*, *Berlinia acuminata*, *Cleistopholis patens*, *Ficus exasperata*, *Macrolobium heudelotianum*, *Musanga smithii*, *Phialodiscus bancoensis*, *Strombosia postulata* (Jover, 1953).

References. Jover, 1953 (Biol.).

Cylindrothorax balteatus (Heath)

Distribution. ETHIOPIAN REGION: Kenya, Uganda.

Mature larva (fig. 153). Extremely similar to those of *Sternotomis* spp. and not generically distinct. From those of *S. bohemanni* Chevrolat, which it most closely

resembles, it differs in having the caudal process much narrower and more strongly produced (fig. 153).

Host plant: *Acacia* (J.C.M.G.).

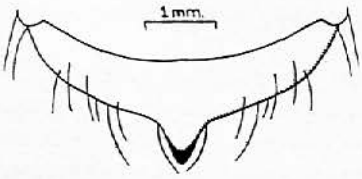


Fig. 153. *Cylindrothorax balteatus* (Heath). Mature larva. Abdominal segment 9. Dorsal aspect.

Material studied. 2 L, Kenya, Londiani, vi.1953, from fallen *Acacia*, J.C.M.G. leg., in coll. B.M.

References. None available.

Pinacosterna nachtigali Harold

Distribution. ETHIOPIAN REGION: Angola, Belgian Congo, Cameroons, French Equatorial Africa, Uganda.

Host plant: *Coffea robusta* (Lepesme and Villiers, 1941).

References. Lepesme and Villiers, 1941 (Biol.), 1944 (Biol.); Mühlmann, 1954 (Biol.).

Anatragus ornatus Kolbe

Distribution. ETHIOPIAN REGION: Tanganyika.

Host plant: *Coffea arabica* (Morstatt, 1913).

References. Lepesme and Villiers, 1944 (Biol.); Morstatt, 1912a (Biol.), 1913 (Biol.), 1937 (Biol.); Mühlmann, 1954 (Biol.).

Pterochaos nebulosus (Voet) (=**irrorator** (Thomson))

Distribution. ETHIOPIAN REGION: Angola, Belgian Congo, Gold Coast, Senegal, Sierra Leone.

Mature larva. Similar to those of *Sternotomis* species, from which it may be distinguished as follows. Length up to 64 mm.; maximum breadth (at prothorax) 12·5 mm. *Head* without a conical projection behind antennal foramen. Epistoma bearing at least twenty setae.

Host plant: *Daniellia olivieri* (D. E. M. Marsh).

Material studied. 1 L, 1 I, Gold Coast, Sampa, 23.i.1955, in dead branches of *Daniellia olivieri*, D. E. M. Marsh leg., in coll. B.M.

References. None available.

Freadelpha confluens Harold

Distribution. ETHIOPIAN REGION: Angola, Tanganyika.

Host plant: *Combretum gueinzii* (J.C.M.G.).

References. None available.

Tragocephalini

Phosphorus virescens (Olivier) and vars. **gabonator** Thomson and **jansoni** Chevrolat

Distribution. ETHIOPIAN REGION: Belgian Congo, Cameroons, Dahomey, Gold Coast, French Equatorial Africa, Ivory Coast, Liberia, Nigeria, Sierra Leone, Tanganyika, Togo.

Adult. Length 24–36 mm. Head and pronotum black, pubescent. Elytra covered with dense bright yellow pubescence except for two large black areas, one basal, the other postmedian, the latter usually with a pair of small yellow spots near suture. *Head* with antennae slightly shorter than body in female, distinctly longer in male; cicatrix absent. *Prothorax* transverse, sides bearing a pair of very stout tubercles,

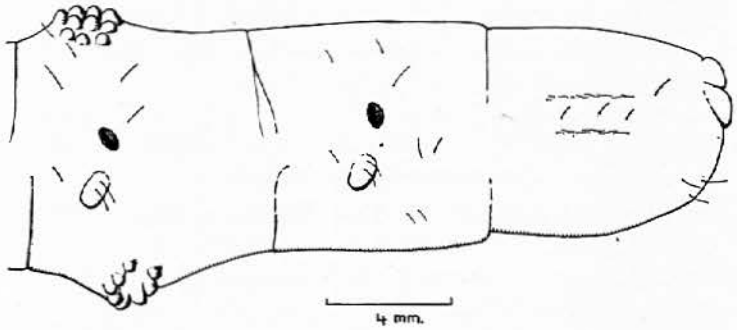


Fig. 154. *Phosphorus virescens* Olivier. Mature larva. Posterior abdominal segments. Lateral aspect.

immediately behind which is a deep transverse impression. Mesosternum with coxal cavities open externally. *Elytra* with shoulders and apices rounded. *Legs* with middle tibiae grooved; tarsal claws divergent, simple basally.

Mature larva (fig. 154). Length up to 63 mm.; maximum breadth (at prothorax) 9·5 mm. *Head* moderately depressed, slightly elongate, widest at middle (maximum head-width 4·9 mm.) and rather abruptly and appreciably constricted on posterior third; frontal sutures complete but rather indistinct; antennal foramen open behind; mouthframe broadly and strongly sclerotised. Frons entirely ferruginous, smooth, with eight distinct setiferous pores; six epistomal setae present. Two pairs of distinct ocellar lenses present, the lower pair (situated opposite ventral articulation of mandible) slightly larger than upper pair and without a pigmented spot. Hypostoma slightly convex, ferruginous, front margin more darkly so; one pair of distinct setiferous pores present; sutures distinct, pitchy, incurved. Gular region with cleavage line indistinct. Antenna 3-segmented.

Maxilla with palpal segment 3 acutely conical, shorter than segment 2. Labial palpi with segment 2 stoutly conical, about one-fourth length of segment 1. Mentum distinct from submentum. *Prothorax* with pronotum faintly rugose, testaceous posteriorly and with a subapical transverse, ferruginous band; sparsely setose, the setae mostly confined to sublateral areas. *Abdomen* with each dorsal ampulla with two transverse furrows and four transverse rows of subconical glabrous tubercles which are not interrupted medially; ventral ampullae with two rows of tubercles.

Segments 8 and 9 (fig. 154) strongly elongate, cylindrical, the latter unarmed. Anus trilobed, distinctly sclerotised, testaceous to ferruginous. Epipleurum protruding on segments 1–7 only. Pleural tubercle without sclerotised pits and bearing two stout setae. *Legs* minute, vestigial but just visible with a ×15 lens. *Spiracles* with peritreme broadly oval, the posterior inner margin bearing a row of at least twenty subcontiguous chambers.

Pupa (fig. 155). Length 47 mm.; maximum breadth 12·5 mm. *Head* with vertex entirely visible from above; vertex smooth, glabrous, not excavate between bases of antennae; frons with four to eight pairs of scattered minute spines; clypeus shallowly impressed with two to three pairs of similar spines. Antennae extending to abdominal segment 1, where they are strongly curved to form a single coil, the apices terminating near mid-femora. Eyes very strongly convex, glabrous. Mandibles each with a pair of setae near middle of outer face. Labrum cordate, rather strongly protuberant and bearing subbasally two groups of about seven stout spines and margin bearing a few smaller spines. *Pronotum* with sides bearing a pair of large, stout tubercles; numerous short, stout spines present on disc and around tubercles. *Mesonotum* and *metanotum* bearing similar, much smaller scattered spines; scutellar groove indiscernible. Elytra and wings extending to abdominal segment 4. *Abdomen* with tergites 1–6 with a transverse band (interrupted medially) of closely set, short, stout spines (each tuberculate basally) on posterior half; anteriorly much less densely spinose. Tergite 7 with similar but scattered spines on posterior two-thirds. Tergite 8 strongly transverse, bearing similar spines. Tergite 9 produced posteriorly into a stout, acutely pointed, spine-like tubercle which is horizontal or slightly curved downward. Sternites glabrous. Pleura scarcely protuberant, each with about thirty short, stout spines (tuberculate basally). *Legs* with a transverse row of spinules near apex of each femur; middle and hind femora each with a blunt tubercular process near base; hind segment extending to abdominal segment 3; tibiae at right angles to longitudinal axis of body. *Functional spiracles* present on abdominal segments 1–6, those on segments 7 and 8 closed and probably non-functional; peritreme narrowly oval, thick and slightly raised above general level of cuticle; posterior margin with subcontiguous chambers.

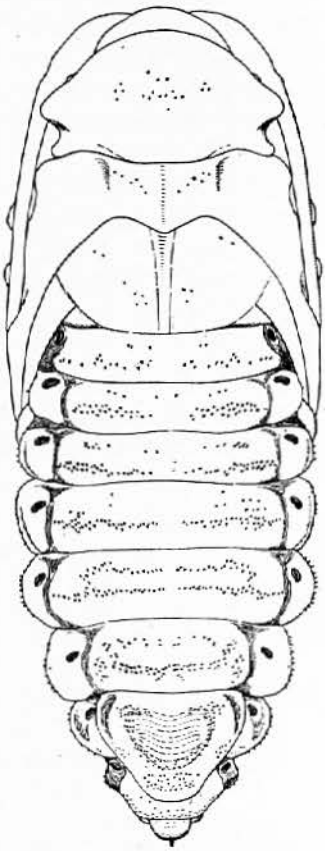


Fig. 155. *Phosphorus virescens* Olivier. Pupa. Dorsal aspect.

Host plants: *Cola* (Patterson, 1914); *Coffea* (R. C. H. Sweeney); *Theobroma* (Weidner, 1938).

Biology. Oviposition takes place on the young shoots of host trees after the tips have been gnawed off. The larva tunnels in the soft wood of the shoot and on reaching

the fork it tunnels towards the trunk, working in spirals in the hard wood. Pupation takes place at the end of the dry season (February to March) and adults emerge during June and July. The pupal cell is shown on Pl. VI, fig. 6.

Economic importance. This species penetrates the trunks of trees four or five years old. In Dahomey serious damage has been caused to young trees of *Cola nitida* and slight damage to *Cola acuminata.*

Control. Patterson (1914) suggests the cutting away of badly infested branches or the destruction of larvae *in situ*, afterwards dressing the wounds with tar and plugging the holes with a mixture of tar and clay.

Material studied. 2 L, 4 P, Gold Coast, Aburi, 1913, L. Armstrong leg., in coll. B.M.; 1 L, Tanganyika, 1951, from *Coffea*, R. C. H. Sweeney leg., in coll. B.M.

References. Chevalier and Perrot, 1911 (I fig., Biol.); Lepesme, 1953 (Biol.); Mallamaire, 1934 (Biol., Contr.); Mühlmann, 1954 (Biol. fig.); Patterson, 1914 (Biol., Contr.); Weidner, 1938 (L fig., P fig., Biol. fig.).

Paraphosphorus bipunctatus (Gahan)

Distribution. ETHIOPIAN REGION: Kenya, Somalia, Tanganyika.

Mature larva (fig. 156). Similar to that of *Phosphorus virescens* (Olivier), from which it differs as follows. Length up to 44 mm.; maximum breadth (at prothorax) 9·1 mm.

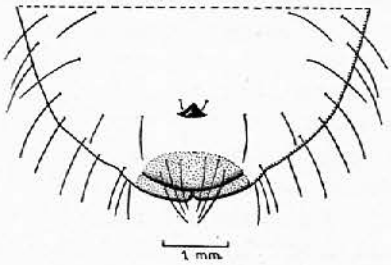


Fig. 156. *Paraphosphorus bipunctatus* (Gahan). Mature larva. Posterior part of abdominal segment 9. Dorsal aspect.

Abdomen with tergite 9 without a postero-median testaceous area but bearing a subvertical, triangular, sclerotised process (fig. 156).

This larva appears to form a link between the genera *Phosphorus* and *Tragocephala.*

Host plants: *Prunus persica, P. domestica, Citrus, Gymnosporia* (J.C.M.G.).

Economic importance. This species has been known to cause considerable damage to *Citrus* and *Prunus* in Kenya (J.C.M.G.).

Material studied. 1 L (adult reared), Kenya, Londiani, 1953, from living *Citrus*, J.C.M.G. leg., in coll. B.M.

References. None available.

Tragocephala nobilis (Fabricius) and vars. **maynei** Gahan and **pretiosa** Hintz

Distribution. ETHIOPIAN REGION: Angola, Cameroons, French Equatorial Africa, French Guinea, Gold Coast, Ivory Coast, Natal, Nigeria, Nyasaland, Rio Muni, Senegal, Sierra Leone, Tanganyika, Uganda.

Adult. Length 12–30 mm. Head and prothorax black, with a broad yellow lateral band. Elytra black, with yellow markings. *Head* with antennae slightly longer than body in male, shorter in female; cicatrix absent. *Prothorax* bearing a pair of stout lateral tubercles. *Elytra* with humeral angles and apices rounded. *Legs* with middle tibiae grooved; tarsal claws divergent, simple basally.

Mature larva (fig. 157). Similar to that of *Phosphorus virescens* (Olivier), from which it may be distinguished as follows. *Head* with front margin of hypostoma bearing a pair of small median tubercles. Lower ocellar lens more than twice as large as upper lens. *Abdomen* with postero-median testaceous area of tergite 9 bearing a conspicuous group of twelve to twenty stout setae (fig. 157). Dorsal anal lobe bearing six to eight stout setae (fig. 157).

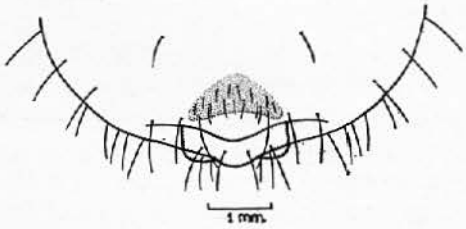


Fig. 157. *Tragocephala nobilis* (Fabricius). Mature larva. Posterior part of abdominal segment 9. Dorsal aspect.

Host plants: *Theobroma* (Mayné, 1917); *Cinnamomum* (Morstatt, 1913b).

Biology. The female gnaws a series of holes in the bark of a twig, often ringing it completely, and deposits the eggs in them. The larvae first attack the outer end of the twig or branch, but soon turn round and tunnel in the opposite direction. Young twigs drop off and branches are frequently destroyed. In twigs which have fallen early in the year, mature larvae can be found. Pupation occurs in August and emergence in November. The life-cycle is two years (Morstatt, 1912b).

Economic importance. This species is occasionally rather a serious pest of *Theobroma.*

Control. Morstatt (1912b) recommends the sawing off in January and February of the infested twigs an inch or so below the bored spot and burning them. As at this time of the year the young larvae have not had time to tunnel far, their capture and destruction is assured. In Amani, the year following this treatment, the pest had almost disappeared.

Material studied. 2 L (adults reared), Tanganyika, Lushoto, 1953, from *Cinnamomum*, J.C.M.G. leg., in coll. B.M.

References. Cotterell, 1927 (Biol.), 1930 (Biol.); Mayné, 1917 (Biol.), 1925 (Biol.); Morstatt, 1912 (Biol., Contr.), 1913b (Biol.); Mühlmann, 1954 (Biol.); Steyaert, 1944 (Biol., Contr.).

Tragocephala variegata Bertol

Distribution. ETHIOPIAN REGION: Angola, Ethiopia, Kenya, Mozambique, Natal, Zanzibar. MADAGASCAN REGION: Madagascar.

Mature larva. With the present material it has not been possible to distinguish this species from *T. nobilis* (Fabricius).

Host plants: *Gossypium* (Hargreaves, 1948); *Deinbollia*? (J.C.M.G.); *Citrus*, *Cajanus cajan* (Mansfield-Aders, 1920).

Biology. In Zanzibar adults are prevalent from October to March. Eggs found in the field in April hatched in ten days. The female gnaws a small hole in the bark and there deposits an egg. The larvae feed for a short time in the branch and then tunnel down the main stem, excavating several aeration holes on the way. Pupation occurs in a plugged cell, low down in the stem or even in the root. A large exit hole denotes the escape of the adult (Mansfield-Aders, 1920).

Material studied. 2 L (adult reared), Kenya, 1953, from living stem of ?*Deinbollia*, J.C.M.G. leg., in coll. B.M.

References. Hargreaves, 1948 (Biol.); Harris, 1932 (Biol.); Mansfield-Aders, 1920 (Biol.); Mühlmann, 1954 (Biol.).

Tragocephala guerini White (=**anselli** Bates)
and vars. **pulchra** Jordan, **buqueti** Thomson and **senatoria** (Murray)

Distribution. ETHIOPIAN REGION: Angola, Belgian Congo, Cameroons, French Guinea, Gold Coast, Nigeria, Rio Muni, São Tomé.

Adult. Length 16–30 mm. Similar to *T. nobilis* (Fabricius), but with pubescence of metasternum contrasting in colour with that of abdomen.

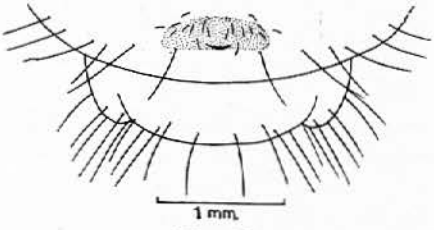


Fig. 158

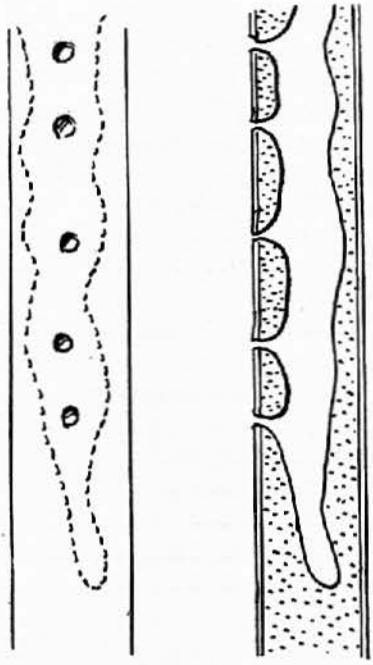


Fig. 159

Fig. 158. *Tragocephala guerini* White. Mature larva. Posterior part of abdominal segment 9 and anal lobes. Dorsal aspect.

Fig. 159. *Tragocephala guerini* White. Larval galleries showing (left) external and (right) internal view of frass-ejection holes.

Mature larva (fig. 158). Separable from those of *T. nobilis* and *T. variegata* as follows. Length up to 42 mm.; maximum breadth (at prothorax) 7 mm. *Abdomen* (fig. 158) with tergite 9 bearing a feebly developed but distinct testaceous, transverse carina posterior to the group of stout setae.

Pupa. Similar to that of *Phosphorus virescens* (Olivier), but with length up to 30 mm. and *abdomen* with pleural area beneath spiracle bearing long setae only.

Host plants: *Theobroma* (Aulmann and la Baume, 1912); *Coffea* (Bredo, 1939).

Biology. Oviposition takes place on branches and trunks of cocoa trees. The young larvae on hatching immediately bore into the wood, where they excavate longitudinal galleries which are gradually increased in size and along which numerous aeration holes are made at intervals (fig. 159 and Pl. VI, fig. 2). These holes are plugged with frass and wooden fibres which serve to protect the larvae from ants. Each gallery contains only a single larva (Pl. VI, fig. 3), but there may be as many as five or more in a single tree. Adults are to be found from December to February. They are to some degree destructive, as they gnaw the bark of young branches (Mayné, 1917).

The habit of girdling is clearly demonstrated by adults of this species: this takes place at the time of oviposition. As to whether the "aeration" holes referred to by Mayné really function in aeration or are merely for the ejection of frass is a debatable point, although the latter seems the more likely.

Economic importance. In infestations by this species, according to Mayné (1917), the degree of seriousness depends largely on the diameter of the branch compared with the diameter of the gallery; if discrepancy is slight, then the limb will die either through the flow of sap being interrupted or weakened and blown off by the wind. The "aeration" holes encourage the growth of fungi.

Control. Mayné (1917) suggests the killing of larvae by means of a flexible wire pushed along the galleries or, if the larvae are inaccessible, the plugging of all the holes with wads of cotton wool soaked in carbon disulphide and sealing them with a mixture of clay and coal tar.

Material studied. 10 L, Belgian Congo, Lukolela, 1935, from *Theobroma*, Liegeois leg., in coll. M.R.C.B.; 3 L, 1 P, Belgian Congo, R. Mayné leg., in coll. M.R.C.B.; 8 P, 4 I, Belgian Congo, Barumbu, 1936, Ghesquière leg., in coll. M.R.C.B.

References. Aulmann and la Baume, 1912 (Biol.); Bredo, 1939 (Biol.); Cotterell, 1930 (Biol.); Duffy, 1953a (Biol. fig.); Ghesquière, 1927 (Biol.); Lepesme and Villiers, 1944 (I fig., Biol.); Mayné, 1917 (L fig., P fig., Biol. fig., Contr.), 1925 (L fig., P fig., Biol.); Morstatt, 1942 (Biol.); Mühlmann, 1954 (Biol.); Steyaert, 1944 (Biol.).

Tragocephala formosa (Olivier) and var. **comitessa** White

Distribution. ETHIOPIAN REGION: Cape, Matabeleland, Natal.

Mature larva (fig. 160). This larva shows closer affinities to that of *Paraphosphorus bipunctatus* (Gahan) Linell than to those of other species of *Tragocephala* so far examined, particularly in the presence of a vertical sclerotised process (fig. 160) on tergite 9 (see key, p. 24).

Host plant: *Citrus auriantium.*

Economic importance. Serious damage once every two or three years is done to

orange trees in Natal and the Cape Province (Department of Agriculture, Union of South Africa, 1924).

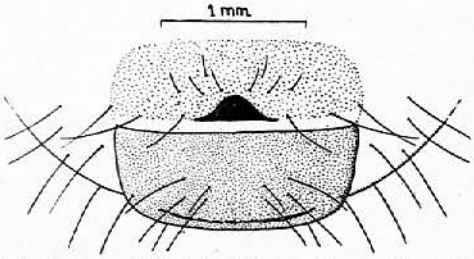


Fig. 160. *Tragocephala formosa* (Olivier). Mature larva. Posterior part of abdominal segment 9. Dorsal aspect.

Material studied. 1 L, Ixopo, 7.xii.1911, from *Citrus*, Fannin leg., in coll. B.M. (pres. by Dr. H. K. Munro); 1 L, Transkei, Kentani, 1.i.1922, from *Citrus*, in coll. B.M. (pres. by Dr. H. K. Munro).

References. Department of Agriculture, Union of South Africa, 1924 (Biol.); Mühlmann, 1954 (Biol.).

Tragocephala jucunda (Gory) (=**Rhaphidopsis pulchra** (Waterhouse))

Distribution. ETHIOPIAN REGION: Mozambique. MADAGASCAN REGION: Madagascar.

Mature larva. No material available. For generic characters see key, p. 24.

Host plant: *Theobroma* (Ghesquière, 1927).

References. Ghesquière, 1927 (Biol.).

Lux pulchra Jordan

Distribution. ETHIOPIAN REGION: Gold Coast, Ivory Coast, Nigeria, Sierra Leone.

Host plant: *Coffea* (Bredo, 1939).

References. Bredo, 1939 (I, Contr.).

Callimation venustum Guérin-Méneville

Distribution. MADAGASCAN REGION: Madagascar.

Mature larva. No material available. The larvae associated with the material at hand and presumed to be of this species are in fact those of *Oberea* sp.

Pupa (fig. 161). Length 21 mm.; maximum breadth 6·5 mm. *Head* with vertex entirely visible from above and rather deeply excavated between bases of antennae and bearing three or four stout setae behind base of each antenna; front with four groups of setae; clypeus with a deep transverse impression and two groups of stout setae near base. Antennae extending as far as abdominal segment 4, where they are strongly recurved ventrally, each forming a single coil and terminating near apices of middle femora. Eyes scarcely convex. Mandibles with at least ten short setae on middle of outer face. Labrum glabrous. Pronotum stoutly tuberculate laterally; disc rugose, sparsely setose. *Mesonotum* with a few setae on each side of scutellum which is glabrous and only slightly protuberant. *Metanotum* smooth, with an oblique row of setae on each side of scutellar groove which is indistinct. Elytra and wings

extending as far as abdominal segment 4. *Abdomen* with tergites 1–6 each with a broad band (interrupted medially) of long, dense, decumbent setae. Tergite 7 truncate and keel-shaped posteriorly, the hind angles right-angled, strongly sclerotised, ferruginous and asperate (fig. 161); postero-median area densely setose. Tergites 8 and 9 short, strongly transverse and bearing several scattered setae. Sternites sparsely setose except sternite 9, the lateral lobes of which are very densely covered with stout reddish setae. *Legs* with femora bearing a few minute subapical setae; hind femora not extending beyond abdominal segment 3; all tibiae more or less at right angles to longitudinal axis of body. *Functional spiracles* present on abdominal segments 1–6; peritreme narrowly oval, thick and strongly raised above general level of cuticle.

Host plant: *Morus*.

Material studied. 1 P, 1 I, Madagascar, 1919, from *Morus*, Waterlot leg., in coll. N.H.P.

References. Mühlmann, 1954 (Biol.)

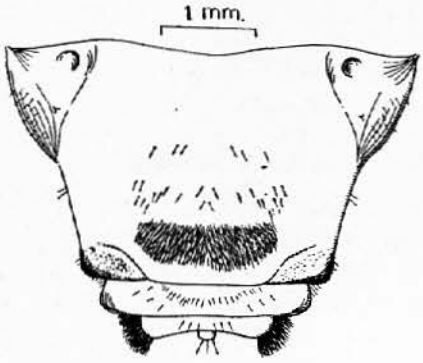


Fig. 161

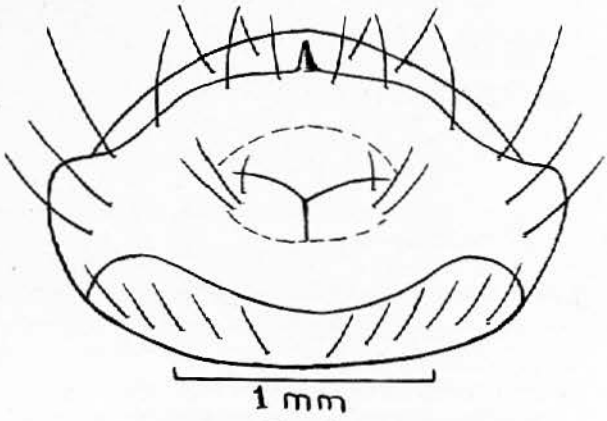


Fig. 162

Fig. 161. *Callimation venustum* Guérin-Méneville. Pupa. Abdominal segments 7–10. Dorsal aspect.

Fig. 162. *Charies thes bella* (Dalman). Mature larva. Abdominal segment 9. Caudal aspect.

Charies thes bella (Dalman)

Distribution. ETHIOPIAN REGION: Belgian Congo, Cameroons, Gold Coast, Ivory Coast, Nyasaland, Mozambique, Rhodesia, Sierra Leone, Tanganyika.

Mature larva (fig. 162). Similar to those of *Tragocephala* and *Paraphosphorus* species, from which it may be distinguished by its much smaller size (length up to 18 mm.; maximum breadth (at prothorax) 4 mm.), the unpigmented anal lobes and the elongate sclerotised process on tergite 9 (fig. 162).

Pupa. Similar to those of *Tragocephala* and *Phosphorus* species, from which it differs in its much smaller size (maximum length 13 mm.) and the abdominal spiracles which are subcircular.

Host plants: *Coffea* and *Theobroma* (Lepesme, 1953); *Blasephida* (E.A.J.D.).

Biology. The larval galleries are subcortical and the pupal cell is ½–1 inch deep in the sapwood. Adults emerge in March and April.

Material studied. 3 L, 3 P, 2 I, Gold Coast, Dwinasi, 17.iii.1955, from *Blasephida*, E.A.J.D. leg., in coll. B.M.

References. Lepesme, 1948 (Biol.), 1953 (I fig., Biol.).

Pseudocharies thes nigroguttata (Aurivillius)

Distribution. ETHIOPIAN REGION: Kenya.

Although the adult of this species has been placed in the tribe Tragocephalini, the larval characters show striking affinities towards the Sternotomini and none towards the Tragocephalini.

Mature larva (fig. 163). Resembling that of *Sternotomis* species, from which it may be distinguished as follows. Form much more slender, more strongly depressed.

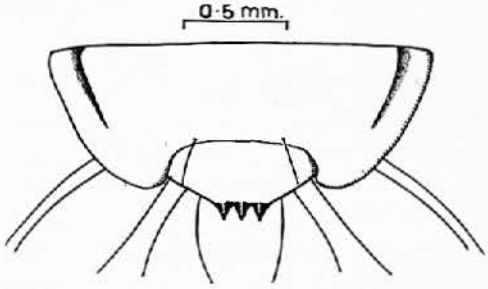


Fig. 163. *Pseudocharies thes nigroguttata* (Aurivillius). Mature larva. Abdominal segment 9. Dorsal aspect.

Length up to 17 mm.; maximum breadth (at prothorax) 3·1 mm. *Head* with temples very feebly carinate and without conical projections. Epistoma bearing six to eight setae. Maxillary palpi with segment 3 at least as long as segment 2. *Abdomen* with the transverse carina on tergite 9 tridentate, the teeth of equal length (fig. 163).

Host plant: *Croton macrostachys* (J.C.M.G.).

Material studied. 12 L (adults reared), Kenya, Gazi (coast), 1953, from *Croton*, J.C.M.G. leg., in coll. B.M.

References. None available.

Graciella pulchella (Klug)

Distribution. ETHIOPIAN REGION: Gold Coast, Fernando Póo, Ivory Coast, Nigeria, Principe I., Rio Muni, Senegal, Togo, Uganda.

Host plants: *Theobroma* and *Coffea* (Lepesme, 1953); *Antiaris toxicaria* (J.C.M.G.); *Anthostema aubryanum*, *Bridelia micrantha*, *Cleistopholos patens*, *Funtumia latifolia*, *Phyalodiscus bancoensis*, *Vernonia confuta* (Jover, 1953).

References. Jover, 1953 (Biol.); Lepesme, 1948 (Biol.), 1953 (I fig., Biol.).

Tragiscoschema bertolonii Thomson
and vars. **tenuicorne** Thomson and **wahlbergi** Fåhraeus

Distribution. ETHIOPIAN REGION: Angola, Bechuanaland, Belgian Congo, Damaraland, Delagoa Bay, Johannesburg, Matabeleland, Mozambique, Nyasaland, Pretoria, Rhodesia, Tanganyika, Transvaal.

Host plants: *Gossypium* (Lesne, 1930); *Hibiscus* (Jack, 1933); *Sterculia*, ?*Dombeya* (Smee, 1937).

Biology. Although the larvae bore in the stems, the damage is not apparent until the cotton is well grown. See larval description and biology (p. 328).

References. Hargreaves, 1948 (Biol.); Jack, 1933 (Biol.); Lesne, 1930 (Biol.); Mason, 1917 (Biol.); Mühlmann, 1954 (Biol.); Smee, 1937 (Biol.).

Tragiscoschema nigroscriptum Fairmaire

Distribution. ETHIOPIAN REGION: Tanganyika.

Host plants: *Gossypium* (Hargreaves, 1948); *Ceiba pentandra* (Duffy).

Mature larva. See p. 329.

References. Hargreaves, 1948 (Biol.); Mühlmann, 1954 (Biol.); Ritchie, 1925 (Biol.).

Rhaphidopsis melaleuca Gerstaeker

Distribution. ETHIOPIAN REGION: Damaraland, Matabeleland, Mozambique, Nyasaland, Transvaal.

Economic importance. Adults damage young shoots of *Heeria reticulata* (Department of Research, Southern Rhodesia).

References. None available.

Armatosterna buquetiana White

Distribution. ETHIOPIAN REGION: Gold Coast, Nigeria, Sierra Leone.

Host plant: *Theobroma* (Cotterell, 1927).

References. Cotterell, 1927 (Biol.); Mühlmann, 1954 (Biol.).

Proctocerini

Proctocera scalaris Chevrolat

Distribution. ETHIOPIAN REGION: Belgian Congo, Cameroons, Ivory Coast, Sierra Leone, Uganda.

Host plant: *Hevea* (Vrijdagh, 1930).

References. Lepesme, 1948 (Biol.); Vrijdagh, 1930 (Biol.).

Ceroplesini

Paranaleptes (=Analeptes) reticulata (Thomson)

Distribution. ETHIOPIAN REGION: Ethiopia, Kenya, Tanganyika, Zanzibar.

Adult. Length 25–35 mm. Black, entirely covered with brownish pubescence; elytra with numerous black granules surrounded by dark brown patches which give them a reticulate appearance. *Head* and *prothorax* finely granulate and densely covered with small punctures. Antennae slightly longer than body in female and at least one and one-quarter times as long in male; without tufts of hairs but sparsely ciliate beneath. Mesosternum with coxal cavities open externally. *Elytra* slightly broadened behind middle, with humeral angles and apices rounded. *Legs* with middle tibiae grooved; tarsal claws divergent, simple basally.

Mature larva (fig. 164). Form elongate, robust, subcylindrical. Length up to

45 mm.; maximum breadth (at prothorax) 11·5 mm. *Head* scarcely depressed, widest at middle (maximum head-width 5·6 mm.) and distinctly constricted near posterior third. Antennal foramen open posteriorly. Mouthframe moderately sclerotised. Frons entirely testaceous except anterior margin. Epistoma bearing six (or eight?) setae. One pair of ocelli present; lens large, round, convex; pigmented spot distinct. Hypostoma flat, smooth, testaceous; sutures distinct, ferruginous, feebly incurved. Gular region with a pale median cleavage line on each side of which are two or three setae. Antenna with segment 2 slightly transverse and bearing a conical hyaline process. Maxilla with segment 3 of palp conical, much shorter than segment 2. Labial palpi with segment 2 elongate, cylindrical, slightly shorter than segment 1. Mentum distinct from submentum. *Prothorax* with posterior area of pronotum orange-testaceous and bearing scattered, long, reddish setae; posterior area coarsely

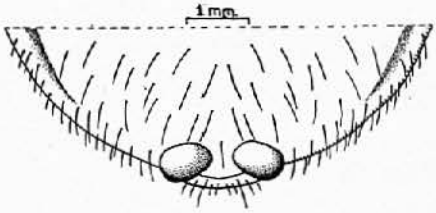


Fig. 164. *Paranaleptes reticulata* (Thomson). Mature larva. Posterior part of abdominal segment 9. Dorsal aspect.

longitudinally striate, glabrous; sublateral impressions rather deep and distinct. Prosternum entirely covered with scattered, long, reddish setae; eusternum distinct, triangular; sternellum non-spiculate. *Abdomen* with dorsal ampullae each with three distinct rows of large, shining tubercles which are not interrupted by the median longitudinal furrow. Tergite 9 bearing a pair of paramedian, oval tubercles which are bun-shaped, very strongly protuberant and not sclerotised or pigmented (fig. 164). Epipleurum protuberant on all segments. Pleural tubercle without sclerotised pits; elongate-oval and bearing long setae which are variable in number. *Legs* vestigial. *Spiracles* with peritreme moderately thick, pale and broadly oval; marginal chambers absent.

Host plants: *Gossypium* (Hargreaves, 1948); *Anacardium occidentale*, *Ficus* sp., ?*Sterculia* (J.C.M.G.).

Biology. In the case of *Ficus* the lateral branches are girdled. Eggs are laid singly under the bark beyond the girdle after a transverse slit with a hole in the middle has been made by the adult (J.C.M.G.). A stem of *Anacardium* girdled by an adult is shown on Pl. VI, fig. 4.

Economic importance. This species has considerable nuisance value, especially on coastal areas of Kenya, and attacks several species of trees grown in gardens (J.C.M.G.). According to Morstatt (1911), kapok has been infested at Dar-es-Salaam. The upper part of the stem was girdled, causing the whole crown to break off.

Material studied. 1 L, Kenya, 1953, from *Anacardium occidentale*, J.C.M.G. leg., in coll. B.M.

References. Hargreaves, 1948 (Biol.); Morstatt, 1911 (Biol.).

Analeptes trifasciata (Fabricius)

Distribution. ETHIOPIAN REGION: Belgian Congo, Dahomey, Ethiopia, Gold Coast, Nigeria, Republic of the Sudan, Sierra Leone, Uganda.

Mature larva. Very similar to that of *Paranaleptes reticulata* (Thomson), from which it may be distinguished by the smaller, almost round, and more strongly convex tubercles on tergite 9.

It should be pointed out that this distinction is based on a single larva which may not be fully mature.

Host plant: *Lannea humilis* (J.C.M.G.).

Material studied. 1 L, Uganda, 1953, from girdled branch of *Lannea humilis*, J.C.M.G. leg., in coll. B.M.

References. None available.

Ceroplesis signata Waterhouse

Distribution. ETHIOPIAN REGION: Belgian Congo, Tanganyika, Uganda.

Mature larva. Very similar to that of *Paranaleptes reticulata* (Thomson), from which it may be distinguished as follows. Form more slender. *Head* with hypostoma glabrous (?). *Abdomen* with tergite 9 bearing paramedian tubercles which are conical, distinctly sclerotised and testaceous apically. *Spiracles* with peritreme subcircular and bearing chambers on posterior margin.

Host plants: *Cassia*, *Cajanus cajan*, *Vigna* (W. V. Harris).

Economic importance. This species has caused considerable wilting to *Vigna* by ringing the bark.

Material studied. 1 L, Uganda, Toro, xi.1938, from *Cassia* stem, R. Sangsten leg., in coll. B.M.

References. None available.

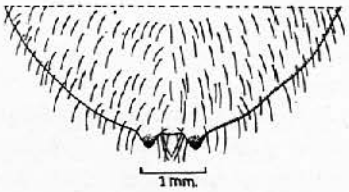


Fig. 165. *Ceroplesis intermedia* Aurivillius. Mature larva. Posterior part of abdominal segment 9. Dorsal aspect.

Ceroplesis intermedia Aurivillius

Distribution. ETHIOPIAN REGION: Kenya, Tanganyika.

Mature larva (fig. 165). Resembling those of *C. signata* Waterhouse and *C. militaris* Gerstaker, from which it may be distinguished as follows. Length up to 32 mm.; maximum breadth (at prothorax) 9·1 mm. *Abdomen* (fig. 165) with urogomphi on tergite 9 long, acutely conical and with at least apical halves strongly sclerotised and ferruginous.

First-instar larva. Length up to 2·2 mm. *Mesothorax*, *metathorax* and *abdominal*

segments 1–7 with dorso-lateral egg-bursting spines; form acute, spine-like, ferruginous. Abdominal tergite 9 without urogomphi.

Pupa (fig. 166). Length up to 32 mm.; maximum breadth 9·2 mm. *Head* with vertex almost entirely visible from above, deeply sulcate medially, the bases of antennal tubercles subcontiguous and swollen; front bearing a few scattered setae; base of clypeus with a transverse row of four to six setae. Antennae extending to between abdominal segments 2 and 3, where they are strongly incurved and each arranged in a single coil on top of each middle femur. Eyes flat, glabrous. Mandibles each with seven to ten stout setae near middle of outer face. Labrum with two transverse rows of numerous, long, dense setae. *Pronotum* bearing laterally a pair of sub-basal, broadly rounded tubercles; numerous stout ferruginous spines (each with a subapical

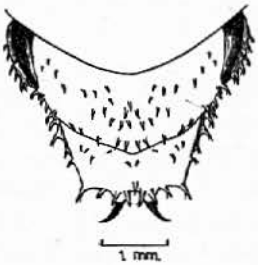


Fig. 166. *Ceroplesis intermedia* Aurivillius. Pupa. Posterior part of abdominal segment 9. Dorsal aspect.

seta) present, especially on front and lateral margins. *Mesonotum* with numerous scattered, shorter spines; scutellum not protuberant, strongly transversely striate. *Metanotum* with similar setae; scutellar groove transversely striate. Elytra and wings extending to between abdominal segments 3 and 4. *Abdomen* with tergites 1–8 bearing numerous stout ferruginous spines (each with a subapical seta) arranged more or less in two transverse bands. Segment 9 (fig. 166) with much larger spines, especially on posterior and lateral margins, and bearing a pair of long, slender urogomphi which are strongly curved ventrally. Sternites bearing numerous long setae. Pleura scarcely protuberant, strongly spinose. *Legs* with a transverse row of minute spines (each with a long basal seta) near apex of each femur; hind femora extending to abdominal segment 4; tibiae placed obliquely to longitudinal axis of body. *Functional spiracles* present on segments 1–6; peritreme broadly oval, thick, pale and strongly raised above general level of cuticle.

