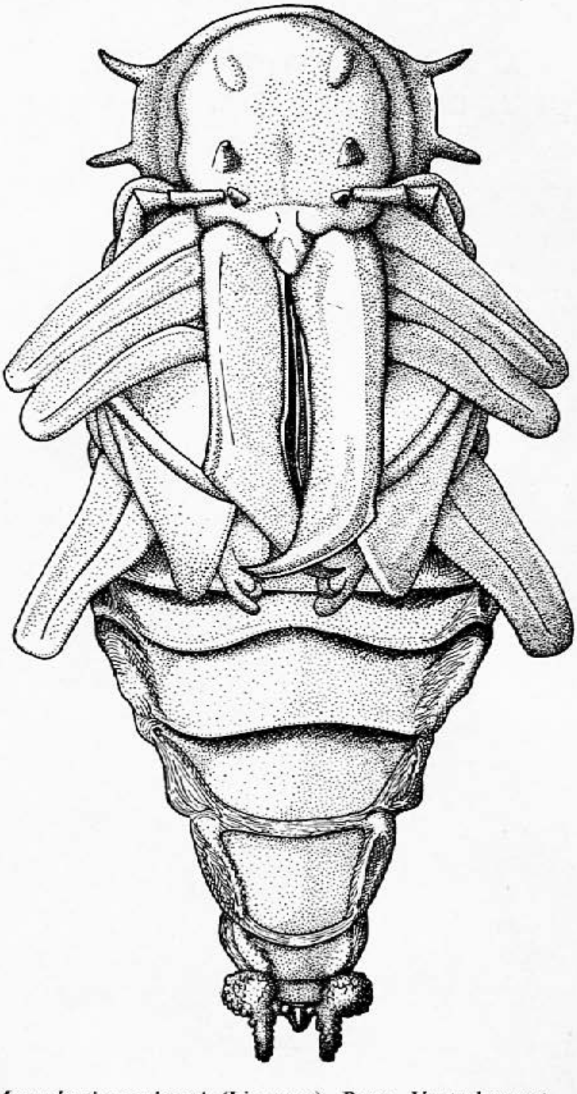

Macrodontia cervicornis (Linnaeus). Pupa. Ventral aspect.

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

BY

E. A. J. DUFFY
(COMMONWEALTH INSTITUTE OF ENTOMOLOGY)

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PREFACE

THE publication of this work was forecast in the preface to Mr. Duffy's previous volume on the African species. Its completion in the relatively short time of two years, for it was ready for the press last year, is an indication of his industry and diligence. During this period Mr. Duffy spent three months in Trinidad and British Guiana investigating, at first hand, timber beetles and the conditions prevalent in the forests there.

The book follows the arrangement of previous volumes and provides a general survey of all that is known of the biology of the neotropical species. The keys to genera and species of both larvae and pupae should be of special value to those wishing to identify species both in the forest and in the timber yards and sawmills.

As before, most of the illustrations are from the author's pen or are from his own figures borrowed from his other works.

In publishing Mr. Duffy's book, the work on which was mainly carried out in the Department of Entomology of the British Museum (Natural History), the Trustees are confident that it will prove of great service to forest entomologists and those engaged in the timber trade.

W. E. CHINA,
Keeper of Entomology

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INTRODUCTION

THIS volume constitutes the third of a proposed series of monographs dealing with the immature stages of timber beetles of the world.[1] As in the previous volumes (Duffy, 1953a, 1957) this research has been dealt with on a regional basis, and in the present work attention has been confined to the Cerambycidae of the Neotropical region. This region embraces the greater part of Mexico, Central America, the Caribbean and the whole of the South American continent. No attempt has been made at this juncture to deal with the strictly North American (Nearctic) Cerambycidae, except when, as not infrequently happens, a species extends in distribution as far south as Mexico or occurs in both regions.

Although the general account of the biology of the Cerambycidae given in the first volume has not been included, descriptions and bionomic accounts of certain introduced species previously discussed in the first two volumes have been included and annotated. In a few cases (notably that of *Hylotrupes bajulus* (Linnaeus)) it was considered desirable, in view of their economic importance, to supply all available data and references. Again presentation and layout have been made to correspond as closely as possible with those of the previous volumes so as to facilitate comparison and cross-reference, although a few alterations and, it is hoped, improvements have been made.

The keys for the identification of larvae and pupae deal with 123 genera and 160 species and 67 genera and 78 species respectively. By far the greater part of this material has been described in detail for the first time. In addition to keys and descriptions, reference has been made to approximately 420 species, supplemented by a correlated account of all bionomic information, much of which is based on personal observation. Control measures are also summarised whenever this has been possible.

In certain cases where a species is considered to be of exceptional economic significance or is unusually modified, a brief and usually illustrated description of the adult has been included, mainly for the guidance of field workers.

With very few exceptions, notably the notorious Cocoa Beetle (*Steirastoma breve* Sulzer), reference to the immature stages and biology of Neotropical cerambycids is meagre and widely scattered throughout various journals, some of which are not obtainable in this country. No single comprehensive work exists, and the comparatively few descriptions of immature stages of this family which have been published, with the exception of a few by Bruch, are superficial and totally inadequate by present-day standards. Lima's excellent *Insetos de Brasil* proved invaluable for furnishing host plants, and what comparatively few references there were to some of the South American species. Numerous shorter publications proved to be most useful for the bionomic information provided, particularly those by Araujo, Ballou, Becker, Bondar,

[1] Volume four, now in preparation, deals with the immature stages of timber beetles (Cerambycidae) of Australia, New Zealand, New Guinea and neighbouring islands.

Bosq, Bruch, Fennah, Fonseca, Martorell, Moreira, Silva, Swabey and Wolcott, whose papers are listed under "References", p. 295.

References to literature have been obtained from various sources, but, as always, the *Review of Applied Entomology* and the *Zoological Record* have proved indispensable. Approximately 600 books and papers have been consulted, but of these it is regretted that certain volumes of several agricultural journals could not be obtained. 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 monographs, 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).

In the course of the preparation of this monograph, useful material has been borrowed from various sources, and the author takes this opportunity of thanking the following persons for their kind co-operation in lending material from their respective institutions or private collections. Dr. W. H. Anderson (Department of Agriculture, Washington), Dr. R. L. Araujo (Instituto Biologico, São Paulo), Dr. A. Araujo e Silva (Divisao de Defesa Sanitaria Vegetal, São Paulo), Dr. G. Becker (Bundesanstalt für Materialprüfung, Berlin), Mr. E. B. Britton (British Museum (Natural History)), the late Dr. F. I. van Emden (Commonwealth Institute of Entomology, London), Dr. J. F. Gates Clarke and Dr. O. L. Cartwright (Smithsonian Institution, Washington), Dr. Ruy Alves de Araujo, Director, and Dr. Acácio Costa, Jr. (Entomologist of the Instituto Agronômico, Belo Horizonte, Minas Gerais, Brazil), the late Dr. R. C. Fisher (Forest Products Research Laboratory, Princes Risborough), Dr. F. Lane (Departmento de Zoologia, Secretaria da Agricultura, São Paulo), Dr. Sv. G. Larsson (Universitetets Zoologiske Museum, Copenhagen), Dr. H. B. Leech (California Academy of Sciences, San Francisco), Prof. E. G. Linsley (University of California), the late Dr. F. Monrós (Fundación Miguel Lillo, Tucumán) and Prof. Dr. H. Weidner (Zoologisches Museum, Hamburg).

The author also wishes to thank the following persons for kindly sending larvae for presentation to the British Museum (Natural History): Father G. Kuschel (Universidad de Chile, Santiago), Mr. W. G. Marshall (London), Mr. F. U. Peña (The Forest Department, Port-of-Spain, Trinidad), Prof. Dr. W. Weyrauch (Lima) and Dr. G. Bondar (Ministry of Agriculture, Brazil).

Through the kindness of Mr. E. B. Britton a small but most valuable collection of Brazilian cerambycid larvae and pupae was purchased by the Trustees from Mr. F. Plaumann (Nova Teutonia) for the national collection.

The author is indebted to Dr. A. da Costa Lima and to Mr. F. C. Ford Robertson (Director of the Commonwealth Forestry Bureau), for furnishing the scientific names of some of the Amerindian, Portuguese and Spanish vernacular names of host plants encountered in various publications.

Thanks are also due to the librarians, Miss B. A. Trott and Miss J. Herniman (Commonwealth Institute of Entomology), and Mr. B. Clifton (British Museum (Natural History)) for so efficiently locating obscure publications.

The author is particularly indebted to Dr. W. J. Hall, C.M.G., M.C. (formerly Director of the Commonwealth Institute of Entomology), for kindly permitting this research to be undertaken as part of official duties, and to Mr. E. O. Pearson (Director of this Institute), for his sustained interest and helpful criticism.

Appreciation is also extended to Dr. W. E. China, C.B.E., and Mr. E. B. Britton for their kind help with the proofs.

After work on this monograph had progressed satisfactorily and a reasonable amount of material had been studied, it was felt that a short visit to Trinidad and British Guiana in order to obtain additional material and first-hand bionomic information was desirable. As both Mr. F. S. Collier (formerly Forest Adviser, Colonial Office) and the late Dr. R. C. Fisher (Forest Products Research Laboratory) strongly supported this project, and the Conservators of Forests of the two territories concerned had welcomed the tentative proposals for such a visit to be made, Dr. W. J. Hall raised the matter with the Colonial Office, as a result of which the necessary funds were made available jointly by the Colonial Welfare and Development Fund and the Governments concerned. A small grant was also secured and gratefully accepted from the Percy Sladen Trust, administered by the Linnean Society of London. 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.

Approximately the first and last fortnights (7th–24th March, 28th May–14th June) of this visit were spent in Trinidad. Headquarters were with the Forest Department, Port-of-Spain, but most of the time was spent in the interior of the island working in various felling areas and sawmills. The intermediate period of approximately two months (25th March–27th May) was spent in British Guiana, where headquarters were, for the first month, at Bartica, which was ideally situated for the purpose. A fortnight was then spent in the North West District with the Conservator of Forests, the remainder of the visit being spent in the environs of Georgetown and at Kamarang Mouth.

Over 100 species of adults, with their larvae, and in many cases pupae, were collected in various timbers in sawmills and in felling areas. This was usually a slow and laborious procedure entailing many hours of chiselling into extremely hard timbers. In addition, many bionomic observations were made, including host preference and the degree of technical damage. Numerous photographs were also taken depicting characteristic damage by the more important species, and some of these have been reproduced in this monograph. Not only has this additional material and information enabled the author to enlarge considerably the scope of this work, but it has also resulted in the British Museum's (Natural History) now possessing the largest collection in the world of Neotropical cerambycid larvae and pupae.

In one respect this visit could scarcely have been undertaken at a less opportune time; not for over ten years had these territories experienced so long and severe a drought. For several months there had been scarcely any rain at all, and it was not until the last three weeks that there were indications that the rains were imminent. In British Guiana the lack of rain had caused the water-level of the upper reaches of the rivers to fall considerably, thus making access by boat to many of the suitable felling areas impossible. For the same reason it was impossible, in some districts, to float the logs down to the sawmills, with the result that stocks of many of the smaller mills were almost depleted. In Trinidad the comparatively arid conditions had facilitated the rapid extraction of logs; consequently suitable logs in the felling areas were scarce and difficult to locate. The effect which only a small amount of rain has on the incidence of borer attack was clearly demonstrated on the author's return to Trinidad, when re-visits to the sawmills revealed fresh infestations in a large variety of timbers.

In spite of this unexpected and unfavourable development, collecting still proved to be more remunerative than had originally been expected, although had it been a more normal season the collection would no doubt have been much larger.

The following species were found to be of decided economic importance in the two territories visited:

Stenodontes spinibarbis (Linnaeus). British Guiana. Infesting *Miconia guianensis*, *Ormosia coutinhoi*, *Alexa leiopetala*, *Catostemma commune*, and *Ocotea rodiaei*. It was interesting to find that, contrary to general belief, greenheart was not entirely immune to insect attack.

Brasilianus lacordairei Gahan. British Guiana. Infesting *Astronium*, *Drypetes*, *Symphonia* and *Eperua*. Severe damage to heartwood seen in several localities.

B. plicatus (Olivier). Trinidad and British Guiana. Infesting *Trattinickia*, *Eperua* and *Symphonia*. Heavy infestations frequently seen.

Callichroma auricoma (Linnaeus). British Guiana. Infesting *Oxytheca ambelanifolia* in which severe damage to heartwood was caused.

C. velutinum (Fabricius) (fig. 91). Trinidad. Infesting *Manilkara bidentata*. Numerous 50-feet logs which had only recently been felled were found to be riddled with thousands of larvae, the heartwood having been rendered useless despite its hardness.

Trachyderes succinctus (Linnaeus). Trinidad. Infesting *Mora*. Damage appreciable but confined to sapwood.

Neoclytus rufus Olivier. Trinidad. Infesting *Mora* and *Tectona*. Frequently attacks freshly sawn boards in sawmills.

Polyrhaphis spinosa Drury (fig. 123). British Guiana. Infesting *Eperua* and *Mora*.

Macropophora trochlearis (Linnaeus). British Guiana. Infesting *Protium*, *Astronium*, *Piratinera*, *Virola* and *Pterocarpus*. Many recently felled trees had been completely ruined by larvae of this species.

Acrocinus longimanus (Linnaeus). Trinidad and British Guiana. Infesting *Ficus* and *Parahancornia*. Both standing and recently felled trees were found to be heavily infested and severely damaged.

Steirastoma breve (Sulzer) (fig. 128). Trinidad. Extremely abundant on certain cocoa estates, where the beetles could be seen copulating and ovipositing on the trees.

The author's thanks are due to the Government of British Guiana and the Government of Trinidad and Tobago for granting permission for this visit to be made and for their generous contribution, and to the Colonial Office for providing a grant from

Colonial Development and Welfare funds. The kindness of the Trustees of the Percy Sladen Trust in making an initial contribution is also much appreciated.

In both the territories visited nothing but the most willing help and co-operation was received from the Forestry Departments. In British Guiana the author was especially indebted to the Conservator of Forests, Mr. R. Smeathers, for organising his itinerary and for help in many ways. The success of the period spent in Bartica was in no small measure due to the help and hospitality of Mr. H. E. J. Woolls and his two forest assistants, Edward Wong and Jonson. Thanks are also due to Mr. M. Bagshaw and Mr. Forbes for their kind help in Georgetown.

The author's itinerary in Trinidad was arranged by the Conservator of Forests, Mr. D. Moore, for whose co-operation and helpful suggestions appreciation is here recorded. Through his kindness in lending the author the services of his research assistant, Mr. F. V. Peña, a great deal of ground was covered and many sawmills were visited. The author is grateful to Mr. Peña for his enthusiastic help. Thanks are also expressed to Messrs. C. J. Millars, R. S. Ayliffe and S. H. Inchbold-Stevens (Forest Department), Prof. T. W. Kirkpatrick (Imperial College of Tropical Agriculture), Dr. F. J. Simmonds (Commonwealth Institute of Biological Control) and Mr. G. Stell (Department of Agriculture), for their kind interest and help, and to Mrs. A. Wright for her gracious hospitality at Spring Hill Estate.

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

NEOTROPICAL CERAMBYCID LARVAE

FAMILY CHARACTERS

Form elongate, usually subcylindrical, occasionally cylindrical or rather 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.

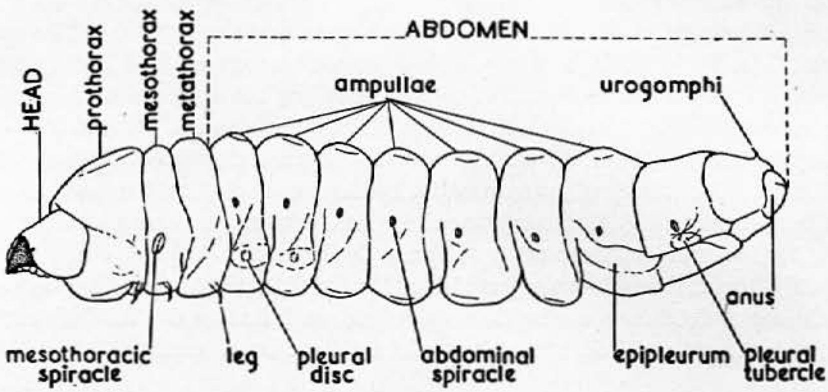


Fig. 1. Diagrammatic figure of a cerambycid larva. Lateral aspect. (Duffy, 1953a)

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 micro-pubescent, micro-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, occasionally with a transverse cleft.

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

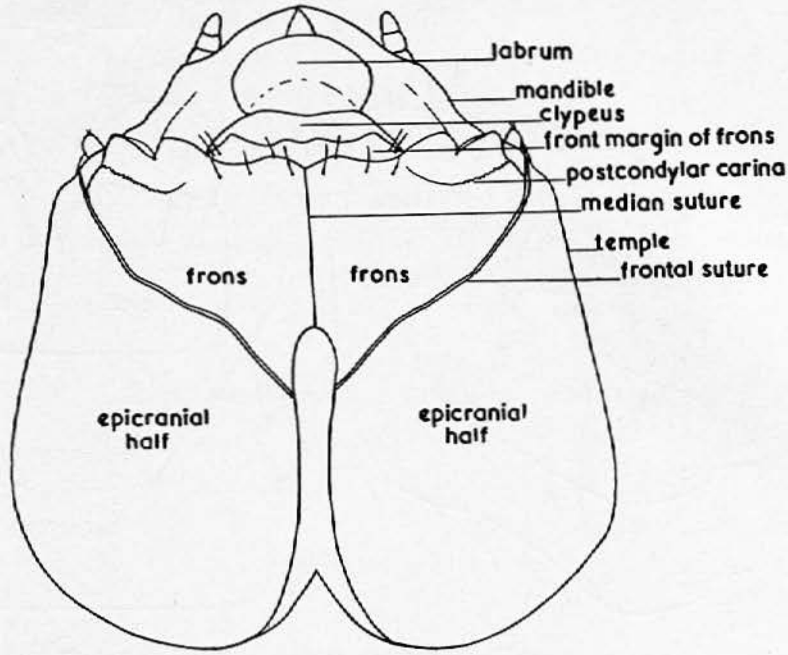


Fig. 2. Diagrammatic figure of a cerambycid larval head. Dorsal aspect. (Duffy, 1953a)

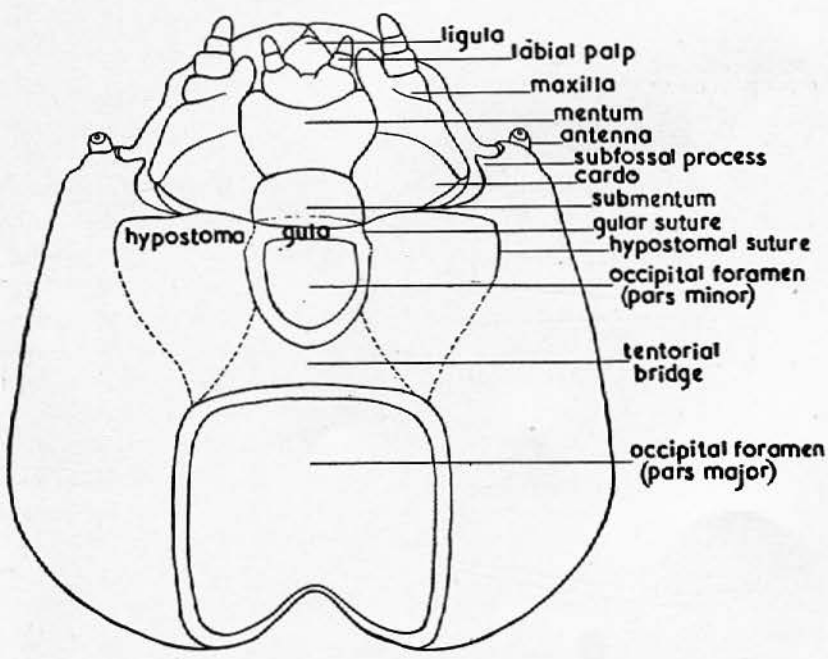


Fig. 3. Diagrammatic figure a of cerambycid larval head. Ventral aspect. (Duffy, 1953a)

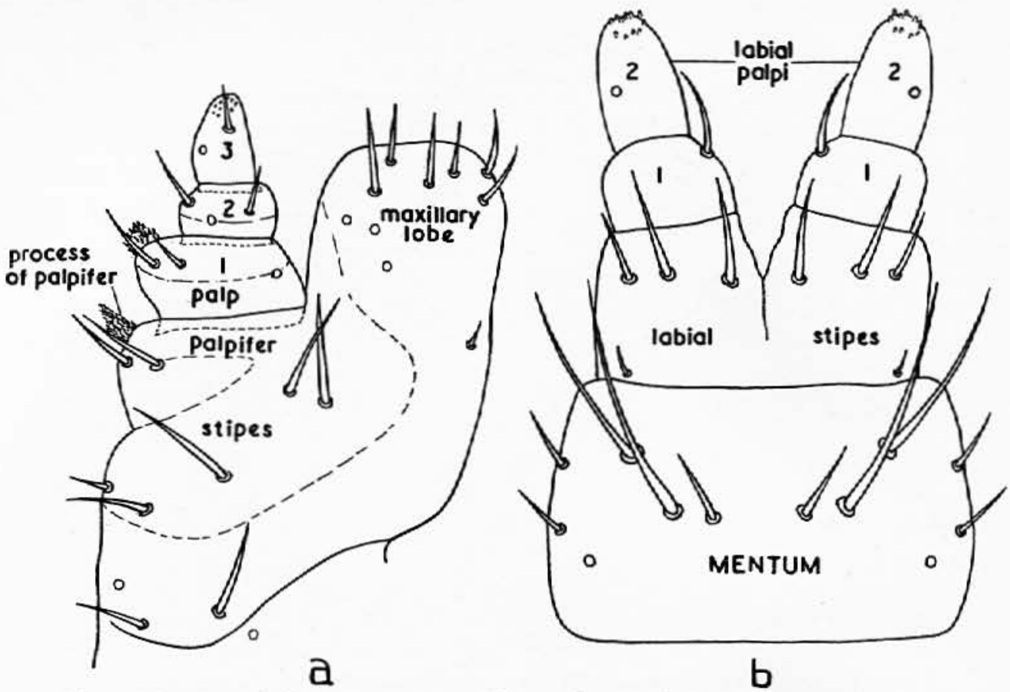


Fig. 4. Diagrammatic figure of ventral mouthparts of a cerambycid larva. Ventral aspect. (*a*) maxillary palp, (*b*) labial palpi. (Duffy, 1953a)

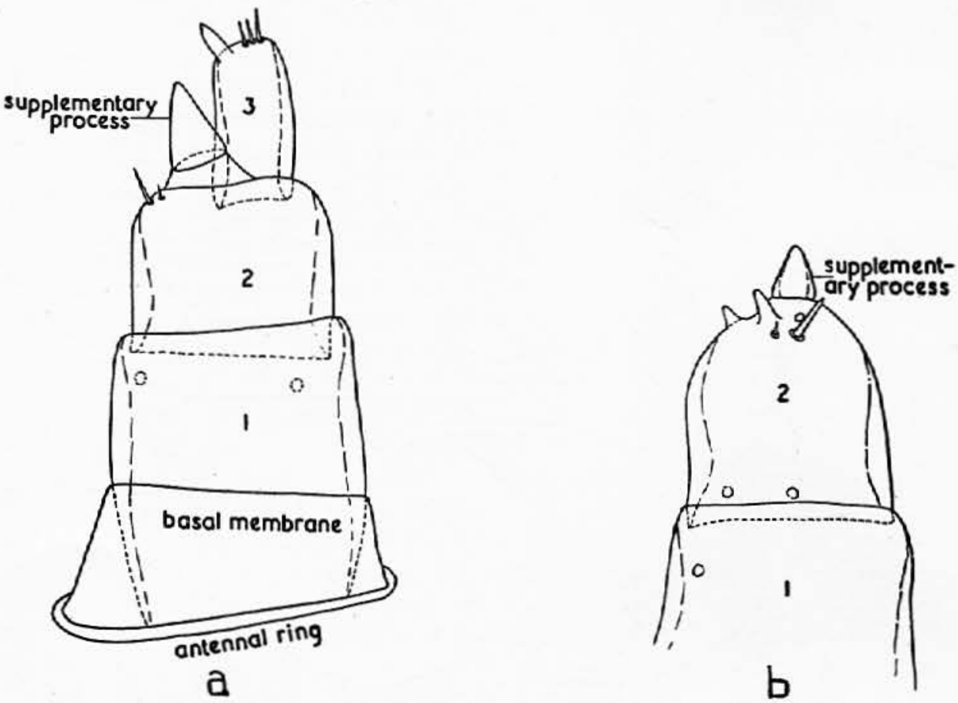


Fig. 5. Diagrammatic figure of a (*a*) a 3-segmented and (*b*) a 2-segmented antenna of a cerambycid larva. Lateral aspect. (Duffy, 1953a)

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 first 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 following figures (figs. 1–8) are reproduced as a guide to the interpretation of the keys and descriptions.

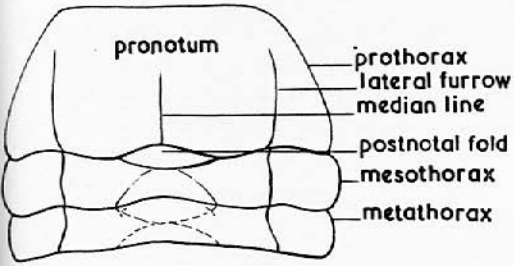


Fig. 6

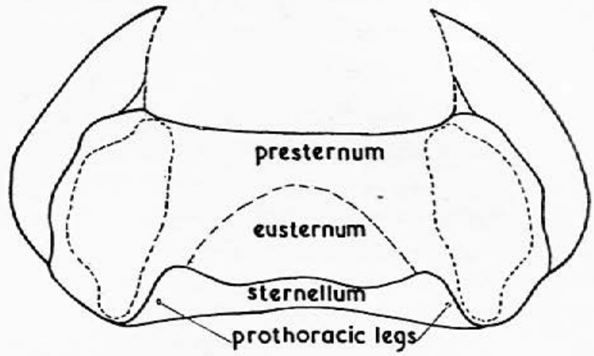


Fig. 7

Fig. 6. Diagrammatic figure of pro-, meso- and matathorax 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 of this family. 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. 5b), and now regarded merely as a

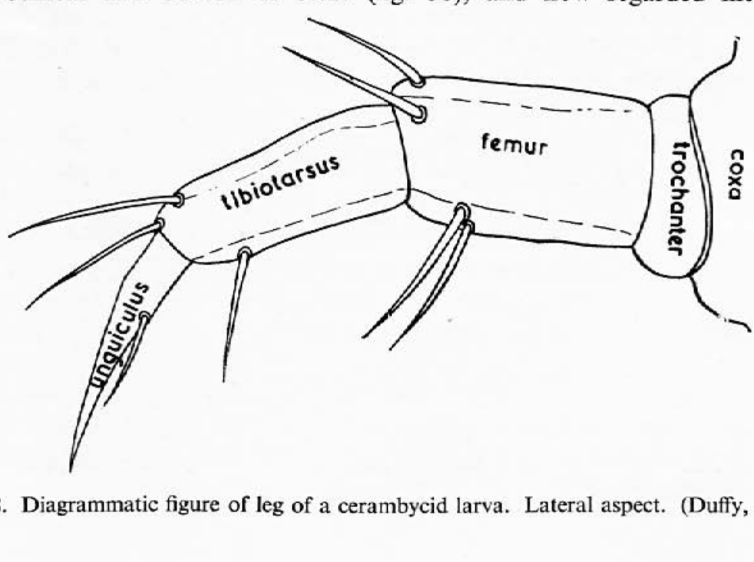


Fig. 8. Diagrammatic figure of leg of a cerambycid larva. Lateral aspect. (Duffy, 1953a)

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. 5a).

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 Neotropical 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 antenna and spiracles and in the presence of egg-bursting spines. Moreover, such taxonomically useful characters as terminal processes and urogomphi are almost invariably undeveloped.

In the preparation of the previous two volumes, attempts have always been made to place the subfamilies and genera in a phyogenetic 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 construction of these larval keys to Neotropical cerambycids has proved to be much more difficult and less straightforward than was the case with those relating to the Palaearctic and Ethiopian regions. The selection of tribal characters in particular was often a complicated procedure, especially as it was found necessary to employ different combinations of the same or similar characters instead of using single fundamental characters. Consequently, although apparently satisfactory from the taxonomic standpoint, their phylogenetic significance may in some instances be questionable. For example, a tribal character previously regarded as diagnostically infallible, namely the presence of three pairs of ocelli in the Cerambycini, no longer holds, as *Sphallenum* has proved to be an exception.

The usual characters for separating the PRIONINAE from the PARANDRINAE is now no longer effective, for certain larvae of the former (e.g. *Stictosomus*) have been found to have an asperate pronotum.

Such structures as pleural pits, previously regarded as characteristic of certain tribes in the LAMIINAE, have now been found present in the prionine genus *Pyrodes*, although here they are placed side by side instead of one above the other. Moreover, it appears that it is only in certain species of some lamiine genera (e.g. *Oncideres*) that these pits are present.

One of the main characteristics of acanthocinine larvae was considered to be the dull micro-spiculate pronotum and prosternellum, but here again *Lepturges* has proved an exception, *L. guadeloupensis* Fleutiaux and Sallé having a glabrous pronotum and *L. sejunctimaculata* Bates having a glabrous prosternellum.

The tribe Acanthoderini appears to comprise a distinctly heterogenous group of larvae. At first sight they seem readily separable from the closely related Acanthocinini merely by their possession of a 3-segmented antenna, but here again *Acanthoderes* itself has proved an exception in possessing only a 2-segmented antenna. The great variation of larval characters within the tribes Acanthoderini and Acanthocinini is discussed under "Tribal characters", pp. 213 and 235.

Numerous tribal characters such as the presence of sclerotised pits on the pleural tubercle or of marginal chambers on the spiracular peritreme, which were previously regarded as being of diagnostic significance, have now been found to be of little value as they occur in several tribes which cannot be regarded as closely related. Indeed, in many cases, no matter which character was selected as a tribal or generic characteristic, an exception was found to it sooner or later.

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, being 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. 135, 148). Head distinctly oblong, with sides parallel or converging posteriorly (figs. 158, 166). Maxillae rigid, only movable from stipes; cardo, maxillary articulating area and submentum fused. Pleural tubercle often bearing a sclerotised pit at each extremity (figs. 22, 107). [Occipital foramen undivided (fig. 148). At least six epistomal setae present (fig. 167). Pronotum and/or ampullae often asperate or spiculate.] . . . . 9. LAMIINAE, p. 22

— Legs usually present and well developed (figs. 1, 41), but if absent or vestigial then mandible with a gouge-like cutting edge (figs. 75, 81). Head transverse to subquadrate, with sides diverging posteriorly (figs. 23, 75). Maxillae movable; cardo, maxillary articulating area and submentum distinct. Pleural tubercle never with sclerotised pits (except PRIONINAE (pars), but then placed side by side) 2

2. 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. 31). Ventral mouthparts attached to hypostoma by little more than the width of the gula. Maxillary palpifer with outer margin strongly rounded and protuberant (fig. 4a); maxillary lobe apparently borne on stipes. Epipleura strongly protuberant on abdominal segments 7–9 only. Four to six epistomal setae present. Postnotal fold usually present 3

— Occipital foramen not divided into two portions, the tentorial cross-arm being 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. Epipleura slightly protuberant on all abdominal segments; seldom protuberant on segments 7–9 only, but if so, then tergite 9 with urogomphi. From four to six (occasionally up to twenty) epistomal setae present. Postnotal fold absent 5

3. Mandible with an oblique cutting edge (figs. 12, 24, 42). Clypeus wide (figs. 24, 42), filling space between dorsal articulations of mandibles. Front margin of frons with lower boundary often projecting over the clypeus and the upper boundary dentate or carinate (except Macrotomini (pars) and PARANDRINAE). Maxillae with palpi and lobes in the same plane as the cardo; lobe slender, subcylindrical and densely setose on inner margin. Abdominal segment 9 long, extended (fig. 41). Legs present, well developed and at least as long as maxillary palpi; unguiculus stout and straight. Six epistomal setae present. Antenna (figs. 5a, 5b) with or without a sclerotised, setose, third segment. Prothoracic coxae almost meeting medially. Pronotum sometimes asperate (fig. 27). Dorsal ampullae with two very distinct transverse impressions. Pleural discs present or absent 4

— Mandible with a gouge-like cutting edge (fig. 53). Clypeus narrow, not filling space between dorsal articulations of mandibles (figs. 64, 75). Front margin of frons with lower boundary never projecting over clypeus and upper boundary never dentate or carinate (figs. 64, 75). Maxillae with palpi and lobes curved upward against ventral surfaces of mandibles; lobe broad and flat, with inner margin glabrous or almost so (fig. 4a). Abdominal segment 9 never long and extended (fig. 81). Legs smaller, seldom as long as maxillary palpi and sometimes absent (fig. 81); unguiculus slender, usually flagelliform. Four epistomal setae present. Antenna always with a strongly sclerotised, setose, third segment (figs. 64, 92). Prothoracic coxae widely separated. Pronotum non-asperate (except *Sphallenum*). 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. 4a).].

8. CERAMBYCINAE, p. 16

4. Posterior area of pronotum glabrous or micro-pubescent (asperate only in *Stictosomus*, but then five pairs of ocelli present). Postcondylar carina and subfossal process present (figs. 19, 31). Front margin of frons with lower boundary usually projecting over clypeus (figs. 18, 24). Pleural discs present. Antenna sometimes with a strongly sclerotised, setose, third segment . . . . 3. PRIONINAE, p. 13

— Posterior area of pronotum coarsely asperate (fig. 13). Postcondylar carina and subfossal process absent (fig. 12). Front margin of frons with lower boundary never projecting over clypeus. Pleural discs absent. Antenna always with a strongly sclerotised, setose, third segment (fig. 12). [Ocelli absent.] . . 1. PARANDRINAE, p. 13

5. Prothoracic skin attached ventrally to base of submentum (fig. 40), thus concealing hypostoma 6

— Prothoracic skin attached ventrally to posterior margin of hypostoma which is fully exposed 7

6. Occipital foramen postero-dorsad. Labrum and clypeus distinctly articulated, testaceous and feebly sclerotised . . . . 6. DISTENIINAE (**Distenia**), p. 80

— Occipital foramen ventral (fig. 40). Labrum and clypeus fused, pitchy and apparently as strongly sclerotised as mandibles. [Mentum strongly produced. Lobes of maxillae bearing dense golden pubescence apically. Five pairs of ocelli present. Frons with a pair of large paramedian depressions near front margin. Form very robust.] 5. OXYPELTINAE, p. 16

7. Posterior emargination of head deep, often extending to frons. Prothorax with pronotum never velvety spiculate. Ampullae always tuberculate 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 very seldom with urogomphi but usually without a sclerotised process. Ligula longer than labial palpi. Antenna with or without a strongly sclerotised, setose, third segment. General form moderately to strongly depressed . . . . 4. LEPTURINAE, p. 15

— Posterior emargination of head very shallow (fig. 42). Prothorax with pronotum velvety spiculate. 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 always with a pair of short, often blunt urogomphi (fig. 45). Ligula shorter than labial palpi. Antenna always with a strongly sclerotised, setose, third segment. General form subcylindrical. [Predominantly in Coniferae.] . . . . 7. ASEMINAE, p. 16

KEYS TO GENERA AND SPECIES

1. PARANDRINAE

Parandra

1. Pronotum very coarsely asperate and ferruginous posteriorly (fig. 13). Asperities of metasternum ferruginous, strongly transverse and distinctly smaller than those on sternum of abdominal segment 1 (fig. 15) . . . . **P. glabra** (Degeer), p. 44

— Pronotum finely asperate and testaceous posteriorly. Asperities of metasternum testaceous, less strongly transverse and about equal in size to those on abdominal sternite 1. **P. punctata** White, p. 47

3. PRIONINAE

1. Thoracic and abdominal cuticle almost entirely velured (micro-pubescent) or exceptionally rugose and rough. Six pairs of ocelli present, the front three pairs being subcontiguous, the others widely separated. Postcondylar carina extremely concave and placed dorsolaterally, the outer part produced into a conical process immediately above the antennal foramen (fig. 18). Abdominal segment 8 almost as long as segment 9. Length up to 215 mm. . . . . Ancistrotini (pars) 2

— Thoracic and abdominal cuticle glabrous or sparsely setose and smooth. Not more than five (usually three) pairs of ocelli present; sometimes entirely absent (Prionini (pars) and Macrotomini (pars)). Postcondylar carina less concave and placed dorsally (fig. 24). Abdominal segment 8 at most half as long as segment 9 3

2. Thoracic and abdominal cuticle almost entirely velured (micro-pubescent). Front margin of frons with upper boundary produced paramedially into a pair of small rounded lobes, and laterally into a pair of very much larger, acutely pointed lobes (fig. 18). Length up to 215 mm., averaging about 180 mm.
Macrodontia cervicornis (Linnaeus), p. 51
— Thoracic and abdominal cuticle non-pubescent but strongly rugose and rough due to granulation. Front margin of frons with upper boundary produced into four lobes of more or less equal size (fig. 19). Length up to 130 mm.
Ancistrotus cumingi Hope, p. 54
3. Clypeus with sides fringed with numerous bristly setae. Ancistrotini (pars).
Pyrodes (s.g. **Pyrodes**) **nitidus** (Fabricius), p. 55
— Clypeus not fringed with lateral setae but scattered sublateral setae present in *Stenodontes* (but then prosternum bearing numerous conical tubercles) 4
4. Front margin of frons with lower boundary not produced over clypeus. Pleural tubercle (fig. 22) present and bearing a pair of sclerotised pits placed side by side. [Front margin of frons with upper boundary completely transversely carinate. Five pairs of ocelli present. Abdominal ampullae glabrous. Prosternum non-tuberculate.]
Ancistrotini (pars) **Pyrodes** (s.g. **Esmarelda**) **auratus** (Linnaeus), p. 56
— Front margin of frons with lower boundary produced over clypeus, at least laterally, except in Macrotomini (pars) and *Microplophorus*, but then upper boundary roundly declivous (fig. 23) or front margin of frons with a pair of paramedian processes (fig. 36). Pleural tubercles and sclerotised pits absent 5
5. Front margin of frons with upper boundary bearing a pair of paramedian dentate processes (fig. 36). [Three pairs of rather indistinct ocelli present. Antenna 3-segmented.]
Anacolini. **Microplophorus magellanicus** Blanchard, p. 73
— Front margin of frons without a pair of dentate processes on upper boundary . 6
6. Front margin of frons roundly declivous; without a complete transverse ridge on upper boundary and lower boundary not produced over clypeus (fig. 23). Antennal basal membrane strongly produced beyond foramen, the latter smooth, evenly rounded and closely surrounding the membrane. [Antenna 2-segmented. Ocelli absent.]
Macrotomini (pars). **Strongylaspis limae** Guérin-Méneville, p. 57
— Front margin of frons with a transverse ridge on upper boundary; lower boundary irregularly produced over clypeus (fig. 28). Antennal basal membrane not or only slightly produced beyond inner margin of foramen, the latter carinate and unevenly rounded 7
7. Prosternum bearing sublateral groups of conical or moniliform tubercles (fig. 25). Only three pairs of subcontiguous ocelli present 8
— Prosternum without sublateral groups of tubercles. Ocelli absent or more than three pairs present 9
8. Prosternum bearing numerous conical, teat-like tubercles which are acutely pointed and strongly sclerotised, at least apically (fig. 25). Front margin of frons with upper boundary straight or crenulate; lower boundary moderately produced over clypeus (fig. 24).
Macrotomini (pars). **Stenodontes,** p. 15
— Prosternum with a pair of large sclerotised, ferruginous teeth, and several small, pale, oval tubercles which are rounded apically (fig. 29). Front margin of frons with upper boundary feebly bilobed paramedially; lower boundary more strongly produced over clypeus . Callipogonini (pars). **Ctenoscelis** (s.g. **Ctenoscelis**) **atra** (Olivier), p. 67
9. Upper boundary of front margin of frons produced into four large rounded or dentiform lobes . . . . Callipogonini (pars). **Ergates spiculatus** Leconte, p. 64
— Upper boundary of front margin of frons not produced into four lobes . . 10
10. Mandible with a strongly raised carina on apical third of outer face (fig. 28).
Callipogonini (pars) 11
— Mandible without a strongly raised carina on outer face . . . Prionini 12

11. Pronotum and prosternum (fig. 27) covered with numerous transverse ferruginous asperities. Antenna of normal proportions, segments 1 and 2 being not more than twice as long as their basal width . . . **Stictosomus reticulatus** (Dalman), p. 63
— Pronotum and prosternum devoid of asperities. Antenna extremely long, segments 1 and 2 both being between three and four times as long as their basal width (fig. 28). **Callipogon**, p. 15
12. Antenna 3-segmented (fig. 32); segment 2 subquadrate, segment 3 small but distinct and strongly sclerotised. Ocelli indiscernible . . . . **Prionus**, p. 70
— Antenna 2-segmented; segment 2 strongly elongate and obliquely truncate apically. Three or more pairs of ocelli present (sometimes obscured by sclerotisation of gena). [Pronotum with a distinct broad transverse, ferruginous band near front margin.] **Psalidognathus** (s.g. **Prionocalus**) **atys** White, p. 69

Callipogon

1. Only three pairs of subcontiguous ocelli present . **C. barbatum** (Fabricius), p. 65
— Two pairs of widely separated ocelli present, in addition to the subcontiguous ocelli. **C. cinnamomeus** (Linnaeus), p. 66

Stenodontes

1. Tubercles of prosternum transversely oval to globular, fleshy, pale and not sclerotised, except sometimes at the extreme apices. **S.** (s.g. **Mallodon**) **spinibarbis** (Linnaeus), p. 61
— Tubercles of prosternum conical, teat-like, strongly sclerotised and ferruginous to pitchy apically 2
2. Frons pale testaceous, the front margin narrowly pale ferruginous; upper boundary of front margin almost straight 3
— Frons pale ferruginous, the front margin broadly pitchy (fig. 24); upper boundary of front margin moderately to very strongly crenulate (fig. 24) 4
3. At least ten tubercles present on each side of presternum; form stout, completely sclerotised and ferruginous. Size large. Length up to 80 mm.; maximum breadth 20 mm. **S.** (s.g. **Stenodontes**) **damicornis** (Linnaeus), p. 62
— Not more than seven tubercles present on each side of prosternum; form slender spine-like, sclerotised, and ferruginous only at apices (fig. 25). Size smaller. Length up to 50 mm.; maximum breadth 11 mm. . **S.** (s.g. **Mallodon**) **dasytomus** Say, p. 62
4. Ventral margin of antennal foramen with a curved ridge-like protuberance (fig. 24). Prothorax with teat-like tubercles of prosternum ferruginous and pitchy apically (fig. 25). **S.** (s.g. **Nothopleurus**) **maxillosus** (Drury), p. 58
— Ventral margin of antennal foramen simple. Prothorax with teat-like tubercles of prosternum pale testaceous, pitchy at extreme apex. [Upper boundary of front margin of frons rather feebly crenulate.] . . **S.** (s.g. **Stenodontes**) **chevrolati** Gahan, p. 60

4. LEPTURINAE

1. Head strongly transverse, appreciably wider at prothorax 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. [In coniferous timbers only.] **Rhagium** (s.g. **Hargium**) **inquisitor** (Linnaeus) p. 74
— Head less transverse, not wider than prothorax. Temples not keeled. Mandible shorter and stouter. Six epistomal setae present. Maxilla with palpal segment 1 not broadened apically. Antenna 3-segmented. [Dorsal ampullae with tubercles arranged in four transverse rows, one row on each side of the two transverse furrows.] **Leptura**, p. 76

5. OXYPELTINAE

1. Labial palpi with basal segment strongly elongate, at least twice as long as second segment. Anal lobes dull, micro-granulate and micro-spiculate. Paramedian transverse depressions of frons rather shallow . **Oxypeltus quadrispinosus** Blanchard, p. 80
— Labial palpi with basal segment slightly elongate, at most one and one-half times as long as second. Anal lobes shining, glabrous or almost so. Paramedian transverse depressions of frons deeply excavate (fig. 39) . . . . **Cheloderus childreni** (Gray), p. 78

7. ASEMINAE

1. Genal setae mostly arising from ferruginous basal dots which give the gena a spotted appearance. Labrum oval, about twice as wide as long. Antenna with third segment quadrate to slightly transverse. Mandible without an oblique plate along dorsal surface; a transverse row of not more than six setae present on outer face near base. Femur and tibiotarsus distinctly ferruginous. Spiracles with a pair of large marginal chambers. **Tetropium guatemalenum** Bates, p. 85
— Genal setae simple at base. Labrum cordate, at most slightly wider than long. Antenna with third segment elongate. Mandible with an oblique plate along inner part of dorsal surface; a transverse row of from twelve to twenty-four long fine setae present on outer face near base. Femur and tibiotarsus pale testaceous. Spiracles with at least six much smaller marginal chambers 2
2. Gular sutures slightly raised and almost as strongly pigmented as hypostomal sutures. Urogomphi as long as or longer than basal width, subcontiguous at base, and with not more than apical third strongly sclerotised. Pronotum very finely asperate (asperities not individually distinguishable with a $\times 15$ lens). Maxillary palpi with third segment almost as long as second. Head with sides rather strongly diverging posteriorly. Length up to 20 mm. . . . . **Asemum,** p. 85
— Gular sutures not raised and much lighter than hypostomal sutures. Urogomphi shorter than their basal width and widely separated. Pronotum more coarsely asperate (asperities individually distinguishable with a $\times 15$ lens). Maxillary palpi with third segment not more than half as long as second. Head with sides only slightly diverging posteriorly. Length up to 34 mm. . . . . **Arhopalus,** p. 82

8. CERAMBYCINAE

1. Abdominal segment 10 strongly protuberant, partly or completely sclerotised and ferruginous, and bearing at least two large horn-like tubercles (figs. 49–51). Anal lobes placed ventrally 2
— Abdominal segment 10 less strongly protuberant; not sclerotised and tuberculate. Anal lobes placed caudally 4
2. Abdominal segment 10 with two large conical tubercles (fig. 51). Abdominal segment 9 with a transverse row of six or more oval, moniliform tubercles, some of which are strongly sclerotised (fig. 51). Three pairs of ocelli present. Metopocoilini. **Metopocoilus quadrispinosus** Buquet, p. 94
— Abdominal segment 10 with at least six large conical tubercles (fig. 50). Abdominal segment 9 without tubercles (fig. 50). One pair of ocelli present . . Torneutini 3
3. Abdominal segment 10 very strongly produced, conical, ferruginous and bearing at least twelve large tubercles (which are truncate apically) and numerous smaller tubercles (fig. 50) . . . . **Praxithea derourei** (Chabrill), p. 93
— Abdominal segment 10 less strongly produced, obliquely truncate and bearing not more than eight conical tubercles (fig. 49) . **Diploschema rotundicolle** (Serville), p. 91
4. Three pairs of large subcontiguous ocelli present (fig. 53) and head-capsule rectangular (with sides not or scarcely diverging behind middle). Dorsal ampullae micro-spiculate,

with two distinct transverse impressions. [Posterior area of pronotum and prosternellum finely micro-spiculate. Abdominal ampullae non-tuberculate.]

Cerambycini. **Brasilianus**, p. 21

— 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. Dorsal ampullae seldom micro-spiculate (except Callichromini (pars) or Clytini (pars), but then only one pair of ocelli present or posterior transverse impression of dorsal ampullae indistinct) 5

5. Front margin of frons produced medially into a small conical tubercle. Posterior part of pronotum and ampullae macro-asperate. [One pair of large ocelli present. Spiracles with marginal chambers.] . . Cerambycini (pars minor). **Sphallenum**, p. 21

— Front margin of frons not produced medially into a small conical tubercle. Pronotum and ampullae not asperate 6

6. Abdominal tergite 9 bearing a pair of paramedian oval, sclerotised, testaceous tubercles which are sometimes carinate (fig. 48). [Proeusternum with a strongly raised, longitudinal, median ridge.] . . Achrysonini. **Achryson surinamum** (Linnaeus), p. 88

— Abdominal tergite 9 without sclerotised tubercles 7

7. Hypostoma distinctly tuberculate, being anteriorly longitudinally carinate or striate or transversely carinate or dentate (figs. 56, 61, 62). Gena protuberant and irregularly swollen around enclosed ocellus which is usually present. Median and sublateral pronotal impressions impressed for almost entire length of prothorax. Pigmented (testaceous) presternal plates present. [Legs long, 4-segmented.]

Hesperophanini, Trachyderini, Lissonotini, Stenaspini, Eburiini and allied tribes . 8

— Hypostoma without distinct irregularities except in Clytini (pars), where it is longitudinally or transversely striate (but then legs absent or three pairs of ocelli present). Gena occasionally shouldered (Phoracanthini), but never protuberant and irregularly swollen around ocellus. Median and sublateral impressions not impressed for entire length of prothorax. Pigmented (testaceous) presternal plates present or absent . . 18

8. Ventral ampullae on segments 4–6 with a sclerotised, testaceous, striate plate behind the transverse impression (fig. 59). Front margin of hypostoma produced into two or four blunt teeth or with four or more longitudinal carinae. [Head with sides strongly constricted medially. Antennal membrane short. Pleural tubercles strongly protuberant.]

Trachyderini. **Trachyderes**, p. 21

— Ventral ampullae without a striate plate. Hypostoma tuberculate or longitudinally striate or transversely carinate anteriorly 9

9. Abdominal sternite 8 with a distinct median, convex, tuberculate protuberance (fig. 60). Front margin of hypostoma produced into a transverse carina anteriorly.

Lissonotini. **Lissonotus shepherdi** Pascoe, p. 108

— Abdominal sternite 8 without a convex protuberance. Front margin of hypostoma not produced into a transverse carina anteriorly (except in *Phymatioderus*, where it is very feeble) 10

10. Posterior margin of submentum slightly and evenly produced and overlapping front margin of hypostoma. [Front margin of hypostoma broadly tuberculate on each side of produced submentum (fig. 63). Labrum transversely oval.]

Hesperophanini (pars). **Stromatium fulvum** (Villers), p. 112

— Posterior margin of submentum not produced posteriorly to overlap hypostoma . 11

11. Front margin of hypostoma testaceous, slightly swollen, and with a feebly defined, transverse carina. Ampulla on abdominal tergite 7 little more than half the size of that on tergite 6 . . . . . . **Phymatioderus bizonatus** (Blanchard), p. 116

— Front margin of hypostoma ferruginous and tuberculate or longitudinally carinate. Ampulla on abdominal tergite 7 as large as that on tergite 6 12

12. Hypostoma with front margin with two or more raised, oval or transversely oval, ferruginous tubercles (fig. 65) . . . . **Chion cinctus** (Drury), p. 115

— Hypostoma with a pair of longitudinal carinae or conical tubercles on each side of gula (figs. 61, 62) 13
13. Front margin of frons strongly to very strongly sinuate medially (fig. 64). Front margin of hypostoma feebly to rather strongly tuberculate. [Gena not irregularly swollen around enclosed ocellus.] . . . . . Hesperophanini (pars). **Chlorida,**[1] p. 21
— Without these two characters combined 14
14. Front margin of hypostoma with six or more longitudinal to oblique carinae Eburiini (pars) 15
— Front margin of hypostoma with only a pair of carinae or conical tubercles. [Temples behind ocellus testaceous.] 17
15. Proeusternum wrinkled, with a pair of small glabrous areas. [Often found in seasoned timber, furniture, etc., especially oak.] . . **Eburia quadrigeminata** (Say), p. 119
— Proeusternum without contrasting glabrous areas 16
16. Abdomen with at least segments 5 and 6 with dorsal and ventral ampullae very strongly protuberant and bilobed (fig. 69). Proeusternum very finely and evenly micro-granulate. **Erosida gratiosa** (Blanchard), p. 120
— Abdominal ampullae not strongly protuberant and bilobed. Proeusternum rather coarsely longitudinally rugose . **Eburodacrys sulphureosignata** (Erichson), p. 117
17. Hypostoma with a pair of longitudinal ferruginous carinae on each side of gula (fig. 61). Ocellus round . . . . **Taranomis bivittatus** (Dupont), p. 109
— Hypostoma with a pair of conical ferruginous tubercles on each side of gula (fig. 62). Ocellus oval . . . . **Cyphosterna bicolor** Chevrolat, p. 110
18. Temple with one to three well-marked transverse impressions (figs. 70, 74) behind ocellus, where it is broadly sclerotised and ferruginous. Ocelli, when present, arranged in one or two pairs . . . . Phoracanthini, Sphaerionini 19
— Temple without transverse impressions and not so broadly sclerotised and pigmented. Ocelli, when present, arranged in one or three pairs, never two pairs . . . 21
19. Two pairs of ocelli present. Temple with a single transverse impression which traverses three pale setal pores (fig. 70). Lateral regions of prothorax never micro-spiculate. Phoracanthini (pars minor) **Elaphidion nanum** (Fabricius) and ?Sphaerionini (**?Protosphaerion insulare** (White)), pp. 121 and 129
— One pair of ocelli present. Temple with one to three transverse impressions. Lateral regions of prothorax micro-spiculate. Phoracanthini (pars major) and Ibidionini 20
20. Spiracles narrowly oval. Transverse impressions on temple coarse. Abdominal ampullae alutaceous. Ocellar lens oval. [In *Eucalyptus*] **Phoracantha semipunctata** (Fabricius), p. 126
— Spiracles subcircular. Transverse impression on temple fine. Abdominal ampullae micro-granulate. Ocellar lens round . . . . . . **Ibidion** sp., p. 131
21. Ocelli present. Proportions of posterior abdominal segments atypical (fig. 76). Heteropsini 22
— Without these two characters combined 23
22. Abdomen with segment 8 distinctly broader than segment 7; segment 9 very short, not more than half length of segment 8 (fig. 76). Ampulla on tergite 7 micro-granulate. **Stenosphenus cribripennis** Thomson, p. 133
— Abdomen with segments 7 and 8 parallel-sided, not constricted intersegmentally; segment 9 about two-thirds length of segment 8. Ampulla on tergite 7 longitudinally striate posteriorly . . . . **Chrysoprasis punctiventris** Bates, p. 134
23. Ocelli absent. Abdomen with segment 8 distinctly broader than segment 7 ; segment 9 extremely short, less than half length of segment 8 (fig. 77). Abdominal ampullae micro-spiculate. [Introduced into Puerto Rico.] . **Xystrocera globosa** (Olivier), p. 136
— Without these two characters combined 24

[1] The front margin of the hypostoma is very variable in larvae of this genus, and in some specimens examined there was little or no evidence of tubercles.

24. Head with sides strongly rounded and widest at or just beyond middle; strongly sclerotised and pigmented posterolaterally (except *Gracilia*).[1] Legs vestigial or absent. Eusternum distinctly triangular. Form very slender (fig. 81). [Genae bearing numerous long, slightly curved setae.] . . . . . Molorchini and allied genera 25
— Head with sides feebly rounded and widest posteriorly; not strongly sclerotised posterolaterally. Legs present (except Clytini (pars), but then form more robust and eusternum with a pair of paramedian, oval, shining, glabrous areas). [Usually one or three pairs of ocelli present, but ocelli absent in Callidiopini (pars). Eusternum indistinctly defined and usually with a pair of paramedian, oval glabrous areas. Form more robust (except Rhinotragini).] 27
25. Legs absent. Ocelli absent or indistinct. Pronotum feebly or irregularly striate posteriorly 26
— Legs present though minute (1- or 2-segmented). Ocelli distinct. Pronotum distinctly longitudinally striate posteriorly . . . . **Gracilia minuta** (Fabricius), p. 140
26. Ampullae on abdominal sternites 3–6 moderately protuberant, not deeply bilobed. Antenna with segment 3 not more than three times as long as basal width. Pronotum longitudinally striate posteriorly. Form moderately slender. . **Molorchus**, p. 139
— Ampullae on abdominal sternites 3–6 strongly and deeply bilobed and teat-like (fig. 81). Antenna with segment 3 at least four times as long as basal width. Pronotum reticulate posteriorly. Form very slender (fig. 81). [Abdominal segments 3–6 with very wide intersegmental skin. Chiefly in wickerwork.] . **Nathrius brevipennis** (Mulsant), p. 142
27. Front margin of prosternum with a row of about thirty small, brown, elongate tubercles (fig. 78). [Pronotum and proeusternum dull, milky white and finely granulate.] Callidiopini. **Curtomerus flavus** (Fabricius), p. 138
— Front margin of prosternum without a row of tubercles 28
28. Mandible with a deep longitudinal impression on outer face (shallow in *Semantus*, but then ocelli absent). Dorso-external process of palpifer as long as 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*).] . . . . Callidiini 29
— Mandible without a longitudinal impression on outer face. Dorso-external process of palpifer very much shorter than segment 3 of maxillary palp, sometimes absent (except in Rhinotragini (pars) in which they are appreciably longer). Legs sometimes absent or vestigial 32
29. Three pairs of distinct ocelli present in a row laterad and ventrad of antenna (fig. 85). Dorsal ampullae with two very distinct transverse furrows (fig. 83). 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. 144
— Ocelli absent or only one pair present. Dorsal ampullae with posterior transverse furrow very indistinct. Pleural discs distinct. Eusternum of prothorax indistinct . . 30
30. Ocelli absent. Mandible with longitudinal impression very shallow. [Segment 3 of maxillary palp about as long as segment 2. Mouthframe completely sclerotised beneath antennae.] . . . . **Semanotus, p. 143**
— One pair of ocelli present. Mandible with longitudinal impression deep . . 31
31. 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. 143
— 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

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

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. [Head with front margin of hypostoma smooth and narrowly ferruginous. Pronotum with anterior third testaceous and scarcely darker than posterior area.]

Phymatodes, p. 154

32. Ocelli absent (except in *Sphecomorpha*, but then ocellus large and oval and abdomen cylindrical). Head-capsule strongly transverse. Abdominal ampullae never tuberculate or micro-spiculate . . . . Rhinotragini 33

— One or three pairs of round ocelli present. Head-capsule quadrate to slightly transverse. Abdominal ampullae sometimes tuberculate (*Callichroma*) or micro-spiculate (Clytini (pars)). [Abdomen subcylindrical.] 37

33. Abdomen cylindrical. One pair of large oval ocelli present.

Sphecomorpha rufa Gounelle, p. 156

— Abdomen subcylindrical. Ocelli absent 34

34. Prothorax velvety micro-spiculate laterally and sublaterally 35

— Prothorax sparsely setose, not micro-spiculate laterally and sublaterally . . 36

35. Proeusternum with a distinct median, longitudinal, setose impression or elevation.

Tomopterus, p. 21

— Proeusternum without a distinct median impression or elevation.

Epimelitta barbicrus (Kirby), p. 159

36. Dorso-external process of segment 1 of maxillary palp distinctly longer than segment 3 of palp. . . . . **Odontocera** sp., p. 160

— Dorso-external process of segment 1 of maxillary palp much shorter than segment 3 of palp . . . . **Ommata poecila** (Bates), p. 16

37. Ampulla on abdominal segment 7 consisting of a single deep, curved, transverse furrow, the surrounding cuticle non-granulate, thus contrasting strongly with the ampulla on tergite 6, which has in addition to the single transverse furrow a pair of distinct longitudinal lateral furrows, the area enclosed by these three furrows being completely and rather coarsely granulate. Labrum with setae arising from ferruginous basal discs which give it a spotted appearance. Maxillary palp with segment 3 distinctly longer than segment 2. [Ocellus large, very strongly protuberant. Genal setae long and curved.]

Compsocerini. **Compsocerus equestris** Guérin-Méneville, p. 161

— Ampulla on abdominal segment 7 not consisting merely of a deep transverse furrow and not differing appreciably from that of tergite 6. Labrum with setae not arising from pigmented basal discs. Maxillary palp with segment 3 at most slightly longer than segment 2, often shorter 38

38. 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 setae. Dorsal ampullae with two very distinct transverse impressions. Antenna with segment 2 bearing at least six apical setae. [One pair of distinct ocelli present.] . . Callichromini 39

— Legs usually minute or absent, never as long as entire maxillary palp, but if nearly so (Clytini (pars)), then three pairs of ocelli present. Maxillary palp with segment 3 at least as long as and usually longer than segment 2 (except *Megacyllene* but then three pairs of ocelli present). Hypostoma glabrous. Dorsal ampullae with posterior transverse impression incomplete or absent. Antenna with segment 2 bearing only two or three setae.

Tillomorphini and Clytini 40

39. Dorsal abdominal ampullae smooth, glabrous and non-tuberculate.

Philematium, p. 168

— Dorsal abdominal ampullae irregularly tuberculate and at least partly micro-spiculate.

Callichroma, p. 21

40. Abdominal segments 4–6 each with paired, sublateral, large, rounded tubercles both dorsally and ventrally (fig. 94) . Tillomorphini. **Epropetes latifascia** (White), p. 169

— Abdominal segments 4–6 without sublateral tubercles 41

41. Three pairs of ocelli present. Segment 3 of maxillary palp shorter than segment 2. Legs more than half as long as maxillary palp. . . . . . **Megacyllene**, p. 22

— One pair of ocelli present (sometimes indistinct). Segment 3 of maxillary palp at least as long as segment 2. Legs less than half as long as entire maxillary palp or absent . 42

42. Hypostoma with front margin distinctly longitudinally striate. Legs absent. **Clytus**, p. 170

— Hypostoma with front margin not longitudinally striate. Legs present . . 43

43. Pleural tubercle on abdominal segment 7 (immediately behind spiracle) strongly protuberant (fig. 96). Prosternum entirely pale testaceous . . **Neoclytus**, p. 173

— Pleural tubercle on abdominal segment 7 not strongly protuberant. Prosternum with a pair of paramedian oval ferruginous areas anteriorly. **Mecometopus jansoni** Bates, p. 176

Brasilianus

1. Front margin of hypostoma enlarged sublaterally into a pair of transversely oval or flattened plate-like structures . . . . . **B. lacordairei** (Gahan), p. 95

— Front margin of hypostoma not enlarged sublaterally . **B. plicatus** (Olivier), p. 98

Sphallenum

1. Front margin of hypostoma broadly and transversely protuberant on each side of gula. Spiracular peritreme with a series of about six marginal chambers which do not extend as far as outer margin of peritreme . . . . **S. setosum** (Germar), p. 100

— Front margin of hypostoma straight, not protuberant on each side of gula. Spiracular peritreme with a pair of large marginal chambers which extend as far as or slightly beyond outer margin of peritreme . . . . **S.** sp., p. 101

Tomopterus

1. Spiracular peritreme on abdominal segment 8 very slightly less broadly oval than that on segment 7 . . . . **T. bispeculifer** White, p. 158

— Spiracular peritreme on abdominal segment 8 appreciably more broadly oval than that on segment 7 . . . . **T. larroides** White, p. 158

Trachyderes

1. Hypostoma with at least four coarse, short, longitudinal carinae immediately behind front margin. Front margin feebly dentate . . . . . **T. hilaris** Bates, p. 105

— Hypostoma without distinct carinae. Front margin distinctly bi- or quadridentate (fig. 56) . . . . **T. succinctus** (Linnaeus), p. 102

Chlorida

1. One pair of large ocelli present. Setae on anterior part of pronotum arising from minute ferruginous basal discs, giving the pronotum a spotted appearance. Temple immediately behind antennal foramen narrowly ferruginous . . **C. festiva** (Linnaeus), p. 113

— Ocelli absent. Setae on anterior part of pronotum simple basally. Temple immediately behind antennal foramen broadly ferruginous . . **C. costata** Serville, p. 114

Callichroma

1. Basal two-thirds of mandible pale testaceous. Maxillary stipes with a small but distinct tubercle (gland?) near middle of ventral face. Form very robust. **C. auricoma** (Linnaeus), p. 167

— Basal two-thirds of mandible ferruginous. Maxillary stipes without a tubercle. Form more slender 2

2. Eusternum of prothorax dull, micro-spiculate. Ocellar lens oval. Submentum with a well-defined semi-oval, ferruginous sclerite . . **C. velutinum** (Fabricius), p. 162
— Eusternum of prothorax shining, rugose. Ocellar lens round. Submentum entirely but less strongly sclerotised . . . . . . **C. vittatum** (Fabricius), p. 167

Megacyllene

1. Pronotum dull, velvety micro-spiculate, at least for posterior third. Ampullae micro-spiculate, at least posteriorly 2
— Pronotum entirely glabrous, shining. Ampullae micro-granulate 3
2. Spiracles each with a single large marginal chamber which projects appreciably beyond peritreme. Antennal segment 3 moderately elongate, not more than three times as long as basal width . . . . **M. mellyi** (Chevrolat), p. 173
— Spiracles without marginal chambers. Antennal segment 3 very elongate, at least four times as long as basal width . . . **M. cayennensis** (Castelnau & Gory), p. 172
3. Hypostoma coarsely transversely striate . . . . **M. acuta** (Germar), p. 171
— Hypostoma entirely smooth. [Proeusternum with a median group of numerous setae which are distributed more or less in a longitudinal band for about anterior two-thirds.] **M. falsa** Chevrolat and **M. castanea** (Castelnau & Gory), p. 172

Neoclytus

1. Ocellus distinct, with lens oval, strongly convex and protuberant 2
— Ocellus very indistinct, with lens plane . . . . **N. regularis** Chevrolat, p. 174
2. Posterior area of pronotum finely longitudinally striate. Hypostoma smooth. **N. cacicus** (Chevrolat) and **N. pusillus** (Laporte & Gory), p. 173
— Posterior area of pronotum micro-granulate, not striate. Hypostoma transversely to obliquely striate anteriorly . . . . . . **N. rufus** (Olivier), p. 175

9. LAMIINAE

1. Anus a transverse cleft (fig. 100) . . . . Batocerini, Monochamini (pars) 2
— Anus trilobate (fig. 143) except Phrynetini, but then abdominal tergite 9 bearing a stout spine 4
2. Pronotum very coarsely asperate; postnotal fold well developed, asperate (fig. 109). Tubercles of abdominal ampullae micro-spiculate. Epicranium bearing a distinct dentate tubercle behind antennal foramen. Legs distinctly visible with a $\times 15$ lens. Pleural tubercles each with a pair of sclerotised pits. [Length up to at least 70 mm.] Batocerini. **Batocera rufomaculata** (Degeer), p. 187
— Pronotum velvety micro-spiculate; postnotal fold absent. Tubercles of abdominal ampullae glabrous. Epicranium without a dentate tubercle behind antennal foramen. Legs absent. Pleural tubercles without sclerotised pits 3
3. Abdominal segment 10 with a group of five to eight short spinules behind lower anal lobe (fig. 100). Clypeus glabrous. Six epistomal setae present. **Neoptychodes trilineatus** (Linnaeus), p. 181
— Abdominal segment 10 without a group of spinules behind lower anal lobe. Clypeus with several pairs of lateral setae. At least ten epistomal setae present . **Taeniotes**, p. 28
4. Mesosternum and metasternum each with two transverse rows of micro-spiculate moniliform tubercles and antennae 3-segmented. [Posterior part of pronotum dull, micro-spiculate.] . . . . **Monochamus titillator** (Fabricius), p. 183
— Without these two characters combined 5
5. Front margin of frons with upper boundary thickened and feebly but distinctly enlarged into a pair of paramedian lobe-like processes (fig. 97); front margin of hypostoma similarly protuberant. [Abdominal ampullae, at least those on segments 6 and 7, bilobed

and strongly protuberant. Spiracles without marginal chambers. Frons broadly ferruginous; hypostoma entirely ferruginous.]