Egg. Length 5 mm.; breadth 1 mm. Form elongate, with rounded ends. Chorion smooth and white.

Host plant: *Acacia abyssinica* (J.C.M.G.).

Biology. Adults were placed in a cage with freshly cut wattle stem (2–3 inches diameter) during June 1952. Narrow transverse slits about 5 mm. wide and each with a small central perforation were found on the bark, the eggs being found under the bark, each in a narrow longitudinal cavity made, presumably, with the ovipositor. The life-cycle is two years in duration (J.C.M.G.). An infested *Acacia* branch is shown on Pl. V, fig. 3.

Material studied. 3 L, 1 P, Kenya, 1953, from *Acacia abyssinica*, J.C.M.G. leg., in coll. B.M.; 2 L, 1 I, Kenya, 1953, from *Acacia abyssinica*, A. L. Townsend leg., in coll. B.M.

References. None available.

Ceroplesis calabarica Chevrolat (=**fissa** Harold)

Distribution. ETHIOPIAN REGION: Angola, Belgian Congo, Gold Coast, Nigeria, Republic of the Sudan, Togo, Uganda.

Adult. Length 16–33 mm. Resembling *C. militaris* Gerstaker, but with antennal tubercles salient and narrowly separated.

Mature larva. Distinguishable from larvae of other species of this genus by the subcontiguous urogomphi which arise from a basal protuberance.

Pupa (fig. 167). Very similar to that of *C. intermedia*, but with shorter and less strongly divergent urogomphi (fig. 167).

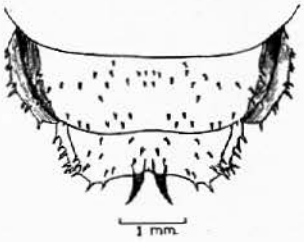


Fig. 167

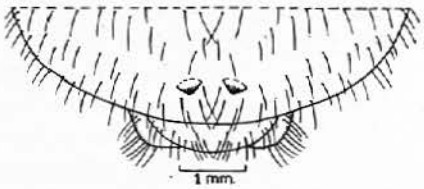


Fig. 168

Fig. 167. *Ceroplesis calabarica* Chevrolat. Pupa. Posterior part of abdominal segment 9. Dorsal aspect.

Fig. 168. *Ceroplesis militaris* Gerstaker. Mature larva. Posterior part of abdominal segment 9. Dorsal aspect.

Host plants: *Coffea canephora* (Aulmann and la Baume, 1911); *Coffea arabica, C. robusta* (Lepesme and Villiers, 1944); *Teclea nobilis* (J.C.M.G.).

Material studied. 8 L, 8 P, 2 I, Belgian Congo, Nioka, 1.v.1934, P. Lefèvre leg., in coll. M.R.C.B.; 2 L, Uganda, from *Teclea nobilis*, J.C.M.G. leg., in coll. B.M.

References. Aulmann and la Baume, 1911 (Biol.); Bredo, 1939 (Biol.); Lepesme, 1948 (Biol.); Lepesme and Villiers, 1941 (Biol.), 1944 (I fig., Biol.); Morstatt, 1937 (Biol.); Mühlmann, 1954 (Biol.).

Ceroplesis militaris Gerstaker and var. **irregularis** Harold

Distribution. ETHIOPIAN REGION: Belgian Congo, Ethiopia, Kenya, Mozambique, Nyasaland, Rhodesia, Tanganyika, Transvaal, Uganda.

Adult. Length 26–43 mm. Black, sometimes with a slight metallic reflection, elytra marked bright red with irregular transverse bands or spots. Mesosternum with coxal cavities open externally. *Legs* with middle tibiae entire; tarsal claws divaricate and simple basally.

Mature larva (fig. 168). Extremely similar to that of *C. signata* Waterhouse, from which it differs as follows. Length up to 47 mm.; maximum breadth (at prothorax)

10·1 mm. *Head* with hyposterma bearing at least four stout setae on each side of gula. *Abdomen* (fig. 168) with dorsal anal lobe bearing at least eighteen setae.

Host plants: *Coffea* (Lepesme and Villiers, 1944); *Lannea stuhlmanni* (J.C.M.G.).

Material studied. 1 L (adult reared), Kenya, Malindi, 1953, from fallen tree, J.C.M.G. leg., in coll. B.M.

References. Lepesme and Villiers, 1944 (I fig., Biol.); Morstatt, 1937 (Biol.); Mühlmann, 1954 (Biol.).

Ceroplesis thunbergi Fåhraeus

Distribution. ETHIOPIAN REGION: Natal, Transvaal.

Adult. Length 20–27 mm. Similar to *C. calabarica* Chevrolat, but without the red marks between the postmedian band and the apical spot.

Mature larva. No material available. For generic characters see key, p. 25.

Host plant: *Acacia mollissima* (Tooke, 1949).

Biology. Adults of this species cut slits in dying branches and trunks of *Acacia* and oviposit in them. If a tree dies or is felled, larvae are still capable of completing their development therein. The life-cycle is one year in duration. Adults feed on the succulent bark, but under wet conditions they have been known to feed extensively on dry bark from dead trees Adults live several weeks and fly readily, especially during hot sunshine (Ripley and Petty, 1937).

Economic importance. Adults have been known to cause widespread damage to wattles. The recent increase of this species is attributed to the practice of not burning slash (which is in itself a control measure against bagworm). Despite the risk of encouraging the spread of other pests, the burning of all slash in restricted areas is recommended, particularly where oviposition scars are numerous on the green bark (Ripley and Petty, 1937).

References. Ripley and Petty, 1937 (Biol. fig., Contr.); Tooke, 1949 (Biol.).

Ceroplesis hottentotta (Fabricius)

Distribution. ETHIOPIAN REGION: Cape Province, Natal, Transvaal.

Mature larva. No material available. For generic characters see key, p. 25.

Host plant: *Salix* (Ormerod, 1889).

References. Distant, 1904 (Biol.); Ormerod, 1889 (Biol.).

Ceroplesis conradti Kolbe

Distribution. ETHIOPIAN REGION: Tanganyika.

Mature larva. No material available. For generic characters see key, p. 25.

Host plants: *Coffea* (Lepesme and Villiers, 1944); *Chlorophora excelsa* (Harris, 1939).

References. Harris, 1939 (Biol.); Lepesme and Villiers, 1944 (I fig., Biol.); Morstatt, 1913b (Biol.), 1937 (Biol.); Mühlmann, 1954 (Biol.).

Ceroplesis (=Moecha) adusta (Harold)

Distribution. ETHIOPIAN REGION: Angola, Belgian Congo, Cameroons, Dahomey, Gold Coast, Ivory Coast, Nigeria, Uganda.

Adult. Length 18–31 mm. Elytra with a reticulate pattern of white and light and dark brown markings.

Mature larva. No material available. For generic characters see key, p. 25.

Host plants: *Theobroma* (Aulmann and la Baume, 1912); *Coffea arabica, C. robusta* (Lepesme and Villiers, 1941).

Biology. This species oviposits on recently cut or decaying branches. The larvae excavate extensive galleries which often results in killing the extremities of the branches. Adults sometimes gnaw the bark of young branches (Mayné, 1917, 1923, 1925).

References. Aulmann and la Baume, 1912 (Biol.); Lepesme, 1948 (Biol.), 1953 (Biol.); Lepesme and Villiers, 1941 (Biol.), 1944 (I fig., Biol.); Mayné, 1917 (Biol.), 1923 (Biol.), 1925 (Biol.); Mühlmann, 1954 (Biol.); Preufs, 1903 (L fig., Biol.).

Ceroplesis (=Moecha) molator (Fabricius) (=**molitor** Aulmann)

Distribution. ETHIOPIAN REGION: Cameroons, Gold Coast, Ivory Coast, Senegal.

Mature larva. No material available. For generic characters see key, p. 25.

Host plant: *Coffea* (Aulmann and la Baume, 1911).

References. Aulmann and la Baume, 1911 (Biol.); Lepesme, 1953 (Biol.); Lepesme and Villiers, 1944 (Biol.); Mühlmann, 1954 (Biol.).

Ceroplesis (=Moecha) büttneri (Kolbe)

Distribution. ETHIOPIAN REGION: Dahomey, Gold Coast, Ivory Coast, Togo.

Mature larva. Very similar to that of *C. signata* Waterhouse, but with peritreme of spiracle broadly oval and rather thin.

Host plants: *Coffea* (Aulmann and la Baume, 1911); *Blasephida* (E.A.J.D.).

Material studied. 1 L, 1 I, Gold Coast, Samreboi, 22.iii.1953, from dead, dry stems of *Blasephida*, E.A.J.D. leg., in coll. B.M.

References. Aulmann and la Baume, 1911 (Biol.); Lepesme, 1953 (Biol.); Lepesme and Villiers, 1944 (I fig., Biol.).

Ceroplesis hintzi Breuning

Distribution. ETHIOPIAN REGION: Belgian Congo.

Mature larva. No material available. For generic characters see key, p. 25.

Host plant: *Coffea canephora* (Lepesme and Villiers, 1944).

References. Lepesme and Villiers, 1944 (I fig., Biol.).

Ceroplesis orientalis (Herbst) (=**caffer** Hintz)

Distribution. ETHIOPIAN REGION: Cape Province, Kenya, Mashonaland, Matabeleland, Natal, Rhodesia, Tanganyika, Transvaal.

Mature larva. No material available. For generic characters see key, p. 25.

Host plant: *Acacia mollissima* (Tooke, 1949).

References. Distant, 1904 (Biol.); Tooke, 1949 (Biol.).

Ceroplesis quinquefasciata (Fabricius)

Distribution. ETHIOPIAN REGION: Angola, Belgian Congo, Cameroons, Senegal, Tanganyika, Transvaal, Uganda.

Mature larva. No material available. For generic characters see key, p. 25.
Host plant: *Cassia siamea* (J.C.M.G.).
References. None available.

Ceroplesis aestuans Olivier

Distribution. PALAEARCTIC REGION: Sahara. ETHIOPIAN REGION: Senegal.
Mature larva. No material available. For generic characters see key, p. 25.
Host plant: *Acacia raddiana* (Mateu, 1954).
References. Mateu, 1954 (Biol.).

Ceroplesis fasciata (Aurivillius)

Distribution. ETHIOPIAN REGION: Belgian Congo, Uganda.
Mature larva. No material available. For generic characters see key, p. 25.
Host plant: *Albizia coriaria* (J.C.M.G.).
References. None available.

Gnathoenia flavovariegata Breuning

Distribution. ETHIOPIAN REGION: Gold Coast.
Mature larva. Inseparable from those of *Ceroplesis* species. It very closely resembles *C. intermedia* Aurivillius, from which it differs in the conical tubercles on abdominal tergite 9 which are subcontiguous, being separated by less than the basal width of one tubercle, and by the frons which is much more extensively ferruginous. Length up to 26 mm.; maximum breadth (at prothorax) 6·9 mm.
Host plant: *Acacia* sp. (E.A.J.D.).
Biology. The larva feeds in the medullary canal of the thick woody stems of the host plant and the adult emerges from a round hole during March.
Material studied. 2 L, 1 I, Gold Coast, Samreboi, Adjum, 24.iii.1955, from *Acacia* sp., E.A.J.D. leg., in coll. B.M.
References. None available.

Titoceres jaspideus (Serville)

Distribution. ETHIOPIAN REGION: Eritrea, Kenya, Transvaal. PALAEARCTIC REGION: Morocco.
Mature larva. Distinguishable from larvae of *Ceroplesis* and *Gnathoenia* by its hypostoma, which is strongly sclerotised and ferruginous and which has the anterior region steeply sloping down to the front margin. Length up to 36 mm.; maximum breadth (at prothorax) 10·5 mm.
Host plant: *Acacia* sp. (J.C.M.G.).
Material studied. 2 L, 1 I, Kenya, Kisumu, 1955, from dry *Acacia* sp., J.C.M.G. leg., in coll. B.M.
References. None available.

Pycnopsis brachyptera Thomson

Distribution. ETHIOPIAN REGION: Cape Colony, Damaraland, Mashonaland, Matabeleland, Natal, Pretoria, Transvaal.

Mature larva. Similar to those of *Ceroplesis* species, from which it differs in having peg-shaped tubercles (which are entirely ferruginous) on tergite 9 and also in not having marginal chambers on the spiracles.

Host plants: *Acacia mollissima*, *Albizia lebbeck* and *A. procera* (Tooke, 1949); *Acacia rehmanniana* (G. H. Bunzli).

Biology. Eggs are deposited under the bark of dead or dying trees of freshly felled brushwood.

Economic importance. Adults cause considerable damage to young trees by gnawing the young shoots or by girdling them (Tooke, 1949). According to G. H. Bunzli, larval damage is never fatal to trees, as it causes only partial die-back, followed by vigorous regrowth.

Material studied. 4 L, 1 P, 6 I, S. Rhodesia, Matopos, 12.v.1953, from *Acacia rehmanniana*, G. H. Bunzli leg., in coll. B.M.

References. Distant, 1904 (Biol.); Ripley and Petty, 1937 (Biol. fig., Contr.); Tooke, 1949 (Biol.).

Morimopsini

The genus *Monoxenus* has been transferred by Breuning (1950b) from the Dorcadionini to the Morimopsini. Examination of the larva has revealed characters which support this transference in so far as it appears to have no fundamental characters in common with those of the Dorcadionini, such as a 3-segmented antenna, pleural tubercles with sclerotised pits, the absence of urogomphi and the anus a transverse cleft.

On the other hand, it should be pointed out that the larva of *Monoxenus* shows apparently strong affinities towards the Crossotini, particularly in the possession of a 2-segmented antenna, a non-spiculate sternellum and well-developed urogomphi.

Monoxenus (s.g. **Dityloderus**) **fuliginosus** Gahan

Distribution. ETHIOPIAN REGION: Cameroons, Kenya, Uganda.

Mature larva (fig. 169). Length up to 33 mm.; maximum breadth (at prothorax)

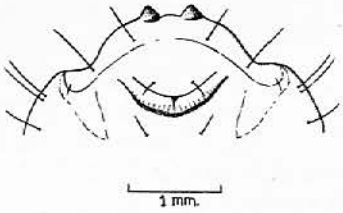


Fig. 169. *Monoxenus fuliginosus* Gahan. Mature larva. Abdominal segments 9 and 10. Caudal aspect.

5·9 mm. *Head* rather strongly elongate, moderately depressed, widest at anterior third (maximum head-width 3·1 mm.), sides abruptly though rather feebly constricted at middle, slightly converging posteriorly; frontal sutures moderately distinct; antennal

foramen open behind; mouthframe moderately strongly sclerotised, ferruginous. Frons broadly ferruginous, smooth, with eight setiferous pores; six epistomal setae present. One pair of ocelli present; lens round, convex; pigmented spot distinct. Hypostoma flat, testaceous, sutures rather indistinct, incurved; gular region with a pale median cleavage line on each side of which is a strongly raised suture and a pair of stout setae. Antenna 2-segmented; segment 2 quadrate and bearing an elongate, conical, hyaline process. Maxilla with palpal segment 3 elongate, slightly shorter than segment 2. Labial palpi with segment 2 cylindrical, slightly more than half length of segment 1. Mentum distinct from submentum. *Prothorax* with pronotum pale testaceous, sparsely setose anteriorly, glabrous and feebly rugose posteriorly. Prosternum with eusternum distinct, triangular and bearing several scattered setae; sternellum non-spiculate. *Abdomen* with each dorsal ampulla with a pair of rather indistinct, transverse furrows and four of transversely oval tubercles. The anterior and posterior margins of abdominal segments 2–7 broadly sinuate paramedially, the extreme margins smooth and glabrous (their form and position suggests that they may be analogous to gin-traps). Tergite 9 bearing medially near posterior margin a pair of blunt urogomphi (fig. 169). Epipleurum protuberant on all segments. Pleural tubercles bearing two long setae and sometimes one to three smaller setae; sclerotised pits absent. *Legs* absent. *Spiracles* with peritreme subcircular and with three rather large chambers on posterior margin.

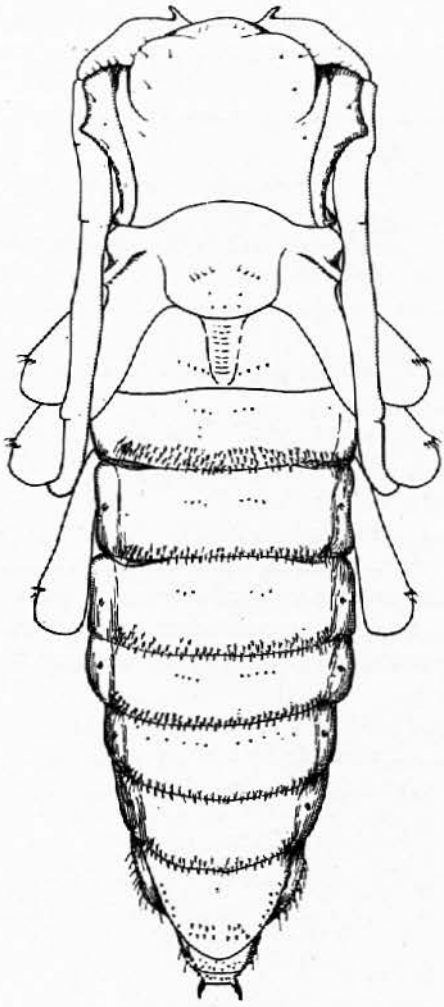


Fig. 170. *Monoxenus fuliginosus* Gahan. Pupa. Dorsal aspect.

Pupa (fig. 170). Length up to 22 mm.; maximum breadth 6 mm. *Head* (fig. 170) with vertex entirely visible from above, rather shallowly excavate and bearing a conical tuberculate process near inner margin of each antennal base; front with about twelve setae as figured; clypeus with a transverse impression at base and bearing two pairs of setae. Antennae extending to between abdominal segments 2 and 3, where they are strongly curved ventrally to terminate near apices of middle tibiae. Eyes flat and each bearing a conspicuous seta near mesal margin. Mandibles each with a pair of stout setae near middle of outer face; labrum rather strongly protuberant and bearing

about thirty-six stout setae; anterior margin broadly rounded. *Pronotum* (fig. 170) strongly margined and sinuate laterally and with a pair of sublateral tuberculate protuberances; disc bearing numerous scattered spines. *Mesonotum* bearing a few scattered spines. *Metanotum* bearing a few scattered spines, each arising from a basal tubercle; scutellar groove strongly transversely striate and with two or three median tubercles. Elytra extending to abdominal segment 2. *Abdomen* with tergites 1–6 each with numerous curved, ferruginous spines (each arising from a basal tubercle) which are mostly placed in a transverse row near posterior margin. Tergites 7 and 8 with spines slightly stouter, sublaterally bearing an apical seta. Tergite 9 bearing a pair of stout, downwardly inclined urogomphi and several scattered spines. Sternites each with a transverse row of setae. Pleura moderately protuberant, bearing several setae. *Legs* with femora bearing a transverse row of short, stout spines near apices; hind femora extending to abdominal segment 4. *Functional spiracles* present on abdominal segments 1–6; peritreme very thin, pale, subreniform and distinctly raised above general level of cuticle.

Host plants: *Pinus radiata, Cupressus macrocarpus* (J.C.M.G.).

Biology. Larvae have been found in felled logs (on ground about two years) in thin, dead, dry stems and in stumps.

Material studied. 3 L, 2 P, 2 I, Kenya, Kinangop, 1951, from *Pinus radiata* (dead), J.C.M.G. leg., in coll. B.M.

References. None available.

Monoxenus (s.g. **Bothynoscelis**) **horridus** (Hintz)

Distribution. ETHIOPIAN REGION: Belgian Congo, Tanganyika, Uganda.

Mature larva. No material available. For generic characters see key, p. 27.

Host plant: *Parinari excelsa* (J.C.M.G.).

References. None available.

Monoxenus (s.g. **Bothynoscelis**) **plurituberculatus** Breuning

Distribution. ETHIOPIAN REGION: Kenya.

Mature larva. No material available. For generic characters see key, p. 27.

Host plant: *Acacia melanoxylon.*

References. None available.

Crossotini

Dichostathes quadripunctatus (Chevrolat)

Distribution. ETHIOPIAN REGION: Belgian Congo, Gold Coast, Ivory Coast, Nigeria, Sierra Leone, Uganda.

Mature larva (figs. 171, 172). Length up to 17 mm.; maximum breadth (at prothorax) 4·6 mm. *Head* (fig. 171) strongly elongate, moderately depressed, widest at anterior third (maximum head-width 2·1 mm.), sides abruptly though rather feebly constricted at middle, slightly converging posteriorly; frontal sutures indistinct; antennal foramen open behind; mouthframe moderately sclerotised, pale ferruginous. Frons broadly ferruginous antero-laterally and distinctly longitudinally striate, with eight setiferous pores; six epistomal setae present. One pair of ocelli present; lens

round, convex; pigmented spot distinct. Hypostoma flat, testaceous; sutures distinct, ferruginous, slightly incurved; gular region with a very pale median cleavage line on each side of which is a pair of stout setae. Antenna 2-segmented; segment 2 quadrate and bearing a small, conical, hyaline process. Maxilla with palpal segment 3 elongate, slightly shorter than segment 2. Labial palpi with segment 2 cylindrical, slightly more

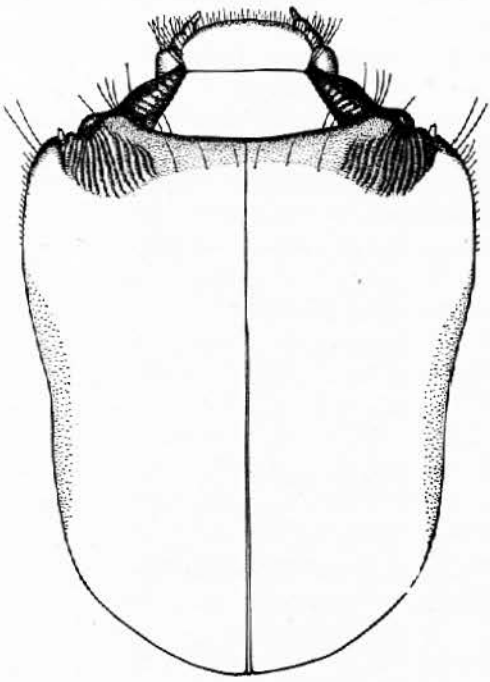


Fig. 171

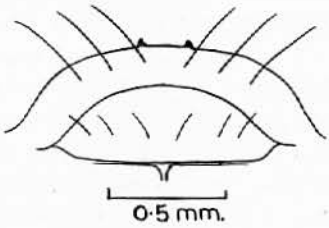


Fig. 172

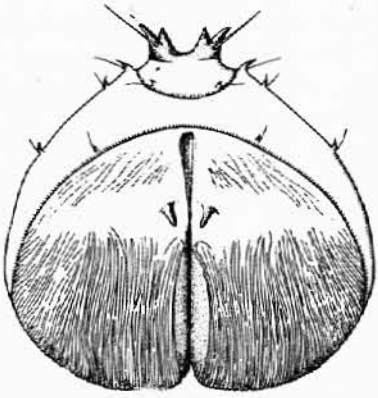


Fig. 173

Figs. 171–172. *Dichostathes quadripunctatus* (Chevrolat). Mature larva. Fig. 171. Head. Dorsal aspect. Fig. 172. Abdominal segment 9. Caudal aspect.

Fig. 173. *Dichostathes quadripunctatus* (Chevrolat). Pupa. Abdominal segment 9. Caudal aspect.

than half length of segment 1. Mentum distinct from submentum. *Prothorax* with pronotum pale testaceous, sparsely setose anteriorly, glabrous and feebly rugose posteriorly. Prosternum with eusternum distinct, triangular and sparsely setose. *Abdomen* with each dorsal ampulla with a pair of rather indistinct transverse furrows and three rows of feebly defined moniliform tubercles. The anterior and posterior margins[1] of all segments from the mesothorax to abdominal segment 7 broadly sinuate paramedially, the extreme margins microscopically spiculate. Tergite 9 bearing medially near posterior margin a pair of short, blunt urogomphi (fig. 172). Epipleurum protuberant on all segments. Pleural tubercles small, bearing about five setae; sclerotised pits absent. *Legs* absent. *Spiracles* with peritreme broadly oval.

[1] Their form and position suggests that these structures are analogous to gin-traps which are so far only known in pupae.

Pupa (fig. 173). Length up to 11 mm.; maximum breadth 4·5 mm. *Head* with vertex entirely visible from above, rather shallowly excavate and bearing two stout spines between antennal bases. Front with several stout spines (each with a basal seta) arranged more or less in two widely separated, longitudinal rows; clypeus with transverse impression at base and bearing four to six short spines. Antennae extending as far as abdominal segment 3, where they are strongly curved ventrally to terminate near front coxae. Eyes flat. Mandibles each with a pair of short spines (each with a basal seta) near middle of outer face; labrum transverse with front margin broadly rounded; rather strongly protuberant and densely setose along front margin and base. *Pronotum* smooth; front margin bearing numerous short spines (each with a basal seta); disc almost devoid of spines. *Mesonotum* and *metanotum* each with a few scattered minute spines; scutellar groove indistinct. Elytra and wings extending to abdominal segment 4. *Abdomen* micro-granulate with tergites 1–6 each with several stout, curved, testaceous spines (each with a basal seta) which are arranged in more or less two transverse rows. Tergite 7 with spines stouter and ferruginous. Tergite 8 transverse with a median oval tubercle bearing two divergent, very stout spines and on each side two to four pairs of smaller spines. Tergite 9 (fig. 173) roundly truncate posteriorly, the caudal area bun-shaped, finely longitudinally striate and with a deep median longitudinal cleft and a pair of minute, blunt, sclerotised processes (urogomphi?). Sternites glabrous. Pleura moderately protuberant, bearing two to five small spines. *Legs* with femora bearing a transverse row of short spines subapically; hind femora extending to abdominal segment 4. *Functional spiracles* present on segments 1–6; peritreme very thin, pale, reniform and scarcely raised above general level of cuticle.

Host plants: *Albizia gummifera, A. zygia, Cassia siamea* (G.H.T.); *Acacia pennata* (E.A.J.D.).

Biology. G. H. Thompson has made the following observations: Oviposition takes place on dead trees. The larval life is passed in the inner bark and the mature larva constructs an oval pupal cell wholly within the sapwood or projecting from the sapwood into the inner bark. The pupal cell is lined with wood fibres. The pupal period lasts eight days. Emergence occurs during February and August.

Material studied. 6 L, 1 P, 1 I, Gold Coast, 1945, from *Albizia gummifera, A. zygia* and *Cassia siamea*, G.H.T. leg., in coll. G.H.T.; 3 L, 2 P, 2 I, Gold Coast, Samreboi, 21.iii.1953, from *Acacia pennata*, E.A.J.D. leg., in coll. B.M.

References. None available.

[Hecyrini]

Hecyra (=Hecyrida) terrea (Bertol)

Distribution. ETHIOPIAN REGION: Kenya, Mozambique, Natal, Nyasaland.

Mature larva (fig. 174). Very similar to that of *Dichostathes quadripunctatus* (Chevrolat), but differing as follows. Length 28 mm.; maximum breadth (at prothorax) 5·9 mm. *Abdomen* with tubercles of dorsal ampullae strongly protuberant. Urogomphi on tergite 9 extremely long and arising from long cylindrical basal tubercles (fig. 174).

Host plant: *Anacardium occidentale.*

Material studied. 3 L (adult reared), Kenya, Likoni, 1953, from *Anacardium occidentale*, J.C.M.G. leg., in coll. B.M.

References. None available.

Hecyra obscurator (Fabricius)

Distribution. ETHIOPIAN REGION: Angola, Belgian Congo, French Guinea, Gold Coast, Nigeria.

Mature larva. No material available.

Host plant: *Carapa procera* (E.A.J.D.).

References. None available.

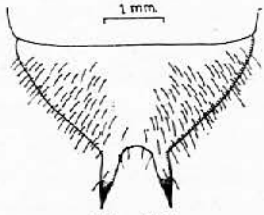


Fig. 174

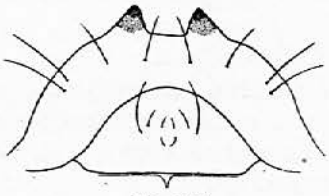


Fig. 175

Fig. 174. *Hecyra terrea* (Bertol). Mature larva. Abdominal segment 9. Dorsal aspect.
Fig. 175. *Frea marshalli* Breuning. Mature larva. Abdominal segment 9. Caudal aspect.

Frea (s.g. **Frea**) **marshalli** Breuning

Distribution. ETHIOPIAN REGION: Kenya, Tanganyika.

Mature larva (fig. 175). Similar to that of *Dichostathes quadripunctatus* (Chevrolat), from which it differs as follows. Length up to 32 mm. *Head* with front margin of frons broadly ferruginous, the ferruginous band equal in width to at least length of clypeus. *Abdomen* with tubercles of dorsal ampullae smooth, shining, distinctly defined and strongly protuberant. Gin-traps with margins glabrous. Urogomphi on tergite 9 robust and conical (fig. 175).

Host plant: *Ficus* (J.C.M.G.).

Material studied. 2 L (adult reared), Kenya, Ngong, 1953, from *Ficus* sp., J.C.M.G. leg., in coll. B.M.

References. None available.

Frea (s.g. **Frea**) **marmorata** Gerstaker

Distribution. ETHIOPIAN REGION: Tanganyika.

Mature larva. No material available. For generic characters see key, p. 27.

Host plant: *Coffea arabica* (Aulmann and la Baume, 1911).

References. Aulmann and la Baume, 1911 (Biol.); Lepesme and Villiers, 1944 (Biol.); Morstatt, 1913b (Biol.); Mühlmann, 1954 (Biol.).

Frea (s.g. **Frea**) **humeralis** Kolbe

Distribution. ETHIOPIAN REGION: Tanganyika.

Host plants: *Rauwolfia* sp., *Albizia gummifera* (J.C.M.G.).

References. None available.

Frea (s.g. **Frea**) **maculicornis** Thomson

Distribution. ETHIOPIAN REGION: Belgian Congo, French Equatorial Africa, Gold Coast, Nigeria, Rio Muni, São Tomé.

Mature larva. No material available. For generic characters see key, p. 27.

Host plant: *Coffea arabica* (Aulmann and la Baume, 1911).

References. Aulmann and la Baume, 1911 (Biol.); Lepesme, 1948 (Biol.); Lepesme and Villiers, 1944 (Biol.); Mühlmann, 1954 (Biol.); Wisser and Lesne, 1899 (Biol.).

Frea (s.g. **Frea**) **uniformis** (Hintz)

Distribution. ETHIOPIAN REGION: Cameroons, Fernando Póo, Gold Coast, Nigeria, Rio Muni.

Mature larva. Similar to that of *Frea marshalli* Breuning, but readily distinguishable by its more coarsely striate frons and its oval, rounded, testaceous urogomphi.

Material studied. 1 L, 1 I, Gold Coast, near Offinsu, 9.iii.1955, from woody creeper, E.A.J.D. leg., in coll. B.M.

References. None available.

Frea (s.g. **Frea**) **haroldi** Quedenfeldt

Distribution. ETHIOPIAN REGION: Cameroons, Lower Congo.

Mature larva. No material available. For generic characters see key, p. 27.

Host plants: *Coffea arabica*, *C. robusta* (Lepesme and Villiers, 1941).

References. Lepesme and Villiers, 1941 (Biol.), 1944 (Biol.); Morstatt, 1937 (Biol.); Mühlmann, 1954 (Biol.).

Frea (s.g. **Frea**) **vermiculata** Kolbe

Distribution. Tanganyika.

Host plant: *Albizia* sp. (J.C.M.G.).

References. None available.

Corus (=**Crossotus**) **albopunctatus** (Breuning)

Distribution. ETHIOPIAN REGION: Kenya.

Host plant: *Gossypium* (Hargreaves, 1948).

References. Hargreaves, 1948 (Biol.).

Corus collaris Chevrolat

Distribution. ETHIOPIAN REGION: Angola, Ivory Coast, Northern Rhodesia, Sierra Leone, Tanganyika.

References. Jover, 1953 (Biol.).

Crossotus molossus (Duvivier)

Distribution. ETHIOPIAN REGION: Belgian Congo, Cameroons, Cape Colony, Kenya, Nigeria.

Mature larva (fig. 176). Resembling that of *Frea marshalli* Breuning, from which it

may be distinguished by the contiguous urogomphi (fig. 176) and the absence of a tubercle on the ventral acetabulum. From *Dichostathes quadripunctatus* (Chevrolat), it differs in having much larger, conical, pitchy urogomphi and distinct, protuberant tubercles on the abdominal ampullae.

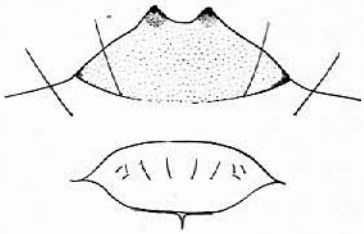


Fig. 176. *Crossotus molossus* (Duvivier). Mature larva. Abdominal segment 9. Caudal aspect.

Host plants: *Ficus, Albizia, Celtis soyauxii* (J.C.M.G.).

Material studied. 3 L, Kenya, 1953, in dead, dry branches, J.C.M.G. leg., in coll. B.M.

References. None available.

Crossotus subocellatus (Fairmaire) =(**Dichostathes subocellatus** Fairmaire)

Distribution. PALAEARCTIC REGION: Arabia, Egypt, Sahara. ETHIOPIAN REGION: Ethiopia, Republic of the Sudan, Somalia.

Mature larva. No material available. For generic characters see key, p. 27.

Host plants: *Poinciana regia* (Adair, 1917); *Acacia nilotica* (Alfieri, 1916); *Acacia raddiana* (Mateu, 1954).

References. Adair, 1917 (Biol.); Alfieri, 1916 (Biol.); Mateu, 1954 (Biol.).

Crossotus leonensis Breuning

Distribution. ETHIOPIAN REGION: Sierra Leone.

Mature larva. No material available. For generic characters see key, p. 27.

Host plant: *Ficus thonningii* (Lepesme, 1948b (Biol.).

References. Lepesme, 1948b (Biol.).

Crossotus heimschi Peyerimhoff

Distribution. PALAEARCTIC REGION: Sahara.

Mature larva. No material available. For generic characters see key, p. 27.

Host plant: *Acacia tortilis.*

References. Villiers, 1946 (I fig., Biol.).

Phrynetini

Larval Characters

Head with antennae 2-segmented; antennal foramen open posteriorly. One pair of rather indistinct ocelli present. *Prothorax* with posterior area of pronotum covered with a network of raised ferruginous ridges. *Abdomen* with dorsal ampullae non-tuberculate and with two transverse furrows. Tergite 9 with a very stout median spine

arising from beneath posterior margin.[1] Anal cleft transverse; dorsal lobe sclerotised, pigmented and sometimes striate. Pleural tubercles without sclerotised pits. *Spiracles* without marginal chambers.

Phryneta (=Inesida) leprosa (Fabricius)

Distribution. ETHIOPIAN REGION: throughout Tropical Africa.

Adult (fig. 177). Length 20–42 mm. Entirely brown and covered with light brown pubescence, except for a small premedian discal spot and a large triangular postmedian

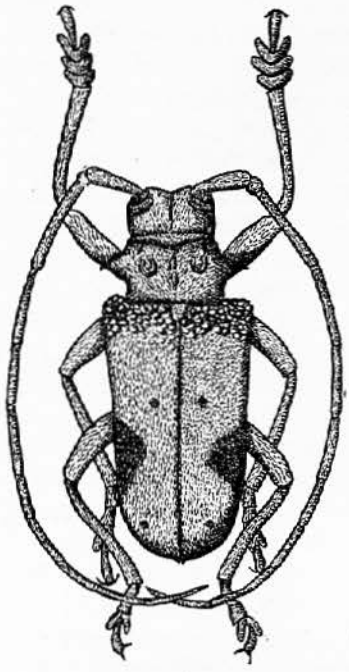


Fig. 177

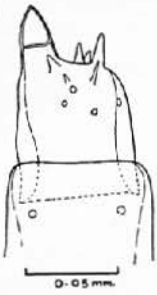


Fig. 178

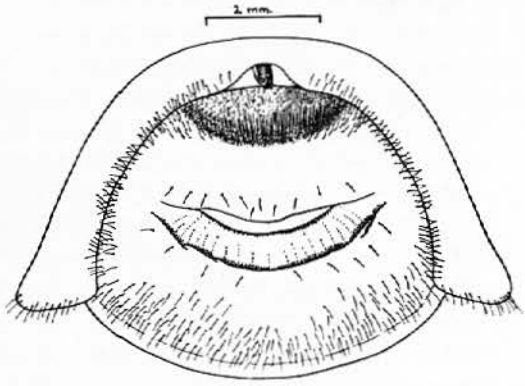


Fig. 179

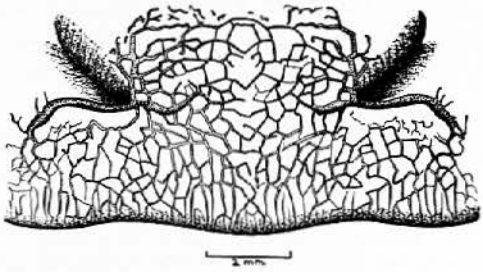


Fig. 180

Fig. 177. *Phryneta leprosa* (Fabricius). Adult.

Figs. 178–180. *Phryneta leprosa* (Fabricius). Mature larva. Fig. 178. Apical part of antenna. Lateral aspect (Duffy, 1953a). Fig. 179. Abdominal segments 9 and 10. Caudal aspect (Duffy, 1953a). Fig. 180. Median region of pronotum (Duffy, 1953a).

mark which are dark brown. *Head* with antennae one and one-half times as long as body in male and as long as body in female. *Prothorax* with a pair of large, slightly curved, spine-like, lateral tubercles; disc with seven small tubercles. Mesosternum with coxal cavities open externally. *Elytra* with humeral angles very coarsely and deeply punctured; apices rounded. *Legs* with middle tibiae entire; tarsal claws divaricate.

Mature larva (figs. 178–180, 182). Length up to 55 mm.; maximum breadth (at prothorax) 14 mm. *Head* moderately depressed, elongate, subparallel-sided, widest

[1] This spine would appear to be controlled through direct muscular action by which it can be appreciably raised.

before middle (maximum head-width 7·5 mm.), slightly constricted at middle; frontal sutures distinct for entire length; antennal foramen open behind; mouthframe strongly and broadly sclerotised. Frons with at least anterior half ferruginous, smooth, with numerous scattered setae; six epistomal setae present. One pair of ocelli present; lens round, scarcely convex; pigmented spot indistinct. Hypostoma convex, ferruginous, with front margin broadly pitchy; setiferous pores absent; sutures pitchy, slightly incurved. Gula region with a pale median cleavage line. Antenna (fig. 178) 2-segmented; segment 2 slightly elongate and bearing a hyaline process. Maxilla with palpal segment 3 acutely conical, slightly shorter than segment 2. Mentum distinct from submentum. Labrum semicircular. Clypeus with a few minute pale setae near each lateral margin. *Prothorax* depressed, with pronotum (fig. 180) glabrous, testaceous and covered with a network of ferruginous spiculate ridges. *Abdomen* with each dorsal ampulla with an anterior transverse, curved furrow and two pairs of lateral furrows; median longitudinal furrow distinct; tubercles absent, microscopically pubescent; each ventral ampulla with only one pair of lateral furrows. Tergite 9 (figs. 179, 182) with a very stout, curved spine, the base of which is concealed beneath the posterior margin; segment 10 (figs. 179, 182) with dorsum dome-shaped, rather strongly sclerotised, ferruginous and very finely longitudinally striate; anus a simple transverse cleft. Epipleurum protuberant on all segments. Pleural tubercle without sclerotised pits. *Legs* absent. *Spiracles* with peritreme exceedingly thick and broadly oval.