Dorcadionini (pars). **Schreiteria bruchi** Melzer, p. 177

— Front margin of frons and hypostoma not produced or protuberant paramedially . 6

6. Pronotum with posterior area at least partly covered with a network of ferruginous spiculate ridges which branch out from the oblique sublateral impressions (fig. 112). Tergite 9 (fig. 111) bearing a very stout curved spine, the base of which is concealed beneath posterior margin. Segment 10 (fig. 111) distinctly sclerotised and pigmented.

Phrynetini. **Phryneta**, p. 191

— Pronotum without a network of ferruginous ridges. Tergite 9 seldom bearing a spine, but if so, then spine straight, slender and not concealed basally. Segment 10 not distinctly sclerotised and pigmented 7

7. Anterior part of frons with a transverse row of longitudinal carinae (fig. 114).

Onciderini (pars) 8

— Frons without a transverse row of longitudinal carinae 9

8. Longitudinal carina on frons confined to sublateral areas (the median third of frons plane); carinae closely spaced, narrow and ridge-like (fig. 114) . **Oncideres**, p. 28

— Longitudinal carinae distributed right across frons; carinae widely separated, broad, and convex in cross-section (fig. 120) . . . . **Hypsioma gibbera** Serville, p. 205

9. Head-capsule very strongly and entirely sclerotised and ferruginous; ventrally with a pair of large punctulate, oval protuberances near junction of hypostomal suture with occipital foramen (fig. 118). Hypostoma exceptionally long, about half as long as broad (fig. 118). [Tubercles of abdominal ampullae micro-spiculate.]

Onciderini (pars). **Jamesia globifera** (Fabricius), p. 203

— Head-capsule less strongly and extensively sclerotised; ventrally without protuberances near occipital foramen. Hypostoma short, distinctly less than half as long as broad 10

10. Abdominal tergite 9 bearing a large transverse, concave, bilobed, sclerotised process (fig. 121). Hypostoma with a very broad, strongly transverse impression. Clypeus bearing numerous lateral setae. [Posterior part of pronotum dull, micro-pubescent. Antenna 3-segmented.] . . Anisocerini. **Onychocerus crassus** (Voet), p. 207

— Abdominal tergite 9 without a concave, bilobed process. Hypostoma without a broad transverse impression. Clypeus glabrous 11

11. Antenna 3-segmented (fig. 102) 12

— Antenna 2-segmented (fig. 149) 17

12. Abdominal tergite 9 with a conspicuous median spine (fig. 132) or sclerotised process. [Epipleurum strongly protuberant on segments 7 and 8. Spiracles with peritreme broadly oval.] 13

— Abdominal tergite 9 without a sclerotised process. [Posterior part of pronotum glabrous or micro-asperate] 14

13. Posterior part of pronotum dull, micro-spiculate. Subfossal tubercles absent.

Aegomorphus aculeatus Buquet, p. 223

— Posterior part of pronotum shining, glabrous. Subfossal tooth-like tubercles present.

Aethomerus lacordairei Bates, p. 223

14. Dorsal abdominal ampullae each with a single transverse, V-shaped furrow and with moniliform tubercles irregularly arranged. [Posterior part of pronotum densely micro-spiculate or rather coarsely asperate.] . . . Polyraphidini. **Polyraphis**, p. 29

— Dorsal abdominal ampullae each with two transverse, straight furrows and with moniliform tubercles arranged in four complete rows 15

15. Pro-presternum and pronotum bearing numerous coarse asperities. Spiracles with posterior half of peritreme bearing several subcontiguous marginal chambers.

Dryoctenes scrupulosus (Germar), p. 224

— Pro-presternum, and sometimes pronotum, non-asperate. Spiracles with or without marginal chambers 16

16. Spiracular peritreme circular or subcircular and completely lined with subcontiguous marginal chambers. Frontal sutures indistinct behind antennal foramen.
Hedypathes betulinus (Klug), p. 226
— Spiracular peritreme broadly oval and without marginal chambers. Frontal sutures distinct behind antennal foramen, showing as a narrow, pale, strongly curved line (fig. 129) . . . . **Steirastoma,** p. 28
17. Mouthframe with a conical process immediately behind the ventral articulation of the mandible. Abdominal tergite 9 with a small median spine.
?Tapeinini. **Tapeina transversifrons** Thomson, p. 227
— Without these two characters combined 18
18. Dorsal abdominal ampullae each with three transverse rows of moniliform tubercles. Mandible with apical third of outer face with a longitudinally impressed pore. [Pronotum and prosternum shining, without micro-asperate or micro-spiculate areas.]
Acanthoderini (pars). **Acanthoderes,** p. 29
— Dorsal abdominal ampullae with tubercles, if present, not arranged in three transverse rows (except in Acanthocinini (pars), but then pronotum micro-spiculate posteriorly). Mandible without an impressed pore on outer face 19
19. Temples with a conspicuous longitudinal carina between antennal foramen and ocellus. Posterior margin of hypostoma with a thickened raised ridge. [Head with frontal sutures angled medially. Posterior area of pronotum densely micro-pubescent. Abdominal ampullae with numerous shining, glabrous, moniliform tubercles.]
Acanthoderini (pars). **Oreodera glauca** (Linnaeus), p. 226
— Without these two characters combined 20
20. Pronotum entirely smooth and shining, except for a small postero-median area which is finely micro-granulate and embossed. Maxillary palpi 2-segmented. [Abdominal tergite 9 without a sclerotised process. Size very small. Length up to 10 mm.; maximum breadth (at prothorax) 2 mm.] . . . . . . Acanthocinini (pars minor I) 21
— Without these two characters combined 22
21. Dorsal and ventral ampullae on abdominal segments 5–7 extremely strongly protuberant and bilobed; ampullae without moniliform tubercles. Basal half of mandible rather coarsely micro-granulate . . . . . **Oectropsis latifrons** Blanchard, p. 256
— Dorsal and ventral ampullae not strongly produced and bilobed; dorsal ampullae each with two transverse rows of subcontiguous moniliform tubercles. Mandibles without granulation . **Lepturges** (pars). **Lepturges guadeloupensis** Fleutiaux & Sallé, p. 255
22. Posterior area of pronotum micro-asperate, micro-spiculate or micro-pubescent. Sternellum of prothorax matt, micro-spiculate (except *Lepturges* (pars)). Head usually rather strongly to very strongly depressed. Epipleuron strongly protuberant on at least segments 7 and 8; segments 7 and 8 distinctly broader than segment 6, parallel-sided and not or scarcely constricted intersegmentally. Pleural tubercles each with a pair of sclerotised pits (except *Nyssodrys*, *Atrypanius*, *Trypanidius* and *Lophopoeum* in which only a single (upper) pit is present. Head moderately to strongly elongate.
Acanthocinini, Colobotheini and Acrocinini 23
— Posterior area of pronotum glabrous (except *Tetraopes*[1]). Sternellum of prothorax shining, never micro-spiculate or micro-pubescent. Head not depressed. Epipleuron only slightly protuberant on all segments, segments 7 and 8 not being distinctly broader than segment 6; distinctly constricted intersegmentally (figs. 172, 173). Pleural tubercles without sclerotised pits (except Adetini, but then abdominal tergite 9 bearing a small median spine) 47
23. Temples with from one to four knob-like or subdentate tubercles behind ocellus (fig. 138). Frons with a transverse linear impression (interrupted medially) . . Acrocinini 24
— Temples never with sclerotised tubercles, usually smooth but sometimes carinate or

[1] In *Tetraopes* the micro-pubescence is very limited and irregular in extent. Moreover, the head-capsule is very thick and the pleural tubercles are without sclerotised pits.

striate (figs. 158, 167). Frons without a transverse linear impression, but sometimes with a raised transverse carina 25

24. Posterior area of pronotum dull, densely micro-spiculate; eusternum glabrous; sternellum micro-spiculate. Abdominal ampullae covered with moniliform tubercles. Temple with four protuberant tubercles (fig. 138) each about the size of the ocellus.
Macropophora trochlearis (Linnaeus), p. 233

— Posterior area of pronotum shining, covered with numerous large, coarse, conical or moniliform asperites (fig. 135); eusternum and sternellum similar. Abdominal ampullae non-tuberculate. Temple with from one to three protuberant tubercles.
Acrocinus longimanus (Linnaeus), p. 228

25. Temples of head-capsule each with a longitudinal carina (fig. 167). [Tubercles of abdominal ampullae densely micro-spiculate.]
?Colobotheini. **?Priscilla hypsomioides** Thomson, p. 267

— Temples without longitudinal carinae (except *Nyssodrys* (pars), but then abdominal ampullae with tubercles glabrous) 26

26. Frons with a pair of transversely oval, sclerotised, ferruginous plates (forming an unusual and characteristic pattern) behind the broadly ferruginous front margin. Head not or scarcely depressed. Antennal foramen closed posteriorly.
Colobotheini (pars major) 27

— Frons without sclerotised plates behind front margin (except *Nyssodrys* (pars), but then temples longitudinally carinate (fig. 167)). Head strongly depressed (except *Lophopoeum*). Antennal foramen open posteriorly (except *Lepturges* (pars) and *Nyssodrys*) . . 28

27. Temples of head-capsule with several curved striae. Abdominal ampullae spiculate, without moniliform tubercles . . . . . . **Colobothea** sp., p. 269

— Temples of head-capsule smooth (fig. 166). Abdominal ampullae glabrous, with moniliform tubercles . . . . **Cathexia longimana** (Pascoe), p. 266

28. Posterior part of pronotum micro-spiculate or micro-pubescent (fig. 163). Abdominal tergite 9 sometimes bearing a spine or sclerotised process.
Acanthocinini (pars major) 29

— Posterior part of pronotum micro-asperate, the anterior asperities broadly rounded and the posterior asperities mostly elongate and spiniform. Abdominal tergite 9 never with a spine or sclerotised process. [Ampullae non-tuberculate.]
Acanthocinini (pars minor II). **Lagocheirus, p.** 29

29. Abdominal tergite 9 with a minute transverse carina (fig. 143) or a distinct protuberant sclerotised process (figs. 144–146) 30

— Abdominal tergite 9 usually simple, but sometimes with a median spine (*Lepturges* (pars) and *Trypanidius*) 35

30. Abdominal tergite 9 bearing a very fine, hair-like, transverse carina (fig. 143), which is usually rather inconspicuous under low power 31

— Abdominal tergite 9 bearing a distinct and much broader sclerotised process (figs. 144–146) 33

31. Proeusternum entirely dull, micro-spiculate. Front margin of frons non-carinate. [Ventral part of mouthframe pitchy, dull, micro-granulate.]
Oedopeza pogonocheroides Serville, p. 241

— Proeusternum shining and glabrous except sometimes medially. Front margin of frons carinate laterally 32

32. Front margin of hypostoma distinctly transversely carinate. Each dorsal abdominal ampulla only about half covered with micro-spiculi, the remainder being glabrous and shining. Length up to 45 mm. . . . . **Astyochus tenebrosus** Bates, p. 242

— Front margin of hypostoma non-carinate. Dorsal abdominal ampullae entirely micro-spiculate. Length up to 20 mm. . . . . **Toronaeus figuratus** Bates, p. 243

33. Abdominal tergite 9 with a subvertical keel-shaped sclerotised process (fig. 144)

Abdominal ampullae non-tuberculate, dull, micro-spiculate. Abdominal segments 7 and 8 elongate . . . . **Chaetanes setiger** Bates, p. 243
— Abdominal tergite 9 with sclerotised process differently modified. Abdominal ampullae with large oval glabrous tubercles. Abdominal segments 7 and 8 quadrate to transverse 34
34. Abdominal tergite 9 with sclerotised process strongly transverse and strongly recurved anteriorly for more than half its length (fig. 145) . **Eutrypanus incertus** Bates, p. 244
— Abdominal tergite 9 with sclerotised process subtriangular, not recurved, and with a transverse carina across middle (fig. 146) . . . . . **Carphina**, p. 245
35. Front margin of frons (fig. 147) and hypostoma distinctly transversely carinate . 36
— Front margin of frons and hypostoma non-carinate 37
36. Abdominal ampullae with moniliform tubercles shining and glabrous. One pair of large ocelli present. Pleural tubercle with only the upper sclerotised pit present.
Nyssodrys, p. 29
— Abdominal ampullae entirely micro-spiculate and non-tuberculate. Ocelli indiscernible. Pleural tubercle with a pair of distinct sclerotised pits.
Acanthocinus (pars). **A. triangulifer** (Erichson), p. 250
37. Posterior micro-spiculate area of pronotum broadly and completely divided medially. [Proeusternum shining, glabrous or sparsely setose.] 38
— Posterior micro-spiculate area of pronotum not completely divided medially . 39
38. Abdominal ampullae tuberculate, shining and glabrous. Epicranial halves with frontal sutures open immediately behind antennal foramen and visible as a pale line. Head-capsule moderately elongate. Hypostomal plates entirely ferruginous.
Ozineus prolixus Melzer, p. 253
— Abdominal ampullae non-tuberculate, dull, and velvety micro-spiculate. Epicranial halves with frontal sutures closed immediately behind antennal foramen, the transverse ferruginous band of front margin being uninterrupted. Head-capsule strongly elongate (fig. 148). Hypostomal plates testaceous except for front and hind margins (fig. 148).
Acanthocinus, p. 247
39. Temples each with several conspicuous, longitudinal, curved striae. Proeusternum shining, sparsely setose . . . . . **Atrypanius albocinctus** Melzer, p. 254
— Temples seldom striate, but if so (*Xylergates*), then striae transverse and straight but strongly rugulose, and proeusternum matt and micro-spiculate 40
40. Abdominal tergite 9 bearing a median spine (fig. 157) 41
— Abdominal tergite 9 without a median spine 42
41. Abdominal ampullae with shining, glabrous moniliform tubercles. Spine on tergite 9 slender. Micro-spiculate area of pronotum confined to a small, subtriangular median area.
Lepturges sejunctimacula Bates, p. 255
— Abdominal ampullae non-tuberculate, matt, velvety micro-spiculate. Spine on tergite 9 short and stout (fig. 157). Micro-spiculate area of pronotum much more extensive.
Trypanidius melancholicus (Serville), p. 257
42. Abdominal ampullae with shining glabrous, moniliform tubercles. Proeusternum entirely shining and sparsely setose 43
— Abdominal ampullae non-tuberculate, matt, velvety micro-spiculate. Proeusternum at least partly matt and densely velvety micro-spiculate. [Head (fig. 158) with temples behind antennal foramen very broadly ferruginous and coarsely transversely striate.]
Xylergates praeter (Dejean) and **X. hilaris** (Dejean), p. 258
43. Maxillary palpi 2-segmented. Anterior margin of micro-spiculate area of pronotum deeply divided into six lobes (fig. 163) . . . . **Exocentrus** sp., p. 264
— Maxillary palpi 3-segmented. Anterior margin of micro-spiculate area of pronotum not deeply divided into lobes 44
44. Antennal foramen closed posteriorly. Gular region indiscernible.
Alcidion bispinum Bates, p. 259

Antennal foramen open posteriorly (denoted by a thin white line). Gular region indicated by a thin white line 45

45. Sternellum of prothorax shining and glabrous 46
— Sternellum of prothorax matt and micro-pubescent . . **Probatius** sp., p. 262
46. Pleural tubercles each with only a single (upper) sclerotised pit. Body form stout (fig. 161). Head scarcely depressed . . . . **Lophopoeum timbourae** Lameere, p. 262
— Pleural tubercles each with a pair of sclerotised pits. Body form slender. Head strongly depressed . . . . **Hyperplatys spinipennis** Fisher, p. 264
47. Pronotum (fig. 169) bearing sublateral impressions and asperities. Ampullae non-tuberculate; generally micro-spiculate, but if not, then strongly protuberant and bilobed. Spiracles with peritreme rather narrowly to extremely narrowly oval . . . 48
— Pronotum without sublateral impressions and asperities. Ampullae usually with moniliform tubercles (except *Tetraopes*). Spiracles with peritreme round or broadly oval . 49
48. Pronotum (fig. 169) with sublateral impressions transverse, semicircular and pale. Abdomen with dorsal ampullae 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. **Saperda,** p. 270
— Pronotum with sublateral impressions linear, straight and brownish. Abdomen with dorsal ampullae spiculate. Spiracles with peritreme extremely narrowly oval to slot-like. Head not or scarcely depressed; thick, with sides strongly converging posteriorly. Clypeus glabrous. Abdominal segment 10 not strongly protuberant. Eusternum not asperate. [One or more pairs of vestigial ocelli present.]
Phytoeciini. **Oberea (ruficollis** (Fabricius))[1]
49. Abdominal segment 9 enlarged, usually almost as large as segment 8, densely setose and sometimes bearing a caudal process (figs. 172, 173). Head salient, oval in cross-section; occipital foramen postero-ventral. Spiracles with numerous chambers which occupy the entire inner margin of the peritreme. Mesosternum and metasternum strongly protuberant. Form slender, cylindrical (fig. 176).
Hippopsini, Spalacopsini and Adetini 50
— Abdominal segment 9 not enlarged, sparsely setose or spiculate; spine-like process usually absent but if present (Aerenicini) then very long and bifurcate or spatulate apically (figs. 175). Head partly retracted in prothorax, not oval in cross-section, and occipital foramen not placed posteriorly. Spiracles with marginal chambers less numerous and not occupying more than half the inner margin of the peritreme. Mesosternum and metasternum not strongly protuberant. Form less slender, subcylindrical . . 52
50. Abdominal segment 9 without a sclerotised process. Ventral ampullae absent.
Hippopsini. **Hippopsis lemniscata** (Fabricius), p. 275
— Abdominal segment 9 with a sclerotised spine-like process (figs. 172, 173). Ventral ampullae present 51
51. Abdominal ampullae present only on tergites 1–2 and 6–7; ampulla on tergite 7 with two rows of small moniliform tubercles (fig. 173). Tergite 9 bearing a minute slender spine (fig. 173) . . . . . . Spalacopsini. **Dorcasta acuta** Pascoe, p. 275
— Abdominal ampullae present on tergites 1–7; ampulla on tergite 7 with a single row of six very large moniliform tubercles (fig. 172). Tergite 9 bearing a stout claw-like process (fig. 172) . . . . Adetini. **Adetus muticus** Thomson, p. 273
52. Abdominal segment 9 bearing a very long, thick, rod-like process, which is strongly sclerotised and ferruginous (fig. 175). Proeusternum sclerotised and ferruginous, contrasting with the distinct testaceous eusternum which is subtriangular. Dorsum of abdominal segment 10 sclerotised and ferruginous. [Spiracular peritreme with only a pair of subcontiguous, digitiform chambers.] . . . . . Aerenecini 53
— Abdominal segment 9 without a sclerotised process. Prosternum not sclerotised and pigmented. Dorsum of abdominal segment 10 fleshy, pale 54

[1] Nothing is known of the biology of Neotropical species of this tribe and no material is available (see Duffy, 1957).

53. Abdominal ampullae all more or less equal in size. Head-capsule almost smooth. Epipleurum strongly protuberant and ridge-like on all abdominal segments. Form very robust . . . . **Phaula,** sp., p. 277
— Abdominal ampullae on segments 6 and 7 very much larger than those on segments 3–5 (fig. 176). Head-capsule very deeply and densely pitted with large coarse setal pores. Epipleurum very strongly protuberant on all abdominal segments. Form very slender. **Acrenicopsis championi** Bates, p. 279
54. Spiracular peritreme 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. Tetraopini (pars). **Tetrops,** p. 280
— Spiracular peritreme with numerous subcontiguous chambers on posterior half. Abdominal segments with postero-dorsal and dorso-lateral regions without spicules . 55
55. Pronotum partly matt and micro-pubescent. Abdominal ampullae micro-spiculate. Ocelli indiscernible. Mouthframe pitchy. Tetraopini (pars). **Tetraopes tetrophthalmus** (Forster), p. 280
— Pronotum shining and glabrous. Abdominal ampullae glabrous. One pair of very large ocelli present. Mouthframe ferruginous 56
56. Dorsal abdominal ampullae bearing four transverse rows of moniliform tubercles. Hypostoma strongly transverse, at least four times as broad as long. Prosternum bearing long reddish setae . . Onciderini (pars). **Ecthoea quadricornis** (Olivier), p. 205
— Dorsal abdominal ampullae without distinct rows of moniliform tubercles. Hypostoma feebly transverse, less than four times as broad as long. Prosternum bearing short very pale setae . . . . Estolini. **Estola albocincta** Melzer, p. 280

Taeniotes

1. Abdomen with ventral ampullae plane, the moniliform tubercles very feebly convex and scarcely protuberant. The glabrous lenticulate setal pores of the anterior half of spiculate area of pronotum mostly narrow and linear . . **T. scalaris** (Fabricius), p. 179
— Abdomen with ventral ampullae feebly but distinctly bilobed, the moniliform tubercles strongly convex and protuberant. Glabrous lenticulate setal pores of anterior half of spiculate area of pronotum mostly broadly oval . **T. pulverulentus** (Olivier), p. 181

Oncideres

1. Abdominal sternite 9 with a transverse, rather strongly sclerotised, pale ferruginous, crenulate band across hind margin (fig. 115). Temple broadly ferruginous (this area at least as wide as half length of mandible) and with a pale testaceous, ocellus-like spot (slightly larger than the true ocellus) ventro-laterally. Front margin of frons ferruginous, the carinae pitchy. [Pleural tubercle with sclerotised pit very large and conspicuous, the upper pit minute] . . . . **O. fasciata** Lucas, p. 195
— Abdominal sternite 9 without a sclerotised band. Temple narrowly ferruginous (this area not wider than one-third length of mandible); ocellus-like spot absent. Front margin of frons testaceous, the carinae testaceous or pale ferruginous 2
2. Pleural tubercle with lower sclerotised pit large and very distinct, the upper pit minute. Front margin of frons ferruginous, the carinae coarse and strongly raised. **O. aegrota** Thomson, p. 200
— Pleural tubercle with sclerotised pits indiscernible. Front margin of frons testaceous, the carinae fine and feebly raised . . . . . **O. ulcerosa** (Germar), p. 198

Steirastoma

1. Pronotum (fig. 130) with a large median, circular, embossed, pale area on which is a pair of parallel, elongate-oval, darker areas (sometimes rather indistinct); asperities rather coarse and individually distinguishable with a $\times 15$ lens 2

— Pronotum without this differentiated median area; asperities sparse and minute (sometimes indistinct) and not individually distinguishable with a $\times 15$ lens. [Tubercles of abdominal ampullae glabrous] 3

2. Moniliform tubercles on abdominal ampullae micro-spiculate. Median circular embossed area of pronotum much more finely asperate than remainder of pronotum and with the paired areas dark and distinct . . . . . . **S. breve** (Sulzer), p. 216

— Moniliform tubercles on abdominal ampullae glabrous. Median circular embossed area of pronotum glabrous and with the paired areas pale and indistinct.
S. marmoratum (Thunberg), p. 222

3. Testaceous area of frons behind ferruginous front margin sparsely setose, bearing at most twelve setae.[1] Antennal foramen immediately above antenna ferruginous. Anterior ferruginous part of temple becoming gradually paler posteriorly.
S. meridionale Aurivillius, p. 221

— Testaceous area of frons behind ferruginous front margin rather densely setose, bearing at least forty setae. Antenna foramen immediately above antenna pitchy. Ferruginous anterior part of temple abruptly changing to testaceous posteriorly (fig. 131).
S. stellio Pascoe, p. 222

Lagocheirus

1. Spicules on abdominal ampullae ferruginous, very coarse and individually distinguishable with a $\times 15$ lens . . . . **L. araneiformis** (Linnaeus), p. 236

— Spicules on abdominal ampullae testaceous, very fine and not individually distinguishable with a $\times 15$ lens . . . . **L. undatus undatus** (Voet), p. 239

Acanthoderes

1. Proeusternum with numerous embossed flattened tuberculate areas which are mostly elongate-oval in shape (fig. 127). [Six epistomal setae present.]
A. lateralis Bates, p. 213

— Proeusternum smooth, non-tuberculate 2

2. Six epistomal setae present. Mouthframe ferruginous . **A. quadrigibba** Say, p. 214

— At least twelve epistomal setae present. Mouthframe pitchy.
A. daviesi (Swederus), p. 214

Polyraphis

1. Pronotum with a pale, glabrous, median, circular area anteriorly (which strongly contrasts with the surrounding darker cuticle), on which is a pair of darker, parallel, elongate-oval areas (fig. 124). Abdominal ampullae with lateral furrows lined with spinules (fig. 125) . . . . **P. spinosa** (Drury), p. 209

— Pronotum without this characteristic design. Abdominal ampullae without spinules along lateral furrows 2

2. Posterior area of pronotum rather coarsely and sparsely asperate. Tubercles of abdominal ampullae matt and micro-spiculate . . . . . **P. grandini** Buquet, p. 211

— Posterior area of pronotum velvety micro-spiculate. Tubercles of abdominal ampullae shining, glabrous . . . . **P. angustata** Buquet, p. 212

Nyssodrys

1. Temples of head smooth. [Meso- and meta-alar areas each with a conspicuous tuberculate protuberance[2]] . . . . **N. deleta** Bates, p. 247

— Temples of head longitudinally carinate (fig. 147) . **N. ophthalmica** Lameere, p. 246

[1] These setae are more conspicuous when the head is viewed laterally.

[2] It is possible that the presence of these tubercles may be due to a prothetelic condition, although it is difficult to account for the partly sclerotised areas.

NEOTROPICAL 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 extend 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 downwards beneath the body and arranged characteristically as follows: (i) slightly curved inwards and terminating near hind femora (*Prionus*, *Phymatodes*); (ii) more strongly curved inward and crossed (*Brasilianus*); (iii) arranged in a single or in several coils on top of each elytron (*Batocera*, *Taeniotes*); directed anteriorly to terminate near front or middle coxae (Saperdini); or (v) directed anteriorly for a considerable distance to terminate alongside or on top of head or strongly recurved and directed posteriorly to abdominal segment 7, where they are again recurved to terminate near apices of elytra (Acanthocinini (males)). Elytra always glabrous (except Acanthocinini). *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 paramedian gin-traps present in the Macrotomini and Callipogonini. 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 femora 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 (Aconthocinini (pars), Polyraphidini).

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, 10).

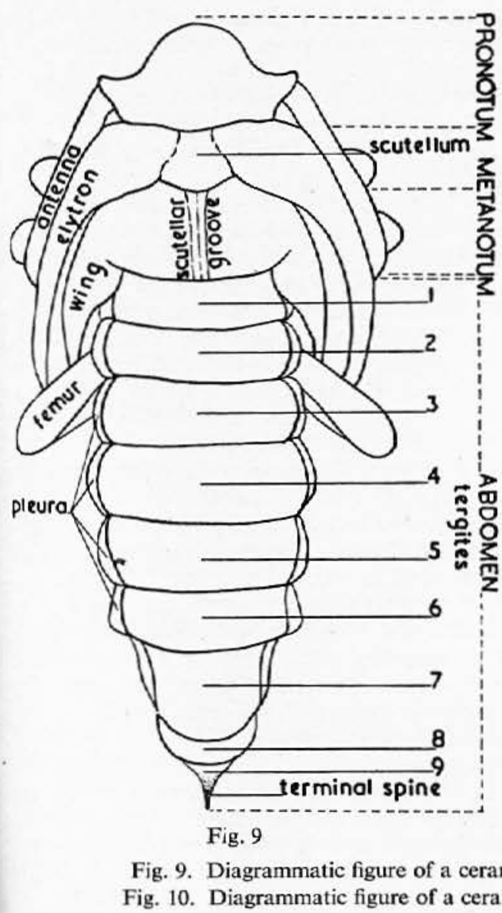


Fig. 9

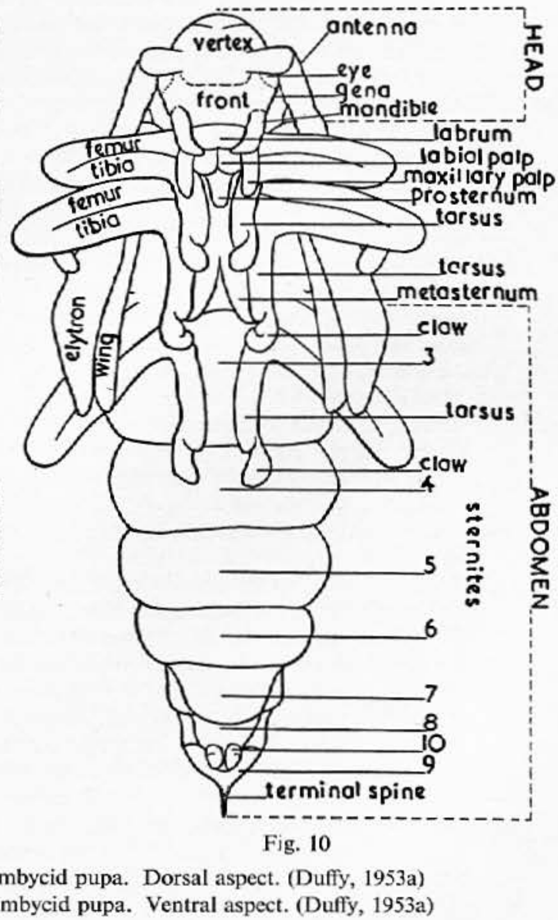


Fig. 10

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 with peritreme narrowly oval (frontispiece). Prothorax either with three pairs of lateral tubercles or none, never one pair only. Prosternum produced behind coxae into a rounded or truncate process. [Femora without spines or setae. Abdominal tergites sometimes with gin-traps. 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. 38). Prothorax either with a single pair of lateral tubercles (fig. 93) 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. 16). Antennae short, extending to between front and middle femora; segments subquadrate, moniliform (fig. 16); never serrate or pectinate. Pronotum without lateral tubercles and abdomen without gin-traps.
1. PARANDRINAE. **Parandra**, p. 33
— Abdominal segment 9 usually unarmed but occasionally either with incurved urogomphi or with a pair of short vertical tubercles. Antennae longer, extending at least to abdominal segment 1 and often recurved beneath body; segments elongate and sometimes serrate or pectinate (fig. 34). Pronotum often with lateral tubercles and abdomen often with gin-traps . . . . 3. PRIONINAE, p. 33
3. Abdominal segment 9 either with a horizontal spine or with outwardly curved or parallel urogomphi. Tarsi each bearing one or a pair of setae. 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.] . . . . 4. LEPTURINAE, p. 34
— Abdominal segment 9 usually unarmed, but sometimes with either a vertical spine (fig. 113) 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. 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 micro-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 . . . . . 7. ASEMINAE, p. 34
— Antennae without spines on basal segment, the remaining segments non-spiculate. Abdominal segment 9 without urogomphi; occasionally either 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. 90). Mandibles without setae (fig. 88). Clypeus without setae (fig. 88). Femora without setae (fig. 88). Pleura strongly protuberant (fig. 88). Abdominal segments 7, 8 and 9 continuous laterally. Eyes moderately convex (fig. 88).

Maxillary palpi not tapering apically, often enlarged. Prosternum never produced behind coxae into a T-shaped process . . . . . 8. CERAMBYCINAE, p. 34

— Head less strongly bent beneath prothorax, so that the vertex is entirely or for the greater part visible from above (fig. 152); vertex between bases of antennae either deeply excavate or flat, never convex. Mandibles each with 1–6 or more setae near middle of outer face (fig. 165). Clypeus with several setae across base (fig. 98). Femora nearly always with subapical spines or setae, but if without them, abdomen either cylindrical or 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. Eyes at most feebly convex, generally flat (fig. 116). Maxillary palpi gradually to strongly tapering; never truncate or enlarged apically (fig. 116). Prosternum often produced beyond coxae into a T-shaped process . . . . 9. LAMIINAE, p. 37

KEYS TO GENERA AND SPECIES

1. PARANDRINAE

Parandra

1. Urogomphi moderately strongly developed (fig. 16), shorter than length of abdominal segment 9 . . . . **P. glabra** (Degeer), p. 44

— Urogomphi very robust, longer than abdominal segment 9 (fig. 17).
P. punctata White, p. 47

3. PRIONINAE

1. Abdominal gin-traps absent 2

— Abdominal gin-traps present 3

2. Antennae strongly serrate or pectinate (fig. 34). Pronotum bearing three pairs of lateral tubercles . . . . Prionini. **Prionus**, p. 70

— Antennae filiform. Pronotum without lateral tubercles.
Callipogonini (pars). **Stictosomus** (s.g. **Anacanthus**) **reticulatus** (Dalman), p. 63

3. Abdominal tergite 9 with a small pair of subcontiguous, conical urogomphi. Pronotum with posterior angles produced posteriorly into a blunt tooth. Four pairs of gin-traps present . . . . Callipogonini (pars). **Callipogon barbatum** (Fabricius), p. 65

— Abdominal tergite 9 with urogomphi, if present, long and recurved or widely separated. Pronotum with posterior angles simple 4

4. Spines on at least lateral areas of abdomen flattened and scale-like. Urogomphi absent.
Callipogonini (pars). **Callipogon cinnamomeus** (Linnaeus), p. 66

— Spines on abdomen not flattened or scale-like. Urogomphi present or absent . 5

5. Gin-traps with posterior transverse plate strongly dentate or crenulate along front margin.
Callipogonini (pars). **Ergates spiculatus** Leconte, p. 64

— Gin-traps with posterior transverse plate smooth and straight along front margin . 6

6. Pronotum with sides broadly explanate and produced medially into a small conical tubercle (fig. 20). Abdominal segment 9 with a pair of very widely separated urogomphi which are attenuated and vertical.
Ancistrotini (pars). **Pyrodes** (s.g. **Pyrodes**) **nitidus** (Fabricius), p. 55

— Pronotum not explanate; lateral tubercles absent or two pairs present (frontispiece). Abdominal segment 9 with urogomphi either absent or narrowly separated . 7

7. Pronotum with two pairs of long, stout, lateral tubercles (frontispiece). Abdominal segment 9 bearing a pair of short, stout, urogomphi which are strongly recurved dorsally. Spiracles broadly oval. Hind femora extending appreciably beyond sides of abdomen. Mandibles extremely large (especially in male), extending posteriorly. Length up to 100 mm. . . . Ancistrotini (pars). **Macrodontia cervicornis** (Linnaeus), p. 51

— Pronotum without lateral tubercles. Abdominal segment 9 without urogomphi. Spiracles narrowly oval. Hind femora not or scarcely projecting beyond sides of abdomen.

Mandibles comparatively small and extending anteriorly or ventrally. Length up to 60 mm. . Macrotomini. **Stenodontes** (s.g. **Nothopleurus**) **maxillosus** (Drury), p. 58

4. LEPTURINAE

1. 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. 74
— Abdominal segment 9 bearing urogomphi. Lateral prothoracic tubercles absent. Tarsi each with a single seta . . . . **Leptura,** p. 76.

5. ASEMINAE

1. Spines on abdominal tergites long, straight, testaceous and never with subapical setae (fig. 46). Pronotum usually with a pair of paramedian, rather large, shallow depressions. Mesosternum broad and flat, with posterior margin at most slightly rounded. [Vertex of head with only a few fine, pale setae. Maxillary palpi slightly obliquely truncate.]
   Arhopalus, p. 82
— Spines on abdominal tergites either curved or straight and ferruginous or darker; if straight, then with a long subapical seta. Pronotum without depressions but sometimes with a pair of longitudinal grooves. Mesosternum narrow, with posterior margin either strongly rounded, protuberant or confluent with metasternum 2
2. Abdominal tergite 8 with numerous short, stout, ferruginous spines. Clypeus with several short ferruginous spinules extending more or less transversely behind front margin. Vertex of head with numerous spines. Mesosternum parallel-sided, and ending in a rounded protuberant process. Abdominal sternites 4–7 with paired sublateral groups of moderately long ferruginous spines. Maxillary palpi cylindrical and rounded apically. Spiracles with peritreme testaceous and completely raised above general level of cuticle . . . . **Asemum, p. 85**
— Abdominal tergite 8 with at most three or four spines. Clypeus without spinules. Vertex of head with two to six minute spines. Mesosternum slightly tapering and not protuberant but confluent with metasternum. Abdominal sternites 4–7 with paired sublateral groups of minute spines, each equipped with a long, fine, subapical seta. Maxillary palpi explanate and obliquely truncate apically. Spiracles with peritreme white, and with only anterior half raised above general level of cuticle . . . . **Tetropium,** p. 85

8. CERAMBYCINAE

1. Abdomen strongly narrowed basally, segment 1 being much narrower than segments 3 and 4 (fig. 90). Hind femora very long, extending posteriorly at least as far as abdominal segment 5. [Antennae short, not extending beyond abdominal segment 1 (fig. 90).]
   Rhinotragini 12
— Abdomen not strongly narrowed basally. Hind femora much shorter . . . 2
2. Antennae short, straight, filiform, not extending beyond abdominal segment 1. Abdominal segment 7 broadly rounded posteriorly. [Length up to 42 mm.]
   Metopocoilus quadrispinosus Buquet, p. 94
— Antennae longer, curved and extending beyond abdominal segment 1, except Clytini (pars), but then antennae thick and feebly serrate and tergite 7 with four anteriorly curved spines. Abdominal segment 7 narrowly rounded or V-shaped posteriorly 3
3. Scutellum extremely long, almost reaching posterior margin of metanotum. Spiracle with peritreme set obliquely, the inner walls of the partly exposed atrium lined with digitiform processes (fig. 57). Abdominal tergite 7 with a transverse row of abruptly angled spines near posterior margin (fig. 58)
   Trachyderes succinctus (Linnaeus), p. 102
— Scutellum of normal dimensions. Spiracles without digitiform processes on walls of

partly exposed atrium. Abdominal tergite 7 without a row of abruptly angled spines near posterior margin 4

4. Prothorax with a pair of median or postmedian lateral tubercles (fig. 93), which are usually long and acutely pointed. Head with vertex dome-shaped (fig. 93) and usually with a deep transverse impression immediately above 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.] 5

— Prothorax without lateral tubercles. Head never with vertex dome-shaped 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.] . . . 8

5. Antennae filiform or feebly serrate and sometimes crossed beneath body. Pronotum without papillae or raised tuberculate areas near base 6

— 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. [Hind femora strongly clavate. Abdominal tergite 7 with a pair of oval tuberculate protuberances (each bearing a few spines). Abdominal tergite 8 with two small groups of spines which are as large as those on tergite 7. Hind femora each with a tapering tuberculate process near base. Introduced from Australia in *Eucalyptus*.]
Phoracantha (s.g. **Phoracantha**) **semipunctata** (Fabricius), p. 126

6. Antennae not crossed beneath body. [Pronotum with lateral tubercles acutely pointed and strongly protuberant.] 7

— Antennae crossed beneath body. [Abdominal tergites 7 and 8 without long curved spines. Abdominal tergite 8 angled posteriorly and bearing several stunted ferruginous spines. Abdominal tergite 9 concealed from above by tergite 8.]
Cerambycini. **Brasilianus, p.** 37

7. Front margin of pronotum strongly produced and conical medially (fig. 93). Abdominal tergites 7 and 8 bearing short stunted spines.
Callichromini. **Callichroma velutinum** (Fabricius), p. 162

— Front margin of pronotum not produced medially. Abdominal tergites 7 and 8 bearing long curved spines . . Hesperophanini. **Chlorida festiva** (Linnaeus), p. 113

8. Mid and hind femora produced posteriorly into a long robust spur (fig. 68). Pronotum with a pair of paramedian, subconical tubercles on disc.
Eburodacrys sulphureosignata (Erichson), p. 117

— Mid and hind femora without spurs. Pronotum without paramedian tubercles on disc 9

9. Tergite 7 (fig. 72) with numerous long, slender spines which are mostly recumbent and pointing inward; posterior margin with a pair of very small tuberculate protuberances which bear a few suberect spines. Ventral margin of eye bearing three or four long, fine setae. Abdominal tergite 8 without spines; hind margin semicircular. [Posterior margin of tergite 7 with a pair of very small tuberculate protuberances which bear a few suberect spines.] . . . . Hesperophanini. **Elaphidion nanum** (Fabricius), p. 121

— Abdominal tergite 7 seldom as densely spinose, but if so, then spines directed posteriorly. Eyes generally without setae, but sometimes spinose. Abdominal tergite 8, if without spines, never semicircular 10

10. 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 11

— Head glabrous or spinose, never bearing setae. Pronotum without conspicuous groups of setose papillae; either glabrous, sparsely setose or spinose 13

11. Pronotum very elongate, bearing numerous long papillae (each with a fine basal seta (fig. 80)). Head with a few pale papillae on vertex. Front with two groups of from two to three setae near base of each antenna. Abdominal tergite 7 with about four recurved spines on papillate bases (fig. 80). Elytra as long as wings. Antennae always recurved, but never crossed beneath body. Abdominal segment 9 retracted in 8 and not visible from above. Functional spiracles present on abdominal segments 1–7; peritreme round. **Gracilia minuta** (Fabricius), p. 140

— Pronotum less elongate, bearing conspicuous groups of setae only. Head without papillae and front with two groups of from two to four setae near base of each antenna. Abdominal tergite 7 with four to six broad, straight, blade-like or thorn-like spines which are inclined forwards. Elytra very short, about half length of wings. Antennae, if recurved beneath body, always crossed. Abdominal segment 9 not retracted in 8; visible from above. Functional spiracles present on abdominal segments 1–6; peritreme oval. **Molorchus,** p. 139

12. Elytra attenuated and strongly tapering towards apices (fig. 90). Abdominal tergites 7 and 8 not strongly produced (fig. 90) . . **Sphecomorpha rufa** Gounelle, p. 156

— Elytra subparallel-sided and rounded apically. Abdominal tergites 7 and 8 strongly produced . . . . **Tomopterus,** p. 37

13. Pronotum strongly elongate and very strongly constricted sub-basally (fig. 95). Antennae long, recurved ventrally to terminate near front tibiae, and feebly clubbed or gradually thickened apically . . . Tillomorphini. **Epropetes latifascia** (White), p. 169

— Pronotum not strongly elongate and not strongly constricted sub-basally. Antennae considerably shorter (except Callidiini (pars)) and tapering apically 14

14. Head (fig. 79) with vertex bearing a group of spines immediately above each antenna and along ventral margin of eyes. Sides of pronotum (fig. 79) with a pair of prominent spinose tubercles near front margin.
Callidiopini. **Curtomerus flavus** (Fabricius), p. 138

— Head glabrous. Sides of pronotum without spinose tubercles near front margin . 15

15. Abdominal tergite 7 without a row of anteriorly curved spines or tubercles (fig. 86). 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. Callidini 17

— 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 16

16. Antennae filiform, extending posteriorly at least as far as abdominal segment 2. Abdominal tergite 7 with spines robust and strongly curved anteriorly . **Megacyllene,** p. 37

— Antennae feebly serrate and not extending posteriorly beyond metathorax. Abdominal tergite 7 with spines slender and not strongly curved.
Neoclytus centurio Chevrolat, p. 174

17. Abdominal tergite 8 with a longitudinal median groove on each side of which are numerous spines (fig. 86). 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. Abdominal

tergite 7 very elongate, with hind margin narrowly rounded (fig. 86). Abdominal segment 9 bilobed, each lobe bearing a fine seta. [Functional spiracles present on abdominal segments 1–5.] . . . . **Hylotrupes bajulus** (Linnaeus), p. 144

— Abdominal 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. Abdominal tergite 7 less elongate and with hind margin either rather sharply angled medially or broadly rounded. Abdominal segment 9 not bilobed . . . 18

18. Pronotum with a few conical papillae above middle of posterior margin. Mesonotum and metanotum bearing a few short testaceous spines. Abdominal tergite 7 with hind margin produced and rather sharply angled medially. Abdominal 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. 143

— Pronotum without papillae. Mesonotum and metanotum without spines. Abdominal tergite 7 with hind margin simple. Abdominal 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, p. 154

Brasilianus

1. Spines on abdominal tergites 7 and 8 arising from large pale, fleshy, conical papillae.
B. plicatus (Olivier), p. 98

— Spines on abdominal tergites 7 and 8 not arising from papillae.
B. lacordairei (Gahan), p. 95

Tomopterus

1. Abdominal tergite 7 with a median oval tubercle bearing two to four short stunted spines. Abdominal tergite 8 with a transverse row of stout spines which are larger than those on tergite 7 . . . . **T. larroides** White, p. 158

— Abdominal tergite 7 with tubercles bearing six or more spines. Abdominal tergite 8 with six or more spines irregularly arranged and no larger than those on tergite 7.
T. bispeculifer White p. 158

Megacyllene

1. Abdominal tergite 8 without spines . . . . **M. mellyi** (Chevrolat), p. 173

— Abdominal tergite 8 bearing four stout, curved spines 2

2. Abdominal tergite 7 with three pairs of inwardly curved spines, anterior to the six larger, anteriorly curved spines across posterior margin, the two anterior pairs being appreciably smaller than the remaining pair . . . . . . **M. acuta** (Germar), p. 171

— Abdominal tergite 7 with only two pairs of inwardly curved spines anterior to the six larger anteriorly curved spines across posterior margin, the anterior pair scarcely smaller than the remaining pair.
M. castanea (Castelnau & Gory) and **M. falsa** Chevrolat, p. 172

9. LAMIINAE

1. Abdominal tergite 9 produced into a long vertical or horizontal spine-like process which is sclerotised apically (fig. 108). [Pronotum bearing a pair of stout medio-lateral tubercles.] 2

— Abdominal tergite 9 seldom with a vertical spine-like process, but if so, then eyes bearing stout spines (Acanthoderini) or pronotum without lateral tubercles (*Lepturges*) . 6

2. Sublateral gin-traps present on abdominal tergites 1–2, 2–3, 3–4 and 4–5 (fig. 113).
Phrynetini. **Phryneta, p. 191**

— Sublateral gin-traps absent 3

3. Antennae arranged in two or more coils, at least in the male (fig. 98). Mandibles each with not more than three setae. Form rather slender (fig. 98) 4
— Antennae arranged to form a single coil. Mandibles each with numerous setae. Form very robust (fig. 110) . . . . **Batocera,** p. 187
4. Apical segments of tarsi each with a single seta 5
— Apical segments of tarsi glabrous (fig. 98) . . . . . . **Taeniotes,** p. 179
5. Femora with a transverse row of subapical setae.
Monochamus titillator (Fabricius), p. 183
— Femora glabrous . . . . . . **Neoptychodes trilineatus** (Linnaeus), p. 181
6. Tibiae, tarsi and antennae exceptionally robust (fig. 122). Antennae short, terminating ventrally in a notch between hind tarsi and hind tibiae (fig. 122). [Labrum bearing several stout spines as well as setae (fig. 122).]
Anisocerini. **Onychocerus crassus** (Voet), p. 207
— Tibiae, tarsi and antennae much more slender. Antennae longer, not terminating in a notch between hind tarsi and hind tibiae 7
7. Abdominal tergite 9 with a median vertical spine near hind margin. Head not excavate between antennal tubercles. Mid and hind femora each with a long tuberculate process near base. . . . . Acanthoderini 8
— Abdominal tergite 9 without a vertical spine near hind margin (except *Lepturges*), but then legs and sides of abdomen bearing numerous long setae 9
8. Abdominal tergite 9 with spine stout and distinct (fig. 134). Prothorax with lateral tubercles long, acute and broad basally (fig. 133).
Dryoctenes scrupulosus (Germar), p. 224
— Abdominal tergite 9 with spine minute. Prothorax with lateral tubercles short and rounded . . . . **Steirastoma meridionale** Aurivillius, p. 221
9. Front femora and tibiae extremely long and extending posteriorly, their apices reaching (at least in female) the apices of hind femora (fig. 136). Lateral tubercles of pronotum strongly attenuated, spiniform. [Cephalic, thoracic and abdominal segments bearing very stout, curved, thorn-like spines. Length at least 50 mm.]
Acrocinini. **Acrocinus longimanus** (Linnaeus), p. 228
— Front femora of normal length, extending laterally, the tibiae at right angles to longitudinal axis of body. Lateral tubercles of pronotum, if present, short and dentate (except *Polyraphis*) 10
10. Lateral tubercles of prothorax strongly attentuated and spiniform (fig. 126). Spiracles with marginal chambers. Abdominal tergite 9 without a sclerotised process. Length up to 31 mm. . . . . Polyraphidini. **Polyraphis,** p. 40
— Lateral tubercle of pronotum, if present, short and dentate. Spiracles with or without marginal chambers 11
11. Antennae extending as far as or beyond hind femora where they are recurved beneath body (fig. 152). Hind femora each with a very long, tapering, tuberculate process, near base (fig. 165). [Pronotum spinose and sometimes with a pair of small lateral, sub-basal tubercles. Sternites glabrous.] 12
— Antennae never extending beyond middle femora before being recurved beneath body (fig. 116). Hind femora generally simple but sometimes with very short tuberculate processes which are less than one-fourth length of tarsi 27
12. Head bearing long setae only. [Elytra glabrous or with sub-basal setae only.] . 13
— Head with short spines as well as setae 16
13. Hind femora with sub-basal tuberculate process short and dentate. Abdominal tergite 7 with numerous (50–100) spinules (each with a long basal seta).
Atrypanius albocinctus Melzer, p. 254
— Hind femora with sub-basal tuberculate process long and attenuated (fig. 165). Abdominal tergite 7 with less than fifty stout spines 14

14. Elytra each with one to three pairs of fine sub-basal setae. Abdominal tergite 7 with numerous (at least twenty) spines 15
— Elytra glabrous. Abdominal tergite 7 with only four to eight spines. **Exocentrus**, p. 264
15. Spines on abdominal tergite 8 at least as large as those on tergite 7. Abdominal sternite 8 (in female) without a sclerotised process . . . **Eutrypanus incertus** Bates, p. 244
— Spines on abdominal tergite 8 much smaller than those on tergite 7. Abdominal sternite 8 (in female) with a longitudinal, median, ferruginous carina (fig. 159). **Xylergates**, p. 258
16. Abdominal tergite 9 bearing a small vertical spine. Legs and pleural regions of abdomen with numerous long, fine, scattered setae. Disc of pronotum bearing a pair of paramedian, long, slender spines, in addition to scattered spinules and setae. Elytra bearing several scattered setae . . . . . **Lepturges sejunctimacula** Bates, p. 255
— Abdominal tergite 9 without a vertical spine. Legs and pleural regions of abdomen with setae, if present, less numerous and confined to apices of femora in the case of the legs. Disc of pronotum without a pair of paramedian spines. Elytra without scattered setae 17
17. Sub-basal area of elytron with at least one conspicuous spine (fig. 152). Abdominal segments 7 and 8 slightly to very strongly produced 22
— Sub-basal area of elytron glabrous. Abdominal segments 7 and 8 slightly produced 18
18. Femora with both spines and setae 19
— Femora with setae only 20
19. Legs with tibiae glabrous. Abdominal sternite 8 with a conspicuous median spine. Length up to 16 mm. . . . . **Chaetanes setiger** Bates, p. 243
— Legs with tibiae each bearing a row of three or four spines. Abdominal sternite 8 glabrous. Length up to 10·25 mm. . . . . **Alcidion bispinum** Bates, p. 259
20. Sub-basal tubercles of hind femora long, attenuated and produced posteriorly. Sub-basal elongate-oval tubercle on elytra strongly protuberant. Pronotal spines much less robust than those on abdominal tergite 8 (fig. 156). Pronotum strongly transverse 21
— Sub-basal tubercles of hind femora short and produced postero-laterally. Sub-basal, elongate-oval tubercle on elytra feebly protuberant. Pronotal spines more robust than those on abdominal tergite 8. Pronotum subquadrate. **Hyperplatys spinipennis** Fisher, p. 264
21. Base of clypeus bearing eight setae arranged in two sublateral groups of four setae. Abdominal tergite 9 without a sclerotised process (fig. 156). **Ozineus prolixus** Melzer, p. 253
— Base of clypeus bearing a row of only four setae. Abdominal tergite 9 bearing four curved spines . . . . . **Lophopoeum** sp. ?**timbouvae** Lameere, p. 262
22. Abdominal segments 7 and 8 very strongly produced (figs. 152, 165). Antennae extremely long, recurved ventrally to terminate alongside head (female) or extended to beyond vertex of head, where they are strongly recurved and directed posteriorly to near abdominal segment 7, where they are again recurved to terminate near apices of elytra (figs. 152, 165) 23
— Abdominal segments 7 and 8 not strongly produced (fig. 116). Antennae much shorter, recurved once only and terminating near bases of mid-femora. [Spine on elytron stout.] 26
23. Abdominal tergite 8 transverse. [Sub-basal spine on elytra with two setae.] **Carphina** sp., p. 245
— Abdominal tergite 8 extremely elongate (fig. 154) 24
24. Elytra each with one or two sub-basal spines and without a protuberant tubercle (fig. 152). Abdominal segments 7 and 8 very strongly produced (fig. 152) 25
— Elytra each with three to five spinules arising from a sub-basal, elongate tubercle. Abdominal segments 7 and 8 less strongly produced. **Oedopeza pogonocheriodes** Serville, p. 241

25. Elytra each with a single sub-basal spine (fig. 154). Basal third of abdominal tergite 7 bearing numerous (at least fifteen) spines.
Acanthocinus triangulifer (Erichson), p. 250
— Elytra each with two sub-basal spines. Basal third of abdominal tergite 7 bearing only a few (two to six) spines . . . . . . **Toronaeus figuratus** Bates, p. 243
26. Tibiae each with a row of four to eight spines. Abdominal tergite 9 bearing a pair of large, inwardly curved spines . . . . **Lagocheirus,** p. 41
— Tibiae glabrous. Abdominal tergite 9 bearing four, small, straight or slightly curved spines . . . . **Trypanidius melancholicus** (Serville), p. 257
27. Vertex of head with a pair of horn-like, sclerotised processes arising from bases of antennae (fig. 116). Antennae compactly coiled beneath body. Abdominal segment 9 truncate apically and densely spinose (fig. 116). Labrum densely setose (fig. 116).
Onciderini 28
— Vertex of head without paired tubercles. Antennae not coiled beneath body. Abdominal segment 9 not truncate and densely spinose apically. Labrum sparsely setose . 29
28. Abdominal segment 9 bearing numerous spines which are all more or less of equal size (fig. 116). Tarsi each with at least one seta (fig. 116) . . . . **Oncideres,** p. 40
— Abdominal segment 9 similarly spinose but bearing in addition six to eight very much larger spines (fig. 119). Tarsi glabrous . . **Jamesia globifera** (Fabricius), p. 203
29. Abdominal tergites 2–7 each with three transverse rows of stout spines which become progressively larger posteriorly. [Antennae short (not recurved) and terminating alongside abdominal segment 3.] . . . Adetini. **Adetus muticus** Thomson, p. 273
— Abdominal tergites without three transverse rows of spines on segments 1–7. Antennae longer 30
30. Abdominal tergite 9 densely setose, with a deep median, longitudinal cleft terminating posteriorly in a styliform process (fig. 174).
Spalacopsini. **Dorcasta acuta** Pascoe, p. 275
— Abdominal tergite 9 not modified in this way 31
31. Abdominal segment 9 short, strongly transverse and placed ventrally, being concealed from above by segment 8; bearing paramedially two groups of dense reddish setae. Abdominal segment 8 short, transverse, broadly rounded and explanate laterally and bearing a transverse row of about ten spines . . Aerenecini. **Phaula** sp., p. 277
— Abdominal segment 9 subquadrate, not concealed from above by segment 8; without groups of dense reddish setae. Abdominal segment 8 subquadrate, not broadly explanate laterally and without a transverse row of spines 32
32. Disc of pronotum bearing numerous short spines, each with a long basal seta. Hind femora extending to at least abdominal segment 5. [Apices of hind tarsi extending posteriorly beyond apices of elytra. Sternites 4–8 without setae.]
Saperdini. **Saperda,** p. 270
— Disc of pronotum bearing setae only. Hind femora extending only as far as abdominal segment 3 or 4 . . . . Phytoeciini. **Oberea**[1]

Oncideres

1. Abdominal segment 9 with a median dorsal cleft (fig. 116). Tibiae bearing numerous setae. Length up to 45 mm. . . . . **O. fasciata** Lucas, p. 195
— Abdominal segment 9 without a median dorsal cleft. Tibiae glabrous. Length up to 24 mm. . . . . **O. ulcerosa** (Germar), p. 198

Polyraphis

1. Paired tubercles on disc of pronotum conical and strongly protuberant (fig. 126). Abdominal tergite 9 bearing a pair of stout, paramedian, straight spines.
P. spinosa (Drury), p. 209

[1] Nothing is known of the biology of Neotropical species of this tribe and no material is available.

— Paired tubercles on disc of pronotum convex, oval and much less strongly protuberant. Abdominal tergite 9 without spines . . . . . **P. grandini** Buquet, p. 211

Lagocheirus

1. Spiracular peritreme with extremities broadly rounded.
L. araneiformis (Linnaeus), p. 236

— Spiracular peritreme with extremities acutely attenuated.
L. undatus undatus (Voet), p. 239

Xylergates

1. Abdominal segment 7 (at least in female) strongly elongate and more than twice as long as segment 8 (fig. 160) . . . . **X. praetor** (Dejean), p. 258

— Abdominal segment 7 (at least in female) less strongly elongate, less than twice as long as segment 8 (fig. 159) . . . . **X. hilaris** (Dejean), p. 258

DESCRIPTIONS AND BIONOMICS OF THE IMMATURE STAGES

THE general form of adults of this family 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, the reflexible antennae 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 forwards at the sides to meet the metathorax.

The family Cerambycidae may conveniently be divided on immature characters into eight subfamilies, namely the PARANDRINAE, PRIONINAE, LEPTURINAE, OXYPELTINAE, DISTENIINAE, ASEMINAE, CERAMBYCINAE and LAMIINAE. In addition there is also the subfamily ANOPLODERMINAE, of which, unfortunately, no immature material has yet become available.

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 localities listed have been segregated into zoogeographical regions, namely Nearctic and Neotropical, those of the latter being placed under one or more of the following regions: Mexico, Central America, Caribbean and South America. The boundaries of the two zoogeographical regions are shown in the accompanying map (fig. 11).

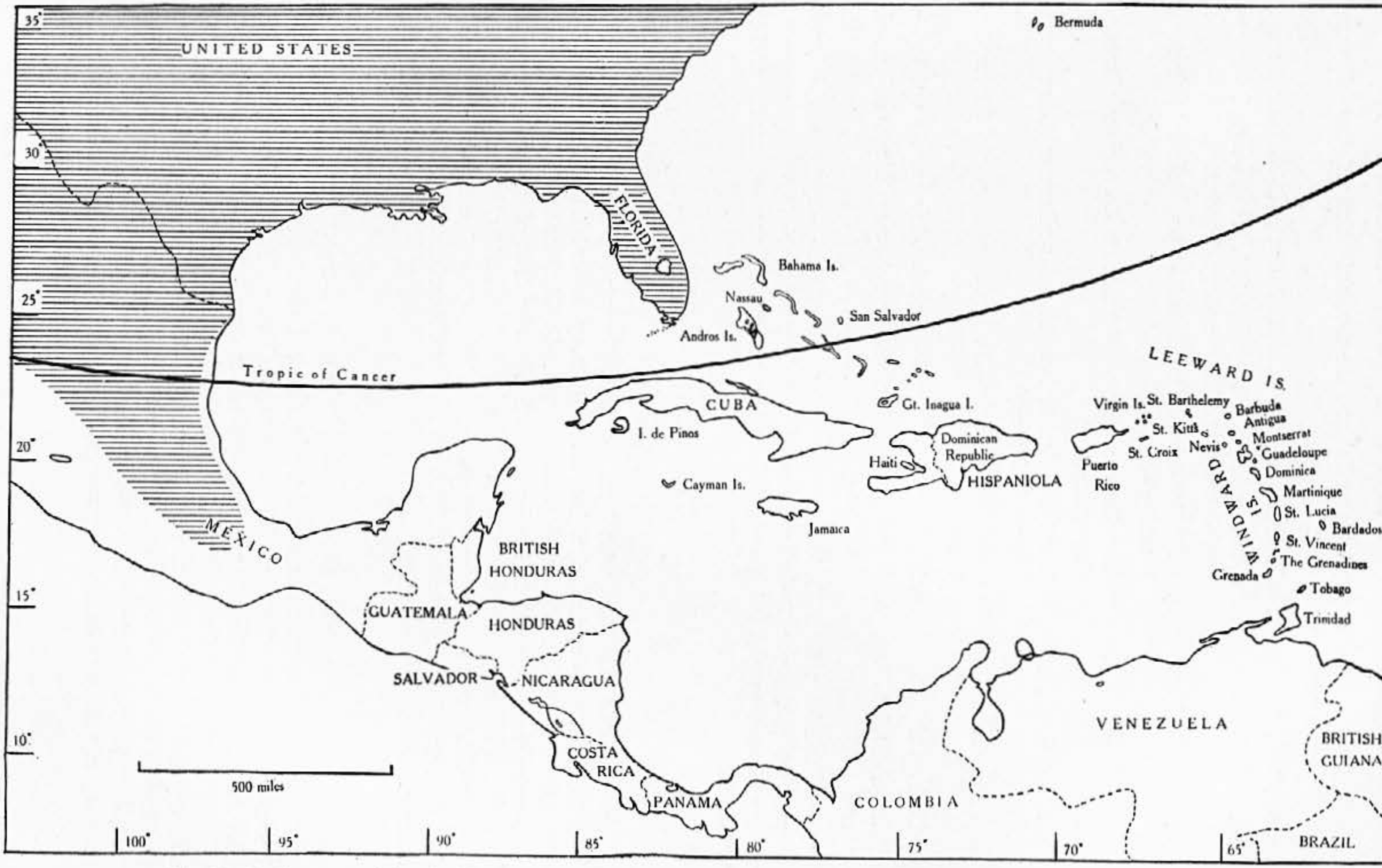


Fig. 11. Outline map of the Caribbean showing boundaries of zoogeographical regions. The Nearctic region is shaded.

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.
,, ,, F.I.E.	In the collection of the late Dr. F. I. van Emden, Commonwealth Institute of Entomology, London.
,, ,, U.S.N.M.	In the collection of the United States National Museum, Washington.
,, ,, 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.
,, ,, C.A.S.	In the collection of the California Academy of Sciences, San Francisco.
,, ,, Z.M.H.	In the collection of the Zoologisches Museum, Hamburg.
,, ,, D.D.S.V.	In the collection of the Divisao de Defesa Sanitaria Vegetal, São Paulo.

Leg.=collected by; 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 and/or predators.

1. PARANDRINAE

Larval Characters

Form cylindrical. *Head* with front margin of frons not projecting over clypeus (fig. 12). Antenna 3-segmented, segment 3 elongate, cylindrical (fig. 12). Postcondylar carina absent (fig. 12). Subfossal process absent. Ocelli absent. Maxillary palpifer with outer margin rounded. *Prothorax* with posterior area of pronotum asperate (fig. 13). *Abdomen* with ampullae coarsely spiculate or 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.

Parandrini

Parandra (s.g. **Archandra**) **glabra** (Degeer)

Distribution. NEOTROPICAL REGION: Mexico, Central America (Costa Rica, Nicaragua, Panama), Caribbean (Guadeloupe, St. Vincent, Trinidad), South America (Argentina, Brazil, British Guiana, Colombia, Ecuador, French Guiana, Venezuela).

Host plants: *Aspidosperma* sp. (Andrade, 1928); *Acacia decurrens* (Lima, 1930); *Araucaria brasiliensis* (Plaumann); *Phoebe* sp. (F. Monrós).

Adult. Length 15–35 mm. Entirely castaneous. *Head* smooth, shining, with mandibles (in male) large and sickle-shaped; antennae (in both sexes) very short, not reaching elytra. *Prothorax* subrectangular, depressed, glabrous, shining; lateral margins without tubercles. *Elytra* slightly depressed, glabrous, shining; apices rounded.

Mature larva (figs. 12–15). Form cylindrical, rather robust, very slightly tapering

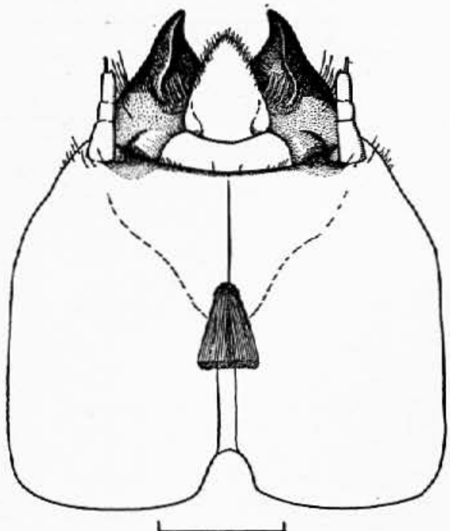


Fig. 12. *Parandra glabra* (Degeer). Mature larva. Head. Dorsal aspect.

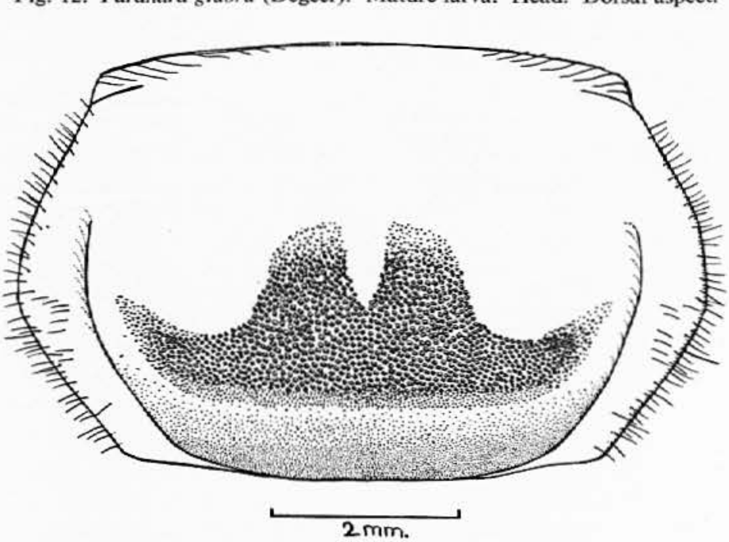


Fig. 13. *Parandra glabra* (Degeer). Mature larva. Pronotum.

posteriorly to abdominal segment 9. *Head* (fig. 12) slightly depressed, quadrate to slightly transverse, with sides rather strongly rounded. Gena and temple sparsely setose. Front margin of frons roundly declivous, almost straight. Antenna (fig. 12) long, fleshy, scarcely retractile; segment 2 the longest and bearing segment 3 and a supplementary process; segment 3 strongly elongate. Mandible (fig. 14) robust, wedge-shaped, pitchy, shining; apex acutely pointed, slightly curved downwards; molar area flattened into a striate trapezoidal plate.[1] Clypeus trapezoidal, leathery, as wide at base as epistoma. Labrum elongate cordate, rather sparsely and coarsely setose apically. *Prothorax* with posterior area of pronotum (fig. 13), eusternum and lateral posterior angles of presternum bearing numerous transverse, ferruginous asperities; eusternum distinctly separated from presternum. Eusternum and sternellum of mesothorax and sternellum of metathorax bearing rows of asperities which are

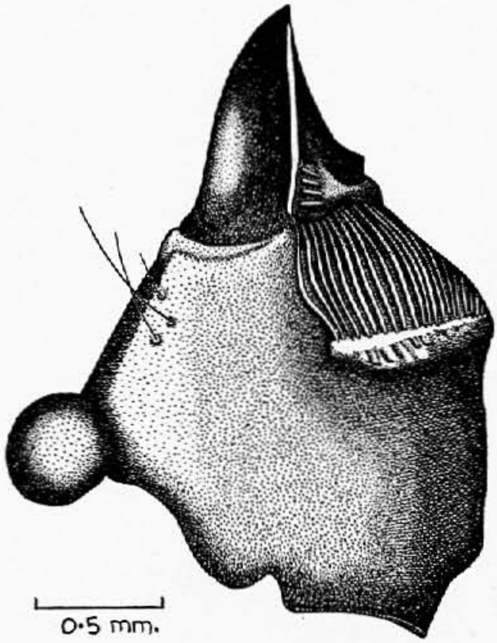


Fig. 14

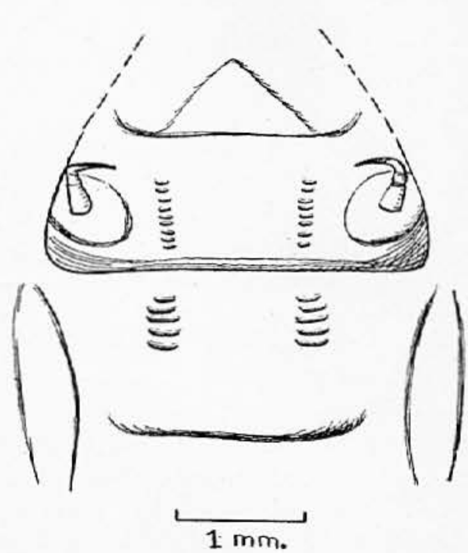


Fig. 15

Figs. 14–15. *Parandra glabra* (Degeer). Mature larva. Fig. 14. Left mandible. Dorsal aspect. Fig. 15. Posterior half of metathoracic sternite and anterior half of abdominal sternite 1, showing relative widths of asperities (semi-diagrammatic).

sublinear and more strongly transverse than those on eusternum of prothorax. *Abdomen* with dorsal ampullae present on segments 1–7; each ampulla rather densely and coarsely spiculate. Segment 1 with eusternum bearing two paramedian longitudinal rows of from three to five transverse asperities which are much larger than those on thoracic segments (fig. 15); sternellum coarsely spiculate antero-laterally. Segments 2–7 with eusternum finely spiculate (less finely laterally) and sternellum coarsely spiculate. Pleural tubercles distinct and epipleura strongly protuberant on abdominal segments 7–9. Anal lobes compact, the dorsal lobe strongly protuberant. *Legs* pale testaceous, slender, rather long; unguiculus attenuated, imbricately spinose. *Spiracles* with peritreme broadly oval, rather thick; marginal chambers reduced. Length up to 46 mm.; maximum breadth (at prothorax) 8·5 mm.

[1] This can be seen simply by raising the labrum with a needle.

It is suspected that the carinate asperities on the metathoracic sternellum and on the eusternum of abdominal segment 1 act as a stridulatory organ.

Pupa (fig. 16). *Head* strongly bent beneath prothorax, quadrate, rounded, glabrous. Antennae rather thick, moniliform and short, extending to between front and middle legs. Labrum cordate, anterior margin rounded and bearing a few minute setae. *Pronotum* slightly transverse, broadest anteriorly; disc irregularly transversely striate and with an oval shallow, median depression posteriorly; several short stout, curved spines present around lateral margins. *Mesonotum* and scutellum prominent, fleshy and bearing a few minute scattered spinules. *Metanotum* with several small spines (roughly in a V formation), the anterior two or three pairs much larger than remainder; scutellar groove well defined. Elytra and wings extending to between abdominal segments 3 and 4. *Abdomen* with tergites 1–7, each bearing numerous short, rather stout, curved spines (each arising from a papillate base). Tergite 8 glabrous. Tergite 9 glabrous and with a pair of stout ferruginous urogomphi, which are widely separated at base and slightly converging posteriorly. Sternites glabrous. Pleura each bearing several slightly curved spines which are appreciably stouter than those on tergites, and which arise from larger conical papillae. *Legs* glabrous, with hind femora extending as far as abdominal segment 3, and hind tibiae almost at right angles to longitudinal axis of body. *Spiracles* present on abdominal segments 1–8, the eighth pair being partly closed and probably non-functional; peritreme narrowly oval, very thick, pale and appreciably raised above general level of cuticle.

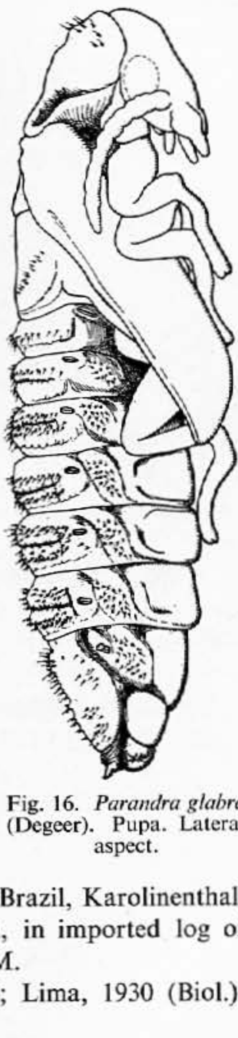


Fig. 16. *Parandra glabra* (Degeer). Pupa. Lateral aspect.

Material studied. 3 L, 2 P, 1 I, Trinidad, Arima, Spring Hill Estate, 19.iii.1957, from rotten log, E.A.J.D. leg., in coll. B.M.; 2 L, Argentina, xii.1941, from rotten *Araucaria brasiliensis*, F. Plaumann leg., in coll. B.M.; 14 L, 4 P, 3 I, Brazil, Karolinenthal, 23.viii.1898, F. Ohaus leg., in coll. Z.M.H.; 1 L, England, in imported log of *Araucaria brasiliensis*, 5.ix.1957, pres. by F.P.R.L., in coll. B.M.

References. Andrade, 1928 (Biol.); Heller, 1904 (L fig.); Lima, 1930 (Biol.); Rojas, 1866 (Biol.).

Parandra (s.g. **Parandra**) **punctata** White (=**luciana** J. Thomson)

Distribution. NEOTROPICAL REGION: South America (British Guiana, Colombia, Ecuador, Peru).

Host plants: *Ficus gleasoni*, *Simaba multiflora* (E.A.J.D.).

Mature larva. Similar to that of *P. glabra* (Degeer) but distinguishable as follows: *Prothorax* with pronotum finely asperate and testaceous posteriorly. Asperities of metasternum testaceous, less strongly transverse and about equal in size to those on abdominal segment 1. Size smaller. Length up to 32 mm.; maximum breadth (at prothorax) 6 mm.

Pupa (fig. 17). Similar to that of *P. glabra* (Degeer) but separable by the much more robust and longer urogomphi (fig. 17). Length up to 19 mm.; maximum breadth 5·1 mm.

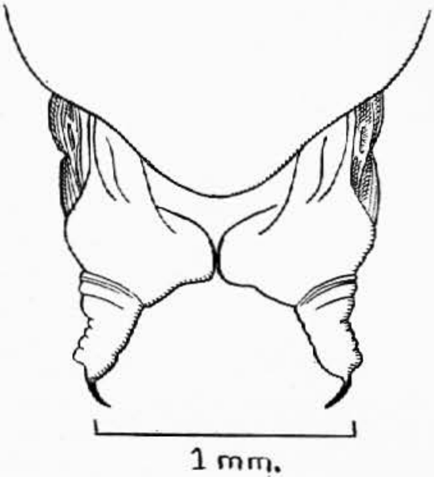


Fig. 17. *Parandra punctata* White. Pupa. Abdominal tergite 9, showing urogomphi.

Biology. The larval galleries run parallel to the grain of the wood and are short, curved and one-half to two inches deep in the sapwood, which is often completely honeycombed (Pl. IV, fig. 1) (E.A.J.D.).

Material studied. 9 L, 1 P, 2 I, British Guiana, Bartica district, Skull Point, 10.iv.1957, from *Ficus gleasoni*, E.A.J.D. leg., in coll. B.M.; 6 L, 1 I, British Guiana, Bartica district, Skull Point, 20.iv.1957, from *Simaba multiflora*, E.A.J.D. leg., in coll. B.M.

Reference. None available.

Parandra (s.g. **Parandra**) **araucana** Bosq

Distribution. NEOTROPICAL REGION: South America (Argentina, Chile).

Host plant: *Araucaria araucana* (Bosq, 1951).

Reference. Bosq, 1951 (Biol.).

Parandra (s.g. **Archandra**) **expectata** Lameere

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil, Paraguay).

Host plant: *Alnus* (Bosq, 1934).

References. Bosq, 1934 (Biol.), 1942a (Biol.).

2. ANOPLODERMINAE

No larvae of this subfamily have yet been described. Adults of all known species appear to be predominantly subterranean in habitat and their larvae almost certainly feed on the roots of various plants.

Hypocephalini

Hypocephalus armatus Desmarest

Distribution. NEOTROPICAL REGION: Brazil. As this species appears to be exceptionally localised, the following minor localities are given: Minas Gerais and Bahia (within only a radius of fifty kilometres of the village of Condeuba).

Adult (Pl. VII, fig. 1). Length 35–75 mm. Entirely black. *Head* with antennae extremely short. *Prothorax* subelliptical, globose, glabrous, shining, with sides narrowly but strongly margined. *Elytra* dull, strongly rugulose, with apices acute. *Legs* with hind femora extremely robust; hind tibiae strongly curved.

Biology. It is unfortunate that the immature stages of this curiously modified prionid, which has caused so much controversy amongst taxonomists, are as yet unknown, for the characteristics of the larva, which are suspected of being typically prionine, would no doubt serve to clarify its true phylogenetic position.

All that is so far known of the biology of this species, which amounts to very little, has recently been admirably summarised by Araujo (1954). It seems that the paucity of bionomic observations concerning this prionid is not so much due to its rarity but to the fact that its known breeding grounds are so inaccessible. By far the most complete and original bionomic account is that by Gounelle (1905), to which scarcely any additional information has since been added. In fact, nearly every account by other authors is largely conjectural or based on the work of Gounelle. It has been stated that adults frequent and burrow beneath corpses, particularly those of oxen. Their presence around corpses was probably purely fortuitous, and on being confronted by a barrier of this kind they would, being fossorial insects, quite naturally start to burrow in order to avoid the obstacle. They are also said to have been found in fallen coco-nuts, but this has not been confirmed. Thomson (1860) maintains that they infest forest trees, and Chevrolat (1868) states that they have been found below ground-level in the bole of a tree which was reduced to powder. Here again there is no supporting evidence.

This beetle is extremely localised, being, at least in Bahia, apparently confined to within a radius of fifty kilometres of a single village. Perhaps the fact that both sexes are apterous is largely responsible for this. It appears that nearly all specimens have been found while crawling over open ground (the soil being clay and sand with fragments of quartz) in an area which is covered in places with deciduous scrub, but which is totally devoid of trees or dense vegetation. There appear to be no characteristics whereby this area can be distinguished from the surrounding terrain. It seems likely, therefore, that the larvae feed at the roots of shrubs or even herbaceous plants, perhaps tunnelling along through the soil from one plant to another as is the case with *Dorysthenes forficatus* (Fabricius) (see Duffy, 1953a).

Emergence normally commences during December, providing rains have already started; but even the effect of rainfall on emergence is not clear. It is possible that the beetles are not able to emerge from the hard sun-baked soil until it has become softened by rain, or they may emerge at this period in order to avoid being flooded in their burrows and drowned.

Female specimens are extremely rare, males being about a hundred times more numerous. The possibility that the females normally remain in the soil, even for mating and oviposition, must not be overlooked. Moreover, females may be nocturnal. The facts that both sexes[1] are apterous and that the males are better equipped for burrowing suggests that females do not normally emerge from the soil at all and that the males, after emergence, re-enter the soil in search of a mate. The gait of the male when on the ground is clumsy and slow. Its fossorial habits have been carefully described and photographed by Gounelle (l.c.).

Soon after its discovery this insect was greatly sought after by numerous collectors, and relatively large sums were paid by certain institutions for specimens. Fairmaire (1884) remarks that round about 1840 a specimen was purchased for about 300 French francs. Similar amounts have been paid since, but after the distribution of numerous specimens in European collections its monetary value substantially declined.

This beetle is known by several vernacular names such as "Vaqueiro", "Carocha" and "Iá-Iá de Cintura", the last name alluding to its waisted appearance. Beetles are known to have been brought home regularly by native women for decorating their babies' cradles. The beetle is suspended by a piece of ribbon over the cradle, and its waving motions in its struggles to free itself, or rather to gain purchase, presumably keep the baby contented.

According to Gounelle (l.c.) this beetle is well equipped to defend itself against molestation or rival males. For example, when prodded with one's finger, the latter is gripped beneath the arched body and securely held by means of the eight stout spine-like processes.

When several males are enclosed in a box, he continues, they will attempt to grip one another in a similar fashion, which, he maintains, accounts for the dents and holes often present in the bodies and elytra of preserved specimens. Gounelle was certainly correct when, over fifty years ago, he said that many long years would pass before the biology of this unique insect would become known.

References. Araujo, 1954 (Biol.); Blanchard, 1845 (monetary value); Burmeister, 1841 (Biol.); Crowson, 1953 (Biol.); Fairmaire, 1884 (Biol.); Goeldi, 1894 (Biol.); Gounelle, 1905 (I fig., Biol.); Guérin-Méneville, 1841 (Biol.); Lacordaire, 1869 (Biol.); Lameere, 1884 (Biol.), 1915 (monetary value); Leng, 1886 (Biol.); Lima, 1955 (Biol.); Lucas, 1885 (Biol.); Sharp, 1884 (Biol.); Westward, 1841 (I fig., Biol.), 1842 (Biol.).

Anoplodermini

Anoploderma (s.g. **Pathocerus**) **wagneri** C. O. Waterhouse

Distribution. NEOTROPICAL REGION: South America (Argentina, ?Brazil).
Host plant: *Acacia cavenia* (F. Monrós).
Reference. None available.

Anoploderma (s.g. **Sypilus**) **d'orbignyi** Guérin-Méneville

Distribution. NEOTROPICAL REGION: South America (Argentina, Patagonia).
Host plant: Chañar (roots) (Bruch, 1921).
Reference. Bruch, 1921 (Biol.).

[1] In related genera of the ANOPLODERMINAE only the females are apterous.

Anoploderma (s.g. **Migdolus**) **fryanum** Westwood

(=**Paulistanus bouvieri** Gounelle)

Distribution. NEOTROPICAL REGION: South America (Brazil).

Biology. Adults of this species are subterranean and may be seen crawling on tracks after heavy rain. The male is very active and flies readily, but the female, which is much more rare, is sluggish, apterous and apparently does not feed (Gounelle, 1899).

Reference. Gounelle, 1899 (Biol.).

3. PRIONINAE

Larval Characters

Form robust, subcylindrical and tapering posteriorly. *Head* usually quadrate to slightly transverse, seldom slightly elongate; 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 strongly sclerotised, often abruptly sloping, with its lower boundary projecting over clypeus and its upper boundary dentate or carinate; 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. 23), cutting edge broadly emarginate; apex produced, acute. Ocelli present or absent. Antenna 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. 18, 19). 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. Epilpeura protuberant on last three segments only; 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).

Ancistrotini

Macrodontia cervicornis (Linnaeus)

(Sawyer Beetle)

Distribution. NEOTROPICAL REGION: Caribbean (Trinidad), South America (Brazil, British Guiana, Ecuador, French Guiana, Venezuela).

Host plants: *Cocos nucifera*, *Attalea funifera*, *A. compta* (Bondar, 1940); *Ceiba pentandra* (Latreille, 1817); ? *Jessenia weberbaueri* (Paprzycki, 1942).

Adult (Pl. VIII, fig. 1). Length 60–130 mm. (excluding mandibles). Head and prothorax reddish brown; elytra light brown with dark brown longitudinal markings. *Head* with mandibles very strongly produced anteriorly, at least as long as prothorax, sometimes nearly three times as long; inner margin strongly serrate. *Prothorax* with three pairs of lateral spines. *Elytra* rather broad and depressed, truncate apically.

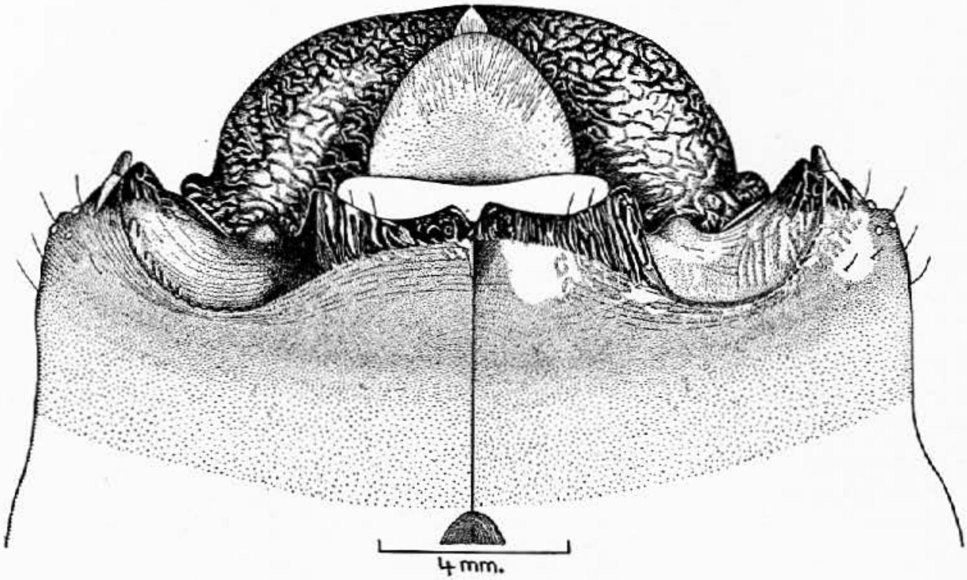


Fig. 18. *Macrodontia cervicornis* (Linnaeus). Mature larva. Front part of head. Dorsal aspect.

Mature larva (fig. 18 and Pl. VIII, fig. 2). Form subcylindrical, very robust, slightly tapering posteriorly to abdominal segment 9. Thoracic and abdominal segments velured (micro-pubescent). *Head* scarcely depressed, slightly transverse (head-width 18·5 mm.). Genae very strongly shouldered, subcarinate, very strongly sclerotised, rugose and pitchy. Mouthframe very strongly sclerotised, rugose and pitchy. Frons with a broad, pitchy, rugose front margin comprising a strongly sclerotised ridge; upper boundary produced over lower boundary paramedially into a pair of rather small rounded lobes and laterally into a pair of very much larger acutely pointed lobes; lower boundary only very feebly produced at sides. Postcondylar carina extremely concave, strongly sclerotised and placed dorso-laterally, the outer part produced into a conical process immediately above the antennal foramen. Subfossal process extremely well developed, acutely conical. Antenna 2-segmented; segment 2 obliquely truncate apically and bearing sensory pores and setae. Six pairs of ocelli present, three pairs being placed subcontiguously in a row laterad and almost ventrad of antennal foramen, the other three pairs, which are widely separated, being placed a short distance behind; lens small, round, convex, ferruginous; pigmented spot indistinct owing to sclerotisation of lens. Mandibles very robust, pitchy, shining.

Labrum cordate, leathery, ferruginous basally, fringed with dense reddish setae. Maxilla with palpal segment 3 as long as segment 2, stout, conical. Labial palpi with segment 2 as long as segment 1, stout, conical. *Prothorax* scarcely depressed, dorsally slightly obliquely sloping anteriorly, about twice as broad as long; pronotum rectangular, delimited laterally by a pair of grooves, almost entirely covered with short, dense, pale pubescence. Prosternum with lateral areas devoid of sclerotised processes or tubercles. *Mesonotum* and *metanotum* similarly velured. *Abdomen* almost entirely velured. Dorsal and ventral ampullae present on segments 1–7; each dorsal ampulla with two distinct transverse furrows. Pleural discs present on segments 1–7. Segment 9 slightly extended but scarcely longer than segment 8. Anus trilobed, each lobe strongly protuberant. *Legs* 3-segmented, distinctly shorter than maxillary palpi. *Spiracles* with peritreme broadly oval, pale, thick, and slightly raised above general level of cuticle. Length up to 215 mm. (averaging 180 mm.); maximum breadth (at prothorax) 45 mm. (averaging 28 mm.).

The larva of this species is unique in having the thoracic and abdominal segments almost entirely densely velured, the integument being brown instead of white.

Pupa (frontispiece). Cuticle extensively sclerotised. *Head* strongly bent beneath prothorax and concealed from above, glabrous. Front bearing two pairs of conical tubercles as figured. Mandibles (particularly in male) extremely large and extending posteriorly, almost as far as apices of elytra (in the male). Antennae filiform, thick, slightly curved and converging ventrally but not recurved. *Pronotum* with disc transversely strigose, the posterior half with a broad median, semicircular impression; sides bearing a pair of large stout spine-like tubercles. *Mesonotum* and *metanotum* glabrous, transversely striate and rugose, the latter with a subconical protuberance near each anterior angle; scutellum strongly raised and flattened and transversely striate. Elytra and wings extending as far as abdominal segment 4, the former with margins strongly ridged. *Abdomen* with tergites rugose and each with a few scattered moniliform setose papillae, but devoid of spines; gin-traps present on abdominal segments 1–2, 2–3, 3–4, 4–5 and possibly 5–6; each consisting of two transverse subcarinate, labiate protuberances. Abdominal segment 9 strongly explanate laterally and produced dorsally into a pair of stout urogomphi which are curved anteriorly. Sternites bearing a few inconspicuous setae. *Legs* glabrous; hind femora extending appreciably beyond sides of abdomen. *Spiracles* present on abdominal segments 1–6, the seventh pair being closed and probably non-functional; peritreme broadly oval to subcircular, thick and placed below general level of cuticle. Length up to 100 mm.; maximum breadth (across abdomen) 40 mm.

Biology. Larvae infest dead and dying trunks of various trees. According to Bodkin (1919), the beetle has the strange habit of clasping a young growing twig of about one inch in diameter with its powerful mandibles and then gyrating round and round until the twig is severed. The sound produced during this performance is characteristic and easily recognisable. Le Moult (1909) states that this insect is known to the natives as "Mouche scieur de long" and "Mouche café" because of the belief that it saws off with its powerful serrated mandibles branches of coffee trees. After personal observation, however, he found that it was a species of *Oncideres* that was responsible for the damage.[1] According to Bondar (1929c) the enormous larval galleries often measure more than a metre in length and ten or more centimetres in diameter. The life-cycle is usually completed within at least two years and adults emerge from October to February. Larvae of various sizes are often found together in the same tree-trunk, which indicates that oviposition probably takes place at various periods throughout the year. Paprzycki (1942) states that pupation takes place in the soil.

In Brazil, larvae of this species are eaten by the native population (Netolitzky, 1920). Adults are of some commercial value as they are greatly sought after by professional collectors.

Economic importance. Despite its unusually large size this species is not regarded as a serious pest.

Material studied. 1 L, Brazil, Sta. Catharina, Bez, Joinville, Ort Humboldt, 31.vii.1920, W. Ehrhardt leg., in coll. Z.M.H.; 1 P, Brazil, Sta. Catharina, Humboldt, viii.1911, W. Ehrhardt leg., in coll. Z.M.H.

References. Bodkin, 1919 (Biol.); Bondar, 1926b (L fig., I fig.), 1929c (L, I fig., Biol.), 1940 (L fig., I fig., Biol.), 1941 (?); Duffy, 1953a (Biol.); Lacordaire, 1830 (Biol.); Latreille, 1817 (Biol.); Le Moult, 1909 (Biol.); Lima, 1930 (Biol.); Lucas, 1867 (P); Netolitzky, 1920 (Biol.); Paprzycki, 1942 (Biol.).

Macrodontia flavipennis Chevrolat

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).

Host plants: *Acrocomia* sp. (F. Monrós); *Acacia decurrens* (Andrade, 1928).

Reference. Andrade, 1928 (Biol.).

Ancistrotus (s.g. **Acanthinodera**) **cumingi** Hope

Distribution. NEOTROPICAL REGION: South America (Chile).

Host plants: *Cocos* (?); *Cryptocharia peumo*, *Crinodendron* spp., *Peumus boldus*, and imported *Populus* and *Eucalyptus* (E. P. Reed); *Pinus pinaster* (G. Kuschel).

Mature larva (fig. 19 and Pl. II, fig. 2). Similar to that of *Macrodontia cervicornis* (Linnaeus) but differing as follows: Thoracic and abdominal cuticle non-pubescent but very strongly rugose due to coarse granulation. *Head* (fig. 19) with upper boundary of front margin of frons produced into four lobes subequal in size. Length up to 130 mm.; maximum breadth (at prothorax) 17 mm.

Biology. The male flies only at dusk and in the daytime is to be found clinging to leaves. The female is apterous and subterranean. Adults emerge in October and November. Native children catch the females, which they call "llico-llico", to feed to their dogs (Fairmaire and Germain, 1859). Porter (1923) describes the curious tracheal setae present in the adult.

Material studied. 1 L, 2 I, Chile, 60 km. E. of San Carlos, Nuble, 26.xii.1950, Ross and Michelbacher leg., in coll. C.A.S.; 2 L, Chile, Los Angeles, Blo-Blo, Las Canteras, 21.v.1957, G. Kuschel leg., in coll. B.M.

[1] According to Paprzycki (1942) *Macrodontia cervicornis* (Linnaeus) is nocturnal; *Oncideres* species, on the other hand, are active only during the daytime.

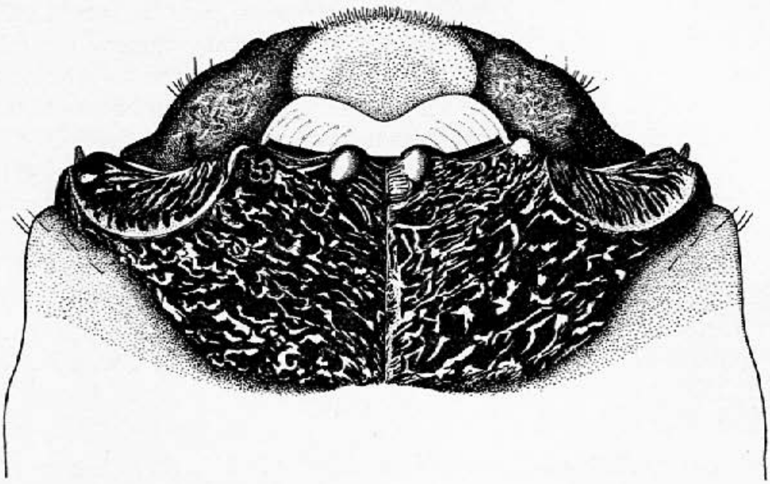


Fig. 19. *Ancistrotus cumingi* Hope. Mature larva. Front part of head. Dorsal aspect.

References. Fairmaire and Germain, 1859 (Biol.); Lepesme, 1947 (Biol.); Porter, 1923 (morphology).

Pyrodes (s.g. **Pyrodes**) **nitidus** (Fabricius)

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).

Mature larva. Unfortunately only a larval head-capsule is available for study; consequently it is not possible to give the larval characteristics of this genus (but see next species). *Head* with frons narrowly pitchy anteriorly; upper boundary of front margin crenulate but not projecting beyond lower boundary, which is moderately produced over clypeus at sides. Postcondylar carina shallow, placed dorsally; subfossal process feebly produced, blunt. Antenna 2-segmented; segment 2 obliquely truncate apically and bearing sensory pores and setae. Three pairs of subcontiguous ocelli present. Clypeus fringed laterally with numerous bristly setae.

Pupa (figs. 20–21). *Head* visible from above, glabrous. Antennae filiform, slightly

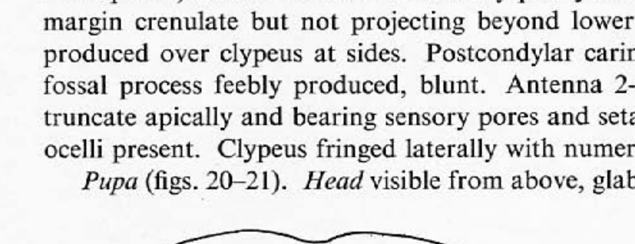


Fig. 20

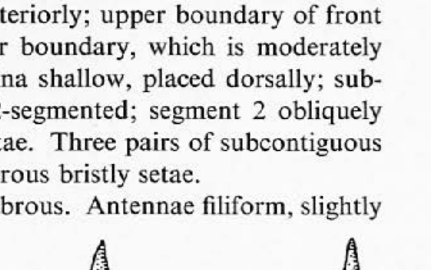


Fig. 21

Figs. 20–21. *Pyrodes nitidus* (Fabricius). Pupa. Fig. 20. Pronotum. Fig. 21. Urogomphi. Caudal aspect.

curved beneath body and terminating near apices of elytra. Pronotum (fig. 20) glabrous or almost so; sides very broadly explanate and produced medially into a small tubercle. *Mesonotum* and *metanotum* glabrous or almost so; scutellum very large and attenuated. Elytra and wings extending to between abdominal segments 3 and 4. *Abdomen* glabrous; gin-traps present on segments 1–2, 2–3, 3–4, 4–5 and 5–6, the first pair feebly sclerotised. Segment 9 (fig. 21) bearing a pair of very widely separated urogomphi which are attenuated and vertical. Sternites glabrous. *Legs* glabrous; hind femora extending as far as abdominal segment 4. *Spiracles* present on abdominal segments 1–6, the seventh and eighth pairs being closed and probably non-functional; peritreme broadly oval, very thin and slightly raised above general level of cuticle. Length up to 50 mm.; maximum breadth 18 mm.

Material studied. 1 L (exuviae), 3 P, 1 I, Brazil, Petropolis, i.1899, F. Ohaus leg., in coll. Z.M.H.

Reference. None available.

Pyrodes (s.g. **Esmeralda**) **auratus** (Linnaeus) (=**bifasciatus** Linnaeus)

Distribution. NEOTROPICAL REGION: South America (Argentina, Bolivia, Brazil, British Guiana, Ecuador, French Guiana, Peru, Venezuela).

Host plant: *Eperua* (E.A.J.D.).

Mature larva (fig. 22). *Head* slightly depressed and transverse. Genae strongly shouldered, with a blunt vertical carina beneath antennal foramen. Frons with a

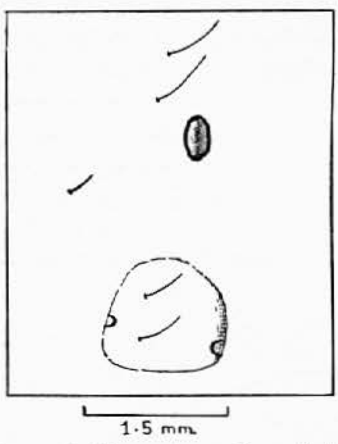


Fig. 22. *Pyrodes auratus* (Linnaeus). Mature larva. Part of abdominal segment 4, showing spiracle and pleural tubercle with sclerotised pits. Lateral aspect.

narrow pitchy anterior margin, the upper boundary of which is rather feebly carinate and the lower boundary not produced over clypeus; postcondylar carina distinct; subfossal process transversely oval. Antenna 2-segmented; segment 2 obliquely truncate apically and bearing sensory pores and setae. Three pairs of subcontiguous ocelli present, behind which are two widely separated ocelli. Clypeus glabrous. Labrum leathery, oval, ferruginous and densely fringed with coarse setae. Maxilla with palpal segment 3 much shorter than segment 2. Labial palpi with segment 2 slightly shorter than segment 1. *Prothorax* with pronotum and eusternum coarsely rugulose and bearing scattered short ferruginous setae; presternum non-tuberculate. *Abdomen* with ampullae glabrous, non-tuberculate. Pleural tubercles each with a pair of sclerotised pits (fig. 22). Anus trilobate. *Legs* 4-segmented, as long as maxillary palpi. *Spiracles* with peritreme narrowly oval, thin and ferruginous. Length up to 50 mm.; maximum breadth (at prothorax) 9 mm.

Appreciably differing from the larva of *Pyrodes nitidus* (Fabricius), particularly in the frons, the lower boundary of which is not produced over the clypeus, and the clypeus which is glabrous. This larva is apparently unique amongst the PRIONINAE in possessing a pair of sclerotised pits (placed laterally) on each pleural tubercle.

Biology. The larval galleries, which are loosely filled with coarse frass, extend 1 to 4 inches into the sapwood of logs, but occasionally the outer heartwood is damaged.

Material studied. 4 L, 1 I, British Guiana, Bartica-Potaro Road, m. 6 (white sand wallaba area), 29.iii.1957, from *Eperua*, E.A.J.D. leg., in coll. B.M.

Reference. None available.

Derancistrini

Derancistrus (s.g. **Solenoptera) thomae** (Linnaeus)

Distribution. NEOTROPICAL REGION: Caribbean (Guadeloupe, Jamaica, Puerto Rico, St. Thomas I.).

Host plants: *Bixa orellana* (Martorell, 1945); *Cedrela mexicana*, *Henrietella fascicularis* (Wolcott, 1951).

References. Martorell, 1945 (Biol.); Wolcott, 1936 (Biol.), 1951 (I fig., Biol.).

Calocomus desmaresti Guérin-Menéville

Distribution. NEOTROPICAL REGION: South America (Argentina, Bolivia, Peru).

Host plants: *Prosopis nigra*, *P. alba* (Bosq, 1934); *Gossypium*, *Pithecolobium saman*, "chañar" (Bosq, 1942a).

References. Bosq, 1934 (Biol.), 1942a (Biol.); Denier, 1939 (Biol.); Reed, 1912 (not seen).

Calocomus morosus White

Distribution. NEOTROPICAL REGION: South America (Argentina, Bolivia, Brazil, Peru).

Host plants: *Prosopis nigra*, *P. alba* (Bosq, 1934); *Pithecolobium saman* (Bosq, 1942a).

References. Bosq, 1934 (Biol.), 1942a (Biol.); Reed, 1912 (not seen).

Macrotomini

Strongylaspis (s.g. **Chiasmetes) limae** Guérin-Menéville

Distribution. NEOTROPICAL REGION: South America (Chile, Ecuador, Peru).

Host plant: *Quilloja saponaria* (Fairmaire and Germain, 1859).

Mature larva (fig. 23). Form subcylindrical, very robust. *Head* (fig. 23) moderately depressed, slightly transverse; frons pale testaceous except declivity of front margin, which is narrowly pitchy; front margin roundly declivous, without a complete transverse ridge on upper boundary and lower boundary not produced over clypeus. Antenna 2-segmented; segment 2 strongly elongate and obliquely truncate apically;

basal membrane strongly produced beyond foramen, the latter smooth, evenly rounded and closely surrounding the membrane but not concealing the inner face. Postcondylar carina distinct; subfossal process acutely conical. Ocelli indiscernible. Mandible 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 palp with segment 3 acutely conical, slightly shorter than segment 2. *Prothorax* obliquely inclined dorsally, about twice as broad as long; pronotum milky white,

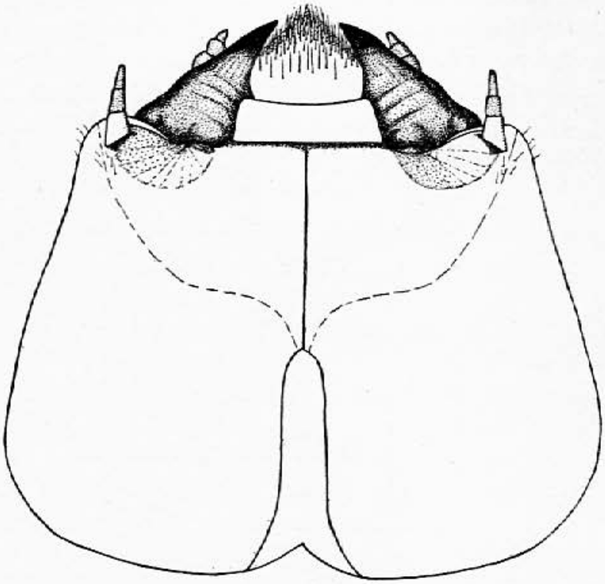


Fig. 23. *Strongylaspis limae* Guérin-Menéville. Mature larva. Head. Dorsal aspect.

sparsely setose anteriorly, vermiculately rugose posteriorly; median cleavage line shallow, rather indistinct; eusternum subtriangular, sparsely setose; presternum without tubercles. *Mesonotum* and *metanotum* smooth, glabrous. *Abdomen* with dorsal and ventral ampullae on segments 1–7 indistinctly defined, slightly wrinkled. Segment 9 large, slightly extended. Anus trilobed, each lobe strongly protuberant. *Legs* shorter than maxillary palpi, testaceous; unguiculus slightly attenuated. *Spiracles* with peritreme broadly oval, moderately thick and slightly raised above general level of cuticle. Length up to 60 mm.; maximum breadth (at prothorax) 14 mm.

Material studied. 4 L, 1 I, Chile, 11.xii.1950, Ross and Michelbacher leg., in coll. C.A.S.

Reference. Fairmaire and Germain, 1859 (Biol.)

Stenodontes (s.g. **Nothopleurus**) **maxillosus** (Drury)

Distribution. NEOTROPICAL REGION: Caribbean (Antigua, Barbados, Barbuda, Guadeloupe, Martinique, Puerto Rico, St. Barthélemy, St. Kitts); NEARCTIC REGION: U.S.A. (Florida).

Host plant: *Bursera gummifera* (Schwarz, 1888).

Mature larva (figs. 24–25). Form subcylindrical, very robust, slightly tapering posteriorly to abdominal segment 9. *Head* (fig. 24) slightly depressed, slightly transverse. Genae very strongly shouldered, rugose, pitchy, and bearing a few pale setae. Mouthframe strongly sclerotised, rugose, broadly pitchy. Frons with a broad pitchy anterior margin comprising a heavily sclerotised ridge which is strongly crenulate and abruptly sloping; upper boundary with margin crenulate, keel-shaped, broadly notched medially and produced beyond lower boundary in two paramedian flanges; lower

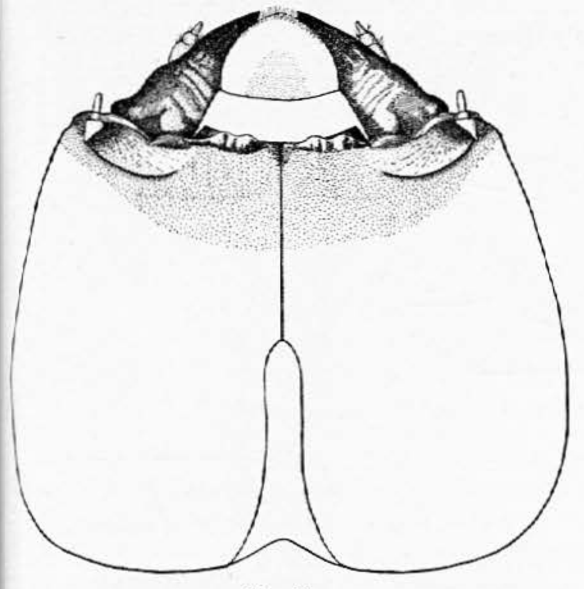


Fig. 24

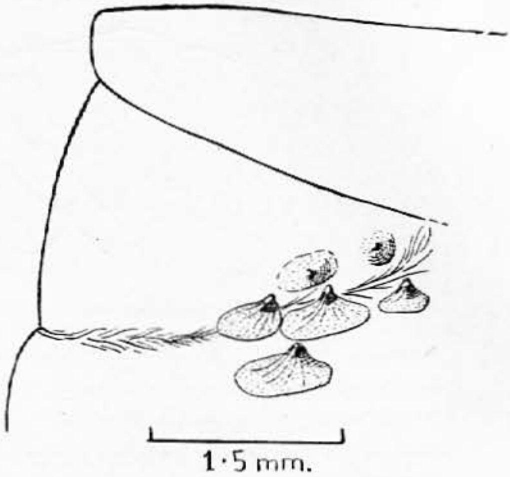


Fig. 25

Figs. 24–25. *Stenodontes maxillosus* (Drury). Mature larva. Fig. 24. Head. Dorsal aspect. Fig. 25. Left half of prothoracic presternum, showing tubercles. Ventral aspect.

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. 24). Three pairs of ocelli present which are sometimes partly obscured by the sclerotisation of gena. Mandible very robust, pitchy, shining, with basal half of outer face coarsely rugose and sparsely setose. Labrum oval, leathery, pale ferruginous, with long dense setae fringing the anterior margin. Gula extremely short, with sutures diverging to meet anterior portion of occipital foramen. Maxilla with palpal segment 3 slightly shorter than segment 2, stout and broadly rounded apically. Labial palpi with segment 2 about half length of segment 1, stout and broadly rounded apically. *Prothorax* moderately depressed, dorsally obliquely sloping anteriorly, about twice as broad as long; pronotum rectangular, delimited laterally by a pair of grooves; median cleavage line scarcely discernible except near base; coarsely rugose and bearing numerous scattered golden setae; postero-lateral angles each with an oblique broadly curved impression. Eusternum incompletely separated from presternum. Presternum (fig. 25) with lateral areas each bearing a group of about six conical, ferruginous, teat-like tubercles which are pitchy apically. *Mesonotum* and *metanotum* smooth, almost glabrous. *Abdomen* with dorsal and ventral ampullae on segments 1–7; each dorsal ampulla with two distinct transverse furrows, feebly rugose and glabrous. Pleural discs present on segments 1–7, each distinct, radially wrinkled or striate around invagination. Segments 8 and 9 feebly rugose, the latter slightly extended, three or four times longer and bearing scattered fine pale setae. Anus trilobed, each lobe protuberant and very densely covered with fine pale pubescence (only conspicuous when viewed laterally). *Legs* 3-segmented, distinctly shorter than maxillary palpi, pale, setose; unguiculus attenuated, imbricately spinose. *Spiracles* with peritreme broadly oval, pale and slightly raised above general level of cuticle. Length up to 80 mm., maximum breadth (at prothorax) 23 mm.

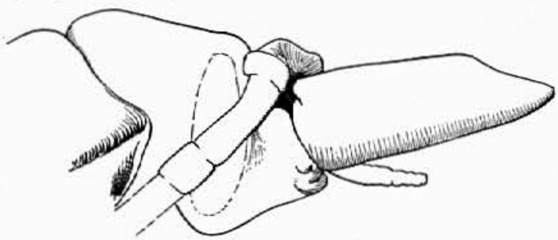


Fig. 26. *Stenodontes maxillosus* (Drury). Pupa. Head. Lateral aspect.

Pupa (fig. 26). *Head* (fig. 26) 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, long, very robust, micro-spiculate. Antennae filiform, thick, extending only as far as abdominal segment 2. *Pronotum* transversely rectangular, with sides parallel, slightly crenulate; disc transversely strigose and bearing scattered setose papillae. *Mesonotum* and *metanotum* with similar striae and papillae, the latter with a subconical protuberance 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. 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 and eighth pairs being partly closed and probably non-functional; peritreme narrowly oval, very thick. Length (excluding mandibles) up to 58 mm.; maximum breadth 21 mm.

Material studied. 2 L, 1 P, 1 I, Antigua, Bellon leg., in coll. B.M.

Reference. Schwarz, 1888 (Biol.).

Stenodontes (s.g. **Stenodontes**) **chevrolati** Gahan

Distribution. NEOTROPICAL REGION: Caribbean (Bahama Is., Cuba, I. de Pinos).

Mature larva. Very similar to that of *S. maxillosus* (Drury) but differing as follows. *Head* with ventral margin of antennal foramen without a curved ridge-like protuberance. *Prothorax* with teat-like tubercles of presternum pale testaceous, pitchy at extreme apex. From *S. damicornis* (Linnaeus) it may be distinguished by the broadly pitchy front margin of the frons, which is feebly crenulate. Length up to 80 mm.; maximum breadth (at prothorax) 22 mm.

Material studied. 1 L, 1 I, Cuba, Cayamas, G. Dimmock leg., in coll. U.S.N.M.

Stenodontes (s.g. **Mallodon**) **spinibarbis** (Linnaeus)

[Aserrador]

Distribution. NEOTROPICAL REGION: Mexico, Central America, Caribbean (Dominica, St. Vincent), South America (Argentina, Brazil, British Guiana (Liberty I.), French Guiana, Paraguay, Uruguay, Venezuela).

Host plants: *Dalbergia nigra* (Zikàn and Zikàn, 1946); *Salix babylonica*, *S. humboldtiana* and *Populus dilitata* (Burmeister, 1865); *Citrus aurantium* (Melzer, 1919); *Populus*, *Alnus* (Bosq, 1934); *Citrus*, *Robinia pseud-acacia* (Bosq, 1942a); *Aspidosperma polyneuron*, *Eucalyptus* spp. (Andrade, 1928); *Alexa leiopetala*, *Catostemma commune*, *Ocotea rodiaei*, *Miconia guianensis*, *Ormosia coutinhoi* (E.A.J.D.).

Adult (Pl. I, fig. 2). Length 38–58 mm. Head and pronotum black; elytra dark brown, glabrous, feebly shining. *Head* (male) with mandibles large and robust, their inner surfaces densely pubescent; antennae much shorter than body in both sexes. *Pronotum* broadly depressed, rectangular, with disc mostly smooth and shining and with a pair of sublateral longitudinal carinae; lateral margins broadly and densely punctured, matt. *Elytra* glabrous, shining, with margins somewhat explanate; apices each with a small sutural spine.

Mature larva (Pl. I, fig. 1). Similar to those of other species of this genus but distinguishable by the tubercles on the presternum, which are transversely oval to globular, fleshy, pale, setose and not sclerotised. The front margin of the frons is almost straight as in *S. damicornis* (Linnaeus). Length up to 130 mm.; maximum breadth (at prothorax) 24 mm.

Biology. The emergence period in Venezuela is during July and August (Rojas, 1866). Larvae of this species were in great demand by the local Indians in British Guiana, who consumed them with obvious relish (E.A.J.D.).

Predators. Several larvae of the large elaterid *Chalcolepidus striatus* were present in some of the logs examined (E.A.J.D.).

Economic importance. Numerous larvae of this species were recently seen by the author in British Guiana where they were infesting the sapwood and inner heartwood of various logs, including greenheart (Pl. I, fig. 3). Some larvae were over five inches in length and more than one inch in diameter, and had excavated galleries over two inches in width. Logs are apparently not attacked until they have been felled for several months.

Material studied. 2 L, 1 I, British Guiana, Bartica district, Skull Point, 18.v.1957, from *Alexa leiopetala*, E.A.J.D. leg., in coll. B.M.; 1 L, 1 P, 1 I, British Guiana, Bartica, 28.iii.1957, from *Catostemma commune*, E.A.J.D. leg., in coll. B.M.; 1 L, 1 P, 1 I, British Guiana, Bartica district, Skull Point, 18.iv.1957, from *Miconia guianensis*, E.A.J.D. leg., in coll. B.M.; 1 L, Brazil, São Paulo, in coll. D.Z.S.P.

References. Andrade, 1928 (Biol.); Bosq, 1934 (Biol.), 1942a (Biol.); Burmeister, 1865 (Biol.); Grégoire, 1957 (I, Physiol.); Hayward, 1941 (Biol.); Heller, 1904 (L fig., P fig.); Lima, 1930 (Biol.), 1955 (Biol.); Melzer, 1919 (Biol.); Reed, 1912 (?); Rojas, 1866 (Biol.); Trujillo, 1942 (L fig., Biol.); Zikán and Zikán, 1946 (Biol.).

Stenodontes (s.g. **Stenodontes**) **damicornis** (Linnaeus)

Distribution. NEOTROPICAL REGION: Caribbean (Jamaica, Puerto Rico), South America (Surinam).

Host plant: *Citrus.*

Mature larva. Distinguishable from larvae of other species of this genus by the front margin of the frons, which is almost straight (at most very feebly crenulate) and narrowly pale ferruginous. The entire head-capsule is much less strongly sclerotised than in other species.

Biology. Negroes carefully broil the larvae over a charcoal fire (Bequaert, 1921). Larvae are eaten in Surinam, West Indies and America by both coloured and white people (Hope, 1842).

Parasites. Sarcophaga lambens Wiedner (=*sternodontis* Townsend) (Aldrich, 1927, Emden, 1950).

Material studied. 1 L, 1 I, Jamaica, 1922, from *Citrus*, Leon leg., in coll. B.M.

References. Aldrich, 1950 (Paras.); Bequaert, 1921 (Biol.); Browne, 1789 (I fig., Biol.); Duffy, 1953a (Biol.); Emden, 1950 (Paras.); Hope, 1842 (Biol.); Mérian, 1719 (L fig., I fig.).

Stenodontes (s.g. **Mallodon**) **dasytomus** (Say)

Distribution. NEOTROPICAL REGION: Mexico (Las Tres Marías), Central America (British Honduras, Guatemala, Nicaragua, Panama), Caribbean (I. Tobago, Puerto Rico), South America (Brazil, Colombia, Ecuador, Peru, Venezuela).

NEARCTIC REGION: U.S.A. (including Arizona, Georgia, Louisiana, Texas and Virginia).

Host plants: *Quercus*, *Salix* (Craighead, 1915); *Acer pseudo-platanus* (Craighead, 1950); *Celtis*, *Carya* (Riley, 1880).

Mature larva. Rather similar to that of *S. damicornis* (Linnaeus) from which it may be distinguished by the more slender and less numerous prosternal tubercles. Length up to 50 mm.; maximum breadth (at prothorax) 11 mm.

Pupa. Craighead (1915) gives a description of the pupa, but it is not sufficiently detailed for inclusion in the present keys.

Biology. In Florida and Texas adults emerge during the period April to August (Riley, 1880). According to Craighead (1950), larvae feed for three or four years in the heartwood of living trees, particularly at their bases, making large galleries which are packed with coarse fibrous frass. The pupal cell is excavated deep in the wood and packed behind with a fibrous plug of frass. The adult gnaws its way out in midsummer.

Economic importance. This species has been recorded (Craighead, 1915) infesting the heartwood of living willow from Mississippi. It is also injurious to oak roots. Although healthy trees are attacked, injured or unhealthy trees are preferred (Riley, 1880). Cross-ties and similar material in contact with the ground are often badly damaged. The heartwood of shade trees is frequently hollowed out, resulting in the trees blowing over during storms (Craighead, 1950).

Material studied. 5 L, 1 I, Arizona, 30.vii.1952, from *Acer*, H. B. Leech leg., in coll. C.A.S.

References. Craighead, 1915 (L fig., P fig., Biol.), 1950 (L, Biol., Contr.); Dugès, 1884 (L fig., P fig.); Packaro, 1881 (Biol.); Riley, 1880 (Biol).

Stenodontes (s.g. **Nothopleurus**) **bituberculata** (Beauvois)

Distribution. NEOTROPICAL REGION: Caribbean (Cuba, Hispaniola (Haiti), Jamaica, Puerto Rico (Mona I.), St. Thomas I.).

Host plants: *Guazuma ulmifolia*, *Melicocca bijuga* (Matorell, 1945).

References. Martorell, 1945 (Biol.); Wolcott, 1936 (Biol.).

Callipogonini

Stictosomus (s.g. **Anacanthus**) **reticulatus** (Dalman) (=**costatus** Serville)

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plant: *Dalbergia nigra* (Zikán and Zikán, 1946).

Mature larva (fig. 27). As only a single mutilated larva is available, the following description is incomplete. *Head* scarcely depressed; frons testaceous, anterior half

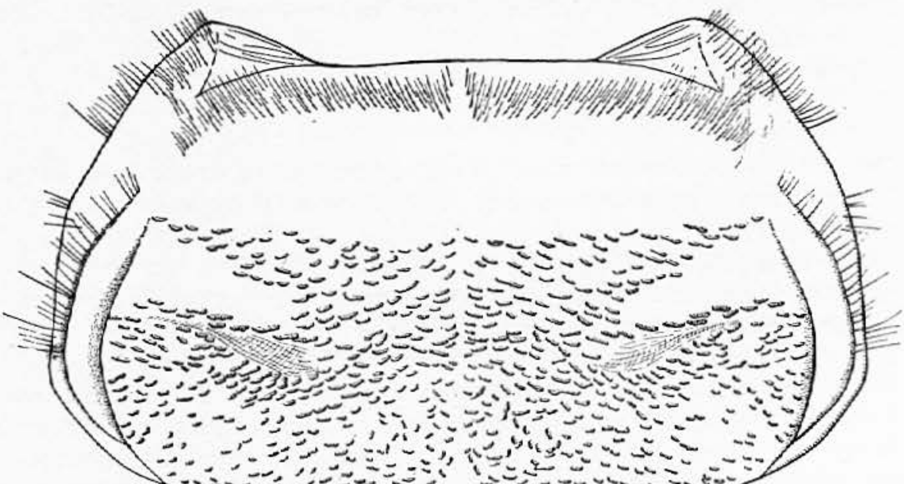


Fig. 27. *Stictosomus reticulatus* (Dalman). Mature larva. Pronotum.

pale ferruginous; front margin with upper boundary narrowly darkly ferruginous, almost straight, not projecting over lower boundary, which is produced laterally into a pair of acutely pointed flattened teeth. Postcondylar carina shallow, ferruginous. Subfossal process acutely produced and strongly compressed apically. Antenna 2-segmented; segment 2 obliquely truncate apically and bearing sensory pores and setae. Five pairs of ocelli present, three pairs being subcontiguous, the other two widely separated and placed posteriorly; lens small, round, convex, testaceous; pigmented spot rather faint. Mandible moderately robust, ferruginous; basal half coarsely rugose, apical half smooth and with a strongly raised transverse pitchy carina on apical third. Labrum transversely oval and rather sparsely fringed anteriorly with golden setae. Maxilla with segment 3 of palp stoutly conical, about two-thirds length of segment 2. Labial palpi with segment 2 stoutly conical, about two-thirds length of segment 1. *Prothorax* (fig. 27) with pronotum and prosternum bearing numerous transverse ferruginous asperities. *Spiracles* with peritreme broadly oval, testaceous and slightly raised above general level of cuticle. Length unknown; maximum breadth (at prothorax) 12·5 mm.

Pupa. Head at right angles to body, visible from above, entirely smooth and glabrous. Antennae filiform, extending as far as abdominal segment 2, where they are recurved ventrally. *Pronotum* transverse, rounded laterally, glabrous, without lateral tubercles. *Mesonotum* and *metanotum* sparsely spinose; scutellum transversely striate. Elytra and wings extending as far as abdominal segment 3. *Abdomen* with tergites covered with scattered spinules. Sternites with scattered, much finer spinules. Segment 9 unarmed. *Legs* glabrous; hind femora extending to between abdominal segments 2 and 3; hind tibiae obliquely set. *Spiracles* present on abdominal segments 1–6, those on segments 7 and 8 being closed and probably non-functional; peritreme broadly oval, testaceous and slightly raised above general level of cuticle. Length up to 52 mm.; maximum breadth 15 mm.

Material studied. 1 L, 6 P, 4 I, Brazil, Petropolis, Karolinental, 29.x.1898, F. Ohaus leg., in coll. Z.M.H.

Reference. Zikán and Zikán, 1946 (Biol.).

Ergates spiculatus Leconte

Distribution. NEOTROPICAL REGION: Mexico; NEARCTIC REGION: U.S.A., Canada.

Host plants: *Pinus ponderosa* (Riley, 1880); *Pseudotsuga mucronata* (Hardy and Preece, 1926).

Mature larva. Head with frons completely ferruginous; front margin with upper boundary projecting in four large teeth, the outer pair projecting well beyond the inner pair; lower boundary with a pair of well-developed lateral lobes. Labrum cordate, at least as long as wide. Three large but indistinct ocelli present. Maxillary palp with segment 3 not longer than segment 2, acutely conical. *Prothorax* without a ferruginous transverse band near front margin. *Abdomen* with dorsal and ventral ampullae on segments 1–7. Pleural discs finely rugose, present on segments 1–6, though rather indistinct on segments 3–6. *Legs* with unguiculus pitchy, at least for basal half. Length up to 90 mm.; maximum breadth (at prothorax) 17·5 mm.

Pupa. Head salient, not concealed from above by pronotum, elongate; sides with two paramedian depressions above antennae, strongly rugose and glabrous except for a few scattered papillae. Antennae long and slender, extending as far as abdominal segment 3, where they are recurved to terminate between the fore and hind coxae. Mandibles very roguse on apical third. Labrum triangular, rugose, with numerous fine setae near apex. *Pronotum* very strongly transverse, with sides slightly rounded and broadly explanate, strongly rugose, striate, with scattered pale papillae. *Mesonotum* and *metanotum* transversely striate and glabrous; scutellum very broad and depressed; scutellar groove conspicuous. Elytra and wings extending as far as abdominal segment 3. *Abdomen* with tergites 1–6 rugose and covered with numerous short stout ferruginous spines; gin-traps present on segments 1–2, 2–3, 3–4, 4–5, 5–6 and 6–7; posterior transverse plate strongly dentate or crenulate along front margin. Tergite 8 with only a few pale spines. Sternites less rugose, with a few scattered papillae. Segment 9 terminating dorsally in a pair of subvertical, very stout urogomphi; glabrous, strongly rugose and deeply divided ventrally. *Legs* with hind femora extending to between segments 3 and 4. *Functional spiracles* present on abdominal segments 1–6; peritreme narrowly oval, thick and slightly raised on anterior half. Length up to 60 mm.; maximum breadth 20 mm.

Egg. Form ovoid, with one end bluntly tapering, the other more strongly tapering and truncate apically. Chorion light brown and covered with dark brown coarse reticulation (Duffy, 1953a).

Biology. The eggs are deposited in clusters in dead or decaying logs, although sometimes in apparently sound wood (Craighead, 1915). The larva excavates a very large gallery which often extends deep into the heartwood. The gallery of a mature larva is about 2 cm. in diameter. Pupation occurs in the sapwood. The pupal cell is large oval and plugged at the entrance with very coarse shredded shavings; the average dimensions are about 10 cm. by 4 cm. (Duffy, 1953a).

Economic importance. The economic importance of this species lies not so much in the frequency of infestation, but rather in the enormous damage caused by a single larva in excavating its broad gallery right into the heartwood. There are numerous references to the destruction caused by this species, which is often long after the timber has been used for structural purposes (for records see Duffy, 1953a, p. 9).

Material studied. 2 L, 1 P, Canada, Vancouver, Hawkins leg., in coll. B.M.; 1 L, London, vii.1948, in imported *Pinus* from North America, in coll. B.M.; 1 L, U.S.A., California, Los Angeles, 12.v.1951, R. Marguardt leg., in coll. C.A.S.

References. Craighead, 1915 (L fig., P, Biol.); Doane, van Dyke, Chamberlin and Burke, 1936 (L fig., I fig., Biol.); Duffy, 1953a (E fig., L fig., P fig., Biol. fig.); Fraser, 1948b (Biol.); Hardy and Preece, 1926 (Biol.); Spencer, 1949 (E, Biol.).

Callipogon (s.g. **Callipogon**) **barbatum** (Fabricius)

Distribution. NEOTROPICAL REGION: Central America (British Honduras, El Salvador, Guatemala, Nicaragua).

Host plant: *Pinus rudis* (Becker, 1953c).

Mature larva (fig. 28). *Head* (fig. 28) scarcely depressed; front margin of frons pitchy, with upper boundary only carinate sublaterally; lower boundary broadly produced over clypeus (even for median third) and produced more strongly laterally into an acute angle. Postcondylar carina shallow, pitchy, ferruginous. Subfossal process rather thick and blunt. Antenna 2-segmented; segments 1 and 2 extremely elongate, both at least three or four times as long as basal width; the latter obliquely truncate and bearing sensory pores and setae. Three pairs of ocelli present; lens round, convex; pigmented spot indiscernible. Mandible moderately robust, pitchy, basal half strongly rugose; apical half smooth and with a strongly raised transverse carina on apical third. Clypeus glabrous. Labrum ferruginous posteriorly and rather densely fringed anteriorly with stiff reddish setae. Maxillary palp 3-segmented, segment 3 shorter than segment 2. Labial palpi 2-segmented, segment 2 shorter than segment 1. *Prothorax* with pronotum and prosternum rugose, sparsely setose, shining. *Abdomen* with ampullae each with a pair of transverse furrows, glabrous, non-tuberculate. *Spiracles* with peritreme broadly oval. Length up to 85 mm., maximum breadth (at prothorax) 21 mm.