Pupa (fig. 181). Length up to 34 mm.; maximum breadth 11 mm. *Head* with vertex entirely visible from above, deeply excavate between bases of antennae and with a pair of setae at apex of inner face of each antennal tubercle; front densely setose on inner half of each eye; clypeus bearing two groups of four to six setae; labrum triangular with numerous marginal setae. Antennae extending as far as abdominal segment 3, where they are strongly curved ventrally, each forming a single coil and terminating near apex of middle femur. Mandibles robust, each with a pair of fine setae near middle of outer face. *Pronotum* almost smooth, with sides bearing a pair of stout conical tubercles; disc with a few scattered fine setae. *Mesonotum* smooth, the scutellum very strongly protuberant and rather densely setose. *Metanotum* smooth, with an oblique row of fine setae which meet at base of scutellar groove, where they are much more numerous. Elytra and wings extending as far as abdominal segment 5. *Abdomen* with tergites 1–7 each with a transverse band of very fine, dense, decumbent setae posteriorly; sublateral gin-traps (fig. 181) present on segments 1–2, 2–3, 3–4, 4–5 and 5–6 (see also Duffy, 1953a, pp. 19 and 84). Tergite 8 short, transverse, sparsely setose. Segment 9 short, produced dorsally into a long, stout, subvertical spine-like process which is slightly inclined anteriorly and strongly sclerotised apically; below this process it is densely setose and ventrally it is deeply divided and similarly setose. Sternites glabrous. Pleura moderately protuberant, each with a pair of minute setae. *Legs* with a transverse row of short fine setae near apex of each femur; hind femora extending to abdominal segment 5; tibiae more or less at right angles to longitudinal axis of body. *Functional spiracles* present on abdominal segments 1–5, but vestigial pairs present on segments 6–8; peritreme oval, thick and very strongly raised above general level of cuticle.

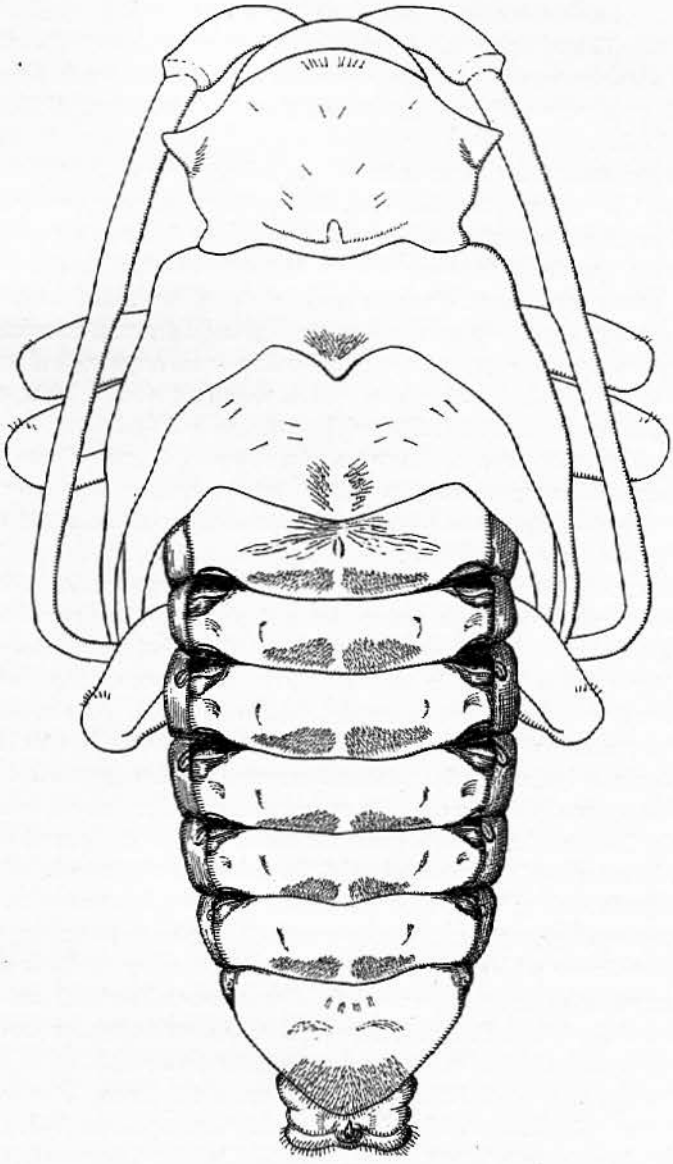


Fig. 181. *Phryneta leprosa* (Fabricius). Pupa. Dorsal aspect.

Host plants: *Chlorophora excelsa, Morus* (Ghesquière, 1927, 1928); *Coffea arabica, Funtumia, Hevea, Manihot* (Lepesme and Villiers, 1941, 1944); *Castilloa elastica* and probably *Ficus elastica* (Aulmann, 1913); *Antiaris africana* (G.H.T.); *Antiaris toxicaria, Celtis africana, C. zenkeri, C. durandii, Bosqueia phoberos, Holoptelea grandis, Chaetacme aristata* (J.C.M.G.). Lepesme (1948) states that *Coffea* was previously listed in error.

Biology. Oviposition occurs at night and from forty to fifty eggs are usually laid by a single adult. Thick bark is usually selected and eggs are inserted singly in incisions made by the beetle's mandibles. The young larvae feed subcortically and penetrate the sapwood or heartwood in which they pupate (Aulmann, 1913; Ghesquière, 1928; Duffy, 1953a).

The following observations are those of G. H. Thompson. Oviposition takes place on dead trees. The larvae tunnel between the bark and sapwood and enter the wood to pupate. The pupal chamber is approximately $\frac{1}{2}$ to 1 inch deep in the sapwood; it is oval and sited parallel to the wood fibres. In the tree studied, which was recumbent on the ground, the pupal chambers arose to the right or the left of the prepupal tunnel (i.e. dorsally or ventrally if the tree had been standing). In past attacks, probably by this species, found in standing trees, the pupal cells were always ventral to the prepupal tunnel. The latter is blocked by coarse fibres, finishing with a layer of finer fibres next to the pupal head (Pl. II, fig. 3). Adults emerge in July.

Parasites. Hymenoptera: *Stirostoma longicornis* Cam. (Ghesquière, 1928). Acarina: On several larvae recently examined by the author there were seen batches of smooth shining, oval eggs which had been deposited around the abdominal pleural areas. A few larvae were also found.

Predators. Pupae of this species are devoured by a large species of elaterid larva. These larvae have been observed to occupy up to 50 per cent of the pupal cells (G.H.T.).

Economic importance. This species is a pest of *Castilloa* but seldom attacks trees standing in deep shade. Entire plantations have often been destroyed, and in the Cameroons this tree is no longer planted (Aulmann, 1913). *Morus* has been badly attacked by this species in Uganda (Hargreaves, 1924). Generally speaking, however, this species attacks only damaged or unhealthy trees. Adults are undoubtedly responsible for causing appreciable damage by gnawing the bark of young plants.

In the Gold Coast and also in Nigeria the author has recently seen numerous and very heavy infestations of this species in *Chlorophora* and *Antiaris*, particularly the former. Recently felled logs both in logging areas and along the roadside were attacked. In some logs over fifty pupal cells were counted. Damage is severe owing to the relatively large galleries which extend deep into the heartwood. This species should undoubtedly be regarded as a major pest of *Chlorophora* in West Africa.

Material studied. 4 L, 1 P, 1 I, Uganda, C. C. Gowdey leg., in coll. B.M.; 1 L, Uganda, Kampala, 24.x.1936, H. Hargreaves leg., in coll. B.M.; 2 L, 2 P, 1 I, Gold Coast, G.H.T. leg., in coll. G.H.T.; 3 L, Uganda, 1953, from *Chlorophora excelsa*, J.C.M.G. leg., in coll. B.M.; 4 L, 2 P, 1 I, Gold Coast, 21.vii.1947, from *Antiaris africana*, G.H.T. leg., in coll. G.H.T.; 12 L, 1 P, 5 I, Belgian Congo, Eala, 16.viii.1912, from *Funtimia elastica* and *Hevea*, R. Mayné leg., in coll. M.R.C.B.; 1 L, 1 I, Belgian Congo, Bangassou, ii.1934, from *Morus*, H. J. Bredo leg., in coll. M.R.C.B.; 3 L, 1 P, 2 I, Gold Coast, Kumasi, 3.iii.1955, from *Antiaris africana*, E.A.J.D. leg., in coll. B.M.

References. Aulmann, 1913 (Biol. fig., Contr.); Duffy, 1953a (L fig., P, Biol.); Ghesquière, 1927 (Biol.), 1928 (I fig., Biol.); Hargreaves, 1924 (Biol.); Lepesme, 1948a (Biol.), 1953 (Biol.); Lepesme and Villiers, 1941 (Biol.), 1944 (Biol.); Morstatt, 1937 (Biol.); Mühlmann, 1954 (Biol.); Preufs, 1903 (I fig., Biol.); Ritchie, 1930 (Biol.); Vrijdagh, 1930 (Biol.).

Phryneta spinator (Fabricius)

Distribution. ETHIOPIAN REGION: Angola, Belgian Congo, British East Africa, Cape, Ivory Coast, Nyasaland, Rhodesia, Senegal, Transvaal.

Adult. Length 15–40 mm. Similar to *P. leprosa* (Fabricius), but with elytral pubescence yellowish or greyish with numerous black spots and without a large triangular postmedian mark.

Mature larva (fig. 183). Very similar to that of *P. leprosa* (Fabricius), from which it differs as follows. *Abdomen* with the spine on tergite 9 distinctly more triangular and with apical half straight and distinctly acuminate (fig. 183). Sclerotised ferruginous area of dorsal anal lobe smooth (fig. 183). See fig. 182 for comparison.

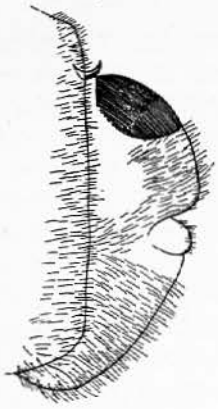


Fig. 182



Fig. 183

Fig. 182. *Phryneta leprosa* (Fabricius). Mature larva. Abdominal segments 9 and 10. Lateral aspect.

Fig. 183. *Phryneta spinator* (Fabricius). Mature larva. Abdominal segments 9 and 10. Lateral aspect.

Egg. Length 6 mm. Form elongate-oval. Chorion white, opaque, turning slightly yellow and finally becoming pinkish (Tooke, 1935b).

Host plants: *Ficus* and *Salix*; occasionally in *Pyrus communis* and *Prunus persica* (Tooke, 1935b). Gunn (1919) lists *Malus pumila, Prunus domestica, Vitis vinifera, Melia azedarach, Cupressus lusitanica* and *C. sempervirens.* Also in *Funtumia* (Vrijdagh, 1930), *Castilloa elastica* and *Ficus elastica* (Aulmann, 1913) and *Artocarpus integer* (J.C.M.G.). *Coffea* has been cited by Aulmann and la Baume (1911) and also by Lepesme and Villiers (1944), but according to Lepesme (1948) this was in error.

Biology. The eggs are deposited usually in batches of up to four, each batch being inserted in a transverse, vertical or T-shaped slit in the bark made by the mandibles of the adult. Sometimes oviposition occurs below ground-level. The incubation period varies from ten to eighteen days. The young larva feeds subcortically, making a broad, irregular gallery. From time to time the larva perforates the bark, thus forming a series of holes through which frass is periodically ejected. When mature, that is, after about two and one-half years of feeding, the larva excavates a pupal cell 1 to 2 inches long and $\frac{3}{4}$ to $1\frac{1}{2}$ inches deep; the entrance to the cell is plugged with coarse,

stringy, wooden fibres. Emergence occurs throughout the period November to March. The life-cycle averages three years in duration (Gunn, 1919; Tooke, 1935b). Adults have been observed to feed upon the bark of *Melia azedorch*, *Cupressus lusitanica* and *C. sempervirens*, but never extensively (Tooke, 1949).

Parasites. Adults have been found to be infested with a parasitic fungus (*Isaria* sp.).

Economic importance. This species is sometimes a serious pest of fig and willow trees, particularly in South Africa. It is well known in Pretoria, where it is supposed to have been introduced in the early days in willow stakes planted along the Aapies River. Trees heavily infested with this species usually die or are killed through the invasion of fungi in the galleries.

According to Distant (1904), larvae of this species have been used in the past to catch "barbel" (*Clarias capensis*).

Control. It has been recommended (Brain, 1929) that fig trees should be grown as far as possible with a single stem and that the lower 2 feet or so of the trunk should be protected by a band of fine wire netting projecting away from the trees, so that the beetles could not gain access to oviposit. Larvae may be killed by making an incision with a knife at one end of the ejection holes and then pushing a strong flexible wire along the gallery. Heavily infested trees should be dug out and burned. When damage is confined to exposed roots, a small quantity of kerosene or carbon bisulphide should be injected (Tooke, 1935b).

Material studied. 3 L (adult reared), Kenya, Nairobi, 1953, from *Artocarpus integer* (dying), J.C.M.G. leg., in coll. B.M.; 2 L, Pretoria, 9.ii.1911, from *Ficus*, Bredell leg., in coll. B.M. (Pres. by Dr. H. K. Munro).

References. Aulmann, 1913 (Biol. Contr.); Aulmann and la Baume, 1911 (Biol.); Brain, 1929 (Biol.); Distant, 1904 (Biol.); Duffy, 1953a (E, Biol., Paras., Contr.); Gunn, 1919 (E fig., L fig., P fig., I fig., Biol. fig.); Howard, 1909 (Biol.); Lepesme, 1948a (Biol.), 1953 (Biol.); Lepesme and Villiers, 1941 (Biol.), 1944 (Biol.); Lounsbury, 1918 (Biol.); Mühlmann, 1954 (Biol.); Stellwaag, 1928 (Biol.); Tooke, 1935b (L fig., P fig., Biol.), 1949 (Biol); Vrijdagh, 1930 (Biol.); Zacher, 1921 (Biol.).

Phryneta (=Phrystola) coeca (Chevrolat) (=**assimilis** Kolbe)



Fig. 184. *Phryneta coeca* (Chevrolat). Mature larva. Abdominal segments 9 and 10. Lateral aspect.

Distribution. ETHIOPIAN REGION: Angola, Belgian Congo, Cameroons, French Equatorial Africa, Gold Coast, Ivory Coast, Nigeria, Tanganyika, Togo, Uganda.

Mature larva (fig. 184). Separable from that of *Phrynetopsis loveni* Aurivillius as follows. Length up to 50 mm.; maximum breadth (at prothorax) 6·9 mm. *Prothorax* with presternum bearing only sparse, erect, finer setae. *Abdomen* with pleural tubercles bearing at least twenty setae. Dorsal anal lobe less protuberant and with median tubercle larger, subcarinate and pitchy apically (fig. 184).

Host plants: *Ficus elastica* (Aulmann, 1913); *Funtumia* (Vrijdagh, 1930); *Alstonia boonei* (J.C.M.G.).

Biology. According to Aulmann (1913), *Ficus* is injured

both by the larvae and, to a greater extent, by the adults of this species which girdle the bark during the rainy season.

Material studied. 2 L, 1 I, Kenya, 1953, from *Alstonia boonei*, J.C.M.G. leg., in coll. B.M.

References. Aulmann, 1913 (Biol.); Lepesme, 1948 (Biol.), 1953 (I fig., Biol.); Mühlmann, 1954 (Biol.); Vrijdagh, 1930 (Biol.).

Phryneta (=**Phrystola**) **hecphora** (Thomson)

Distribution. ETHIOPIAN REGION: Angola, Belgian Congo, Gold Coast, Uganda.

Mature larva. Very similar to that of *P. coeca* (Chevrolat), from which it differs as follows. Length up to 62 mm.; maximum breadth (at prothorax) 10 mm. *Abdomen* with dorsal anal lobe entirely testaceous, evenly rounded and smooth.

Pupa. Very similar to that of *P. leprosa* (Fabricius), from which it differs mainly in having a conspicuous median tubercle on the disc of the pronotum. The abdominal tergite 9 in this species is much more sparsely setose.

Host plants: *Theobroma* (Aulmann and la Baume, 1912); *Ficus elastica* (Aulmann, 1913); *Vernonia amygdalina* (J.C.M.G.).

Biology. The larvae feed subcortically (Aulmann, 1913).

Material studied. 1 L, 1 P, Uganda, Gulu, 23.iii.1954, from *Vernonia amygdalina*, J.C.M.G. leg., in coll. B.M.

References. Aulmann, 1913 (Biol. fig., Contr.); Aulmann and la Baume, 1912 (Biol.); Mühlmann, 1954 (Biol.).

Phryneta conradti Kolbe

Distribution. ETHIOPIAN REGION: Belgian Congo, Tanganyika.

Mature larva. No material available. For generic characters see key, p. 25.

Host plant: *Ficus elastica.*

References. Mühlmann, 1954 (Biol.).

Phryneta luctuosa Murray

Distribution. ETHIOPIAN REGION: Cameroons, Nigeria.

Mature larva. No material available. For generic characters see key, p. 25.

Host plant: *Funtumia* sp.

References. Mühlmann, 1954 (Biol.).

Phryneta (=**Phrystola**) **obliquata** (Harold) (=**assimilis** Aulmann)

Distribution. ETHIOPIAN REGION: Belgian Congo, Kenya, Republic of the Sudan, Somalia, Tanganyika, Uganda.

Mature larva. No material available. For generic characters see key, p. 25.

Host plants: *Theobroma* (Aulmann and la Baume, 1912); *Ficus elastica* (Aulmann, 1913); *Acacia* (J.C.M.G.).

Biology. Larvae infest young branches and adults gnaw the bark (Aulmann, 1913).

References. Aulmann, 1913 (Biol. fig.); Aulmann and la Baume, 1912 (Biol.).

Phryneta aurocincta Guérin-Méneville

Distribution. ETHIOPIAN REGION: Cameroons, Gold Coast, Ivory Coast, Nigeria, Senegal, Sierra Leone, Tanganyika, Togo, Uganda.

Mature larva. No material available. For generic characters see key, p. 25.

Host plant: *Ficus thonningii* (Lepesme, 1948).

Biology. Considerable damage is done to *Ficus* by larvae of this species which excavate galleries of about ½ inch in diameter in the bole and larger branches. Adults are to be found during the rainy season, usually near the tops of trees. Their flight, which usually takes place in the late afternoon or after storms, is heavy and clumsy. During the morning they are to be found resting in crevices of tree trunks. Both sexes stridulate vigorously when molested (Lepesme, 1948).

References. Lepesme, 1948 (Biol.), 1953 (Biol.).

Phryneta marmorea (Olivier)

Distribution. MADAGASCAN REGION: Madagascar.

Mature larva. No material available. For generic characters see key, p. 25.

Host plant: *Acacia.*

References. Frappa, 1931a (Biol.).

Phrynetopsis loveni Aurivillius

Distribution. ETHIOPIAN REGION: Kenya, Tanganyika, Uganda.

Mature larva (fig. 185). Distinguishable from other species of *Phryneta* and *Phrynetopsis* by the abdominal segment 9 which is distinctly shorter than segment 8.

Host plant: *Pygeum africanum* (J.C.M.G.).

Biology. The larvae first make subcortical galleries and then tunnel into the wood where the galleries are wide and are packed with frass. These galleries are extensive and often penetrate the heartwood. Adults attack apparently healthy trees (J.C.M.G.).

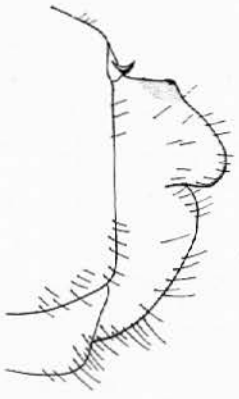


Fig. 185

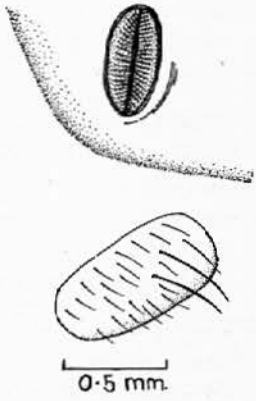


Fig. 186

Fig. 185. *Phrynetopsis loveni* Aurivillius. Mature larva. Abdominal segments 9 and 10. Lateral aspect.

Fig. 186. *Phrynetopsis fuscicornis* (Chevrolat). Mature larva. Abdominal spiracle and pleural tubercle.

Material studied. 1 L, 2 I, Kenya, Londiani, 1953, from *Pygeum africanum*, J.C.M.G. leg., in coll. B.M.

References. None available.

Phrynetopsis fuscicornis (Chevrolat)

Distribution. ETHIOPIAN REGION: Ivory Coast, Kenya, Nigeria, Senegal, Uganda.

Mature larva (fig. 186). Very similar to that of *P. loveni* Aurivillius, from which it differs as follows. Length up to 42 mm.; maximum breadth (at prothorax) 6·1 mm. *Abdomen* with pleural tubercles each bearing at least twenty setae (fig. 186). *Spiracles* with peritreme broadly oval.

Host plants: *Trema guineensis*, *Bosqueia phoberos*, *Ficus* (J.C.M.G.).

Material studied. 2 L, 1 P (damaged), 1 I, Uganda, 1953, from *Trema guineensis*, J.C.M.G. leg., in coll. B.M.

References. None available.

Phrynetopsis variegata (Reiche)

Distribution. ETHIOPIAN REGION: Eritrea.

Mature larva. Similar to that of *Phryneta hecphora* (Thomson), but distinguishable by the much larger and less protuberant tubercle on the dorsal anal lobe.

Host plant: *Ficus carica* (Dept. Agric., Eritrea).

Material studied. 2 L, 2 I, Eritrea, Asmara, 4.i.1955, from *Ficus carica*, Dept. Agric. leg., in coll. B.M.

Phrynetopsis trituberculata Kolbe

Distribution. ETHIOPIAN REGION: Tanganyika.

Host plant: *Ficus* sp. (J.C.M.G.).

References. None available.

Homelix variegatus Jordan

Distribution. ETHIOPIAN REGION: Belgian Congo, French Equatorial Africa.

Host plant: *Coffea kouilensis* (Lepesme, 1939).

References. Lepesme, 1939 (Biol.); Lepesme and Villiers, 1941 (Biol.), 1944 (Biol.); Mühlmann, 1954 (Biol.).

Homelix decussatus (Chevrolat)

Distribution. ETHIOPIAN REGION: Ivory Coast, Nigeria.

Host plant: *Coffea robusta* (Lepesme, 1939).

References. Lepesme, 1939 (Biol.); Lepesme and Villiers, 1941 (Biol.).

Paromelix unicolor (Quedenfeldt)

Distribution. ETHIOPIAN REGION: Belgian Congo.

Host plant: *Khaya ivorensis* (F.P.R.L.).

References. None available.

Xylorhizini

Cymatura tarsalis Aurivillius

Distribution. ETHIOPIAN REGION: Belgian Congo, Kenya, Uganda.

Host plant: *Terminalia velutina* (J.C.M.G.).

References. None available.

Gen. et sp. indet.

Mature larva (fig. 187). Owing to the unusual sculpturation of the pronotum and the fact that it may prove to be a species of some considerable economic importance. an illustrated description seems warranted.

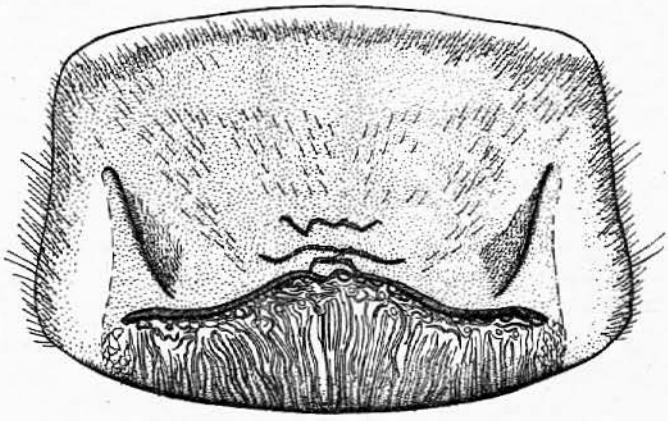


Fig. 187. Gen. et sp. incog. Mature larva. Pronotum.

Length up to 75 mm.; maximum breadth (at prothorax) 13·5 mm. *Head* rather strongly depressed, parallel-sided; frontal sutures pale but distinct; antennal foramen open posteriorly. Mouthframe very strongly and broadly sclerotised. One pair of ocelli present; lens round, moderately convex; pigmented spot rather faint owing to sclerotisation of lens. Hypostoma feebly convex, pale ferruginous, with front margin broadly pitchy; sutures pitchy, incurved; gula a pale median line. Antenna 2-segmented; segment 2 elongate, bearing a conical hyaline process. Maxilla with segment 3 of palp slightly more than half length of segment 2. Labial palp with segment 2 nearly two-thirds length of segment 1. Labrum transversely oval. *Prothorax* (fig. 187) obliquely slanting; posterior third of pronotum with a pair of paramedian, curved, glabrous, ferruginous ridges which merge medially into three or four finer ridges; eusternum and sternellum entirely ferruginous and rather densely setose. *Abdomen* with ampullae smooth, matt, micro-granulate and devoid of spicules and tubercles. Tergite 9 unarmed. Segment 10 with anus a transverse cleft, the lobes dark testaceous and sparsely setose. Epipleurum protuberant on last three segments only. Pleural tubercle without sclerotised pits. *Legs* vestigial. *Spiracles* with peritreme rather narrowly oval, pale ferruginous and scarcely raised above general level of cuticle.

Host plant: *Parinari excelsa* (J.C.M.G.).

Economic importance. According to Gardner, larvae of this species cause considerable damage to timber of *Parinari*, which is very hard and requires special saws for cutting.

Material studied. 1 L, Uganda, Kalinzu, 1954, from living *Parinari excelsa*, J.C.M.G. leg., in coll. B.M.

Petrognathini
Larval Characters

The larva of *Petrognatha gigas* (Fabricius) is the only representative of this tribe available (but see also *Tetraulax*, p. 292). The transverse anus indicates a close relationship to the Phrynetini. Another common character is the setose clypeus. Superficially, this larva resembles those of the Saperdini owing to the presence of asperities on the pronotum and spicules on the ampullae, but this would seem to be of no phylogenetic significance but rather environmental owing to their common preference for healthy trees with a high sap content.

Petrognatha gigas (Fabricius)

Distribution. Angola, Belgian Congo, Cameroons, Gold Coast, Ivory Coast, Nigeria, Senegal, Uganda.

Adult. Length 45–70 mm. Head, prothorax and scutellum densely covered with greyish to yellowish white pubescence, except at base and for a large submedian marginal area where they are very dark brown. *Head* not excavate between antennal tubercles which are very short. Antennae very thick, segment 1 without a cicatrix; segment 3 slightly curved medially; slightly longer than body in female and more than twice as long as body in male. Mandibles very robust. *Prothorax* transverse, with a pair of strong, spine-like, lateral tubercles. Mesosternum with coxal cavities open externally. *Elytra* each bearing a strong spine on shoulder; basal fourth bearing numerous coarse asperities which become spiculate posteriorly (var. *spinosa* Kolbe) or are absent. *Legs* with middle tibiae grooved; tarsal claws divaricate, simple basally.

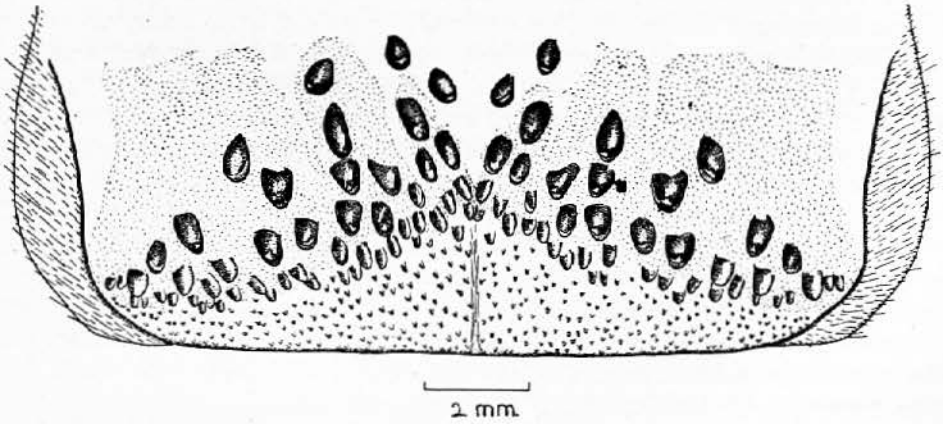


Fig. 188. *Petrognatha gigas* (Fabricius). Mature larva. Posterior area of prothorax. Dorsal aspect.

Mature larva (fig. 188). Length up to 125 mm.; maximum breadth (at prothorax) 22 mm. *Head* slightly depressed, subparallel-sided, widest before middle (maximum head-width 12·1 mm.); frontal sutures indistinct owing to sclerotisation; antennal foramen closed behind; mouthframe very strongly and broadly sclerotised, pitchy, the remainder of head capsule ferruginous; six epistomal setae present. One pair of ocelli present; lens round, strongly convex and protuberant; pigmented spot indiscernible owing to sclerotisation of lens. Hypostoma feebly convex, ferruginous, with front margin broadly pitchy; sutures pitchy, incurved; gula indiscernible. Antenna 2-segmented; segment 2 slightly elongate and bearing a slender, conical, hyaline process. Maxilla with segment 3 of palp stoutly conical, about half length of segment 2. Labial palpi with segment 2 nearly two-thirds length of segment 1. Mentum distinct from submentum. Labrum transversely oval. Clypeus bearing a few bristly setae near lateral margins. *Prothorax* obliquely slanting, with sides diverging posteriorly; posterior part of pronotum (fig. 188) with extremely coarse asperities which decrease in size towards posterior margin of pronotum; eusternum and sternellum coarsely asperate. *Abdomen* with each dorsal ampulla with two transverse impressions and four transverse rows of erect, blunt, ferruginous spines in addition to numerous scattered spines. Tergite 9 unarmed. Segment 10 bearing dense ferruginous setae, the anus a transverse cleft. Epipleurum protuberant on all segments. Pleural tubercle with a pair of large sclerotised pits. *Legs* vestigial. *Spiracles* with peritreme rather narrowly oval, extremely thick and strongly raised above general level of cuticle.

Egg. Length 8·5 mm.; breadth 4 mm. Form oval, strongly elongate, slightly more convex on one side. Chorion yellowish white, matt, feebly rugose (Villiers, 1946a).

Host plants: *Ficus elastica, F. infectoria, F. religiosa, Ceiba* (Aulmann, 1913); *Castilloa* (Mayné, 1927); *Ficus retusa, Adansonia, Casuarina* (Villiers, 1948a); *Ficus thonningii* (Lepesme, 1948).

Biology. Eggs are inserted in cracks in bark, in folds in young rootlets and occasionally in old larval galleries. The larvae tunnel in trunks and larger branches making enormous galleries with periodic "aeration" holes. Before pupation, the larva tunnels as far as the exterior, making in the bark a large oval hole about 35 mm. by 20 mm.; the entrance is plugged with a large wad of wooden fibres. Emergence occurs from June to November, but is commonest during July. Adults are nocturnal and their flight is heavy and of short duration. In the daytime they cling to tree trunks where, despite their large size, they are difficult to detect, so closely do they resemble the bark; even their thick antennae resemble rootlets. Sometimes adults, especially females, occupy old larval galleries during the daytime. Males are pugnacious and readily mutilate each other. With their powerful mandibles they can draw blood if handled carelessly. Stridulation is very loud. Adults live for little more than a week and copulate usually at night (Villiers, 1946a). According to Netolitzky (1920), larvae of this species are eaten by natives in West Africa.

Economic importance. According to Lepesme (1948), trees of *Ficus thonningii* are killed within a few years through attack by this species and Villiers (1946a) states that whole avenues of *F. retusa* have been killed by it in Dakar.

Material studied. 3 L, 1 I, Belgian Congo, Eola, 3.iv.1912, from *Castilloa*, R. Mayné leg., in coll. M.R.C.B.

References. Aulmann, 1913 (Biol.); Duffy, 1953a (Biol.); Hope, 1842 (Biol.); Lepesme, 1948 (Biol.), 1950 (I fig., Biol.), 1953 (I fig., Biol.); Mayné, 1927 (Biol.); Mühlmann, 1954 (Biol.); Netolitzky, 1920 (Biol.); Preufs, 1903 (I fig., Biol.); Villiers, 1946a (E, L fig., P, I fig., Biol. fig.).

Tetraulax albofasciatus Breuning

See p. 292.

[Pachystolini]

Pachystola mamillata (Dalman)

Distribution. ETHIOPIAN REGION: Angola, Belgian Congo, Ivory Coast, Sierra Leone.

Host plant: *Coffea robusta* (Lepesme, 1939).

References. Lepesme, 1939 (Biol.); Lepesme and Villiers, 1941 (Biol.); Mühlmann, 1954 (Biol.).

Dorcaschematini and **Niphonini**

Larvae of these tribes appear to possess closer affinities to the Monochamini and Prosopocerini, near which the adults have been placed. See p. 203.

Cloniocerini

See p. 258.

Apodasyini

See p. 280.

Pogonocherini

Larval Characters

Form slender, subcylindrical. *Head* depressed, with sides slightly constricted behind middle. Mandible short, reticulate on outer face. Antennal foramen closed behind. Setiferous pores of hypostoma absent. Antenna 2-segmented and bearing a hyaline process. Maxillary palp 2- or 3-segmented. Gular region without a distinct suture or ventral cleavage line. *Prothorax* with posterior region of pronotum shining and glabrous. *Abdomen* with ampullae feebly tuberculate and with a broad, longitudinal, median furrow. Epipleurum protuberant on last three segments only. Pleural tubercles without sclerotised pits and with a single seta. Tergite 9 with a sclerotised process or plate. *Spiracles* with about six marginal chambers.

Considerable confusion has arisen in previous accounts of larvae of this tribe. The larval characters which Kemner (1922) and Emden (1939–1940) attribute to *Tetrops praeusta* (Linnaeus) actually apply to *Pogonocherus hispidus* (Linnaeus) and the larval descriptions of *P. hispidulus* (Piller and Mitterpacher) by Perris (1877) and Xambeu (1898–1902) obviously apply to some other species. This confusion may probably be explained by the fact that larvae of *Tetrops* and one or even two species of *Pogonocherus* are often to be found infesting the same wood.

Pogonocherus hispidus (Linnaeus)

Illustrated descriptions of the immature stages and an account of the biology of this species have recently been published (Duffy, 1953a).

Distribution. PALAEARCTIC REGION: Algeria, Morocco, Tunisia.

Mature larva. See key, p. 27.

Pupa. See key, p. 43.

Additional references. Villiers, 1946 (I fig., Biol.).

Pogonocherus perroudi Mulsant

Distribution. PALAEARCTIC REGION: Algeria, Tunisia.

Mature larva. No material available. For generic characters see key, p. 27.

Host plants: *Pinus halepensis* (Peyerimhoff, 1919); *Pinus maritima, P. silvestris, Quercus* (?) (Xambeu, 1898–1902).

References. Peyerimhoff, 1919 (Biol.); Villiers, 1946 (I fig., Biol.); Xambeu, 1898–1902 (L, Biol.).

Pogonocherus cedri Peyerimhoff

Distribution. PALAEARCTIC REGION: Algeria.

Mature larva. No material available. For generic characters see key, p. 27.

Host plants: *Cedrus* (Peyerimhoff, 1919); *Abies numidica* (Villiers, 1946).

Biology. Larvae infest slender branches. Adult emergence takes place from the middle of August to the end of September (Villiers, 1946).

References. Peyerimhoff, 1919 (Biol.); Villiers, 1946 (I fig., Biol.).

Pogonocherus caroli Mulsant, s. sp. **icosiensis** Peyerimhoff

Distribution. PALAEARCTIC REGION: Algeria, Tunisia.

Mature larva. No material available. For generic characters see key, p. 27.

Host plant: *Pinus halepensis.*

Biology. Larvae feed in slender stems. Adults probably eclode during September to October and overwinter to emerge the following spring.

References. Caillol, 1914 (Biol.); Rey, 1887 (L, P); Villiers, 1946 (I fig., Biol.); Xambeu, 1898–1902 (L, P).

Hippopsini

Larvae of this tribe correspond very closely to those of the Agapanthiini, with which they have been dealt (see p. 274).

Acanthoderini

Acanthoderes (s.g. **Psapharochrus**) **clavipes** (Schrank)

Distribution. PALAEARCTIC REGION: Algeria.

Host plants: In Europe: *Fagus, Quercus, Corylus, Populus, Acer* (Villiers, 1946); *Punica granatum* (Borg, 1930).

Biology. In Malta, the young branches of *Punica* are attacked and galleries are formed in the heartwood. The beetle is fairly abundant in moist, shaded areas, especially on irrigated land where the plant is grown to form hedges. Adults appear in March and oviposit in cracks in the bark (Borg, 1930).

References. Borg, 1930 (Biol.); Henriksen, 1914 (L fig.); Matsushita, 1931 (Biol.); Mendizabal, 1943 (Biol.); Perris, 1877 (L fig., P, Biol.); Villiers, 1946 (I fig., Biol.); Xambeu, 1898–1902 (L, P, Biol.).

Acanthocinini
Larval Characters

Form depressed, rather slender. *Head* strongly depressed, with sides abruptly constricted before or at middle; antennal foramen closed or very narrowly open behind; gena with a conspicuous transverse furrow immediately in front of ocellus. Gula with sutures not raised but with a small rugose area on each side (bearing two to six setae); six epistomal setae present. Ocellus with pigmented spot indistinct. Mentum distinct from submentum. Antenna 2-segmented and bearing a conical hyaline process. Maxilla with outer margin of palpifer rather strongly rounded and protuberant (except *Exocentrus*); maxillary palp 2- or 3-segmented. *Prothorax* with posterior area of pronotum velvety spiculate. *Abdomen* with ampullae dull and spiculate or shining and tuberculate. Epipleurum very strongly protuberant on last three segments. Pleural tubercle with sclerotised pits distinct. *Spiracles* circular, with posterior margin of peritreme with marginal chambers.

Exocentrus sp.