Pupa. *Head* salient, not concealed from above by prothorax, glabrous. Mandibles extending anteriorly, moderately to strongly robust, glabrous. Antennae thick, filiform, extending posteriorly as far as abdominal segment 3, where they are slightly curved inwards. *Pronotum* transversely rectangular with basal angles dentate; disc

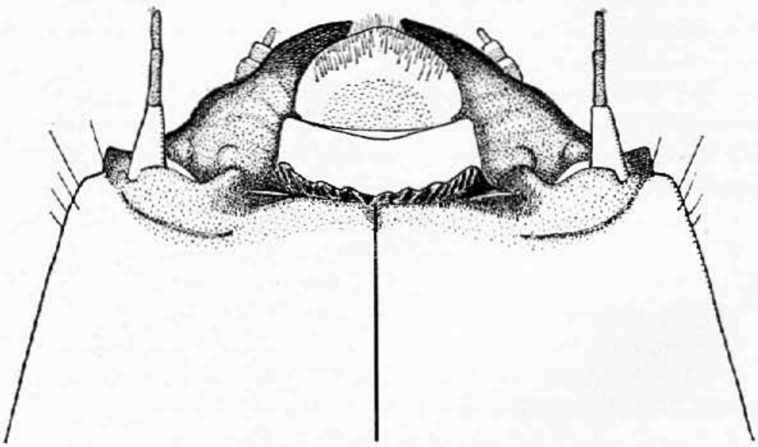


Fig. 28. *Callipogon barbatum* (Fabricius). Mature larva. Front part of head. Dorsal aspect.

transversely striate, glabrous, distinctly and completely margined posteriorly. *Mesonotum* and *metanotum* transversely striate, glabrous; scutellum rather thick and protuberant; scutellar groove with a pair of parallel longitudinal ridges. Elytra and wings extending as far as abdominal segment 4. *Abdomen* with tergites rugose and bearing numerous scattered ferruginous spinules; gin-traps present on segments 2–3, 3–4, 4–5 and 5–6; each consisting of two transverse protuberances, the anterior one thick and labiate, the posterior one thin and carinate. Sternites glabrous or almost so. *Legs* with hind femora extending as far as abdominal segment 4. *Functional spiracles* present on abdominal segments 1–6, the seventh and eighth pairs being closed and probably non-functional; peritreme rather broadly oval, moderately thick and slightly raised above general level of cuticle. Length up to 60 mm.; maximum breadth 16 mm.

Material studied. 3 L, 1 P, Costa Rica, Toro Amarille, 26.vii.1933, F. Nevermann leg., in coll. F.I.E.; 1 L, Mexico, Tapachula, M. Kabsch leg., in coll. Z.M.H.

References. Becker, 1953c (L fig., P fig., I fig., Biol. fig.); Schwerdtfeger, 1955 (Biol.).

Callipogon (s.g. **Orthomegas**) **cinnamomeus** (Linnaeus)

Distribution. NEOTROPICAL REGION: Central America (Nicaragua), Caribbean (Grenada, Trinidad), South America (Brazil, British Guiana, Colombia, French Guiana, Venezuela).

Host plants: *Hevea* (Bodkin, 1919); *Ocotea rodiaei*, *Inga* sp., *Peltoygne pubescens*, *Miconia guianensis*, *Byrsonima stipulacea*, *Jacaranda copaia* (E.A.J.D.).

Mature larva. Very similar to that of *C. barbatum* (Fabricius) from which it differs in having two pairs of supplementary ocelli in addition to the three pairs of subcontiguous ocelli (these supplementary ocelli are placed behind the subcontiguous ocelli, the lower one of the former being more or less in line with the upper one of the latter). Length up to 110 mm.; maximum breadth (at prothorax) 18 mm.

Pupa. Similar to that of *C. barbatum* (Fabricius) but differing as follows. *Abdomen* with spines on at least lateral areas flattened and scale-like. Urogomphi absent. Length up to 50 mm.; breadth 18 mm.

Biology. The galleries, which are up to 1½ inches broad, extend deeply into the sapwood and heartwood. They are linear, wide and tightly packed with granular frass.

Material studied. 1 L, British Guiana, Bartica district, Caow Creek, 5.iv.1957, from *Miconia guianensis*, E.A.J.D. leg., in coll. B.M.; 1 L, British Guiana, Bartica district, Caow Creek, from *Inga* sp., E.A.J.D. leg., in coll. B.M.; 1 L, British Guiana, Bartica district, Caow Creek, 4.v.1957, from *Peltoygne pubescens*, E.A.J.D. leg., in coll. B.M.; 2 L, 1 P, 1 I (reared), British Guiana, Bartica district, Skull Point, 10.iv. 1957, from *Byrsonima stipulacea*, E.A.J.D. leg., in coll. B.M.; 3 L, 1 I, British Guiana, Bartica district, Caow I., 1.iv.1957, from *Jacaranda copaia*, E.A.J.D. leg., in coll. B.M.

Reference. Grégoire, 1957 (I, Physiol.).

Callipogon (s.g. **Enoplocerus**) **armillatus** (Linnaeus)

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil, British Guiana, French Guiana, Paraguay, Venezuela).

Host plant: *Tecoma* sp. (F. Monrós).

References. Bosq, 1934 (Biol.), 1942a (Biol.); Goeldi, 1897 (P fig., I fig., Biol.)

Ctenoscelis (s.g. **Ctenoscelis**) **atra** (Olivier)

Distribution. NEOTROPICAL REGION: South America (Brazil, French Guiana).

Host plant: *Ficus* (Ohaus, 1900).

Mature larva (fig. 29). Form subcylindrical, very robust, slightly tapering posteriorly to abdominal segment 9. Similar to larvae of *Stenodontes* but differing as follows. *Head* with front margin of frons with upper boundary produced into a pair of small paramedian lobes; lower boundary more strongly produced over each side of clypeus. *Prothorax* with presternum (fig. 29) with lateral areas bearing one large sclerotised ferruginous tooth and several small, pale, oval, convex tubercles.

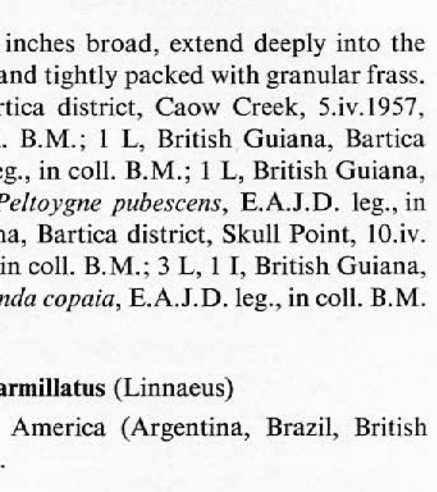


Fig. 29. *Ctenoscelis atra* (Olivier). Mature larva. Right half of prothorax, showing prothoracic leg and dentate process. Ventral aspect.

Material studied. 1 L, Brazil, Petropolis, 1898, F. Ohaus leg., in coll. Z.M.H.; 1 L (dry), no data, in coll. B.M.

References. Heller, 1904 (L fig., P fig.); Melzer, 1919 (Biol.); Ohaus, 1900 (Biol.).

Ctenoscelis (s.g. **Ctenoscelis**) **acanthopus** Germar

Distribution. NEOTROPICAL REGION: South America (Argentine, Brazil, Paraguay).

Host plants: *Ocotea pretiosa* (Zikán and Zikán, 1946); *Theobroma* (Moreira, 1921); palms (Wille, 1925).

Biology. Adults of this species emit a distasteful and strong-smelling secretion (Zikán and Zikán, 1946).

References. Bosq, 1942a (Biol.); Lima, 1922 (Biol.), 1928 (Biol.), 1955 (Biol.); Moreira, 1921 (Biol.); Wille, 1925 (Biol.); Zikán and Zikán, 1946 (Biol.).

Prionini

Derobrachus (s.g. **Derobrachus**) **asperatus** H. W. Bates

Distribution. NEOTROPICAL REGION: Central America (Costa Rica), South America (Peru).

Host plant: *Persea* sp. (Wille, 1935).

Biology. Wille (1935) describes the characteristic damage caused by adults of this species and by *Oncideres poecilla* Bates, which, he implies, are identical. The present author, however, considers this to be open to considerable doubt, particularly as the adult of *Derobrachus* is prognathous and therefore incapable of girdling.

Control. Wille (l.c.) suggests the hand collection of adults and the disposal of dead wood.

Reference. Wille, 1935 (Biol., Contr.).

Derobrachus (s.g. **Derobrachus**) **geminatus** Leconte

Distribution. NEOTROPICAL REGION: Mexico; NEARCTIC REGION: U.S.A. (California).

Host plants: Orchard trees (roots) (Doane, van Dyke, Chamberlin and Burke, 1936).

Reference. Doane, van Dyke, Chamberlin and Burke, 1936 (Biol.).

Derobrachus (s.g. **Orthosoma**) **brunneus** (Forster)

Distribution. NEOTROPICAL REGION: Caribbean (Guadeloupe, Hispaniola (Haiti)); NEARCTIC REGION: U.S.A.

Host plant: *Pinus* (Riley, 1880).

Economic importance. According to Doane, van Dyke, Chamberlin and Burke (1936) this species is particularly destructive to structural timbers which are in contact with the ground.

References. Boving and Craighead, 1931 (L fig.); Doane, van Dyke, Chamberlin and Burke, 1936 (Biol.); Packard, 1881 (Biol.); Riley, 1880 (Biol.); Saunders, 1883 (I fig., Biol.).

Psalidognathus (s.g. **Prionocalus**) **atys** White

Distribution. NEOTROPICAL REGION: South America (Ecuador, Peru).

Mature larva. Rather similar to those of *Stenodontes* and *Ctenoscelis* from which it differs as follows. *Head* with three pairs of protuberant subcontiguous ocelli, behind which is an additional pair (sometimes partly or wholly obscured by sclerotisation of gena). Frons entirely pitchy, extremely coarsely rugoso-punctate; upper boundary of front margin straight or feebly crenulate (not produced); lower boundary moderately produced over clypeus laterally; gena with a strongly raised transverse carina immediately beneath ocelli. *Prothorax* with pronotum with a broad, transverse and very distinct ferruginous band near front margin. Prosternum without sublateral groups of tubercles. *Abdomen* with segment 8 about half as long as segment 9. *Spiracles* with peritreme broadly oval, extremely thick and appreciably raised above general level of cuticle. Length up to 102 mm.; maximum breadth (at prothorax) 19·5 mm.

This larva appears to possess all the fundamental characteristics of the Macrotomini, such as the 2-segmented antenna and three pairs of ocelli, and cannot be included in the Prionini in which this genus has been placed on the basis of adult classification.

Material studied. 6 L, Ecuador, Thal v. Loja, 8.ix.1905, Ohaus leg., in coll. Z.M.H.

Psalidognathus (s.g. **Psalidognathus**) **modestus** Fries

Distribution. NEOTROPICAL REGION: Central America (Costa Rica, Panama), South America (Colombia, Ecuador).

Reference. Lameere, 1885 (? L fig.).

Psalidognathus (s.g. **Psalidognathus**) **friendi** Gray

Distribution. NEOTROPICAL REGION: South America (Bolivia, Colombia, Ecuador, Venezuela).

Host plant: *Cedrus* (Rojas, 1857).

Biology. Adults fly at dusk during May and June (i.e. during the rainy season) (Rojas, 1857).

Reference. Rojas, 1857 (Biol.).

Psalidognathus (s.g. **Psalidognathus**) **sallei** J. Thomson

Distribution. NEOTROPICAL REGION: South America (Venezuela).

Host plant: *Cedrus* (Rojas, 1866).

Biology. Adults fly at dusk and during the night and are readily attracted to artificial light. The females, which are apterous, remain at the foot of trees while the males fly around them, fighting amongst themselves. Emergence occurs mainly at the beginning of the rains in June and July and also in September and October (Rojas, 1866).

Reference. Rojas, 1866 (Biol.).

Prionus

Several species of this genus are found in Mexico, but no larvae are available. The following is a description of *P. coriarius* (Linnaeus), which should be essentially similar.

Mature larva (figs. 30–33). Form subcylindrical, very robust, gradually tapering posteriorly to abdominal segment 9. *Head* (figs. 30–31) moderately depressed, slightly transverse. Genae very strongly shouldered, rugose, darkly pigmented and bearing a few pale setae. Mouthframe strongly sclerotised, rugose, broadly pitchy. Frons with a broad pitchy anterior margin which merges posteriorly into a ferruginous area, which in turn merges into a smooth testaceous area. Front margin of frons comprising a pitchy, heavily sclerotised ridge, which is abruptly sloping; upper boundary varying from straight to slightly bilobed, keel-shaped and notched medially; lower boundary produced over clypeus in four rugose lobes, the paramedian pair being small and blunt. Postcondylar carina distinct. Subfossal process acutely conical. Antenna 3-segmented; segment 2 barrel-shaped, obliquely truncate apically and bearing a minute sensory organ and a dome-shaped apical segment (fig. 32). Mandible very robust, pitchy, shining, with outer face strongly rugose. Labrum transversely oval, leathery, bearing numerous stout setae. Ocelli absent. Gula extremely short; sutures diverging to meet anterior portion of occipital foramen. Maxillary lobe and palpus with shape and setae as figured (fig. 33). *Prothorax* moderately depressed, about twice as broad as long, with a conspicuous transverse ferruginous band near front margin. Pronotum rectangular, delimited laterally by a pair of conspicuous grooves; median cleavage line shallow, distinct; anterior region transversely rugose, bearing a few scattered setae; posterior region irregularly rugose, glabrous. Eusternum distinctly separated from presternum by a V-shaped suture. Sternum coarsely rugose, with a few scattered short setae. *Mesonotum* and *metanotum* irregularly rugose, almost glabrous. *Abdomen* with dorsal and ventral ampullae on segments 1–7. Pleural discs present on segments 1–6; each radially striate, with a deep pore. Segments 8 and 9 feebly rugose, the latter large, extended and bearing a few short pale setae. Segment 10 trilobed, each lobe strongly protuberant, rugose and bearing a few fine setae. *Legs* rather short, slightly longer than maxillary palpi, ferruginous, very setose. *Spiracles* of mesothorax broadly oval; metathoracic pair minute; abdominal spiracles with peritreme broadly oval, thick and slightly raised above general level of cuticle. Length up to 76 mm.; maximum breadth (at prothorax) 14·25 mm.

For characteristics of the first-, second- and third-instar larvae, see Duffy, 1953a (p. 110).

Pupa (figs. 34–35). The following is a description of that of *P. coriarius* (Linnaeus). *Head* almost concealed from above by prothorax; glabrous, with four converging series of striae on disc. Antennae thick (serrate in male), extending as far as first abdominal segment. Labrum triangular, elongate, glabrous. Pronotum strongly transverse, with three pairs of lateral tubercles, the middle pair being the most strongly produced; transversely striate, glabrous. *Mesonotum* similarly striate, glabrous; scutellum fleshy, prominent, glabrous. *Metanotum* almost smooth. Elytra and wings extending as far as abdominal segment 4. *Abdomen* with tergites rugose, the first six bearing scattered minute papillae; sternites smooth (except last two) and glabrous. Tergite 9 markedly rugose, with two paramedian elongate, fleshy protuberances.

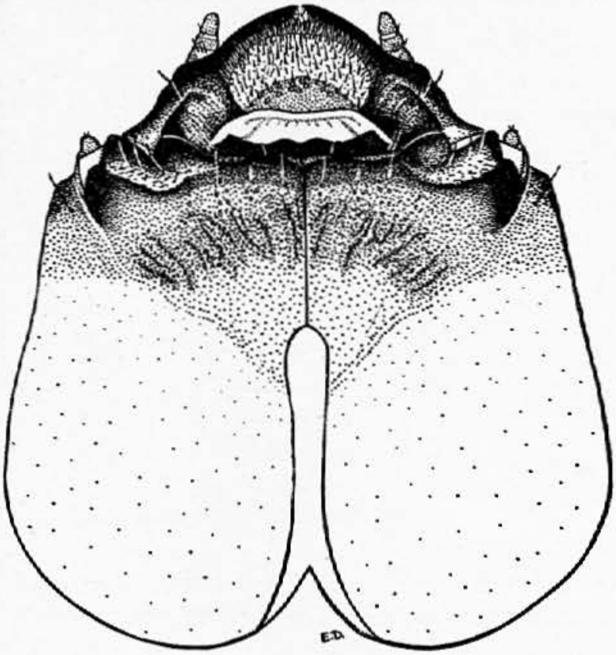


Fig. 30

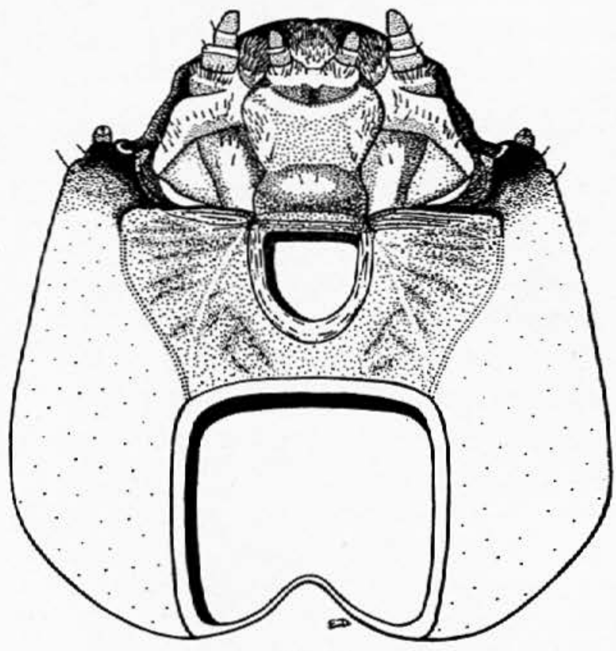


Fig. 31

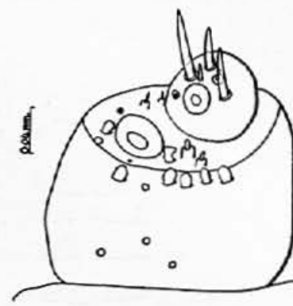


Fig. 32

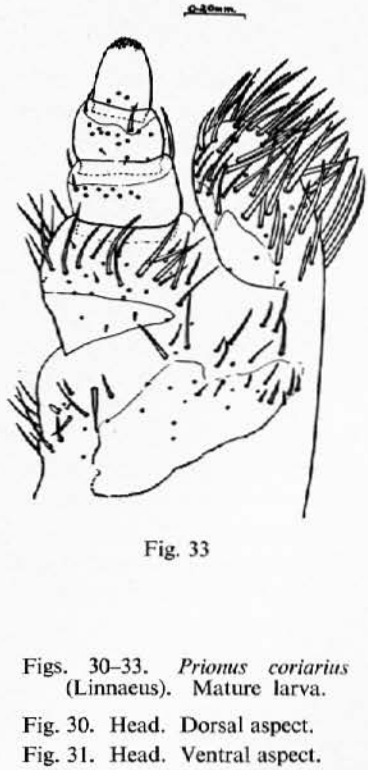


Fig. 33

Figs. 30–33. *Prionus coriarius* (Linnaeus). Mature larva.

Fig. 30. Head. Dorsal aspect.

Fig. 31. Head. Ventral aspect.

Fig. 32. Apical part of antenna.

Fig. 33. Apical part of right maxilla. Ventral aspect.

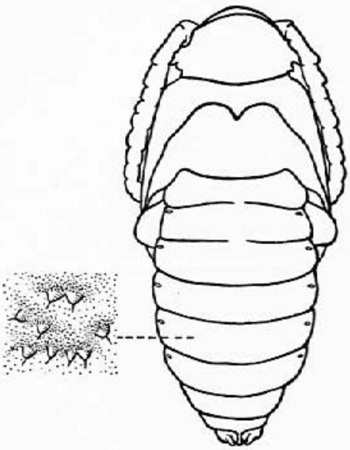


Fig. 34

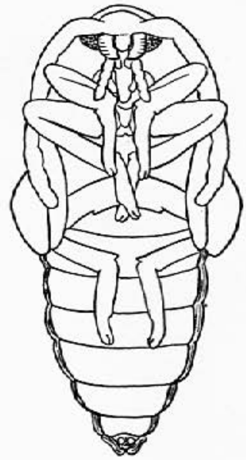


Fig. 35

Figs. 34–35. *Prionus coriarius* (Linnaeus). Pupa. Fig. 34. Male. Dorsal aspect. Fig. 35. Female. Ventral aspect.

Legs with hind femora extending only as far as abdominal segment 3. *Functional spiracles* present on segments 1–6, the seventh pair being almost closed and probably non-functional; peritreme narrowly oval and rather thick.

For information on the biology of various palaearctic and nearctic species of this genus, see Duffy, 1953a.

Anacolini

Trichoderes pini Chevrolat

Distribution. NEOTROPICAL REGION: Mexico, Central America (Guatemala).

Host plant: *Pinus* (Candèze, 1861).

Reference. Candèze, 1861 (L fig.).

Quercivir zikani Melzer

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plants: *Nectandra* sp. ?, ?*Cybistax antisyphilitica*, ?*Jacaranda puberula*, *J. semiserrata*, ?*Tecoma caraiba*.

Biology. The pupal period lasts about 44 days (Melzer, 1919).

Reference. Melzer, 1919 (Biol.).

Polyoza lacordairei Serville

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).

Reference. Heller, 1904 (L fig., P).

Myzomorphus scutellatus (Sallé)

Distribution. NEOTROPICAL REGION: South America (Venezuela).

Biology. Adults are to be found during the heat of the day on the trunks of felled trees. They are particularly common when a day of rain is succeeded by strong sunshine. Emergence occurs during July and August (Rojas, 1866).

Reference. Rojas, 1866 (Biol.).

Microplophorus magellanicus Blanchard

Distribution. NEOTROPICAL REGION: South America (Argentina, Chile), Falkland Is.

Host plants: *Nothofagus antarctica* (Lameere, 1906); *Nothofagus dombeyi* (Kuschel, 1955); *Lomatia obliqua*, *Libocedrus chilensis* (Bosq, 1942a).

Mature larva (fig. 36). Similar to that of *Strongylaspis limae* Guérin-Méneville from which it may be distinguished by the presence of a pair of paramedian dentate processes on the upper boundary of the frons (fig. 36). Length up to 50 mm.; maximum breadth (at prothorax) 12 mm.

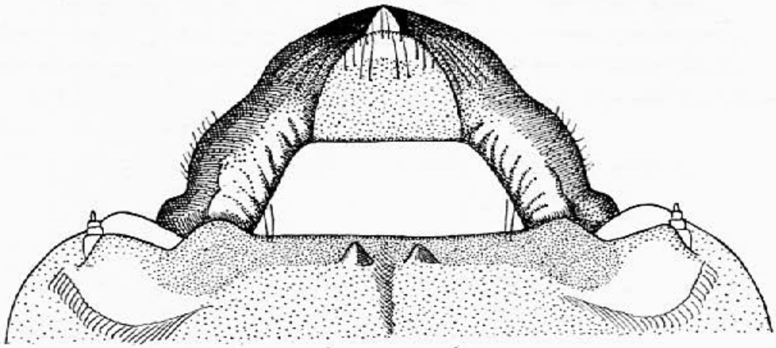


Fig. 36. *Microplophorus magellanicus* Blanchard. Front part of head. Dorsal aspect.

Material studied. 2 L, Falkland Is., A. M. Reid leg., in coll. B.M.

References. Bosq, 1942a (Biol.); Kuschel, 1955 (Biol.); Lameere, 1906 (Biol.); Monrós, 1944 (Biol.).

Microplophorus calverti Philippi

Distribution. NEOTROPICAL REGION: South America (Chile).

Host plant: *Araucaria araucana* (Kuschel, 1955).

References. Bosq, 1942a (Biol.); Kuschel, 1955 (Biol.); Lameere, 1906 (Biol.).

Meroscelisus zikani Melzer

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plant: *Nectandra* sp. (Lima, 1930).

References. Lima, 1930 (Biol.); Melzer, 1927 (Biol.).

4. LEPTURINAE

Larval Characters

Form subcylindrical to strongly depressed. *Head* slightly to strongly transverse; epicranical 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 small, with nearly contiguous marginal chambers.

Rhagium inquisitor (Linnaeus) and var. **lineatum** Olivier

[The Ribbed Pine Borer]

Distribution. NEOTROPICAL REGION: Mexico (var. *lineatum*); NEARCTIC REGION: U.S.A., Canada (var. *lineatum*); PALAEARCTIC REGION: Europe, Scotland, Siberia, North Africa, Japan.

Host plants: *Pinus*, *Picea*, *Larix*, *Betula* and *Quercus* (Reineck, 1919, Saalas, 1923, Xambeu, 1898–1902); *Cedrus atlantica* (Peyerimhoff, 1919); *Abies numidica* (Mühlmann, 1954).

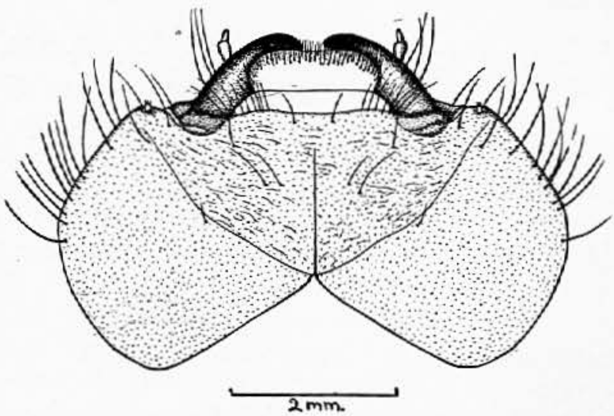


Fig. 37. *Rhagium inquisitor* (Linnaeus). Mature larva. Head. Dorsal aspect.

Mature larva (fig. 37). Form rather slender; cuticle rather thin and setose. *Head* (fig. 37) very strongly depressed and transverse (maximum head-width 5·75 mm.) and with sides very strongly rounded; completely ferruginous and rather dull dorsally. Genae ferruginous, with numerous long fine setae; temples with a distinct longitudinal keel beneath antennae. Median adfrontal suture black and complete for basal three-fourths. Frons without a transverse line, but paramedian depressions present. About twenty epistomal setae present. Mandible slender and strongly produced, with cutting edge short. Maxilla with basal segment of palpus strongly broadened apically.

Prothorax uniformly testaceous, without a ferruginous band near front margin. *Abdomen* with ampullae rather feebly tuberculate, dull and micro-spiculate. Tergite 9 feebly sclerotised and without a sclerotised process. *Legs* with unguiculus slender and attenuated. Length up to 27 mm.; maximum breadth (at prothorax) 6·1 mm.

Pupa (fig. 38). *Head* (fig. 38) slightly elongate, triangular, rugose; vertex with at least six long stout setae above each eye; frons with three to six setae near base of each antenna; base of clypeus with about six setae on each side. Antennae extending as far as abdominal segment 1, where they are curved downwards to terminate near base of each elytron. Mandible with a conspicuous dorso-lateral seta. Labrum transverse, rectangular, glabrous. *Pronotum* quadrate, with front margin strongly rounded and with a pair of large lateral tubercles; a row of erect, closely set, long, slender setae

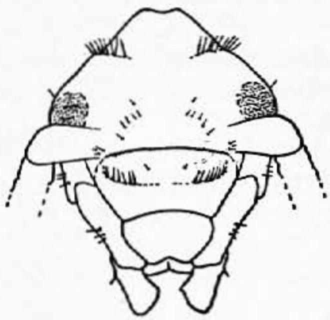


Fig. 38. *Rhagium inquisitor* (Linnaeus). Pupa. Head. Ventral aspect.

present along front and hind margins and scattered finer setae present on lateral tubercles and disc. *Mesonotum* with two groups of fine ferruginous setae and scutellum with similar setae, especially near base. *Metanotum* with a group of similar setae on each side of scutellar groove, which is shallow and transversely striate. Elytra and wings extending as far as abdominal segment 3. *Abdomen* with tergites 1–6 each bearing a pair of transverse rows of short ferruginous spines (each with a long basal seta). Tergites 7 and 8 with a row of similar but stouter spines along posterior margin. Tergite 9 with a stout terminal spine which is pale testaceous basally, as are the spinules on each side. Sternites with sublateral groups of long stout setae, except the ninth, which has only two setae and the tenth which is glabrous. *Legs* with numerous long stout setae at apex of each femur, and paired setae near apex of each tarsus; hind femora extending to abdominal segment 4. *Functional spiracles* present on abdominal segments 1–5, the sixth and seventh pairs being closed and vestigial; peritreme broadly oval, rather thin and level with general level of cuticle. Length up to 21 mm.; maximum breadth 7·75 mm.

Biology. Larvae of this species feed almost entirely subcortically, keeping themselves more or less protected by barriers of frass and fibres, which they break down and rebuild from time to time as they move about for food. The larval period varies from one to three years. Adults overwinter in their pupal cells, and do not emerge until the following spring (Duffy, 1953a).

Parasites. Hymenoptera: *Coeloïdes initiator* F., *Dorycetes leucogaster* Nees

(Xambeu, 1898–1902); *Bracon simplex* Creeson (Hess, 1920); *Ephialtes dux* Tschek., *E. tuberculatus* Fourc., *E. terebrans* Ratz., *Ischnoceros seticornis* Kr., *Xorides irrigator* F., *Deutoxorides collaris* Gr. (Seyrig, 1924); *Sichelia filiformis* Grav., *Ephialtes abbreviatus* Thoms. (Thompson, 1923).

Predators. Coleoptera: Larvae of the staphylinid *Nudobius lentus* Er. (Xambeu, 1898–1902).

Natural enemies. Woodpeckers (*Gecinus* spp.). Hess (1920) mentions that eggs and first-instar larvae are sometimes carried off by ants.

Economic importance. These larvae seem to prefer wood which is less decayed than do those of related species, which probably accounts for their not infrequent presence in converted softwood timber.

Material studied. 9 L, Aberdeen, viii.1920, in bark of fallen *Pinus*, F. Laing leg., in coll. B.M.; 2 P, Germany, Hanover, K. Jordan leg., in coll. B.M.; 3 P, U.S.A., Massachusetts, 27.ix.1904, G. Dimmock leg., in coll. U.S.N.M.; 1 P, Denmark, Gribso, 18.ix.1927, S. G. Larsson leg., in coll. U.Z.M.C.

References. Caillol, 1914 (Biol.); Craighead, 1923 (L fig., Biol. fig.), 1950 (Biol. fig.); Doane, van Dyke, Chamberlin and Burke, 1936 (I fig., Biol.); Duffy, 1953a (L fig., P fig., Biol. fig.), 1957 (Biol.); Felt, 1908 (L fig., P fig., I fig., Biol. fig.); Horn, 1863 (Biol.); Mühlmann, 1954 (Biol.); Packard, 1881 (Biol.); Riley, 1880 (Biol.); Villiers, 1946 (I fig., Biol.).

A more comprehensive list of references is given in Duffy, 1953a (p. 129).

Leptura aliena Bates

Distribution. NEOTROPICAL REGION: Mexico, Central America (Guatemala).

Host plant: *Pinus rudis* (Schwerdtfeger, 1955).

Mature larva. No material available. Larvae of this genus may be distinguished from those of *Rhagium* by the characters given in the key, p. 15.

Pupa. No material available. Pupae of this genus may be distinguished from those of *Rhagium* by the characters given in the key, p. 34.

Reference. Schwerdtfeger, 1955 (Biol.).

Necydalini

As already pointed out (Duffy, 1953a, p. 146), larvae of this tribe show a strong and undoubted relationship to the ASEMINAE and can only with difficulty be retained in the LEPTURINAE. Unfortunately no neotropical material of this tribe is available.

Callisphyris semicalignathus Fairmaire and Germain

Distribution. NEOTROPICAL REGION: South America (Argentina, Chile).

Host plant: *Nothofagus dombeyi*.

Biology. Only perfectly healthy trees are infested by this species. The large galleries excavated by the larvae result in killing the tree.

References. Fairmaire, 1888 (Biol.); Fairmaire and Germain, 1859 (Biol.); Monrós, 1944 (Biol.).

Callisphyris macropus Newman

Distribution. NEOTROPICAL REGION: South America (Argentina, Chile).

Host plants: *Saxifraga* (roots), *Rubus* (stems), *Ribes*, *Berberis darwinii*, *B. buxifolia* (stems) (Monrós, 1944).

Reference. Monrós, 1944 (Biol.).

Callisphyris vespa Fairmaire and Germain

Distribution. NEOTROPICAL REGION: South America (Argentina, Chile).

Host plants: *Cydonia*, *Ribes*, *Prunus malus* (Bosq, 1942a).

Reference. Bosq, 1942a (Biol.).

Rhatymoscelis melzeri Costa Lima

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plants: *Psidium guajava*, *Myrcia jaboticaba* (Lima, 1922).

References. Lima, 1922a (Biol.), 1922b (Biol.), 1928 (Biol.), 1955 (Biol.).

Bimiini

Sibylla coemeteri (Thomson)

Distribution. NEOTROPICAL REGION: South America (Argentina, Chile).

Host plant: *Nothofagus dombeyi* (living trees) (Monrós, 1944).

References. Bosq, 1942a (Biol.); Monrós, 1944 (Biol.).

Sibylla dancoi Lameere

Distribution. NEOTROPICAL REGION: South America (Chile).

Host plant: *Nothofagus antarctica*.

Reference. Lameere, 1906 (Biol.).

5. **OXYPELTINAE**, subfam. nov.

The examination of larvae of the genera *Cheloderus* and *Oxypeltus* has shown them to possess certain lepturine characteristics such as wedge-shaped, dentate mandibles, undivided occipital foramen, and at least five pairs of ocelli. They are not, however, typically lepturine, for the large hypostoma is concealed by the ventral prothoracic skin, which is attached to the base of the submentum; in this respect a close affinity to the DISTENIINAE is indicated. Another apparently unique character common to the genera in question is the fusion and strongly sclerotised condition of the labrum and clypeus. The head-capsule has the facies of many lamiine larvae, being distinctly elongate, sub-parallel-sided and with the occipital foramen also elongate. The legs, which are well developed, have an unusually short unguiculus, which is slightly twisted and produced apically into a minute spine-like tubercle.

In former keys to larvae of the LEPTURINAE and ASEMINAE (Duffy, 1953a, 1957), these larvae would run down more readily to the latter subfamily, owing to the absence of any posterior emargination of the head-capsule, the widely separated front coxae and the non-tuberculate but micro-spiculate abdominal ampullae.

The adult of *Cheloderus childreni* (Gray) was first described as a prionid owing to its typical prionine facies. Later it was regarded by Thomson and Lacordaire as a true cerambycid. Crowson (1953) has provisionally placed the Oxypeltini (comprising *Oxypeltus* and *Cheloderus*) in the LEPTURINAE, but he has drawn attention to the fact that they are atypical, possessing prionid-like facies, little posterior constriction of the head, and no mesonotal stridulatory file.

In view of the atypical lepturine characteristics of both adults and larvae, and the possession in the latter of the unique characters here referred to, there seems sufficient justification for removing the "Oxypeltini" from the LEPTURINAE and raising it to subfamily status.

Cheloderus childreni (Gray)

Distribution. NEOTROPICAL REGION: South America (Argentina, Chile, Colombia).

Host plants: *Nothofagus dombeyi* (Monrós, 1944); *Myrtus luma*, *Quercus* (Germain, 1900).

Adult. Head, prothorax and scutellum brilliant metallic green; antennae and legs metallic bluish-violet; elytra shining, glabrous, metallic green and copper. *Head* with antennae much shorter than body in both sexes. *Prothorax* very strongly explanate

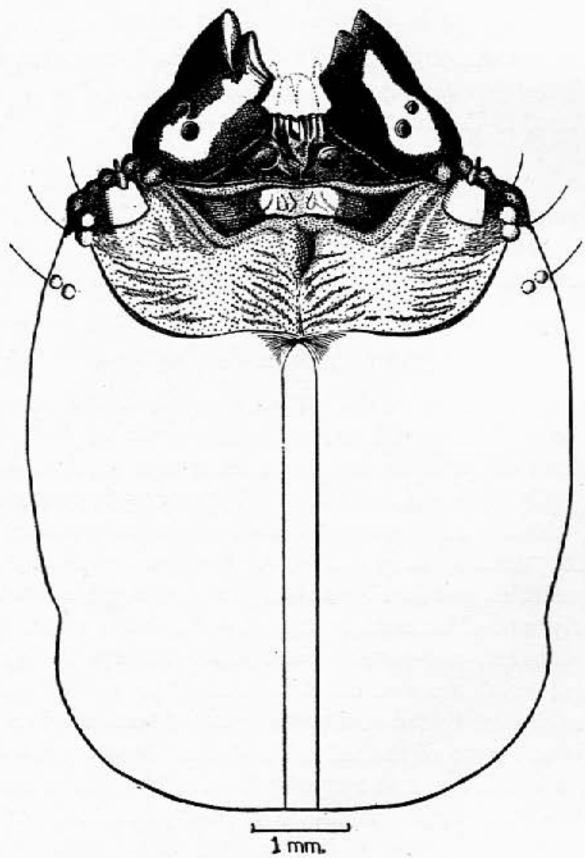


Fig. 39. *Cheloderus childreni* (Gray). Mature larva. Head. Dorsal aspect.

sublaterally, where it is produced into a pair of broad, slightly raised tubercles; coarsely rugoso-punctate. *Elytra* shining, very coarsely and deeply punctate; apices with sutural angle with a minute spine.

Mature larva (figs. 39–40). Form rather short, stout, parallel-sided and slightly depressed. *Head* (figs. 39–40) strongly sclerotised, ferruginous, becoming pitchy around mouthframe; distinctly narrower than prothorax (maximum head-width 5·9 mm.); slightly depressed and elongate, with sides almost straight and parallel; occipital foramen elongate. Frons ferruginous, pitchy anteriorly and strongly rugose; a pair of paramedian, transverse, rather deep impressions present near front margin; four epistomal setae present. Antenna 3-segmented; basal membrane very large; segment 3 elongate, cylindrical; supplementary process acutely conical. Mandible with cutting edge bidentate and with a conspicuous setose fovea on dorsal surface near base. Labrum and clypeus strongly sclerotised and fused. Five pairs of large ocelli present, two pairs (subcontiguous) immediately behind antenna, two pairs (subcontiguous) behind these, and one pair postero-ventrad of antenna; lens large, moderately convex; pigmented spot rather indistinct. Hypostoma large, nearly as

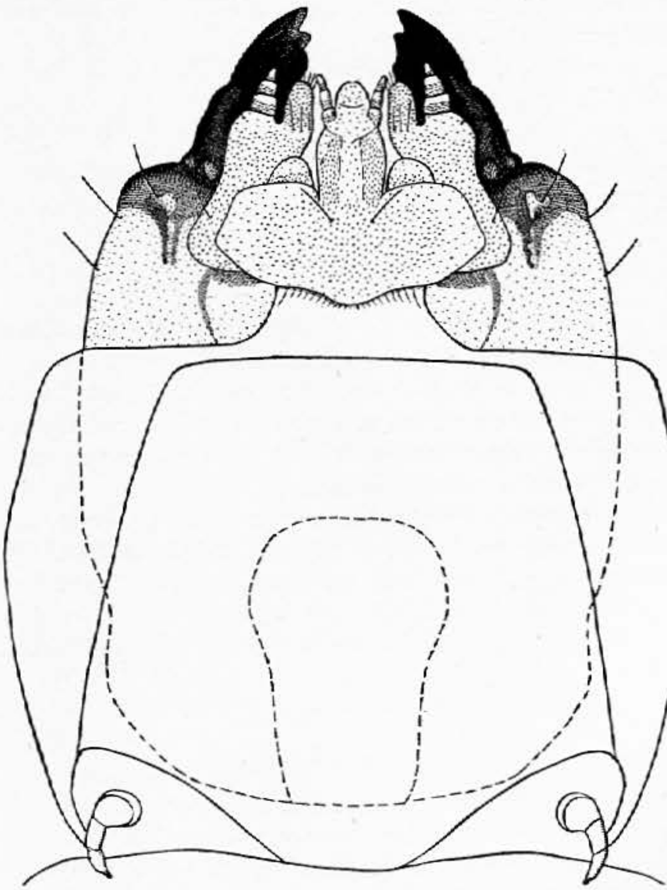


Fig. 40. *Cheloderus childreni* (Gray) Mature larva. Head. Ventral aspect.

long as broad, concealed by prothoracic skin which is attached to the base of the submentum. Maxilla with segment 3 of palp stoutly conical, about half length of segment 2; lobe covered apically with dense golden pubescence and bearing several long stout setae. Labial palpi with segment 1 slightly elongate, at most one and one-half times as long as segment 2. Mentum not distinct from submentum, elongate, strongly produced. *Prothorax* about twice as broad as long; dorsally obliquely sloping, pale ferruginous; pronotum micro-spiculate, with transverse rugae; prosternum similar. *Abdomen* with ampullae present on segments 1–7; each dorsal ampulla with two transverse furrows, the area between and around them densely micro-granulate and micro-spiculate. Tergite 9 smooth, sparsely setose, without a sclerotised process. Anus trilobate, the lobes shining, glabrous. *Legs* ferruginous, with unguiculus short and stout, slightly twisted and produced apically into a small spine-like tubercle. *Spiracles* with peritreme rather thick, narrowly oval, testaceous. Length up to 40 mm.; maximum breadth (at prothorax) 11 mm.

Biology. Adults of this species are diurnal, not nocturnal as was previously supposed (Kuschel, 1955).

Material studied. 1 L, Chile, Llanquihue, ix.1954, from *Nothofagus dombeyi*, G. Kuschel leg., in coll. B.M.

References. Bosq, 1942a (Biol.); Germain, 1900 (Biol.); Kuschel, 1955 (Biol.); Monrós, 1944 (Biol.).

Cheloderus penai Kuschel

Distribution. NEOTROPICAL REGION: South America (Chile).

Host plant: *Nothofagus antarctica* (Kuschel, 1955).

Reference. Kuschel, 1955 (Biol.).

Oxypeltus quadrispinosus Blanchard

Distribution. NEOTROPICAL REGION: South America (Argentina, Chile).

Host plants: *Nothofagus pumilio*, *N. dombeyi* (Bosq, 1942a).

Mature larva. Similar to that of *Cheloderus childreni* (Gray), but differing as follows: *Head* with paramedian transverse depressions of frons shallow. Labial palpi with basal segments strongly elongate, at least twice as long as second segment. *Abdomen* with anal lobes dull, micro-spiculate.

Biology. Adults fly readily in warm sunshine, making rapid zigzag vertical flights which makes their capture very difficult (Fairmaire and Germain, 1859).

Material studied. 1 L, Argentina, Patagonia, 22.v.1954, from *Nothofagus dombeyi*, S. Schajovstoi leg., in coll. B.M.

References. Bosq, 1942a (Biol.); Fairmaire and Germain, 1859 (Biol.); Germain, 1900 (Biol.).

6. DISTENIINAE

Larval Characters

In general form larvae of this subfamily, at least in the genus *Distenia*, are strikingly aberrant. Firstly, the occipital foramen is postero-dorsad (as in certain LAMIINAE) and, secondly, the prothoracic skin is attached ventrally directly to the submentum, a condition suggesting close affinity to the OXYPELTINAE.

Craighead (1923) characterises these larvae as follows: "Head transverse, dorsal margins of the epicranial halves behind front entirely separated; occipital foramen postero-dorsad; tentorium very broad, gula and hypostoma not evident. Mandibles rather elongate from side; apex slightly produced, cutting edge obliquely truncate, short. Epistoma not produced over clypeus, three epistomal setae. Clypeus trapezoidal, filling space between dorsal condyles of mandibles. Submentum attached to the collar; maxillae movable, cardo visible; maxillary articulating lobe full; palpifer small, joint-like; lacinia borne on stipes. Antennae frail, retractile. *Prothorax* with presternum and epipleurum anteriorly fused. Epipleurum large, rectangular; eusternum not sharply defined; coxae small, widely separated and situated at extremities of sternellum. Mesothoracic spiracles not protruding into prothorax. Legs moderate in size, weak. Epipleurum protuberant only on last three abdominal segments; pleural disc never present. Spiracles in a well-defined, elliptical, protruding region."

Distenia rugiscapis Bates

Distribution. NEOTROPICAL REGION: Central America (Panama).

Mature larva. No material available, but according to Craighead (1923) it closely resembles that of the North American *D. undata* (Fabricius), and can only be distinguished from it by the coarser and denser pubescence on the pronotum and ampullae. The following is a description, based on that by Craighead, of *D. undata*: Form very elongate, slender, anteriorly depressed, posteriorly cylindrical; prothorax proportionately much wider than in other subfamilies of cerambycid larvae, suggesting a buprestid; integument thin, shining, sparsely setose. *Head* depressed, widest about middle, slightly tapering anteriorly and posteriorly, rather deeply retracted in prothorax; mouthframe strongly sclerotised; epistoma nearly straight, rather abruptly raised; clypeus and labrum thin, the latter semi-elliptical, widest at base, finely and densely haired; mandibles narrow from side, about twice as long as basal width, cutting edge short, truncate, dorsal angle slightly toothed; no ocelli; antennae conical; segments 1 and 2 short, transverse, subequal; segment 3 slender and longer; antennal foramen closed posteriorly. Maxillary palpi conical, segment 3 longer than segment 2; process of palpifer small, fleshy; lacinia short, fleshy; mentum longer than wide; labial palpi slender, segment 2 shorter than segment 1; ligula large, fleshy; neither gular nor hypostomal sutures distinct. *Prothorax* depressed, transversely oval; pronotum trapezoidal, widest at base, a narrow band of short hairs across anterior margin, posteriorly velvety pubescent; presternum bearing two small fleshy lobes on anterior margin at base of submentum; eusternum widely trapezoidal, widest at base, posteriorly velvety pubescent; sternellum also velvety pubescent; mesonotum, metanotum, mesosternum and metasternum transverse, velvety pubescent; scutal and hypopleural areas protuberant. *Legs* small, slender, 3-segmented; tarsus attenuate, claw-like. *Abdomen* with segments very elongate, slender, cylindrical, intersegmental skin very long; ampullae widely separated, flat, transverse, dull, velvety pubescent, present only on segments 1–6; parascutal and coxal lobes protuberant laterally; segment 9 the longest, cylindrical; anus transverse, trilobate. *Spiracles* small, orbicular.

References. Craighead, 1923 (L, and L fig., P, Biol. of *D. undata* (Fabricius)).

7. 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. Clypeus trapezoidal, as broad at base as epistoma. Labrum transverse, semicircular to cordate. 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, very retractile and 3-segmented; antennal foramen 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 micro-spiculate; eusternum distinct, triangular; presternum and epipleurum fused; coxal lobe small, opposite sternellum. *Abdomen* with ampullae either glabrous or dull, micro-spiculate, never tuberculate 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 urogomphi; pleural discs absent. *Legs* moderately long, slender. *Spiracles* of mesothorax not protruding into prothorax; abdominal spiracles with two or more small marginal chambers.

Asemini

Arhopalus (=Criocephalus) obsoletus (Randall)

Distribution. NEOTROPICAL REGION: Mexico, Central America (Guatemala). NEARCTIC REGION: U.S.A.

Host plant: *Pinus tenuifolia* (Schwerdtfeger, 1955).

Mature larva. No larvae available. The following is a description of the palaearctic species *A. ferus* (Mulsant). Form rather robust, slightly depressed anteriorly (fig. 41). *Head* (fig. 42) depressed, transverse, widest behind middle, with sides moderately strongly rounded; smooth, orange-testaceous, shining, moderately strongly sclerotised. Genae testaceous, with rather dense, long, reddish setae, which are distributed beyond level of posterior end of frontal sutures. Frontal sutures distinct as pale lines, each extending to a gap in antennal foramen; median adfrontal suture complete and very distinct. Mouthframe strongly sclerotised, pitchy. Frons with front margin very slightly curved and roundly declivous; at least sixteen epistomal setae present. Antenna (fig. 43) with second segment bearing a conical supplementary process, which is as long as, or slightly longer than, its basal width; segment 3 very elongate. Mandible pitchy shining, with a transverse group of numerous setae across basal half; inner part of dorsal surface with a large oblique plate. Labrum cordate, about as long as wide; ferruginous, with numerous short, bristly setae apically and with a few longer setae medially. Ocelli absent. Gula narrow, testaceous, with sutures not raised;

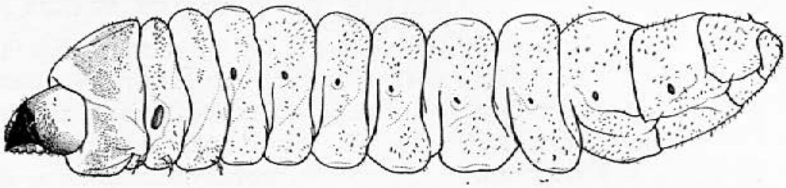


Fig. 41

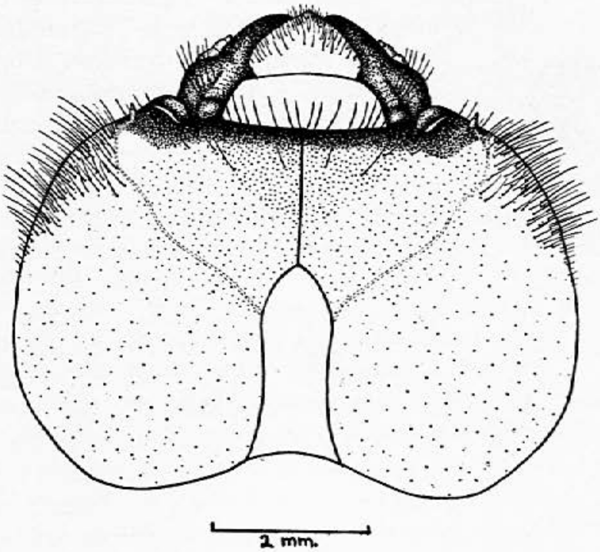


Fig. 42

Fig. 43

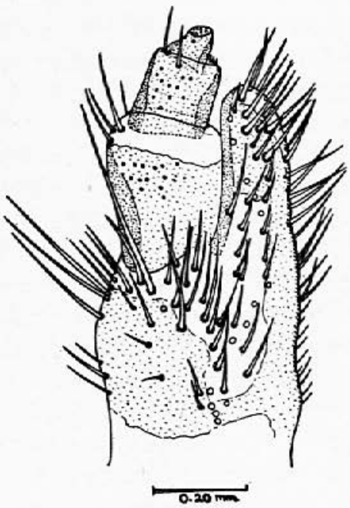


Fig. 44

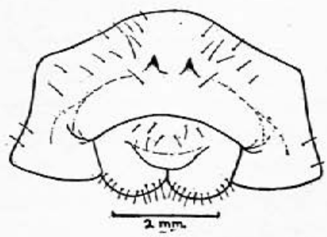


Fig. 45

Figs. 41–45. *Arhopalus ferus* (Mulsant). Mature larva. Fig. 41. Lateral aspect. Fig. 42. Head. Dorsal aspect. Fig. 43. Apical part of the antenna. Lateral aspect. Fig. 44. Apical part of right maxilla. Ventral aspect. Fig. 45. Urogomphi and anal lobes. Caudal aspect.

hypostomal plates large, trapezoidal, ferruginous, with anterior margin thick and pitchy. Ventral mouthparts fleshy; apical segment of maxillary palpi about half as long as second and as long as apical segment of labial palpi; lobe (fig. 44) slender, cylindrical, with setae as figured. Prothorax depressed, trapezoidal, widest in front; lateral setae very dense and ferruginous. Pronotum sparsely setose, pale and shining anteriorly, posteriorly orange-yellow, finely asperate, with numerous interspaced glabrous spots. Eusternum and sternellum finely asperate and setose. *Abdomen* with ampullae on segments 1–7. Pleural tubercle broadly oval and bearing about five setae. Urogomphi (fig. 45) on segment 9 acutely conical, seldom separated by more than twice their basal diameter, usually less. *Legs* distinct, 3-segmented; unguiculus very long, attenuate and imbricately spinose. *Spiracles* of prothorax large, about twice as broad as those on abdominal segment 1; obsolescent metathoracic spiracle visible; abdominal spiracles with peritreme broadly oval, and with at least six small subcontiguous chambers on posterior margin. Length up to 34 mm.; maximum breadth (at prothorax) 9 mm.

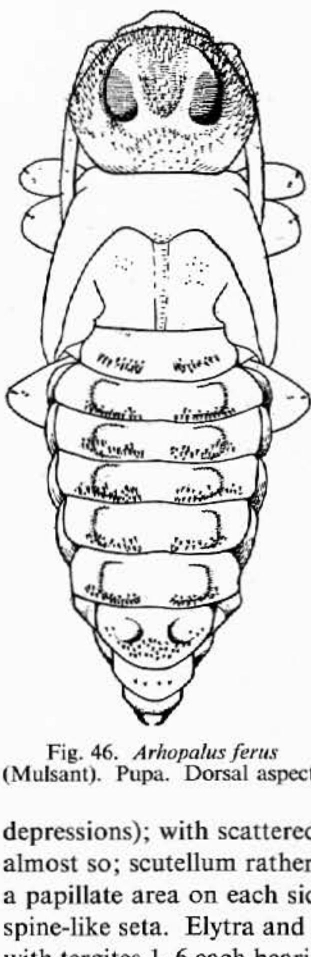


Fig. 46. *Arhopalus ferus* (Mulsant). Pupa. Dorsal aspect.

Pupa. Not available. The following is a description of that of *A. ferus* (Mulsant). *Head* (fig. 46) bent beneath pronotum which almost conceals it from above; quadrate, with sides strongly rounded, rugose, and with at most a few short pale spines and setae. Antennae transversely rugose, densely micro-spiculate, and with four to six rather stout ferruginous spines near apex of basal segment only; extending to just beyond middle of metathorax, where they are curved downwards to terminate near front coxae. Labrum triangular, transversely rugose and glabrous. Maxillary palpi spiculate and with a few fine pale setae. *Pronotum* very slightly transverse, with sides strongly rounded, and disc with two paramedian striated areas (often in the form of depressions); with scattered pale papillae of varying length. *Mesonotum* glabrous or almost so; scutellum rather broad, fleshy and with a few fine setae. *Metanotum* with a papillate area on each side of scutellar groove, each papilla being equipped with a spine-like seta. Elytra and wings extending as far as abdominal segment 4. *Abdomen* with tergites 1–6 each bearing four transverse groups of long straight spines near hind margin. Tergite 7 with a transverse group of scattered spines and tergite 8 with only a few spines. Tergite 9 short, glabrous, terminating in a pair of urogomphi, which are widely separated, slender and strongly curved inwards. Sternites with lateral groups of spines, except the last three, which are glabrous. *Legs* with several ferruginous spines near apex of each femur; hind femora with a large basal tubercle, almost at right angles to longitudinal axis of body and extending to between abdominal segments 2 and 3. *Functional spiracles* present on abdominal segments 1–7; peritreme broadly oval, moderately thick and slightly raised for anterior half. Length up to 30 mm.; maximum breadth 7·7 mm.

Biology. Larvae infest stumps of *Pinus* near ground-level and down into the roots (Craighead, 1923). Extensive galleries filled with fibrous and pellet-like frass are made in the sapwood or heartwood, large portions of the former often being destroyed. The life-cycle is from one to three years in duration. This species contributes to the decay of *Dendroctonus*-killed trees by destroying the base and roots, thereby causing trees to fall prematurely (Craighead, 1950).

References. Craighead, 1923 (L, Biol.), 1950 (Biol.); Duffy, 1953a (L fig., P fig., Biol. of *A. ferus* (Mulsant)); Schwerdtfeger, 1955 (Biol.).

Asemum glabrellum Bates

Distribution. NEOTROPICAL REGION: Mexico.

Mature larva. This is the only neotropical species of this genus. No larvae are available, but they should be essentially similar to that of the palaearctic species *A. striatum* (Linnaeus) which differs from those of *Arhopalus* as follows. *Head* less depressed, with sides more strongly diverging behind middle; genal setae shorter, finer, testaceous. Labrum slightly wider than long. Gular sutures slightly raised and almost as darkly pigmented as hypostomal sutures. Maxillary palpi with apical segment almost as long as second segment. *Prothorax* with lateral setae only moderately dense; pronotum with posterior part pale testaceous and much more finely asperate. *Abdomen* with urogomphi longer and stouter, subcontiguous at base and with apical third (at most) strongly sclerotised. Length up to 20 mm., maximum breadth (at prothorax) 5·8 mm.

Pupa. The following is a description of the pupa of *Asemum striatum* (Linnaeus). *Head* with vertex with two groups of short spines intermingled with numerous short pale setae; front with a transverse row of short spines above base of clypeus. Antennae transversely rugose, densely spiculate and with at least three short spines on each segment; extending to just beyond middle of metathorax, where they are strongly curved downwards to terminate near bases of elytra. Maxillary palpi spiculate and with a few short pale setae. *Pronotum* strongly transverse, with sides strongly rounded, and with scattered stout, ferruginous spines and long fine setae, especially along front margin. *Mesonotum* with a few fine setae; scutellum broad, rather depressed and glabrous or almost so. *Metanotum* with a few scattered minute spines on each side of scutellar groove. *Abdomen* with tergites 1–6 each bearing four transverse groups of numerous thorn-like ferruginous spines. Tergites 7 and 8 with scattered stout spines. Sternites with scattered groups of spines, except the ninth, which bears only two stout spines, and the tenth, which is glabrous. *Functional spiracles* with peritreme rather thick and raised above general level of cuticle. Length up to 18 mm.; maximum breadth 7 mm.

References. Duffy, 1953a (E, L fig., P fig., Biol. fig. of *A. striatum* (Linnaeus)).

Tetropium guatemalenum Bates

Distribution. NEOTROPICAL REGION: Central America (Guatemala).

Host plant: *Pinus rudis* (Becker, 1953c). An adult was found by Schwerdtfeger (1955) under the bark of *P. ayacahuite*, but this may be of no significance.

Mature larva (fig. 47). Rather similar to those of *Arhopalus* but differing as follows. *Head* transverse, with sides only slightly wider behind middle; genal setae mostly arising from ferruginous basal dots, which give the genae a spotted appearance. Frons distinctly darker than epicranial halves. Antenna with apical segment quadrate to transverse. Mandible without an oblique plate along edge of dorsal surface and bearing fewer setae. Labrum transversely ovate, about twice as wide as long. Gula much shorter, not more than half as long as hypostomal sutures. Maxillary palpi with apical segment almost as long as second segment. *Prothorax* as in *Asemum*. *Abdomen* with urogomphi (fig. 47) subcontiguous, slender and spine-like. *Legs* with femur and tibiotarsus distinctly ferruginous. *Spiracles* of abdomen with peritreme

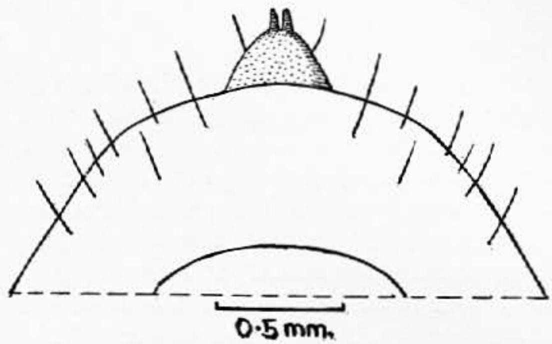


Fig. 47. *Tetropium guatemalenum* Bates. Mature larva. Urogomphi. Caudal aspect

subcircular and with two protuberant subcontiguous tubes on posterior margin. Length up to 19 mm.; maximum breadth (at prothorax) 5 mm.

Pupa. Not available. The following is a description of that of the palaearctic *T. gabrieli* Weise. Similar to that of *Asemum striatum* (Linnaeus), but differing as follows. *Head* with two to six short pale spines on vertex. Antennae transversely rugose, densely spiculate, the basal segment with about six testaceous spines near apex of basal segment, and remaining segments with scattered, much smaller spines; extending as far as abdominal segment 2. Maxillary palpi broadly truncate at apex. *Pronotum* elongate, with sides moderately rounded, and vertex with a pair of paramedian, longitudinal furrows; vertex and front margin with numerous conical papillae (each with an apical seta). *Mesonotum* glabrous; scutellum with a few minute setae. *Abdomen* with tergites 1–6 bearing two oval groups of spines (each with a subapical seta). Tergite 7 with a few scattered spines. Tergite 8 often, and 9 always, glabrous. *Legs* with a row of spines (with apical setae) near apex of each femur. *Functional spiracles* with peritreme slightly raised in anterior half. Length up to 16 mm.; maximum breadth 3·75 mm.

Biology. The larval galleries, and often the pupal cells, are subcortical. Sometimes, however, the larva enters the wood for a short distance and then turns abruptly, burrowing in a downward direction where the pupal cell is excavated. The pupal cell is 30–40 mm. in length. The times of pupation and emergence are apparently very variable, for pupae have been found in April, October and March, and adults in April, September, November and March (Schwerdtfeger, 1955). It seems probable that there may be two generations a year as in certain palaearctic species (Duffy, 1953a).

References. Becker, 1953 (Biol.); Duffy, 1953a (L fig., P fig., Biol. fig. of *T. gabrieli* Weise); Schwerdtfeger, 1955 (L fig., P fig., Biol. fig.).

Tetropium opacum Franz

Distribution. NEOTROPICAL REGION: Central America (Guatemala).

Host plant: *Pinus rudis* (Becker, 1953c).

Biology. The larval galleries are subcortical, but pupation takes place either under the bark or in the wood as in *T. guatemalenum* Bates.

References. Becker, 1953c (Biol.); Schwerdtfeger, 1955 (I fig., Biol.).

Tetropium beckeri Franz

Distribution. NEOTROPICAL REGION: Central America (Guatemala).

Host plant: *Pinus rudis* (Becker, 1953c).

References. Becker, 1953c (Biol.); Schwerdtfeger, 1955 (Biol.).

Tetropium schwerdtfegeri Franz

Distribution. NEOTROPICAL REGION: Central America (Guatemala).

Host plant: *Pinus rudis* (Schwerdtfeger, 1955).

Reference. Schwerdtfeger, 1955 (Biol.).

8. 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 a posterior portion. 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 upwards 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 distinctly defined. 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.

Thaumasini

Thaumasus gigas (Olivier)

Distribution. NEOTROPICAL REGION: Central America (Costa Rica, Guatemala), South America (Colombia).

Biology. Rodriguez (1905) refers to certain excrescences which he observed on the trunks of forest trees. Apparently the latter were always of the same species, but no name is given. These excrescences correspond with an excavated gallery in the trunk, and are themselves perforated with three or four holes (aeration holes?). They are composed of a gelatinous substance mixed with wood shavings and are in the form of half a pear. From the number of these excrescences and the presence of fungi this author estimates that the larval period of *T. gigas* (Olivier) is at least three years.

Reference. Rodriguez, 1905 (Biol.).

Achrysonini

Achryson surinamum (Linnaeus)

Distribution. NEOTROPICAL REGION: Mexico, Central America (Costa Rica, Guatemala, Nicaragua, Panama), Caribbean (Antigua, Barbados, Cuba, Dominica, Grenada, Guadeloupe, Hispaniola, Jamaica, St. Vincent, Tobago, Trinidad), South America (British Guiana, Paraguay, Uruguay, Venezuela). NEARCTIC REGION: U.S.A. (including Arizona, California, Texas). ETHIOPIAN REGION: São Thomé I (introduced?). PALAEARCTIC REGION: British Isles (occasionally imported).

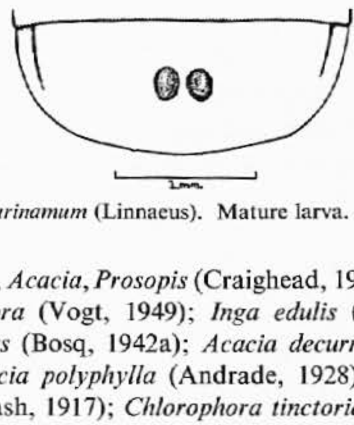


Fig. 48. *Achryson surinamum* (Linnaeus). Mature larva. Abdominal tergite 9.

Host plants: *Cercidium*, *Acacia*, *Prosopis* (Craighead, 1923); *Celtis laevigata*, *Ulmus crassifolia*, *Prosopis juliflora* (Vogt, 1949); *Inga edulis* (Ballou, 1945); *Nectandra*, *Robinia pseud-acacia*, *Ficus* (Bosq, 1942a); *Acacia decurrens molissima*, *Tamarindus indica* (Costa, 1943); *Acacia polyphylla* (Andrade, 1928); *Schnopsis*, *Aspidosperma* (F. Monrós); *Brya* sp. (Dash, 1917); *Chlorophora tinctoria* (F. Peña).

Mature larva (fig. 48). Form subcylindrical, slightly tapering. *Head* with sides diverging posteriorly; genae smooth, pale, sparsely setose. Mouthframe ferruginous and completely sclerotised beneath antennae. Antenna with segment 3 at least three times as long as basal width and about half length of segment 2; supplementary segment short, about one-third length of segment 3. Mandible pitchy with a shallow fovea which is sometimes longitudinally produced. Labrum roundly trapezoidal, bearing short setae. One pair of ocelli present, subcontiguous with base of antennae; lens very strongly protuberant; pigmented spot indistinct. Hypostoma transversely rugose, with front margin narrowly ferruginous; sutures distinct, almost straight; gula narrow, with sutures protuberant. Maxilla with segment 3 of maxillary palp as long as segment 2; process of palpifer distinct but short. *Prothorax* trapezoidal, with lateral regions bearing fine slender setae. Pronotum regularly and strongly punctate anteriorly; finely reticulate and irregularly longitudinally striate posteriorly; median cleavage line distinct. *Mesonotum* and *metanotum* finely granulate. Prosternum bisected by a strongly raised longitudinal ridge. *Abdomen* with dorsal ampullae shining, finely reticulate and with two pairs of lateral impressions. Tergite 9 (fig. 48) with a pair of paramedian, oval, testaceous carinae or tubercles which are rather faint in some specimens. Pleural discs granulate and distinct on abdominal segments 1–3. *Legs* 4-segmented, testaceous, about as long as maxillary palpi. *Spiracles* small, broadly oval, with peritreme thin and pale. Length up to 23 mm.; maximum breadth (at prothorax) 5·5 mm.

Biology. Adults are readily attracted to artificial light (E.A.J.D.).

Material studied. 7 L, U.S.A., in coll. U.S.N.M.; 2 L, 2 P, 2 I, Brazil, Nova Teutonia, F. Plaumann leg., in coll. B.M.; 2 L, 6 I, Trinidad, Port-of-Spain, 1958, F. Peña leg., in coll. B.M.

References. Andrade, 1928 (Biol.); Ballou, 1945 (Biol.); Bosq, 1942a (Biol.); Costa, 1943 (?); Craighead, 1923 (L, Biol.); Dash, 1917 (Biol.); Duffy, 1953a (L fig., Biol.); Lima, 1930 (Biol.), 1955 (Biol.); Vogt, 1949 (Biol.).

Achryson lutarium Burmeister

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil, Paraguay, Uruguay).

Host plant: *Prosopis* (Bosq, 1942a).

Reference. Bosq, 1942a (Biol.).

Achryson maculatum Burmeister

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil, Paraguay, Uruguay).

Host plant: *Suaeda divaricata* (Lesne, 1938).

References. Bosq, 1942a (Biol.); Lesne, 1938 (Biol.).

Eurymerus eburoides Serville

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil, Paraguay, Uruguay).

Host plants: *Myrciaria* (Andrade, 1928); *Myrcia jaboticaba*, *Jacaranda decurrens*, *Psidium guajava*, *Eucalyptus exserta* (Costa, 1943, Lima, 1955); *Celtis* (Bosq, 1942a).

Biology. In the Argentine this species often infests the branches and trunks of *Eucalyptus* trees which have been blown down or felled. The larval galleries are at first subcortical, forming a design rather characteristic of certain scolytids. Later they penetrate the wood (Bosq, 1934).

References. Andrade, 1928 (Biol.); Bosq, 1934 (Biol.), 1942a (Biol.); Costa, 1943 (?); Lima, 1930 (Biol.), 1955 (Biol.); Travassos, 1932 (Biol. fig.).

Torneutini

Torneutes pallidipennis Reich

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil, Paraguay, Uruguay).

Host plants: *Acacia visco* (F. Monrós); *Acacia farnesiana* (Burmeister, 1879); *Acacia cavenia* (Bosq, 1942a).

References. Bosq, 1942a (Biol.); Bosq and Ruffinelli, 1951a (Biol.); Burmeister, 1879 (Biol.).

Torneutes bouchanti Buquet

Distribution. NEOTROPICAL REGION: South America (Argentina, Uruguay).

Host plant: *Acacia cavenia* (Bosq, 1942a).

Reference. Bosq, 1942a (Biol.).

Coccoderus novempunctatus (Germar) (=**tuberculatus** Buquet)

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).

Host plants: *Acacia decurrens* var. *molissima*, *Inga* sp., *Cassia strobilacea* (Lima, 1955); *Cassia fistula*, *Piptadenia communis*, *Tamarindus indica*, *Delonyx regia*, *Carpotroche brasiliensis* (Bondar, 1915); *Caesalpinia echinata*, *C. peltophoroides* (Silva and Almeida, 1941); *Inga vera* (Andrade, 1928).

Biology. Larvae infest the trunks of various trees and are usually found in the heartwood. The larval galleries are elliptical in cross-section, measuring 10–20 mm. in diameter. As they are several metres in length the damage is extensive and encourages fungal attack. Adults emerge in September and October (Silva and Almeida, 1941).

According to Bondar (1921) oviposition takes place on the smaller branches and from these the larvae bore into the larger ones and also the trunk. When mature, the larva makes a subcortical spiral gallery round the branch or trunk, the upper portion of which, with the mature larva, falls to the ground; the larva then pupates. Branches up to 6 inches in diameter may be amputated in this manner. The life-cycle lasts two years.

Economic importance. This species severely damages certain Leguminosae.

Control. Infested branches should be collected and split in order to expose and kill the larvae; if very numerous they should be burned (Bondar, 1915b).

References. Andrade, 1927 (Biol.), 1928 (Biol.); Bondar, 1915a (Biol.), 1915b (L fig., I fig., Biol., Contr.), 1921 (Biol. fig.); Lima, 1922 (Biol.), 1930 (Biol.), 1955 (Biol.); Silva and Almeida, 1941 (I fig., Biol. fig.).

Psygmatocerus wagleri Perty

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).

Host plants: *Myroxylon peruiferum* (=*Myrospermum erythroxylon*) (Silva and Almeida, 1941; Bondar, 1937); *Schwartzia langsdorfii* (Monte, 1951).

Biology. The large and extensive larval galleries of this species are excavated in the heartwood of trunks and branches of living trees. Adults emerge during November and December (Bondar, 1937a).

References. Bondar, 1937a (I fig., Biol. fig.), 1937b (Biol.); Lima, 1955 (Biol.); Monte, 1951 (?); Silva and Almeida, 1941 (I fig., Biol. fig.).

Diploschema rotundicolle (Serville)

[Broca das Laranjeiras]

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil, Uruguay).

Host plants: *Citrus aurantium*, *C. deliciosa*, *Melia azedarach*, *Prunus persica*, *Croton floribundus* (Bondar, 1913a); *Tabebuia cossinoides*, *Cabralea cangerana*, *Cedrela fissilis*, *Citrus medica*, *Sapindus divaricatus*, *Columbrina rufa*, *Croton urucurana*, *Erythroxylum pulchrum*, *Cedrela glaziovii*, *Rhamnidium elaeocarpum*, *Croton cryptocalyx* (Andrade, 1928, Lima, 1955); *Aleurites fordi* (Fonseca, 1938).

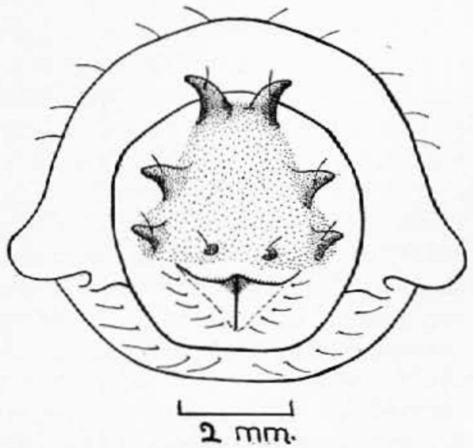


Fig. 49. *Diploschema rotundicolle* (Serville). Mature larva. Abdominal segments 9 and 10. Caudal aspect.

Adult. Length 30–40 mm. Head and prothorax black, covered with rather coarse light brown pubescence; elytra glabrous, pale yellowish brown. *Head* with front strongly concave and antennae much shorter than body in both sexes. *Prothorax* with three longitudinal glabrous carinae on disc; lateral tubercles absent. *Elytra* each with a short sutural spine at apex.

Mature larva (fig. 49). Form elongate, subcylindrical, rather slender. *Head* with genae and temples smooth and sparsely setose, the former ferruginous. Antennal foramen circular, not raised or produced dorsally. Front margin of frons rather broadly ferruginous, with a pair of paramedian, transverse impressions (each bearing a pair of setae) between upper and lower boundaries. Antenna with segment 3 at least four times as long as basal width and about half as long as segment 2, which is slightly elongate; supplementary process minute. Mandibles smooth, pitchy, each with a pair of stout setae on basal half of outer face. Labrum subcircular, rather sparsely covered with coarse pale setae. One pair of ocelli present close to antennal foramen; lens oval, convex; pigmented spot indistinct. Hypostoma smooth, glabrous, with front margin ferruginous laterally; gular sutures slightly raised. Maxilla with segment 3 of palpi cylindrical, about two-thirds length of segment 2. Labial palpi with segment 2 as long as segment 1, which is quadrate. *Prothorax* with posterior part of pronotum feebly longitudinally rugose; anterior part smooth, testaceous, sparsely setose. *Abdomen* with dorsal ampullae each with two transverse furrows and a broad, shallow median furrow; rugose, glabrous. Ampullae on segments 4–7 more widely separated (the intersegmental skin being longer) than on segments 1–3. Tergite 9 (fig. 49) without tubercles; anal lobes placed ventrally. *Legs* with unguiculus long, slender, pale and imbricately spinose. *Spiracles* with peritreme pale, narrowly oval, without marginal chambers. Length[1] up to 45 mm.; maximum breadth (at prothorax) 9·25 mm.

Larvae of this tribe appear to be closely related to the Cerambycini from which they differ mainly in the presence of only one pair of ocelli, the curiously extended and modified tenth abdominal segment and the proportionately longer intersegmental skin of segments 4–7.

Biology. Eggs are laid between December and April in minute excisions at the extremities of the branches of the host plant. The larva tunnels downwards, through the larger branches to the trunk. Sometimes the trunk is riddled throughout its whole girth and may contain as many as sixteen galleries. Each gallery may measure up to 7 or even 10 feet. The larval period is approximately eight months. When mature, the larva turns and bores upwards, enlarging a portion of the gallery into a pupal cell and making an elliptical orifice about half an inch in diameter through which the adult later emerges. Below this opening the larva blocks the gallery to form a cell 3–5 inches in length; this cell is constructed in the spring, in the second year of larval life. The pupal stage lasts about 71 days. Occasionally horizontal galleries are made when there is danger of the larva being crushed by the natural growth of the stem and by the cicatrisation of the wounds made (Bondar, 1913a, 1929a).

According to Fonseca and Autouri (1932), the larva excavates along its gallery a series of holes at more or less regular intervals for the ejection of frass (see also Duffy, 1953a, p. 42).

Economic importance. Fonseca and Autouri (l.c.) regard this species as a serious pest of *Citrus* plantations in Brazil. In the Argentine it has been observed boring in the tips of branches of *Melia azedarach*, a tree hitherto apparently immune to insect attack (Daguerre, 1931). In Brazil this species also attacks the tung-oil tree (*Aleurites fordi*).

Control. Trees should be inspected for the presence of frass in the months of May and June, and the ends of the small infested branches cut off. It is then easy to destroy any larvae which may have descended towards the trunk or into the main branch. All the lateral frass-ejection holes should be plugged with wax or clay and the exposed orifice of the gallery injected with bisulphide of carbon. A. Sampaio has observed that eggs are deposited on young tender branches in the axils of the leaves. The tunnelling of the young larvae soon cause the leaves to wither. This, he maintains, is a useful and reliable indication of infestation which enables one to arrest the damage almost immediately by cutting off the tip of the branch or twig (Bondar, 1913a, 1929a).

As a preventive measure, Fonseca (1938) suggests whitewashing the trunks of trees and branches with the following mixture:

[1] Bondar (1929a) gives the maximum length as 60 mm.

Pure lime 3 kilos; powdered sulphur 3 kilos; water 100 litres.

Daguerre (1931) suggests that infested branches should be removed and burned.

Material studied. 2 L, Brazil, São Paulo, Ipiranga, 16.i.1908, from *Citrus medica*, H. Luederwaldt leg., in coll. D.Z.S.P.

References. Andrade, 1927 (Biol.); Araujo, 1939 (Biol., Contr.); Autuori, 1936 (Biol. fig., Contr.); Bondar, 1912b (?), 1913a (L fig., I fig., Biol. fig., Contr.), 1914 (L fig., I fig., Biol., Contr.), 1915a (L fig., I fig., Biol. fig.), 1929a (L fig., I fig., Biol. fig., Contr.); Bosq, 1934 (Biol.), 1942a (Biol.); Conceicao, 1908 (?); Daguerre, 1931 (Biol., Contr.); Ebeling, 1950 (Biol.); Fonseca, 1938 (L, Biol., Contr.); Fonseca and Autouri, 1932 (L, Biol.); Ihering, 1909 (?); Lima, 1922 (Biol.), 1928 (Biol.), 1930 (Biol.), 1936 (?), 1955 (Biol. fig., Contr.); Moreira, 1921b (P fig., Biol. fig.); Novaes, 1927 (Biol.); Pierce, 1917 (Biol.); Quayle, 1938 (Biol.); Sampaio, 1909 (?); Zikán and Zikán, 1946 (Biol.).

Praxithea derourei (Chabrill) (=**Elaphidion collare** Burmeister)

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil, Paraguay Uruguay).

Host plants: *Prunus domestica*, *Psidium guajava*, *Guarea trichiloides* (Lima, 1955); *Cydonia*. *Quercus*, *Castanea*, *Melia azederach*, *Rosa*, *Malus*, *Pyrus* (Bosq, 1942a).

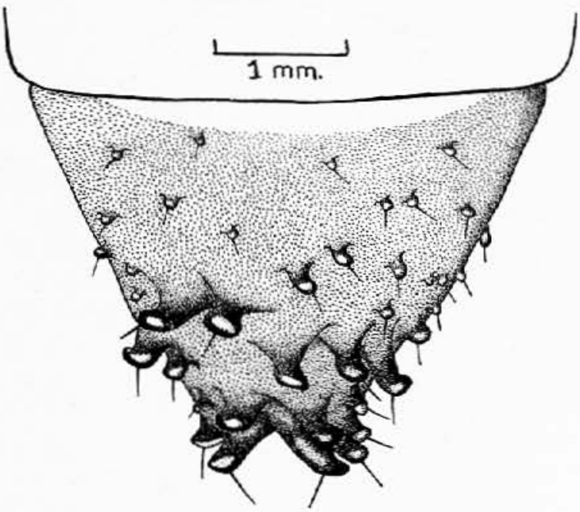


Fig. 50. *Praxithea derourei* (Chabrill). Mature larva. Abdominal segment 10. Dorsal aspect.

Mature larva (fig. 50). Similar to that of *Diploschema rotundicolle* (Serville) from which it may readily be distinguished as follows. *Abdomen* with segment 10 much more strongly produced, conical, entirely ferruginous and bearing at least twelve large tubercles (which are enlarged and truncate apically) as well as smaller tubercles (fig. 50). Length up to 60 mm.; maximum breadth (at prothorax) 8·75 mm.

Biology. Adults emerge during December and January, the females ovipositing between the terminal buds, particularly on the higher branches. The larvae tunnel down to the larger branches and even to the trunk. The life-cycle is probably one year in duration (Bosq, 1942b). The characteristic damage resembles that caused to *Citrus* by *Diploschema rotundicolle* (Serville).

Economic importance. This cerambycid attacks a number of ornamental and forest trees, including fruit trees, and in the Argentine entire orchards have been destroyed.

Control. Infested branches should be cut off and burned, or the bore holes injected with carbon bisulphide and then sealed with clay. This should be done before summer, and if necessary repeated, not more than 15–20 c.c. carbon bisulphide per tree being injected at a time (Bosq, 1942b).

Material studied. 1 L, Argentina, Buenos Aires, 17.xii.1941, from *Castanea*, in coll. B.M.

References. Bosq. 1942a (Biol.), 1942b (L fig., I fig., Biol. fig., Contr.); Lima, 1955 (Biol.).

Metopocoilini

Metopocoilus quadrispinosus Buquet

Distribution. NEOTROPICAL REGION: South America (Argentine, Brazil).

Host plants: Leguminosae (Bondar, 1915b); *Lonchocarpus spruceanus*, *Machaerium stipitatum* (Lima, 1922).

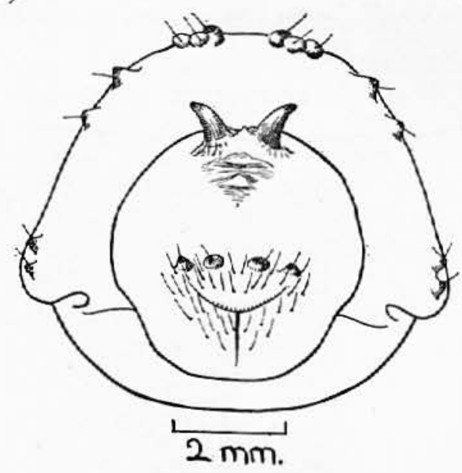


Fig. 51. *Metopocoilus quadrispinosus* Buquet. Mature larva. Abdominal segments 9 and 10. Caudal aspect.

Mature larva (fig. 51). Similar to those of the Torneutini, but differing as follows. *Head* with three pairs of ocelli present. *Abdomen* with segment 10 bearing only two large tubercles (fig. 51). Segment 9 with a transverse row of six or more moniliform tubercles, some of which are strongly sclerotised (fig. 51).

Although closely resembling the Torneutini in the modification of the tenth abdominal segment, and in having equally long intersegmental skin, larvae of this tribe may perhaps form a connecting link between the Torneutini and the Cerambycini, owing to the presence of three pairs of ocelli.

Pupa. Form elongate, subcylindrical, compact. *Head* entirely smooth and glabrous; vertex not concealed from above by pronotum. Antennae thick, filiform, short, extending only as far as abdominal segment 1. Eyes feebly convex, glabrous. *Pronotum* slightly transverse; disc faintly transversely striate and with a few scattered inconspicuous spinules; sides with a sub-basal blunt tooth. *Mesonotum* and *metanotum* glabrous except for a few inconspicuous spinules. Elytra and wings extending as far as abdominal segment 4. *Abdomen* with tergites 1–6 bearing transverse groups of short ferruginous spines (each with a basal seta). Tergite 7 with similar scattered spines and hind margin broadly rounded. Tergite 8 short, strongly transverse, with only a few spines. Tergite 9 retracted and strongly plicate. Sternites with a few scattered spinules. *Legs* with hind femora extending to abdominal segment 3. *Functional spiracles* present on abdominal segments 1–5, the sixth to eighth pairs being partly closed; peritreme moderately thick, reniform and not or scarcely raised above general level of cuticle. Length up to 42 mm.; maximum breadth 11·25 mm.

Biology. Eggs are deposited on the branches of Leguminosae and the larvae tunnel down the stems. The life-cycle lasts two years, adults emerging in October and November (Bondar, 1915b).

Material studied. 1 L, 1 P, Brazil, São Paulo, Piraciraba, G. Bondar leg., in coll. D.Z.S.P.

References. Bondar, 1915b (L fig., I fig., Biol.); Lima, 1922 (Biol.), 1928 (Biol.), 1955 (Biol.).

Cerambycini

Larval Characters

Head rectangular or only slightly narrowed anteriorly; posteriorly straight or only very slightly emarginate. Three pairs of ocelli present. 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.

Brasilianus (=**Hamaticherus**) **lacordairei** (Gahan)

Distribution. NEOTROPICAL REGION: South America (Argentine, Bolivia, Brazil, British Guiana, Paraguay).

Host plants: *Prosopis*, *Piptadenia*, *Aspidosperma* (F. Monrós); *Astronium ulei*, *Drypetes variabilis*, *Symphonia globulifera*, *Eperua falcata* (E.A.J.D.).

Adult (fig. 52). Length 31–40 mm. Head, prothorax and elytra entirely dark brown, the pubescence indistinct. *Head* with antennae twice as long as body in male, slightly longer than body in female; segments 3–7 each with a stout recurved apical spine. *Prothorax* transversely strigose and bearing a pair of stout lateral tubercles. *Elytra* each with a pair of long apical spines.

Mature larva (fig. 53). *Head* (fig. 53) subrectangular, posteriorly straight. Mouthframe pitchy, genae pitchy, temples ferruginous to pitchy, rugose. Antenna with segment 3 three to four times as long as basal width and about half as long as segment 2; supplementary process very short, about one-fourth length of segment 3. Mandible pitchy rugose, bearing numerous bristly setae on basal half of outer face. Labrum transversely oval and fringed with very coarse setae. Three pairs of subcontiguous ocelli present; arranged in a straight row laterad and ventrad of antenna; lens round, convex, pigmented spot indistinct. Hypostoma pitchy anteriorly with front margin (fig. 53) enlarged sublaterally into a pair of flattened plate-like structures; sutures pitchy, incurved; gula abruptly raised. Maxilla with segment 3 of palp about half length of segment 2. Labial palpi with segment 2 less than half length of segment 1. *Prothorax* with posterior area of pronotum, eusternum and sternellum dull, micro-spiculate. *Abdomen* with dorsal ampullae each with two transverse furrows, non-tuberculate, rather densely micro-spiculate. Tergite 9 without a sclerotised process. Anal lobes glabrous, surrounded by rather dense, short, ferruginous setae. Pleural discs indistinct. *Legs* with unguiculus long, slender, ferruginous, imbricately spinose. *Spiracles* with peritreme broadly oval, thick, pale, without marginal chambers. Length up to 60 mm.; maximum breadth (at prothorax) 15·5 mm.

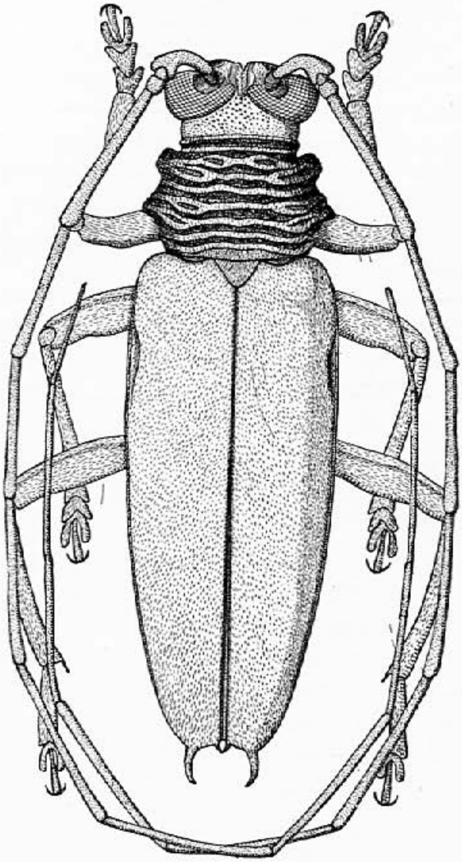


Fig. 52. *Brasilianus lacordairei* (Gahan). Adult.

Pupa (Pl. V, fig. 3). *Head* smooth and glabrous except for small paired groups of setae at base of labrum and clypeus; vertex almost concealed from above by pronotum. Antenna with segments 3–6 produced apically into a large spine; extending to abdominal segment 5, where they are recurved and crossed beneath abdomen. Eyes feebly convex, glabrous. *Pronotum* subquadrate, with front margin broadly rounded; sides with a pair of short blunt conical tubercles; disc with a pair of sublateral semicircular impressions near base; bearing scattered minute setae. *Mesonotum* and *metanotum* with a few scattered minute spinules. Elytra and wings extending as far as abdominal segment 4. *Abdomen* with tergites 2–6 each bearing numerous short, stunted spines arranged more or less in an ellipse. Tergite 7 with numerous similar but slightly stouter spines; sides converging and broadly angled posteriorly. Tergite 8 similar, but with only a few scattered spines and a pair of paramedian, distinctly stouter spines. 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, ferruginous. Length up to 44 mm.; maximum breadth 12·25 mm.

Biology. The larval galleries (Pl. V, fig. 2), which are nearly 2 inches broad, are at first shallow, meandering, and packed with coarse granular frass; later they extend through the sapwood into the heartwood for a distance of about 5 inches, where pupation takes place.

When the larva is mature, it first comes to the surface of the sapwood, where an oval disc of bark up to 3 inches in diameter is excised; this later becomes loose and falls away (Pl. V, fig. 2). The larva then withdraws into its gallery, the entrance of which is kept entirely clear. At a distance of about 1 inch in the wood, the gallery is turned abruptly in a downward direction, making a right-angled bend; just beyond this bend, at the entrance to the pupal cell, a calcareous dome-shaped cap or operculum is secreted by the larva. Behind this a wad of frass about 1 inch long is compacted

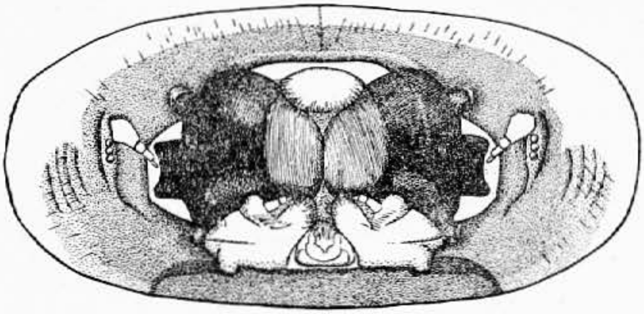


Fig. 53. *Brasilianus lacordairei* (Gahan). Mature larva. Head. Frontal aspect.

against the operculum (Pl. V, fig. 3). The remainder of the gallery accommodates the larva, and it is here that it secretes calcium to construct a lozenge-shaped chamber around itself. This chamber is about $1\frac{1}{2}$ inches long and is very fragile and porous, being rough and white externally and smooth and light brown internally.[1]

During the process of the secretion of calcium the larva becomes considerably reduced in length and bulk. This appears to be the only instance known in which three effective barriers are constructed for the protection of the pupa. Externally this characteristic form of damage might easily be attributed to *Lagochirus* (see p. 236), but apart from its appreciably larger size, it differs in one important respect, which is that the adult emergence hole in the exposed sapwood is not plugged with a protuberant wad of frass. Several weeks elapse between the completion of the cocoon and pupation. Adults emerge from April to June (E.A.J.D.).

Economic importance. In several localities in British Guiana the author has recently seen severe damage by this species to recently felled (i.e. less than two months) logs of *Astronium ulei*. Severe damage was also caused to *Drypetes variabilis* and *Symphonia globulifera*.

Material studied. 4 L, British Guiana, Bartica-Potaro Road, m. 24, 15.iv.1957, from *Eperua falcata*, H.E.J. Woolls and E.A.J.D. leg., in coll. B.M.; 3 L, 1 P, 1 I, British Guiana, North West District, Baromanni, Arikoua Creek, from *Symphonia*

[1] For additional information on the construction of calcareous cocoons and the secretion of calcium carbonate from the Malpighian tubes, see Duffy (1953a), p. 13.

globulifera, E.A.J.D. leg., in coll. B.M.; 2 L, 1 P, 1 I, British Guiana, Bartica-Potaro Road, m. 24, 15.iv.1957, from *Astronium ulei*, E.A.J.D. leg., in coll. B.M.

Reference. Bosq, 1942a (Biol.).

Brasilianus (=**Hamaticherus**) **plicatus** (Olivier) (=**rufipennis** Gory)

Distribution. NEOTROPICAL REGION: Central America (Panama), Caribbean (Trinidad), South America (Argentina, British Guiana, French Guiana, Venezuela).

Host plants: *Trema micrantha*, ?*Amphirrhox longifolia*, *Solanum leontocarpum* (Lima, 1955); *Tibouchina estrellensis* (Zikán and Zikán, 1946); *Helietta cuspidata* (Bosq, 1942a); *Trattinickia rhoifolia*, *Eperua falcata*, *Symphonia globulifera*, *Myristica surinamensis* (E.A.J.D.).

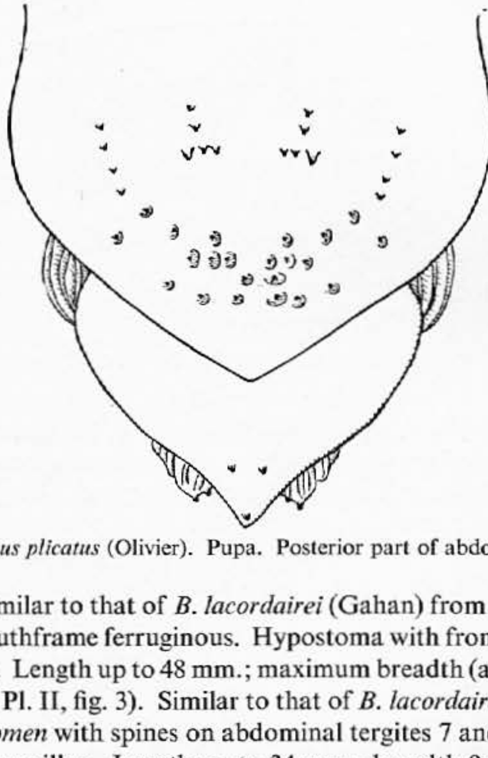


Fig. 54. *Brasilianus plicatus* (Olivier). Pupa. Posterior part of abdomen. Dorsal view.

Mature larva. Similar to that of *B. lacordairei* (Gahan) from which it differs as follows. *Head* with mouthframe ferruginous. Hypostoma with front margin without sublateral enlargements. Length up to 48 mm.; maximum breadth (at prothorax) 8·75 mm.

Pupa (fig. 54 and Pl. II, fig. 3). Similar to that of *B. lacordairei* (Gahan), but differing as follows. *Abdomen* with spines on abdominal tergites 7 and 8 arising from large, pale, fleshy, conical papillae. Length up to 34 mm.; breadth 9·5 mm.

Biology. The pupal cell (Pl. II, fig. 3), containing the calcareous cocoon, is excavated at a depth of two or more inches in the sapwood (E.A.J.D.).

Predators. Larvae of the large elaterid *Chalcolepidus striatus* (Linnaeus) are predacious on larvae of this species.

Material studied. 1 L, 1 P, 1 I, British Guiana, Bartica-Potaro Road, m. 24, 11.iv.1957, from *Eperua falcata*, E.A.J.D. leg., in coll. B.M.; 1 L, 1 P, 1 I, British Guiana, Bartica-Potaro Road, 6 m. W. of m. 30, 12.iv.1957, from *Trattinickia rhoifolia*, E.A.J.D. leg., in coll. B.M.; 1 L, 1 I, Trinidad, Arima district (sawmills), 11.vi.1957, from *Myristica surinamensis*, E.A.J.D. leg., in coll. B.M.

References. Andrade, 1928 (Biol.); Bosq, 1942a (Biol.); Lima, 1930 (Biol.), 1955 (Biol.); Xambeu, 1893 (L); Zikán and Zikán, 1946 (Biol.).

Brasilianus (=**Hamaticherus**) **mexicanus** (Thomson) (=**castaneus** Bates)

Distribution. NEOTROPICAL REGION: Mexico, Central America (British Honduras, Nicaragua), South America (Brazil, British Guiana). NEARCTIC REGION: U.S.A. (California).

Host plants: *Trema micrantha*, *Ecclinusa ramiflora*, *Astronium fraxinifolium* (Lima, 1955); *Peltogyne* (Zikán and Zikán, 1946); *Chrysophyllum raminiflorum*, *Sponia micrantha* (Bondar, 1915b).

Biology. Adults emerge through the larval gallery from September to December, and are attracted to artificial light. In the case of *Chrysophyllum*, only unhealthy, dead or recently felled trees are selected for oviposition; on the other hand, only healthy trees of *Sponia* are attacked. The larvae feed subcortically until almost mature, when they tunnel towards the centre of the trunk, where a pupal cell is excavated (Bondar, 1915b).

Economic importance. The timber of *Chrysophyllum* is often so severely damaged by this species that it is rendered valueless.

Control. Felled or fallen trunks should be decorticated, especially that part in contact with the ground.

References. Andrade, 1928 (Biol.); Bondar, 1915b (L fig., I fig., Biol. fig.); Lima, 1922 (Biol.), 1928 (Biol.), 1930 (Biol.), 1955 (Biol.); Zikán and Zikán, 1946 (Biol.).

Brasilianus (=**Hamiticherus**) **murinus** (Gahan)

Distribution. NEOTROPICAL REGION: South America (Argentina).

Host plant: *Aspidosperma* (Bosq, 1942a).

Reference. Bosq, 1942a (Biol.).

Coleoxestia spinipennis (Serville)

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plants: *Citrus aurantium*, *Luehea divaricata*, *Ficus carica* (Bondar, 1929a).

Economic importance. This species may be regarded as only a minor pest of *Citrus*.

References. Bondar, 1929a (Biol.), 1938b (Biol., Contr.); Fonseca and Autouri, 1932 (L, Biol.); Lima, 1930 (Biol.), 1955 (Biol.).

Coleoxestia annulipes (Buquet)

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plant: *Mimosa* (Lima, 1955).

Reference. Lima, 1955 (Biol.).

Coleoxestia waterhousei (Gounelle)

Distribution. NEOTROPICAL REGION: (Brazil).

Host plants: *Mimusops* (?) *elata* (Andrade, 1928); *Citrus aurantium* (Lima, 1955).

References. Andrade, 1928 (Biol.); Lima, 1930 (Biol.), 1955 (Biol.).

Sphallenum setosum (Germar)

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).

Host plants: *Psidium guajava*, *Anona* (Bondar, 1930a); *Cajanus indicus* (Lima, 1955). According to Bondar (1930a) *Psidium* is attacked only when it supports the climber *Canavalia*, and *Anona* only when covered with *Phaseolus lunatus* or *Dolichos* (?) *lablab*.

This is a typical example of a temporary gallery system, as previously discussed (Duffy, 1953a, p. 43).

Mature larva. Form elongate, rather robust, subcylindrical. *Head* with genae ferruginous, feebly rugose; temples smooth, without carinae or weals; frons with front margin broadly ferruginous to pitchy and produced medially into a small subconical tubercle. 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 minute. Labrum transversely oval and fringed with coarse golden setae. One pair of ocelli present; lens large, oval, convex; pigmented spot moderately distinct; hypostoma with front margin broadly and transversely protuberant and swollen on each side of gula; sutures pitchy, incurves; gula broad, with sutures feebly raised. Maxilla with segment 3 of palp about two-thirds length of segment 2. Labial palpi with segment 2 about two-thirds length of segment 1. *Prothorax* with four orange pro-alar plates; pronotum rather densely covered with subcircular asperities (as in *Parandra*, fig. 13); prosternum asperate postero-laterally. *Abdomen* with dorsal ampullae with transverse furrows very feebly defined; rather densely covered with spine-like asperities; tubercles absent. Tergite 9 without a sclerotised process. Anal lobes smooth, bearing a few coarse setae. *Legs* 3-segmented, ferruginous; unguiculus pale, imbricately spinose. *Spiracles* with peritreme rather narrowly oval, with a series of about six marginal chambers on posterior half. Length up to 55 mm.; maximum breadth (at prothorax) 6·5 mm.

Larvae of this genus are not at all typical of the Cerambycini, particularly as only a single pair of ocelli is present and the transverse furrows of the ampullae are feebly defined. It is suggested that this genus may perhaps form a link between the Cerambycini and the Hesperophanini.

Biology. Eggs are deposited in the stems of various legumes such as *Phaseolus*, being placed at intervals between the stem and the supporting tree. The young larva feeds within the stem of the legume, soon causing the formation of a swelling or gall, which is more pronounced when there are several larvae feeding in close proximity to each other. Before pupation, however, the larvae pass from the climber into the supporting tree (at points where both are in close contact), where they tunnel in an upward direction. Adults emerge during August and September (Bondar, 1930a). See also "Temporary galleries" (Duffy, 1953a, p. 43).

Control. Larvae should be extracted from the conspicuous galls by slitting the latter longitudinally, so as to damage the stem as little as possible (Bondar, 1930a).

Material studied. 1 L, Brazil, Guaratiba, D. Federal, 16.viii.1935, A. J. d'Araujo e Silva leg., in coll. D.D.S.V.

References. Bondar, 1928a (L fig., I fig., Biol. fig.), 1930a (L fig., I fig., Biol. fig., Contr.), 1930b (L fig., I fig., Biol. fig., Contr.); Duffy, 1953 (Biol.); Lima, 1930 (Biol.), 1955 (Biol.).

Sphallenum sp.

A larva, which is undoubtedly of another species of this genus, differs from that of *S. setosum* (Germar) by the characters given in the key, p. 21.

Material studied. 1 L, Brazil, São Paulo, Ipiranga, 29.i.1908, Luederwaldt leg., in coll. D.Z.S.P.

Sphallenum spadiceum Gahan

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plant: *Eucalyptus tereticornis* (Bondar, 1929).

References. Andrade, 1928 (Biol.); Bondar, 1929b (?); Lima, 1930 (Biol.), 1955 (Biol.).

Criodion angustatum Buquet

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).

Host plants: *Inga* (?) *cylindrica* (Lima, 1955); *Inga fagifolia* (Travassos, 1932).

References. Lima, 1955 (Biol.); Travassos, 1932 (Biol. fig.).

Criodion fulvopilosum Gahan

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plant: Leguminosae (Bondar, 1915b).

Biology. Larvae of this species infest many species of Leguminosae in which they excavate galleries measuring up to 50 cm. in length. Adults emerge during the summer (Bondar, 1915b).

References. Andrade, 1928 (Biol.); Bondar, 1915b (I fig., Biol. fig.); Lima, 1922 (Biol.), 1923 (Biol.), 1955 (Biol.).

Criodion sommeri Gahan

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plant: Myrtaceae (Zikán and Zikán, 1946).

References. Lima, 1955 (Biol.); Zikán and Zikán, 1946 (Biol.).

Criodion tomentosum Serville

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plants: *Inga* spp., *Piptadenia communis* (Lima, 1922); Leguminosae, *Acacia decurrens* var. *mollissima* (Bondar, 1921).

Biology. The presence of this species in *Acacia decurrens* (introduced into Brazil from Australia) is revealed by swellings which develop into wounds that exude gum. Adults occur from November to March and oviposit on the trunk and larger branches. The larvae penetrate the wood and bore upwards, making galleries up to 19 inches in length. The larval stage lasts about two years, pupation taking place at the upper end of the gallery (Bondar, 1921).

Control. Infestation is easily discouraged by clean cultivation, but once the trees are attacked they should be felled and burned.

References. Andrade, 1927 (Biol.), 1928 (Biol.); Bondar, 1915b (Biol.), 1921 (L fig., I fig., Biol. fig., Contr.); Lima, 1922 (Biol.), 1929 (Biol.), 1930 (Biol.), 1955 (Biol.).

Trachyderini

Examination of the larvae of two species of *Trachyderes* has shown that they possess all the major characters of the Hesperophanini, such as the uneven hypostoma and the protuberant and irregularly swollen gena. In the adult classification, however, the Trachyderini have been placed (provisionally?) at the end of the CERAMBYCINAE, but in view of the larval morphology it is suggested that the position of this tribe in the adult classification be reviewed.

Trachyderes succinctus (Linnaeus)

Distribution. NEOTROPICAL REGION: Central America (Costa Rica, Panama), Caribbean (Grenada, Guadeloupe, Martinique, St. Thomas, Trinidad), South America (Argentina, Bolivia, Brazil, British Guiana, Paraguay, Venezuela).

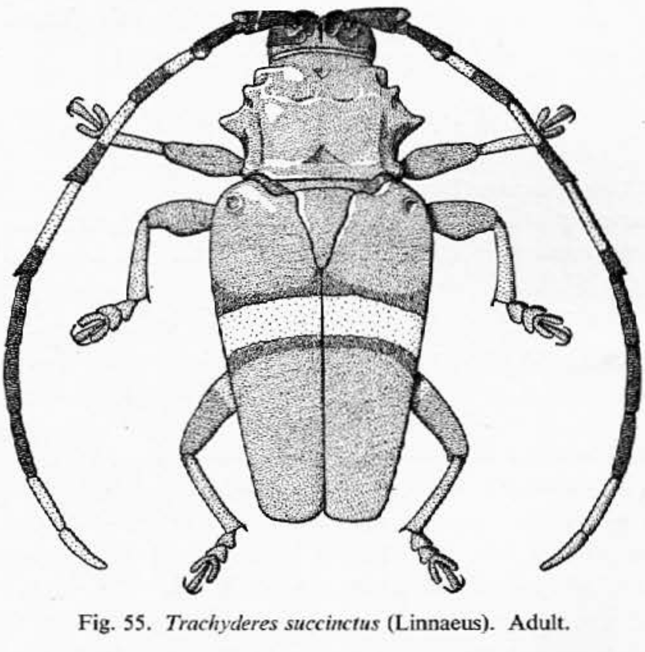


Fig. 55. *Trachyderes succinctus* (Linnaeus). Adult.

Host plants: *Morus alba*, *Mimosa bracaatinga*, *Eucalyptus* spp., *Psidium guajava*, *Citrus* spp., *Aspidosperma*, *Caesalpinia echinata*, *C. ferrea* (Silva and Almeida, 1941); *Ficus* (wild and cultivated) (Wille, 1925); *Mora excelsa* (Swabey, 1935); *Persea gratissima* (Bosq, 1942a); *Theobroma*, *Inga*, *Erythrina* (Faber, 1909). The record for *Theobroma* is questionable.

Adult (fig. 55). Length 12–31 mm. Head, prothorax and elytra brown, glabrous, the latter with a broad, median, transverse, bright yellow band; antennae black except for basal halves of segments 4–6, which are orange. *Head* with a very deep impression on front. *Prothorax* with a pair of bluntly conical tubercles; scutellum extremely long, extending posteriorly almost as far as transverse band of elytra.

Mature larva (fig. 56). *Head* subquadrate, somewhat wider behind middle; sides appreciably constricted medially; genae strongly shouldered, protuberant, irregularly swollen and broadly ferruginous around ocellus. Front margin of frons darkly ferruginous. Hypostoma with front margin longitudinally striate and produced into a blunt tooth on each side of gula (fig. 56); testaceous, except front margin, which is narrowly ferruginous. One pair of ocelli present; lens large, round, protuberant; pigmented spot indistinct. Antenna with basal membrane short; segment 2 cylindrical, about twice as long as broad, not or scarcely longer than segment 3, which is very slender and about five times as long as basal width. Labrum cordate, rather densely covered with pale setae. Maxillary palp with segment 3 slightly longer than segment 2. Labial palpi with segments 1 and 2 subequal. *Prothorax* with pronotum subrectangular, the anterior area with a transverse yellowish band which is densely

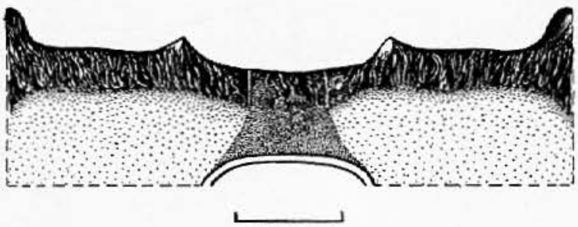


Fig. 56. *Trachyderes succinctus* (Linnaeus). Mature larva. Hypostoma.

setose; posterior area longitudinally striate, glabrous; median and sublateral impressions impressed for entire length of prothorax. Presternum with a pair of testaceous, setose, sternal plates. Eusternum not distinctly defined. Postnotal fold distinct. *Abdomen* with ampullae non-tuberculate, micro-granulate, each with one distinct transverse impression; ventral ampullae on segments 4–6 each with a feebly sclerotised, coarsely striate plate as in *T. hilaris* (fig. 59). Pleural tubercles strongly protuberant. *Legs* long, 4-segmented. *Spiracles* with peritreme thin, broadly oval. Length up to 41 mm.; maximum breadth (at prothorax) 8·25 mm.

The strongly shouldered and irregularly protuberant gena, and the dentate front margin of the hypostoma suggest close affinity to the Hesperophanini, particularly the genera *Chion* and *Stromatium*.

Pupa (figs. 57–58). *Head* with vertex visible from above, glabrous. Antennae extending as far as abdominal segment 4, where they are recurved ventrally to terminate near front coxae. Eyes feebly convex, glabrous. Labrum glabrous. *Pronotum* transverse, glabrous; sides stoutly tuberculate; disc transversely striate, with three pairs of rounded tubercles sublaterally. *Mesonotum* glabrous; scutellum extremely elongate, the apex nearly reaching posterior margin of mesonotum. Metanotum glabrous; scutellar groove covered by produced scutellum. Elytra and wings extending to abdominal segment 3. *Abdomen* with tergites 2–6 with numerous short, straight spines which are inclined posteriorly and arranged more or less in two transverse rows. Tergite 7 (fig. 58) with numerous stouter spines which are all strongly curved inwards (almost right angled) towards centre of tergite; posterior margin with a transverse row (interrupted medially) of slightly stouter, more abruptly angled spines; above this row of spines is a pair of paramedian tubercles each bearing a pair of outwardly curved spines. Tergite 8 with several much smaller spines which are feebly curved inwards. Segment 9 retracted into segment 8. Sternites glabrous. *Legs* glabrous, with hind femora extending to abdominal segment 4. *Functional spiracles* present on abdominal segments 1–5, those on segments 6 and 7 being closed and probably non-functional; peritreme broadly oval, obliquely set, the inner walls of the partly exposed atrium lined with digitiform processes (fig. 57). Length up to 32 mm.; maximum breadth 11·5 mm.

Biology. Eggs are laid in little pyramidal cases which adhere to the wood and are deposited either on felled logs in the forest or on stacked lumber in the yards. Larvae

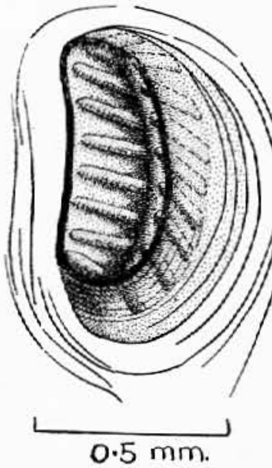


Fig. 57

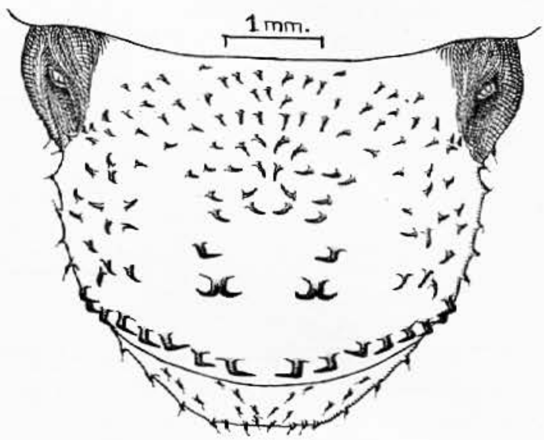


Fig. 58

Figs. 57–58. *Trachyderes succinctus* (Linnaeus). Pupa. Fig. 57. Spiracle. Fig. 58. Abdominal tergites 7 and 8. Dorsal aspect.

hatch in six to eight days and tunnel into the sapwood, throwing up little mounds of wood dust. The galleries usually extend longitudinally, although they turn and twist considerably. The pupal and prepupal gallery are free from frass, but the larval galleries are tightly packed with coarse dust. Adults emerge about fifteen days after pupation, the complete life-cycle taking about five months. The oval emergence holes of the adults measure up to half an inch in diameter (Swabey, 1935). Bodkin (1919) states that the adults may be found in the daytime feeding on the sweet sticky secretion of the flowering heads of Para grass. They take to flight readily and are active during both day and night. According to Wille (1925), the adults feed on various fruits such as apples, pears and quince, and Rojas (1857) states that they feed on the resin of *Hermesia castaneifolia*, on the stems of maize (Indian corn) and on the resin of *Erythrina umbrosa* and *E. velutina*.

Economic importance. This insect was recently found by the author to be common locally in the sawmills of Trinidad. *Mora* appeared to be the preferred host, in which damage was appreciable, although confined to the sapwood.

Control. Swabey (1935) recommends the rapid conversion of timber and/or water storage.

Material studied. 1 L, Panama, iv.1930, in coll. U.S.N.M.; 1 L, 1 P, 1 I, Brazil, Minas Gerais, Mar de Hespanha, 19.x.1919, J. F. Zikán leg., in coll. D.Z.S.P.

References. Andrade, 1928 (Biol.); Belsac, 1926 (Biol. fig.); Bodkin, 1919 (Biol.); Bondar, 1939 (Biol.); Bosq, 1942a (Biol.); Ebening, 1950 (Biol.); Faber, 1909 (Biol.); Fonseca and Autouri, 1933 (L, Biol.); Hall, 1932 (Biol.); Ihering, 1909 (Biol.); Landes, 1900 (Biol.); Lima, 1922 (Biol.), 1928 (Biol.), 1930 (Biol.), 1955 (Biol.); Quayle, 1938 (Biol.); Rojas, 1857 (Biol.); Silva and Almeida, 1941 (I fig., Biol. fig.); Swabey, 1935 (I fig., Biol. fig., Contr.); Wille, 1925 (Biol.).

Trachyderes hilaris Bates

Distribution. NEOTROPICAL REGION: Central America (Costa Rica), South America (Ecuador).

Host plant: *Virola* sp. (Duffy, 1953a).

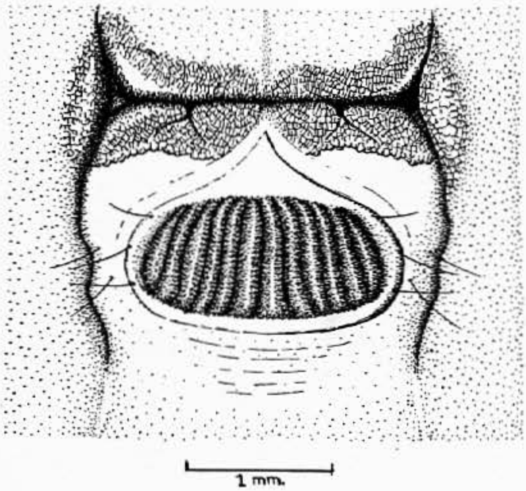


Fig. 59. *Trachyderes hilaris* Bates. Mature larva. Ampulla of abdominal sternite 6.

Mature larva (fig. 59). Very similar to that of *T. succinctus* (Linnaeus), but with hypostoma bearing at least four short longitudinal carinae immediately behind front margin. Length up to 45 mm.; maximum breadth (at prothorax) 9 mm.

Material studied. 1 L, 20.xi.1947, from imported South American *Virola* in coll. F.P.R.L.

Reference. Duffy, 1953a (L fig., Biol.).

Trachyderes bilineatus (Olivier)

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plants: *Ficus* (wild and cultivated), *Eucalyptus*, *Citrus* (Wille, 1925); *Prunus persica* (Lima, 1922).

Biology. Adults feed on various fruits such as apples, pears and quince (Wille, 1925).

References. Lima, 1922 (Biol.), 1928 (Biol.); Wille, 1925 (Biol.).

Trachyderes sulcatus Burmeister

Distribution. NEOTROPICAL REGION: South America (Argentina).

Host plants: *Parkinsonia aculeata* (Bosq, 1942a); *Prunus*, *Vitis*, "guindo" (Reed, 1912).

References. Bosq, 1942a (Biol.); Reed, 1912 (?).

Trachyderes dimidiatus (Fabricius) (=**taeniatus** (Germar))

Distribution. NEOTROPICAL REGION: South America (Argentina, Bolivia, Brazil, French Guiana, Paraguay).

Host plants: *Salix babylonica* (Andrade, 1928); fruit trees (Bosq, 1934); *Prunus* spp. (Bosq, 1942a).

References. Andrade, 1928 (Biol.); Bosq, 1934 (Biol.), 1942a (Biol.); Lima, 1930 (Biol.), 1955 (Biol.).

Trachyderes octolineatus (Thunberg)

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plant: *Piptadenia communis* (Lima, 1955).

Reference. Lima, 1955 (Biol.).

Trachyderes rufipes (Fabricius)

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plant: *Morus alba* (Lima, 1955).

Reference. Lima, 1955 (Biol.).

Trachyderes striatus (Fabricius)

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil, French Guiana, Uruguay).

Host plants: *Ficus* (wild and cultivated), *Eucalyptus*, *Citrus* (Wille, 1925); fruit trees (Bosq, 1934).

Biology. Adults feed on various ripe fruits such as apples, pears and quince (Wille, 1925); and also on *Phaseolus* (Bosq, 1942a).

References. Bosq, 1942a (Biol.); Hayward, 1941 (Biol.); Ihering, 1909 (?); Lima, 1922 (Biol.), 1928 (Biol.); Reed, 1912 (Biol.); Trujillo, 1942 (Biol.); Wille, 1925 (Biol.).

Trachyderes thoracicus (Olivier) (=**morio** Laporte)

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).

Host plants: *Myrciaria*, *Psidium guava* (Andrade, 1928); *Caesalpinea echinata*, *C. ferrea* (Silva and Almeida, 1941); *Ficus*, *Eucalyptus*, *Citrus* (Wille, 1925); *Prunus*, *Pyrus*, *Castanea* (Bosq, 1942a).

Biology. Larvae of this species cause appreciable damage to the trunks of fig trees, which usually results in the trees being killed. Adults emerge in January and February (Bondar, 1913b) in Brazil, and in December and January in the Argentine (Bosq, 1934). Wille (1925) states that adults feed on various fruits such as apples, pears and quince.

References. Andrade, 1928 (Biol.); Belsak, 1926 (Biol. fig.); Bondar, 1913b (Biol.); Bosq, 1934 (Biol.), 1942a (Biol.); Costa, 1937 (?); Ebening, 1950 (Biol.); Fonseca and Autouri, 1932 (Biol.); Ihering, 1909 (?); Lima, 1922 (Biol.), 1928 (Biol.), 1930 (Biol.), 1955 (Biol.); Novaes, 1927 (Biol.); Quayle, 1938 (Biol.); Silva and Almeida, 1941 (Biol.); Wille, 1925 (Biol.).

Trachyderes variegatus Perty

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).

Host plants: *Ficus* (wild and cultivated), *Eucalyptus*, *Citrus* (Wille, 1925).

Biology. Adults feed on various fruits such as apples, pears and quince (Wille, 1925); and also on ripe figs (Bosq, 1942a).

References. Bosq, 1934 (Biol.), 1942a (Biol.); Wille, 1925 (Biol.).

Ancylosternus morio (Fabricius) (=**scutellaris** (Olivier))

Distribution. NEOTROPICAL REGION: South America (Brazil, Colombia, French Guiana, Patagonia, Uruguay, Venezuela).

Host plants: *Pyrus*, *Prunus* (Belsak, 1926).

Biology. Eggs are deposited in young branches of fruit trees of which this species is a pest. The larval galleries are at first subcortical, but later penetrate the sapwood longitudinally. The adults, which emerge from December to January, feed on ripe fruit (Belsak, 1926). According to Rojas (1866), adults feed on the ears of maize (Indian corn) during the heat of the day. Emergence takes place during June, July and August.

Control. Larvae may be killed by injecting their galleries with a mixture of resin, wax and essence of turpentine; or, alternatively, by extracting them by means of a hooked wire (Belsak, 1926).

References. Belsak, 1926 (I fig., Biol. fig., Contr.); Rojas, 1866 (Biol.); Trujillo, 1942 (Biol., Contr.).

Dendrobias mandibularis Serville

Distribution. NEOTROPICAL REGION: Mexico, Central America (British Honduras, Guatemala), South America (Colombia). NEARCTIC REGION: U.S.A. (Arizona, California, Texas).

Host plants: *Parkinsonia* (Craighead, 1923); *Citrus* (Ebeling, 1950).

Mature larva. No material available. Craighead (1923) gives the following description. "*Form* robust, cylindrical, then slightly compressed posteriorly; sparsely hairy; epistoma suddenly emarginate behind clypeus; labrum broadly oval to suborbicular, hairy; antennal joints subequal; mandible with a sulcus on outer face; joints of palpi subequal; process of palpifer very distinct; anterior margin of hypostoma swollen, bearing four more or less distinct tubercles. *Pronotum* posteriorly coarsely striate, the striae somewhat pinnately arranged behind; tergal plates prominent, lateral absent; presternal plates square, widely separated; eusternal glabrous spots triangular; ampullae strongly alutaceous, shining, posterior ventral ones somewhat divided and between the lobes longitudinally wrinkled. Spiracles narrowly oval, peritreme thin."

Biology. According to Schwarz (1904), adults are especially fond of printer's ink, and have sometimes obliterated the large letters on posters of theatrical performances which were pasted on walls and fences. It seems more probable, however, that it was the moisture in the paste which was the real attraction. Chemsak (1958) has found the rind of water-melon to be particularly attractive to this species.

References. Chemsak, 1958 (Biol.); Craighead, 1923 (L, Biol.); Duffy, 1953a (Biol.); Ebeling, 1950 (Biol.); Schwarz, 1904 (Biol.).

Oxymerus aculeatus Dupont

Distribution. NEOTROPICAL REGION: South America (Brazil).
Host plant: *Ficus benjamina* (Monte, 1933).
References. Lima, 1955 (Biol.); Monte, 1933 (?).

Oxymerus confusus Dupont

Distribution. NEOTROPICAL REGION: South America (Brazil).
Host plant: *Ficus benjamina* (Monte, 1933).
References. Lima, 1955 (Biol.); Monte, 1933 (?).

Oxymerus luteus (Voet) (=**rivulosus** (Germar))

Distribution. NEOTROPICAL REGION: Caribbean (Grenada, The Grenadines (including Mustique), St. Vincent), South America (Argentina, Brazil, Paraguay, Uruguay).
Host plants: *Prunus* (branches), *Rosa* (stems) (Bosq, 1934).

Biology. Adults of this species when in flight resemble the braconid *Ipobracon grenadensis* Ashm.; both are strongly attracted to flowers of *Paspalum virgatum* (Myers, 1932).

References. Bosq, 1934 (Biol.), 1942a (Biol.); Myers, 1932 (Biol.).

Oxymerus obliquatus Burmeister

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil, Paraguay, Uruguay).
Host plant: *Gossypium* (branches) (Bosq, 1942a).
Biology. Adults frequently assemble on flowers of *Paspalum dilatatum*, etc.
Reference. Bosq, 1942a (Biol.).

Oxymerus pallidus Dupont

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).
Host plant: *Piptadenia macrocarpa* (branches) (Bosq, 1942a).
Reference. Bosq, 1942a (Biol.).

Lissonotus shepherdi Pascoe

Distribution. NEOTROPICAL REGION: South America (Brazil, British Guiana).

Mature larva (fig. 60). Similar to those of *Trachyderes* species, but differing as follows. *Head* with front margin of hypostoma produced into a transverse carina (interrupted medially). *Prothorax* with proeusternum with a pair of median longitudinal impressions resembling gular sutures. *Abdomen* with ventral ampullae without striate plates posteriorly; sternite 8 bearing a median, convex, tuberculate process (fig. 60). *Spiracles* with peritreme much thicker. Length up to 31 mm.; maximum breadth (at prothorax) 7 mm.

That the Lissonotini are closely allied to the Trachyderini is clearly indicated through this larval comparison.

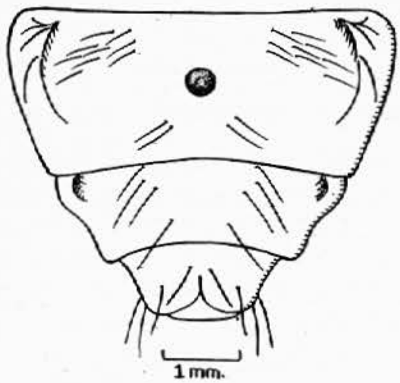


Fig. 60. *Lissonotus shepherdi* Pascoe. Mature larva. Abdominal sternites 8–10.

Material studied. 3 L, 1 I, British Guiana, Bartica district, Caow Creek, 3.iv.1957, from unknown liane, E.A.J.D. leg., in coll. B.M.

Reference. None available.

Lissonotus flavocinctus Dupont var. **puncticollis** Bates

Distribution. NEOTROPICAL REGION: Mexico. NEARCTIC REGION: U.S.A. (California).

Host plant: *Acacia farnesiana* (Vogt, 1949).

Reference. Vogt, 1949 (Biol.).

Lissonotus andalgalensis Bruch

Distribution. NEOTROPICAL REGION: South America (Argentina).

Host plants: *Acacia* spp. (F. Monrós); *Populus* (Reed, 1912).

References. Bosq, 1942a (Biol.); Reed, 1912 (?).

Stenaspini

Taranomis bivittatus (Dupont) (=**Sphaenothecus bivittatus** Dupont)

Distribution. NEOTROPICAL REGION: Mexico (including Carmen I.). NEARCTIC REGION: U.S.A. (Arizona, Texas).

Host plant: "Cosabe" (stems).

Mature larva (fig. 61). Rather similar to that of *Stromatium fulvum* (Villers) from which it differs mainly in the following characteristics. *Head* with front margin non-tuberculate; two pairs of widely separated longitudinal carinae present on hypostoma (fig. 61). Ocelli with lens round, protuberant; pigmented spot visible. Antenna with basal membrane short. Labrum as long as or slightly longer than broad. Posterior margin of submentum not produced to overlap hypostoma. Length up to 20 mm.; maximum breadth (at prothorax) 4·75 mm.

From larvae of the Trachyderini it may at once be distinguished by the absence of sclerotised striate plates on the ventral ampullae.

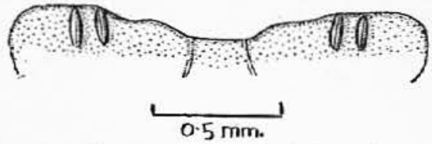


Fig. 61. *Taranomis bivittatus* (Dupont). Mature larva. Hypostoma.

Biology. In North America (Texas) adults are commonly found on flowers of *Bumelia celastrina*, *Prosopis juliflora*, *Acacia rigidula*, *Solidagio canadensis canescens* and *Condalia obovata* (Vogt, 1949).

Material studied. 1 L, Mexico, Hermosillo, Sonora, 14.xii.1948, from stem of "Cosabe", Johnston leg., in coll. U.S.N.M.

Reference. Vogt, 1949 (Biol.).

Cyphosterna bicolor Chevrolat

Distribution. NEOTROPICAL REGION: Mexico.

Host plant: *Bambusa*.

Mature larva (fig. 62). Similar to that of *Taronomis bivittatus* (Dupont) from which it may readily be separated as follows. *Head* with two pairs of conical tubercles instead of two pairs of longitudinal carinae on hypostoma (fig. 62). Ocellus oval; pigmented spot indiscernible. Length up to 22 mm.; maximum breadth (at prothorax) 5 mm.

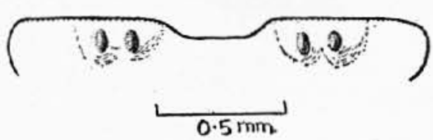


Fig. 62. *Cyphosterna bicolor* Chevrolat. Mature larva. Hypostoma.

Material studied. 1 L, Mexico, 12.iii.1947, from *Bambusa*, in coll. U.S.N.M.; 1 L (exuvia), 1 I, Mexico, 18.vi.1945, from stem of *Bambusa*, Nogales leg., in coll. U.S.N.M.

Dorcadocerini

Dorcadocerus barbatus (Olivier)

Distribution. NEOTROPICAL REGION: Mexico, South America (Argentina, Brazil, Paraguay, Uruguay).

Host plants: *Psidium guajava*, *Myrcia jaboticaba* (Bondar, 1913c); *Citrus aurantium* (Anonymous, 1917); *Prosopis nigra* (F. Monrós); *Myrciaria* (Andrade, 1928); *Ficus carica* (Goeldi, 1897).

Biology. Larvae infest branches and trunks in which they excavate longitudinal galleries which have a series of frass ejection holes (Bondar, 1913).

References. Andrade, 1928 (Biol.); Anonymous, 1917 (Biol.); Bondar, 1912a (I fig., Biol. fig., Contr.), 1913c (L fig., I fig., Biol. fig.); Bosq, 1942a (Biol.); Costa, 1943 (?); Goeldi, 1897 (Biol.); Lima, 1922 (Biol.), 1928 (Biol.), 1930 (Biol.), 1955 (Biol.); Moreira, 1921b (Biol.); Novaes, 1927 (Biol.); Wille, 1925 (Biol.).

Megaderini

Megaderus stigma (Linnaeus)

[Carocha]

Distribution. NEOTROPICAL REGION: Central America (Costa Rica, Panama), Caribbean (I. Tobago, Trinidad), South America (Argentina, Bolivia, Brazil, British Guiana, Colombia, Venezuela).

Host plant: *Mora excelsa* (Swabey, 1935).

Egg. Form elongate-oval. Chorion smooth, dull yellowish-white. Length 1·5 mm.; breadth 0·8 mm. The incubation period is four to five days (Moreira, 1930).

Biology. Adults secrete a characteristic scent which is less pleasant than that of certain Callichromini (Rojas, 1866). They are also readily attracted to artificial light (Moreira, 1930). This species has been known to damage telegraphic cables. The eggs are deposited on the sheath into which the resulting larvae bore, as many as eighty holes having been found in a length of 130 feet. These holes appear in a 45° sector on either side of the centre of the upper half of the sheath; reduced insulation is caused by moisture passing through them. The incubation period is from four to over nine days. The larvae do not ingest the lead as they bore through it, but they eventually die through lack of food and water. The normal host of this beetle is, of course, wood, and the fact that oviposition sometimes occurs on metal surfaces is purely fortuitous, the beetle possibly being stimulated by some tropism. In its normal environment the life-cycle is probably not completed in less than one year. The length of adult life varies from one to three months (Rendell, 1930).

Economic importance. According to Rendell (1930), this cerambycid has caused considerable damage to aerial telephone cables in Brazil. Perforations appeared over the whole length, irrespective of the position in the span or of cable rings. The presence of several sugar factories in the vicinity of where damage to cables was most severe suggests the possibility that the beetles may have been attracted to the area in the first instance by the odour.

Swabey (1935) states that adults have been observed on *Mora* stacks, but as the species has not been known to attack sound wood it cannot be considered of economic importance.

Control. In one case infestation is said to have been prevented by wrapping the lead sheath with white cotton tape, the tape being painted afterwards with a red oxide paint. A covering of tarred jute would probably protect the lead sheath from larval damage and make it distasteful to the female beetle (Rendell, 1930). Moreira (1930) suggests that cables should be coated with grease, which usually prevents the adults from settling; even if eggs are deposited, they do not adhere firmly and the larvae cannot perforate the cable because they cannot gain purchase.