Mature larva (figs. 189, 190). Form elongate, very slender, subcylindrical. Length up to 9·5 mm.; maximum breadth (at prothorax) 2·1 mm. *Head* (fig. 189) rather strongly depressed, with sides feebly but distinctly constricted before middle and slightly converging posteriorly; antennal foramen closed posteriorly; mouthframe moderately strongly sclerotised; frons micro-granulate with a transverse row of eight setiferous pores, the setae extremely long, almost reaching front margin of labrum; front margin

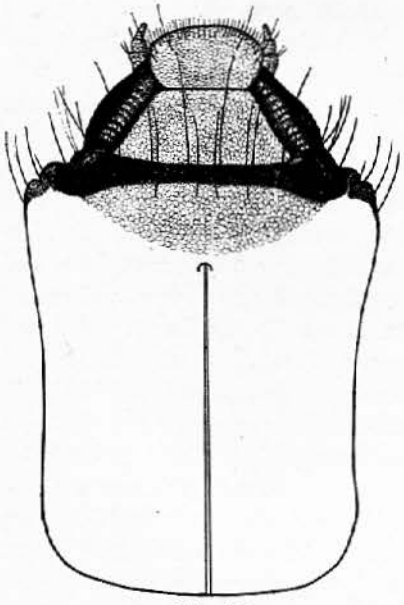


Fig. 189

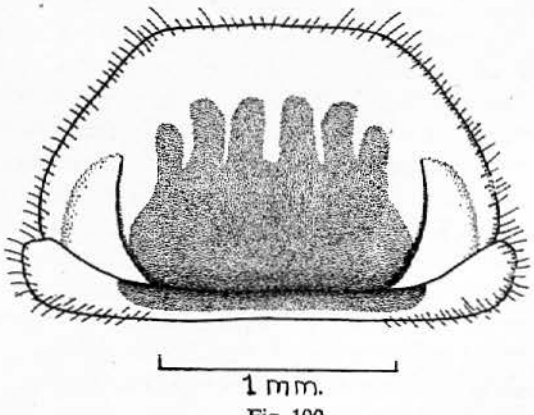


Fig. 190

Figs. 189–190. *Exocentrus* sp. Mature larva. Fig. 189. Head. Dorsal aspect. Fig. 190. Prothorax. Dorsal aspect.

of frons bearing six similar setae. Genae strongly shouldered and protuberant, ferruginous, with a deep vertical impression immediately in front of ocellus. One pair of ocelli present; lens oval, sclerotised; pigmented spot indistinct. Clypeus and labrum micro-granulate. Hypostoma flat, testaceous, micro-granulate and bearing two pairs of setae on each side of gular region; hypostomal sutures ferruginous, straight, parallel. Gular region with a pale median cleavage line. Antenna 2-segmented; segment 2 quadrate and bearing a small conical hyaline process. Maxillae micro-granulate, with palpi 2-segmented; segment 2 conical, elongate, slightly shorter than segment 1.

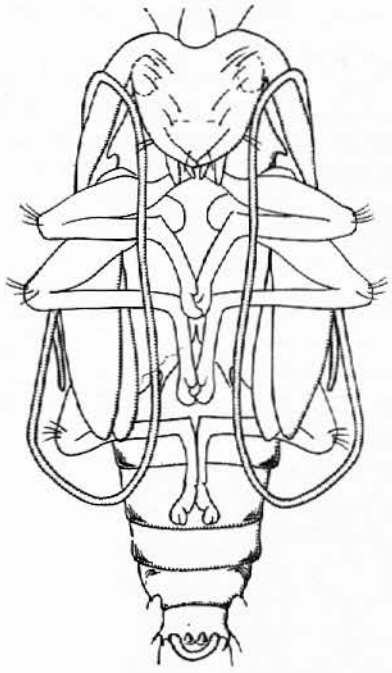


Fig. 191. *Exocentrus* sp. Pupa. Ventral aspect.

Prothorax (fig. 190) entirely micro-granulate, testaceous and with a transverse row of setae just behind front margin; posterior part of pronotum more darkly testaceous and velvety microspiculate, this area with six anterior lobes. *Mesonotum* and *metanotum* granulate, the latter also with a transverse furrow and two rows of moniliform tubercles. Prosternum almost smooth, very sparsely setose. *Abdomen* entirely micro-granulate; dorsal ampullae each with a single transverse furrow and two rows of moniliform, glabrous tubercles which are interrupted medially by a broad, shallow, longitudinal furrow. Tergite 9 unarmed. Epipleurum strongly protuberant on last three segments only. Pleural tubercles broadly oval, with a pair of distinct sclerotised pits. Anus trilobed. *Legs* absent. *Spiracles* round with peritreme pale, micro-granulate.

Pupa (fig. 191). Length 7·4 mm.; maximum breadth 2·1 mm. Cuticle entirely micro-granulate. *Head* with vertex visible from above and deeply excavate between antennal tubercles, around which a few long pale setae are present; front with a few pairs of similar setae; clypeus with a distinct transverse impression across base and bearing two pairs of setae. Antennae extremely long, extending as far as abdominal segment 5, where they are strongly recurved ventrally and (in the female[1]) directed anteriorly as far as the eyes, where they are again recurved and directed posteriorly to terminate alongside the apices of the elytra. Eyes feebly convex, glabrous. Mandibles each with a pair of fine setae near middle of outer face. *Pronotum* with sides bearing a pair of sub-basal, acutely pointed tubercles which are slightly inclined posteriorly; disc finely rugose; anterior and lateral margins sparsely setose. *Mesonotum* and *metanotum* finely rugose, the latter bearing two oblique rows of sparse pale setae; scutellar groove indistinct. Elytra glabrous; elytra and wings extending as far as abdominal segment 4. *Abdomen* with tergites 1–6 each with numerous, short, curved,

[1] In male specimens the antennae are no doubt considerably longer and are probably arranged as in *Acanthocinus* (Duffy, 1953a, p. 273, fig. 262).

pale spines (each with a fine basal seta) which are arranged more or less in two transverse rows. Tergite 7 slightly elongate with three pairs of paramedian incurved spines on posterior third. Tergite 8 short, strongly transverse, with a stouter pair of incurved spines, posterior to which is a pair of very much stouter, anteriorly-curved spines. Tergite 9 very short, smooth; urogomphi minute. Sternites glabrous. Pleura rather strongly protuberant. *Legs* with front and middle femora clavate; each femur with a row of long, fine, subapical setae; middle and hind femora each with a long tuberculate process near base; hind femora extending almost to abdominal segment 5; all tibiae more or less at right angles to longitudinal axis of body. *Functional spiracles* present on abdominal segments 1–6; peritreme rather narrowly oval, thin, pale and slightly raised above general level of cuticle.

Host plants: *Khaya grandifoliola, Triplochiton scleroxylon* (G.H.T.).

Biology. The following observations are by G. H. Thompson. This species attacks recently dead trees and living trees where scorched. Boles and branches of all dimensions are infested. The larvae feed in the inner bark and an oval pupal cell is constructed in the same location and lined with wood fibres. Adults emerge from January to March.

Material studied. 10 L, 2 P, 1 I, Gold Coast, 9.i.1946, from *Triplochiton scleroxylon*, G.H.T. leg., in coll. G.H.T.

Exocentrus ortmansi Gahan

Distribution. ETHIOPIAN REGION: Belgian Congo.

Mature larva. No material available. For generic characters see key, p. 27.

Host plant: *Theobroma* (Mayné, 1917).

Biology. This species breeds in living twigs. Adults emerge in February (Mayné, 1917).

References. Mayné, 1917 (Biol.).

Leiopus africanus Jordan

Distribution. ETHIOPIAN REGION: French Congo, Nigeria.

Mature larva. Similar to those of *Exocentrus*, but differing as follows. Length up to 19 mm.; maximum breadth (at prothorax) 5·1 mm. *Head* with ocellus unusually large and distinct, as large as mesothoracic spiracle. *Prothorax* with anterior margin of micro-spiculate area of pronotum with at least six irregular lobes, the large inner lobe itself usually subtrilobate. *Spiracle* of metathorax subcircular to very broadly oval.

Pupa. Similar to that of *Exocentrus* species, but differing as follows. Length up to 14 mm.; maximum breadth 3·5 mm. *Head* with vertex bearing three to four spines near base of each antennal tubercle; front bearing four to five short spines near mesal margin of each eye. Antennae shorter, recurved only once beneath body. *Abdomen* with segment 7 attenuated. *Legs* with femora bearing both subapical spines and setae; tibiae each with a single stout spine.

Host plant: *Tarrietia utilis* (E.A.J.D.).

Biology. The larva feeds entirely under the bark where pupation also takes place.

The pupa lies in a shallow concavity in the bark and is surrounded by a barrier of interlaced wooden fibres. Adults emerge in April and May (E.A.J.D.).

Material studied. 10 L, 1 I, Nigeria, Nikrowa, 8.v.1955, from recently felled logs of *Tarrietia utilis*, E.A.J.D. leg., in coll. B.M.; 12 L, 5 P, 3 I, Nigeria, Sapobar, 26.iv.1955, from unknown host, E.A.J.D. leg., in coll. B.M.

References. None available.

Leiopus bedeli Pic

Distribution. PALAEARCTIC REGION: Algeria, Tunisia.

Mature larva. No material available. For generic characters see key, p. 27.

Host plant: *Quercus* (Xambeu, 1896).

Biology. Larvae infest dead branches.

References. Villiers, 1946 (I fig., Biol.); Xambeu, 1896 (L, Biol.).

Lagochirus funestus Thomson

This Mexican species has been used in the past in an effort to control prickly pear. Thousands of specimens were reared and released in the worst *Opuntia*-ridden areas of South Africa. Results, however, were disappointing and the colony soon died out owing to the asphyxiation of larvae by the copious secretion of the plants, the presence of many nocturnal enemies (ants, spiders, lizards, etc.) and the infrequent rainfall (Pettey, 1946, 1953; Lepesme, 1950).

Apomecynini

See p. 286.

Agapanthiini

See p. 274.

Cloniocerini

The larva of *Cloniocerus* shows closer affinities to the Saperdini than to the Pogonocherini, near which it has been placed in adult classification.

Cloniocerus (= Thercladodes) kraussi (White)

Distribution. ETHIOPIAN REGION: Angola, Mozambique, Natal, Transvaal. MADAGASCAN REGION: Madagascar.

Mature larva (fig. 192). Form very elongate, slender, cylindrical. Length up to 26 mm.; maximum breadth (at prothorax) 3·4 mm. *Head* thick, subovate in cross-section; widest across posterior limit of frons, with sides strongly converging posteriorly. Antennal foramen open posteriorly; mouthframe strongly sclerotised, pitchy; frons with a row of eight setae; six epistomal setae present. One pair of ocelli present; lens round, strongly convex. Mandibles short, less than twice as long as basal width. Clypeus glabrous. Hypostoma smooth, pitchy anteriorly. Gula very broad, with sutures distinct. Labrum transversely oval. Antenna 2-segmented; segment 2 bearing a hyaline process. Mentum distinct from submentum. *Prothorax* with a pair of sublateral linear impressions (as in *Dirphya*, fig. 195); pronotum smooth, shining and sparsely setose anteriorly; dull, extremely finely and longitudinally striate posteriorly, devoid of asperities. Prosternum sparsely setose, devoid of spicules and asperities.

Abdomen with tergites each with a single transverse furrow (the ampullae cannot at present be described owing to the desiccated condition of the larval material). Tergite 9 bearing an extremely long, horizontal, spine-like process (fig. 192). Anus trilobate. *Legs* absent. *Spiracles* with peritreme very thick and subcircular.

Egg. Length $\frac{1}{2}$ inch; breadth $\frac{1}{24}$ inch. Translucent, greenish yellow, smooth and shining. Cylindrical, with rounded ends (Fuller, 1913).

Host plants: *Olea verrucosa*, *O. woodii*, *Fraxinus*, *Jasminum*, *Ligustrum* (Fuller, 1913).

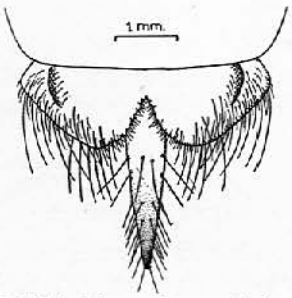


Fig. 192. *Cloniocerus kraussi* (White). Mature larva. Abdominal segment 9. Dorsal aspect.

Biology. Oviposition occurs from November to February. Eggs are laid singly in a cavity beneath the bark excavated by the adult, and hatch in about twelve days. The young larvae tunnel in the centre of the stem, periodically pruning portions of the already perforated parts, always boring downwards, never in any other direction. When about to girdle the stem from inside, the larva bites into the inner walls of its gallery, making a deep circular incision which reaches the bark, except at two opposite points where a little woody tissue is left intact. Taking the line between these two points as base, it then tunnels in a downward direction, gradually narrowing the width of the excavation until a wedge-shaped portion has been removed on either side. The larva then perforates the bark along the four descending lines of its excavation so that on each side of the stem there is visible externally a V-shaped slit. The supporting strands of woody fibre do not bear the almost severed portion for long, and excavation is frequently only just completed before the upper part breaks off. Immediately after pruning, the larva proceeds to plug the orifice by partially tearing off shreds from the inner wall, pushing them upward but leaving them attached at their bases, thus forming a miniature *cheval-de-frise*; in later prunings much thicker fibrous plugs are constructed. Very often twigs are to be found which bear series of perforations; these are frass-ejection holes made by the larva. Pupation takes place during August and September, the adults emerging during September and October. Thus larvae are to be found in all months of the year. After oviposition, the adult has been observed to climb up the twig for about 2 inches and there girdled it so that it later broke off, but only about one twig in three was treated in this manner. Perhaps this habit is gradually being lost to communities infesting privet and is only necessary in the case of native host plants. Attempts often appear to be made by the adults to ensure there is a plentiful flow of sap around the egg; this is done sometimes by partial defoliation or else by bruising the stem (Fuller, 1913).

Economic importance. This species has caused considerable damage to young ash plantations in Cape Colony and may eventually prove to be a pest wherever its host plants are extensively cultivated. Extensive damage was caused, particularly to privet hedges, in 1910. It is maintained that if the cultivation of olives assumed importance anywhere in South Africa, this species might become a serious pest. Infestation of privet tends to become intensified from year to year, as the adults usually oviposit on plants in which they have matured (Fuller, 1913).

Control. Damage is conspicuous and infested stems may easily be removed.

Material studied. 4 L, Pietermaritzburg, ix.1913, from stems of *Ligustrum*, A. Kelly leg., in coll. B.M. (Pres. by Dr. H. K. Munro.)

References. Department of Agriculture, Union of South Africa, 1925 (Biol.); Fuller, 1913 (E, L fig., P fig., Biol. fig., Contr.); Mühlmann, 1954 (Biol.).

Saperdini and Gleneini
Larval Characters

Form elongate, cylindrical. *Head* depressed, with sides subparallel and broadly rounded at base; antennal foramen closed behind. Clypeus with two to six pairs of lateral setae. Antenna 2-segmented and bearing a tapering hyaline process. Mentum setose and not distinct from submentum. Gula indiscernible, with one or more fine setae present on each side. Mandible slender, about twice as long as basal width, the cutting edge obliquely emarginate. *Prothorax* with pronotum oblique (except *Stenostola*) and sclerotised anteriorly; posteriorly covered with coarse asperities; sublateral impressions transverse, semicircular or subcircular and pale; eusternum semicircular or trapezoidal, usually asperate and distinct. *Abdomen* with dorsal ampullae finely asperate (very coarsely in *Stenostola*), bearing two transverse furrows and a distinct longitudinal, median furrow. Segment 9 unarmed. Epipleurum protuberant on all segments. Pleural tubercle oval, without sclerotised pits but bearing several setae.

Breuning (1950a) regards the Saperdini, Gleneini and Phytoeciini as all belonging to the same tribe. A study of the larvae has shown, however, that although larvae of the Saperdini and Gleneini are fundamentally extremely similar, those of the Phytoeciini possess unique characteristics (see p. 264).

Saperda populnea (Linnaeus)

Illustrated descriptions of the immature stages and a biological account of this species have recently been published (Duffy, 1953a).

Distribution. PALAEARCTIC REGION: Algeria, Morocco.

Mature larva. See key, p. 33.

Pupa. See key, p. 44.

Biology. According to Kalandra and Pfeffer (1935), this insect plays a minor part in the transmission of Dutch Elm disease, spores of *Ceratostomella ulmi* having been found in the digestive organs.

Additional references. Caillol, 1914 (Biol.); Kalandra and Pfeffer, 1935 (Biol.); Mühlmann, 1954 (Biol. fig.); Villiers, 1946 (I fig., Biol.).

Saperda scalaris (Linnaeus)

Illustrated descriptions of the immature stages and a biological account of this species have recently been published (Duffy, 1953a).

Distribution. PALAEARCTIC REGION: Algeria.

Mature larva. See key, p. 33.

Pupa. See key, p. 44.

Additional host plants: *Alnus glutinosa, Ilex.*

Additional references. Caillol, 1914 (Biol.); Mühlmann, 1954 (Biol.); Villiers, 1946 (I fig., Biol.).

Saperda perforata (Pallas)

Distribution. PALAEARCTIC REGION: Algeria.

Mature larva. Extremely similar to that of *S. scalaris* (Linnaeus). See key, p. 33.

Host plants: *Populus tremula, P. alba* var. *nivea,* and *Salix.*

Economic importance. According to Kemner (1922), this species is a secondary pest of *Populus tremula* and prefers stems that have long been dead.

Material studied. 2 L, Germany, Erfurt, xii.1930–i.1931, from *Populus tremula,* E. Lehmann leg., in coll. F.I.E.

References. Emden, 1939–1940 (L); Fehse, 1921 (Biol.); Kemner, 1922 (L fig., Biol.); Mühlmann, 1954 (Biol.); Ulrich, 1915 (Biol.); Villiers, 1946 (I, Biol.).

Saperda punctata (Linnaeus)

Distribution. PALAEARCTIC REGION: Algeria.

Mature larva. No material available. For generic characters see key, p. 28.

Host plant: *Ulmus.*

Biology. Larvae infest dead branches and boles. The adults, which are nocturnal. are to be found during the end of May or the beginning of June.

Parasites. Hymenoptera: *Ephialtes planifrons* Thoms. (Thompson, 1943).

References. Caillol, 1914 (Biol.); Mühlmann, 1954 (Biol.); Perris, 1847 (L, Biol.), 1869 (Biol.), 1877 (L, Biol.); Puymaurin, 1788 (Biol.); Thompson, 1943 (Paras.); Villiers, 1946 (I fig., Biol.); Xambeu, 1898–1902 (L, P, Biol.).

Glenea (s.g. **Glenea**) **giraffa** (Dalman) (=**jucunda** Thomson)

Distribution. ETHIOPIAN REGION: Gold Coast, Ivory Coast, Senegal, Sierra Leone.

Adult. Length 10–15 mm. Head and pronotum dark brown, the former with four longitudinal white bands dorsally. Elytra castaneous, each with a pair of longitudinal white bands on basal half; apical half with six white spots. *Head* not excavate between antennal tubercles. Antennae not or scarcely longer than body. *Prothorax* without lateral tubercles. *Elytra* strongly carinate laterally, slightly tapering posteriorly, the apices emarginate and bidentate. *Abdomen* with first four segments decreasing in length posteriorly. *Legs* with tarsal claws appendiculate basally.

Mature larva (fig. 193). Length up to 24 mm.; maximum breadth (at prothorax) 4·1 mm. *Head* moderately depressed, with sides subparallel (maximum head-width 3·2 mm.), feebly constricted before middle and broadly rounded at base; antennal foramen closed posteriorly. Mouthframe moderately sclerotised, ferruginous, the

ferruginous band much narrower than length of clypeus; frons with a transverse row of ten to twelve setae; six epistomal setae present; genae strongly shouldered and ferruginous. One pair of ocelli present; lens round, strongly convex; pigmented spot distinct. Clypeus bearing two to six short lateral setae. Hypostoma slightly convex, smooth, testaceous, with front and hind margins ferruginous; sutures ferruginous and incurved. Gula indistinct, with two widely separated setae on each side. Antenna 2-segmented; segment 2 quadrate and bearing a conical hyaline process. Maxillary palp with segment 3 conical, slightly shorter than segment 2; palpifer elongate, subparallel-sided. Mentum not distinct from submentum. *Prothorax* (fig. 193) obliquely slanting anteriorly; posterior area of pronotum covered with coarse individually distinguishable asperities which become gradually smaller towards posterior

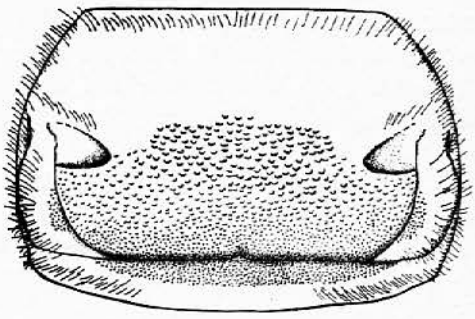


Fig. 193. *Glenea giraffa* (Dalman). Mature larva. Prothorax. Dorsal aspect.

margin; sublateral impressions rather shallow, transversely oval. Presternum with scattered fine setae; posterior area of eusternum and anterior area of sternellum each with a transverse band of asperities. *Abdomen* with each dorsal ampulla with two curved transverse furrows, a distinct median longitudinal furrow and bearing numerous scattered, short, blunt asperities. Segment 9 unarmed. Epipleurum protuberant on all segments. Pleural tubercle oval, bearing about four pale setae; sclerotised pits absent. Anus rather strongly protuberant, trilobate. *Legs* absent. *Spiracles* with peritreme very pale, rather narrowly oval and moderately thick.

Host plants: *Pterygota macrocarpa* (G.H.T.); *Cola acuminata* (Hargreaves, 1927); *Chrysophyllum* sp., *Cola cordifolia* (E.A.J.D.); *Baphia nitida, Cola gabonensis, Coryanthe pachyceras, Cussonia bancoensis, Discoglypremna caloneura, Guarea thompsonii, Microdesmis puberula, Turraenthus africana, Vernonia confuta* (Jover, 1953).

Biology. G. H. Thompson has made the following observations. Apparently only dead trees are attacked. The larvae tunnel between the bark and the sapwood. Pupation takes place in an oval cell excavated in the inner bark which is lined with wood fibres. Adults emerge in June.

Predators. Pupae are devoured by elaterid larvae.

Material studied. 8 L, 1 I, Gold Coast, 22.vi.1945, from *Pterygota macrocarpa*, G.H.T. leg., in coll. G.H.T.; 7 L, 1 I, Gold Coast, Dwinasi, 17.iii.1955, from *Chrysophyllum* sp., E.A.J.D. leg., in coll. B.M.; 2 L, 1 I, Gold Coast, Samreboi, 22.iii.1955, from *Cola cordifolia*, E.A.J.D. leg., in coll. B.M.

References. Hargreaves, 1927 (Biol.); Jover, 1953 (Biol.); Mühlmann, 1954 (Biol.).

Glenea (s.g. **Glenea**) **fasciata** (Fabricius)

Distribution. ETHIOPIAN REGION: Belgian Congo, Cameroons, Gold Coast, Ivory Coast, Nigeria.

Mature larva. Extremely similar to that of *G. giraffa* (Dalman), from which it may be distinguished by the abdominal setae which are stout and ferruginous.

Pupa (fig. 194). Resembling those of the Phytoeciini, from which it differs as follows. Length up to 15·5 mm.; maximum breadth 7·1 mm. *Head* entirely visible from above, feebly excavate and with one or two pairs of stout spines between bases of antennae; front with scattered short spines (each with a basal seta); clypeus with a transverse impression and two pairs of stout setae across base. Antennae extending as far as abdominal segment 2, where they are strongly curved downwards and recurved to terminate alongside bases of front femora. Eyes flat, glabrous. Mandibles each with three stout setae near middle of outer face. Labrum with six setae across base. *Pronotum* bearing several scattered, short, stout spines (each with a long basal seta). *Mesonotum* and *metanotum* bearing several similar spines. Elytra and wings extending to abdominal segment 5. *Abdomen* with tergites 1–6 each with a transverse group of slender spines (each with a basal seta). Sternites 4–6 glabrous. *Legs* with hind femora extending to abdominal segment 6. *Functional spiracles* present on abdominal segments 1–5; peritreme rather narrowly oval, moderately thick, surrounded by a tuberculate rim and strongly raised above general level of cuticle.

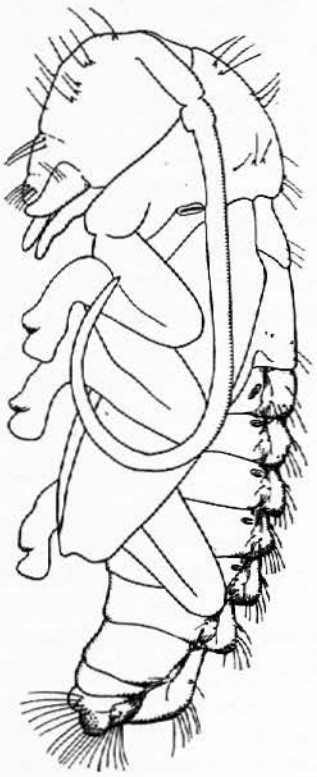


Fig. 194. *Glenea fasciata* Fabricius). Pupa. Lateral aspect.

Host plants: *Theobroma*, *Coffea robusta* (Ghesquière, 1927; Lepesme and Villiers, 1944).

Material studied. 7 L, 3 P, Belgian Congo, Lukolela, 1935, Liegeois leg., in coll. M.R.C.B.

References. Ghesquière, 1927 (Biol.); Lepesme, 1948 (Biol.); Lepesme and Villiers, 1941 (Biol.), 1944 (Biol.); Mühlmann, 1954 (Biol.); Vrijdagh, 1930 (Biol.).

Glenea (s.g. **Volumnia**) **apicalis** (Chevrolat) and var. **westermanni** Thomson

Distribution. ETHIOPIAN REGION: Angola, Cameroons, Ivory Coast, Mozambique, Natal, Nigeria, Nyasaland, Sierra Leone, Uganda.

Mature larva. Extremely similar to that of *Glenea fasciata* (Fabricius), from which it mainly differs in its more robust form, abdominal segment 8 being strongly transverse (at least four times as broad as long).

Host plants: *Gossypium* (Hargreaves, 1948); *Hibiscus fuscus* (J.C.M.G.).

Material studied. 2 L, Kenya, Muguga, 1953, from living stems of *Hibiscus fuscus*, J.C.M.G. leg., in coll. B.M.

References. Hargreaves, 1948 (Biol.).

Glenea (s.g. **Glenea**) **divergevittata** Breuning

Distribution. ETHIOPIAN REGION: Gold Coast, Nigeria, Uganda.

Host plants: *Berlinia* sp., *Cola* sp. (G.H.T.).

References. None available.

Phytoeciini

Larval Characters

Head thick, widest across posterior limit of frons, with sides strongly converging posteriorly rather as in *Agapanthia* (fig. 206). One or two pairs of ocelli present; one, two or three pairs of vestigial ocelli sometimes present. Clypeus glabrous (except *Nupserha*). Hypostoma with a transverse row of setae. Gula indiscernible. Antenna 2-segmented. Mentum distinct from submentum. *Prothorax* with posterior part of pronotum coarsely asperate; sublateral impressions linear, straight, long and brownish. *Abdomen* with each dorsal ampulla with a single transverse furrow. Pleural tubercle with two stout setae but no sclerotised pits. *Spiracles* with peritreme thick and very narrowly oval.

Dirphya princeps (Jordan) (=**Nitocris princeps** (Jordan))
[Yellow-headed Coffee Borer]

Distribution. ETHIOPIAN REGION: Belgian Congo, Cameroons, French Guinea, Gabon, Ivory Coast, Kenya, Tanganyika, Uganda.

Adult. Length 15–25 mm. Entirely dark brown to pitchy except head and anterior margin of pronotum which are waxy yellow. *Head* scarcely excavate between antennal tubercles. Antennae as long as or slightly longer than body. *Prothorax* with lateral tubercles feebly convex; disc with three small round tubercles. *Elytra* very elongate, narrowed medially, slightly broadened apically, the apices bidentate; disc very coarsely punctured except for a triangular area near base where it is glabrous. *Legs* with tarsal claws appendiculate.

Mature larva (figs. 195, 196). Form extremely elongate, slender, cylindrical. Length up to 45 mm.; maximum breadth (at prothorax) 5 mm. *Head* thick, subovate in cross-section, widest across posterior limit of frons, with sides strongly converging posteriorly; antennal foramen closed behind; mouthframe rather strongly sclerotised; frons with a transverse row of eight setae; six epistomal setae present. Two pairs of ocelli present; lens round, strongly protuberant; pigmented spot distinct though sometimes deeply retracted. Mandibles short, less than twice as long as basal width. Clypeus glabrous. Hypostoma smooth, ferruginous with a transverse row of short setae; sutures slightly curved, pitchy. Gula indiscernible. Labrum transversely oval. Antenna 2-segmented; segment 2 bearing a conical hyaline process. Maxilla with palp 3-segmented; lobe short and stout. Labial palpi 2-segmented. Mentum setose, distinct from submentum. *Prothorax* (fig. 195) obliquely slanting, with sides diverging posteriorly; anterior part of pronotum with a transverse row of long, fine, widely

separated setae near front margin; posterior half with coarse asperities which decrease in size towards hind margin; sublateral impressions linear, straight, long and brownish. Presternum coarsely setose, eusternum distinct, setose. *Abdomen* with each dorsal ampulla finely and densely spiculate, moderately protuberant (not bilobed) and with the transverse furrow distinctly callose. Segments 4–7 longer than broad. Segment 9 transverse with a pair of large, shallow, sublateral foveae and obliquely truncate apically; strongly callose on posterior and lateral margins. Segment 10 (fig. 196) with dorsal lobe produced dorsally and bearing several long, fine setae; lower lobes scarcely

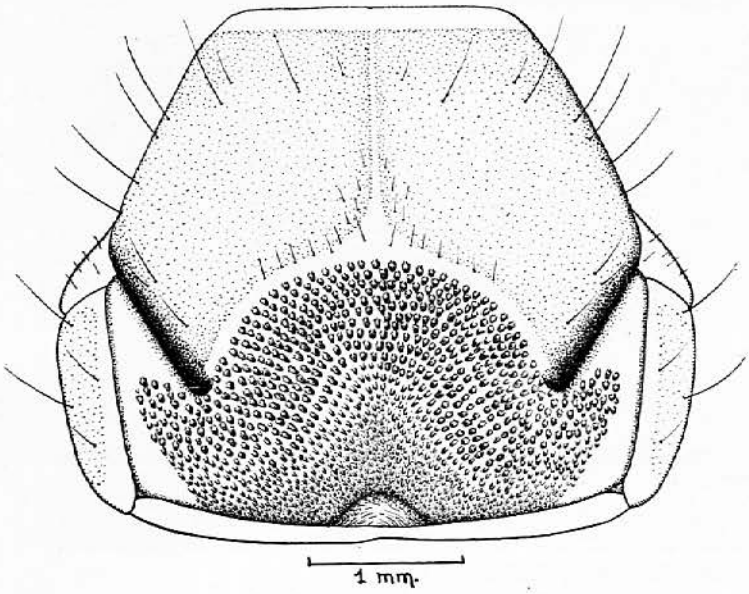


Fig. 195. *Dirphya princeps* (Jordan). Mature larva. Prothorax. Dorsal aspect.

protuberant and bearing shorter, finer setae. Pleural tubercle with a pair of long, fine setae; sclerotised pits absent. *Legs* absent. *Spiracles* with peritreme thick, narrow and slot-like.

Egg. Length 3·2 mm.; breadth 1·1 mm. Chorion brown (Bredo, 1939).

Host plants: *Coffea robusta*, *C. arabica* and *C. excelsa* (Chevalier, 1947; Gowdey, 1914, Lepesme and Villiers, 1944).

Biology. Oviposition usually takes place a few inches from the tips of the lateral branches of the host plant. Eggs are deposited singly in the green bark in a small hole which the female makes with its mandibles. The first-instar larva penetrates the bark as far as the cambium; it then tunnels down the trunk, often as far as the main root, the gallery being sometimes as much as 4 feet in length; at distances varying from 4 to 5 inches, horizontal galleries are bored leading to the exterior from which frass is periodically extruded; these "aeration" or frass-ejection holes (also known as "flute" holes) are about 1·5 to 2 mm. in diameter. The larva reaches ground-level about July or August. Towards the end of the year pupation occurs at the base of the vertical gallery in a cell barricaded with wooden shavings.

The pupal period lasts from seven to nine weeks (from November to December). The life-cycle is usually completed within a year, but may be prolonged to two or three years under adverse conditions.

The adult has not been observed to feed either on the foliage or on the bark (Gowdey, 1914; Lepesme and Villiers, 1944; Wilkinson, 1929).

Parasites. Hargreaves (1922, 1936) reports that on one estate some 40 per cent of larvae were parasitised by a species of Braconidae (*Bathyaulax* sp.). The parasite larva feeds externally on its host and when full grown spins a cocoon of white silk in the gallery and pupates. Several minute hyperparasites were bred from one braconid cocoon.

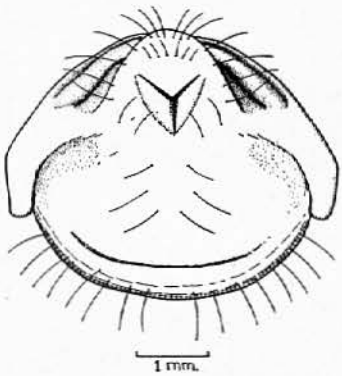


Fig. 196. *Dirphya princeps* (Jordan). Mature larva. Abdominal segments 9 and 10. Caudal aspect.

Predators. Hemiptera: The reduviid *Margasus afzelii* St. has been observed to prey on this species (Hancock, 1926).

Economic importance. This species was originally reported in 1910 as a pest of *Coffea robusta* in Uganda, but it has since been found to attack *C. arabica* and *C. excelsa.* Some estates have suffered serious damage, especially the older ones which were affected by the coffee leaf-disease *Hemeleia vastatrix*, which renders the trees less vigorous.

Early recognition of the presence of *D. princeps* (Jordan) is essential to prevent loss of labour and the possible loss of trees. Infested primaries become black and withered and may be distinguished from the effect of "die-back" by the fact that branches of the former kind are flexible while those of the latter are brittle.

Trees left untreated are either killed outright or are broken off by the wind owing to extensive tunnelling. Trees less than twenty years old do not appear to be attacked (Gowdey, 1914; Hargreaves, 1922; Lepesme and Villiers, 1944).

According to Ritchie (1936), the position with this species in Tanganyika is more satisfactory than with *D. usambica* Kolbe in the eastern areas. This is owing to stronger plant development and the multiple stem system of cultivation.

Control. The best treatment is to cut off and destroy infested primaries before the larva reaches the main stem; infestation is indicated by the presence on the ground of the characteristic frass generally during April and May. If the larva has already

reached the main stem, the gallery should be traced back to the primary from which it originated; this should be cut off near its base and all frass-ejection holes plugged with clay or putty. Carbon bisulphide, carbon tetrachloride or kerosene should be poured down the gallery at the point where it enters the main stem from the primary and the entrance to the burrow plugged up. The accumulated frass should then be swept away from the base of the stem, for if none is found on a subsequent visit, it may be concluded that the larva is dead. Alternative, but less satisfactory, methods are the use of paraffin oil or the spearing of larvae with a wire, as is done in German East Africa for *D. usambica* Kolbe (Bredo, 1939; Gowdey, 1911; Wilkinson, 1929).

Hargreaves (1922) suggests that when infested primaries are pruned, instead of being burnt they should be kept in a box to allow such parasites as may be present to emerge.

Material studied. 2 L, Tanganyika, 1951, from *Coffea*, R. C. H. Sweeney leg., in coll. B.M.; 5 L, Kenya, Kyambu, 16.vii.1937, from *Coffea arabica*, H. Wilkinson leg., in coll. B.M.

References. Bredo, 1939 (E, L, I fig., Contr.); Chevalier, 1947 (Biol.); Gardner, 1934 (L fig.); Gowdey, 1914 (Biol.); Hancock, 1926 (Paras.); Hargreaves, 1922 (Biol.), 1924 (Biol.), 1936 (Paras.); Lepesme, 1953 (I fig., Biol.); Lepesme and Villiers, 1944 (L fig., I fig., Biol., Contr.); Morstatt, 1935 (I fig., Biol.), 1937 (Biol.); Mühlmann, 1954 (Biol.); Ritchie, 1935 (Biol.), 1936 (Biol.); Wilkinson, 1929 (Biol., Contr.).

Dirphya (=**Nitocris**) **nigricornis** (Olivier)

Distribution. ETHIOPIAN REGION: Kenya, Mozambique, Natal, Nyasaland, Senegal, Transvaal.

Adult. Length 23–31 mm. Similar to *D. princeps* (Jordan), differing mainly in colour, the pronotum and basal fourth of elytra being orange-yellow.

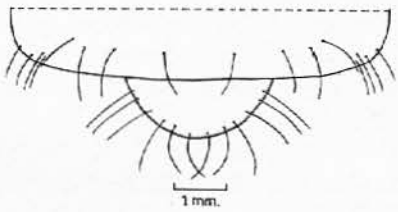


Fig. 197. *Dirphya nigricornis* (Olivier). Mature larva. Abdominal segments 9 and 10. Caudal aspect.

Mature larva (fig. 197). Closely resembling that of *D. princeps* (Jordan), but differing as follows. Length up to 51 mm.; maximum breadth (at prothorax) 6·1 mm. *Abdomen* with segments 4–7 quadrate. Segment 10 with dorsal anal lobe (viewed dorsally) much more strongly protuberant (fig. 197).

Pupa (fig. 198). Length up to 32 mm.; maximum breadth 7·2 mm. *Head* entirely visible from above, feebly excavate and with three setae opposite base of each antenna; front with four setae near mesal margin of each eye; clypeus with a transverse impression and about six setae across base. Antennae extending as far as abdominal segment 2, where they are strongly curved downward and recurved to terminate alongside head.

Eyes moderately convex, glabrous. Mandibles each with a single seta near middle of outer face. Labrum triangular, glabrous. *Pronotum* bearing several scattered setae. *Mesonotum* and scutellum bearing two groups of three to four setae. *Metanotum* bearing several scattered setae on each side of scutellar groove, which is narrow, very distinct and bears a few minute setae. Elytra and wings extending to abdominal segment 4. *Abdomen* with tergites each with a transverse group of short, stout, blunt, ferruginous spines (each with a subapical seta). Tergites 8 and 9 with a transverse row of about eight minute spines, each with a long subapical seta. Sternites 4–6 each with a median oval, protuberant area which is feebly spiculate and wrinkled.[1] Pleura moderately protuberant on segments 5–8 and each with one to three short spines. *Legs* with hind femora extending to abdominal segment 4; tibiae directed posteriorly. *Functional spiracles* present on abdominal segments 1–5; peritreme rather narrowly oval, very thin, but surrounded by a thick tuberculate rim and slightly raised above general level of cuticle.

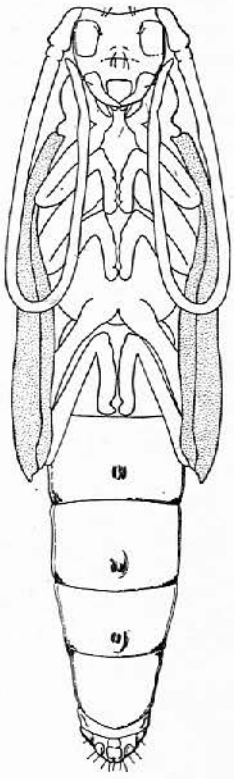


Fig. 198. *Dirphya nigricornis* (Olivier). Pupa. Ventral aspect.

Host plants: *Vangueria* (J.C.M.G.); *Theobroma*.

Biology. Eggs are laid at the tops of bushes and the larvae bore into the middle of the stems and tunnel down the centre to the tips of the tap-roots. At the upper portion the larva makes a series of circular holes open to the exterior. In all cases so far investigated, the end of the tap-root was bent up almost at a right angle, and this bad planting may have made the plants more susceptible to attack. Apart from the aeration holes, which are made by the young larva, there are no indications of attack until the dry weather sets in and the leaves turn yellow and droop, by which time the larva will have penetrated well down the stem. The life-cycle is annual and emergence starts at the beginning of the rains (Smee, 1928).

Material studied. 1 L, 1 P (adult reared), Kenya, Nairobi, 1953, from living *Vangueria* sp., J.C.M.G. leg., in coll. B.M.

References. Morstatt, 1935 (Biol.); Mühlmann, 1954 (Biol.); Smee, 1928 (Biol.).

Dirphya (=**Nitocris**) **luteiceps** Fairmaire

Distribution. ETHIOPIAN REGION: Cameroons, Gold Coast.

Mature larva. No material available. For generic characters see key, p. 28.

Host plant: *Coffea arabica* (Chevalier, 1947).

Economic importance. Chevalier (1947) states that this species causes serious damage to *Coffea* in the Cameroons.

References. Chevalier, 1947 (Biol.).