References. Bondar, 1938c (?); Duffy, 1953a (Biol.); Fonseca, 1940 (Biol.);

Lacordaire, 1830 (Biol.); Lima, 1955 (Biol.); Moreira, 1930 (E fig., L fig., I fig., Biol. fig., Contr.); Pickel, 1929 (Biol. fig.); Rendell, 1930 (E fig., L fig., I fig., Biol. fig., Contr.); Rojas, 1866 (Biol.); Swabey, 1935 (Biol.); Zikán and Zikán, 1946 (Biol).

Hesperophanini

Stromatium fulvum (Villers) (=**unicolor** (Olivier))

Distribution. NEOTROPICAL REGION: Caribbean (Cuba), South America (Brazil). PALAEARCTIC REGION: North Africa (Algeria, Morocco, Tunisia, Egypt), Persia, Turkestan.

Host plants: *Carya* sp. (from records of F.P.R.L.); *Ulmus* (Lichtenstein, 1918); *Cytisus spinosus*, *Pistacia lentiscus*, *Quercus ilex* (Silantjev, 1908); *Juglans*, *Fagus*, *Morus*, *Cassia* (Shafik, 1938); *Prunus armeniaca*, *Ficus* (Mendizabal, 1943); *Corylus*, *Platanus*, *Cedrus* (Villiers, 1946).

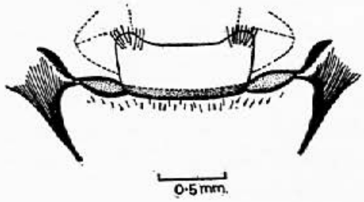


Fig. 63. *Stromatium fulvum* (Villers). Mature larva. Hypostoma.

Mature larva (fig. 63). *Head* subquadrate, somewhat wider behind middle, the posterior margin with a feeble median emargination; shouldered behind each antenna. Genae with setae short and sparse. Front margin of frons feebly concave and not strongly pigmented. 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. Antenna strongly protuberant, with a long basal membrane. *Prothorax* with pronotum subrectangular, with anterior area narrowly yellowish, shining; posterior area longitudinally striate, except for a posterior, finely reticulate area. Postnotal fold present. Eusternum not distinctly defined. *Abdomen* with ampullae non-tuberculate; transverse furrows indistinct. *Legs* well developed. *Spiracles* with peritreme oval, pale.

Biology. 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 many records of *S. fulvum* (Villers) infesting furniture and structural timbers. According to Shafik (l.c.) 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 have become established there.

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 cubic feet, 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 cubic feet, 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.), 1957 (L fig., Biol., Contr.); Fabre, 1891 (Biol.); Lepesme, 1944 (I fig., Biol.); Lichtenstein, 1918 (Biol.); Linsley, 1938 (Biol.); Mendizabal, 1943 (Biol.); Mulsant and Mayet, 1873 (L); Perris, 1877 (L, P, Biol.); Reîkhardt and others, 1930 (Biol., Contr.); Saraiva, 1957 (E fig., I fig., Biol., 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.).

Chlorida festiva (Linnaeus)

[The Mango Borer]

Distribution. NEOTROPICAL REGION: Central America (Nicaragua, Panama), Caribbean (Antigua, Barbados, Cuba (including I. de Pinos), Dominica, Grenada, Guadeloupe, Hispaniola, Jamaica, Montserrat, Puerto Rico, St. Vincent, Trinidad), South America (Argentina, Brazil, British Guiana, Surinam, Venezuela). ETHIOPIAN REGION: Principe, São Tomé.

Host plants: ?*Acacia decurrens mollisima*, ?*Enterolobium monjolo*, *Psidium guajava* (Lima, 1955); *Mangifera indica* (Caldeira and Vieira, 1938); *Albizia lebbeck*, *Casuarina equisetifolia*, *Stahlia monosperma* (Martorell, 1945); *Solanum melanogena* (Edwards, 1938); *Acacia polyphylla* (Andrade, 1928); *Brya* sp. (Dash, 1917); *Theobroma* (Duffy, 1957); *Swietenia* (Wolcott, 1951); *Triplaris surinamensis* (Kalshoven); *Alchornia sidaefolia* (F. Plaumann); *Clathrotropis brachypetala* (E.A.J.D.); *Astronium fraxinifolium* (Acácio Costa, Jr.).

Adult. Length 14–30 mm. Head and prothorax orange-yellow with black markings; elytra pale olive-green with a yellow submarginal stripe; antennae with basal segment yellow the remaining segments black; legs orange-yellow. *Head.* with antennae slightly longer than body in male, slightly shorter than body in female. *Prothorax* bearing a pair of spine-like tubercles laterally. *Elytra* each with a pair of longitudinal carinae and a pair of long apical spines.

Mature larva (fig. 64). Similar to that of *Stromatium fulvum* (Villers), but differing as follows. *Head* (fig. 64) with hypostoma narrowly and feebly tuberculate on front margin. Front margin of frons strongly sinuate medially (fig. 64). Gena not irregularly swollen around ocellus. Posterior margin of submentum not produced posteriorly to overlap hypostoma. Labrum as long as or slightly longer than broad. *Prothorax* with pronotum bearing a single isolated pair of setae placed paramedially near posterior margin. Length up to 37 mm.; maximum breadth (at prothorax) 9 mm.

Pupa. Head entirely smooth and glabrous; vertex not concealed from above by pronotum. Antennae filiform, extending to abdominal segment 4, where they are recurved ventrally to terminate alongside front coxae. Eyes feebly convex, glabrous. *Pronotum* with front margin broadly rounded; sides with a pair of stout median conical tubercles and front angles with an oblique truncate tubercle; disc with a pair of paramedian, slightly raised, circular areas which bear scattered setae. *Mesonotum* and *metanotum* glabrous or almost so. Elytra and wings extending as far as abdominal segment 3. *Abdomen* with tergites 2–6 each bearing numerous short, stout, ferruginous spines. Tergite 7 quadrate, with sides strongly converging posteriorly, the hind margin slightly produced medially; a pair of large tubercles, each

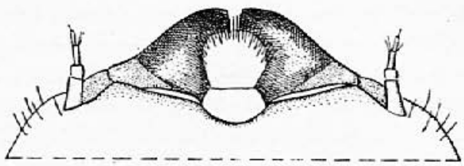


Fig. 64. *Chlorida festiva* (Linnaeus). Mature larva. Anterior part of head. Dorsal aspect.

bearing two very long curved spines arising near posterior margin, anterior to which is a smaller pair of tubercles, each bearing a pair of smaller divergent spines. Tergite 8 bearing a similar pair of tubercles posteriorly. Tergite 9 retracted. Sternites bearing a few scattered fine setae sublaterally. *Legs* with hind femora extending as far as abdominal segment 5. *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. Length up to 30 mm.; maximum breadth 8 mm.

Biology. The larval galleries extend deep into the heartwood. Adults are frequently attracted to artificial light (E.A.J.D.).

Natural enemies. In Puerto Rico these beetles are eaten by various birds such as *Crotophaga ani*. Nymphs of a uropodid mite are often found clinging to the thorax of these beetles (Martorell, 1945).

Economic importance. Adults have been known to injure the bark of *Hevea* rubber trees (Bodkin, 1919).

Material studied. 3 L, 1 I, British Guiana, Batica district, Caow Creek, 2.iv.1957, from *Clathrotropis brachypetala*, E.A.J.D. leg., in coll. B.M.; 1 L, 1 P, Brazil, x.1941, from *Alchornia sidaefolia*, F. Plaumann leg., in coll. B.M.; 12 L, 1 P, Holland, in imported logs of *Triplaris surinamensis*, Kalshoven leg., in coll. B.M.

References. Andrade, 1927 (Biol.), 1928 (Biol.); Bodkin, 1919 (Biol.); Caldeira and Vieira, 1938 (Biol.); Dash, 1917 (Biol.); Duffy, 1957 (Biol.); Edwards, 1938 (Biol.); Grégoire, 1957 (I, Physiol.); Lima, 1930 (Biol.), 1955 (Biol.); Mühlmann, 1954 (Biol.); Travassos, 1932 (Biol.); Wolcott, 1936 (Biol.), 1951 (I fig., Biol.).

Chlorida costata Serville

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).

Host plants: *Colubrina rufa* (Lima, 1955); *Rhamnidium elaeocarpum* (Andrade, 1928).

Mature larva. Similar to that of *C. festiva* (Linnaeus), but differing as follows.

Head with ocelli concealed by strong sclerotisation of gena. Temple immediately behind antennal foramen broadly ferruginous and subtuberculate. *Prothorax* with setae on pronotum simple basally. Length up to 50 mm.; maximum breadth (at prothorax) 7 mm.

Material studied. 2 L, Brazil, Nova Teutonia, F. Plaumann leg., in coll. B.M.

References. Andrade, 1927 (Biol.), 1928 (Biol.); Lima, 1930 (Biol.), 1955 (Biol.).

Chion cinctus (Drury)

[The Belted Chion]

Distribution. NEOTROPICAL REGION: Mexico, Caribbean (Bahama Is.). NEARCTIC REGION: U.S.A. PALAEARCTIC REGION: British Isles (occasionally imported).

Host plants: *Hicoria, Quercus, Juglans, Castanea, Parkinsonia* (Craighead, 1923); *Sapindus, Salix* (Vogt, 1949); *Pyrus malus* (Riley, 1880); *Celtis* (Blackman and Stage, 1924); *Carya* (Gill, 1917).

Mature larva (figs. 65–66). Closely resembling that of *S. fulvum* (Villers), but with posterior margin of submentum not produced to overlap front margin of hypostoma.

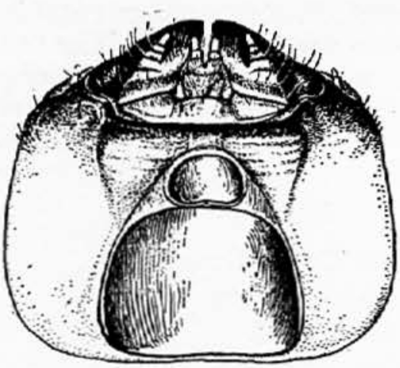


Fig. 65

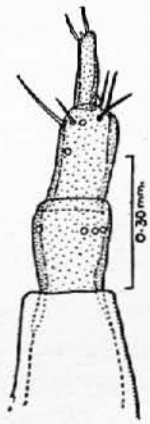


Fig. 66

Figs. 65–66. *Chion cinctus* (Drury). Mature larva. Fig. 65. Head. Ventral aspect. Fig. 66. Antenna. Lateral aspect.

Biology. The eggs are laid in cracks in decayed or in recently cut, rather dry, barkless branches. Although this larva tunnels subcortically, it is chiefly in the sapwood that it excavates. According to Blackman and Stage (1924), the gallery is filled with coarse pellets of frass, but Craighead (1923) maintains that it is kept more or less clear of debris, much frass being rejected. Galleries up to 2 feet in length have been observed. Pupation takes place deep in the outer sapwood, either in the autumn or in the spring; if the former, the adult over-winters in the pupal cell. Emergence takes place in May and June. The life-cycle is usually two years, but sometimes three or more. There are several records of retarded larval development, notably those by Fitch (1856), who gives an instance in which a table between twenty and twenty-eight years old was found to be infested, and Blackman and Stage (1924) who refer to an infestation in an eight-year-old wagon spoke.

According to Gill (1917), the larval galleries extend for a considerable depth in the heartwood.

Control. Craighead (1950) recommends the cutting of timber early in the autumn and seasoning it well through the winter under cover and off the ground, so that it has become thoroughly dried by the time the beetles appear the following spring. In the case of infestations in pecan orchards, Gill (l.c.) suggests the collection and burning of all dead and dying wood.

Material studied. 1 L, North America, Champion leg., in coll. B.M.; 2 L, from imported *Quercus*, in coll. F.P.R.L.

References. Blackman and Stage, 1924 (Biol.); Craighead, 1923 (L fig., P, Biol.), 1950 (L fig., Biol., Contr.); Duffy, 1953a (L fig., P fig., Biol., Contr.); Gill, 1917 (I fig., Biol. fig., Contr.); Riley, 1880 (Biol.); Vogt, 1949 (Biol.).

Phymatioderus bizonatus (Blanchard)

Distribution. NEOTROPICAL REGION: South America (Chile).

Host plants: *Eucalyptus* (Porter, 1940); *Lithraea caustica*, *Quercus peduncula* (G. Kuschel).

Mature larva. Similar to that of *Chion cinctus* (Drury), but differing as follows. *Head* with front margin of hypostoma testaceous, slightly swollen and with a feebly transverse carina. *Abdomen* with ampulla on tergite 7 little more than half the size of that on tergite 6. Length up to 32 mm.; maximum breadth (at prothorax) 6·1 mm.

Material studied. 6 L, Chile, Santiago, 22.iv.1957, from *Quercus peduncula*, G. Kuschel leg., in coll. B.M.; 5 L, Chile, Santiago, Las Cruces, 26.iv.1957, from *Lithracea caustica*, G. Kuschel leg., in coll. B.M.

Reference. Porter, 1940 (Biol.).

Anoplomerus rotundicollis (Guérin-Menéville)

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plant: *Jacaranda* sp. (Zikán and Zikán, 1946).

Reference. Zikán and Zikán, 1946 (Biol.).

Grammicosum flavofasciatum (Blanchard)

Distribution. NEOTROPICAL REGION: South America (Argentine, Chile).

Host plants: *Nothophagus dombeyi* (Monrós, 1944); *N. obliqua* (Bosq, 1942a).

References. Bosq, 1942a (Biol.); Monrós, 1944 (Biol.).

Grammicosum signaticolle (Blanchard)

Distribution. NEOTROPICAL REGION: South America (Chile).

Host plant: *Robinia pseud-acacia* (Porter, 1936).

Reference. Porter, 1936 (Biol.).

Pantomallus morosus (Serville)

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plant: *Jacaranda decurrens* (Lima, 1955).

Reference. Lima, 1955 (Biol.).

Eburiini

Eburodacrys sulphureosignata (Erichson) (=**Eburia sulphureosignata** Erichson)

Distribution. NEOTROPICAL REGION: Caribbean (Trinidad), South America (Bolivia, British Guiana, French Guiana, Peru).

Fig. 67. *Eburodacrys sulphureosignata* (Erichson). Mature larva. Hypostoma.

Host plants: *Terminalia obovata*, *Rhizophora*, *Buchenaria capitata* (E.A.J.D.).

Adult. Length 12–20 mm. Head, prothorax and elytra castaneous, the latter each with a single basal and a pair of paramedian, elongate-oval, bright yellow markings. *Head* with antennae longer than body in both sexes. *Prothorax* with a pair of black, conical, lateral tubercles and a pair of paramedian black, rounded tubercles on disc. *Elytra* each with a long apical spine. *Legs* with middle and hind femora bearing a strong spine.

Mature larva (fig. 67). Similar to those of *Taranomis* and *Cyphosterna*, but with the front margin of the hypostoma bearing numerous longitudinal to slightly oblique carinae (fig. 67), and with the temples narrowly ferruginous behind ocelli. Length up to 23 mm.; maximum breadth (at prothorax) 5·5 mm.

Pupa (fig. 68). *Head* with vertex concealed from above by pronotum, glabrous. Antennae filiform, extending as far as abdominal segment 5, where they are recurved ventrally to terminate near hind femora. Eyes feebly convex, glabrous. *Pronotum* bearing numerous fine, pale, scattered setae, especially along margins; sides with a pair of short, stout tubercles; disc with a pair of paramedian subconical tubercles. Elytra and wings extending to abdominal segment 4. *Abdomen* with tergites 2–6 with numerous rather short straight spines. Tergite 7 with similar spines arranged rather as in *Elaphidion*, but without a pair of tuberculate protuberances. Tergite 8 glabrous. Segment 9 retracted in segment 8. Sternites glabrous. *Legs* with mid- and hind femora produced posteriorly into a long robust spur (fig. 68); extending posteriorly to

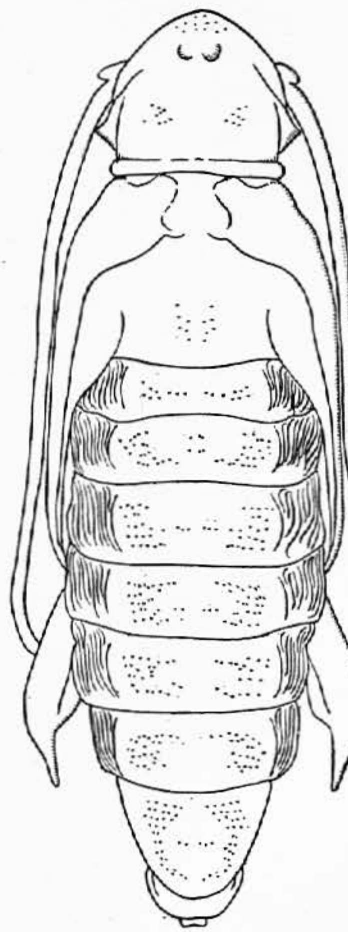


Fig. 68. *Eburodacrys sulphureosignata* (Erichson). Pupa. Dorsal aspect.

abdominal segment 6. *Functional spiracles* present on abdominal segments 1–5; peritreme broadly oval, and rather strongly raised above general level of cuticle. Length up to 17·5 mm.; maximum breadth 5·3 mm.

Economic importance. In Trinidad this species is often responsible for extensive damage to freshly felled logs in sawmills. In the North West District of British Guiana many mooring-posts and landing-stages of *Rhizophora* were heavily infested and rotting away (E.A.J.D.).

Material studied. 6 L, Trinidad, Arena Reserve, 13.vi.1957, from *Buchenaria capitata*, E.A.J.D. leg., in coll. B.M.; 8 L, 2 P, 1 I, Trinidad, Arima district (sawmills), 11.vi.1957, from *Terminalia obovata*, E.A.J.D. and F. Peña leg., in coll. B.M.; 8 L, 1 P, 1 I, British Guiana, N.W. District, Morawhanna, Hosororo, 4.v.1957, from *Rhizophora*, E.A.J.D. leg., in coll. B.M.

References. None available.

Eburodacrys dubitata (White)

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plant: *Acacia* sp. (Costa, 1943).

References. Costa, 1943 (Biol.); Lima, 1955 (Biol.).

Eburodacrys longilineata (White)

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plant: *Acacia polyphylla* (Andrade, 1928).

References. Andrade, 1928 (Biol.); Lima, 1930 (Biol.), 1955 (Biol.).

Eburodacrys sexmaculata (Olivier)

Distribution. NEOTROPICAL REGION: South America (Brazil, British Guiana).

Host plants: *Cassia grandis*, *Piptadenia macrocarpa*, *Mimosa sordida*, ? *M. bracaatinga*, *Caesalpinia ferrea*, *C. echinata*, *Tamarindus indica*, *Platymenia reticulata* (Silva and Almeida, 1941).

References. Lima, 1955 (Biol.); Silva and Almeida, 1941 (I fig., Biol. fig.).

Eburodacrys sexguttata Lameere

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil, British Guiana).

Host plants: *Nectandra*, *Persea gratissima* (especially branches previously attacked by *Oncideres* spp.).

Reference. Bosq, 1942a (Biol.).

Eburodacrys vittata (Blanchard)

Distribution. NEOTROPICAL REGION: South America (Argentine, Bolivia, Brazil, Paraguay).

Host plants: *Myrcia jaboticaba* (Fagundes, 1928); *Citrus* (Bosq, 1942a); *Myrciaria* (Andrade, 1928).

References. Andrade, 1927 (Biol.), 1928 (Biol.); Bosq, 1942a (Biol.); Lima, 1930 (Biol.), 1955 (Biol.).

Eburia quadrigeminata (Say)

Distribution. NEOTROPICAL REGION: Caribbean (Cuba). NEARCTIC REGION: U.S.A., Canada. PALAEARCTIC REGION: British Isles (frequently imported).

Host plants: *Quercus*, *Hicoria*, *Robinia*, *Fraxinus*, *Castanea*, *Ulmus*, *Fagus* (Craighead, 1923); *Acer*, *Cupressus* (Craighead, 1950).

Mature larva. Form rather robust, slightly compressed posteriorly. *Head* quadrate, with sides almost straight and parallel-sided. Gena moderately shouldered, smooth, narrowly testaceous and bearing a few long fine setae. Front margin of frons rather indistinctly ferruginous and evenly rounded. Antennal foramen with upper boundary not raised or produced. Mouthframe entirely sclerotised beneath antennae. Antenna slender, with segments 2 and 3 at least twice as long as broad; segment 3 cylindrical, about half length of segment 2; supplementary process minute. Clypeus very short. Labrum suborbicular, thick, fleshy, with front margin densely setose. Mandible short, stout; basal part ferruginous, two-thirds length of pitchy apical part. Ocellus subcontiguous with antennal foramen; lens large, round, white; pigmented spot very indistinct; partly surrounded by shouldered gena. Hypostoma with front margin longitudinally and rather feebly carinate, testaceous. Gular sutures protuberant, parallel. Maxilla with segment 3 of palp shorter than segment 2; process of palpifer minute. *Prothorax* quadrangular, with four pale yellow, sclerotised plates; pronotum slightly transverse; anterior part bearing scattered fine setae; posterior part alutaceously striate and with scattered lenticular pits; median cleavage line deeply impressed. Sternum wrinkled, with scattered setae, except for two glabrous smooth patches on eusternum. *Abdomen* slightly compressed laterally; dorsal ampullae alutaceous, shining, with two lateral and two transverse grooves. Anal lobes rugose. Pleural discs wrinkled, indistinct. *Legs* 4-segmented, moderately long; unguiculus flagelliform, feebly sclerotised and imbricately spinose. *Spiracles* with peritreme thin and pale.

Biology. The larvae bore into the heartwood of dry solid timber, excavating large contorted galleries, which are very tightly packed with frass. The life-cycle is extremely variable. There are records of this beetle emerging from furniture that has been in use for as long as twenty years (Blair, 1948; Craighead, 1923; Webster, 1888).

Economic importance. This species is of decided economic importance, particularly in so far as furniture is concerned. There are numerous instances on record of furniture being damaged through the emergence of adults often several years after its construction (see Duffy, 1954).

Mature oaks, bearing scars through which larvae can gain access to the heartwood, are often severely damaged (Craighead, 1923).

Control. Craighead (1950) recommends fumigation or the removal of infested woodwork.

Material studied. 1 L, London, from cabinet of American oak, 22.viii.1935, in coll. B.M.; 1 L, 1 P, U.S.A., Veitch, Virginia, 19.x.1912, from logs of *Quercus*, A. D. Hopkins leg., in coll. U.S.N.M.

References. Blackman and Stage, 1924 (Biol.); Blair, 1948 (Biol.); Cann, 1937 (Biol.); Craighead, 1923 (L fig., Biol.), 1950 (Biol., Contr.); Duffy, 1949 (Biol.), 1953 (L fig., P, Biol., Contr.), 1954 (Biol.); Emden, 1939–1940 (L); Webster, 1888 (Biol.).

Eburia octoguttata (Germar)

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).
Host plant: *Citrus aurantium* (Andrade, 1928).
References. Andrade, 1927 (Biol.), 1928 (Biol.); Bosq, 1942a (Biol.); Ebeling, 1950 (Biol.); Lima, 1930 (Biol.), 1955 (Biol.); Quayle, 1938 (Biol.).

Eburia sordida Burmeister

Distribution. NEOTROPICAL REGION: South America (Argentina, Paraguay).
Host plant: *Citrus* (Bosq, 1942a).
Reference. Bosq, 1942a (Biol.).

Eburia pilosa Erichson

Distribution. NEOTROPICAL REGION: South America (Chili, Peru).
Host plant: *Ficus carica* (G. Kuschel).
Reference. None available.

Erosida gratiosa (Blanchard)

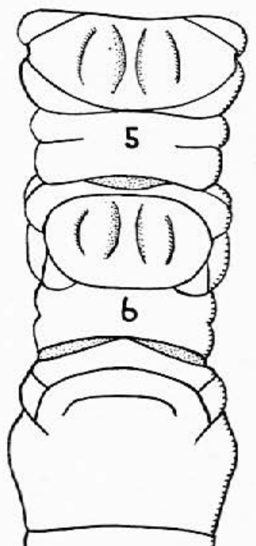


Fig. 69. *Erosida gratiosa* (Blanchard). Mature larva. Abdominal segments 5–10 (diagrammatic). Dorsal aspect.

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).
Host plant: ?*Eugenia pitanga* (Fagundes, 1928).
Mature larva (fig. 69). Similar to that of *Eburodacrys sulphureosignata* (Erichson), but differing as follows. *Prothorax* with proeusternum very finely and evenly microgranulate. *Abdomen* with at least segments 5 and 6 with dorsal and ventral ampullae very strongly protuberant and bilobed (fig. 69). Length up to 14 mm.; maximum breadth (at prothorax) 4·75 mm.
Material studied. 1 L, Brazil, x.1941, F. Plaumann leg., in coll. B.M.
References. Fagundes, 1928 (?); Lima, 1930 (Biol.), 1955 (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 distinct. 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 Anall obes sparsely setose. *Legs* short, but clearly 4-segmented; femur and tibiotarsus strongly sclerotised; unguiculus flagelliform, usually feebly sclerotised and imbricately tuberculate or spinose.

Elaphidion nanum (Fabricius) (=**cinereum** Olivier)

Distribution. NEOTROPICAL REGION: Caribbean (Bahamas Is., Cuba, Hispaniola (including Haiti), Jamaica, Puerto Rico, Virgin Is. (St. Thomas, Vieques)). NEARCTIC REGION: U.S.A. (Florida). PALAEARCTIC REGION: British Isles (occasionally imported).

Host plants: *Conocarpus erecta* (Schwarz, 1888); *Casuarina equisetifolia* (Martorell, 1945); *Guaiacum officinale* (Duffy, 1953a); *Xanthoxylum* sp. (R. H. Milligan).

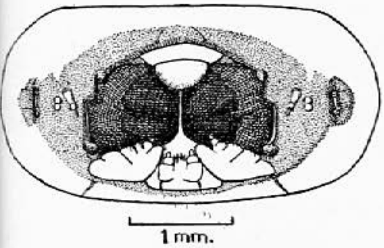


Fig. 70

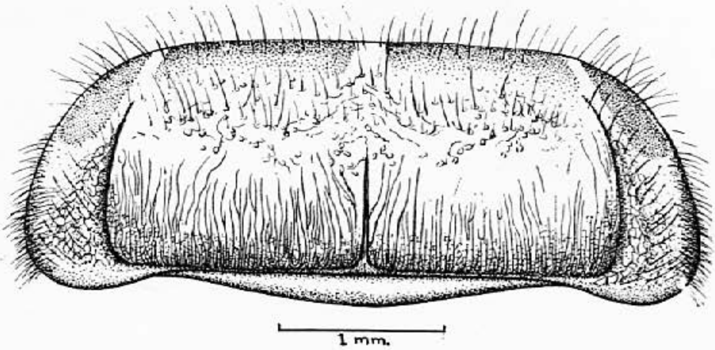


Fig. 71

Figs. 70–71. *Elaphidion nanum* (Fabricius). Mature larva. Fig. 70. Head. Frontal aspect. Fig. 71. Prothorax. Dorsal aspect.

Adult. Length 8–15 mm. Head, prothorax and elytra ferruginous to pitchy and densely covered with yellowish-brown pubescence; pronotum with three longitudinal, dark brown, glabrous carinae; elytra sometimes each with a longitudinal, dark brown glabrous stripe (due to abrasion). *Prothorax* with sides rounded, without lateral tubercles. *Elytra* rather coarsely punctured; narrowly subtruncate apically.

Mature larva (figs. 70–71). *Head* very strongly transverse, trapezoidal, moderately depressed. Genae strongly shouldered and broadly sclerotised and ferruginous behind ocelli (for a distance of about twice that between ocelli and base of mandible) and with two to four conspicuous, widely separated pale setal pores traversed by a fine but distinct impression (fig. 70); temples bearing a few short bristly setae; sclerotisation of mouthframe rather broadly ferruginous, not interrupted beneath antennae. Antenna with segment 2 nearly twice as long as basal width; supplementary process conical, less than half length of segment 3, which is about three times as long as basal width. Mandible short, broad, entirely pitchy. Labrum transversely oval, with anterior margin fringed with rather sparse pale setae. Two pairs of subcontiguous ocelli present; lens small, round, moderately convex. Hypostoma with front margin rather broadly sclerotised and ferruginous, smooth; sutures short, slightly incurved. Gula distinctly raised; sutures concave. Maxillary palpi with segment 3 as long as segment 2; dorso-external process of palpifer distinctly attenuated. Labial palpi with segment 2 as long as segment 1. *Prothorax* (fig. 71) strongly transverse, with sides strongly rounded; lateral regions smooth and sparsely covered with pale setae; pronotum with median cleavage line distinctly impressed for basal half; anteriorly pale orange-testaceous, sparsely setose; posteriorly milky white, longitudinally striate. Prosternum rather coarsely vermiculately rugose. *Abdomen* with ampullae shining, smooth, glabrous, subtuberculate and not bilobed. *Legs* pale, 3-segmented. *Spiracles* with peritreme broadly oval, moderately thick, pale and not raised above general level of cuticle. Length up to 20 mm.; maximum breadth (at prothorax) 4·5 mm.

Pupa (fig. 72). As in the case of the larvae, pupae of this genus are rather diverse and that of *E. nanum* (Fabricius) does not conform to the general characters of the Phoracanthini. It differs from other genera of the Phoracanthini so far examined as follows. *Head* with antennae filiform. Eyes with three or four long fine setae near

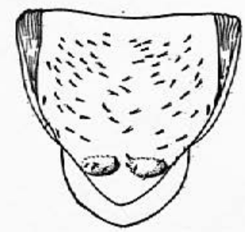


Fig. 72. *Elaphidion nanum* (Fabricius). Pupa. Abdominal tergites 7 and 8.

posterior margin. *Pronotum* glabrous, except for a few minute spinules and setae along front margin; lateral tubercles absent. *Abdomen* with tergite 7 (fig. 72) with numerous long slender spines, which are mostly recumbent and pointing inward; posterior margin with a pair of very small tuberculate protuberances which bear a few sub-erect spines. Tergite 8 glabrous, with hind margin semicircular. Length up to 13 mm.

Biology. The larvae feed subcortically for their entire larval existence in branches and slender boles, making meandering galleries which are roughly two-thirds or more in the bark, and one-third or less in the wood. The pupal cell is in the outer sapwood, or, occasionally, in the inner bark. Each cell consists of a short shallow, oval excavation about 3 cm. long; it is usually formed close to where the larval gallery was first started. Pupation takes place in August and September, and emergence during September and October (Duffy, 1953a). Adults are readily attracted to artificial light (Martorell, 1945).

Parasites. Many larvae and pupae were observed by the author to be infested with dipterous larvae belonging to the family Phoridae.

Economic importance. Although penetration of the larval galleries of this species is relatively superficial, there are cases when an infestation can cause serious losses. Such a case was kindly pointed out to the author by Mr. W. G. Marshall, who had imported logs of Lignum-vitae which proved to be infested. He found that penetration was frequently half an inch, and, as these logs were required for turning to a diameter of two inches or more, the reduction of the diameter through the penetration of only one inch rendered these logs useless.

Material studied. 15 L, 4 P, 1 I, Lancashire, 13.ix.1948, in *Guaiacum* imported from Jamaica, M. G. Fraser leg., in coll. B.M.

References. Chittenden, 1898 (Biol.); Duffy, 1953a (I fig., P fig., Biol. fig.); Fraser, 1948c (Biol.); Hickin, 1958 (I fig., Biol.) Martorell, 1945 (Biol.); Schwarz, 1888 (Biol.); Wolcott, 1951 (Biol.).

Elaphidion irroratum (Linnaeus)

Distribution. NEOTROPICAL REGION: Mexico (including Las Tres Marías), Central America (Nicaragua), Caribbean (Cuba, (including I. de Pinos), Hispaniola, Guadeloupe, Jamaica, Puerto Rico (including Mona I.), St. Barthélemy, St. Kitts). NEARCTIC REGION: U.S.A. (including Florida, Illinois, New York).

Host plants: *Albizia lebbeck* (Wolcott, 1941); *Laguncularia racemosa* (Schwarz, 1888); *Avicennia nitida* (Riley, 1880).

Predators. Larvae of the elaterid *Chalcolepidus silbermanni* Chevrolat are predatory on larvae of this cerambycid (Martorell, 1945).

References. Chittenden, 1898 (Biol.); Martorell, 1945 (Biol.); Riley, 1880 (Biol.); Schwarz, 1888 (Biol.); Wolcott, 1941a (Biol.), 1941b (Biol.), 1951 (Biol.).

Elaphidion glabratum (Fabricius) (=**mite** Newman)

[The Lime Twig Borer]

Distribution. NEOTROPICAL REGION: Caribbean (Antigua, Bahamas Is., Dominica, Guadeloupe, Puerto Rico, St. Barthélemy, St. Lucia, St. Kitts, St. Thomas), South America (Brazil).

Host plant: *Citrus* (Ballou, 1913).

Biology. Attack by this beetle begins on a small twig in which the larva gradually tunnels its way along to the supporting branch. The latter is almost completely girdled spirally by the larva and the entire life-cycle is passed within the outer dead portion, although it is probable that some living wood may be consumed. Infested branches soon break and are thus rendered conspicuous. Emergence takes place some time after eclosion. The life-cycle is apparently comparatively long, as both larvae and adults have been found in twigs which had been dead for a long time. It is probable that there is actually a wide range of host plants from which renewed attacks on limes may take place periodically. Shortly after attack, injury to the branch is rendered conspicuous by the wilting and the eventual withering of the foliage and the breaking of the branch. Infestation always occurs rather high up in the tree among the smaller branches and twigs. The branches which are girdled usually do not exceed 1 inch in diameter, generally less (Ballou, 1913).

Control. Any dying branch, the leaves of which are withered or discoloured, should be carefully examined; either the larvae should be dug out or the branch cut off sufficiently far back to ensure the removal of the larvae. Infestation is usually noticed after the branch has broken, in which case the point at which the cut should be made is obvious, for the larva will always be in the hanging portion. These infested branches should be collected at monthly intervals and burned. This periodic destruction of larvae should soon preclude the development of further broods (Ballou, 1913).

References. Anonymous, 1913 (Biol.); Ballou, 1913 (Biol. fig., Contr.); Evans, 1952 (Biol. fig., Contr.).

Elaphidion collare Burmeister

Distribution. NEOTROPICAL REGION: South America (Argentine, Uruguay).
Host plants: *Melia azederach*, *Rosa*, *Prunus* (Bosq, 1934).
References. Bosq, 1934 (Biol.); Trujillo, 1942 (Biol.).

Elaphidion mutatum Gahan

Distribution. NEOTROPICAL REGION: Caribbean (Cuba, Puerto Rico). NEARCTIC REGION: U.S.A. (Florida).

Host plants: *Zanthoxylum flavum* (Wolcott, 1941a); *Lagerstroemia indica*, *Clusia rosea* (Wolcott, 1951).

Reference. Wolcott, 1941a (Biol.), 1951 (Biol.).

Elaphidion spinicorne (Drury)

Distribution. NEOTROPICAL REGION: Caribbean (Hispaniola (including Haiti), Jamaica, Puerto Rico (including Mona I.)).

Host plant: *Albizia lebbeck* (Wolcott, 1941a).

Predators. Larvae of the elaterid *Chalcolepidus silbermanni* Chevrolat are predatory on larvae of this cerambycid (Martorell, 1945).

Reference. Martorell, 1945 (Biol.); Wolcott, 1941a (Biol.), 1951 (Biol.).

Elaphidion spinicorne (Fairmaire, nec Drury)

(=**Ibidion spinicorne** Fairmaire)

Distribution. NEOTROPICAL REGION: South America (Argentina).

Host plants: Various fruit and forest trees (Bosq, 1942a); *Melia azederach* (Bruch, 1921b).

References. Bosq, 1942a (Biol.); Bruch, 1921b (Biol.).

Elaphidion tomentosum Chevrolat

Distribution. NEOTROPICAL REGION: Caribbean (Cuba, Hispaniola (including Haiti), Montserrat, Puerto Rico).

Host plant: *Clusia rosea* (Martorell, 1945).

Reference. Martorell, 1945 (Biol.).

Elaphidion villosum (Fabricius)

[The Bark Pruner; the Oak Pruner]

Distribution. NEOTROPICAL REGION: Caribbean (Cuba). NEARCTIC REGION: U.S.A., Canada.

Host plants: *Quercus tinctoria* (Clarkson, 1887); fruit trees, *Acer*, *Carya*, *Castanea*, *Abies* (Haldeman, 1853 (Biol.)); *Prunus* (Riley, 1880); *Vitis*, *Gleditschia*, *Cercis canadensis*, *Rhus*, *Citrus*, *Maclura aurantiaca*, *Wistaria*, *Celastrus scandens* and probably *Lindera benzoin*, *Sassafras*, *Rhus glabra*, *R. typhina*, *Juglans*, *Betula* (Chittenden, 1898).

Biology. This species attacks the smaller branches of a large variety of hardwood trees. The larva tunnels down the centre of the stem until full grown, when it cuts off the branch from inside, leaving a thin shell of bark, which later breaks. Frass ejection holes are rarely made. Pupation takes place between two plugs of frass in late autumn or early spring and adults emerge from June to September. The life-cycle is completed in one year (Craighead, 1923). According to Chittenden (1898), the larva does not always sever the twig which it occupies.

As in the case of *Oncideres* species, twigs and small branches are amputated and the resulting damage is therefore somewhat similar; but whereas in the case of *Oncideres* the amputation or girdling is done externally by the adult, it is done through the larva working internally in the case of *E. villosum* (Fabricius). In damage by *Oncideres* species the end of the severed branch presents a more or less jagged surface at its centre, but in the case of *Elaphidion* the central area is smoothly cut, with an oval aperture plugged with a wad of fibres which has been constructed by the larva occupying the severed portion for protection.

Economic importance. Although the damage caused by this beetle is not in itself very serious, the fallen twigs and branches are likely to serve as a breeding place for other wood borers which may be more injurious to timber (Chittenden, 1898). Numerous accounts are given in the literature of the extraordinary abundance of this beetle, and it is apparently not uncommon to find hundreds of severed twigs beneath a single tree or to find the ground in oak woods strewn with branches.

Control. As an effective control measure, the gathering and burning of fallen twigs during winter is recommended.

Parasites. Hymenoptera. *Odontobracon elaphidivorus* Rohwer (Rohwer, 1917); ?*Bracon eurygaster* Brullé (Chittenden, 1898).

Natural enemies. Arachnida. *Theridium tepidariorum* C. Koch (Chittenden, 1910). Birds. *Dryobates pubescens*, *Cyanocitta cristata*, *Penthestes atricapillus* (Chittenden, 1910).

References. Anonymous, 1913 (Biol.); Chittenden, 1898 (L fig., P fig., I fig., Biol. fig.), 1910 (L fig., P fig., I fig., Biol. fig., Paras., Contr.); Clarkson, 1885 (Biol.), 1887 (Biol.); Craighead, 1923 (L fig., Biol.); Felt, 1898 (L fig., P fig., Biol. fig.); Fitch, 1859 (Biol.); Gill, 1917 (L fig., I fig., Biol. fig., Contr.); Haldeman, 1853 (Biol.); Hamilton, 1887 (Biol.); Peck, 1819 (?); Packard, 1881 (L fig., P fig., I fig., Biol. fig.), 1890 (L fig., P fig., I fig., Biol. fig.); Riley, 1880 (Biol.); Rohwer, 1917 (Paras.); Thompson, 1943 (Paras.).

Elaphidion insulare Newman

Distribution. NEOTROPICAL REGION: Caribbean (Nevis, Puerto Rico (including Mona I.)).

Host plant: *Ficus laevigata* (Wolcott, 1951).

Reference. Wolcott, 1951 (Biol.).

Elaphidion inerme Newman

[The Orange Sawyer]

Distribution. NEOTROPICAL REGION: Central America (Guatemala, Nicaragua, Panama). NEARCTIC REGION: U.S.A. (Texas, Florida).

Host plants: *Citrus aurantium*, *Quercus virens* (Chittenden, 1898).

Biology. Damage to *Citrus* by this species is the result of careless pruning, the untrimmed ends attracting the ovipositing female. The young larvae remain inside these dead ends until the latter are entirely hollowed out. They then descend into the living wood, thus weakening the bud.

Reference. Chittenden, 1898 (I fig., Biol.).

Phoracantha semipunctata (Fabricius)

[Taladro de los Eucaliptos]

Distribution. NEOTROPICAL REGION: South America (Argentina, Chile, Uruguay). ETHIOPIAN REGION: South Africa (Cape Province, Orange Free State, Pretoria). MADAGASCAN REGION: Mauritius, Rodriguez. PALAEARCTIC REGION: Egypt, Palestine. AUSTRALASIAN REGION: Australia, New Zealand.

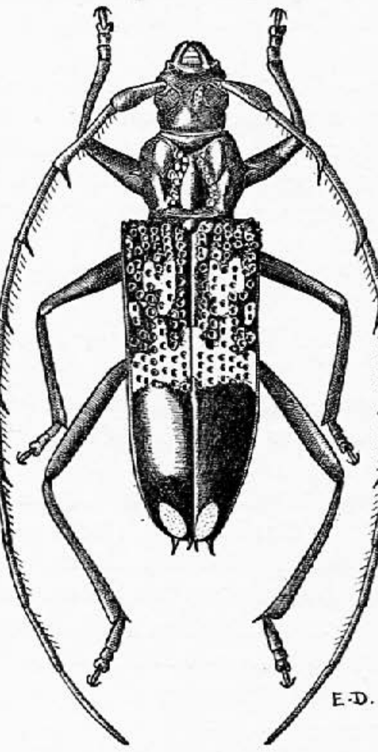


Fig. 73. *Phoracantha semipunctata* (Fabricius). Adult.

This species is of Australian origin, but has become widely distributed through commerce and is now established in New Zealand, South Africa and South America.

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* (Bytinski-Salz and Neumark, 1953), and in South America *E. viminalis* (Bosq, 1940) and *E. globulus* (Molinari, 1923).

Adult (fig. 73). 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 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. Length 16–30 mm.

Mature larva (fig. 74). Form robust and rather strongly depressed. *Head* slightly transverse (maximum head-width 6·5 mm.). Temples (fig. 74) 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. Length up to 32 mm.; maximum breadth (at prothorax) 10·5 mm.

Pupa. *Head* with vertex dome-shaped, smooth, glabrous and partly visible from above; front feebly rugose, glabrous. Antennae with segments 3–6 (at least) strongly

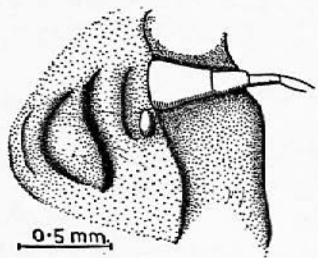


Fig. 74. *Phoracantha semipunctata* (Fabricius). Mature larva. Temple. Lateral aspect.

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 or 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. Length up to 25 mm.; maximum breadth 6 mm.

Egg. Form elongate, subcylindrical, spindle-shaped. Chorion pale yellow, soft, gelatinous. Length 2·6 mm. (Tooke, 1935a).

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 from 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 bark or in crevices. Life span of the adult is about 40 days in summer and up to 180 days during the colder season. Oviposition occurs practially 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 (l.c.), 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 Africa in wooden sleepers from Australia about 1896. It was first found about 1900 in blue gum 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. Orion has informed the author that this insect is a serious pest of *Eucalyptus* in Mauritius.

Introduced trees of *Eucalyptus* species, especially *E. globulus*, growing in parks and other open places in the Argentine have been infested by this species in the past (Molinari, 1923).

Control. Tooke (l.c.) 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 cubic foot 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.); Bosq, 1934 (Biol.), 1940 (Biol.); Bruch, 1918 (I fig., 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.), 1957 (E, L fig., P, I fig., 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.).

Orion patagonus Guérin-Méneville

Distribution. NEOTROPICAL REGION: South America (Argentina, Bolivia, Brazil, Chile, Uruguay).

Host plant: *Robinia pseud-acacia* (Reed, 1912).

References. Bosq, 1942a (Biol.); Reed, 1912 (?).

Sphaerionini

Protosphaerion insulare (White)

Distribution. NEOTROPICAL REGION: Caribbean (Jamaica).

Host plant: *Amyris*.

Mature larva. Larvae labelled as being probably this species appear to be identical to those of *Elaphidion nanum* (Fabricius), and cannot be separated in the key. It is strongly suspected that they are in fact larvae of *E. nanum* (Fabricius).

Material studied. 12 L, Jamaica, 9.v.1945, from under bark of *Amyris* wood, in coll. U.S.N.M.

Reference. None available.

Ambonus electus (Gahan)

Distribution. NEOTROPICAL REGION: South America (Brazil).

References. Bayford, 1950 (P, Biol.); Duffy, 1953a (Biol.).

Trichophorus interrogationis Blanchard

Distribution. NEOTROPICAL REGION: South America (Argentina, Bolivia, Brazil, Paraguay).

Host plants: *Acacia decurrens mollissima* (Andrade, 1928); *Piptadenia* (Bosq, 1942a).

References. Andrade, 1928 (Biol.); Bosq, 1942a (Biol.); Lima, 1930 (Biol.), 1955 (Biol.).

Trichophorus lippus (Germar)

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).

Host plant: *Acacia decurrens mollissima* (Andrade, 1928).

References. Andrade, 1928 (Biol.); Lima, 1930 (Biol.), 1955 (Biol.).

Trichophorus electus Gahan

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil, Paraguay).
Host plant: *Piptadenia* (Bosq, 1942a).
Reference. Bosq, 1942a (Biol.).

Stizocera plicicollis (Germar)

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).
Host plants: ?*Dalbergia nigra* (Duffy, 1953a); *Aspidosperma* (Landeiro, 1944).

Control. As a control measure, Landeiro (1944) recommends the application of the following mixture: quicklime 3 kg.; powdered sulphur 3 kg.; water 100 litres.

The quicklime should be mixed with the water to the consistency of paste, the sulphur and a little water being first mixed to a paste in a separate container before being stirred into the lime.

This wash should be applied to the trunks of *Aspidosperma* during August.

References. Duffy, 1953a (Biol.); Landeiro, 1944 (L fig., P fig., I fig., Biol. fig., Contr.).

Stizocera vanzwaluwenburgi Fisher

Distribution. NEOTROPICAL REGION: Caribbean (Puerto Rico).
Host plant: *Tabebuia pallida* (Martorell, 1945).

Economic importance. Heavy infestations have been observed in the trunks of the host which were being used for supporting the zinc roof of a barn (Martorell, 1945).

Reference. Martorell, 1945 (Biol.).

Nyssicus quadrinus Bates

Distribution. NEOTROPICAL REGION: South America (Brazil).
Host plant: *Anacardium occidentale* (Caldeira and Vieira, 1938).
References. Caldeira and Vieira, 1938 (Biol.); Lima, 1955 (Biol.).

Paramallocera ilinizae Kirsch

Distribution. NEOTROPICAL REGION: South America (Ecuador).
Host plants: *Eucalyptus*, *Prunus capollin*, *Pyrus*, *Malus* (Rodríguez, 1945).

Biology. Eggs are deposited on the bark and covered with a viscous fluid. The larvae hatch in three to four weeks and bore in the cambium layer for a year or more, the galleries extending upwards or downwards. Pupation takes place in shallow cells in the woody tissue and the emergence holes of the adults, which are about 1 cm. in diameter, are readily visible on smooth-barked trees. Under laboratory conditions the pupal stage was found to last twenty-nine days. Adults are nocturnal, and are usually inactive and hidden in the daytime.

The destruction of the cambium layer causes branches to die off above the site of the attack, and if the trunk is girdled the whole tree dies (Rodríguez, 1945).

Economic importance. *Eucalyptus* trees in Ecuador (Cotopaxi) were recently found to have been infested with larvae of this species, with the result that they were weakened and, in some cases, killed. The heaviest infestation occurred in trees which were surrounded by old capulí trees, which were also infested and most of which had been long dead. As the capulí is of earlier cultivation than *Eucalyptus*, it probably served as the source of the infestation.

Control. Chemical measures were found to be impracticable, but to prevent the spread of this beetle, zones in which *Eucalyptus* and other susceptible trees are cultivated were placed under quarantine in 1943. Instructions were given to fell infested trees, strip off and burn the bark, and pass a flame over the surface of the trunk before the latter was utilised.

Reference. Rodríguez, 1945 (L fig., P fig., I fig., Biol.).

Hemilissa gummosa (Perty)

Distribution. NEOTROPICAL REGION: South America (Brazil).
Host plants: *Esenbeckia leiocarpa*, *Aspidosperma polyneuron* (Andrade, 1928).
References. Andrade, 1928 (Biol.); Lima, 1930 (Biol.), 1955 (Biol.).

Periboeum paucispinum Lameere

Distribution. NEOTROPICAL REGION: South America (Brazil).
Host plant: *Hymenaea stilbocarpa* (Acácio Costa, Jr.).
Reference. None available.

Ibidionini

Ibidion sp.

Mature larva. Similar to that of *Phoracantha semipunctata* (Fabricius), but differing as follows. *Head* with only a single transverse impression, which is very fine. Ocellus with lens round. *Abdomen* with ampullae micro-granulate. *Spiracles* with peritreme subcircular.

According to Craighead (1923) certain North American species of this genus have two pairs of ocelli.

Biology. The larval galleries are shallow, meandering and tightly packed with fine powdery frass. Pupation takes place in the outer sapwood at a depth not exceeding one-quarter of an inch.

Material studied. 3 L, 1 I, British Guiana, Bartica district, Caow Creek, 2.iv.1957, from *Jacaranda copaia*, E.A.J.D. leg., in coll. B.M.

Ibidion plagiatum Burmeister

Distribution. NEOTROPICAL REGION: South America (Argentina).
Host plants: *Vitis*, *Rosa* (Bosq, 1942a).
Reference. Bosq, 1942a (Biol.).

Phormesium virgulatum Bates

Distribution. NEOTROPICAL REGION: South America (Guatemala, Venezuela).
Host plant: *Inga edulis* (Ballou, 1945).
Reference. Ballou, 1945 (Biol.).

Phormesium quadrinotatum Thomson

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).
Host plants: *Nectandra*, *Persea gratissima* (Bosq, 1942a).
Reference. Bosq, 1942a (Biol.).

Heterachtes bonariensis Thomson

Distribution. NEOTROPICAL REGION: South America (Argentina, Uruguay).
Host plants: *Prunus* spp. (Bosq., 1934); *Ficus*, *Populus* (Bosq, 1942a).
Reference. Bosq, 1934 (Biol.), 1942a (Biol.).

Hexoplon ctenostomoides Thomson

[Broca das pontas]

Distribution. NEOTROPICAL REGION: South America (Brazil).
Host plants: *Citrus* spp., particularly *C. aurantium* (Silva, 1955).
Biology. Larvae bore along the twigs from the tips downwards, causing the leaves to shrivel up. Adults emerge from October to December.
References. Silva, 1955 (I fig., Biol. fig.).

Compsa vana Thomson

Distribution. NEOTROPICAL REGION: South America (Brazil, French Guiana, Guatemala, Venezuela).
Host plant: *Albizia moluccana* (Lima, 1955).
Reference. Lima, 1955 (Biol.).

Compsa squalida Thomson

Distribution. NEOTROPICAL REGION: South America (Colombia, Venezuela).
Host plant: *Inga edulis* (Ballou, 1945).
Reference. Ballou, 1945 (Biol.).

Compsa livida Germain

Distribution. NEOTROPICAL REGION: South America (Chile).
Host plant: *Araucaria* (Porter, 1923).
Reference. Porter, 1923 (Biol.).

Cycnidolon mucoriferum (Thomson) (=**modestum** Lacordaire)

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil, Paraguay).
Host plants: *Bauhinia*, *Nectandra* (Bosq, 1942a).
Reference. Bosq, 1942a (Biol.).

Octoplon flavopictum (Perty)

Distribution. NEOTROPICAL REGION: South America (Brazil).
Host plant: *Acacia decurrens mollissima* (Andrade, 1928).
References. Andrade, 1928 (Biol.); Lima, 1930 (Biol.), 1955 (Biol.).

Octoplon ruficaudatum Thomson var. **rufum** Gounelle

Distribution. NEOTROPICAL REGION: South America (Argentina, French Guiana, Paraguay).

Host plant: *Nectandra* (Bosq, 1942a).

Reference. Bosq, 1942a (Biol.).

Heteropsini

Stenosphenus cribripennis Thomson

Distribution. NEOTROPICAL REGION: Mexico, Central America (Guatemala).

Larva (about half-grown) (figs. 75–76). Form elongate, slightly tapering, thorax depressed. *Head* (fig. 75) strongly transverse with sides strongly rounded. Genae not

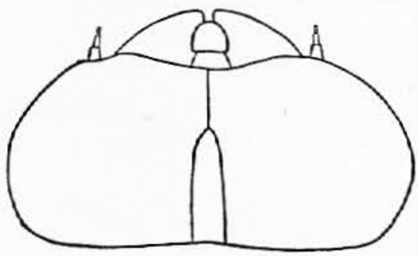


Fig. 75

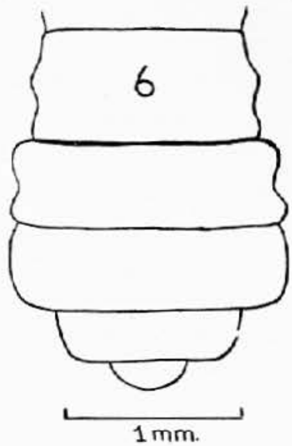


Fig. 76

Figs. 75–76. *Stenosphenus cribripennis* Thomson. Mature larva. Fig. 75. Outline of head (diagrammatic). Dorsal aspect. Fig. 76. Outline of abdominal segments 6–10 (diagrammatic). Dorsal aspect.

shouldered; bearing several long, fine, pale setae. Mouthframe pale ferruginous. Antenna with segment 2 about one and one-half times as long as basal width; segment 3 about three times as long as basal width. Mandible short, broad, entirely pitchy. Labrum transversely oval, with anterior margin fringed with pale setae. One pair of large ocelli present; lens round, convex. Hypostoma micro-granulate, with front margin rather broadly pale ferruginous, glabrous; sutures indistinct. Gula slightly raised; sutures concave, distinct. Maxilla and labial palpi with apical segments distinctly longer than penultimate segments; dorso-external process of palpifer distinct, attenuated. *Prothorax* strongly transverse; pronotum finely longitudinally striate; prosternum micro-granulate; eusternum undefined. *Abdomen* (fig. 76) with ampullae having two lateral and two transverse bow-shaped furrows; shining, micro-granulate, feebly tuberculate and scarcely protuberant. *Legs* distinctly 4-segmented, pale. *Spiracles* with peritreme thin, pale and broadly oval. Length up to 10 mm.; maximum breadth (at prothorax) 2·7 mm.

Material studied. 8 L, 7 I, Mexico, Cuautilan, 27.xi.1941, from handle of basket, in coll. U.S.N.M.

Reference. None available.

Chrysoprasis punctiventris Bates

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plant: Myrtaceae.

Mature larva. Very similar to that of *Stenosphenus cribripennis* Thomson, but differing as follows. *Abdomen* with posterior part of ampulla on tergite 7 longitudinally striate. Segments 7 and 8 parallel-sided, not constricted intersegmentally.

Material studied. 1 L, Brazil, viii.1941, from Myrtaceae, F. Plaumann leg., in coll. B.M.

Reference. None available.

Chrysoprasis linearis Bates

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).

Host plants: ?*Pera glabrata*, ?*Vernonia diffusa* (Travassos, 1932).

References. Lima, 1955 (Biol.); Travassos, 1932 (Biol.).

Chrysoprasis nymphula Bates

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plant: *Tamarindus indica* (Lima, 1955).

Reference. Lima, 1955 (Biol.).

Callideriphus laetus Blanchard

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).

Host plants: *Rosa*, *Eucalyptus*, *Prunus* (Bosq, 1942a).

Economic importance. In the Argentine this species is considered to be a pest of fruit trees.

Reference. Bosq, 1942a (Biol.).

Mallosoma zonatum (Sahlberg)

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).

Host plant: *Cassia fistula* (Lima, 1955).

Reference. Lima, 1955 (Biol.).

Rhopalophorini

Rhopalophora collaris (Germar)

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).

Host plants: *Citrus aurantium* (Moreira, 1912); *Citrus limon* (Bosq, 1942a); *Alchornea iricurana* (Lima, 1955).

Economic importance. Although Moreira (1912) states that this species causes as much damage to orange trees as does *Macropophora accentifer* (Olivier), Bondar

(1929a) maintains that it infests only trees which are already dead. Adults emerge during December and January (Moreira, 1921b).

References. Araujo, 1939 (Biol., Contr.); Bondar, 1913a (?), 1921a (?), 1929b (?); Bosq, 1942a (Biol.); Fonseca and Autuori, 1932 (Biol.); Lima, 1922 (Biol.), 1928 (Biol.), 1930 (Biol.), 1955 (Biol.); Moreira, 1912 (?), 1921b (Biol.); Quayle, 1938 (Biol.).

Disaulax hirsuticornis (Kirby)

Distribution. NEOTROPICAL REGION: South America (Brazil).
Host plant: *Caesalpinia ferrea* (Silva and Almeida, 1941).
References. Lima, 1955 (Biol.); Silva and Almeida, 1941 (Biol.).

Ozodes multituberculatus Bates

Distribution. NEOTROPICAL REGION: Central America (Nicaragua, Panama).
Host plant: *Vochysia hondurensis* (Duffy, 1953a).
Reference. Duffy, 1953a (Biol.).

Ancylocerini

Ancylocera cardinalis (Dalman)

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil, Uruguay).
Host plants: *Jacaranda cuspidifolia*, *Citrus aurantium* (Lima, 1955); *Acacia bonariensis* (Bosq, 1942a).
References. Bosq, 1942a (Biol.); Lima, 1930 (Biol.), 1955 (Biol.).

Platyarthrini

Trachelissa maculicollis (Serville)

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).
Host plant: *Prunus persica* (Lima, 1955).
Reference. Lima, 1955 (Biol.).

Tropidosomatini

Tropidosoma spenceri (Kirby)

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).
Host plants: *Flacourtia ramontchi* (Bondar, 1928); *Prunus* (Novaes, 1929).

Biology. Larvae of this species have been found in an imported plum tree in Brazil. They bore in living wood down the branches and into the trunk, where pupation takes place (Bondar, 1928c). Adults of this species, according to Zikán and Zikán (1946), emit rather a pungent odour similar to that produced by coccinellids.

Control. Bondar (1928c) advised the injection of 1 c.c. of carbon bisulphide into the lowest of the openings (i.e. frass ejection hole) made along the gallery, the aperture then being sealed.

References. Bondar, 1928c (L fig., I fig., Biol. fig., Contr.), 1929b (?); Lima, 1930 (Biol.), 1955 (Biol.); Novaes, 1929 (Biol.); Zikán and Zikán, 1946 (Biol.).

Oemini

Larval Characters

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. 77). From larvae of the Obriini, which some species superficially resemble, they may further be distinguished by the head-capsule which is not strongly sclerotised and pigmented postero-laterally.

Xystrocera globosa (Olivier)

Distribution. NEOTROPICAL REGION: Caribbean (Puerto Rico (introduced)). ORIENTAL REGION: Assam, Burma, Celebes, Ceylon, China, Formosa, India, Java, Malaya, Pakistan, Philippine Is., Seychelles, Thailand. MADAGASCAN REGION: Mauritius, Madagascar, Rodríguez. PALAEARCTIC REGION: Egypt, Japan, Korea. HAWAIIAN REGION: Hawaiian Is.

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* (Gressitt, 1942).

Adult. 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. Length 15–32 mm.

Mature larva (fig. 77). *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 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. 77. Length up to 44 mm.; maximum breadth (at prothorax) 7·1 mm.

Pupa. No pupae of this species are available. 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."

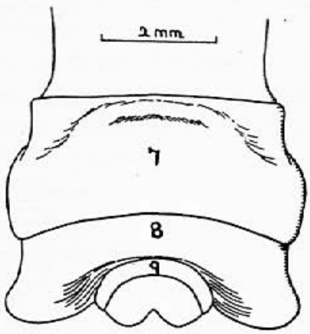


Fig. 77. *Xystrocera globosa* (Olivier). Mature larva. Outline of posterior part of abdomen (diagrammatic). Dorsal aspect.

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 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 may be prolonged for two years, while other individuals of the same brood may develop in less than a year."

The calcareous cocoon is shown in the author's previous monograph (1953a, Pl. V, fig. 1).

According to Coquerel (1848), larvae of this species are eaten by natives in Madagascar. Gressitt (1942) states that adults are nocturnal and may be attracted to artificial light. 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. Gressitt (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., Physiol.), 1953b (L, P, Biol.), 1957 (L fig., P, Biol. fig., Physiol., Contr.); Gardner, 1927 (L, P fig.); Gressitt, 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.); Ultée, 1931 (Biol.); Willcocks, 1909 (L fig., P fig., I fig., Biol., Contr.).

Callidiopini

Curtomerus flavus (Fabricius) (=**Cylindera flava** Aurivillius)

Distribution. NEOTROPICAL REGION: Mexico, Caribbean (Bahamas Is., Cuba, Grenada, Guadeloupe, Jamaica, Puerto Rico (including Mona I.), St. Croix, St. Vincent), South America (British Guiana). NEARCTIC REGION: U.S.A. (Florida). HAWAIIAN REGION: Hawaiian Is. AUSTRALASIAN REGION: Bonin Is., Marquesas, Tahiti. ETHIOPIAN REGION: St. Helena. PALAEARCTIC REGION: British Isles (imported).

Host plants: *Acacia decurrens*, *A. farnesiana*, *Eucalyptus*, *Datura*, *Pimenta officinalis* (Duffy, 1953b); *Xylosoma*?, *Cocos*?, *Nicotiana* (Gressitt, 1956); *Bucida buceras*, *Casuarina equisetifolia*, *Coccolobis uvifera* (Martorell, 1945).

Mature larva (fig. 78). *Head* transverse, with sides diverging posteriorly. Genae with numerous long, pale, slightly curved setae. Front margin narrowly pitchy. Labrum transversely oval. Ocelli absent. Hypostoma with front margin narrowly ferruginous; sutures indistinct; some long fine setae present on each side of gula, which is distinctly raised. Maxillary and labial palpi with apical segment longer than penultimate. *Prothorax* with posterior half of pronotum dull, milky white and finely granulate; front margin of prosternum (fig. 78) with a row (interrupted medially) of about thirty small elongate, brownish tubercles; proeusternum dull, milky white and finely granulate. *Abdomen* with ampullae granulate and glabrous. *Legs* small, slightly longer than segment 3 of maxillary palp. Length up to 16 mm.; maximum breadth (at prothorax) 4·2 mm.

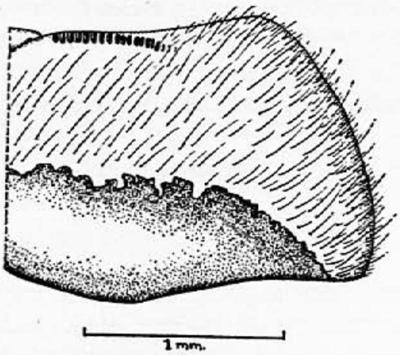


Fig. 78

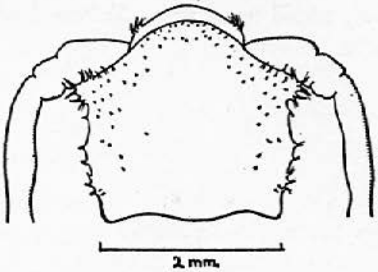


Fig. 79

Figs. 78–79. *Curtomerus flavus* (Fabricius). Fig. 78. Mature larva. Left half of prosternum. Fig. 79. Pupa. Head and pronotum. Dorsal aspect.

Pupa (fig. 79). *Head* with vertex, which is visible from above, bearing a group of spines immediately above each antenna. Eyes strongly convex, with a row of spines along ventral margin. *Pronotum* with a pair of prominent spinose, lateral tubercles near front margin. *Abdomen* with spines on tergites 1–6 mostly directed anteriorly. Tergite 7 with numerous scattered short spines. Tergite 8 with about six short spines. *Legs* with femora strongly clavate; hind femora extending as far as abdominal segment 5. *Functional spiracles* present on segments 1–5, but vestigial pairs present on segments 6 and 7; peritreme broadly oval and moderately thick. Length 8–11 mm.; maximum breadth 3·1 mm.

Biology. In Puerto Rico, adults of this species are commonly eaten by the introduced toad, *Bufo marinus* (Wolcott, 1951).

Material studied. 8 L, 1 P, 1 I, Honolulu, May, 1928, from *Acacia decurrens* O. H. Swezey leg., in coll. B. P. Bishop Mus., Honolulu; 9 L, 3 I, Oahu, Niu Valley, 30.ix.1928, from "guava", O. H. Swezey leg., in coll. B.P. Bishop Mus., Honolulu.

References. Anonymous, 1916 (Biol.); Duffy, 1953a (L fig., P fig., Biol.), 1953b (L fig., P fig., Biol.); Gressitt, 1956 (Biol.); Martorell, 1945 (Biol.); Schiödte, 1876 (L fig.); Wolcott, 1936 (Biol.), 1941a (Biol.), 1951 (Biol.).

Graciliini and allied tribes

Larval Characters[1]

Larvae of the tribes Graciliini, Molorchini, Obriini and Psebiini appear to form a natural and more or less homogeneous group, with the following characters in common.

[1] These characters are also applicable to the Nearctic species of *Molorchus*.

Form small, slender, seldom exceeding 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)

[Das Weidenböckchen]

Distribution. NEOTROPICAL REGION: South America (Argentina, Uruguay; imported from North America and Europe in wickerwork baskets, etc.). NEARCTIC REGION: U.S.A. (including Buffalo, New York, Syracuse). PALAEARCTIC REGION: British Isles, Canary Is., Europe, Madeira, North Africa, Japan.

Host plants: *Rubus*, *Rosa canina*, *Corylus* (Duffy, 1946c); *Salix*, *Aesculus*, *Betula*, *Quercus* (Reineck, 1919); *Crataegus* (Judeiche and Nitsche, 1889); *Rhamnus alternus*, *Ceratonia siliqua* (Peyerimhoff, 1919); *Ulmus*, *Ficus*, *Citrus aurantium*, *Malus pumila* (Villiers, 1946).

Mature larva. Form subcylindrical, extremely slender. *Head* strongly transverse, widest just behind middle, testaceous, shining. Genae with numerous long setae, which are curved backwards. Antenna minute, conical, 3-segmented; second segment transverse and bearing a supplementary process. One pair of distinct ocelli present; pigmented spot very distinct. *Prothorax* depressed, about three times as broad as long; pronotum very closely and finely longitudinally striate posteriorly. *Abdomen* with ampullae strongly protuberant, bilobed. *Legs* minute. Length up to 9 mm.; maximum breadth 1·9 mm.

Pupa (fig. 80). *Head* with vertex visible from above, smooth, and with 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. Clypeus with a transverse impression at base. Antennae extending as far as abdominal segment 4, where they are strongly recurved to terminate near fore coxae. Eyes moderately convex, with a stout seta near mesal margin. Labrum triangular, glabrous. Pronotum bearing numerous long pale papillae (each with a long fine basal seta) along front and lateral margins and two groups of fine setae near base. *Mesonotum* smooth and usually glabrous; scutellum moderately protuberant. *Metanotum* smooth, but sometimes with two or three minute setae. Elytra and wings extending to abdominal segment 3. *Abdomen* with tergites 1–6 each with a transverse row of from four to six short papillae (each with a fine seta). Segment 9 retracted in segment 8, and not visible from above. Sternites glabrous or almost so. Pleura slightly protuberant, each with fine paired setae. *Legs* with hind femora extending as far as abdominal segment 4, and lying almost parallel to longitudinal axis of body. *Functional spiracles* present on abdominal segments 1–7; peritreme round, very thin and inconspicuous, but slightly raised above general level of cuticle. Length 3·5–7 mm.; maximum breadth 1·3 mm.

Biology. The larval habitat is in dead, dry stems, branches and twigs. Nests of the ant *Formica rufa* have been known to be composed of twigs infested with larvae of this species (Bouillon, 1859). According to Kaufmann (1948) this species has been known to breed in old shoe leather.

The larvae make irregular longitudinal galleries under the bark. During March or April they pupate either head upwards or head downwards in the sapwood or pith channel. The pupal cell is similar to those of *Molorchus* species. Sometimes pupation takes place in the bark, if it is thick. Adults emerge from May to July.

Parasites. Hymenoptera. *Cleonymus depressus* F. (Lichtenstein, 1919).

Economic importance. This species has on occasions caused extensive damage to wickerwork (Hincks, 1930), rustic work, wooden hoops or casks, etc. Infestation often continues until the wood is almost completely reduced to powder. According to Fowler and Donisthorpe (1913) this species has been known to infest osiers grown at Lulworth Cove by fishermen for making lobster-pots.

Material studied. 12 L, 3 P, Surrey, Ashtead, 21.iv.1946, in dead stem of *Rubus*, E.A.J.D. leg., in coll. B.M.; 2 L, 2 P, Surrey, Effingham, 21.iv.1946, in dead *Rubus*, E.A.J.D. leg., in coll. B.M.

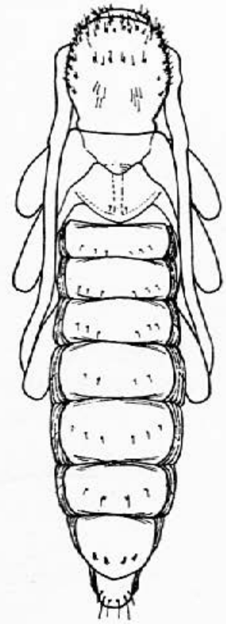


Fig. 80. *Gracilia minuta* (Fabricius). Pupa. Dorsal aspect.

References. Beutenmuller, 1896 (Biol.); Bouillon, 1859 (Biol.); Bosq, 1942a (Biol.); Calliol, 1914 (Biol.); Della Beffa, 1931 (L, P, Biol. fig.); Duffy, 1946c (Biol.), 1953a (L, P fig., Biol. fig.), 1957 (Biol.); Emden, 1939–1940 (L); Faggioli, 1948–1949 (I fig., Biol. fig.); Fowler and Donisthorpe, 1913 (Biol.); Henriksen, 1914 (L); Hincks, 1930 (Biol.); Judeich and Nitsche, 1889 (Biol.); Lepesme, 1944 (I fig., Biol.); Lichtenstein, 1919 (Paras.); Nördlinger, 1880 (Biol.); Perris, 1877 (L, P, Biol.); Peyerimhoff, 1919 (Biol.); Reineck, 1919 (Biol.); Sandahl, 1892 (Biol.); Schiödte, 1876 (L fig.); Schmitt, 1843 (L); Verhoeff, 1892 (Biol.); Villiers, 1946 (I fig., Biol.); Xambeu, 1898–1902 (L, P, Biol.); Zacher, 1943 (L fig., I fig., Biol., Contr.), 1944 (E., Biol.).

Obriini

Obrium vicinum Gounelle

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil, Paraguay). Host plant: *Nectandra* (Bosq, 1942a).

Mature larva. No larvae available. The following is a description of *O. cantharinum* (Linnaeus) which should be essentially similar. Form very slender and elongate. *Head* with lens of ocellus rather large and feebly convex; pigmented spot distinct.

Antenna with segment 2 twice as long as broad; segment 3 slender, cylindrical, about four times as long as broad. Gula distinct, triangular. *Prothorax* with posterior part of pronotum rather coarsely striate; median cleavage line feebly impressed. *Abdomen* with ampullae on segments 3–7 deeply bilobed and strongly protuberant. Epipleura scarcely protuberant on last three segments. *Legs* minute, much shorter than third segment of maxillary palp.

Reference. Bosq, 1942a (Biol.).

Epipodocarpus andinus Bosq

Distribution. NEOTROPICAL REGION: South America (Chile).

Host plant: *Podocarpus andina* (Bosq, 1951).

Reference. Bosq, 1951 (Biol.).

Psebiini

Nathrius (=Leptideella=Leptidea) brevipennis (Mulsant)

[Das Fliegenböckchen]

Distribution. NEOTROPICAL REGION: South America (Argentina, Chile). Originally introduced in basketwork but now established in dry localities. NEARCTIC REGION: U.S.A. (California). PALAEARCTIC REGION: British Isles, Europe, North Africa.

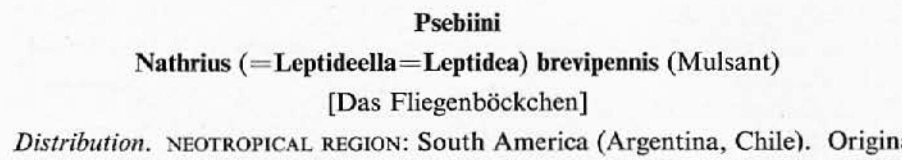


Fig. 81. *Nathrius brevipennis* (Mulsant). Mature larva. Lateral aspect.

Host plants: *Salix* (Reineck, 1919); *Rosa canina* (Duffy, 1946c). According to Kaufmann (1946) this species is less discriminating in Europe and has been recorded feeding in *Castanea*, *Quercus*, *Corylus*, *Cupressus* and *Robinia*. Middlekauff and Underhill (1949) record it from *Ficus* and *Juglans*, and Peyerimhoff (1919) from *Ceratonia* and *Pinus*. Villiers (1946) lists *Ceratonia siliqua*, *Quercus mirbecki*, *Pinus halepensis*, *Pistacia lentiscus* and *Ziziphus lotus*. In the Argentine it has been recorded by Bosq (1942a) from *Olea*, *Corylus*, *Juglans*, *Viburnum opulus*, *Ligustrum*, *Rosa*, *Wistaria sinensis*, *Prunus*, *Salix*, *Laurus nobilis*, *Morera aurantiaca*, *Morus* (dry branches and twigs); also in imported basketwork, etc.

Mature larva (fig. 81). Similar to those of *Obrium* and *Gracilia*, but differing as follows. Form extremely slender. *Head* with ocelli indistinct. Antenna with segment 3 at least four times as long as basal width. *Prothorax* with pronotum reticulate posteriorly. *Abdomen* with ampullae on sternites 3–6 very strongly and deeply bilobed and teat-like (fig. 81). *Legs* absent.

Egg. According to Nicolas (1884), the eggs are covered with a glutinous coating, mixed with particles of earth or dust which have accumulated on the pubescent abdomen of the adult (see also Duffy, 1953a, pp. 32 and 47).

Biology. The larvae feed in dead stems and twigs and in wickerwork. In Europe pupation takes place in April and May, and emergence during June and July.

Economic importance. Considerable damage has been done in the past by this species to wickerwork (Hincks, 1930). As in the case of *Gracilia minuta* (Fabricius), infestation continues for several years until the wickerwork has been almost reduced to powder. According to Fowler and Donisthorpe (1913) it has been known to infest osiers grown at Lulworth Cove by fishermen for making lobster-pots. A cotton-mill in Germany recently became infested with this species through the importation of osier baskets (Prell, 1927); N. E. Hickin recently sent the author a section of a hurdle made of hazel and some osier wickerwork which were heavily infested. They were both definitely of English origin, which confirms the author's contention that this species is now established in this country.

Control. Manon (1911) suggests the impregnation of infested wickerwork with petrol or copper sulphate solution.

Material studied. 4 L, North America, New York, 5.v.1948, in barrel-hoops (*Castanea*) imported from France, in coll. F.I.E. This species has recently been reared by the author from larvae taken from *Rosa* stems at Ashtead, Surrey.

References. Barnes, 1904 (Biol.); Bosq, 1942a (Biol.); Caillol, 1914 (Biol.); Delarue, 1875 (Biol.); Della Beffa, 1931 (L, P, Biol.); Duffy, 1946c (Biol.), 1953a (E, L fig., Biol., Contr.); 1957 (Biol.); Emden, 1939–1940 (L); Faggioli, 1948–1949 (I fig., Biol. fig.); Fowler and Donisthorpe, 1913 (Biol.); Hincks, 1930 (Biol.); Kaufmann, 1946 (Biol.); Lepesme, 1944 (I fig., Biol.); Linsley, 1933 (Biol.); Manon, 1911 (Biol.); Middlekauff and Underhill, 1949 (Biol.); Mühlmann, 1954 (Biol.); Nicolas, 1884 (Biol.); Perris, 1877 (L, P, Biol.); Peyerimhoff, 1919 (Biol.); Prell, 1927 (Biol.); Reineck, 1919 (Biol.); Villiers, 1946 (I fig., Biol.); Xambeu, 1898–1902 (L, P, Biol.); Zacher, 1943 (I fig., Biol.), 1944 (Biol.).

Necydalini (see LEPTURINAE, p. 76)

Bimiini (see LEPTURINAE, p. 77)

Callidiini

Larval Characters[1]

Form robust and of a contrasted 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

[1] These characters are also applicable to the Nearctic species of *Callidium*.

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; The Old House Borer; The Porter Hylotrupes; The Italian Beetle; Der Hausbock; Der Hausbockkäfer; Le Capricorne des Maisons.]

Distribution. NEOTROPICAL REGION: South America (Argentina). NEARCTIC REGION: U.S.A. PALAEARCTIC REGION: British Isles, Europe, Scandanavia, Italy, Middle East, North Africa (Algeria, Egypt, Morocco, Tunisia), Asia Minor, Siberia. ETHIOPIAN REGION: South Africa (Cape Province). AUSTRALASIAN REGION: Australia, New Zealand. ORIENTAL REGION: China.

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. pinea*, *P. ponderosa*, *P. radiata*, *P. sylvestris*, *P. taeda* and possibly *Pseudotsuga taxifolia* (Tooke, 1949).

It should also be mentioned that there have recently been several reports, mainly from France, of this species infesting *Quercus* (Benoit and Jacquiot, 1953), and it would appear possible that some strains of *H. bajulus* (Linnaeus) 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.

Adult (fig. 82). 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. *Elytra* depressed, rugose, with an interrupted band of pale pubescence before middle, often forming four distinct patches. Length 14–20 mm.

Mature larva (figs. 83–85). Form rather robust, slightly depressed. *Head* (fig. 85) 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. 84) 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,

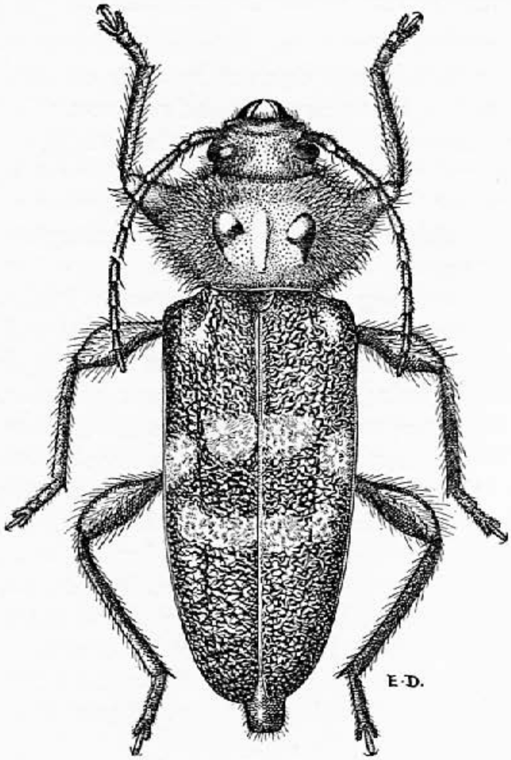


Fig. 82

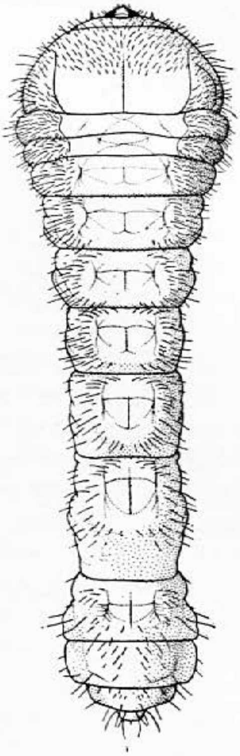


Fig. 83

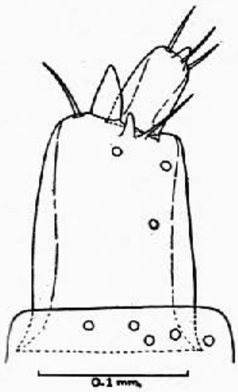


Fig. 84

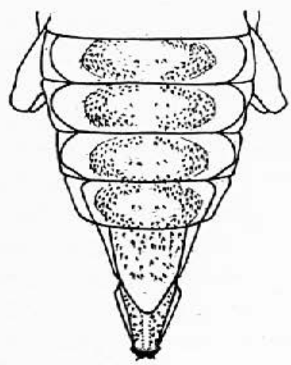


Fig. 86

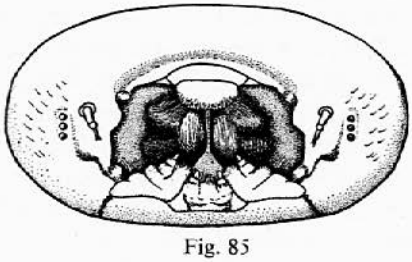


Fig. 85

Figs. 82–86. *Hylotrupes bajulus* (Linnaeus). Fig. 82. Adult. Fig. 83. Mature larva. Dorsal aspect. Fig. 84. Apical part of antenna. Lateral aspect. Fig. 85. Head. Frontal aspect. Fig. 86. Pupa. Posterior part of abdomen. Dorsal aspect.

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. 85); ocellar lens strongly protuberant; pigmented spot distinct. Hypostoma rugose, with front margin not or scarcely darker than remainder. Gula rather 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* (fig. 83) with dorsal ampullae shining, coarsely rugose (even slightly tuberculate), with posterior transverse impression distinct; median furrow rather shallow. Anal lobes sparsely 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. Length up to 24 mm.; maximum breadth (at prothorax) 7·5 mm.

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.

First-instar larva. 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. Length up to 1·2 mm.; maximum breadth 0·65 mm.

Pupa (fig. 86). *Head* quadrate, glabrous. *Mesonotum* with several long, fine, pale setae directed backwards 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. Length 14–25 mm.; maximum breadth 7 mm.

Egg. Form elongate, spindle-shaped, very variable in outline but one pole usually more attenuated than the other. Chorion white, dull, smooth. Length 1·2–2 mm.;

[1] Behind these, three widely separated, vestigial ocelli are usually visible.

breadth 0·5 mm. According to Weidner (1936b), eggs laid at the beginning of the oviposition period are much more slender than those laid later on.

Biology. The eggs are deposited in batches and 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; Ekstein (1953a) records 200, Kaufmann (1936) 300 and Becker (1942a) 400, although estimates by 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 forty-eight 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* (Linnaeus) 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 downwards. 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, 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 24 to 48 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.

Becker (1949b) has shown that young larvae with initial weights of up to about 25 mg. increased their weight more quickly at higher temperatures and older ones at lower and that young larvae responded less to fluctuating temperatures, as might be encountered in a building, than older ones. In experiments over ten months a reduction in temperature and humidity for one week each month favoured larval development and reduced mortality. Measurement of individuals showed that there was no correlation between the length of females and the size of their eggs or the weight of the larvae from them after feeding for six months. Mortality was high among eggs incubated at 28° C. [82·4° F.] and 35 per cent relative humidity, but after the larvae that hatched had fed for four months under favourable conditions, all were as heavy as the heaviest larvae from eggs kept at optimum humidity (97 per cent). When first-instar larvae were placed between blocks of pine sapwood and pine heartwood or wood of deciduous trees, the pine sapwood was definitely preferred.

Results are also given by Becker (1949b) of experiments carried out at 28° C. and 97 per cent relative humidity to test the nutritional value of diastase and various proprietary preparations of peptone. The degree to which they promoted growth varied according to the age of the larvae, but the addition to the wood of 1·7 per cent of its weight of peptones resulted in average increases in weight, after seventy days feeding, up to about twenty-five times as great as that in the controls. Glucose, brewers' yeast and vitamins B_1 and B_2 added to the peptone increased its effect in the order given, glucose being neutral or negative and vitamin B_2 doubling the rate of growth.

Further nutritional experiments were later carried out by Rasmussen (1956a, 1956b). Results showed that the nutritional value of the media (i.e. pine veneer or filter paper impregnated with different concentrations of peptone, with or without yeast extract) increased with the concentration of peptone and was improved by the addition of yeast; both effects were much less apparent in the case of filter paper and mortality was higher. There was a tendency for the larvae to prefer the highest concentration of peptone. In further tests only filter paper impregnated with peptone and yeast was used, and cholesterol was added for comparison. When it was absent, the larvae did not increase their growth rate with increasing concentrations of peptone and showed signs of nutritional deficiency, but these symptoms did not appear when cholesterol was present, and a later test showed it to be an essential growth factor for first-instar larvae.

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. Males tend to live considerably longer than females. In European countries adults usually eclode during June and July. The duration of the life-cycle varies considerably, but would seem usually to be between three and four years, although Tooke (1949) has shown that in South Africa development is usually considerably accelerated. Dürr (1956) has recently found the duration of the larval and pupal stages to be 182 days shorter in *Pinus radiata* than in *P. pinaster*, and 537 days shorter in very recently felled wood than in seasoned timber.

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).

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 premium to cover the 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 (l.c.), 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

[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).

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 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.

So far as South America is concerned, infestation so far appears to be confined to the Argentine. Gemignani and Rodriguez (1940) record damage to floorboards of a house in Buenos Aires, and state that *H. bajulus* was originally introduced into Argentina in pine battens and that damage by this species is now of common occurrence. Hayward's statement (1941) that various buildings in Argentina (Concordia) have been heavily infested corroborates this.

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[1] at the rate of 25 fluid ounces per 1,000 cubic feet

[1] It is now thought inadvisable to use carbon tetrachloride as the health hazard is too great.

completely killed off the larvae, and that hydrocyanic acid gas[1] produced by Zyklon B at the rate of 30 ounces 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° to 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 (l.c.) 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 wood 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 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 (l.c.), the possibilities of complete and effective control in

[1] Both these methods are now considered too dangerous to adopt.

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 £20 or to imprisonment with or without hard labour for a period not exceeding two months.

Material studied. 7 L, Germany, nr. Berlin, K. Eckstein leg., in coll. B.M.; 14 L, 1 P, Essex, nr. Grays, vii.1949, in infested floorboards, E.A.J.D. leg., in coll. B.M.; 1 L, London, Balham, vi.1955, from infested crate, E.A.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), 1947 (Physiol.), 1949a (L, Biol., Physiol.), 1949b (L, Biol., Physiol.), 1950a (Contr.), 1950b (Physiol.), 1953a (E, Biol.), 1954 (Biol.); Blair, 1947 (Biol.); Blanc, 1907 (Biol.); Boas, 1923 (Biol. fig.); Bosq, 1934 (Biol.), 1942a (Biol.); Bouthery, 1879 (Biol.); Brammanis, 1944 (Biol., Contr.); Brèthes, 1922a (Biol.), 1922b (Biol.); Brimblecombe, 1953 (L fig., I fig., Biol. fig., Contr.); British Museum (Natural History), 1954 (L fig., I fig., Biol.); Buchner, 1953 (Physiol.); Burmeister, 1865 (Biol.); Butovitsch, 1939 (Biol.); Caillol, 1914 (Biol.); Craighead, 1923 (L, Biol.), 1950 (Biol. fig., Contr.); Davies and Canovan, 1953 (Biol.); 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.), 1957 (E fig., L fig., P fig., Biol. fig., Contr.); Dürr, 1951 (L, Physiol., Contr.), 1956 (E fig., L fig., P fig., I fig., Biol.); 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.); Finkenbrink, 1940 (Biol.); Fisher, 1938 (Insurance), 1945 (Biol.), 1949 (L fig., Biol. fig., Contr.); Fisher and Harris, 1949 (Biol.); Forest Products Research Laboratory, 1952 (Biol.); Franzke, 1936 (Biol.); Gemignani and Rodríguez, 1940 (I fig., Biol. fig., Contr.); Girard, 1881 (Biol.); Grösswald, 1939 (Biol.); Guse, 1893 (Biol.), Hahmann, 1932 (Contr.); Hayward, 1941 (Biol.); Heeger, 1857 (E fig., L fig., P fig., Biol.); Heidenreich, 1939a (Biol. fig., Contr.), 1939b (Biol., Contr.); Heitz, 1927 (Biol.); Henriksen, 1914 (L fig.); Henry, 1907 (Biol., Contr.), 1909 (Biol.); Herzig, 1941 (Contr.); Hespeler, 1934 (Biol.), 1939 (Contr.); Hickin, 1947 (Biol.); Horn, 1933 (Biol.), 1934 (Biol.); Houlbert and Monnot, 1908 (L fig., Biol.); Jacquiot, 1950 (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.); Kaufmann and Schuch, 1938 (Biol.); Körting, 1957 (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.); Lepesme, 1944 (L fig., I fig., Biol.); Määr, 1933a (Biol.), 1933b (Biol.), 1933c (Biol.), 1935 (Biol.); Mansour, 1934 (Biol.); Mansour and Mansour-Bek, 1934a (Biol.), 1937 (Biol.); Moll, 1926 (Biol.); 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.); Rasmussen, 1956a (L, Physiol. fig.), 1956b (L, Physiol. fig.); Reineck, 1919 (Biol.); Riley, 1880 (Biol.); Rudow, 1912 (Biol.); Ruiz Castro, 1943 (Biol.); Saalas, 1923 (Biol.); Saraiva, 1954 (?), 1957a (E fig., L fig., Biol., Contr.), 1957b (Contr.), 1957b (Contr.); 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.), 1938 (Physiol.), 1939 (Biol.); Schultze-Dewitz, 1957 (Physiol.); Schulze and Becker, 1942 (Contr.); Schwarz, 1935 (Biol.); Schwerdtfeger, 1932 (Biol.); Sieke, 1936 (Contr., fig.); Snyder, 1927 (Biol., fig.); Steiner, 1937 (Biol. fig.), 1938 (Biol.), 1939a (Contr.), 1939b (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.), 1947 (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.).

Calydon submetallicum (Blanchard)

Distribution. NEOTROPICAL REGION: South America (Argentina, Chile).

Host plants: *Nothofagus dombeyi*, *N. obliqua* (Fairmaire and Germain, 1859).

Biology. A common species which infests both living and dead wood (Monrós, 1944).

References. Fairmaire and Germain, 1859 (Biol.); Monrós, 1944 (Biol.).

Phymatodes varius (Fabricius)

Distribution. NEOTROPICAL REGION: Mexico. NEARCTIC REGION: U.S.A., Canada.

Host plant: *Quercus* (Horn, 1863).

Mature larva. No larvae available. It should, however, be essentially similar to that of *P. testaceus* (Linnaeus), here described, which, in the New World, occurs only in North America. *Head* with ferruginous area of gena not enclosing ocellus. Ocellus with lens indistinct or absent; pigmented spot large, distinct beneath cuticle. Mouthframe smooth and interrupted by a pale narrow gap at inner side of ocellus, just beneath antenna. Acetabulum without a conical tubercle. Maxilla with segment 3 of palpi one and one-half times as long as segment 2. *Prothorax* with pronotum rather coarsely striate, the interstices reticulate only near base; median cleavage line deeply impressed. *Abdomen* with ampullae rather coarsely granulate (fig. 87), slightly shining. *Legs* with femur wider than long; femur and tibiotarsus testaceous.

Pupa. No material available. The following is a description of that of *P. testaceus* (Linnaeus). *Head* (fig. 88) finely rugose, transversely striate in part, glabrous, with vertex visible from above. Antennae transversely striate, especially near base; extending as far as abdominal segment 1, where they are curved downwards alongside mid-femora to terminate near mid-coxae. Eyes scarcely protuberant, glabrous.

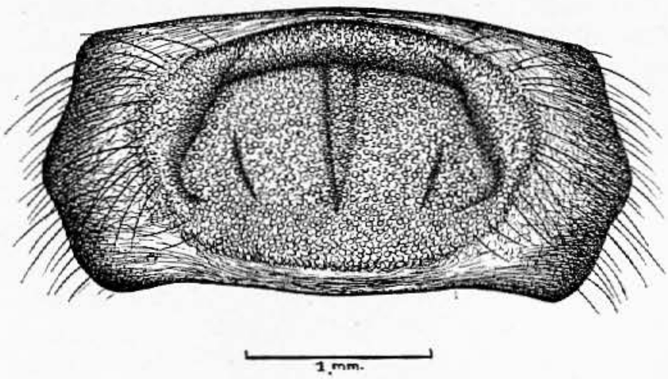


Fig. 87

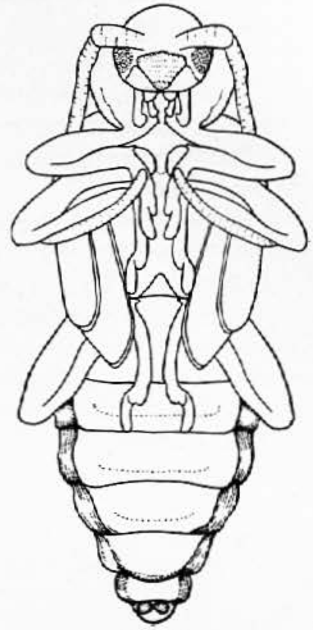


Fig. 88

Fig. 87. *Phymatodes testaceus* (Linnaeus). Mature larva. Abdominal segment 3. Dorsal aspect.

Fig. 88. *Phymatodes testaceus* (Linnaeus). Pupa. Ventral aspect.

Labrum triangular, with front margin rounded, glabrous. Maxillary palpi enlarged apically. *Pronotum* very slightly transverse, with sides moderately rounded, and front margin slightly wider than hind margin; a conspicuous conical tuberculate process present, just behind middle of front margin; disc transversely striate, glabrous. Mesonotum usually transversely striate medially, glabrous. *Metanotum* for the most part transversely striate, glabrous. Elytra and wings extending to between abdominal segments 3 and 4, the former appreciably shorter than the latter. *Abdomen* with tergites 1–6 each with a transverse group of small pale spines across posterior half, and with an incomplete row of slightly smaller spines across anterior half (which are often curved laterally to form an ellipse). Tergite 7 slightly transverse, parallel-sided for anterior half, with sides converging posteriorly, but hind margin not angled medially; bearing scattered stouter spines, which are stoutest near posterior margin. Tergite 8 transverse and explanate laterally, glabrous. Tergite 9 extremely short, with hind margin almost straight, glabrous. Sternites smooth and glabrous; sternite 10 protruding beyond sternite 9, thus partly visible from above. Pleura strongly protuberant, longitudinally rugose and glabrous. *Legs* with femora markedly clavate, glabrous; hind femora extending to abdominal segment 5. *Functional spiracles* present on abdominal segments 1–7; peritreme broadly oval, thin and raised above general level of cuticle. Length 7–16·5 mm.; maximum breadth 3·5 mm.

References. Duffy, 1953a (E, L fig., P fig., Biol. of *P. testaceus* (Linnaeus)); Horn, 1863 (Biol.); Riley, 1880 (Biol.); Thompson, 1943 (Paras.).

Phymatodes lividus (Rossi)

Distribution. NEOTROPICAL REGION: South America (Argentina, Uruguay (imported)). PALAEARCTIC REGION: British Isles, Europe, North Africa.

Host plants: *Quercus*, *Castanea* (Xambeu, 1898–1902); Reineck (1919) also gives *Aesculus* and *Salix*.

Mature larva. No material available. According to the description by Perris (1877) it closely resembles that of *P. testaceus* (Linnaeus), but the description is not sufficiently detailed to provide reliable distinguishing characters.

Biology. Larvae feed under the bark of recently cut wood or recently dead trees.

Economic importance. In Europe this species used to be of some economic importance in the brewing industry, as the chestnut hoops used in the construction of barrels and casks often became infested, with a result that casks often collapsed and much wine was wasted. Nowadays, owing to the widespread use of metal hoops, the damage caused by this insect has become insignificant.

References. Caillol, 1914 (Biol.); Duffy, 1953a (Biol.), 1957 (Biol.); Judeich and Nitsche, 1889 (Biol.); Mühlmann, 1954 (Biol.); Perris, 1877 (L fig., P, Biol.); Reineck, 1919 (Biol.); Villiers, 1946 (I, Biol.); Xambeu, 1898–1902 (L, P, Biol.).

Rhinotragini

Sphecomorpha rufa Gounelle

[The Wasp Longhorn]

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plant: *Psidium guajava* (Bondar, 1913c).

Mature larva (fig. 89). *Head* transverse, with sides very feebly rounded and divergent posteriorly; frons pale, testaceous, with front margin rather broadly ferruginous; genae bearing several pale bristly setae, which are slightly curved. Labrum transversely oval, fringed anteriorly with short pale setae. Mandible pitchy, smooth, glabrous. Antenna with basal membrane rather long; segment 2 about two and one-half times as long as basal width; segment 3 at least four times as long as basal width and nearly half as long as segment 2; supplementary process very short. One pair of ocelli present; lens large, oval, feebly convex; pigmented spot indistinct. Hypostoma testaceous, with front margin broadly ferruginous, smooth, glabrous; sutures indiscernible. Gula broad. Maxilla with segment 3 of palp almost as long as segment 2; dorso-external process of palpifer small. Labial palpi with segment 2 as long as segment 1. *Prothorax* with anterior part of pronotum with a testaceous transverse band (interrupted medially); posteriorly dull, finely micro-granulate. *Abdomen* with each dorsal ampulla with two transverse furrows and finely micro-granulate (fig. 89). Anal lobes bearing a few pale setae. Pleural discs indiscernible. *Legs* 2-segmented, rather short, about half length of metathoracic spiracle. *Spiracles* with peritreme testaceous, broadly oval and without marginal chambers. Length up to 28 mm.; maximum breadth (at prothorax) 5 mm.

This larva appears to be more closely related to the Callichromini than to any other major tribe.

Pupa (fig. 90). *Head* with vertex not concealed from above by pronotum; elongate, triangular, glabrous. Antennae short, extending as far as abdominal segment 1, gradually thickened towards apices. Eyes feebly convex. Labrum subtrapezoidal, glabrous. *Pronotum* without lateral tubercles; disc with a few scattered very fine pale setae. *Mesonotum* and *metanotum* with a few similar setae; scutellum rather strongly protuberant; scutellar groove distinct. Elytra strongly attenuated and tapering towards apices; elytra and wings extending as far as abdominal segment 4. *Abdomen*

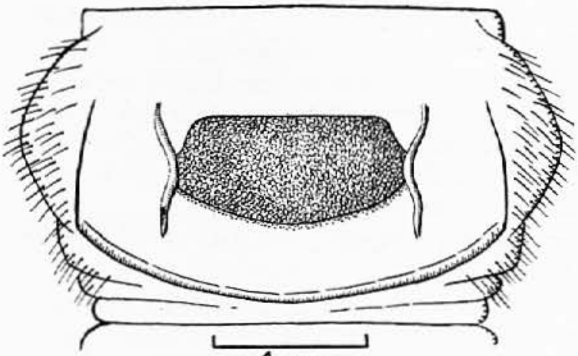


Fig. 89. *Sphecomorpha rufa* Gounelle. Mature larva. Abdominal tergite 6.

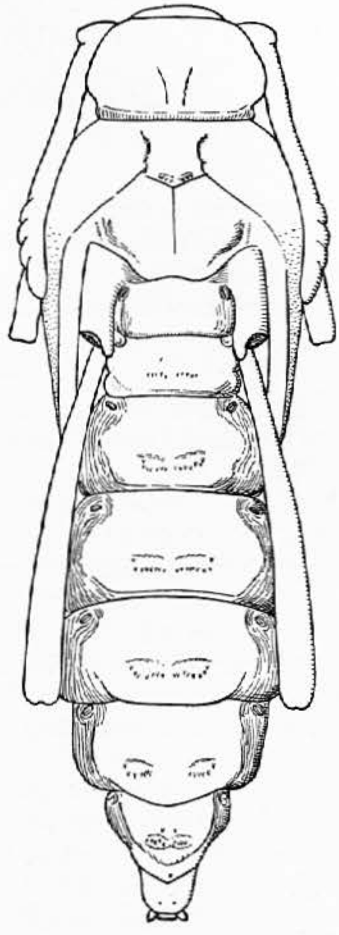


Fig. 90. *Sphecomorpha rufa* Gounelle. Pupa. Dorsal aspect.

very strongly narrowed and constricted basally; tergites 1–8 each with a single transverse row of short stout spines (each with a basal seta), anterior to which are a few scattered smaller spines. Tergite 9 extremely short, with a transverse, subrectangular elevation. Sternites smooth, glabrous. *Legs* with hind femora placed parallel to longitudinal axis of body; very long, extending to between abdominal segments 5 and 6. *Functional spiracles* present on abdominal segments 1–6, the pair on segment 7 being closed and probably non-functional; peritreme extremely thin, pale, and broadly oval; marginal chambers absent. Length up to 26 mm.; maximum breadth 6 mm.

Biology. Larvae of this species feed subcortically and excavate galleries 30–40 cm.

long and from 1 to 2 cm. in diameter. Pupation occurs from July to November, adults emerging a month or two later. The life-cycle is completed within a year (Bondar, 1913c).

Control. Bondar (l.c.) suggests the extraction of larvae by means of a penknife during the period of March to June.

Material studied. 1 L, 1 P, Brazil, São Paulo, Campinas, iv.1912, G. Bondar leg., in coll. D.Z.S.P.

References. Bondar, 1913c (L fig., P fig., Biol. fig., Contr.); Lima, 1930 (Biol.), 1955 (Biol.).

Sphecomorpha murina (Klug)

Distribution. NEOTROPICAL REGION: South America (Brazil).

Biology. Adults of this species frequent flowers of *Eryngium paniculatum* (Zikán and Zikán, 1946).

Reference. Zikán and Zikán, 1946 (Biol.).

Tomopterus bispeculifer White

Distribution. NEOTROPICAL REGION: South America (Brazil, British Guiana).

Host plant: *Oxytheca ambelanifolia* (E.A.J.D.).

Mature larva. *Head* very strongly transverse. Genae bearing numerous rather short, bristly setae. Mouthframe smooth, ferruginous; frontal sutures indistinct. Mandible entirely pitchy. Hypostoma pale ferruginous, smooth; sutures incurved; gula with sutures slightly raised. Maxilla with segment 3 of palp almost as long as segment 2. Labial palpi with segment 2 slightly longer than segment 1. *Prothorax* with posterior area of pronotum dull, finely micro-granulate; lateral regions dull, velvety micro-spiculate; prosternum velvety micro-spiculate sublaterally; proeusternum with a distinct median, longitudinal, setose elevation. *Abdomen* with ampullae rather dull, micro-granulate. Tergite 9 without a sclerotised process. Anal lobes sparsely setose. *Legs* well developed, 3-segmented, slightly shorter than maxillary palp. *Spiracles* with peritreme rather narrowly oval, thin, pale. Length up to 18 mm.; maximum breadth (at prothorax) 5 mm.

Pupa. Similar to that of *Sphecomorpha* from which it differs as follows. *Elytra* subparallel-sided and rounded apically. *Abdomen* with tergite 9 without a subrectangular elevation. Length up to 14·5 mm.; maximum breadth 4·75 mm.

Material studied. 4 L, 3 P, 1 I, British Guiana, North West District, 2.v.1957, from *Oxytheca ambelanifolia*, E.A.J.D. leg., in coll. B.M.

Reference. None available.

Tomopterus larroides White

Distribution. NEOTROPICAL REGION: Caribbean (Trinidad), South America (Argentina, Brazil).

Host plant: *Manilkara bidentata* (E.A.J.D.).

Mature larva. Very similar to that of *T. bispeculifer* White, but distinguishable by the spiracles on abdominal segment 8, which are appreciably more broadly oval than those on segment 7. Length up to 13 mm.; maximum breadth (at prothorax) 3·75 mm.

Pupa. Similar to that of *T. bispeculifer* White, but differing as follows. *Abdomen* with tergite 7 bearing a tubercle on which are two to four short stunted spines. Tergite 8 with a transverse row of four spines which are distinctly larger than those on tergite 7. Length up to 9 mm.; maximum breadth 3·75 mm.

Biology. Damage by this species is superficial, being entirely confined to the cambium. Only recently felled logs are infested. These larvae have always been found by the author in association with those of *Callichroma velutinum* (Fabricius) (see p. 165). The shallow, meandering galleries and shot-hole-like emergence holes are shown on Pl. IV, fig. 3. The brachypterous adults, which emerge in June, resemble a small bee (E.A.J.D.). Larvae were later found by F. Peña in the crown of a felled tree in branches from 12 inches down to ½ inch in diameter. Larvae infesting the smaller branches had pupated in the sapwood.

Material studied. 12 L, 8 P, 3 I, Trinidad, Victoria Mayaro Forest Reserve, 7.vi.1957, from *Manilkara bidentata*, E.A.J.D. leg., in coll. B.M.; 8 L, 2 P, 1 I, Charuma District, vii.1957, from *Manilkara bidentata*, F. Peña leg., in coll. B.M.

Reference. None available.

Tomopterus quadratipennis Bates

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plant: *Achras sapota* (Lima, 1955).

Reference. Lima, 1955 (Biol.).

Tomopterus vespoides White

Distribution. NEOTROPICAL REGION: Central America (Panama (including I. Taboga)), South America (Argentine, Brazil).

Host plant: *Achras sapota* (Monteiro, 1929).

Biology. This species infests both the trunk and branches, the eggs being deposited at the end of spring or early in summer. The larvae bore through the bark into the wood in an upward direction, and then pupate, the adults emerging from October to December. The leaves of infested branches wither (Monteiro, 1929).

Control. Trunks and branches should be painted with milk of lime, containing carbolineum. Infested branches should be removed and burnt, and if the trunk is infested calcium carbide should be injected into the holes, which should then be sealed (Monteiro, 1929).

References. Monteiro, 1929 (L, P fig., I fig., Biol. fig., Contr.); Lima, 1930 (Biol.).

Epimelitta barbicrus (Kirby)

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).

Mature larva. Very similar to those of *Tomopterus* from which it differs in not having a median, longitudinal, setose elevation or impression on the proeusternum. Length up to 21 mm.; maximum breadth (at prothorax) 4·75 mm.

Material studied. 2 L, Brazil, F. Plaumann leg., in coll. B.M.

Reference. None available.

Odontocera flavicauda Bates

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).
Host plant: *Cabralea cangerana* (Lima, 1955).
Reference. Lima, 1955 (Biol.).

Odontocera fasciatus Olivier

Distribution. NEOTROPICAL REGION: Central America (Panama), South America (Argentina, Brazil, British Guiana).
Host plant: *Triplaris surinamensis* (Kalshoven).
Reference. None available.

Odontocera apicalis Klug

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).

Mature larva. No larvae of this species are available, but that of an unidentified species of this genus closely resembles that of *Ommata poecila* (Bates). So far as is known, it is the only species (genus?) of this tribe in which the dorso-external process of the basal segment of the maxillary palp is strongly developed, being longer than segment 3 of the maxillary palp.

Biology. Adults of this species frequent flowers of *Eryngium paniculatum* (Zikán and Zikán, 1946).

Material studied. 2 L (*Odontocera* sp.), Brazil, x.1941, F. Plaumann leg., in coll. B.M.

Reference. Zikán and Zikán, 1946 (Biol.).

Acyphoderes aurulentus (Kirby) (=**sericina** White)

Distribution. NEOTROPICAL REGION: Mexico, Central America (Puerto Rico), South America (Argentina, Brazil).
Host plants: *Psidium guajava* (Bondar, 1913); *Camptosema pinnatum* (Lima, 1955).
References. Bondar, 1913c (Biol.); Lima, 1922 (Biol.), 1928 (Biol.), 1955 (Biol.).

Acyphoderes baeri Gounelle

Distribution. NEOTROPICAL REGION: South America (Argentina).
Host plant: *Ruprechtia* (F. Monrós).
Reference. None available.

Acyphoderes crinita (Klug)

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).
Host plants: *Myroxylon peruiferum* (Silva and Almeida, 1941); *Myrocarpus frondosus* (Bosq, 1943).
Biology. Adults emerge from August to November (Silva and Almeida, 1941).
References. Bosq, 1942a (Biol.); Lima, 1955 (Biol.); Silva and Almeida, 1941 (I fig., Biol.).

Ommata (s.g. **Eclipta**) **poecila** (Bates)

Distribution. NEOTROPICAL REGION: South America (Brazil).
Host plants: Sapindaceae (F. Plaumann).

Mature larva. Similar in form to those of *Tomopterus* from which it differs in having the lateral regions of the prothorax non-micro-spiculate and the abdomen with ampullae milky white, and finely micro-granulate. Length up to 12 mm.; maximum breadth (at prothorax) 3 mm.

Material studied. 3 L, Brazil, ix.1941, F. Plaumann leg., in coll. B.M.

Reference. None available.

Compsocerini

Compsocerus equestris Guérin-Méneville

[Guitarrero]

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil, Paraguay, Uruguay).

Host plants: *Salix babylonica* (F. Monrós); fruit trees (trunks and branches) (Bosq, 1934); *Salix*, *Ficus*, *Celtis*, *Prunus*, *Pinus* (trunks and branches) (Bosq, 1942a).

Mature larva. Head transverse, with sides diverging posteriorly; frontal sutures indistinct; genae bearing very long, slightly curved, reddish setae. Labrum with setae arising from ferruginous basal discs which give a spotted appearance. Mandible smooth, with a longitudinal impression on outer face. Antenna salient, slender, with basal membrane rather elongate; segment 3 at least four times as long as basal width; supplementary process less than one-quarter the length of segment 3. One pair of ocelli present; lens large, round and very strongly convex and protuberant; pigmented spot distinct. Maxilla with segment 3 of palp distinctly longer than segment 2; dorso-external process of palpifer short. Hypostoma smooth, sparsely setose. Gula slightly raised. *Prothorax* with posterior part of pronotum finely longitudinally striate. *Abdomen* with dorsal ampullae on segments 1–6 each bearing a single shallow transverse furrow and a pair of longitudinal, lateral furrows, the area enclosed by these furrows being completely and rather coarsely granulate; tergite 7 with a single transverse, much deeper furrow, the surrounding cuticle being non-granulate. Anal lobes sparsely setose. Pleural discs indistinct. *Legs* 4-segmented; much longer than maxillary palp. *Spiracles* with peritreme pale, rather thick, broadly oval, and without marginal chambers. Length 20 mm.; maximum breadth 4·75 mm.

Biology. Adults are often to be found on bruised or rotten fruit (Hayward, 1941).

Material studied. 1 L, 1 I, Brazil, Nova Teutonia, F. Plaumann leg., in coll. B.M.

References. Bosq, 1934 (Biol.), 1942a (Biol.); Hayward, 1941 (Biol.); Trujillo, 1942 (Biol. fig.).

Chenoderus octomaculatus Fairmaire

Distribution. NEOTROPICAL REGION: South America (Argentina, Chile).

Host plant: *Nothofagus dombeyi* (Bosq, 1942a).

Reference. Bosq, 1942a (Biol.).

Chenoderus testaceus (Blanchard)

Distribution. NEOTROPICAL REGION: South America (Argentina, Chile).

Host plant: *Nothophagus obliqua.*

Reference. Bosq, 1942a (Biol.).

Euryprosopus angustissimus Buquet

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).
Host plant: *Nectandra* (previously infested by *Oncideres*) (Bosq, 1942a).
Reference. Bosq, 1942a (Biol.).

Orthoschema ventrale (Germar)

Distribution. NEOTROPICAL REGION: South America (Argentina).
Host plant: *Enterolobium timbouva* (Andrade, 1928).
References. Andrade, 1928 (Biol.); Lima, 1930 (Biol.), 1955 (Biol.).

Paromoeocerus barbicornis (Fabricius)

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil, Paraguay, Uruguay).

Host plants: *Mimosa bracatinga* (?), *M. sordida* (Andrade, 1928); *Ficus* (wild and cultivated) (Wille, 1925); *Celtis*, *Salix* (dry branches) (Bosq, 1942a).

Biology. Adults are often to be found on bruised or rotting fruit (Hayward, 1941).

References. Andrade, 1927 (Biol.), 1928 (Biol.); Bosq, 1934 (Biol.), 1942a (Biol.); Hayward, 1941 (Biol.); Lima, 1930 (Biol.), 1955 (Biol.); Wille, 1925 (Biol.).

Callichromini

Callichroma velutinum (Fabricius)

Distribution. NEOTROPICAL REGION: Caribbean (Trinidad), South America (British Guiana, French Guiana).

Host plants: *Manilkara bidentata*; *Pouteria egregia* (E.A.J.D.); *Achras sapota* (F. Peña).

Adult (fig. 91). Length 24–42 mm. Head, prothorax and scutellum metallic violet-blue; prothorax covered with dense black pubescence on each side of the longitudinal, glabrous median area; elytra metallic bluish green or violet, with two longitudinal bands of dense black pubescence. Antennae and legs dull black. *Head* with antennae much longer than body in male, shorter than body in female. *Prothorax* bearing a pair of stout conical tubercles laterally. *Elytra* strongly narrowed posteriorly. *Legs* with hind femora and tibiae strongly compressed and blade-like, the latter distinctly broader.

Mature larva (fig. 92). *Head* (fig. 92) testaceous, with rounded, divergent sides; frontal sutures indistinct; front margin of frons ferruginous, rugose; six epistomal setae present. Genae and temples bearing dense short, ferruginous setae. Labrum semicircular, densely fringed with reddish setae. Mandible with basal part ferruginous and apical part pitchy, the former bearing numerous short setae. Ocellus with lens large, oval, convex; pigmented spot indiscernible. Antenna with segment 3 elongate, more than four times as long as basal width; supplementary process about one-third length of segment 3. Maxilla with segment 3 of palp much shorter than segment 2; dorso-external process of palpifer almost as long as segment 3 of palp. Hypostoma testaceous, transversely strigose, with numerous scattered pale setae. Gula broad, strongly raised. *Prothorax* with front margin broadly ferruginous, behind

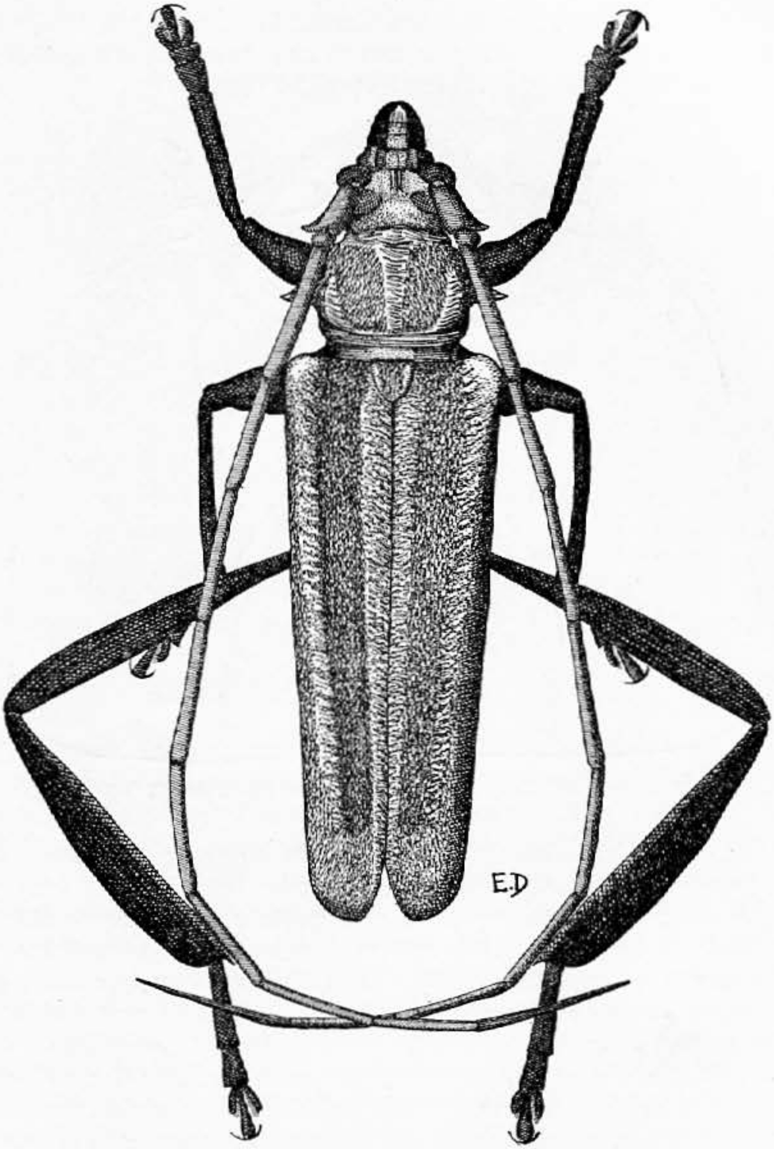


Fig. 91. *Callichroma velutinum* (Fabricius). Adult.

which it is milky white; posteriorly coarsely and longitudinally strigose; eusternum dull, micro-spiculate medially; sternellum similar. *Abdomen* with dorsal ampullae each with two transverse impressions, irregularly tuberculate and partly micro-spiculate. Anal lobes rather densely setose. Pleural discs indistinct. *Legs* well developed, 3-segmented, about as long as maxillary palp. *Spiracles* with peritreme broadly oval, testaceous, without marginal chambers. Length up to 50 mm.; maximum breadth (at prothorax) 4·75 mm.

First-instar larva. Egg-bursting spines situated in pairs dorso-laterally on abdominal segments 3, 4 and 5. Each spine is stout and thorn-like, arising from a large, testaceous, sclerotised basal plate. Length up to 3·8 mm.

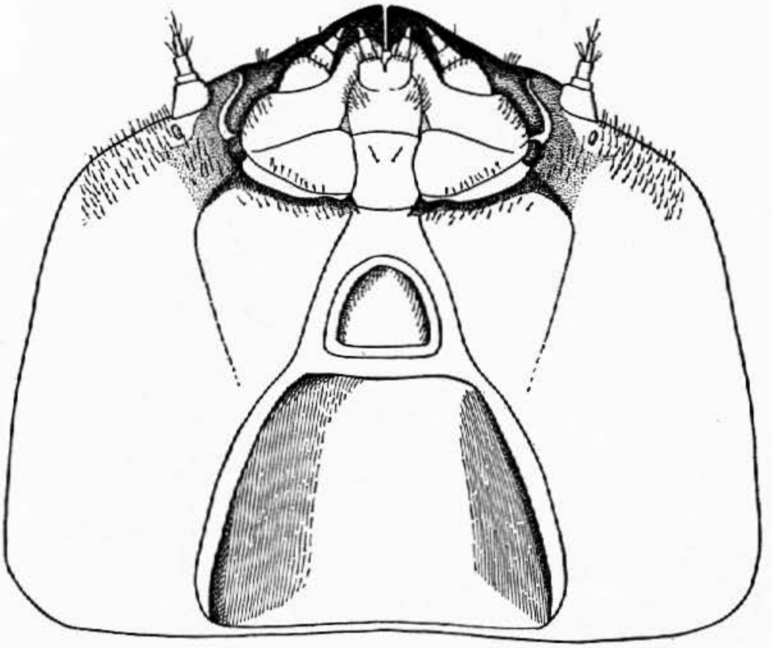


Fig. 92. *Callichroma velutinum* (Fabricius). Mature larva. Head. Ventral aspect.

Pupa (fig. 93). *Head* entirely concealed from above by pronotum, elongate, triangular; vertex dome-shaped, smooth, glabrous; front smooth and glabrous; clypeus with a deep transverse impression at base, glabrous. Antennae filiform, very long, extending as far as or almost as far as abdominal segment 9 before being recurved ventrally to terminate alongside head. Eyes moderately convex, glabrous. Labrum elongate, trapezoidal, glabrous. *Pronotum* with sides produced into a pair of acutely rounded, glabrous tubercles; front margin strongly produced medially into a large conical tubercle bearing numerous fine setae (fig. 93); disc with a pair of paramedian, sub-basal, transverse, tuberculate ridges, bearing fine scattered setae. *Mesonotum* glabrous or almost so; scutellum rather strongly produced, acutely pointed and bearing several scattered setae, mainly laterally. *Metanotum* bearing a few fine setae on each side of scutellar groove, which is inconspicuous. 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 as figured, some of which are inclined forwards. Tergite 7 with hind margin produced and V-shaped posteriorly, and bearing a few small spines. Segment 9 partly retracted in segment 8. Sternites smooth and glabrous. *Legs* with hind femora extending as far as abdominal segment 8 and lying parallel to longitudinal axis of body. *Functional spiracles* present on abdominal segments 1–7; peritreme very narrowly oval, thin, and slightly raised above general level of cuticle. Length up to 40 mm.; maximum breadth 9 mm.

Egg. Form elongate-ovoid, one pole very slightly more attenuated than the other. The general shape varies somewhat, especially the degree of attenuation. Chorion pale testaceous and faintly marked with polygonal areas which correspond with the overlying follicular cells. Length 2·5 mm.; breadth 1·4 mm.

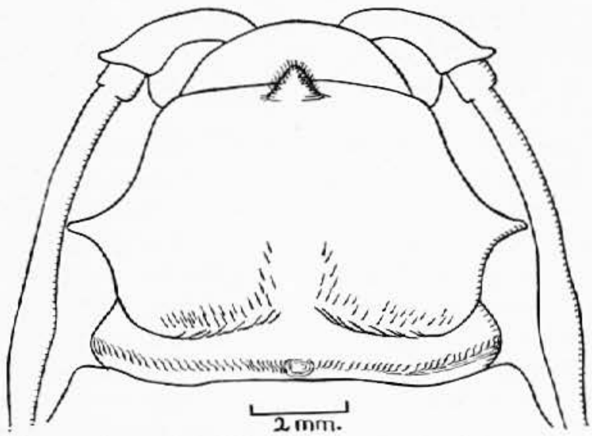


Fig. 93. *Callichroma velutinum* (Fabricius). Pupa. Head and pronotum. Dorsal aspect.

Biology. When collecting with F. Peña early in June, 1957, in the Victoria-Mayaro Forest Reserve, Trinidad, the author found several balata (*Manilkara bidentata*) logs which were heavily infested with larvae of *C. velutinum* (Fabricius). Most of these were either lying in full sun or were on the edge of clearings. They had been subjected to one of the most severe droughts on record, from February to June, and only the stumps remained green and comparatively moist. Most timbers would have become severely desiccated, but the heavy gum ("balata gum") content no doubt delayed this process and almost certainly preserved the larvae from fatal desiccation.

The larvae feed at first subcortically, making characteristic, large, shallow, oval excavations in the inner bark (Pl. III, fig. 2). On the upper surface of the logs were numerous piles of reddish wood dust compacted into short curved cylinders resembling minced beef, which had been ejected by the young larvae in boring through the bark.

In every infested log examined, larvae of the much smaller *Tomopterus larroides* White (see p. 159) were always present, but, although numerous, their galleries were confined to the subcortex.

When about two-thirds grown the larvae tunnel down into the sapwood (Pl. III, fig. 1) and eventually deep into the heartwood where pupation takes place. The elongate-oval pupal cell (Pl. III, fig. 3) measures about 2 inches in length, and is plugged at the entrance with a calcareous operculum. From samples of infested balata logs brought back by the author from Trinidad, adults emerged in December, 1957. The scent which they emitted was quite powerful and, it was thought, even more pleasant than that of the British Musk Beetle (*Aromia moschata* (Linnaeus)) (E.A.J.D.).

In view of the serious and extensive damage to balata, the Conservator of Forests, Trinidad, kindly arranged for F. Peña, his Statistical Assistant, to return to the site of these infestations later in the year, and the following observations are those since made by him.

"On the 19th., 23rd., 24th., and 25th. of July, 1957, visits were made to clearings in the Victoria-Mayaro Forest Reserve in order to make further observations on the balata infestations. On the above dates, during weather that alternated daily between moderate to light showers and bright sunshine, adult beetles appeared in the clearing around the balata stumps and boles, every day, between 10.30 a.m. and 3.00 p.m. They were not seen outside these hours, and the main period of activity was between noon and 2.00 p.m.

"Males were usually seen first, wheeling around the balata in lazy circles and making an ominous buzzing noise. While in the air their antennae were no different than when at rest—projecting forwards and outwards and curled back at the tips. On alighting they would patrol the balata, in an unhurried manner, until they encountered a female. They would then rush and run astride the smaller female who usually tried to escape. On no occasion was a female observed to resort to flight. The male was seen to pat the female's eyes with his front tarsi. Coitus lasted between 45 to 90 seconds, with the female proceeding straight away to lay her eggs. The male always accompanied her, still astride and patting her eyes, while she laid her eggs. One male was observed to serve two females. One female was seen being served twice by the same male and again by another male, all inside five minutes, with egg-laying tours in between.

"The males fought each other on sight with great speed and activity for about 10 to 15 seconds, until one would run away or fly off. A small male was seen attacking a large male astride a female. Invariably one of the males would use its mandibles to grip the other male at the base of one of its antennae. While in this position the other beetle could not bite any part of his adversary.

"The female searched the bark for deep protected crevices with her long ovipositor. She did not apparently select the positions by eye neither did she use her mandibles to prepare an egg-site. The eggs were laid singly in no particular pattern and at no fixed distance apart. The eggs were ivory-white when first laid but had changed to greenish yellow by the following day. All the eggs found were apparently fastened longitudinally to the bark, sometimes on the underside of the bark scale. It was very difficult to break out the bark without squeezing the eggs, as they were placed in the narrowest of crevices. Eggs were laid on all sides of the stumps. Only one egg hatched in the laboratory and that larva was pickled.

"On the last day the beetles returned to the felled boles. Their activity was confined to the protected sides where there had incidentally been least bark stripping. The boles had a few holes in the bark indicating that adults had emerged since the first visit in June. No pupae have been found to date and larvae that occupied a pupal cell were still in the larval stage, in the laboratory, in August. The main emergence period is therefore not yet known and it cannot be guaranteed that the adult beetles observed in July resulted from the main infestation in June in the same clearing.

"This beetle is recorded at the Imperial College of Tropical Agriculture as having been collected from the Sapodilla Fruit tree, which belongs to the same family as balata. Balata is the main durable, heavy-construction timber in Trinidad and is used for railway sleepers, piles, bridge runners, and so forth. Trees that have lain in the forest for years are worked into timber. About one in twenty woodcutters acknowledged that they had occasionally found balata with holes in the heartwood; to the others it was a complete surprise."

Economic importance. The author has recently found infestations of *C. velutinum* in balata to be both heavy and widespread, at least locally. The unusual abundance of larvae in every log and stump examined, and the very deep penetration of the heartwood by mature larvae obviously render timber completely useless for structural purposes. As balata is a first-class timber for railway sleepers, this beetle can only be regarded as a pest of major importance. Similar damage to balata, presumably by this species, and certainly by a callichromine, was recently seen by the author in several localities in British Guiana.

Material studied. 12 L (adults reared), Trinidad, Victoria-Mayaro Forest Reserve, 17.vi.1957, from *Manilkara bidentata*, E.A.J.D. and F. Peña leg., in coll. B.M.; 8 L, 1 I, British Guiana, Bartica-Potaro Road, m. 24, 11.iv.1957, from *Poutaria egregia*, E.A.J.D. leg., in coll. B.M.; 2 P (reared in B.M. from *Manilkara* log brought back from Trinidad; pupated 14.xii.1957), in coll. B.M.; eggs, first-instar larvae, 4 P, 1 I, Trinidad, Victoria-Mayaro Forest Reserve, vii.1957, F. Peña leg., in coll. B.M.

Reference. None available.

Callichroma vittatum (Fabricius)

Distribution. NEOTROPICAL REGION: Mexico, Central America (British Honduras, Guatemala, Panama), Caribbean (Hispaniola, including Haiti), South America (Argentina, Brazil, British Guiana, Colombia, French Guiana, Venezuela).

Host plants: *Pouteria ovata*, *Couepia versicolor* (E.A.J.D.).

Mature larva. Similar to that of *C. velutinum* (Fabricius), but differing as follows. *Head* with ocellar lens round. Submentum entirely but less strongly sclerotised. *Prothorax* with eusternum shining, rugose. Length up to 22 mm.; maximum breadth (at prothorax) 5 mm.

Biology. The larval galleries resemble those of the Clytini. Pupation takes place at a depth of about half an inch in the sapwood (E.A.J.D.).

Material studied. 2 L, 1 P, 1 I, British Guiana, North West Region, Hosororo, 2.v.1957, from *Couepia versicolor*, E.A.J.D. leg., in coll. B.M.

Reference. Duffy, 1953a (Biol.).

Callichroma auricoma (Linnaeus) (=**suturale** (Fabricius))

Distribution. NEOTROPICAL REGION: South America (Brazil, British Guiana, French Guiana, Surinam).

Host plants: *Ficus* sp. (Caldeira and Vieira, 1938); *Oxytheca ambelanifolia* (E.A.J.D.).

Mature larva (Pl. XIII, fig. 2). Similar to that of *C. velutinum* (Fabricius) from which it differs as follows. *Head* with basal two-thirds of mandible testaceous.

Maxillary stipes with a small but distinct tubercle (gland?) near middle of ventral face. Form very robust. Length up to 45 mm.; maximum breadth (at prothorax) 12 mm.

Economic importance. Damage to timber by this species is very severe, as pupation takes place deep in the heartwood. The pupal cell is closed with a calcareous operculum (Pl. XIII, fig. 2).

Material studied. 2 L, 2 I, British Guiana, Bartica District, Skull Point, 26.iv.1957 from *Oxytheca ambelanifolia*, E.A.J.D. leg., in coll. B.M.

References. Caldeira and Vieira, 1938 (Biol.); Lima, 1955 (Biol.).

Callichroma chloe Gounelle

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plant: *Ficus pohliana* (Andrade, 1928).

References. Andrade, 1928 (Biol.); Bondar, 1937 (Biol.); Lima, 1930 (Biol.), 1955 (Biol.).

Callichroma distinguendum Gounelle

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plants: "Aca" and "bacupary" (Bondar, 1937).

Biology. Only wounded trees are attacked by this species.

Reference. Bondar, 1937 (I fig., Biol.).

Callichroma phyllopus Buquet

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).