[1] The exact function of these specialised areas cannot yet be ascertained.

Dirphya (=Nitocris) usambica (Kolbe)

Distribution. ETHIOPIAN REGION: Kenya, Tanganyika.

Adult (fig. 199). Similar to that of *D. princeps* (Jordan), but with black maculation as figured.

Mature larva. No material available. For generic characters see key, p. 28.

Host plants: *Coffea* (Aulmann and la Baume, 1911); *Rytigynia schumanii* (Harris, 1937b).

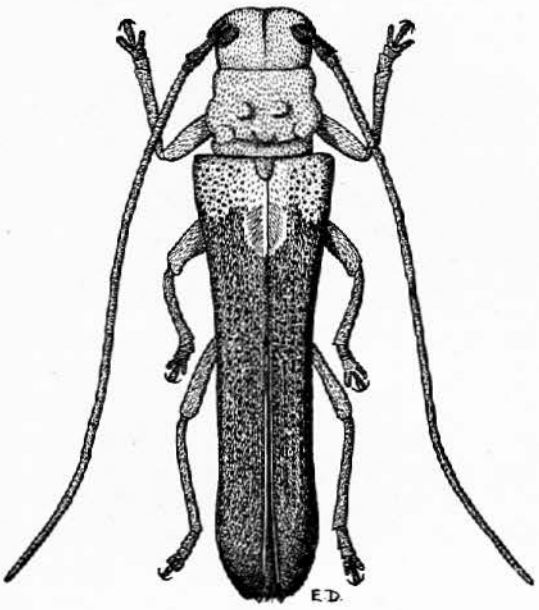


Fig. 199



Fig. 200

Fig. 199. *Dirphya usambica* (Kolbe). Adult.

Fig. 200. *Dirphya usambica* (Kolbe). Stems of *Coffea* showing (left) frass-ejection holes and (right) larval galleries. (Morstatt, 1935)

Biology. The characteristic larval damage is shown in fig. 200.

Economic importance. According to Chevalier (1947), this species caused serious damage to *Coffea* in Tanganyika.

Control. Fiedler (1950) recommends the injection of the galleries with Xylamon.

References. Aulmann and la Baume, 1911 (Biol.); Chevalier, 1947 (Biol.); Fiedler, 1950 (Biol., Contr.); Harris, 1937b (Biol.); Kolbe, 1911 (Biol.); Morstatt, 1912a (L fig., P fig., I fig., Biol. fig.), 1913b (Biol.), 1935 (L fig., P fig., I fig., Biol. fig.); Mühlmann, 1954 (Biol. fig.); Zacher, 1914 (L fig., P fig., I fig., Biol. fig.).

Synnupserha (=Nupserha) homeyeri (Harold)

Distribution. ETHIOPIAN REGION: Angola, Belgian Congo, Ethiopia, Kenya.

Mature larva (figs. 201, 202). Similar to those of *Dirphya* spp., from which it differs as follows. Length up to 24 mm.; maximum breadth (at prothorax) 3·4 mm. *Head*

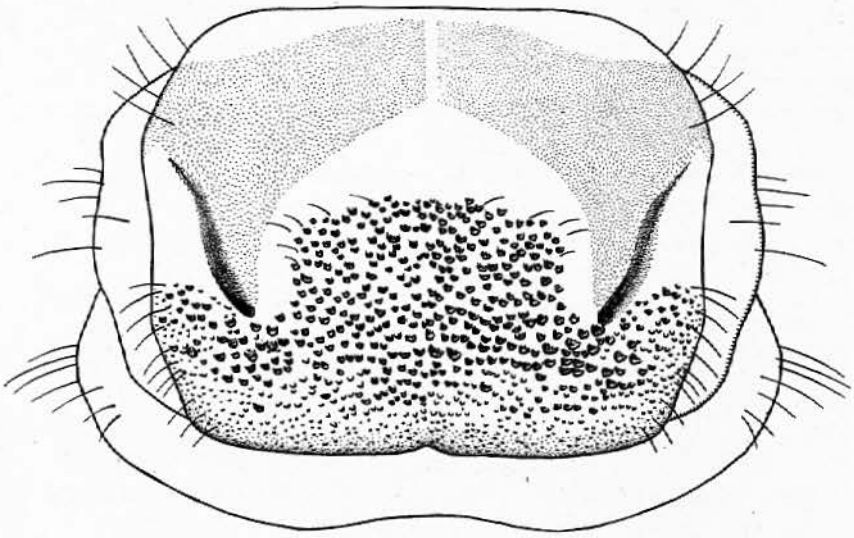


Fig. 201

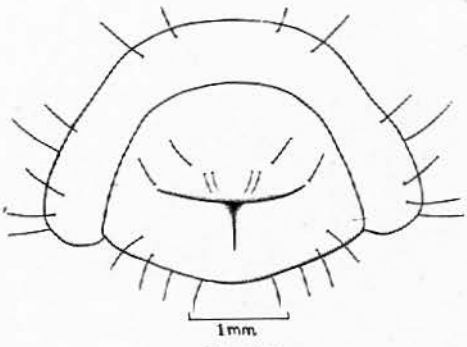


Fig. 202

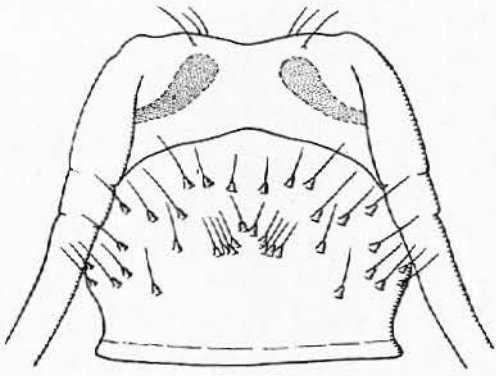


Fig. 203

Fig. 201. *Synnupserha homeyeri* (Harold). Mature larva. Prothorax. Dorsal aspect.
Fig. 202. *Synnupserha homeyeri* (Harold). Mature larva. Abdominal segments 9 and 10. Caudal aspect.
Fig. 203. *Synnupserha homeyeri* (Harold). Pupa. Head and prothorax. Dorsal aspect.

with only one pair of true ocelli (accompanied by a single pair of vestigial ocelli, consisting of a greyish pigmented spot without a distinct lens). *Prothorax* with pronotal asperities much less dense and somewhat irregularly distributed (fig. 201). *Abdomen* with segment 10 rounded apically; dorsal anal lobe not produced dorsally (fig. 202).

Pupa (fig. 203). Resembling that of *Dirphya nigricornis* (Olivier), from which it may be distinguished as follows. Length up to 18 mm.; maximum breadth 5·5 mm. *Head* with antennae short, terminating alongside middle tarsi. *Prothorax* with disc of pronotum bearing numerous setae, each arising from a papillate base (fig. 203).

Host plant: *Vernonia holstii* (J.C.M.G.).

Material studied. 1 L, 1 P, 1 I, Kenya, Kerita, 1953, from stem of *Vernonia holstii*, J.C.M.G. leg., in coll. B.M.

References. None available.

Synnupserha apicata (Fairmaire)

Distribution. ETHIOPIAN REGION: Kenya, Kilimanjaro, Somalia.

Host plant: *Crassophalum* sp. (J.C.M.G.).

References. None available.

Nupserha apicalis Fåhraeus

Distribution. ETHIOPIAN REGION: Cape Province, Natal, Nyasaland, Tanganyika.

Adult. Length 9–12 mm. Head and pronotum orange-yellow, the former with a

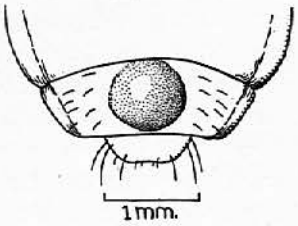


Fig. 204. *Nupserha apicalis* Fåhraeus. Mature larva. Abdominal segments 8–10. Dorsal aspect.

single median black spot and the latter with a pair of black spots on disc. Elytra yellow, the apical third black. Antennae brown. *Head* scarcely excavate between antennal tubercles. Antennae slightly longer than body in male, shorter in female. *Prothorax* transversely cylindrical, without lateral tubercles. *Elytra* tapering posteriorly, with disc depressed, the suture raised and each with a strong lateral and two sublateral carinae; apices emarginate and bidentate. *Abdomen* with segments 1–4 subequal in length. *Legs* with tarsal claws appendiculate basally.

Mature larva (fig. 204). Form cylindrical, with segments rather short. Length up to 17 mm.; maximum breadth (at prothorax) 3·9 mm. *Head* thick, subovate in cross-section, widest across posterior limit of frons, with sides strongly converging posteriorly; antennal foramen closed behind; mouthframe ferruginous; six epistomal setae present. One pair of ocelli present; lens round, very strongly protuberant; pigmented spot distinct; one pair of vestigial ocelli present posterior to true ocelli. Mandibles short, truncate apically. Clypeus with two to three pairs of lateral setae. Hypostoma testaceous, with front margin narrowly ferruginous, with a transverse row of fine setae; sutures slightly curved, pitchy; gula indiscernible. Labrum slightly transverse. Antenna 2-segmented; segment 2 bearing a conical, hyaline process. Maxillary palp 3-segmented; segment 3 slightly shorter than segment 2; lobe short and stout. Labial palpi with segment 2 much shorter than segment 1. Mentum distinct from submentum. *Prothorax* strongly obliquely slanting; pronotum very deep, sublateral, linear impressions; posterior part with fine asperities which decrease in size towards hind margin. *Abdomen* with all segments rather strongly transverse. Each dorsal ampulla moderately protuberant, feebly bilobed, shining, non-tuberculate and glabrous. Tergite 9 with a median dome-shaped area which is more strongly sclerotised and slightly more darkly

pigmented than the surrounding cuticle (fig. 204). Anus trilobed; lobes compact. Pleural tubercles broadly oval, bearing one short and two long setae; sclerotised pits absent. *Legs* present; 3-segmented (distinctly visible with a ×15 lens). *Spiracles* with peritreme rather thick and narrowly oval.

Host plants: *Convolvulus* (Fuller, 1914a); *Ipomoea.*

Biology. The galls caused by larvae of this species occur mainly in erect stems; they are elongate, hollow swellings, tapering at both ends, 2 to 3 inches long, and may be either straight or in a spiral; they are always concolorous with the stem and become hard and woody in winter. Adults apparently overwinter within these galls and emerge and oviposit during November. It is believed that before oviposition the female first crushes the stem between its mandibles at two points about ¼ inch apart and then places an egg in a longitudinal median slit made between them. The newly emerged larvae tunnel towards the root through the core of the stem, excavating galleries of about 2 or 3 inches in length. Larvae become full grown by April or May, when they construct a cocoon in the bottom of the gallery. The cocoon is hard and is apparently composed of larval frass (Fuller, 1914a).

Economic importance. This species has been recorded infesting an introduced species of bindweed, although it probably attacks indigenous species as well. Infestation by this species does not appear to prove fatal to the plants, although it may sometimes check a primary growth which causes branching below the gall (Fuller, 1914a).

Material studied. 7 L, Pietermaritzburg, 25.iv.1918, from stems of *Ipomoea*, C. Fuller leg., in coll. B.M. (Pres. by Dr. H. K. Munro.)

References. Fuller, 1914a (Biol. fig.).

Oberea oculata (Linnaeus)

Illustrated descriptions of the immature stages and a biological account of this species have recently been published (Duffy, 1953a).

Distribution. PALAEARCTIC REGION: Morocco.

Mature larva. See key, p. 28.

Additional references. Caillol, 1914 (Biol.); Mühlmann, 1954 (Biol.); Villiers, 1946 (I, Biol.).

Oberea trigonifera Aurivillius

Distribution. ETHIOPIAN REGION: Kenya.

Mature larva. Similar to that of *O. oculata* (Linnaeus), but differing mainly in having only one pair of vestigial ocelli (in addition to the true ocellus) in the dorsal ampullae, which have two distinct transverse furrows, and in the pronotum, which has much denser and more regularly placed asperities.

These characters, or at least the first two, would strongly suggest that this species is generically distinct from *Oberea.*

Host plant: *Vernonia lasiopus* (J.C.M.G.).

Material studied. 2 L, Kenya, Muguga, from *Vernonia lasiopus*, J.C.M.G. leg., in coll. B.M.

References. None available.

Oberea maculicollis Lucas

Distribution. PALAEARCTIC REGION: Algeria, Morocco.
Mature larva. No material available. For generic characters see key, p. 28.
Host plants: *Populus alba* var. *nivea*, *P. thevestina* and *Salix*.
Biology. Adults assemble on flowers in May.
References. Villiers, 1946 (I fig., Biol.).

Oberea erythrocephala (Schrank)

Distribution. PALAEARCTIC REGION: Morocco.
Mature larva. No material available. For generic characters see key, p. 28.
Host plant: *Euphorbia.*
Parasites. Hymenoptera: *Vipio guttiventris* Thoms.
References. Caillol, 1914 (Biol.); Villiers, 1946 (I fig., Biol.); Xambeu, 1898–1902 (L, P, Biol.).

Phytoecia (s.g. **Opsilia**) **malachitica** Lucas

Distribution. PALAEARCTIC REGION: Algeria, Morocco, Tunisia.
Mature larva. No material available. For generic characters see key, p. 28.
Host plants: *Cerinthe major*, *C. gymnandra*, *Cynoglossum columnae*, *Anchusa* (Peyerimhoff, 1911; Villiers, 1946).
Biology. Adults appear in May.
References. Peyerimhoff, 1911 (Biol.); Villiers, 1946 (I fig., Biol.).

Phytoecia (s.g. **Phytoecia**) **rufipes** (Olivier)

Distribution. PALAEARCTIC REGION: Algeria, Morocco.
Mature larva. No material available. For generic characters see key, p. 28.
Host plant: *Foeniculum vulgare.*
Biology. Probably very similar to that of *P. cylindrica* (Linnaeus) (see Duffy, 1953a).
References. Caillol, 1914 (Biol.); Villiers, 1946 (I fig., Biol.).

Phytoecia (s.g. **Phytoecia**) **erythrocnema** Lucas

Distribution. PALAEARCTIC REGION: Algeria, Morocco, Tunisia.
Mature larva. No material available. For generic characters see key, p. 28.
Host plants: *Daucus carota*, *Carduus* (?).
References. Villiers, 1946 (I fig., Biol.).

Phytoecia (s.g. **Opsilia**) **coerulescens** (Scopoli)

Distribution. PALAEARCTIC REGION: Algeria, Morocco, Tunisia.
Mature larva. No material available. For generic characters see key, p. 28.
Host plants: *Echium vulgare* (Xambeu, 1898); *Cynoglossum*, *Lithospermum*, *Lycopsis* (Villiers, 1946).
References. Caillol, 1914 (Biol.); Chapuis and Candèze, 1853 (L fig.); Perris, 1877 (L, Biol.); Villiers, 1946 (I fig., Biol.); Xambeu, 1898 (P, Biol.), 1898–1902 (L, Biol.).

Phytoecia (s.g. **Opsilia**) **molybdaena** (Dalman)

Distribution. PALAEARCTIC REGION: Algeria, Morocco, Tunisia.

Mature larva. No material available. For generic characters see key, p. 28.

Host plants: *Lithospermum officinale*, *Cerinthe major* (Xambeu, 1898–1902); also probably *Echium grandiflorum* and *Cynoglossum* (Villiers, 1946).

Biology. According to Xambeu (1898–1902), pupation occurs in stems just above ground-level.

References. Caillol, 1914 (Biol.); Frauenfeld, 1868 (Biol.); Villiers, 1946 (I fig., Biol.); Xambeu, 1898–1902 (Biol.).

Phytoecia (s.g. **Obereina**) **melanocephala** (Fabricius)

Distribution. PALAEARCTIC REGION: Algeria, Morocco, Tunisia.

Mature larva. No material available. For generic characters see key, p. 28.

Host plant: *Carduus.*

Biology. Adults emerge during May and June.

References. Villiers, 1946 (I fig., Biol.).

Conizonia (s.g. **Conizonia**) **warnieri** (Lucas)

Distribution. PALAEARCTIC REGION: Algeria, Morocco, Tunisia.

Host plant: *Centaurea pullata.*

References. Villiers, 1946 (I fig., Biol.).

Conizonia (s.g. **Conizonia**) **guerini** (Brème)

Distribution. PALAEARCTIC REGION: Algeria.

Host plant: *Carduus.*

Biology. Adults emerge during May and June.

References. Villiers, 1946 (I fig., Biol.).

Conizonia (s.g. **Conizonia**) **fuscicornis** (Heyden)

Distribution. PALAEARCTIC REGION: Algeria, Morocco, Tunisia.

Host plant: *Centaurea pullata* (Villiers, 1946).

References. Villiers, 1946 (I fig., Biol.).

Conizonia (s.g. **Conizonia**) **allardi** Fairmaire

Distribution. PALAEARCTIC REGION: Algeria, Morocco, Tunisia.

Host plant: *Carduncellus pinnatus* (Villiers, 1946).

References. Villiers, 1946 (I fig., Biol.).

Conizonia (s.g. **Conizonia**) **detrita** (Fabricius)

Distribution. PALAEARCTIC REGION: Algeria, Morocco, Tunisia.

Host plants: *Scolymus hispanicum* (Peyerimhoff, 1919); *Carduus* (?) (Villiers, 1946).

References. Peyerimhoff, 1919 (Biol.); Villiers, 1946 (I fig., Biol.).

Agapanthiini and **Hippopsini**

The larvae of these two tribes are remarkable and represent strikingly aberrant forms in the Cerambycidae. They both possess several fundamental characters and

unusual characteristics in common and there can be little doubt that they are in fact extremely closely related, despite the fact that in adult classification these tribes are rather remotely separated. The main characters common to both tribes are: Form very elongate, slender, curved, cylindrical. *Head* salient, oval in cross-section; occipital foramen postero-ventral. One pair of ocelli present. Labrum thick, transverse. Mandibles bidentate. Numerous (twelve to twenty-four) epistomal setae present. *Prothorax* with presternum bearing a pair of ferruginous sclerotised plates; mesosternum and metasternum setose, protuberant. *Abdomen* with segments elongate, cylindrical; segment 9 swollen, densely setose and as wide and high as apex of segment 8. *Spiracles* with peritreme round, the inner margin lined with chambers.

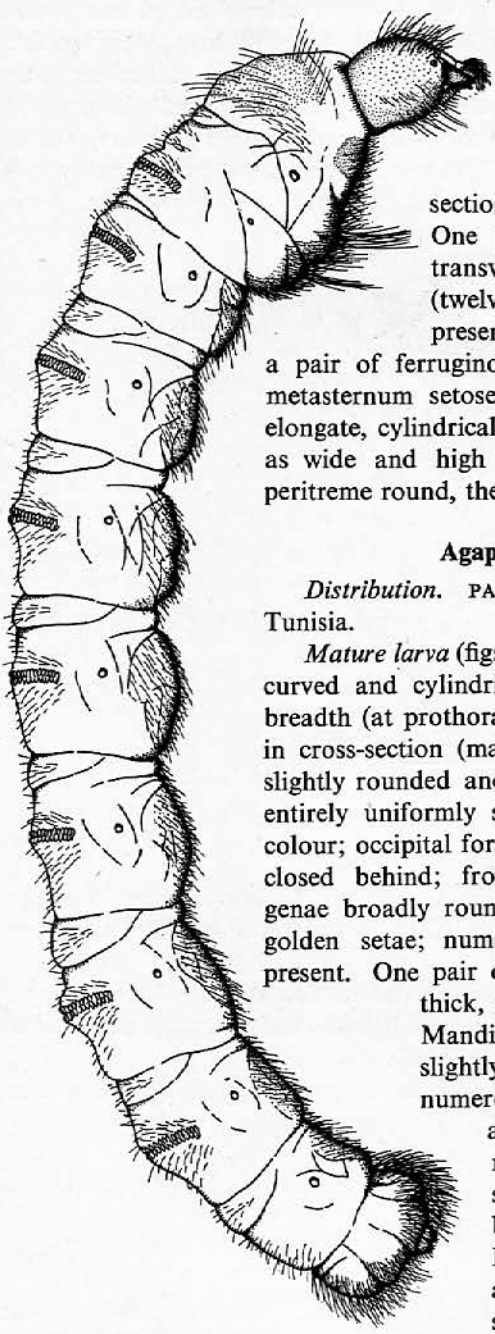


Fig. 205. *Agapanthia asphodeli* (Latreille). Mature larva. Lateral aspect.

Agapanthia asphodeli (Latreille)

Distribution. PALAEARCTIC REGION: Algeria, Morocco, Tunisia.

Mature larva (figs. 205, 206). Form very elongate, slender, curved and cylindrical. Length up to 30 mm.; maximum breadth (at prothorax) 4·7 mm. *Head* (fig. 206) salient, oval in cross-section (maximum head-width 2·7 mm.), with sides slightly rounded and converging for posterior third; almost entirely uniformly sclerotised and pale greenish yellow in colour; occipital foramen postero-ventral; antennal foramen closed behind; frontal sutures distinct for entire length; genae broadly rounded, smooth, and bearing numerous fine golden setae; numerous (at least thirty) epistomal setae present. One pair of very indistinct ocelli present. Labrum thick, strongly transverse and densely setose. Mandibles bidentate apically. Hypostoma slightly convex, smooth, testaceous and bearing numerous scattered, short setae; hypostomal and gular sutures undefined. Antenna minute, 2-segmented; segment 2 very short, transversely dome-shaped and bearing a small tapering, hyaline process. Maxillary palpi 3-segmented; segment 3 as long as segment 2. Labial palpi with segment 2 slightly shorter than segment 1. Mentum distinct from submentum. *Prothorax* with a large sclerotised plate

which is micro-granulate dorsally; median cleavage line faintly impressed; lateral grooves absent; presternum with a pair of sublateral sclerotised plates; mesosternum and metasternum strongly protuberant and bearing long, dense setae. *Abdomen* (fig. 205) with segments elongate and cylindrical, each dorsal ampulla with two transverse rows of glabrous elongate tubercles which are broadly interrupted by a median furrow; ventral ampullae absent. Segment 9 swollen, densely setose posteriorly and as wide and high as apex of segment 8. Epipleurum protuberant on all segments. Pleural tubercle without sclerotised pits but bearing numerous setae. Anus

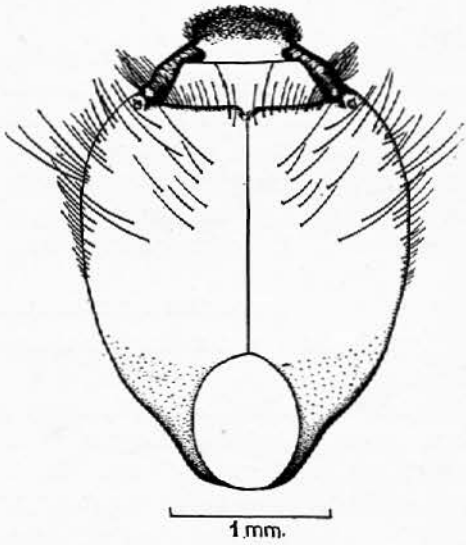


Fig. 206. *Agapanthia asphodeli* (Latreille). Mature larva. Head. Dorsal aspect.

trilobed and in centre of apical truncature of segment 9. *Legs* absent. *Spiracles* round, with about thirty marginal chambers which occupy the entire inner margin of peritreme.

First-instar larva. This is probably very similar to that of *A. villosoviridescens* Degeer. A detailed account of the extreme modification and unusual behaviour of the latter has already been published (Duffy, 1951).

Pupa. No material available. It probably closely resembles that of *A. villosoviridescens* Degeer (Duffy, 1953a, p. 279).

Host plants: *Asphodelus*, *Carduus* (Villiers, 1946).

Biology. Probably very similar to that of *A. villosoviridescens* Degeer (see Duffy, 1953a).

Material studied. 1 L, S. France, 8.vi.1901, in *Asphodelus*, Chapman leg., in coll. B.M.

References. Bellier, 1869 (Biol.); Caillol, 1914 (Biol.); Emden, 1939–1940 (L); Mulsant and Mayet, 1873 (L, Biol.); Perris, 1877 (L fig., P); Villiers, 1946 (I fig., Biol.); Westwood, 1839 (Biol.); Xambeu, 1898–1902 (L, P, Biol.).

Agapanthia cardui (Linnaeus)

Distribution. PALAEARCTIC REGION: Morocco, Sahara, Tunisia.

Mature larva. No material available. The description by Perris (1855) is inadequate.

Host plants: *Salvia bicolor* (Peyerimhoff, 1915); *Melilotus macrorhiza* (Perris, 1855); *Carduus*, *Asphodelus* (Villiers, 1946); *Cynara scolymus* (Borg, 1930).

Biology. In North Africa adults are to be found from April to June.

Parasites. Hymenoptera: *Diphlebus unicolor* F. (Xambeu, 1898–1902).

Economic importance. According to Borg (1930), artichokes, especially on clayey moist soils or in shady valleys, are often attacked by this species in Malta. The larvae tunnel in the leaf petioles and sometimes in the crown of the main stem.

References. Borg, 1930 (Biol.); Caillol, 1914 (Biol.); Mühlmann, 1954 (Biol.); Perris, 1855 (L fig., P, Biol.); Peyerimhoff, 1915 (Biol.); Villiers, 1946 (I fig., Biol.); Xambeu, 1898–1902 (L, P, Biol.).

Agapanthia lateralis Ganglbauer

Distribution. PALAEARCTIC REGION: Egypt.

Mature larva. No material available. For generic characters see key, p. 29.

Host plant: *Asphodelus.*

Biology. Emergence takes place in January and February.

References. Petroff, 1920 (Biol.).

Agapanthia irrorata (Fabricius)

Distribution. PALAEARCTIC REGION: Morocco, Sahara, Tunisia.

Mature larva. No material available. The descriptions by Xambeu (1898–1902) and Graells (1850) are inadequate.

Egg. Length 5 mm. Form elongate; chorion white, opaque and covered with a protective secretion (Xambeu, 1898–1902).

Host plants: *Onopordon illyricum* (Xambeu, 1898–1902); *Thapsia villosa* (Peyerimhoff, 1911); *Salvia bicolor* (Peyerimhoff, 1915); *Thapsia garganica* and *Asphodelus microcarpus* (Lucas, 1881).

Biology. Probably very similar to that of *A. villosoviridescens* Degeer (see Duffy, 1953a). In North Africa emergence occurs during May and June.

References. Caillol, 1914 (Biol.); Graells, 1850 (L fig., P fig., Biol. fig.); Lucas, 1881 (Biol.); Peyerimhoff, 1911 (Biol.), 1915 (Biol.); Villiers, 1946 (I fig., Biol.); Xambeu, 1898–1902 (E, L, P, Biol.).

Agapanthia annularis (Olivier)

Distribution. PALAEARCTIC REGION: Morocco, Tunisia.

Mature larva. No material available. For generic characters see key, p. 29.

Host plant: *Carduus.*

References. Villiers, 1946 (I fig., Biol.).

Hyllisia stenideoides Pascoe

Distribution. ETHIOPIAN REGION: Kenya.

Mature larva (fig. 207). Distinguishable from those of *Agapanthia* species as follows. Form appreciably more slender. *Head* entirely and uniformly testaceous dorsally, the frontal sutures indistinct. Posterior area of hypostoma ferruginous.

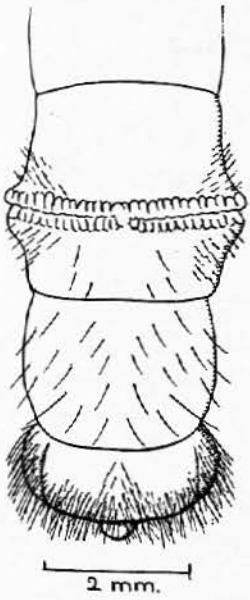


Fig. 207

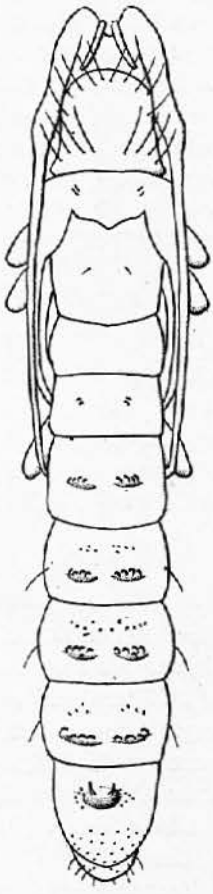


Fig. 208

Fig. 207. *Hyllisia stenideoides* Pascoe. Mature larva. Abdominal segments 6–10. Dorsal aspect.

Fig. 208. *Hyllisia stenideoides* Pascoe. Pupa. Dorsal aspect.

Ocellus comprising a distinct pigmented spot but lens not clearly defined. *Prothorax* with sclerotised area much less extensive and almost confined to front margin. *Abdomen* with dorsal ampullae present on segments 1–3 and 7 only. Segment 7 strongly and abruptly broadened medially, this segment distinctly broader medially than the remaining segments (fig. 207) and with tubercles of ampullae much more strongly developed.

Pupa (fig. 208). Length up to 16 mm.; maximum breadth 2·9 mm. *Head* with

vertex entirely visible from above, very deeply excavated between antennal bases. Clypeus with about twelve setae across base. Antennae extending as far as abdominal segment 2 or 3, where they are strongly curved downward and directed anteriorly as far as vertex of head, where they are curled over dorsally to terminate alongside head; segment 1 very elongate, extending almost to hind margin of pronotum. Eyes feebly convex, glabrous. Mandibles each with a pair of fine setae near middle of outer face. *Pronotum* elongate, broadest posteriorly, bearing several scattered, fine setae, especially around lateral margins. *Mesonotum* glabrous. *Metanotum* bearing at most one or two setae. Elytra and wings extending to abdominal segment 4. *Abdomen* with tergites 2–6 each with feebly protuberant bilobed ampullae, each of which bear a transverse group of hook-like spines which are strongly curved in a posterior direction. Tergite 7 elongate, slightly tapering and bearing several slightly curved spines, those on middle of disc being much stouter and arising from a slight tuberculate protuberance. Tergite 9 very short, concealed beneath tergite 8. Pleura scarcely protuberant, each with a few fine setae. *Legs* glabrous; hind femora extending to abdominal segment 3; tibiae directed posteriorly. *Functional spiracles* present on segments 1–7; peritreme broadly oval.

Host plants: *Osphilia* sp., *Leonotis* sp. (J.C.M.G.).

Biology. Larvae feed in the pith of living and dead stems of herbaceous plants.

Material studied. 2 L, Kenya, Muguga, 1954, from *Leonotis*, J.C.M.G. leg., in coll. B.M.

References. None available.

Calamobius filum (Rossi) (=**gracilis** (Creutzer)=**marginellus** (Fabricius))

Distribution. PALAEARCTIC REGION: Algeria, Morocco, Tunisia.

Mature larva. No material available. The larval description by Xambeu (1893) is inadequate.

Egg. Length 1 mm. Form elongate. Chorion white, matt, the middle yellowish (Xambeu, 1893).

Host plants: *Avena longiglumis* (Villiers, 1946), but in Europe it has been recorded from *Hedysarum coronarium* (Jacobini, 1870) and *Hordeum*, *Triticum* and other cereals (Guérin-Menéville, 1847).

Biology. Eggs are deposited in grass stalks in holes gnawed by the female. Probably more than 200 eggs are laid by a single female, one in each stem, and usually only in those which are robust and healthy. Thus one female may be responsible for the destruction of about 200 ears of corn by the autumn, for the ears which have been attacked are broken off by the wind. As the larva matures it tunnels down through the nodes to about 5 to 8 cm. from the roots where it overwinters. The larva can apparently remain one or even two years in a stem without pupating when stems are not planted in soil, but it eventually dies owing to desiccation (Guérin-Menéville, 1847). According to Villiers (1946), larvae feed at roots of grasses, and in North Africa emergence takes place from April to July.

Economic importance. This species has been regarded as a serious pest of cereal crops (Marre, 1919) and is known to French country folk as "Aiguillonnier". According to other authors (Balachowsky and Mesnil, 1935–1936), however, it seems likely that the gravity of these attacks has been exaggerated.

Control. Guérin-Menéville (1847) has suggested the cutting of corn as near to ground-level as possible (instead of 10 to 12 inches above ground-level) so that no larvae remain to metamorphose the following year. See also Marre (1919).

References. Balachowsky and Mesnil, 1935–1936 (Biol.); Caillol, 1914 (Biol.); Guérin-Menéville, 1845 (Biol.), 1947 (Biol.); Jacobini, 1870 (Biol.); Kittel, 1883 (Biol.); Lunardoni, 1889 (Biol.); Marre, 1919 (Biol.); Mendizabal, 1943 (I fig., Biol.); Mühlmann, 1954 (Biol.); Nördlinger, 1855 (Biol.); Perris, 1877 (Biol.); Peyerimhoff, 1911 (Biol.); Quaintance, 1913 (Biol.); Vianne, 1879 (I fig., Biol.); Villiers, 1946 (I fig., Biol.); Xambeu, 1890 (E, L, P, Biol.), 1893 (E, L, P, Biol.), 1898–1902 (L, P, Biol.).

Apodasyini

Larval Characters

Form slender, subcylindrical. *Head* moderately depressed, with sides slightly constricted behind middle. Antennal foramen closed behind. Hypostoma without setiferous pores. Antenna 2-segmented and bearing a hyaline process. Maxillary palp 2- or 3-segmented. Gular region without distinct sutures or ventral cleavage line. *Prothorax* with posterior area of pronotum shining and glabrous. Abdomen with ampullae each with two transverse rows of moniliform tubercles. Tergite 9 bearing spine-like urogomphi. Epipleurum protuberant on last three segments only. Pleural tubercle without sclerotised pits. *Spiracles* with marginal chambers.

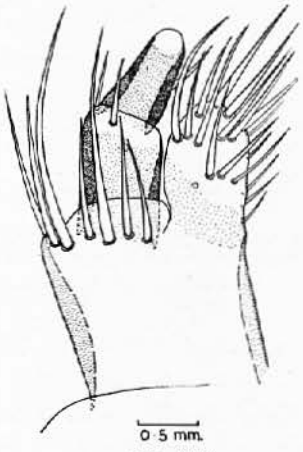


Fig. 209

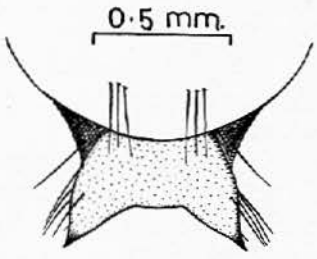


Fig. 210

Figs. 209–210. *Sophronica grisea* Aurivillius. Mature larva. Fig. 209. Apical part of maxilla. Ventral aspect. Fig. 210. Urogomphi. Caudal aspect.

Sophronica grisea Aurivillius

Distribution. ETHIOPIAN REGION: Ethiopia, Ivory Coast, Kenya, Rhodesia, Tanganyika, Uganda.

Mature larva (figs. 209, 210). Length up to 14 mm.; maximum breadth (at prothorax) 2·4 mm. *Head* moderately depressed, slightly wider before middle, with sides constricted behind middle; antennal foramen closed behind. Mouthframe rather

narrowly sclerotised, ferruginous; frons with a row of eight setiferous pores; six epistomal setae present. One pair of ocelli present, lens strongly protuberant; pigmented spot distinct. Hypostoma flat, smooth, pale ferruginous; sutures fine, strongly curved, setiferous pores absent, gular region undefined. Antenna 2-segmented; segment 2 bearing a conical hyaline process. Maxillary palp (fig. 209) 2-segmented; segment 2 subcylindrical, as long as segment 1. Labial palpi with segment 2 subcylindrical, as long as segment 1. Mentum distinct from submentum. *Prothorax* with posterior area of pronotum shining, glabrous and feebly longitudinally striate. Eusternum distinct, triangular, sparsely setose anteriorly; smooth and glabrous posteriorly. *Abdomen* with each dorsal ampulla bearing two transverse rows of shining, glabrous, moniliform tubercles. Tergite 9 (fig. 210) bearing a pair of distinct spine-like urogomphi. Epipleurum strongly protuberant on last three segments only. Pleural

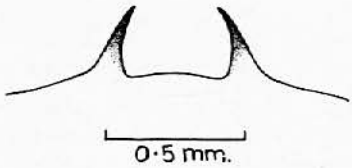


Fig. 211. *Sophronica grisea* Aurivillius. Pupa. Abdominal segment 9, showing urogomphi. Dorsal aspect.

tubercle without sclerotised pits and bearing at least three fine setae. Anus trilobed. *Legs* absent. *Spiracles* with peritreme round, rather thick, testaceous and bearing marginal chambers.

Pupa (fig. 211). Length up to 11·1 mm.; maximum breadth 2·6 mm. *Head* with vertex visible from above and bearing a single seta opposite base of each antenna, where it is rather feebly excavated. Front with about eight to ten setae and clypeus bearing a row of six setae across base. Antennae extending almost as far as abdominal segment 2, where they are strongly recurved (antennae damaged in this specimen). Eyes feebly convex, glabrous. Mandibles each with a pair of fine setae near middle of outer face. Labrum semicircular, bearing a few minute setae. *Pronotum* without lateral tubercles; disc sparsely and finely setose on anterior half only. *Mesonotum* and *metanotum* bearing a few minute setae; scutellum slightly protuberant, glabrous; scutellar groove distinct, transversely striate. Elytra and wings extending as far as abdominal segment 4. *Abdomen* with tergites 1–7 each with a transverse group of a few fine setae only (spines absent). Tergite 9 (fig. 211) bearing a pair of very stout divergent urogomphi. Sternites sparsely setose. *Legs* with each femur bearing a transverse row of fine setae near apex; middle and hind femora non-tuberculate sub-basally; hind femora extending to between abdominal segments 2 and 3; all tibiae more or less at right angles to longitudinal axis of body. *Functional spiracles* present on abdominal segments 1–5; peritreme subcircular, thick, pale testaceous and very strongly raised above general level of cuticle.

Material studied. 2 L, 1 P (adult reared), Kenya, Nairobi, 1953, from dead stem, J.C.M.G. leg., in coll. B.M.

References. None available.

Sophronica ventralis Aurivillius

Distribution. ETHIOPIAN REGION: Belgian Congo, Kenya, Nigeria, Uganda.

Adult. Length 6–9 mm. Entirely castaneous. *Head* flat between antennal tubercles which are not produced. Antennae stoutly filiform, bearing numerous long, erect setae. *Prothorax* transverse, strongly and obtusely rounded laterally. Middle coxal cavities open externally. *Elytra* rather short, rounded apically; coarsely and rather sparsely punctate, covered with short, light brown, decumbent setae and with numerous long, outstanding, dark brown setae. *Legs* with middle tibiae entire; tarsal claws divaricate, simple basally.

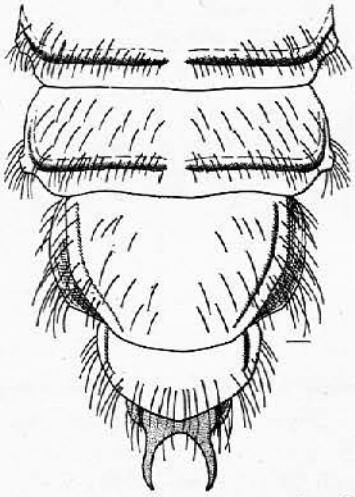


Fig. 212. *Sophronica ventralis* Aurivillius. Pupa. Posterior abdominal segments. Dorsal aspect.

Mature larva. Very similar to that of *S. grisea* Aurivillius, from which it may be distinguished by the characters given in the key, p. 29.

Pupa (fig. 212). Similar to that of *S. grisea* Aurivillius, but with carinae on posterior margins of tergites.

Host plant: *Coffea* (berries) (H. Hargreaves).

Economic importance. This species has been reported infesting coffee berries, particularly in Kenya. It is more widely distributed than the scolytid coffee-borer *Stephanoderes hampei* Ferrier and is responsible for more loss. Percentages of infestation have been recorded as 0·1 to 17·2. No instance has been observed, however, of it attacking green, ripening or ripe berries, only mbuni coffee being infested. According to Anderson (1930), this species will continue to reproduce for several generations in dry coffee stores.

Material studied. 4 L, 3 P, 1 I, Kenya, 1953, J.C.M.G. leg., in coll. B.M.

References. Anderson, 1930 (Biol.); Trench and Anderson, 1930 (Biol.).

Sophronica amplipennis Pascoe

Distribution. ETHIOPIAN REGION: Angola, Gold Coast.

Mature larva. Distinguishable from other species of this genus by its very stout

conical urogomphi and by the much larger and less numerous tubercles of the dorsal ampullae. [Length up to 18 mm.; maximum breadth (at prothorax) 3·9 mm.].

Material studied. 2 L, 1 I, Gold Coast, Offinsu, 30.iii.1955, from dead stem of woody creeper, E.A.J.D. leg., in coll. B.M.; 5 L, 2 I, Gold Coast, Kumasi, Bobiri reserve, 28.iii.1955, from dead woody creeper, E.A.J.D. leg., in coll. B.M.

References. None available.

Sophronica nigrovittata Aurivillius

Distribution. ETHIOPIAN REGION: Cameroons.

Mature larva. No material available. For generic characters see key, p. 29.

Host plant: *Coffea* (berries).

References. Lepesme, 1950 (Biol.).

Sophronica calceata Chevrolat

Distribution. ETHIOPIAN REGION: Angola, Belgian Congo, Ivory Coast, Mozambique, Nigeria, Sierra Leone, Tanganyika, Uganda.

Mature larva. No material available. For generic characters see key, p. 29.

Host plants: *Coffea* (berries); *Acacia albida* (seeds) (J.C.M.G.).

References. Lepesme, 1950 (I fig., Biol.).

Sophronica gracilior Breuning

Distribution. ETHIOPIAN REGION: Belgian Congo, Ivory Coast, Kenya.

Mature larva. No material available. For generic characters see key, p. 29.

Host plant: *Gossypium* (seed pods).

References. Lepesme, 1950 (Biol.).

Sophronica testacea Gahan

Distribution. ETHIOPIAN REGION: British East Africa.

Mature larva. No material available. For generic characters see key, p. 29.

Host plants: *Parkia* (in fruit); *Acacia albida* (pods).

References. Lepesme, 1950 (Biol.).

Sophronica rufulescens Breuning

Distribution. ETHIOPIAN REGION: Kenya.

Mature larva. Similar to those of *S. ventralis* Aurivillius and *S. grisea* Aurivillius, from which it differs in having stouter, straight and slightly divergent urogomphi.

Host plant: *Pinus radiata* (J.C.M.G.).

Material studied. 5 L (adult reared), Kenya, from thin dry stems of *Pinus radiata*, 1954, J.C.M.G. leg., in coll. B.M.

References. None available.

Stenidea troberti Mulsant

Distribution. PALAEARCTIC REGION: Algeria, Morocco, Tunisia.

Mature larva. No material available. For generic characters see key, p. 29.

Host plants: *Pistacia lentiscus*, *Quercus*, *Nerium oleander*.

Biology. Adults emerge during the end of summer or beginning of autumn.

References. Villiers, 1946 (I fig., Biol.).

Tetraopini

Enaretta castelnaudi Thomson

Distribution. ETHIOPIAN REGION: Angola, Ethiopia, Ivory Coast, Transvaal, Rhodesia.

This species has been removed from the tribe Apomecynini and placed in this tribe, to which it shows stronger affinities in the larval stage.

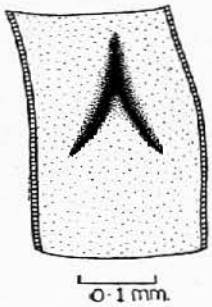


Fig. 213. *Enaretta castelnaudi* Thomson. Mature larva. Cross-section of proventriculus showing sclerite.

Adult. Length 7–11 mm. Entirely covered with greyish pubescence, with scattered darker punctures. *Head* with first segment of antenna without a cicatrix. *Prothorax* without lateral tubercles; mesothorax with coxal cavities open externally. *Elytra* each with two prominent longitudinal carinae on basal half and with eleven or twelve small raised tubercles bearing a tuft of orange-brown setae. *Legs* with middle tibiae with an oblique subapical groove; tarsal claws simple basally, divergent.

Mature larva (fig. 213). Form elongate, slender, cylindrical. Length up to 13 mm.; maximum breadth (at prothorax) 4·2 mm. *Head* rather thick, scarcely depressed, widest across middle (maximum head-width 1·8 mm.), with sides slightly constricted behind lateral limit of frons and broadly rounded posteriorly. Antennal foramen open behind; mouthframe rather strongly sclerotised, ferruginous. One pair of ocelli present; lens round, protuberant; pigmented spot indistinct. Clypeus glabrous. Labrum strongly transverse, Hypostoma with a pair of conspicuous, paramedian, oval swellings separated by a rather broad median cleavage line. Antenna 2-segmented; segment 2 bearing a conical hyaline process. Mandible with a characteristically sculptured concavity on apical third of outer face. Maxilla with palp 2-segmented; lobe very short and stout. Labial palpi with segment 2 minute. Mentum distinct from submentum. *Prothorax* with pronotum sparsely setose, very finely rugose, sublateral impressions and asperities absent. *Abdomen* with ampullae micro-granulate, devoid of conspicuous tubercles. Tergite 9 unarmed. Anus trilobed. *Legs* absent. *Spiracles* with peritreme thick, round, the inner margin produced into a crescentic membrane (similar to *Tetrops*).

This larva possesses a well-developed proventriculus which bears internally a spear-shaped sclerite (fig. 213).

Host plants: *Acacia albida*, *A. hebeclada*, *A. stolonifera*.

Biology. The characteristic damage caused by this species to seeds of *Acacia* is shown on Pl. II, fig. 1.

Material studied. 1 L (poor condition), 2 I, Northern Rhodesia, i.1953, in seeds of *Acacia*, D. W. Hall leg., in coll. B.M.

References. None available.

Tetrops praeusta (Linnaeus)

Illustrated descriptions of the immature stages and a biological account of this species have already been published (Duffy, 1953a).

Distribution. PALAEARCTIC REGION: Algeria.

Mature larva. See key, p. 29.

Additional references. Caillol, 1914 (Biol.); Massee, 1946 (Biol.); Mühlmann, 1954 (Biol.); Villiers, 1946 (I fig., Biol.).

Hecphora testator Fabricius

Distribution. ETHIOPIAN REGION: Belgian Congo, Nigeria, Republic of the Sudan, Sierra Leone, Uganda.

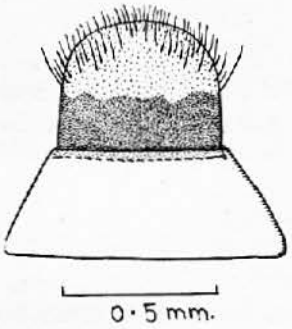


Fig. 214. *Hecphora testator* Fabricius. Mature larva. Labrum and clypeus. Dorsal aspect.

Mature larva (fig. 214). Length up to 25 mm.; maximum breadth (at prothorax) 5·5 mm. Cuticle orange-testaceous. *Head* scarcely depressed, elongate, widest just before middle, with sides slightly rounded, feebly constricted behind middle and slightly converging posteriorly. Frontal sutures rather indistinct. Antennal foramen distinctly open posteriorly. Mouthframe strongly sclerotised, pitchy, the frons entirely ferruginous. Gena strongly sclerotised, pitchy. Ocellus large; lens round, convex; pigmented spot indistinct. Hypostoma slightly convex, ferruginous and bearing a few stiff setae on each side of pale median cleavage line; sutures thick, slightly incurved. Antenna 2-segmented. Maxilla with segment 3 of palp cylindrical, as long as segment 2. Labial palpi with segment 2 cylindrical, shorter than segment 1. Mentum distinct from submentum. Clypeus glabrous. Labrum semicircular, testaceous, with at least basal third with a broad ferruginous sclerotised band (fig. 214). *Prothorax* with at

least posterior half of pronotum and sternellum micro-spiculate, the former with scattered coarse setae and glabrous lenticulate pits. *Abdomen* with each dorsal ampulla with two transverse furrows, the area between them entirely covered with small, oval, shining, glabrous tubercles, the surrounding cuticle being dull, micro-spiculate and bearing scattered, coarse, stiff setae. Tergite 9 unarmed. Anus trilobate. Pleural tubercle bearing numerous coarse setae; sclerotised pits absent. *Legs* absent. *Spiracles* large, with peritreme circular and without marginal chambers.

The position of this species in the larval key is rather unsatisfactory. With the exception of the large circular spiracles, no other characters even suggestive of the Tetraopini are evident. Moreover, this larva has 3-segmented labial palpi, a micro-spiculate pronotum and sternellum and ampullae characteristic of the Monochamini and the Ancylonotini, but perhaps nearer the latter, as the pleural tubercles are without sclerotised pits. On the other hand, it does have a distinctly defined eusternum.

It is possible that this larva is not in fact that of *H. testator* Fabricius, although adults were obtained from the same piece of wood.

Host plant: *Nauclea latifolia* (J.C.M.G.).

Material studied. 1 L, 2 I, Uganda, Abera Forest, 1954, from living *Nauclea latifolia*, J.C.M.G. leg., in coll. B.M.

References. None available.

Apomecynini

Larval Characters

Larvae of this tribe show stronger affinities to the Agapanthiini than to the Niphonini, near which this tribe has been placed on the basis of adult classification. The characters common to the Apomecynini and the Agapanthiini are the thick, salient, strongly sclerotised head capsule and the setose abdominal segment 9 which is subtruncate posteriorly.

Apomecyna binubila Pascoe

Distribution. ETHIOPIAN REGION: Belgian Congo, Ivory Coast, Mashonaland, Nigeria, Republic of the Sudan, Rhodesia, Senegal, Tanganyika, Transvaal.

Adult. Length 7–11 mm. Castaneous, covered with ferruginous pubescence varied with brownish and having two large clouded grey patches on each elytron, one near the base, the other towards the apex. *Head* with antennae extending to about half-way along elytra; cicatrix absent. *Prothorax* without lateral tubercles; disc very strongly and sparsely punctured. Mesothorax with coxal cavities open externally. *Elytra* wider than prothorax at base, very strongly and sparsely punctured, the apices truncate. *Legs* with middle tibiae with an oblique subapical groove; claws simple basally, divergent.

Mature larva (fig. 215). Form moderately robust, cylindrical. Length up to 18·5 mm.; maximum breadth (at prothorax) 3·6 mm. *Head* feebly depressed, widest at middle (maximum head-width 2·1 mm.) and sides regularly rounded; antennal foramen narrowly but very distinctly open behind; frons strongly sclerotised, entirely ferruginous, strongly contrasting with the pale frontal sutures and bearing eight setiferous pores; six epistomal setae present. One pair of ocelli present; lens strongly convex;

pigmented spot very distinct. Hypostoma flat, ferruginous; two pairs of paramedian setiferous pores present; sutures distinct, pitchy, slightly incurved. Gula region with a distinct, pale, median cleavage line. Antenna 2-segmented; segment 2 bearing a tapering hyaline process. Maxilla with segment 3 acutely conical, slightly longer than segment 2. Labial palpi with segment 2 slender, cylindrical, as long as segment 1. Mentum not distinct from submentum. *Prothorax* with a transverse orange-testaceous band just behind front margin; pronotum faintly striate posteriorly; eusternum well defined, with a few long setae. *Abdomen* with each dorsal ampulla with a single transverse furrow and two transverse rows of glabrous tubercles anterior to which are a few irregularly arranged ones. Ventral ampullae with two rows of tubercles. Segment 9 (fig. 215) unarmed but bearing numerous stout reddish setae which are much coarser than those on remainder of abdomen. Epipleurum slightly protuberant on all segments. Pleural tubercle without sclerotised pits. Anus trilobed. *Legs* absent. *Spiracles* with peritreme very thick, subcircular; marginal chambers absent.

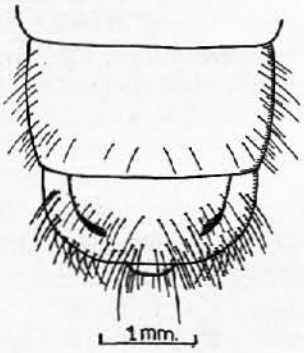


Fig. 215

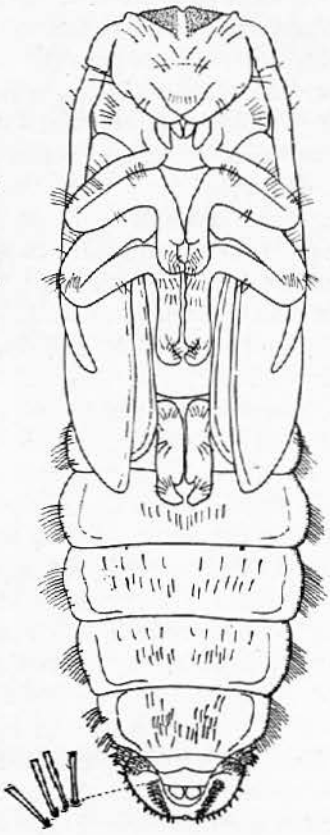


Fig. 216

Fig. 215. *Apomecyna binubila* Pascoe. Mature larva. Abdominal segments 8 and 9. Dorsal aspect.

Fig. 216. *Apomecyna binubila* Pascoe. Pupa. Ventral aspect.

Pupa (fig. 216). Length up to 12 mm.; maximum breadth 4·2 mm. *Head* with vertex partly visible from above, broadly but rather shallowly excavated between bases of antennae and densely setose or pubescent; front with about six pairs of long, stout setae; clypeus bearing six setae across base but transverse impression very feeble. Antennae extending as far as abdominal segment 2, where they are slightly curved downward to terminate opposite hind tarsal claws. Eyes feebly convex, glabrous. Mandibles each with two stout setae. Labrum semicircular, with several setae. *Pronotum* with numerous short fine setae, especially along front margin, and several

scattered, much stouter, longer setae around lateral margins. *Mesonotum* with several short setae on each side of scutellum which is scarcely protuberant. *Metanotum* with numerous scattered setae on each side of scutellar groove which is deeply transversely striate. Elytra and wings extending as far as abdominal segment 5. *Abdomen* with tergites 1–6 each with a transverse group of closely set, stout setae near posterior margin, anterior to which are numerous scattered spinules. Tergite 7 bearing numerous scattered, much larger, spines, especially across posterior margin. Tergites 8 and 9 short, transverse, bearing similar spines. Segment 9 bearing numerous stout, modified setae (fig. 216) which are enlarged and truncate apically. Sternites bearing numerous very fine setae. *Legs* with femora each bearing several long curved setae; hind femora extending to abdominal segment 4; tarsi each bearing several setae on each segment. *Functional spiracles* present on abdominal segments 1–6; peritreme rather thick, broadly oval and slightly raised above general level of cuticle.

Egg. Form elongate with rounded ends, and one side a little less convex than the other. Chorion opaque, white and bearing faint pentagonal markings. Size 1·7 mm. × 0·5 mm. (Pollard, 1954).

Host plants: *Cucurbita* (Fuller, 1914b); *Cucumis* (Zacher, 1921); *Cucumis melo*, *Colocynthis citrullus* (Pollard, 1954).

Biology. The eggs are believed to be deposited in the tissue of young stems of pumpkins between the nodes and that of the leaf stalks. Many larvae were found together in a single stem, in some cases not more than 3 to 5 inches apart. In several feet of another stem examined two or three adults were extracted from every 10 to 12 inches of stem. Oviposition causes severe bruising, abrasion and discoloration to the stems. Moreover, when the larvae are boring, the stem often becomes swollen and splits and a pale gall-like excrescence of ejected frass may be formed. In cases of advanced infestation, the stems are killed, except for the thin outer rind which may be intact or may have become ruptured as a result of the larva constructing its bulky pupal chambers. Often the stem is like a shrivelled flattened straw, which, when lifted, reveals a series of knots indicating the presence of pupal cells. Adults eclode from about mid-April onwards, having overwintered in their pupal cells. They are frequently attracted to artificial light. This species is probably double-brooded (Fuller, 1914b).

Recent observations on this species have been made by Pollard (1954). According to this author, the eggs are deposited singly, mainly in the internodes. They are either inserted in the tissues (lying either parallel or at right angles to the axis of the stem) or in the central hollow fistular pith. In mature plants with woody stems, the eggs are deposited just below the thin bark and in all cases are only 1 or 2 mm. below the surface. The maximum incubation period under laboratory conditions was four days.

The position of the larval tunnel is influenced by the girth of the stem. In slender stems the larval gallery is confined to the central hollow, but in woody stems the galleries are excavated between the bark and the wood, usually extending into and along the wood later on. The length of the mature larval galleries varied from 5 to 7 cm. and up to fourteen larvae and pupae were found in a piece of stem 10 cm. in length by 2 cm. in diameter. Apparently ejection holes are not made by the larvae,

possibly owing to the extensive splitting and cracking of the stems. Under laboratory conditions the duration of the larval stage averaged twenty-five days.

Pupation takes place near the centre of the larval tunnel, the pupa lying parallel to the axis of the stem. No complete cocoon is constructed and pupae are frequently exposed through the splitting of the stems. The pupal period averaged 5·9 days.

Parasites. Hymenoptera: *Iphiaulax* sp.

Economic importance. Young plants of pumpkins and melons are destroyed by this beetle and infestation is often heavy, especially in certain areas in the Sudan. The present author has recently seen plots of *Cucurbita* in the Gold Coast (near Samreboi) which had been severely damaged. Cucurbits in South Africa are also attacked by this pest.

Material studied. 30 L, 8 P, Republic of the Sudan, 16.iii.1953, from melon, D. G. Pollard leg., in coll. B.M.; 5 L, Gold Coast, near Samreboi, 23.iii.1955, from *Cucurbita*, E.A.J.D. leg., in coll. B.M.

References. Fuller, 1914b (Biol. fig.); King, 1911 (L fig., P fig., I fig., Biol.); Mühlmann, 1954 (Biol.); Pollard, 1954 (E, L fig., P fig., I fig., Biol. fig.); Zacher, 1921 (Biol.).

Apomecyna adspersa Thomson

Distribution. MADAGASCAN REGION: Mauritius and La Réunion.

Mature larva. No material available. For generic characters see key, p. 29.

Host plants: *Cucurbita*, *Sechium edule* (A. J. E. Orian).

References. None available.

Apomecyna parumpunctata Chevrolat

Distribution. ETHIOPIAN REGION: Cameroons, French Guinea, Gold Coast, Ivory Coast, Nigeria, Sierra Leone, Uganda.

Mature larva. No material available. For generic characters see key, p. 29.

Host plants: *Coffea robusta* (Lepesme, 1939); *Dioscorea* (Peacock, 1913).

References. Lepesme, 1939 (Biol.); Lepesme and Villiers, 1941 (Biol.), 1944 (Biol.); Mühlmann, 1954 (Biol.); Peacock, 1913 (Biol.).

Apomecyna acutipennis Kolbe

Distribution. ETHIOPIAN REGION: Tanganyika.

Mature larva. No material available. For generic characters see key, p. 29.

Host plant: *Telfairia pedata.*

References. Harris, 1939 (Biol.); Mühlmann, 1954 (Biol.).

Apomecyna arabica Breuning

Distribution. PALAEARCTIC REGION: Sahara.

Mature larva. No material available. For generic characters see key, p. 29.

Host plants: *Colocynthis vulgaris* (?), *Acacia* sp. (?) (Mateu, 1954).

References. Mateu, 1954 (Biol.).

Eunidia fuscostictica Breuning

Distribution. ETHIOPIAN REGION: Ivory Coast, Kenya, Uganda.

Mature larva (figs. 217, 218). Form rather slender, cylindrical. Length up to 20 mm.; maximum breadth (at prothorax) 3·8 mm. *Head* (fig. 217) very slightly depressed, extremely elongate, with sides slightly constricted medially; frontal sutures indistinct; mouthframe feebly sclerotised, testaceous; six epistomal setae present.

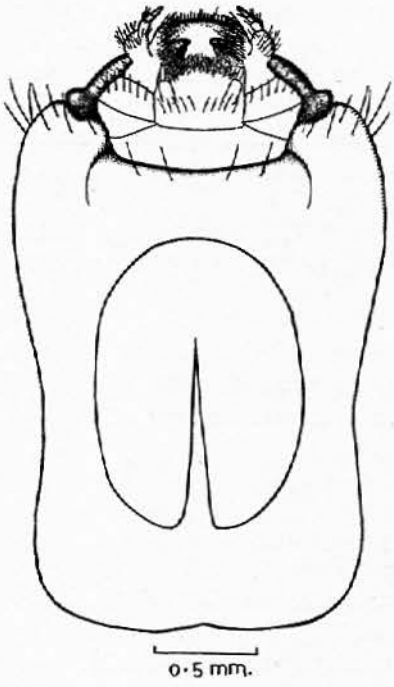


Fig. 217

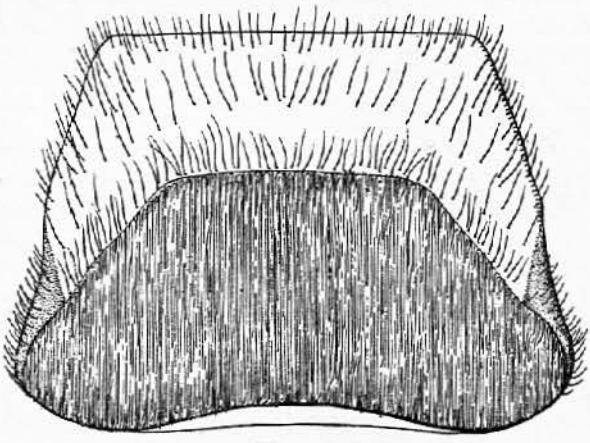


Fig. 218

Figs. 217–218. *Eunidia fuscostictica* Breuning. Mature larva. Fig. 217. Head. Ventral aspect. Fig. 218. Prothorax. Dorsal aspect.

One pair of ocelli present; lens strongly protuberant; pigmented spot indistinct. Hypostoma flat, pale testaceous; gular region undefined, two to three pairs of long, fine setae present. Antenna 2-segmented; segment 2 bearing a conical hyaline process. Maxillary palpi 3-segmented; segment 3 longer than segment 2. Labial palpi with segment 2 as long as segment 1. Mentum distinct from submentum. *Prothorax* (fig. 218) with posterior part of pronotum white, glabrous, and extremely finely longitudinally striate. Eusternum white, glabrous and extremely finely striate. *Abdomen* with each dorsal ampulla with a single transverse impression and two rows of shining moniliform tubercles. Tergite 9 unarmed. Epipleurum slightly protuberant on all segments. Pleural tubercles without sclerotised pits, broadly oval and bearing two to three fine setae. Anus trilobate. *Legs* absent. *Spiracles* with peritreme round, rather thick and testaceous.

Pupa. Length up to 11 mm.; maximum breadth 2·9 mm. *Head* with vertex visible

from above and bearing a pair of setae opposite base of each antenna. Front with three to four pairs of setae and clypeus bearing a row of six setae across base. Antennae extending to abdominal segment 2, where they are strongly recurved (antennae incomplete in this specimen). Eyes feebly convex, glabrous. Mandibles each with a pair of setae near middle of outer face. Labrum semicircular. *Pronotum* without lateral tubercles; disc bearing groups of setae as follows: one group near middle of front margin; two groups across middle and two paramedian groups near posterior margin. *Mesonotum* and *metanotum* sparsely setose. Elytra and wings extending as far as abdominal segment 5. *Abdomen* with tergites 1–7 each with a transverse row of setae only. Tergite 9 produced dorsally into a vertical, tuberculate, spine-like process which is sclerotised apically. Sternites glabrous. *Legs* with each femur bearing two to three subapical setae; middle and hind femora tuberculate sub-basally; hind femora extending to abdominal segment 3; all tibiae more or less at right angles to longitudinal axis of body. *Functional spiracles* present on abdominal segments 1–6; peritreme broadly oval, thin and pale.

Host plant: *Teclea nobilis* (J.C.M.G.).

Material studied. 4 L, 1 P, Uganda, Katonga, from *Teclea nobilis*, J.C.M.G. leg., in coll. B.M.

References. None available.

Eunidia duffyi Breuning

Distribution. ETHIOPIAN REGION: Kenya.

Mature larva. Very similar to that of *E. fuscostictica* Breuning, from which it differs in having a completely smooth mouthframe.

Material studied. 2 L, 3 I, Kenya, Kilifi, 1955, from dry wood, J.C.M.G. leg., in coll. B.M.

References. None available.

Eunidia picta Franz

Distribution. ETHIOPIAN REGION: Uganda.

Mature larva. Similar to that of *E. fuscostictica* Breuning, except the posterior constriction of the head capsule, the posterior margin of which is much narrower than the front margin, and the mouthframe which is entirely smooth.

Host plant: *Teclea nobilis* (J.C.M.G.).

Material studied. 10 L, 1 P, Uganda, Mpanga, 1954, from dead *Teclea nobilis*, J.C.M.G. leg., in coll. B.M.

References. None available.

Eunidia ruficornis Breuning

Distribution. ETHIOPIAN REGION: Uganda.

Mature larva. Resembling that of *E. fuscostictica* Breuning, but differing in having an entirely smooth mouthframe and a much shorter head capsule.

Host plants: *Teclea nobilis*, *T. trichocarpa* (J.C.M.G.).

Material studied. 4 L, Kenya, Londiani, 1953, from dead *Teclea nobilis*, J.C.M.G. leg., in coll. B.M.

References. None available.

Eunidia flavoapicata Breuning

Distribution. ETHIOPIAN REGION: Kenya, Uganda.

Mature larva. No material available. For generic characters see key, p. 29.

Host plant: *Acacia* sp.

References. None available.

Tetraulax albofasciatus Breuning

Distribution. ETHIOPIAN REGION: Belgian Congo, Kenya.

Mature larva. The systematic position of this larva is extremely difficult to ascertain. It cannot, however, on any grounds be included in the Petrognathini, in which tribe the adult has been placed. The main characters excluding it from the Petrognathini are (i) the trilobate anus and (ii) the glabrous pronotum. In the present key, the only tribe to which it appears to show obvious affinities is the Apomecynini, although the facies are not at all typical.

From the larva of *Apomecyna binubila* Pascoe it may be distinguished mainly by its more tapering slender form and by the strongly protuberant epipleurum on segments 7 to 9, by the sparsely setose segment 9 and the testaceous frons.

Material studied. 8 L, Kenya, Londiani, 1954, from creeper, J.C.M.G. leg., in coll. B.M.

References. None available.

Enaretta castelnaudi Thomson

See p. 29.

CATALOGUE OF HOST PLANTS OF AFRICAN CERAMBYCIDAE

Abies numidica. *Ergates faber, Leptura dubia, Neomarius gandolphei, Prionus coriarius, Pogonocherus cedri, Rhagium inquisitor.*

Abies webbiana. *Stromatium barbatum.*

Abies sp. *Hylotrupes bajulus.*

Acacia abyssinica. *Ceroplesis intermedia.*

Acacia albida. *Sophronica calceata, S. testacea, Enaretta castelnaudi.*

Acacia arabica. *Coptops aedificator, Stromatium barbatum.*

Acacia caesia. *Stromatium barbatum.*

Acacia catechu. *Stromatium barbatum, Xystrocera globosa.*

Acacia confusa. *Xystrocera globosa.*

Acacia dealbata. *Stromatium barbatum.*

Acacia decurrens. *Chlorophorus carinatus.*

Acacia drepanolobium. *Bolbotritus bainesi, Xystrocera vittata.*

Acacia eburnea. *Stromatium barbatum.*

Acacia farnesiana. *Stromatium barbatum.*

Acacia hebeclada. *Enaretta castelnaudi.*

Acacia horrida. *Acanthophorus capensis.*

Acacia jacquemontii. *Stromatium barbatum.*

Acacia lahai. *Nosoeme clavipes.*

Acacia latronum. *Stromatium barbatum.*

Acacia leucophloea. *Stromatium barbatum.*

Acacia melanoxylon. *Chlorophorus carinatus, Monoxenus plurituberculatus, Xystrocera ansorgei.*

Acacia modesta. *Stromatium barbatum, Xystrocera globosa.*

Acacia mollissima. *Ceroplesis orientalis, C. thunbergi, Psathyrissa brunnea, Pycnopsis brachyptera, Xystrocera globosa.*

Acacia nilotica. *Crossotus subocellatus, Hylotrupes bajulus, Macrotoma palmata.*

Acacia pennata. *Stromatium barbatum, Coptops aedificator, Dichostathes quadripunctatus.*

Acacia raddiana. *Macrotoma palmata.*

Acacia rehmanniana. *Pycnopsis brachyptera.*

Acacia senegal. *Stromatium barbatum.*

Acacia seyal. *Ceroplesis aestuans, Crossotus subocellatus, Macrotoma palmata.*

Acacia stolonifera (seeds). *Enaretta castelnaudi.*

Acacia tortilis. *Crossotus heimschi, Hesperophanes fasciculatus, Hypoeschrus strigosus, Macrotoma palmata, Stenopterus ater.*

Acacia spp. *Apomecyna arabica, Batocera rufomaculata, Cordylomera spinicornis, Ceresium unicolor, Gnathoenia flavovariegata, Gnatholea liturifer, Hesperophanes griseus* (?), *Prionus pectinicornis, Tetropiopsis major* (?), *Titoceres jaspideus.*

Acalypha neptunica. *Prosopocera cylindrica.*

Acer campbellii. *Stromatium barbatum.*

Acer caudatum. *Stromatium barbatum.*

Acer cultratum. *Stromatium barbatum.*

Acer obtusatum. *Anaglyptus gibbosus, Chlorophorus pilosus, Hesperophanes fasciculatus, Leptura fontenayi, Rhopalopus insubricus.*

Acer pseudoplatanus. *Chlorophorus pilosus, Stromatium barbatum.*

Acer spp. *Acanthoderes clavipes, Macrotoma palmata.*

Acrocarpus fraxinifolius. *Coptops aedificator, Stromatium barbatum, Xystrocera ansorgei, X. globosa.*

Adansonia digitata. *Coptops aedificator.*

Adansonia sp. *Petrognatha gigas.*

Adenanthera pavonina. *Xystrocera globosa.*

Adina cordifolia. *Batocera rufomaculata.*

Aegle marmelos. *Coptops aedificator, Stromatium barbatum.*

Aesculus hippocastanum. *Stromatium barbatum.*

Aesculus indica. *Stromatium barbatum.*

Afzelia africana. *Pachydissus hector.*

Afzelia bella. *Acmocera compressa, A. conjux, Phrosyne brevicornis, Sternotomis pulchra, Zographus regalis.*

Afzelia sp. *Coptops aedificator.*

Alangium salviifolium. *Stromatium barbatum.*

Albizia chinensis. *Stromatium barbatum, Xystrocera globosa.*

Albizia coriaria. *Ceroplesis fasciata, Macrotoma natala, Xystrocera nigrita.*

Albizia distachya. *Stromatium barbatum.*

Albizia falcata. *Xystrocera globosa.*

Albizia gummifera. *Dere* sp., *Dichostathes quadripunctatus, Frea humeralis, Macrotoma serripes.*
Albizia julibrissin. *Stromatium barbatum.*
Albizia lebbeck. *Batocera rufomaculata, Coptops aedificator, Pycnopsis brachyptera, Xystrocera globosa.*
Albizia lebbeckoides. *Stromatium barbatum.*
Albizia lucida. *Xystrocera globosa.*
Albizia odoratissima. *Xystrocera globosa.*
Albizia procera. *Pycnopsis brachyptera, Stromatium barbatum, Xystrocera globosa.*
Albizia sassa. *Acmocera compressa, A. conjux, Coptops aedificator, Phrosyne brevicornis.*
Albizia warnecki. *Alloeme rubra.*
Albizia zygia. *Coptops aedificator, Dichostathes quadripunctatus, Zoocosmius viridicinctus.*
Albizia spp. *Cerasphorus hirticornis, Crossotus molossus, Frea vermiculata, Mallodon downesi.*
Aleurites sp. *Sthenias cylindrator.*
Allophylus abyssinicus. *Chlorophorus carinatus.*
Allophylus mastersi. *Oemida gahani.*
Alnus glutinosa. *Mesosa nebulosa, Prionus coriarius, Saperda scalaris, Stromatium barbatum.*
Alnus nepalensis. *Stromatium barbatum.*
Alnus nitida. *Stromatium barbatum.*
Alnus spp. *Hylotrupes bajulus, Rhopalopus insubricus.*
Alstonia boonei. *Phryneta coeca.*
Alstonia congensis. *Batocera wyllei.*
Anacardium occidentale. *Acanthophorus confinis, Coptops aedificator, Hecyra terrea, Paranaleptes reticulata.*
Anchusa sp. *Phytoecia malachitica.*
Aningeria altissima. *Chromalizus barbiventre.*
Annona squamosa. *Stromatium barbatum.*
Anogeissus latifolia. *Stromatium barbatum.*
Anogeissus pendula. *Stromatium barbatum.*
Anogeissus sericea. *Stromatium barbatum.*
Anopyxis ealaensis. *Ancylonotus tribulus.*
Anthocephalus cadamba. *Stromatium barbatum.*
Anthostema aubryanum. *Ancylonotus tribulus, Graciella pulchella, Monochamus dentipes, Sternotomis pulchra.*
Anthyllis numidica. *Hesperophanes fasciculatus.*
Antiaris africana. *Acanthophorus spinicornis, Dere nigrita, Mallodon downesi, Phryneta leprosa.*
Antiaris toxicaria. *Coptops aedificator, Graciella pulchella, Phryneta leprosa, Sternotomis bohemanni, S. pulchra, S. variabilis.*
Antrocaryon micraster. *Pachydissus cameronicus.*
Ardisia solanacea. *Stromatium barbatum.*
Artocarpus altilis. *Batocera rufomaculata, Sternotomis chrysopras, S. pulchra.*
Artocarpus blumei. *Olenecamptus bilobus.*
Artocarpus calophylla. *Stromatium barbatum.*
Artocarpus chaplasha. *Olenecamptus bilobus.*
Artocarpus hirsuta. *Olenecamptus bilobus.*
Artocarpus integer. *Batocera rufomaculata, Oemida gahani, Olenecamptus bilobus, Phryneta spinator, Xystrocera ansorgei.*
Artocarpus lakoocha. *Stromatium barbatum.*
Artocarpus sp. *Coptops aedificator.*
Asphodelus microcarpus. *Agapanthia irrorata.*
Asphodelus spp. *Agapanthia asphodeli, A. cardui, A. lateralis.*
Aucoumea klaineana. *Batocera wyllei, Plocaederus basalis.*
Avena longiglumis. *Calamobius filum.*
Averrhoa carambola. *Stromatium barbatum.*

Baikiaea plurijuga. *Pachydissus regius, Zamium incultum.*
Balanites roxburghii. *Stromatium barbatum.*
Bambusa sp. *Stromatium barbatum.*
Baphia nitida. *Amphidesmus apicalis, A. theorini, Chromalizus afer, Coptops aedificator, Cordylomera spinicornis, Glenea giraffa, Prosopocera bipunctata.*
Baphia pubescens. *Prosopocera bipunctata.*
Barringtonia acutangula. *Batocera rufomaculata.*
Bauhinia acuminata. *Batocera rufomaculata, Xystrocera globosa.*
Bauhinia foveolata. *Stromatium barbatum.*
Bauhinia purpurea. *Coptops aedificator, Stromatium barbatum.*
Bauhinia racemosa. *Stromatium barbatum.*
Bauhinia retusa. *Coptops aedificator, Stromatium barbatum.*
Bauhinia vahlii. *Coptops aedificator, Stromatium barbatum.*
Bauhinia variegata. *Coptops aedificator, Stromatium barbatum.*

Bauhinia sp. *Olenecamptus bilobus.*
Beaumontia grandiflora. *Stromatium barbatum.*
Berlinia acuminata. *Acmocera conjux, Coptops aedificator, Phrosyne btevicornis, Prosopocera bipunctata, Zographus regalis.*
Berlinia sp. *Glenea divergevittata.*
Bersama sp. *Dorcasomus gigas.*
Betula alnoides. *Stromatium barbatum.*
Betula pendula. *Stromatium barbatum.*
Betula utilis. *Stromatium barbatum.*
Bischofia javanica. *Stromatium barbatum.*
Blasephida sp. *Charies thes bella, Ceroplesis büttneri.*
Blighia unijugata. *Chromacilla purpureocinctum.*
Bombax malabaricum. *Batocera rufomaculata, Coptops aedificator, Stromatium barbatum, Xystrocera globosa.*
Bombax rhodognaphalon. *Plocaederus frenatus.*
Bosqueia angolensis. *Mallodon downesi, Sternotomis chrysopras, S. pulchra.*
Bosqueia phoberos. *Oeax lichenea, Phryneta leprosa, Phrynetopsis fuscicornis, Sternotomis variabilis.*
Bosqueia spp. *Apiogaster rufiventris, Oeax triangularis, Olenecamptus macari, Xystrocera interrupta, X. devittata.*
Boswellia serrata. *Stromatium barbatum.*
Bridelia micrantha. *Amphidesmus apicalis, A. theorini, Graciella pulchella.*
Bridelia tomentosa. *Stromatium barbatum.*
Broussonetia papyrifera. *Batocera rufomaculata, Stromatium barbatum.*
Buchanania latifolia. *Batocera rufomaculata, Coptops aedificator.*
Butea monosperma. *Coptops aedificator, Stromatium barbatum.*

Cajanus cajan. *Ceroplesis signata, Tragocephala variegata.*
Calligonum comosum. *Eremoceras surcoufi, Plocaederus caroli.*
Calodendrum capense. *Macrotoma palmata.*
Calotropis procera. *Derolus mauritanicus.*
Calycotome spinosa. *Deilus fugax.*
Calycotome sp. *Niphona picticornis.*
Cananga odorata. *Mallodon downesi.*
Canarium schweinfurthii. *Plocaederus basalis.*
Canarium strictum. *Stromatium barbatum.*
Canthium sp. *Anthores leuconotus.*
Carallia integerrima. *Stromatium barbatum.*
Carapa moluccensis. *Stromatium barbatum.*
Carapa procera. *Hecyra obscurator.*
Carduncellus pinnatus. *Conizonia allardi.*
Carduus spp. *Agapanthia annularis, A. asphodeli, A. cardui, Conizonia detrita, C. guerini, Phytoecia erythrocnema* (?), *P. melanocephala.*
Careya arborea. *Coptops aedificator.*
Carica papaya. *Batocera rufomaculata.*
Carpinus betulus. *Stromatium barbatum.*
Carpinus viminea. *Stromatium barbatum.*
Carya sp. *Stromatium fulvum.*
Cassia auriculata. *Stromatium barbatum.*
Cassia fistula. *Stromatium barbatum.*
Cassia glauca. *Xystrocera globosa.*
Cassia nodosa. *Stromatium barbatum.*
Cassia siamea. *Ceroplesis quinquefasciata, Coptops aedificator, Dichostathes quadripunctatus, Stromatium barbatum.*
Cassia spp. *Ceroplesis signata, Stromatium fulvum.*
Castanea spp. *Chlorophorus varius, Hesperophanes gayi, Phymatodes glabratus* (?).
Castilloa elastica. *Phryneta leprosa, P. spinator.*
Castilloa sp. *Petrognatha gigas, Sternotomis variabilis.*
Casuarina equisetifolia. *Stromatium barbatum.*
Casuarina spp. *Megopis mutica, Petrognatha gigas, Philematium virens, Niphona cylindracea.*
Cedrela toona. *Stromatium barbatum.*
Cedrus atlantica. *Rhagium inquisitor.*
Cedrus deodara. *Stromatium barbatum.*
Cedrus spp. *Callidium cedri, Hovatoma wrighti, Leptura fontenayi, Neomarius gandolphei, Semanotus russicus, Stromatium fulvum, Pogonocherus cedri.*
Ceiba pentandra. *Ancylonotus tribulus, Batocera rufomaculata, Monochamus scabiosus, Tragiscoschema nigroscriptum.*
Ceiba spp. *Mallodon downesi, Petrognatha gigas.*
Celtis africana. *Phryneta leprosa, Xystrocera ansorgei.*
Celtis australis. *Stromatium barbatum.*
Celtis durandi. *Phryneta leprosa, Ocularia grisescens, Xystrocera ansorgei.*
Celtis soyauxii. *Acmocera conjux, A. compressa, Acridoschema isidori, Coptops aedificator, Cordylomera spinicornis, Crossotus molossus, Hypomares brunneus, Macrotoma serripes, Nosoeme clavipes,*

Ocularia brunnea, Olenecamptus hofmanni, Xystrocera nitidiventris.

Celtis zenkeri. *Phryneta leprosa.*

Celtis sp. *Acmocera olympiana.*

Centaurea pullata. *Conizonia fuscicornis, C. warnieri.*

Ceratonia siliqua. *Cerambyx cerdo, C. velutinus, Hesperophanes fasciculatus, Nathrius brevipennis, Penichroa fasciata.*

Cercis siliquastrum. *Penichroa fasciata.*

Cerinthe gymnandra. *Phytoecia malachitica.*

Cerinthe major. *Phytoecia malachitica, P. molybdaena.*

Chaetacme aristata. *Phryneta leprosa.*

Chailletia sp. *Philematium currori.*

Chamaerops humilis. *Dorysthenes forficatus.*

Chlorophora excelsa. *Ceroplesis conradti, Coptops aedificator, Phryneta leprosa, Plocaederus viridipennis, Sternotomis pulchra.*

Chloroxylon swietenia. *Stromatium barbatum.*

Chrysophyllum albidum. *Chromalizus concentricale* var. *ituricum, Monochamus lepesmei.*

Chrysophyllum sp. *Glenea giraffa.*

Cinnamomum glanduliferum. *Stromatium barbatum.*

Cinnamomum tamala. *Stromatium barbatum.*

Cinnamomum sp. *Macrotoma palmata, Troagocephala nobilis.*

Cistanthera papaverifera. *Acmocera conjux, Xylotrechus fragilis.*

Citrus aurantium. *Alphitopola maculosa, Gracilia minuta, Monochamus dentipes, Stromatium barbatum, Tragocephala formosa.*

Citrus grandis. *Stromatium barbatum.*

Citrus medica. *Stromatium barbatum.*

Citrus nobilis. *Alphitopola maculosa.*

Citrus spp. *Coptops aedificator, Macrotoma palmata, Monochamus ruspator, Paraphosphorus bipunctatus, Tragocephala variegata.*

Clausena lansium. *Stromatium barbatum.*

Cleidion gabonicum. *Acmocera conjux.*

Cleistopholis patens. *Acmocera conjux, Coptops aedificator, Graciella pulchella, Mallodon downesi, Monochamus dentipes, Zographus regalis.*

Clerodendrum colebrookianum. *Stromatium barbatum.*

Cocos nucifera. *Batocera rufomaculata.*

Coffea arabica. *Anatragus ornatus, Anthores leuconotus, Bixadus sierricola, Ceroplesis adusta, C. calabarica, Coptops aedificator, Dirphya luteiceps, D. princeps, Frea haroldi, F. maculicornis, F. marmorata, Phryneta leprosa, Sternotomis bohemanni, Stromatium barbatum.*

Coffea canephora. *Bixadus sierricola, Ceroplesis calabarica, C. hintzi, Coptops aedificator, Lasiopezus nigromaculatus.*

Coffea excelsa. *Acmocera compressa, Bixadus sierricola, Coptops aedificator, Dirphya princeps, Sternotomis callais.*

Coffea kouilensis. *Homelix variegatus, Lasiopezus variegator.*

Coffea liberica. *Bixadus sierricola, Monochamus centralis, M. ruspator, Sternotomis chrysopras, S. pulchra.*

Coffea robusta. *Apomecyna parumpunctata, Bixadus sierricola, Chromalizus fragrans, Ceroplesis adusta, C. calabarica, Dirphya princeps, Frea haroldi, Glenea fasciata, Homelix decussatus, Monochamus griseoplagiatus, Ochropyga lepesmei, Pinacosterna nachtigali, Pachystola mamillata, Sternotomis chrysopras, S. virescens, Sthenias cylindrator.*

Coffea spp. *Ancylonotus tribulus, Anthores leuconotus, Bixadus sierricola, Ceroplesis büttneri, C. conradti, C. militaris, C. molator, Charies thes bella, Chromacilla collare, Dirphya usambica, Domitia cervina, Graciella pulchella, Lasiopezus longimanus, Lux pulchra, Mallodon downesi, Monochamus pauper, M. thomsoni, Pachydissus hector, Phosphorus virescens, Phryneta spinator* (?), *Plocaederus denticornis, Tragocephala guerini, Xystrocera metallica.*

Coffea spp. (berries). *Sophronica calceata, S. nigrovittata, S. ventralis.*

Cola acuminata. *Glenea giraffa, Macrotoma serripes, Phosphorus virescens.*

Cola caricifolia. *Ocularia ashantica.*

Cola cordifolia. *Glenea giraffa.*

Cola gabonensis. *Glenea giraffa.*

Cola nitida. *Phosphorus virescens.*

Cola spp. *Falsovelleda congolensis, Glenea divergevittata, Phosphorus virescens.*

Colocynthis citrullus. *Apomecyna binubila, Pseudoalbana lameerei.*

Colocynthis vulgaris. *Apomecyna arabica.*

Combretodendron africanum. *Acmocera*

compressa, *Mallodon downesi*, *Monochamus centralis*, *M. scabiosus*.

Combretum gueinzii. *Freadelpha confluens.*

Commiphora sp. *Plocaederus bennigseni.*

Conium maculatum. *Hylotrupes bajulus.*

Convolvulus sp. *Nupserha apicalis.*

Cordia myxa. *Stromatium barbatum.*

Cordyline australis. *Stromatium barbatum.*

Cornus macrophylla. *Stromatium barbatum.*

Coryanthe pachyceras. *Glenea giraffa.*

Corylus colurna. *Stromatium barbatum.*

Corylus ferox. *Stromatium barbatum.*

Corylus spp. *Acanthoderes clavipes*, *Hylotrupes bajulus*, *Stromatium fulvum.*

Cotoneaster bacillaris. *Stromatium barbatum.*

Cotoneaster microphylla. *Stromatium barbatum.*

Crassophalum sp. *Synnupserha apicata.*

Crataegus laciniata. *Anaglyptus gibbosus.*

Crataegus oxyacantha. *Stromatium barbatum.*

Crataegus sp. *Xylotrechus arvicola.*

Croton macrostachys. *Mallodon downesi*, *Metameces suturalis*, *Pseudocharies thes nigroguttata.*

Croton megalocarpus. *Opepharus spectabilis.*

Croton spp. *Acanthophorus maculatus*, *Falsallophyton gardneri.*

Cryptomeria japonica. *Stromatium barbatum.*

Cucumis melo. *Apomecyna binubila.*

Cucurbita spp. *Apomecyna adspersa*, *A. binubila.*

Cudrania javanensis. *Stromatium barbatum.*

Cupressus benthami. *Chlorophorus carinatus*, *Jordanoleiopus gardneri.*

Cupressus lusitanica. *Chlorophorus carinatus*, *Oemida gahani*, *Phryneta spinator.*

Cupressus macrocarpa. *Monoxenus fuliginosus*, *Oemida gahani.*

Cupressus sempervirens. *Lucasianus levaillanti*, *Phryneta spinator.*

Cupressus torulosa. *Stromatium barbatum.*

Cupressus spp. *Acanthophorus maculatus*, *Androeme plagiata*, *Phymatodes glabratus*, *Semanotus laurasi.*

Cussonia bancoensis. *Glenea giraffa.*

Cussonia longissima. *Idactus ellioti.*

Cussonia nigerica. *Idactus ellioti.*

Cydonia vulgaris. *Xylotrechus arvicola.*

Cynara scolymus. *Agapanthia cardui.*

Cynoglossum spp. *Phytoecia coerulescens P. molybdaena* (?).

Cynoglossum spp. *Phytoecia coerulescens*, *P. molybdaena* (?).

Cynometra alexandri. *Mallodon downesi.*

Cytisus battandieri. *Deilus fugax.*

Cytisus spinosus. *Stromatium barbatum.*

Cytisus supinus. *Deilus fugax.*

Cytisus spp. *Hesperophanes fasciculatus*, *H. griseus* (?), *Penichroa fasciata*, *Stenopterus mauritanicus.*

Dalbergia kurzii. *Stromatium barbatum.*

Dalbergia lanceolaria. *Stromatium barbatum.*

Dalbergia latifolia. *Stromatium barbatum.*

Dalbergia ovata. *Stromatium barbatum.*

Dalbergia paniculata. *Coptops aedificator*, *Stromatium barbatum.*

Dalbergia rimosa. *Stromatium barbatum.*

Dalbergia sericea. *Stromatium barbatum.*

Dalbergia sissoo. *Batocera rufomaculata*, *Stromatium barbatum.*

Dalbergia stipulacea. *Stromatium barbatum.*

Dalbergia volubilis. *Stromatium barbatum.*

Daniellia oliveri. *Mallodon downesi*, *Pachydissus camerunicus*, *Pterochaos nebulosus*, *Xystrocera femorata.*

Daucus carota. *Phytoecia erythrocnema.*

Debregeasia hypoleuca. *Stromatium barbatum.*

Deinbollia sp. *Tragocephala variegata* (?).

Dendrocalamus strictus. *Stromatium barbatum.*

Desmodium tiliifolium. *Stromatium barbatum.*

Deutzia corymbosa. *Stromatium barbatum.*

Deutzia staminea. *Stromatium barbatum.*

Dioscorea sp. *Apomecyna parumpunctata.*

Diospyros chloroxylon. *Stromatium barbatum.*

Diospyros embryopteris. *Stromatium barbatum.*

Diospyros humilis. *Stromatium barbatum.*

Diospyros kaki. *Stromatium barbatum.*

Diospyros melanoxylon. *Stromatium barbatum.*

Diospyros microphylla. *Stromatium barbatum.*

Diospyros montana. *Stromatium barbatum.*

Diospyros tomentosa. *Stromatium barbatum.*

Diospyros sp. *Chlorophorus pilosus.*

Dipterocarpus macrocarpus. *Stromatium barbatum.*

Discoglypremna caloneura. *Acmocera compressa*, *A. conjux*, *Ancylonotus tribulus*,

Coptops aedificator, Glenea giraffa, Mallodon downesi.

Dombeya mastersi. *Chlorophorus carinatus, Oemida gahani.*

Dombeya sp. *Tragiscoschema bertolonii* (?).

Dyera costulata. *Batocera rufomaculata.*

Ebenus pinnata. *Chlorophorus sexguttatus.*

Echium grandiflorum. *Phytoecia molybdaena* (?).

Echium vulgare. *Phytoecia coerulescens.*

Ekebergia capensis. *Mallodon downesi.*

Ekebergia rueppelliana. *Mallodon downesi.*

Elaeagnus conferta. *Stromatium barbatum.*

Elaeocarpus lanceaefolius. *Stromatium barbatum.*

Entandrophragma angolense. *Coptops aedificator, Cordylomera spinicornis, Monochamus griseoplagiatus, M. ruspator, M. dentipes, Parandroeme brunnea.*

Entandrophragma cylindricum. *Cordylomera spinicornis, Monochamus griseoplagiatus, M. ruspator.*

Entandrophragma utile. *Cordylomera spinicornis, Monochamus griseoplagiatus, M. ruspator.*

Eriobotrya dubia. *Stromatium barbatum.*

Eriobotrya japonica. *Stromatium barbatum.*

Eriobotrya petiolata. *Stromatium barbatum.*

Eriolobus indica. *Stromatium barbatum.*

Erythrina indica. *Batocera rufomaculata.*

Erythrina suberosa. *Stromatium barbatum.*

Erythroxylon emarginatum. *Anthores leuconotus.*

Eucalyptus calophylla. *Stromatium barbatum.*

Eucalyptus camaldulensis. *Phoracantha recurva, P. semipunctata.*

Eucalyptus crebra. *Phoracantha semipunctata.*

Eucalyptus diversicolor. *Phoracantha semipunctata.*

Eucalyptus globulus. *Hesperophanes fasciculatus, Leptura fontenayi, Phoracantha semipunctata, Penichroa fasciata, Stromatium barbatum.*

Eucalyptus leucoxylon. *Phoracantha semipunctata.*

Eucalyptus longifolia. *Phoracantha semipunctata.*

Eucalyptus microcorys. *Chlorophorus carinatus.*

Eucalyptus nova-anglica. *Phoracantha recurva.*

Eucalyptus robusta. *Phoracantha semipunctata.*

Eucalyptus saligna. *Phoracantha semipunctata.*

Eucalyptus salubris. *Phoracantha semipunctata.*

Eucalyptus sideroxylon. *Phoracantha semipunctata.*

Eucalyptus tereticornis. *Phoracantha semipunctata, Stromatium barbatum.*

Eucalyptus triantha. *Phoracantha semipunctata.*

Eucalyptus viminalis. *Phoracantha semipunctata.*

Eucalyptus spp. *Macrotoma palmata, Megopis mutica, Oemedia gahani.*

Eugenia bracteata. *Stromatium barbatum.*

Eugenia laeta. *Stromatium barbatum.*

Euonymus frigidus. *Stromatium barbatum.*

Euonymus hamiltonianus. *Stromatium barbatum.*

Euonymus lacerus. *Stromatium barbatum.*

Euphorbia sp. *Oberea erythrocephala.*

Eurya symplocina. *Stromatium barbatum.*

Excoecaria agallocha. *Coptops aedificator, Stromatium barbatum.*

Fagaropsis angolensis. *Chlorophorus carinatus, Macrotoma palmata, Oemida gahani.*

Fagus sylvatica. *Stromatium barbatum.*

Fagus spp. *Acanthoderes clavipes, Hesperophanes gayi, Rhopalopus insubricus, Stromatium fulvum.*

Feronia elephantum. *Stromatium barbatum.*

Ferula communis. *Parmena pubescens.*

Ficus aspersa. *Macrotoma natala.*

Ficus benghalensis. *Batocera rufomaculata, Olenecamptus bilobus.*

Ficus brachypoda. *Cerasphorus hirticornis.*

Ficus carica. *Batocera rufomaculata, Olenecamptus bilobus, Phrynetopsis variegata, Tetropiopsis numidica, Stromatium barbatum.*

Ficus elastica. *Batocera rufomaculata, Olenecamptus bilobus, Petrognatha gigas, Phryneta coeca. P. conradti, P. hecphora, P. obliquata, P. leprosa, P. spinator, Stenotomis bohemanni.*

Ficus exasperata. *Amphidesmus apicalis, A. theorini, Aulacopus thoracicalis, Sternotomis pulchra, Zographus regalis.*

Ficus glaberrima. *Stromatium barbatum.*

Ficus glomerata. *Batocera rufomaculata,*

Coptops aedificator, Olenecamptus bilobus.

Ficus hispida. *Stromatium barbatum.*

Ficus infectoria. *Batocera rufomaculata, Petrognatha gigas, Olenecamptus bilobus.*

Ficus laccifera. *Olenecamptus bilobus.*

Ficus lacor. *Olenecamptus bilobus.*

Ficus nemoralis. *Stromatium barbatum.*

Ficus polita. *Acmocera conjux, Amphidesmus apicalis A. theorini, Coptops aedificator, Sternotomis pulchra, S. chrysopras.*

Ficus religiosa. *Batocera rufomaculata, Coptops aedificator, Olenecamptus bilobus, Petrognatha gigas.*

Figus retusa. *Olenecamptus bilobus, Petrognatha gigas, Stromatium barbatum.*

Ficus roxburghii. *Olenecamptus bilobus.*

Ficus rumphii. *Olenecamptus bilobus.*

Ficus scandens. *Stromatium barbatum.*

Ficus thonningii. *Crossotus leonensis, Petrognatha gigas, Phryneta aurocincta.*

Ficus tjakela. *Batocera rufomaculata, Olenecamptus bilobus.*

Ficus spp. *Acanthophorus arabicus, Acridoschema isidori, Chlorophorus varius, Coptops aedificator, Crossotus molossus, Derolus mauritanicus, Frea marshalli, Gracilia minuta, Hesperophanes gayi, H. griseus, H. fasciculatus, H. sericeus, Leptura fontenayi, Niphona picticornis, Paranaleptes reticulata, Penichroa fasciata, Phryneta spinator, Phrynetopsis fuscicornis, P. trituberculata, Prionus coriarius, Macrotoma palmata, Sternotomis amabilis, S. andrewesi, S. chrysopras, S. variabilis, S. virescens, Stromatium fulvum.*

Foeniculum vulgare. *Phytoecia rufipes.*

Fraxinus dimorpha. *Macrotoma scutellaris.*

Fraxinus floribunda. *Stromatium barbatum.*

Fraxinus sp. *Cloniocerus kraussi.*

Funtumia elastica. *Acridocephala bistriata, Monochamus ruspator, Parandra gabonica.*

Funtumia latifolia. *Acmocera conjux, Cordylomera spinicornis, Graciella pulchella.*

Funtumia spp. *Coptops aedificator, Monochamus x-fulvum, Phryneta coeca, P. leprosa, P. luctuosa, P. spinator, Prosopocera bioculata.*

Gamblea ciliata. *Stromatium barbatum.*

Garcinia indica. *Stromatium barbatum.*

Garcinia wightii. *Stromatium barbatum.*

Gardenia obtusifolia. *Stromatium barbatum.*

Gardenia turgida. *Stromatium barbatum.*

Gardenia urcelliformis. *Anthores leuconotus.*

Garuga pinnata. *Batocera rufomaculata, Coptops aedificator, Stromatium barbatum.*

Gelonium sp. *Prosopocera lactator.*

Genista scorpius. *Hylotrupes bajulus.*

Genista spp. *Deilus fugax, Niphona picticornis.*

Glochidion lanceolarium. *Stromatium barbatum.*

Glycyrrhiza glabra. *Penichroa fasciata.*

Gmelina arborea. *Stromatium barbatum.*

Gossypium spp. *Corus albopunctatus, Glenea apicalis, Paranaleptes reticulata, Tragiscoschema bertolonii, T. nigroscriptum, Tragocephala variegata.*

Gossypium spp. (seed pods). *Sophronica gracilior.*

Gouania leptostachya. *Stromatium barbatum.*

Grevillea robusta. *Stromatium barbatum.*

Grewia disperma. *Stromatium barbatum.*

Grewia elastica. *Stromatium barbatum.*

Grewia hainesiana. *Stromatium barbatum.*

Grewia oppositifolia. *Stromatium barbatum.*

Grewia subinaequalis. *Stromatium barbatum.*

Grewia tiliifolia. *Stromatium barbatum, Xystrocera globosa.*

Grewia sp. *Hypargyra albilateris.*

Guarea cedrata. *Cordylomera spinicornis.*

Guarea thompsonii. *Chromalizus afer, Glenea giraffa.*

Gymnosporia luteola. *Oemida gahani.*

Gymnosporia sp. *Paraphosphorus bipunctatus.*

Gynocardia odorata. *Stromatium barbatum.*

Hagenia sp. *Chlorophorus carinatus.*

Halocnemum strobilaceum. *Hesperophanes sericeus.*

Haronga paniculata. *Phrosyne brevicornis, Sternotomis pulchra.*

Harungana madagascariensis. *Phrosyne brevicornis, Sternotomis pulchra.*

Hedera helix. *Stromatium barbatum.*

Hedysarum coronarium. *Calamobius filum.*

Heeria reticulata. *Rhaphidopsis melaleuca* (?).

Helicia robusta. *Stromatium barbatum.*

Helicteres isora. *Stromatium barbatum.*
Heritiera fomes. *Stromatium barbatum.*
Heritiera littoralis. *Ceresium unicolor.*
Heteropanax fragrans. *Stromatium barbatum.*
Hevea brasiliensis. *Batocera rufomaculata, Coptops aedificator, Mallodon downesi.*
Hevea spp. *Idactus ellioti, Plocaederus viridipennis, Phryneta leprosa, Proctocera scalaris, Mallodon downesi, Sternotomis variabilis.*
Hibiscus fuscus. *Glenea apicalis.*
Hibiscus sp. *Tragiscoschema bertolonii.*
Hiptage madablota. *Stromatium barbatum.*
Hoheria lyallii. *Stromatium barbatum.*
Holigarna arnottiana. *Stromatium barbatum.*
Holmskioldia sanguinea. *Stromatium barbatum.*
Holoptelea grandis. *Phryneta leprosa.*
Holoptelea integrifolia. *Coptops aedificator, Stromatium barbatum.*
Hopea wightiana. *Stromatium barbatum.*
Hordeum spp. *Calamobius filum.*
Hymenostegia afzelii. *Acmocera conjux.*
Hypericum mysorense. *Stromatium barbatum.*

Ilex aquifolium. *Anaglyptus gibbosus, Mesosa nebulosa.*
Ilex dipyrena. *Stromatium barbatum.*
Ilex sikkimensis. *Stromatium barbatum.*
Ilex wightiana. *Stromatium barbatum.*
Ilex sp. *Saperda scalaris.*
Indigofera heterantha. *Stromatium barbatum.*
Indigofera pulchella. *Stromatium barbatum.*
Ipomoea sp. *Nupserha apicalis.*
Isoberlinia scheffleri. *Xystrocera devittata.*

Jasminum sp. *Cloniocerus kraussi.*
Juglans regia. *Stromatium barbatum.*
Juglans spp. *Cerambyx cerdo, Chlorophorus pilosus, Hesperophanes gayi, H. fasciculatus, Stromatium fulvum.*
Juniperus communis. *Semanotus laurasi.*
Juniperus lycia. *Icosium tomentosum.*
Juniperus oxycedrus. *Icosium tomentosum, Phymatodes glabratus, Semanotus laurasi.*
Juniperus phoenicea. *Icosium tomentosum, Semanotus laurasi.*
Juniperus procera. *Oemida gahani.*
Juniperus thurifera. *Phymatodes glabratus, Semanotus laurasi.*
Juniperus virginiana. *Semanotus laurasi.*
Juniperus spp. *Androeme plagiata, Chlorophorus carinatus, Lucasianus levaillanti, Semanotus russicus.*

Khaya anthotheca. *Cordylomera spinicornis, Monochamus griseoplagiatus, M. ruspator, M. tuberosa, M. x-fulvum.*
Khaya grandifoliola. *Cordylomera spinicornis, Exocentrus* sp., *Monochamus ruspator.*
Khaya senegalensis. *Cordylomera spinicornis.*
Khaya spp. *Cordylomera spinicornis, Plocaederus viridipennis.*
Kydia calycina. *Stromatium barbatum.*

Lagerstroemia lanceolata. *Stromatium barbatum.*
Lagerstroemia villosa. *Stromatium barbatum.*
Lagunaria patersonii. *Chlorophorus carinatus, Oemida gahani, Xystrocera ansorgei.*
Lannea acidissima. *Pachydissus camerunicus.*
Lannea grandis. *Batocera rufomaculata, Coptops aedificator, Stromatium barbatum.*
Lannea humilis. *Analeptes trifasciata.*
Lannea kerstingii. *Lasiopezus longimanus, Plocaederus spinicornis.*
Lannea stuhlmannii. *Ceroplesis irregularis, Lasiopezus sordidus, Plocaederus spinicornis.*
Lannea welwitschii. *Lasiopezus marmoratus, Plocaederus spinicornis.*
Larix griffithii. *Stromatium barbatum.*
Lasiodiscus mildbraedii. *Chromacilla* sp.
Lasiosiphon eriocephalus. *Stromatium barbatum.*
Laurus nobilis. *Niphona picticornis.*
Lavatera stenopetala. *Plagionotus scalaris.*
Leonotis sp. *Hyllisia stenideoides.*
Leucomeris spectabilis. *Stromatium barbatum.*
Ligustrum sp. *Cloniocerus kraussi.*
Limoniastrum guyonianum. *Apatophysis barbara.*
Lithospermum officinale. *Phytoecia molybdaena.*
Lithospermum sp. *Phytoecia coerulescens.*
Litsea polyantha. *Olenecamptus bilobus.*
Litsea wightiana. *Stromatium barbatum.*
Lophira alata. *Mallodon downsei.*

Lophira procera. *Acanthophorus spinicornis, Chromalizus afer.*
Lovoa brownii. *Monochamus griseoplagiatus, M. x-fulvum.*
Lovoa klaineana. *Plocaederus fucatus.*
Lovoa spp. *Cordylomera spinicornis, Monochamus x-fulvum.*
Lycopsis sp. *Phytoecia coerulescens.*

Maba abyssinica. *Arrhytmus fenestratus, Antennoeme quadriplagiata, Metameces suturalis.*
Maba sp. *Phrosyne viridis.*
Machilus bombycina. *Stromatium barbatum.*
Machilus duthiei. *Stromatium barbatum.*
Machilus odoratissima. *Stromatium barbatum.*
Macrolobium heudelotianum. *Chromalizus afer, Coptops aedificator, Monochamus dentipes, M. scabiosus, Prosopocera bipunctata, Zographus regalis.*
Madhuca butyracea. *Stromatium barbatum.*
Madhuca indica. *Philematium virens.*
Maesopsis eminii. *Monochamus centralis, M. scabiosus.*
Magnolia campbellii. *Stromatium barbatum.*
Mallotus nepalensis. *Stromatium barbatum.*
Mallotus philippinensis. *Stromatium barbatum.*
Malus baccata. *Stromatium barbatum.*
Malus pumila. *Chlorophorus varius, Gracilia minuta, Phryneta spinator.*
Malva sylvestris. *Plagionotus scalaris.*
Mangifera indica. *Batocera rufomaculata, Olenecamptus bilobus, Stromatium barbatum.*
Mangifera spp. *Macrotoma palmata, Mallodon downesi.*
Manihot glaziovii. *Coptops aedificator, Mallodon downesi.*
Manihot spp. *Monochamus ruspator, Phryneta leprosa, Sternotomis variabilis, S. virescens.*
Manilkara cuneifolia. *Latisternum strandi, Philematium virens.*
Mansonia altissima. *Mallodon downesi.*
Mappia foetida. *Stromatium barbatum.*
Melia azedarach. *Phryneta spinator.*
Melilotus macrorhiza. *Agapanthia cardui.*
Meliosma dilleniifolia. *Stromatium barbatum.*
Meliosma pungens. *Stromatium barbatum.*
Meliosma thomsoni. *Stromatium barbatum.*
Michelia champaca. *Stromatium barbatum.*
Michelia excelsa. *Stromatium barbatum.*
Michelia nilagirica. *Stromatium barbatum.*
Microdesmis puberula. *Glenea giraffa.*
Millettia auriculata. *Coptops aedificator.*
Millettia brandisiana. *Stromatium barbatum.*
Millettia pulchra. *Stromatium barbatum.*
Millettia racemosa. *Stromatium barbatum.*
Millettia stapfiana. *Chromalizus afer, Coptops aedificator.*
Millettia spp. *Pterolophia biarcuata.*
Mimusops africana. *Philematium natalense.*
Mimusops elengi. *Stromatium barbatum.*
Moringa pterygosperma. *Batocera rufomaculata.*
Morus alba. *Stromatium barbatum.*
Morus indica. *Batocera rufomaculata, Olenecamptus bilobus, Stromatium barbatum.*
Morus spp. *Callimatium venustum, Chlorophorus varius, Hesperophanes fasciculatus, Macrotoma scutellaris, Phryneta leprosa, Stromatium fulvum, Xylotrechus arvicola.*
Mucuna imbricata. *Coptops aedificator.*
Murraya exotica. *Stromatium barbatum.*
Musanga cecropioides. *Aderpas albomarmoratus, Bixadus sierricola, Sternotomis callais.*
Musanga smithii. *Acmocera conjux, Amphidesmus apicalis, A. theorini, Chromalizus afer, Sternotomis pulchra, Zographus regalis.*
Myrica nagi. *Stromatium barbatum.*
Myrsine semiserrata. *Stromatium barbatum.*

Nauclea latifolia. *Hecphora testator.*
Nerium oleander. *Derolus mauritanicus, Hesperophanes fasciculatus, Parmena pubescens, Stenidea troberti, Sthenias cylindrator.*

Ocotea usambarensis. *Macrotoma foveolata.*
Oldfieldia sp. *Colobizus tibiotarsalis* (?).
Olea chrysophylla. *Oemida gahani.*
Olea hochstetteri. *Oemida gahani, Macrotoma dohertyi.*
Olea verrucosa. *Cloniocerus kraussi.*
Olea woodii. *Cloniocerus kraussi.*
Olea sp. *Vesperus flaveolus.*
Olearia avicenniifolia. *Stromatium barbatum.*

Ononis natrix. *Chlorophorus trifasciatus.*
Onopordon illyricum. *Agapanthia irrorata.*
Opuntia sp. *Lagochirus funestus.*
Osphilia sp. *Hyllisia stenideoides.*
Ougeinia dalbergioides. *Stromatium barbatum.*
Oxyanthus speciosus. *Anthores leuconotus.*
Oxyspora paniculata. *Stromatium barbatum.*

Pachylobus deliosa. *Sternotomis pulchra.*
Parinari excelsa. *Macrotoma palmata, Mallodon downesi, Monoxenus horridus.*
Parkia bicolor. *Chromalizus afer.*
Parkia filicoidea. *Macrotoma serripes.*
Parkia sp. (fruit). *Sophronica testacea.*
Parkinsonia aculeata. *Stromatium barbatum.*
Parrotiopsis jacquemontiana. *Stromatium barbatum.*
Pavetta indica. *Coptops aedificator.*
Pavetta oliveriana. *Anthores leuconotus.*
Pentaclethra macrophylla. *Acmocera compressa.*
Pentacme suavis. *Stromatium barbatum.*
Persea americana. *Mallodon downesi.*
Phialodiscus bancoensis. *Acanthophorus spinicornis, Acmocera compressa, Chromalizus afer, Coptops aedificator, Graciella pulchella, Sternotomis pulchra, S. chrysopras, Zographus regalis.*
Phlogacanthus thyrsiflorus. *Stromatium barbatum.*
Phoenix dactylifera. *Prionus pectinicornis.*
Phoenix spp. *Apatophysis barbara, Niphona picticornis.*
Photinia notoniana. *Stromatium barbatum.*
Phyllanthus discoideus. *Plocaederus viridipennis.*
Picea smithiana. *Stromatium barbatum.*
Picea sp. *Hylotrupes bajulus.*
Pinus canariensis. *Hylotrupes bajulus.*
Pinus caribaea. *Hylotrupes bajulus.*
Pinus halepensis. *Chlorophorus carinatus, Ergates faber, Hylotrupes bajulus, Nathrius brevipennis, Oxypleurus nodieri, Penichroa fasciata, Pogonocherus caroli, P. perroudi.*
Pinus maritima. *Hylotrupes bajulus, Oxypleurus nodieri, Pogonocherus perroudi.*
Pinus palustris. *Hylotrupes bajulus.*
Pinus pinaster. *Hylotrupes bajulus.*
Pinus pinea. *Hylotrupes bajulus.*
Pinus ponderosa. *Hylotrupes bajulus.*
Pinus radiata. *Chlorophorus carinatus, Hylotrupes bajulus, Monoxenus fuliginosus, Oemida gahani, Oxypleurus nodieri, Sophronica rufulescens.*
Pinus sylvestris. *Hylotrupes bajulus, Pogonocherus perroudi.*
Pinus taeda. *Hylotrupes bajulus.*
Pinus wallichiana. *Stromatium barbatum.*
Pinus spp. *Hylotrupes bajulus, Macrotoma scutellaris* (?), *Niphona picticornis.*
Piptadenia africana. *Acmocera compressa, Mallodon downesi, Monochamus x-fulvum, Zoocosmius viridicinctus.*
Piptadenia aubrevillei. *Coptops aedificator.*
Piptadenia oudhensis. *Stromatium barbatum.*
Piptadenia sp. *Alloeme rubra.*
Piptanthus nepalensis. *Stromatium barbatum.*
Pipturus sp. *Ceresium unicolor.*
Pistacia integerrima. *Stromatium barbatum.*
Pistacia lentiscus. *Nathrius brevipennis, Niphona picticornis, Penichroa fasciata, Stenidea troberti, Stenopterus ater, S. mauritanicus, Stromatium fulvum.*
Pistacia terebinthus. *Niphona picticornis, Stenopterus ater.*
Pistacia spp. *Hesperophanes fasciculatus, H. sericeus, Purpuricenus barbarus.*
Pithecellobium bigeminum. *Stromatium barbatum.*
Pittosporum abyssinicum. *Acanthophorus maculatus.*
Pittosporum eriocarpum. *Stromatium barbatum.*
Pittosporum eugenioides. *Stromatium barbatum.*
Pittosporum floribundum. *Stromatium barbatum.*
Platanus orientalis. *Batocera rufomaculata.*
Platanus spp. *Cerambyx velutinus, Macrotoma palmata, Stromatium fulvum.*
Plecospermum spinosum. *Stromatium barbatum.*
Podocarpus gracilior. *Oemida gahani.*
Podocarpus milanjianus. *Chlorophorus carinatus.*
Poinciana elata. *Stromatium barbatum.*
Poinciana regia. *Crossotus subocellatus, Mallodon downesi, Stromatium barbatum.*
Polygala arillata. *Stromatium barbatum.*
Polyscias fulva. *Idactus ellioti.*
Polyscias kikuyuensis. *Oemida gahani.*

Pongamia glabra. *Coptops aedificator, Stromatium barbatum.*
Populus alba. *Oberea maculicollis, Saperda perforata.*
Populus ciliata. *Stromatium barbatum.*
Populus thevestina. *Oberea maculicollis.*
Populus tremula. *Saperda perforata, Stromatium barbatum, Xylotrechus arvicola.*
Populus spp. *Acanthoderes clavipes, Hesperophanes griseus* (?), *Hylotrupes bajulus.*
Premna maxima. *Chlorophorus carinatus, Monochamus triangularis.*
Premna serratifolia. *Stromatium barbatum.*
Prinsepia utilis. *Stromatium barbatum.*
Prosopis juliflora. *Stromatium barbatum.*
Prosopis spicigera. *Stromatium barbatum.*
Prunus amygdalus. *Hesperophanes fasciculatus, H. gayi.*
Prunus armeniaca. *Chlorophorus varius, Macrotoma palmata, Stenopterus ater, Stromatium fulvum.*
Prunus cerasus. *Xylotrechus arvicola.*
Prunus domestica. *Phryneta spinator, Paraphosphorus bipunctatus.*
Prunus eburnea. *Stromatium barbatum.*
Prunus japonica. *Stenopterus mauritanicus.*
Prunus microcarpa. *Stromatium barbatum.*
Prunus persica. *Chlorophorus varius, Paraphosphorus bipunctatus, Phryneta spinator, Stromatium barbatum, Xystrocera globosa.*
Prunus racemosa. *Stromatium barbatum.*
Prunus spinosa. *Leptura unipunctata.*
Pseudospondias microcarpa. *Monochamus x-fulvum, Plocaederus viridipennis.*
Pseudotsuga taxifolia. *Hylotrupes bajulus* (?).
Psidium guajava. *Pectoctenus scalabrii.*
Pterocarpus marsupium. *Coptops aedificator, Stromatium barbatum.*
Pterygota alata. *Stromatium barbatum.*
Pterygota macrocarpa. *Glenea giraffa.*
Pueraria tuberosa. *Coptops aedificator.*
Punica granatum. *Acanthoderes clavipes, Hesperophanes fasciculatus, Niphona picticornis.*
Pycnanthus angolensis. *Mallodon downesi.*
Pycnanthus kombo. *Monochamus scabiosus.*
Pycnocoma macrophylla. *Mallodon downesi.*
Pygeum africanum. *Oemida gahani, Phrynetopsis loveni.*
Pyracantha crenulata. *Stromatium barbatum.*
Pyrus communis. *Macrotoma palmata, Phryneta spinator, Stromatium barbatum.*
Pyrus lanata. *Stromatium barbatum.*
Pyrus pashia. *Stromatium barbatum.*
Pyrus ursina. *Stromatium barbatum.*

Quercus afares. *Cerambyx cerdo, Leptura scutellata, Prionus coriarus.*
Quercus dealbata. *Stromatium barbatum.*
Quercus dilatata. *Stromatium barbatum.*
Quercus ilex. *Cerambyx cerdo, C. miles, Clytus ambigenus, Macrotoma scutellaris, Plagionotus arcuatus, Prionus coriarus, Leptura scutellata, Stromatium barbatum.*
Quercus incana. *Stromatium barbatum.*
Quercus mirbecki. *Cerambyx cerdo, Clytus ambigenus, Isotomus theresae, Nathrius brevipennis, Plagionotus arcuatus, Pseudomyrmecion ramalium, Purpuricenus sexmaculatus.*
Quercus pubescens. *Stromatium barbatum.*
Quercus robur. *Semanotus russicus.*
Quercus semecarpifolia. *Stromatium barbatum.*
Quercus semiserrata. *Stromatium barbatum.*
Quercus serrata. *Stromatium barbatum.*
Quercus suber. *Cerambyx cerdo, Leptura suberis, L. tangerina, Macrotoma scutellaris, Plagionotus arcuatus, Xylotrechus antilope.*
Quercus spp. *Acanthoderes clavipes, Callimellum angulatum, Cerambyx velutinus, Hesperophanes fasciculatus, H. gayi, Hylotrupes bajulus, Leiopus bedeli, Leptura fontenayi, Niphona picticornis, Pogonocherus perroudi* (?), *Rhamnusium algericum, Stenidea troberti, Strangalia distigma, Stromatium fulvum, Xylotrechus arvicola.*

Randia dumetorum. *Stromatium barbatum.*
Randia uliginosa. *Stromatium barbatum.*
Randia spp. *Anthores leuconotus, Oemida gahani.*
Rapanea rhododendroides. *Oemida gahani.*
Rapanea urvillei. *Stromatium barbatum.*
Raphanistrum arvense. *Cartallum ebulinum.*
Raphanus raphanistrum. *Cartallum ebulinum.*
Rataceae. *Sternotomis cornutor.*
Rauwolfia vomitoria. *Monochamus dentipes, Phrosyne brevicornis.*
Rauwolfia sp. *Frea humeralis.*
Rhamnus alaternus. *Niphona picticornis.*
Rhamnus persicus. *Stromatium barbatum.*
Rhododendron argenteum. *Stromatium barbatum.*

Rhododendron campanulatum. *Stromatium barbatum.*
Rhododendron falconeri. *Stromatium barbatum.*
Rhus insignis. *Stromatium barbatum.*
Rhus punjabensis. *Stromatium barbatum.*
Rhus wallichii. *Stromatium barbatum.*
Rhyzophora racemosa. *Monochamus dentipes.*
Ribes rubrum. *Stromatium barbatum.*
Robinia pseudoacacia. *Hesperophanes fasciculatus.*
Robinia spp. *Chlorophorus varius, Hesperophanes gayi.*
Rosa macrophylla. *Stromatium barbatum.*
Rosa moschata. *Stromatium barbatum.*
Rosa sericea. *Stromatium barbatum.*
Rubus lasiocarpus. *Stromatium barbatum.*
Rytigynia schumanii. *Anthores leuconotus, Dirphya usambica.*

Salix babylonica. *Stromatium barbatum.*
Salix daphnoides. *Stromatium barbatum.*
Salix elegans. *Stromatium barbatum.*
Salix spp. *Ceroplesis hottentotta, Hesperophanes griseus* (?), *Macrotoma palmata, Oberea maculicollis, Phryneta spinator, Saperda perforata.*
Salvadora persica. *Stromatium barbatum.*
Salvia bicolor. *Agapanthia cardui, A. irrorata.*
Samanea saman. *Xystrocera nigrita.*
Sapium ellipticum. *Acanthophorus spinicornis, Paroeme verrucifer.*
Sapium sebiferum. *Stromatium barbatum.*
Sarothamnus scoparius. *Deilus fugax.*
Saurauja napaulensis. *Stromatium barbatum.*
Schefflera manni. *Parandra gabonica.*
Schinus molle. *Xystrocera ansorgei.*
Scolymus hispanicus. *Conizonia detrita.*
Sechium edule. *Apomecyna adspersa.*
Semecarpus anacardium. *Batocera rufomaculata, Coptops aedificator, Stromatium barbatum.*
Sesbania aculeata. *Chlorophorus varius.*
Sesbania aegyptiaca. *Chlorophorus varius, Stromatium barbatum.*
Shorea obtusa. *Stromatium barbatum.*
Shorea robusta. *Batocera rufomaculata, Coptops aedificator, Stromatium barbatum.*
Siphonodon celastrineus. *Stromatium barbatum.*
Solanum melongena. *Chlorida festiva.*
Sonneratia apetala. *Stromatium barbatum.*
Sorbus aria. *Anaglyptus gibbosus.*
Sorbus domestica. *Hesperophanes fasciculatus.*
Sorbus foliolosa. *Stromatium barbatum.*
Sorbus terminalis. *Xylotrechus arvicola.*
Spartium junceum. *Deilus fugax.*
Spartium sp. *Niphona picticornis.*
Spatholobus roxburghii. *Coptops aedificator, Stromatium barbatum.*
Spiraea canescens. *Stromatium barbatum.*
Spondia monbin. *Coptops aedificator, Mallodon downesi.*
Spondias axillaris. *Stromatium barbatum.*
Spondias cytherea. *Batocera rufomaculata.*
Spondias pinnata. *Batocera rufomaculata, Stromatium barbatum.*
Staphylea emodi. *Stromatium barbatum.*
Sterculia colorata. *Batocera rufomaculata.*
Sterculia rhinopetala. *Aulacopus reticulatum.*
Sterculia rhynchocarpa. *Apiocephalus punctipennis.*
Sterculia tragacantha. *Ancylonotus tribulus, Chromalizus afer, Macrotoma serripes, Mallodon downesi, Monochamus dentipes, Sternotomis pulchra.*
Sterculia villosa. *Batocera rufomaculata.*
Sterculia spp. *Acmocera compressa, Paranaleptes reticulata, Opepharus spectabilis* (?), *Tragiscoschema bertolonii* (?).
Strombosia pustulata. *Coptops aedificator, Zographus regalis.*
Styrax serrulatum. *Stromatium barbatum.*
Syzygium cumini. *Batocera rufomaculata, Stromatium barbatum.*
Syzygium hemisphericum. *Stromatium barbatum.*

Tamarix aphylla. *Plocaederus caroli.*
Tamarix spp. *Hylotrupes bajulus, Macrotoma palmata.*
Tarenna pavettoides. *Bixadus sierricola.*
Tarrietia utilis. *Leiopus africanus, Prosopocera bipunctata.*
Taxus baccata. *Hesperophanes fasciculatus.*
Teclea grandifolia. *Eulitopus glabricollis.*
Teclea nobilis. *Ceroplesis calabarica, Cordylomera spinicornis* (?), *Eunidia fuscostictica, E. picta, E. ruficornis, Euporus ignicollis, Monochamus x-fulvum.*
Teclea trichocarpa. *Eunidia ruficornis.*
Teclea viridis. *Chromalizus fragrans.*

Tectona grandis. *Pachydissus regius, Stromatium barbatum.*
Telfairia pedata. *Apomecyna acutipennis.*
Terminalia bellirica. *Coptops aedificator, Stromatium barbatum.*
Terminalia ivorensis. *Plocaederus basalis, P. viridescens.*
Terminalia superba. *Plocaederus viridipennis.*
Terminalia tomentosa. *Coptops aedificator, Stromatium barbatum.*
Terminalia velutina. *Cymatura tarsalis.*
Tetraclinis articulata. *Icosium tomentosum, Lucasianus levaillanti.*
Tetrapleura tetraptera. *Arrhytmus fenestratus.*
Thapsia garganica. *Agapanthia irrorata.*
Thapsia villosa. *Agapanthia irrorata.*
Theobroma spp. *Acanthophorus maculatus, Acmocera conjux, Ancylonotus tribulus, Armatosterna buquetiana, Ceroplesis adusta, Charies thes bella, Chlorida festiva, Chlorophorus carinatus, Coptops aedificator, Dirphya nigricornis, Exocentrus ortmansi, Graciella pulchella, Glenea fasciata, Macrotoma edulis, M. serripes, Mallodon downesi, Monochamus ruspator, Phryneta hecphora, P. obliquata, Phosphorus virescens, Plocaederus viridipennis, Sternotomis chrysopras, Tragocephala guerini, T. jucunda, T. nobilis, Xystrocera globosa.*
Tilia cordata. *Stromatium barbatum.*
Tilia sp. *Xylotrechus arvicola.*
Toddalia asiatica. *Stromatium barbatum.*
Torricellia tiliaefolia. *Stromatium barbatum.*
Trachylobium sp. *Xylotrechus oculicollis.*
Trema guineensis. *Phrynetopsis fuscicornis.*
Trewia nudiflora. *Stromatium barbatum.*
Trichilia heudelotii. *Chromalizus afer, Monochamus ruspator.*
Trichocladus malosanus. *Oemida gahani.*
Triplochiton scleroxylon. *Acmocera olympiana, Ancylonotus tribulus, Coptops aedificator, Exocentrus* sp., *Mallodon downesi, Monochamus ruspator.*
Triticum sp. *Calamobius filum.*
Turpinia nepalensis. *Stromatium barbatum,*
Turraeanthus africana. *Acmocera conjux, Coptops aedificator, Cordylomera spinicornis, Glenea giraffa, Mallodon downesi, Monochamus dentipes.*

Ulmus wallichii. *Stromatium barbatum.*
Ulmus spp. *Gracilia minuta, Leptura fontenayi, Niphona picticornis, Saperda punctata, Stromatium barbatum, S. fulvum.*

Vangueria linearisepala. *Anthores leuconotus.*
Vangueria sp. *Dirphya nigricornis.*
Vernonia amygdalina. *Phryneta hecphora.*
Vernonia confuta. *Amphidesmus apicalis, A. theorini, Glenea giraffa, Graciella pulchella.*
Vernonia holstii. *Synnupserha homeyeri.*
Vernonia lasiopus. *Oberea trigonifera.*
Viburnum cylindricum. *Stromatium barbatum.*
Viburnum cotinifolium. *Stromatium barbatum.*
Viburnum erubescens. *Stromatium barbatum.*
Viburnum grandiflorum. *Stromatium barbatum.*
Viburnum nervosum. *Stromatium barbatum.*
Vigna sp. *Ceroplesis signata.*
Vitis vinifera. *Chlorophorus varius, Phryneta spinator.*
Vitis sp. *Cerambyx miles, Chlorophorus pilosus, Dorysthenes forficatus, Hesperophanes sericeus, Vesperus flaveolus.*

Woodfordia floribunda. *Stromatium barbatum.*
Wrightia tinctoria. *Coptops aedificator, Stromatium barbatum.*

Xylia xylocarpa. *Xystrocera globosa.*
Xylopia rubescens. *Acmocera conjux, Phrosyne brevicornis.*
Xylosoma longifolium. *Stromatium barbatum.*

Ziziphus lotus. *Nathrius brevipennis.*
Ziziphus nummularia. *Stromatium barbatum.*
Ziziphus vulgaris. *Hesperophanes fasciculatus.*
Ziziphus xylopyrus. *Stromatium barbatum.*

REFERENCES

In the following list, the abbreviations of names of journals comply, whenever possible, with those cited in the "World List". Several of the journals concerned, however, have been started since its publication, and in such cases the abbreviations have been made to agree with it as closely as possible.

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APPENDIX

Additional species

SINCE submitting this monograph for publication, larvae of a few additional species have been received and are here discussed.

LAMIINAE

Morimopsini

Niphoparmena carinipennis Breuning

Distribution. ETHIOPIAN REGION: Tanganyika.

Mature larva. The larva of this species runs down to couplet 4 in the key, next to the Parmenini, from which it differs as follows. Pronotum smooth. Abdominal segment 9 unarmed; dorsal anal lobe with three caudal spines, which are long and ferruginous apically, the middle spine being placed in a lower plane. Length 16 mm.; maximum breadth (at prothorax) 3·2 mm.

This is the only cerambycid larva so far known to the author which bears spines on the tenth (anal) segment.

Material studied. 3 L, Tanganyika, Kilimanjaro, 1955, from creeper, J.C.M.G. leg., in coll. B.M.

References. None available.

Acanthocinini

Jordanoleiopus gardneri Breuning

Distribution. ETHIOPIAN REGION: Tanganyika.

Host plant: *Cupressus benthami.*

Mature larva. The larva of this species runs down to couplet 48 in the key. From *Exocentrus* and *Leiopus* it may be distinguished mainly by the extent of the micro-spiculate area of the pronotum, which is confined to the median third of the pronotum and which is bi- or trilobed anteriorly. Length 11 mm.; maximum breadth (at prothorax) 3·2 mm.

Material studied. 3 L, Tanganyika, Lushoto, 1955, from *Cupressus benthami*, J.C.M.G. leg., in coll. B.M.

References. None available.

Crossotini

Neohecyra compacta Breuning

Distribution. ETHIOPIAN REGION: Rhodesia, Tanganyika.

Mature larva. The larva of this species runs down to couplet 42 in the key, but instead of possessing paramedian urogomphi on abdominal tergite 9, it has a dome-shaped protuberance on which is a pair of short ferruginous carinae which are parallel and placed longitudinally. The front margin of the head-capsule is longitudinally striate sublaterally as in fig. 171. Length 22 mm.; maximum breadth (at prothorax) 5·1 mm.

Material studied. 2 L, Tanganyika, Mufindi, 1955, from dead wood, J.C.M.G. leg., in coll. B.M.

References. None available.

Tragocephalini
Tragiscoschema bertolonii Thomson?

In view of its unusual modifications and its potential economic importance, the larva which is almost certainly that of a species of *Tragiscoschema* is described here in detail. As the host plant is *Gossypium*, it is very probably *T. bertolonii* Thomson.

Mature larva (fig. 219). Length up to 30 mm.; maximum breadth (at prothorax) 3·6 mm. *Head* slightly elongate, oval in cross-section, with sides slightly rounded and converging for

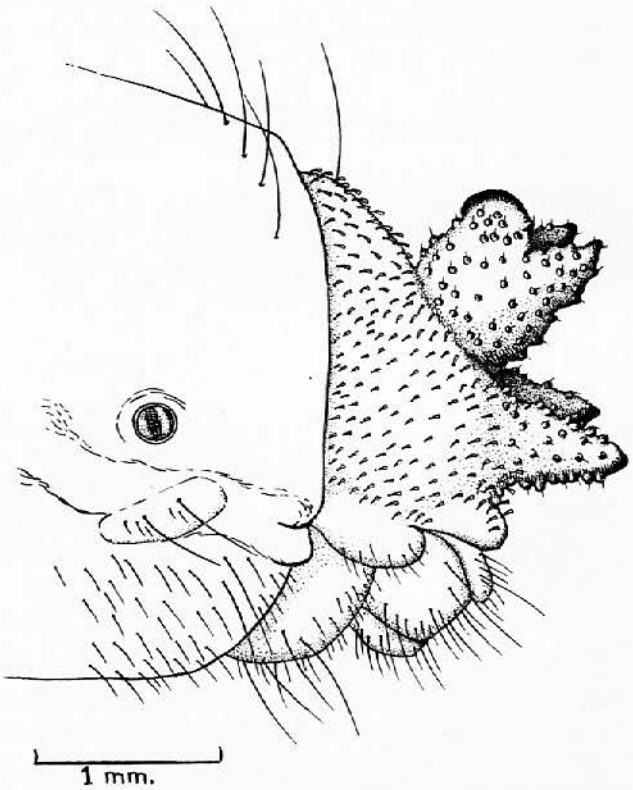


Fig. 219. *Tragiscoschema* sp. Mature larva. Abdominal segments 9 and 10. Lateral aspect.

posterior third (as in *Agapanthia*, fig. 206); occipital foramen ventral; frontal sutures rather indistinct; antennal foramen open behind; mouthframe moderately strongly sclerotised. Frons pale testaceous except front margin which is ferruginous; six epistomal setae present. Two pairs of distinct ocellar lenses present, the lower pair slightly larger and without a pigmented spot. Hypostoma slightly convex, testaceous, front margin narrowly ferruginous; three pairs of setiferous pores present; sutures and cleavage line indiscernible. Antenna three-segmented. Maxilla with palpal segment 3 acutely conical, shorter than segment 2. Labial palpi with segment 2 slightly tapering, almost as long as segment 1. *Prothorax* with pronotum strongly raised, with widely separated longitudinal striae. *Abdomen* with each dorsal and ventral ampulla with a single transverse furrow and two transverse rows of elongate-oval glabrous tubercles which are not interrupted medially, and which have much more numerous tubercles on segments 6 and 7; each ventral ampulla with a pair of paramedian pores anteriorly. Segment 9 (fig. 219), caudal, hemielliptical in outline and roundly declivous posteriorly forming a hood over the ventrally-placed tenth (anal) segment; covered with

numerous truncate-spatulate setae and with a large median tri-tuberculate process which is covered with numerous sclerotised moniliform granules each bearing a simple seta; superior tubercle stoutly cylindrical, itself tri-tuberculate apically, the upper tubercle with a longitudinal, median, ferruginous carina, the paired lower tubercles stoutly conical; inferior paired tubercles conical, attenuated and sclerotised apically. Anus trilobate, the paired ventral lobes very large and strongly flattened. Epipleurum slightly protuberant on segments 7 to 9 only. Pleural tubercle without sclerotised pits and bearing two long and one to three short fine setae. *Legs* minute but just visible with a × 15 lens. *Spiracles* with peritreme circular, the posterior margin bearing a row of numerous subcontiguous chambers.

This larva runs down satisfactorily in the key to the Tragocephalini and Sternotomini (couplet 9). From all other genera of both these tribes it may immediately be distinguished by the strangely modified caudal process.

Biology. From infested cotton stems recently sent to the Commonwealth Institute of Entomology it has been possible to make the following observations. The damage caused by larvae of this species is quite characteristic of the Tragocephalini and very similar to that of *Tragocephala* (fig. 159 and Pl. VI, fig. 2) in so far as the stems are first girdled by the adult before oviposition and the galleries have frass-ejection holes. The galleries, which are simple, linear and completely clear of frass, extend at least six inches, probably two or three times as far, along the pith channel. The frass-ejection holes, however, are apparently less numerous and further apart than in stems infested with *Tragocephala* larvae. Moreover, these holes are surprisingly small, being only between 1·0 and 1·5 mm. in diameter. Infestation occurs both above and below the girdle, although it is not yet certain whether those larvae boring below the girdle are able to attain maturity. The infested stems examined averaged about three-eighths of an inch in diameter.

One of the stems examined contained a living larva about two-thirds grown. It was extremely active and could move up and down the tubular gallery with ease and speed. When feeding, which took place intermittently, the larva pecked rather than chewed and continually changed its feeding ground by moving its head first to one side and then to the other as it moved along.

The curious caudal process is used only when the diameter of the gallery becomes appreciably greater than that of the larva, in which case it functions as a lever when the larva is moving backwards up the stem or as a break when descending. It may also afford the larva effective protection against predators and assist in the removal of frass.

Material studied. 1 L, Nyasaland, Chiromo, vi.1956, from *Gossypium* stems, E. O. Pearson leg., in coll. B.M.; 2 L, Southern Rhodesia, Sabi, 4.iii.1956, from *Gossypium* stems, pres. by C. N. Smithers, in coll. B.M.

Distribution and *References*. See page 224.

Note: One of the larvae here described has recently been reared by the author at the British Museum (N.H.), thus making it possible to confirm its suspected identity. Larvae of *T. nigroscriptum* Fairmaire have just been received from P. T. Walker (Colonial Pesticide Research) in Tanganyika, where both *Gossypium* and *Ceiba pentandra* are attacked. The larva of this species closely resembles that of *T. bertolonii* Thomson, from which it may be distinguished by the presence of an extensive brown, circular area at the base of the caudal process, which contrasts with the remainder of the ninth tergite which is pale testaceous.

PRIONINAE

Macrotomini

Eudianodes swanzyi Pascoe

The prionid larva (Gen. et sp. indet.) referred to and figured on p. 69 has since been identified as being that of this species.

Distribution. ETHIOPIAN REGION: Belgian Congo, Cameroons, Gold Coast, Tanganyika.

Mature larva (fig. 39). Readily distinguishable from all other known prionid larvae by the unusual structure of the prosternum.

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PLATES

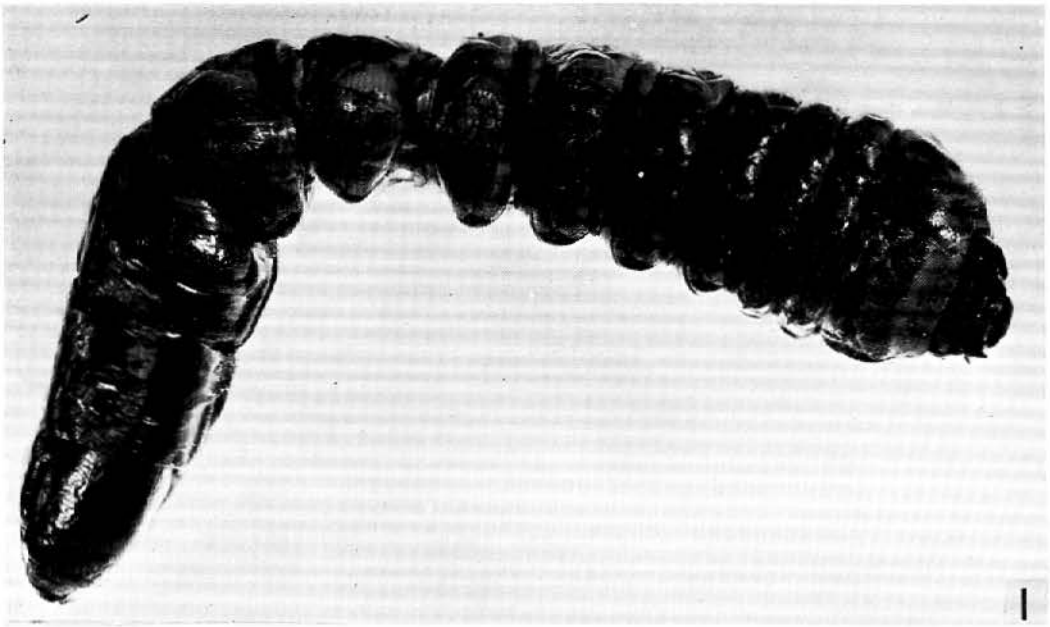






Fig. 1. *Acanthophorus maculatus* (Fabricius). Mature larva.

Fig. 2. *Anthores leuconotus* Pascoe. Split stem of *Coffea*, showing larvae and galleries. (R. C. H. Sweeney)

Fig. 3. *Cordylomera spinicornis* (Fabricius). Adults emerging from *Khaya* log.

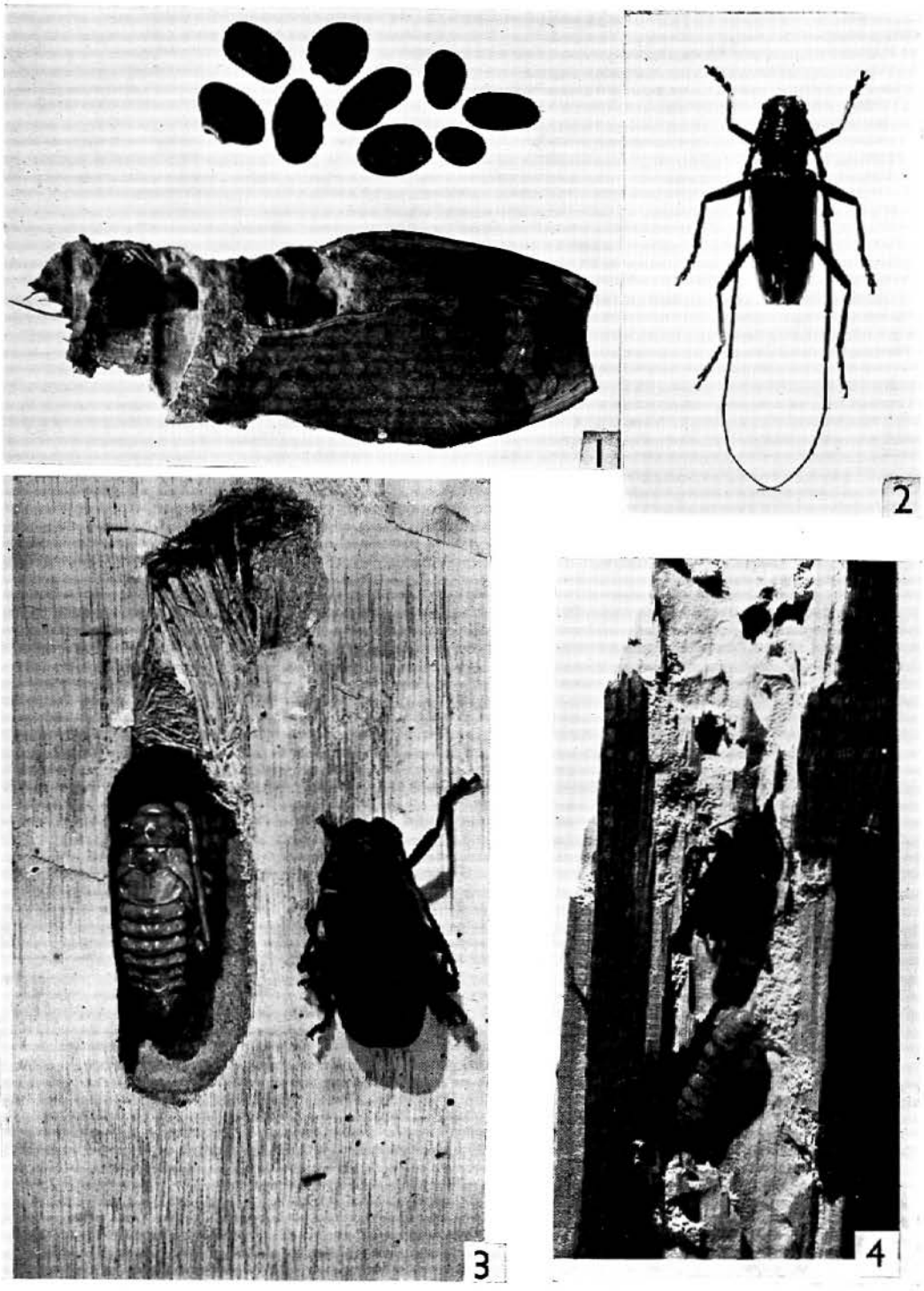


Fig. 1. *Enaretta castelnaudi* Thomson. Infested seeds of *Acacia*.
Fig. 2. *Plocaederus basalis* Gahan. Adult (male).
Fig. 3. *Phryneta leprosa* (Fabricius). Adult, pupal cell and pupa in *Antiaris africana*.
Fig. 4. *Hylotrupes bajulus* (Linnaeus). Adult and larva in *Pinus* beam from attic. (E.A.J.D.)



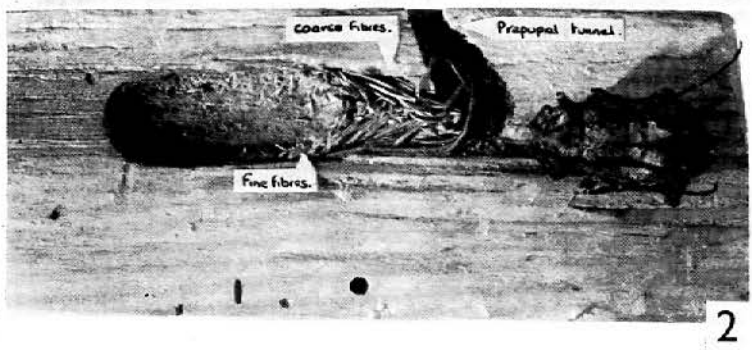
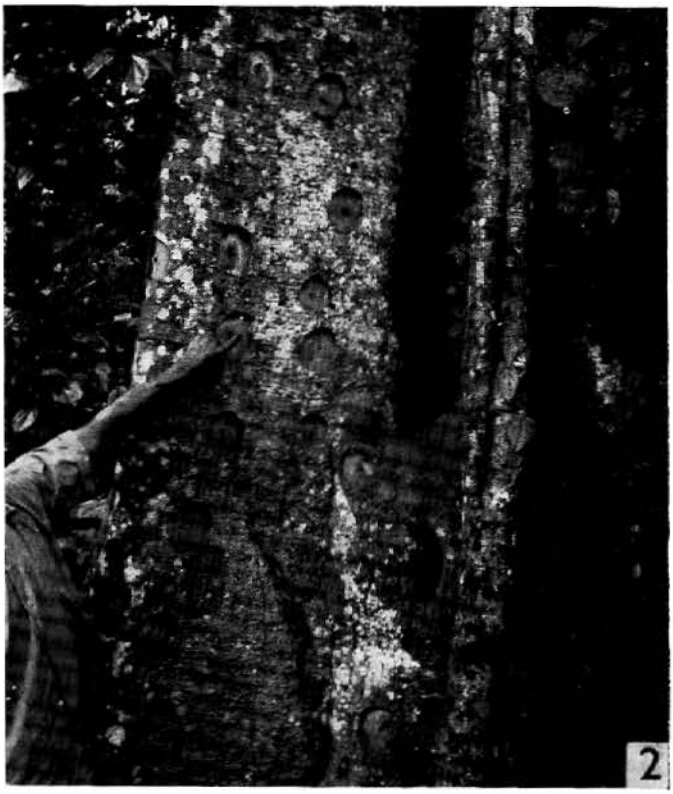


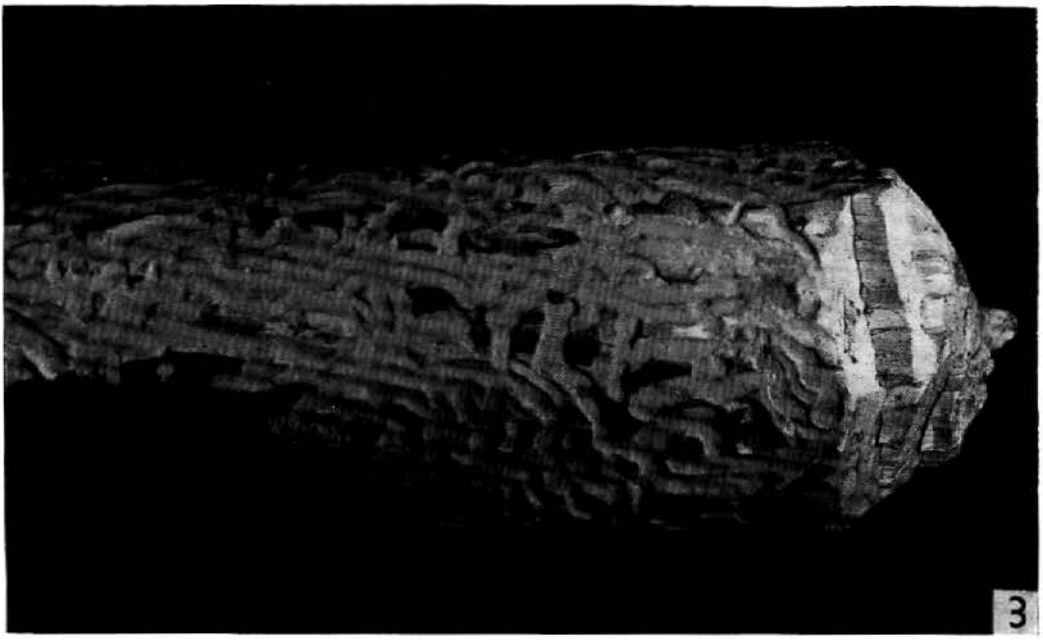




Fig. 1. *Plocaederus viridipennis* (Hope). Calcareous cocoon.
Fig. 2. *Idactus ellioti* Gahan. Adult and pupal cell in *Cussonia*.
Fig. 3. *Prosopocera bipunctata* (Drury). Adult and larval galleries in *Baphia*.
Fig. 4. *Macrotoma serripes* (Fabricius). Adult and larva in *Albizia*.







Figs. 1 and 2. *Batocera wyllei* Chevrolat. Fig. 1. Bole of *Alstonia*, showing excisions made by larvae in the bark. Fig. 2. Same close up. (W. H. H. Foster)

Fig. 3. *Chlorophorus carinatus* Aurivillius. Larval galleries in *Cupressus*. (R. K. Ryland)



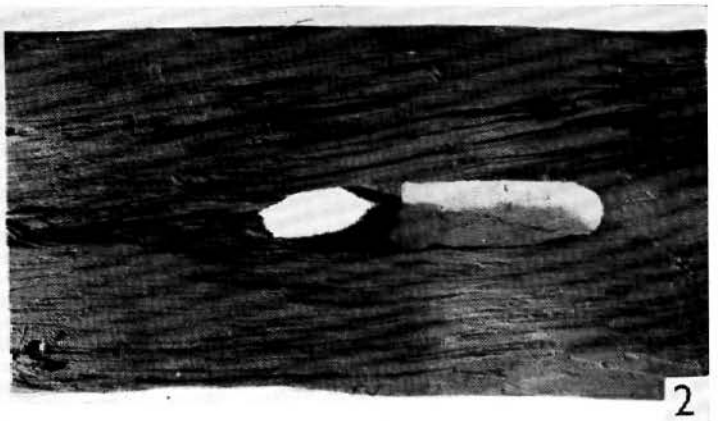






Fig. 1. *Xystrocera globosa* (Olivier). Calcareous cocoon with end removed to show adult. (E.A.J.D.)

Fig. 2. *Plocaederus basalis* Gahan. Pupal cell with calcareous lining in *Terminalia*.

Fig. 3. *Ceroplesis intermedia* Aurivillius. Adult and larvae in branch of *Acacia*.

Fig. 4. *Monochamus ruspator* (Fabricius). Adult and pupal cell in *Khaya*.

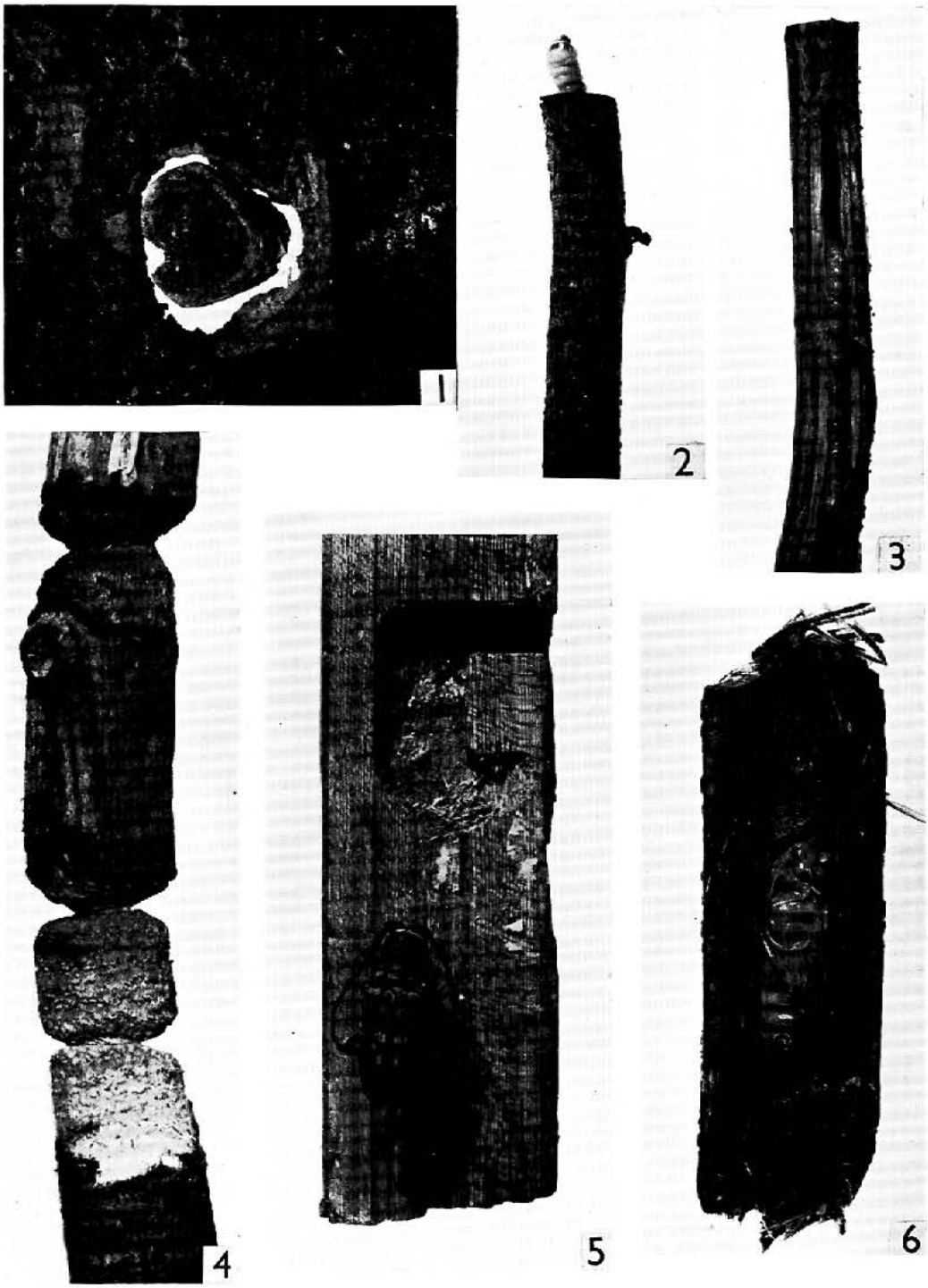


Fig. 1. *Idactus ellioti.* An almost completed excision prepared by larva in bark of *Cussonia.*

Fig. 2. *Tragocephala guerini* White. Frass-ejection holes made by larva in *Coffea.*

Fig. 3. *Tragocephala guerini* White. Larva inside stem of *Coffea.*

Fig. 4. *Paranaleptes reticulata* (Thomson). Living stem of *Anacardium* girdled by adult. (R. K. Ryland)

Fig. 5. *Sternotomis amabilis* Hope. Adult and pupal cell in *Ficus.*

Fig. 6. *Phosphorus virescens* (Olivier). Pupa inside cell in *Theobroma.*







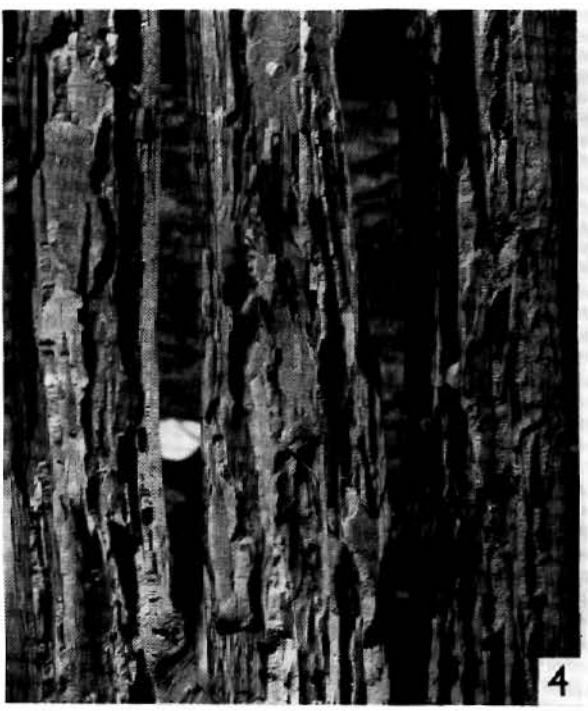
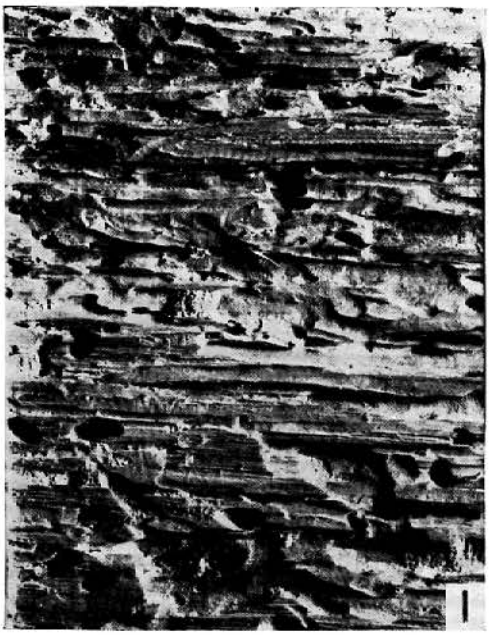
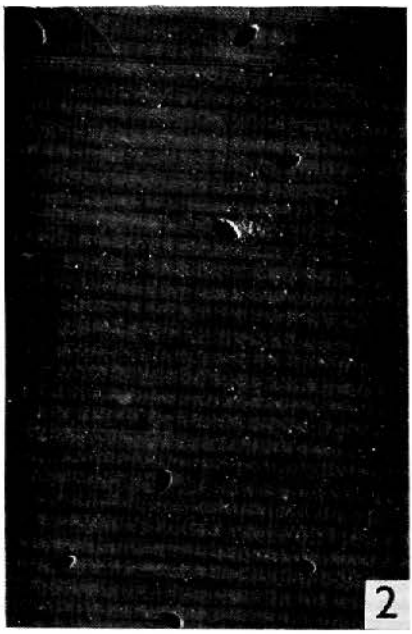


Fig. 1. *Plocaederus frenatus* Fåhraeus. Calcareous cocoon broken open to expose pupating larva. (Forest Products Research Laboratory)

Fig. 2. *Zamium incultum* Pascoe. Larval galleries in *Baikiaea*. (Forest Products Research Laboratory)

Figs. 3 and 4. *Stromatium barbatum* (Fabricius). Fig. 3. Emergence holes in *Casuarina* pole. Fig. 4. Same split open to show galleries. (E. S. Brown)









Figs. 1 and 2. *Oemida gahani* (Distant). Infested floor-board from Nairobi. Fig. 1. Exposed larval galleries. Fig. 2. Emergence holes. (A. K. Ryland)

Figs. 3 and 4. *Pachydissus camerunicus* Aurivillius. Fig. 3. Bole of *Daniellia*, showing slot-like larval excavations. Fig. 4. Close-up of same with adult. (D. E. M. Marsh)









Fig. 1. *Monochamus centralis* Duvivier. Larval excisions in bole of *Combretodendron*. (W. E. Webb)

Fig. 2. *Idactus ellioti* Gahan. Bole of *Cussonia* (bark removed), showing nest-like barriers of larval frass. (W. E. Webb)

Fig. 3. *Macrotoma serripes* (Fabricius). Larva in bole of *Parkia*. (E.A.J.D.)

Fig. 4. *Aulacopus reticulatum* Serville. Bole of *Sterculia*, showing exposed larval galleries. (E.A.J.D.)











Fig. 1. Collecting area. View from scarp near Mampong. (E.A.J.D.)

Fig. 2. *Mallodon downesi* Hope. Larval galleries in butt end of *Bosqueia* log (diam. 3 ft.). (E.A.J.D.)

Fig. 3. *Pachydissus camerunicus* Aurivillius. Felled *Daniellia*, showing larval excavations. (Eastern Nigeria Information Service)

Fig. 4. Collecting area. Offinsu. (E.A.J.D.)

Fig. 5. Collecting area. Typical farm clearing near Kumasi. (E.A.J.D.)