Host plant: "Aca" (Bondar, 1937).

Reference. Bondar, 1937 (Biol.).

Callichroma elegans (Olivier)

Distribution. NEOTROPICAL REGION: Caribbean (Dominica, Grenada, Guadeloupe).

Host plant: *Theobroma* (Faber, 1909).

Reference. Faber, 1909 (Biol.).

Callichroma equestre Gounelle

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plants: *Mimosa sordida, Jacaranda caroba* (Andrade, 1928).

References. Andrade, 1927 (Biol.), 1928 (Biol.); Bondar, 1937 (Biol.); Lima, 1930 (Biol.), 1955 (Biol.).

Callichroma pseudovittatum Schwarzer

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plant: "Aca" (Bondar, 1937).

References. Bondar, 1937 (Biol.); Lima, 1955 (Biol.).

Philematium festivum (Fabricius)

Distribution. NEOTROPICAL REGION: Caribbean (Guadeloupe). ETHIOPIAN REGION: Sierra Leone.

Mature larva. The larva of this species is not available, but a description of a closely allied species (*P. natalense* Bates) is as follows. *Head* testaceous, strongly rugose, with rounded divergent sides; 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 vermiculately 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. Length up to 25 mm.; maximum breadth (at prothorax) 7 mm.

Biology. Adults have been observed on flowers of *Cocos*.

Material studied. 2 L, 1 I (of *P. natalense* Bates), England, Lancashire, Lydiate, x.1949, in imported *Mimusops africana*, M. G. Fraser leg., in coll. B.M.

Reference. Lepesme, 1947 (Biol.).

Tillomorphini

Epropetes latifascia (White)

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plant: *Esenbeckia* sp. (F. Plaumann).

Mature larva (fig. 94). *Head* subtrapezoidal, with sides feebly rounded and slightly diverging posteriorly. Gena scarcely shouldered, pale, smooth, bearing several fine, pale setae. Frons smooth, rather narrowly ferruginous anteriorly; sclerotisation of mouthframe complete beneath antenna and enclosing ocellus. Hypostoma testaceous, with front margin pale ferruginous. Gula rather broad, distinctly raised. Maxilla with segment 3 of palp longer than segment 2; labial palpi with segment 2 longer than segment 1. *Prothorax* with pronotum strongly transverse and finely longitudinally striate posteriorly; eusternum faintly and more coarsely longitudinally striate. *Abdomen* with dorsal and ventral ampullae finely micro-granulate, those on segments 4–6 each with a pair of large rounded, strongly protuberant tubercles placed sublaterally (fig. 94). Anal lobes sparsely setose. Pleural discs indistinct. *Legs* very small, slender, with unguiculus strongly attenuated. *Spiracles* with peritreme circular, pale and thin. Length up to 11 mm.; maximum breadth (at prothorax) 2·25 mm.

Pupa (fig. 95). *Head* with vertex visible from above, smooth, glabrous; front smooth and glabrous. Antennae slender, smooth, extending as far as abdominal segment 3, where they are recurved ventrally to terminate near front tibiae; apices gradually thickened, feebly clubbed. Eyes moderately strongly convex, glabrous.

Labrum triangular, glabrous. *Pronotum* very strongly elongate (fig. 95), with sides very strongly constricted sub-basally; disc bearing numerous short setae arranged more or less in three transverse rows, and each arising from a pale basal papilla. *Mesonotum* with a pair of minute, paramedian setae. *Metanotum* with one to three pairs of minute, paramedian setae; scutellar groove indiscernible. Elytra and wings extending as far as abdominal segment 3. *Abdomen* with tergites 1–6 each with a transverse row of short stunted spines (each with a basal seta). Tergite 7 with sides

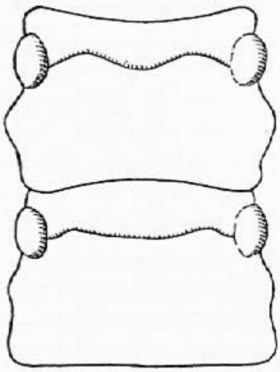


Fig. 94

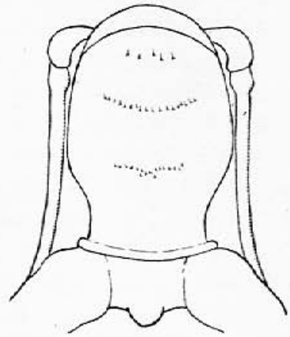


Fig. 95

Fig. 94. *Epropetes latifascia* (White). Mature larva. Abdominal segments 4 and 5. Dorsal aspect.

Fig. 95. *Epropetes latifascia* (White). Pupa. Pronotum.

converging posteriorly; median area produced into a pair of oval tuberculate protuberances placed paramedially (each bearing about four stunted spines). Tergite 8 with similar but much smaller protuberances. Segment 9 retracted in segment 8. Sternites glabrous. Pleura moderately protuberant, rugose, glabrous. *Legs* glabrous, with hind femora extending to between segments 4 and 5, and lying parallel to longitudinal axis of body. *Functional spiracles* present on abdominal segments 1–6, with peritreme circular, thin and pale. Length up to 12 mm.; maximum breadth 3 mm.

Material studied. 1 L, 1 P, Brazil, ix.1941, from *Esenbeckia* sp., F. Plaumann leg., in coll. B.M.

Reference. None available.

Clytini

Larval Characters[1]

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 usually absent. 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

[1] These characters are also applicable to Nearctic and Palaeartic species of *Clytus*.

longitudinally rugose; median cleavage line absent or impressed. Eusternum indistinctly defined, 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.

Megacyllene (=Cyllene) acuta (Germar)

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil, Paraguay, Uruguay).

Host plants: *Ficus pohliana* (Andrade, 1928); *Balfourodendron riedielanum* (Duffy, 1953a); fruit trees (Bosq, 1934); *Tilia* (Bosq, 1942a).

Mature larva. Head subtrapezoidal, with sides almost straight, slightly diverging posteriorly. Gena somewhat shouldered, pale, smooth, bearing several short pale setae. Frons testaceous, with front margin rather broadly ferruginous. Mouthframe rather strongly sclerotised, ferruginous; completely sclerotised beneath antennae, but not enclosing ocellus. Antenna with segment 3 cylindrical, about four times as long as broad and about half as long as segment 2; supplementary process very short. Labrum semicircular, fringed with fine silky setae. Three pairs of subcontiguous ocelli present. Hypostoma broadly ferruginous and strongly transversely striate; sutures slightly curved, ferruginous. Gula rather broad, distinctly raised. Maxilla with segment 3 of palp slightly shorter than segment 2; dorso-external process of palpifer much shorter than segment 3 of palp. Labial palpi with segment 2 much shorter than segment 1. *Prothorax* with pronotum orange-testaceous anteriorly; longitudinally rugose, becoming micro-granulate and glabrous posteriorly; median cleavage line rather feebly impressed. Eusternum glabrous except medially where it is sparsely setose. *Abdomen* with dorsal ampullae dull, extremely finely micro-granulate, milky white. Anal lobes sparsely setose. Pleural discs indistinct. *Legs* very small, 2-segmented, almost as long as second and third segments of maxillary palp. *Spiracles* with peritreme rather broadly oval, thin and without marginal chambers. Length up to 25 mm.; maximum breadth (at prothorax) 8 mm.

Pupa. Head with vertex visible from above, smooth; front transversely striate medially, glabrous. Antennae short, extending as far as abdominal segment 2, where they terminate above elytra. Eyes moderately convex, glabrous. Labrum glabrous. *Pronotum* slightly transverse, with sides moderately rounded and smooth; antero-lateral areas bearing a few scattered spinules. *Mesonotum* and *metanotum* with a few scattered setae; scutellar groove distinct, transversely striate. Elytra and wings extending to abdominal segment 3. Abdomen with tergites 2–6 each with a transverse row of straight spines anterior to which are several irregularly placed spines. Tergite 7 with three pairs of inwardly curved spines anterior to the six larger anteriorly curved spines across posterior margin, the two anterior pairs being appreciably smaller than remaining pair. Tergite 8 bearing four stout inwardly curved spines. Segment 9 retracted in segment 8. Sternites with a few minute setae sublaterally. Pleura moderately protuberant, glabrous. *Legs* with hind femora extending as far as abdominal segment 4 and placed parallel to longitudinal axis of body. *Functional spiracles* present on abdominal segments 1–5, those on segments 6–8 being closed and probably non-functional; peritreme rather narrowly oval and not appreciably raised above general level of cuticle. Length up to 21 mm.; maximum breadth 8 mm.

Biology. Adults are often to be found on bruised or rotting fruit (Hayward, 1941).

Material studied. 6 L, 1 P, Lancashire, Halsall, 20.ix.1948, from *Balfourodendron* imported from Brazil, M. G. Fraser leg., in coll. B.M.

References. Andrade, 1928 (Biol.); Bosq, 1934 (Biol.), 1942a (Biol.); Duffy, 1953a (L fig., P, Biol. fig.); Hayward, 1941 (Biol.); Lima, 1930 (Biol.), 1955 (Biol.).

Megacyllene (=**Cyllene**) **cayennensis** (Castelnau and Gory) (=**caracasensis** (Chevrolat))

Distribution. NEOTROPICAL REGION: Central America (Costa Rica, Guatemala, Nicaragua), South America (British Guiana, French Guiana, Venezuela).

Host plant: *Alexa leiopetala* (E.A.J.D.).

Adult. Length 6–14 mm. Head, prothorax and elytra densely covered with black pubescence; prothorax with two transverse, golden-yellow bands; elytra with similar bands arranged as figured. *Head* with antennae much shorter than body in both sexes. *Prothorax* broadest posteriorly, without lateral tubercles. *Elytra* spined apically.

Mature larva. Similar to that of *M. acuta* (Germar) from which it may be distinguished by the dull micro-spiculate pronotum and the smooth hypostoma. Length up to 21 mm.; maximum breadth (at prothorax) 6 mm.

Biology. The larval galleries, which are tightly packed with powdery frass, are subcortical at first but soon start to meander through the sapwood up to a depth of 4 or 5 inches where pupation takes place.

Economic importance. Extensive damage to recently felled logs (i.e. less than six weeks) has been seen by the author in British Guiana.

Material studied. 2 L, 1 I, Costa Rica, 15.iv.1934, F. Nevermann leg., in coll. F.I.E.; 8 L, 2 I, British Guiana, Bartica District, Skull Point, 20.iv.1957, from *Alexa leiopetala*, E.A.J.D. leg., in coll. B.M.

Reference. None available.

Megacyllene castanea (Castelnau and Gory)

Distribution. NEOTROPICAL REGION: South America (Brazil).

Mature larva. Similar to that of *M. acuta* (Germar), but distinguishable by its entirely smooth hypostoma. Length up to 24 mm.; maximum breadth (at prothorax) 8 mm.

Pupa. Similar to that of *M. acuta* (Germar) from which it differs as follows. *Abdomen* with tergite 7 with only two pairs of inwardly curved spines anterior to the six larger anteriorly curved spines across posterior margin, the anterior pair scarcely smaller than the remaining pair. Length up to 21 mm.; maximum breadth 7·5 mm.

Material studied. 2 L, 1 P, Brazil, viii.1941, F. Plaumann leg., in coll. B.M.

Reference. None available.

Megacyllene (=**Cyllene**) **falsa** (Chevrolat)

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plants: *Ficus pohliana*, *Jacaranda mimosaefolia*, *Holocalyx glaziovii*, *Aspidosperma polyneuron* (Andrade, 1928); *Albizia moluccana* (Lima, 1955).

Mature larva. Similar to that of *M. acuta* (Germa), but differing by the smooth hypostoma. From *M. castanea* (Castelnau and Gory) it differs in having the pro-eusternum setose medially. Length up to 15 mm.; maximum breadth (at prothorax) 5·5 mm.

Pupa. Indistinguishable from that of *M. castanea* (Castelnau and Gory). Length up to 16 mm.; maximum breadth 4·75 mm.

Material studied. 2 L, 1 P, Brazil, viii.1941, F. Plaumann leg., in coll. B.M.

References. Andrade, 1928 (Biol.); Lima, 1930 (Biol.), 1955 (Biol.).

Megacyllene (=**Cyllene**) **mellyi** (Chevrolat)

Distribution. NEOTROPICAL REGION: South America (Argentine, Brazil).

Host plant: "Vassoura" or "vassourinha" (Ihering, 1909).

Mature larva. Distinguishable from that of *M. acuta* (Germar) by its micro-spiculate pronotum and curiously modified spiracular peritreme. Length up to 26 mm.; maximum breadth (at prothorax) 5·5 mm.

Pupa. Distinguishable from that of *M. acuta* (Germar) by its non-spinose abdominal tergite 8.

Material studied. 5 L, 1 P, Brazil, São Paulo, Ipiranga, 13.xi.1908, H. Luederwaldt leg., in coll. D.Z.S.P.

References. Ihering, 1909 (Biol.); Lima, 1955 (Biol.).

Megacyllene (=**Cyllene**) **guttata** (Chevrolat)

Distribution. NEOTROPICAL REGION: Mexico, Central America (British Honduras), South America (Venezuela).

Host plant: *Bulnesia arborea* (W. G. Marshall).

Economic importance. Damage by this species (Pl. IV, fig. 2), although sometimes extensive, appears to be confined to the sapwood. Numerous adults have recently been obtained in this country from logs of Lignum-vitae (*Bulnesia arborea*) imported from Venezuela, but no larvae were obtained (W. G. Marshall).

Reference. Hickin, 1958 (I fig., Biol.).

Megacyllene (=**Cyllene**) **erythropa** (Chevrolat)

Distribution. NEOTROPICAL REGION: Mexico, Central America (Guatemala).

Host plants: *Acacia brindsi* (Becker, 1953c); *Prosopis dulcis* (Dugès, 1885a).

References. Becker, 1953c (Biol.); Dugès, 1885a (L fig., P fig., I fig., Biol.).

Megacyllene spinifera (Newman) (=**Clytus nebulosus** Laporte and Gory)

Distribution. NEOTROPICAL REGION: South America (Argentine, Chile, Uruguay).

Host plants: *Prosopis nigra-gris* (Scott, 1927); *Prosopis* spp., *Populus*, *Cydonia* (Bosq, 1942a).

References. Bosq, 1934 (Biol.), 1942a (Biol.); Duffy, 1953a (Biol.); Reed, 1912 (?); Scott, 1927 (Biol.).

Neoclytus cacicus (Chevrolat)

Distribution. NEOTROPICAL REGION: Mexico, Central America (British Honduras, El Salvador, Guatemala, Nicaragua, Panama).

Host plant: *Guiacum officinale*.

Mature larva (fig. 96). Similar to those of *Megacyllene* species, but differing as follows. *Head* with apical segment of maxillary palpi distinctly longer than penultimate segment. Only one pair of ocelli present. *Abdomen* with pleural tubercles on segment 7 strongly protuberant laterally (fig. 96).

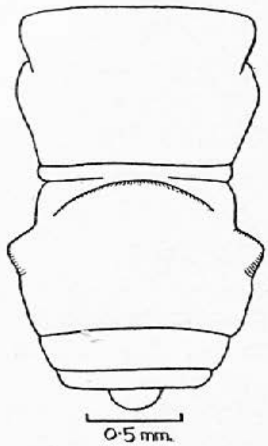


Fig. 96. *Neoclytus cacicus* (Chevrolat). Mature larva. Abdominal segments 7–10. Dorsal aspect.

Material studied. 25 L, Panama, 29.xi.1941, from logs of *Guiacum officinale*, in coll. U.S.N.M.; 2 L, 1 I, Guatemala, Champerico, 24.i.1941, in coll. U.S.N.M.

Neoclytus cordifer Klug

Distribution. NEOTROPICAL REGION: Caribbean (Cuba).

Host plant: *Citrus.*

Reference. Quayle, 1938 (Biol.).

Neoclytus centurio Chevrolat

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).

Host plant: *Nectandra* (Bosq, 1942a).

Pupa. Similar to those of *Megacyllene* from which it differs in having shorter, feebly serrate antennae and more slender, almost straight spines on abdominal tergite 7. Length up to 12 mm.; maximum breadth 4·2 mm.

Material studied. 2 L, 1 P, Brazil, x.1941, F. Plaumann leg., in coll. B.M.

Reference. Bosq, 1942a (Biol.).

Neoclytus regularis Chevrolat

Distribution. NEOTROPICAL REGION: Caribbean (Trinidad), South America (Venezuela).

Host plant: *Brownea latifolia* (F. Peña).

Mature larva. Distinguishable from other species of this genus by the absence of a distinct convex ocellus. Length up to 22 mm.; maximum breadth (at prothorax) 5·5 mm.

Biology. Larvae have been found in a sapling with a diameter of about 2 inches. The larval galleries extend throughout the wood.

Material studied. 6 L, 3 I, Trinidad, Catshill, vi.1957, from *Brownea latifolia*, F. Peña leg., in coll. B.M.

Reference. None available.

Neoclytus longipes (Drury)

Distribution. NEOTROPICAL REGION: Caribbean (Cuba, Jamaica). NEARCTIC REGION: U.S.A. (Georgia, New York).

Host plant: *Pimenta officinalis.*

Reference. Anonymous, 1916 (Biol.).

Neoclytus rufus (Olivier)

Distribution. NEOTROPICAL REGION: Caribbean (Grenada, Trinidad), South America (British Guiana, Colombia, Paraguay, Venezuela).

Host plants: *Mora excelsa* (Swabey, 1935, Duffy, 1953a); *Inga edulis* (Ballou, 1945); *Peltophorum ferrugineum* (G. Stell).

Adult. Length 6–12·5 mm. Head, prothorax and elytra ferruginous, the latter with several narrow white markings. *Head* with antennae much shorter than body in both sexes. *Prothorax* with several short, transverse carinae on disc; elongate, without lateral tubercles. *Elytra* with apices slightly obliquely truncate, the sutural angle spined. *Legs* with posterior pair distinctly longer than anterior pairs; femora clavate.

Mature larva. Very similar to that of *N. cacicus* Chevrolat, from which it differs in having a non-striate pronotum and the hypostoma transversely to obliquely striate anteriorly.

Biology. Pairing takes place at frequent intervals and numerous eggs are deposited in small irregularities in the bark or in sawn lumber. Oviposition has not been observed on dressed lumber. The presence of small strips of bark which have been left on a board are particularly favourable for larval development.

In the case of eggs deposited on bark, the galleries are subcortical, rarely penetrating the sapwood; heartwood is never attacked. When eggs are laid on sawn sapwood the longitudinal galleries seldom penetrate more than half an inch below the surface. The life-cycle is completed in about three months. Adult emergence is often the first visible sign of attack, as no wood dust is ejected by the larvae. The emergence holes are circular and measure about one-eighth of an inch in diameter.

Under forest conditions damage is confined to the cambium, but when the bark has been removed the larval galleries may enter the sapwood.

Damage by this species is more frequent where portions of bark have been left on the edges of boards. When no bark is present, many eggs fail to develop. These beetles may entirely ruin a sapwood board and even run through a complete stack (Swabey, 1935).

Economic importance. In Trinidad this beetle was recently found to be common locally, especially in sawmills, where adults were frequently seen ovipositing on logs and freshly sawn planks of *Mora* (E.A.J.D.).

Control. Swabey (l.c.) recommends the rapid conversion of timber and/or water storage.

Material studied. 6 L, 2 I, Trinidad, Tabaquite, Brickfields, 6.vi.1957, from *Mora excelsa*, E.A.J.D. leg., in coll. B.M.

References. Ballou, 1945 (Biol.); Duffy, 1953a (Biol.); Swabey, 1935 (I fig., Biol. fig., Contr.).

Neoclytus unicolor (Laporte and Gory)

Distribution. NEOTROPICAL REGION: South America (Peru).

Host plant: *Pyrus malus*.

Reference. Wille, 1940 (Biol.).

Neoclytus araneiformis (Olivier)

Distribution. NEOTROPICAL REGION: Caribbean (Guadeloupe, Hispaniola (including Haiti), Puerto Rico).

Host plants: *Inga vera* (Wolcott, 1936); *Bucida buceras* (Wolcott, 1941a).

References. Martorell, 1945 (Biol.); Wolcott, 1936 (Biol.), 1941a (Biol.), 1951 (Biol.).

Neoclytus curvatus (Germar)

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).

Host plant: *Pyrus communis* (Lima, 1955).

Reference. Lima, 1955 (Biol.).

Neoclytus pusillus (Laporte and Gory)

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).

Host plants: *Diospyros kaki* (Monte, 1932); *Acacia* (Lima, 1955); *Strychnus* sp. (Plaumann).

Mature larva. Indistinguishable from those of *N. cacicus* Chevrolat.

Biology. Adults emerge towards the end of October and throughout November.

Control. Monte (1932) suggests the injection of galleries with benzine and the holes then being stopped up.

Material studied. 2 L, Brazil, xii.1941, from *Strychnus* sp., F. Plaumann leg., in coll. B.M.

References. Lima, 1955 (Biol.); Monte, 1932 (I fig., Biol., Contr.).

Neoclytus famelicus (Burmeister)

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).

Host plant: *Nectandra* (Bosq, 1942a).

Reference. Bosq, 1942a (Biol.).

Mecometopus jansoni Bates

Distribution. NEOTROPICAL REGION: Central America (Costa Rica, Nicaragua, Panama), South America (British Guiana, French Guiana).

Host plant: *Pentaclethra macroloba* (E.A.J.D.).

Mature larva. Very similar to those of *Neoclytus* species, but with the pleural tubercle on abdominal segment 7 not protuberant. Length up to 15 mm.; maximum breadth (at prothorax) 4·8 mm.

Biology. The subcortical larval galleries are typical of those made by Clytini. Pupation takes place 2 or 3 inches deep in the sapwood. Adults may often be seen in large numbers running over freshly felled logs in the hot sun.

Material studied. 6 L, 2 I, British Guiana, Bartica District, 27.iii.1957, from *Pentaclethra macroloba*, E.A.J.D. leg., in coll. B.M.

Reference. None available.

Mecometopus palmatus (Olivier)

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).

Host plant: ?*Enterolobium* (Lima, 1955).

Reference. Lima, 1955 (Biol.).

Euryscelis suturalis (Olivier)

Distribution. NEOTROPICAL REGION: Caribbean (Bahamas Is., Hispaniola (including Haiti), Puerto Rico). NEARCTIC REGION: U.S.A. (Florida).

Host plant: *Prosopis juliflora* (Martorell, 1945).

Reference. Martorell, 1945 (Biol.).

Trachyderini, see p. 102

9. LAMIINAE

Larval Characters

Head elongate, 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 only. 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

Schreiteria bruchi Melzer

Distribution. NEOTROPICAL REGION: South America (Argentina).

Host plant: *Azorella yareta* (Bosq, 1942a).

Mature larva (fig. 97). Form cylindrical, very robust, tapering posteriorly. *Head* slightly depressed with sides parallel, slightly constricted medially, and broadly rounded posteriorly. Frons with front margin very broadly and strongly sclerotised and ferruginous, the upper boundary feebly but distinctly produced or enlarged into a pair of paramedian lobes or protuberances (fig. 97); antennal foramen open posteriorly; six epistomal setae present. Mandible feebly tapering, about twice as long as basal width, with cutting edge feebly emarginate. One pair of ocelli present; lens oval, feebly convex, with pigmented spot indistinct owing to sclerotisation of gena. Hypostoma short, strongly sclerotised, ferruginous and unevenly swollen; sutures pitchy, incurved. Gular region undefined, glabrous. Antenna 2-segmented, segment 2 bearing a large tapering hyaline process. Clypeus and labrum very strongly transverse, the latter coarsely setose anteriorly. Maxillary palp 3-segmented; segment 3 acutely conical, as long as segment 2. Labial palpi with segment 2 shorter than segment 1. Mentum distinct from submentum. *Prothorax* sparsely setose, with posterior area of pronotum dull, finely micro-spiculate; eusternum sparsely setose. *Abdomen* with dorsal ampullae tuberculate, glabrous, with at least those on tergites 6 and 7 bilobed and strongly protuberant. Segment 9 without a sclerotised process. Anus trilobate, sparsely setose. Epipleurum feebly protuberant on all segments. Pleural tubercle with a pair of sclerotised pits. *Legs* vestigial. *Spiracles* with peritreme very thick, ferruginous, subcircular; marginal chambers absent. Length up to 23 mm.; maximum breadth (at prothorax) 5·5 mm.

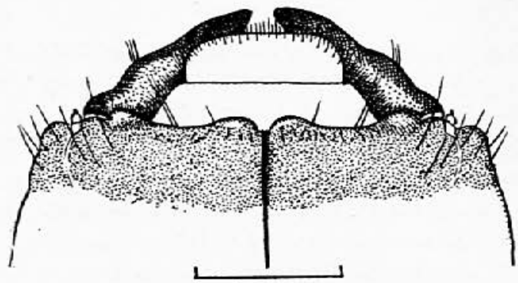


Fig. 97. *Schreiteria bruchi* Melzer. Mature larva. Front part of head. Dorsal aspect.

The study of this larva has enabled the author to corroborate Melzer's contention that this species probably belongs to the Dorcadionini. Moreover, it appears to be closely related to the genus *Moneilema* (see Duffy, 1953, p. 239).

Egg. Form elongate-oval. Chorion white, feebly shining, smooth. Length 9·2 mm.; breadth 0·7 mm. (Bruch, 1935).

Biology. This species occurs only at elevations between 3,000 and 4,000 metres in the Tucumán, where the curious umbellifer "yareta" grows amongst the stone outcrops. Larvae entirely hollow out the stems which they occupy, and then descend to the roots, where pupation takes place during September (Bruch, 1935).

Material studied. 3 L, Argentina, C. Bruch leg., in coll. F.I.E.

References. Bosq, 1942a (Biol.); Bruch, 1935 (E fig., L fig., P fig., I fig., Biol. fig.).

Phrynidius sp. (**echinus** Bates or **singularis** Bates)

Distribution. NEOTROPICAL REGION: Central America (Guatemala (also Panama, in the case of *P. echinus* Bates)).

Host plant: *Cupressus* (Becker, 1953c).

Biology. Larvae of this species have been found by Becker (1953c) in a *Cupressus* stump which had been attacked by a fungus.

Reference. Becker, 1953c (Biol.).

Moneilema (s.g. **Collapteryx**) **opuntiae** Fisher

Distribution. NEOTROPICAL REGION: Mexico.

Host plant: *Opuntia* sp. (Fisher, 1928).

Reference. Fisher, 1928 (Biol.).

Moneilema (s.g. **Collapteryx**) **rugosipennis** Fisher

Distribution. NEOTROPICAL REGION: Mexico.
Host plants: *Opuntia imbricata*, *Platyopuntia* sp. (Fisher, 1928).
Reference. Fisher, 1928 (Biol.).

Moneilema (s.g. **Moneilema**) **vittata** Fisher

Distribution. NEOTROPICAL REGION: Mexico.
Host plant: *Opuntia* sp. (Fisher, 1928).
Reference. Fisher, 1928 (Biol.).

Monochamini

Larval Characters

Head depressed. Antenna 2- or 3-segmented; antennal foramen closed behind. One pair of ocelli present. Gula distinctly protuberant. Prothorax with posterior part of pronotum velvety micro-spiculate or micro-pubescent; sternellum similar. *Abdomen* with dorsal ampullae each with two transverse furrows and four transverse rows of moniliform tubercles, which are usually micro-spiculate. Epipleurum strongly protuberant on all segments. Pleural tubercles each with a pair of sclerotised pits. Anus trilobate. *Spiracles* without marginal chambers.

The genera *Taeniotes* and *Neoptychodes* are not typical of this tribe as a whole, since they possess a transverse anal aperture and pleural tubercles without sclerotised pits. They may conceivably form a connecting link between this tribe and the Batocerini.

Taeniotes scalaris (Fabricius)

Distribution. NEOTROPICAL REGION: Mexico, Central America (British Honduras, Costa Rica, Guatemala, Nicaragua, Panama), Caribbean (Grenada, Martinique), South America (Bolivia, Brazil, Colombia, Ecuador, Peru, Venezuela).

Host plants: *Ficus carica*, *Ficus* spp., *Morus alba* (Bondar, 1913); *Artocarpus integrifolia* (Silva and Almeida, 1941); *Castilloa* (Crawford, 1910).

Mature larva. Form elongate, subcylindrical, tapering posteriorly. *Head* moderately depressed, with sides straight and distinctly converging posteriorly (maximum head-width 6·1 mm.); frontal sutures indistinct; antennal foramen closed behind; mouthframe strongly and broadly sclerotised, ferruginous, with the dorsal transverse band much broader than length of clypeus; epistoma with at least ten setae; mandibles relatively stout, less than twice as long as basal width, and bearing two stout setae (and a few minute setae) on outer face. One pair of ocelli present; lens round, convex, corneous; pigmented spot indistinct. Hypostoma ferruginous, coarsely transversely striate; sutures pitchy, incurved; gula distinct, raised. Antenna minute, 3-segmented; segment 3 subquadrate, not or scarcely longer than supplementary process, which is conical and hyaline. Labrum transversely oval and densely setose anteriorly. Maxilla with segment 3 of palp acutely conical, shorter than segment 2. Labial palpi with segment 2 about half length of segment 1. Mentum not distinct from submentum. *Prothorax* depressed, transversely rectangular; posterior area of pronotum broadly velvety micro-spiculate (spotted with lenticulate setal pores); anteriorly with a transverse row of long fine setae. *Mesonotum* and *metanotum* non-spiculate. Prosternum with sternellum dull, very finely micro-spiculate. *Abdomen* with each dorsal ampulla with two transverse furrows and four rows of glabrous, moniliform tubercles; ventral ampullae with two rows of similar tubercles. Segment 9 without a sclerotised process. Anus a transverse cleft (as in *Neoptychodes*, fig. 100). Epipleurum protuberant on all segments. Pleural tubercle elongate, without sclerotised pits. *Legs* absent. *Spiracles* with peritreme rather broadly oval, thin, pale, and without marginal chambers. Length up to 55 mm.; maximum breadth (at prothorax) 10·25 mm.

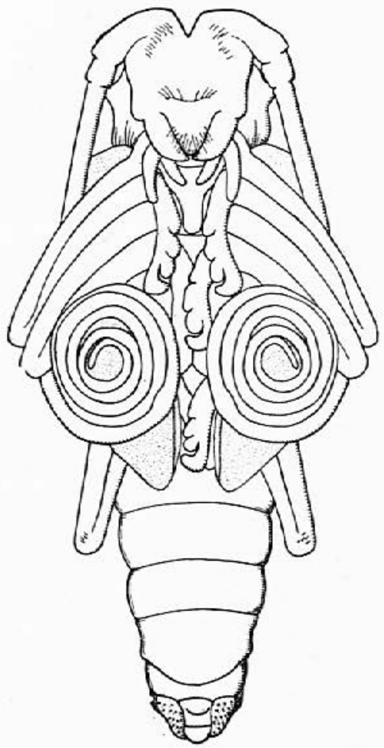


Fig. 98. *Taeniotes scalaris* (Fabricius). Pupa. Ventral aspect.

Pupa (fig. 98). *Head* with vertex almost entirely visible from above, very deeply excavated and with two pairs of setae between bases of antennal tubercles, front with setae as figured. Antennae extending to abdominal segments where they are strongly recurved and each arranged in several coils near apices of elytra. Eyes feebly convex, glabrous. Labrum rather densely setose. *Pronotum* with a pair of short rounded tubercles. *Mesonotum* with two oblique rows (arranged in a V) of setae; scutellum rather strongly protuberant and bearing numerous setae. *Metanotum* with two oblique rows of similar setae; scutellar groove feebly transversely striate. Elytra and wings extending to abdominal segment 4. *Abdomen* with tergites 1–3 each with a transverse band (interrupted medially) of closely set, long, stout setae; tergites 4–6 generally with only a single transverse row of setae. Tergite 7 subquadrate, tapering posteriorly and bearing a few scattered setae on posterior half. Tergite 8 very short, transverse, bearing only two or three pairs of setae. 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. Pleura moderately protuberant. *Legs* with a transverse row of fine setae near apices of femora; hind femora extending to abdominal segment 6; tibiae placed obliquely to longitudinal axis of body. *Functional spiracles* present on segments 1–5, those on segments 6–8 being closed and probably non-functional; peritreme oval, moderately thick and very strongly raised above general level of cuticle. Length up to 35 mm.; breadth 10·5 mm.

Biology. Larvae of this species, which is sometimes a pest of orchards, infest branches and boles of living trees. A series of frass ejection holes is made at regular intervals along the larval gallery. The characteristic damage resembles that of *Trachyderes thoracicus* (Olivier) (Bondar, 1913b).

According to Crawford (1910) this species causes considerable damage in rubber

(*Castilloa*) plantations. He maintains that ovipositing adults are attracted to fungal growths which have arisen from incisions made through tapping operations.

Control. Bondar (l.c.) recommends that larvae should be extracted with a penknife and that badly infested limbs be removed and burnt.

Material studied. 1 L, 1 P, Brazil, São Paulo, Campinas, x.1912, from *Ficus carica*, G. Bondar leg., in coll. D.Z.S.P.; 8 L, Guatemala, Agua Blanca Plantation, from rubber stems, presented by Chalmers, Guthrie & Co., in coll. B.M.

References. Andrade, 1927 (Biol.), 1928 (Biol.); Bondar, 1913b (L fig., P fig., I fig., Biol., Contr.), 1938b (I fig., Biol., Contr.); Crawford, 1910 (Biol.); Grégoire, 1957 (I, Physiol.); Lima, 1922 (Biol.), 1928 (Biol.), 1930 (Biol.), 1955 (Biol.); Novaes, 1927 (Biol.); Silva and Almeida, 1941 (Biol.).

Taeniotes pulverulentus (Olivier)

Distribution. NEOTROPICAL REGION: Central America (Costa Rica), Caribbean (Guadeloupe, Martinique), South America (Bolivia, Brazil, Ecuador, French Guiana, Paraguay, Peru, Surinam).

Mature larva. Very similar to that of *T. scalaris* (Fabricius), but differing as follows. *Prothorax* with the glabrous, lenticulate, setal pores of anterior half of spiculate area of pronotum mostly broadly oval. *Abdomen* with the ventral ampullae feebly but distinctly bilobed, the moniliform tubercles convex and protuberant.

Material studied. 1 L, Brazil, Guaratiba, D. Federal, 13.iii.1949, A. G. d'Araujo e Silva leg., in coll. D.D.S.V.

Reference. None available.

Taeniotes farinosa (Linnaeus)

Distribution. NEOTROPICAL REGION: South America (Brazil, British Guiana, Ecuador, French Guiana, Peru, Surinam).

Host plant: *Theobroma* (Faber, 1909).

Reference. Faber, 1909 (Biol.).

Taeniotes insularis Thomson

Distribution. NEOTROPICAL REGION: Caribbean (Cuba, Dominica, Guadeloupe).

Host plants: *Ficus carica* (Landes, 1900).

Reference. Landes, 1900 (Biol.).

Neoptychodes (=Ptychodes) trilineatus (Linnaeus)

[The Three Lined Fig-tree Borer]

Distribution. NEOTROPICAL REGION: Mexico, Central America (British Honduras, Costa Rica, Nicaragua, Panama), Caribbean (Cuba, Jamaica, Puerto Rico, Trinidad), South America (British Guiana, Colombia, Surinam, Venezuela). NEARCTIC REGION: U.S.A. (California, Louisiana, Texas). AUSTRALASIAN REGION: Society Is. (Tahiti), French Oceana.

Host plants: *Ficus*, *Alnus*, *Morus* (Craighead, 1923); *Ficus carica* (Dumbleton, 1954); *Chlorophora tinctoria* (F. Peña). Fairmaire (1850) mentions *Spondias dulcis* and *Inocarpus edulis* being attacked in Tahiti.

Mature larva (figs. 99–100). Similar to that of *Taeniotes scalaris* (Fabricius), but distinguishable as follows. *Abdomen* with segment 10 with a group of five to eight short spines behind lower anal lobe (fig. 100).

Pupa. Very similar to that of *Taeniotes scalaris* (Fabricius) from which it may be distinguished by the presence of a seta on each tarsal segment. Length up to 27 mm.; maximum breadth 8·5 mm.

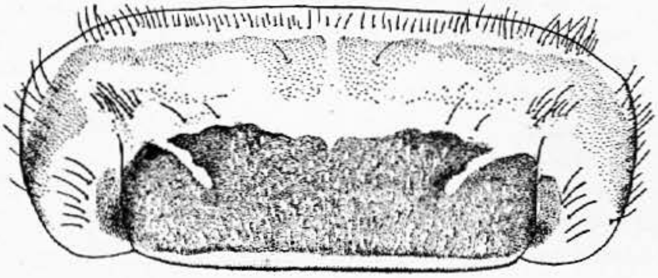


Fig. 99

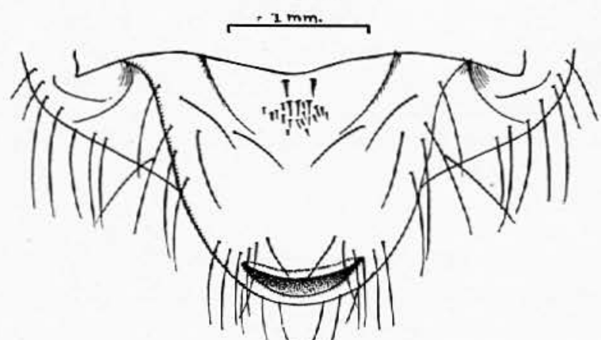


Fig. 100

Figs. 99–100. *Neoptychodes trilineatus* (Linnaeus). Mature larva. Fig. 99. Pronotum. Fig. 100. Abdominal segment 10. Ventral aspect.

Egg. Form elongate, subcylindrical. Chorion white (sometimes faintly yellowish or greenish), more or less patterned like the grain of the fig-wood. Length 3·52 mm.; breadth 0·91 mm. (Horton, 1917.)

Biology. The eggs are deposited in the bark of the larger branches or trunk of partly dead or decaying trees. Prior to oviposition the female makes a double transverse incision in the bark to a depth of 0·125–0·25 inch. Sometimes two or three eggs are placed in the same incision. About 100–184 eggs are laid by a single adult. The incubation period is about five days. The first-instar larva usually devours most of the egg-shell before boring into the bark. Several days later the larva enters the sapwood and bores towards the heartwood, tightly packing the gallery with frass and debris. Within six months the larva is usually mature and has tunnelled near to the surface ready for pupation. The pupal cell is formed by enlarging the end of the gallery; it is completely lined within with wooden particles and frass which have been glued together with a secretion. The pupal period lasts on an average twenty-four days.

Generations are irregular, and emergence takes place practically throughout the whole year. The average duration of the life-cycle is 3·5 months (Horton, 1917).

In an infested log of *Chlorophora tinctoria* (about two to three months old), larvae were found to have tunnelled their way into the sapwood, while still comparatively young, up to a distance of about 2 inches. Emergence takes place at the distal end of the pupal cell through a neat round hole, around which a circular disc of bark had been gnawed away (F. Peña).

Predators. Larvae of the elaterid *Semiotus ligneus* L. (det. C. M. F. von Hayek) have been found in infested logs.

Economic importance. This species causes considerable damage to certain trees, especially *Ficus carica*. Abraised or diseased parts of the tree are most prone to attack, healthy green trees hardly ever being infested.

Control. Horton (l.c.) recommends the following measures. Keep trees in as perfect condition as possible. Whenever a branch is broken off, the stump should be smoothed down and painted with a mixture of five parts coal-tar and one part creosote. Two or three coats should be applied. Heavily infested branches or trunks should be cut down and burned.

Material studied. 1 L, U.S.A., Louisiana, Franklin, 5.x.1927, from *Ficus*, J. B. Miller leg., in coll. U.S.N.M.; 8 L, 1 P, U.S.A., New Orleans, 24.viii.1899, from *Ficus*, L. M. Harris leg., in coll. U.S.N.M.; 6 L, 6 P, 4 I, Trinidad, South West District, vii.1957, from *Chlorophora tinctoria*, F. Peña leg., in coll. B.M.

References. Craighead, 1923 (L fig., Biol.), 1950 (Biol., Contr.); Duffy, 1953a (L fig., P, Biol., Contr.); Dumbleton, 1954 (Biol.); Horton, 1917 (E fig., L fig., P fig., Biol. fig., Contr.); Le Beau, 1938 (Biol., Contr.); Risbec, 1946 (E fig., L fig., Biol.); Ritchie, 1918 (Biol.).

Monochamus titillator (Fabricius)

[The Southern Pine Sawyer]

Distribution. NEOTROPICAL REGION: Caribbean (Cuba, Puerto Rico), South America (Colombia). NEARCTIC REGION: U.S.A., Canada.

Host plants: *Pinus*, *Picea* and *Abies*.

Mature larva (figs. 101–107). Form very elongate, slender, slightly depressed. *Head* (fig. 101) strongly depressed, slightly wider before middle, and abruptly constricted behind middle (maximum head-width 5·5 mm.); frontal sutures distinct only anteriorly; antennal foramen closed behind; mouthframe very strongly and broadly sclerotised, with the transverse, dorsal, ferruginous band as broad as length of clypeus. Six epistomal setae present. Mandible slender, about three times as long as basal width; cutting edge broadly emarginate. One pair of ocelli present; lens small, round; pigmented spot usually rather indistinct. Hypostoma ferruginous, with front margin more darkly so; sutures distinct, pitchy, incurved. Gular sutures distinctly raised. Antenna (fig. 102) minute, second segment slightly transverse; supplementary process prominent, acutely conical, as long as segment 3. Labrum roundly oval and densely setose anteriorly. Ventral mouthparts with strongly sclerotised, ferruginous areas. Maxilla (fig. 103) with segment 3 of palp acute, shorter than segment 2. Labial palpi (fig. 104) with segment 3 cylindrical, about half length of segment 2. Mentum distinct

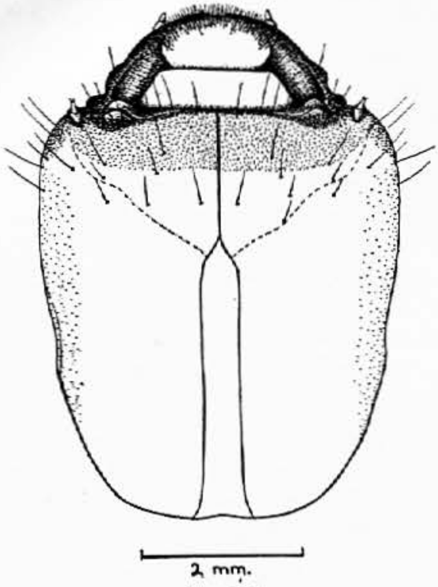


Fig. 101

Fig. 102

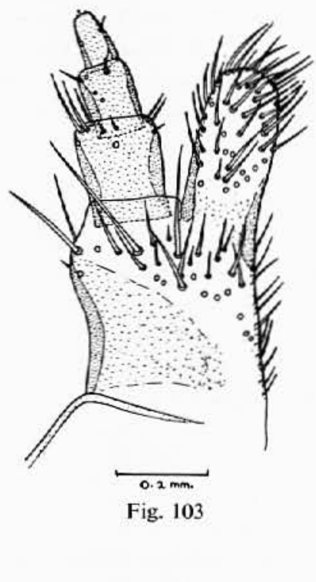


Fig. 103

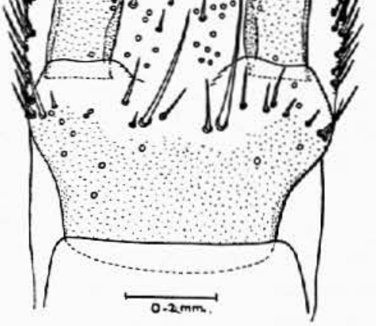


Fig. 104

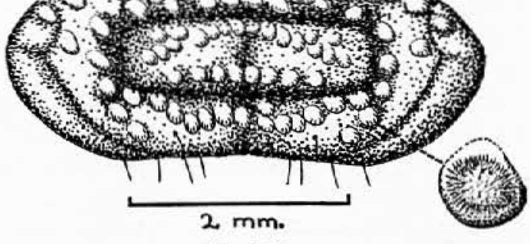


Fig. 105

Figs. 101–105. *Monochamus titillator* (Fabricius). Mature larva. Fig. 101. Head. Dorsal aspect. Fig. 102. Apical part of right antenna. Lateral aspect. Fig. 103. Apical part of right maxilla. Ventral aspect. Fig. 104. Labial palpi and ligula. Ventral aspect. Fig. 105. Dorsal ampulla of abdominal segment 6.

from submentum. *Prothorax* depressed rectangular; posterior region of pronotum velvety micro-spiculate, spotted with lenticulate, glabrous areas. *Mesonotum* dull, velvety micro-pubescent anteriorly, shining posteriorly. *Metanotum*, mesosternum and metasternum each with two transverse rows of micro-spiculate moniliform tubercles. *Abdomen* with each dorsal ampullae (fig. 105) with two distinct, transverse furrows and four distinct rows of micro-spiculate, moniliform tubercles which are not interrupted by the longitudinal median furrow. Ventral ampullae with two rows of tubercles. Segment 9 without a sclerotised process. Anus (fig. 106) trilobed, the

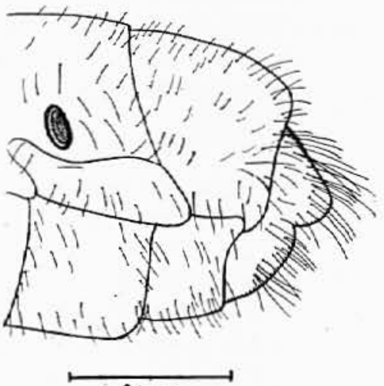


Fig. 106

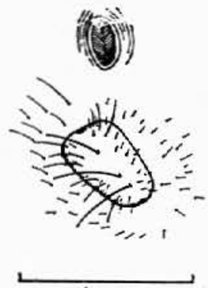


Fig. 107

Fig. 108

Figs. 106–107. *Monochamus titillator* (Fabricius). Mature larva. Fig. 106. Abdominal segments 8–10. Lateral aspect. Fig. 107. Spiracle and pleural tubercle of abdominal segment.

Fig. 108. *Monochamus titillator* (Fabricius). Pupa. Abdominal segments 8 and 9. Lateral aspect.

dorsal lobe almost semicircular and strongly protuberant. Epipleurum protuberant on all segments. Pleural tubercle (fig. 107) elongate, with a distinct sclerotised pit at each extremity, and bearing two very long, and about ten much shorter, setae. *Legs* vestigial, consisting of a minute tubercle bearing several setae. *Spiracles* with peritreme broadly oval. Length up to 47 mm.; maximum breadth (at prothorax) 9 mm.

Pupa (fig. 108). *Head* faintly rugose; vertex almost entirely visible from above, very deeply excavated, and sometimes with one or two stout setae near bases of antennae; front with short stout setae as figured. Clypeus with a deep transverse impression, and four to six setae across base. Antennae extending to between abdominal segments 2 and 3, where they are strongly curved downwards, and each arranged in several (at least in the male) coils on top of each elytron. Eyes feebly convex, glabrous. Mandibles each with at least four stout setae near middle of outer face. Labrum bearing at least twelve stout setae along front and lateral margins. *Pronotum* with sides bearing a pair of tubercles; numerous, scattered, short, stout setae present, especially on lateral tubercles. *Mesonotum* smooth, and with two oblique rows of similar setae; scutellum rather strongly protuberant and setose. *Metanotum* with two converging rows of similar setae. 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 quadrate, slightly tapering and bearing a band of setae across hind margin. Tergite 8 strongly transverse, very short, and with a row of setae across hind margin. Tergite 9 (fig. 108) short, and produced dorsally into a long, vertical, spine-like process, which is strongly sclerotised apically; ventrally it is deeply divided and spinose. Sternites glabrous or almost so. Pleura scarcely protuberant; each with paired stout setae. *Legs* with a transverse row of short stout setae near apex of each femur; mid- and hind femora each with a blunt tubercular process near base; hind femora extending to abdominal segment 5; tibiae directed posteriorly. *Functional spiracles* present on abdominal segments 1–5, but vestigial pairs present on segments 6 and 7; peritreme rather narrowly oval, exceedingly thick, and slightly raised above general level of cuticle. Length 28–30 mm.; maximum breadth 8·5 mm.

Egg. Form elongate-oval. Chorion opaque, white, sculptured, and with a micropyle at one end. Length 4 mm.; breadth 1·5 mm.

Biology. The eggs are laid in felled or injured trees, healthy trees seldom being attacked. Prior to oviposition the adult gnaws a funnel-shaped pit (sometimes it is merely a transverse slit) in the bark, which extends to the soft sappy inner bark. The eggs are then deposited in a circle around the bottom of the pit; up to nine eggs have been noticed in a single pit. Oviposition occurs from March to October, and the incubation period lasts about five days. When about three or four weeks old the larvae penetrate the outer sapwood, and then emerge again to feed on the inner bark, wooden fibres and frass being packed between the bark and the wood. Distinct channels are soon made through the detritus as the larvae move from their entrance pit to fresh feeding sites. When mature the larva extends the pit right into the sapwood, as far as the heartwood. Here the larva usually starts to tunnel parallel to the grain of the wood for 2 or 3 inches, and then turns to burrow within about ¼ inch from the surface, thus making a U-shaped gallery. The bottom of the "U" is enlarged to form the pupal cell. Only very rarely do larvae pupate under the bark (Webb, 1909). Fraser (1948d) gives the following account of infested timber imported from Canada. "The galleries range from 0·1 to 0·75 in. across and are disappointingly frequently empty. Examination of a large number of galleries leaves no room for doubt that the habit of the larva is to work its way into the centre of the log and, on reaching it, to return, but not by the same gallery, to the sapwood. Thus, in the majority of boards, there are two apparent galleries for each larva. It is probable that this habit of doubling back is inspired by the greater hardness of the core, not by a desire to return to the sapwood to pupate, since the size of some galleries which reveal this 'hairpin bend' indicates clearly that the occupants would not be ready to pupate for a very long time. One section of timber 6 in. by 3 in. by 2 ft. 9 in. long, selected at random, has 69 holes in its surface area, ranging from 0·15 to 0·75 in. across. The frass contained in the galleries is of a most unusual nature, being in the form of 'splinters' of an average length of 0·75 cm. It is loosely and irregularly packed and therefore falls easily from the gallery so that most holes are empty for the first few centimetres. The larvae in several cases have worked back along a gallery to start a new working at right angles to the original. No instance had been observed of two separate galleries meeting nor has there been any indication of communal use of a gallery. The timber is infested more or less to the same degree throughout its entire length, usually 10 to 12 ft., a fact which is only to be expected if it is assumed that the damage is done after the felling of the tree."

According to Bowditch (1873), if the diameter of the tree exceeds 6 inches, the pupal cell extends straight to the opposite side of the trunk. The adult escapes by extending the arm of the cell to the surface of the sapwood and then gnawing through the bark, leaving a round exit hole about $\frac{3}{8}$ inch in diameter. Emergence occurs chiefly in June and July. The life-cycle is normally completed in two years.

Parasites. Hymenoptera: *Bracon webbi* Viereck (Webb, 1909). Diptera: Craighead (1923b) states that larvae of American species of *Monochamus* are frequently attacked in the pupal cells by a tachinid. The author has noticed that adults of this and most other species of *Monochamus* are frequently covered with clusters of mites, especially on their dorsum.

Control. Webb (1909) claims that the most efficient control measure is that of placing the freshly felled logs in water. He also suggests the barking of logs up to the time when larvae normally enter the sapwood, but this is only effective providing the logs can be used soon after, before the exposed sapwood starts to decay.

Material studied. 5 L, 1 P, U.S.A., in coll. B.M.

References. Bowditch, 1873 (Biol.); Craighead, 1923b (L fig., P, Biol.); Chittenden, 1899 (Biol.); Duffy, 1953a (L fig., P fig., Biol. fig., Contr.); Felt, 1907 (Biol.); Fraser, 1948d (Biol.); Hopkins, 1899 (Biol.); Horn, 1885 (Biol.); Webb, 1909 (E fig., L fig., P fig., Biol. fig.).

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 without a sclerotised process. Anus a transverse cleft.

Batocera (s.g. **Batocera**) **rufomaculata** (Degeer)

(=**rubra** Maxwell-Lefroy)

[The Mango Tree Borer or Violin]

Distribution. NEOTROPICAL REGION: Caribbean (Barbados, Trinidad (?), Virgin Is. (St. Croix, St. Thomas, Tortola)). PALAEARCTIC REGION: Israel, Palestine. ORIENTAL REGION: Andeman Is., Assam, Burma, Ceylon, China, Hainan Is., India, Malaya, Pakistan, Tibet. ETHIOPIAN REGION: East Africa. MADAGASCAN REGION: La Réunion, Madagascar, Mauritius, Rodriguez.

Host plants: Neotropical Region: *Ochroma lagopus*, *Ficus* spp., *Musa*, *Mangifera*, *Persea*, *Asimina* (Ballou, 1916b). Oriental Region: *Adina cordifolia*, *Albizia lebbeck*, *Artocarpus integer*, *Barringtonia acutangula*, *Bauhinia acuminata*, *Bombax malabaricum*, *Broussonetia papyrifera*, *Carica papaya*, *Ceiba pentrandra*, *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* (Beeson, 1941). Madagascan Region: *Mangifera indica*, *Acacia*, *Ficus benghalensis*, *Artocarpus altilis*, *Spondias dulcis* (Department of Agriculture, Mauritius, 1918).

Adult. Length 26–52 mm. Head, prothorax and elytra covered with grey or yellowish-grey pubescence; prothorax with a pair of large orange or orange-yellow marks on disc; elytra very variably maculated with small orange-yellow or pale yellow spots, usually six on each elytron, but often less or with numerous scattered subsidiary spots. *Head* with antennae about one-third longer than body in male, only slightly longer than body in female. *Prothorax* bearing a pair of stout conical tubercles laterally. *Elytra* with shoulders bearing a small spine; basal third bearing numerous small, shining, moniliform tubercles; apices slightly obliquely truncate, the sutural angle spined.

Mature larva (fig. 109). *Head* elongate, rather strongly depressed, widest at anterior third and strongly converging posteriorly. Frontal sutures indistinct; antenna

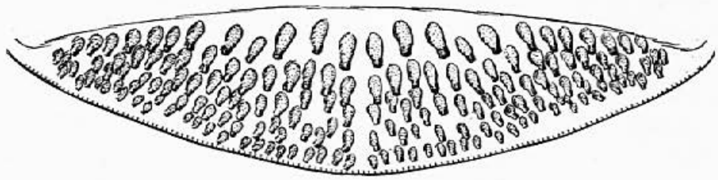


Fig. 109. *Batocera rufomaculata* (Degeer). Mature larva. Postnotal fold.

foramen closed behind; mouthframe extremely strongly and very broadly sclerotised, pitchy; frons pitchy anteriorly 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. Antennae 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* with pronotum ferruginous and smooth except for 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 (fig. 109) well developed, bearing about five transverse rows of elongate, subcylindrical, subvertical asperities; anterior row of asperities distinctly larger than those on remaining rows, which become gradually smaller posteriorly.

Miller (1926) records the maximum length of this larva to be 100 mm.

First-instar larva. According to Miller (1926), egg-bursting spines are present on abdominal segments 1–8; the apex of each spine is dentate. The spiracles are biforous. 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. 110). 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 strong, subvertical, acute prominence ending in a chitinous spine; this prominence bilobed ventrally, each lobe more or less carinate, and armed with chitinous spines."

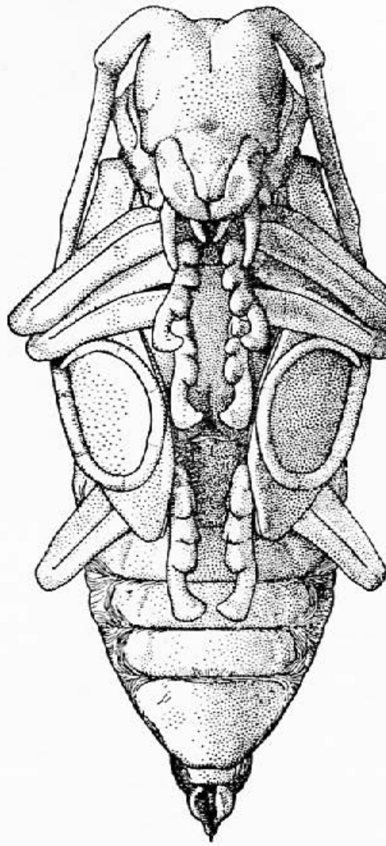


Fig. 110. *Batocera* sp. Pupa. Ventral aspect.

Egg. Form cylindrical, feebly curved, slightly narrower at one end, ends narrowly rounded; chorion brownish white, smooth, coriaceous, with some feeble, irregular punctures (Miller, 1936).

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 narrow rounded ends. The newly hatched larva is about 10 mm. long; it feeds at first in the meristem and later penetrates deeper. The larval excavation 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. According to Ballou (1916b) this insect was of very recent introduction to the Virgin Is., but it has already been responsible for killing a number of wild fig trees (*Ficus* sp.) in St. Croix.

In Mauritius this insect is responsible for considerable damage to certain trees, 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, suppression, 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 burnt later. 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.

Ballou (1916b) suggests the killing of larvae *in situ* with wire probes, the use of trap logs, and the hand collection of adults.

Material studied. 1 L, England, Princes Risborough, 26.iv.1933, from log imported from Andaman Is., in coll. F.P.R.L.

References. Anonymous, 1920 (Contr.); Ballou, 1916a (Biol.), 1916b (Biol.;

[1] This method is considered too dangerous to adopt.

Contr.); 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, British Virgin Islands, 1919 (Biol.); Department of Agriculture, Mauritius, 1918 (L fig., P fig., I fig.); Duffy, 1953a (Biol.), 1957 (E, L fig., Biol., Contr.); Evans, 1952 (Biol.); Gardner, 1927 (L fig., P fig., Biol.); Green, 1913 (L fig., I fig., Biol. fig., Contr.); Gressitt, 1951 (Biol.); Husain and Khan, 1941 (E fig., L fig., P fig.); Miller, 1936 (E fig., L fig., P fig., I fig., Biol.); Mühlmann, 1954 (Biol.); Pearson, 1937 (Biol.); Pierce, 1918 (Biol. fig.); 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.).

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. Anal cleft transverse; dorsal lobe sclerotised, pigmented and sometimes striate. Pleural tubercles without sclerotised pits. *Spiracles* without marginal chambers.

Phryneta verrucosa (Drury)

Distribution. NEOTROPICAL REGION: Caribbean (Barbados, Grenada, Trinidad).

Mature larva. No material available. The following is a description of that of the African *Phryneta leprosa* (Fabricius), which should be essentially similar. *Head* moderately depressed, elongate, subparallel-sided, widest before middle, slightly constricted at middle; frontal sutures distinct for entire length; antennal foramen open

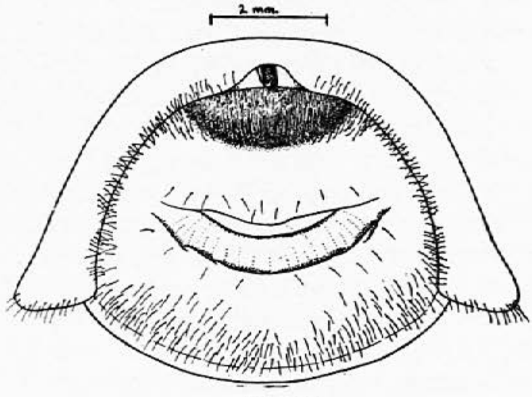


Fig. 111

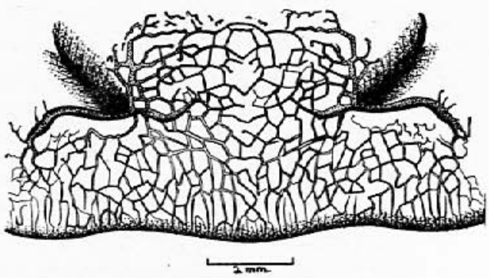


Fig. 112

Figs. 111–112. *Phryneta leprosa* (Fabricius). Mature larva. Fig. 111. Abdominal segments 9 and 10. Caudal aspect. Fig. 112. Median region of pronotum.

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. Gular region with a pale median cleavage line. Antenna 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. 112) 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 (fig. 111) with a very stout, curved spine, the base of which is concealed beneath the posterior margin; segment 10 (fig. 111) with dorsum done-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. Length up to 55 mm.; maximum breadth 14 mm.

Pupa. No material available. The following is a description of that of *Phryneta leprosa* (Fabricius). *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. 113) present on segments 1–2, 2–3, 3–4, 4–5 and 5–6 (see also Duffy (1953), 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 longitidinal 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. Length up to 34 mm.; maximum breadth 11 mm.

Reference. None available.

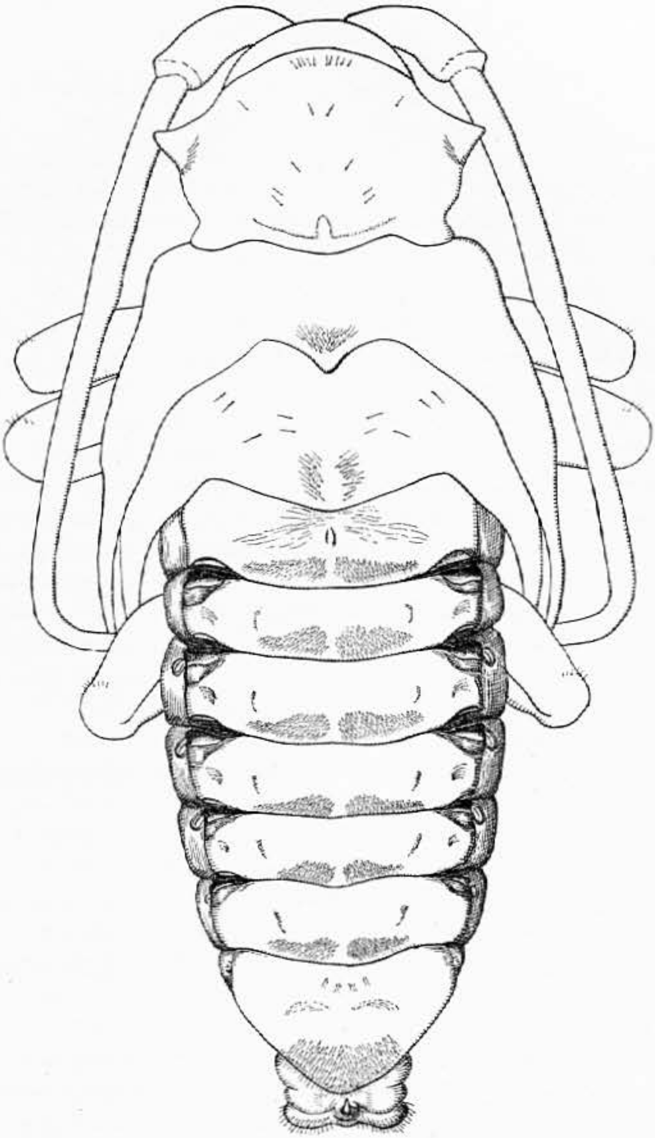


Fig. 113. *Phryneta leprosa* (Fabricius). Pupa. Dorsal aspect.

Dorcaschematini

Stereomerus pachypezoides Melzer

Distribution. NEOTROPICAL REGION: South America (Argentina).
Host plant: *Senecio.*
Reference. Bosq, 1942a (Biol.).

Onciderini

Larval Characters

Form elongate, cylindrical, rather robust. *Head* with anterior part of frons with a transverse row of longitudinal carinae (*Oncideres*, fig. 114) or hypostoma exceptionally long (*Jamesia*, fig. 118). Antenna 2-segmented. *Prothorax* with pronotum glabrous, shining. *Abdomen* with dorsal ampullae each with four transverse rows of moniliform tubercles. Tergite 9 without a sclerotised process. Anus trilobate.

Oncideres

[Corta palo; Serradores]

Species of this genus of lamiids are commonly known as "Serradores". The adults have the curious habit of girdling the branch (fig. 117) in which the eggs are deposited. These branches soon break right off and fall to the ground, the emerging larvae feeding on the dead wood. Usually only healthy living trees are attacked. The remarkable girdling of branches which is characteristic of the damage caused by species of this genus is very conspicuous, for the diameter of the branches girdled is often as much as 5 or even 8 cm. Apparently branches are attacked in this way because the larvae cannot survive in living wood, although it appears that it is not essential for the severed stem to rest on the moist ground as implied by Riley (1880b), as there are numerous records of *Oncideres* larvae having successfully developed in amputated stems which had failed to reach the ground, having been caught up in surrounding branches.

To girdle a single branch takes the female beetle one to two weeks. Often there may be as many as a dozen beetles working on different portions of the same branch, in which thirty or more eggs may eventually be deposited. The life-cycle is completed within a year. The adult beetles feed from time to time on the tender bark of the young shoots.

There is some discrepancy in the literature dealing with the biology of this group concerning the sequence of oviposition and girdling. Some reports infer that girdling precedes oviposition, others are non-committal. Girault (1910), however, states quite definitely that at least in the case of *Oncideres texana* Horn, oviposition is accomplished before the branch is girdled.

The most likely explanation for the curious habit of amputation is that given by Herrick (1902) in his paper on *O. texana* Horn, in which he maintains that amputation is to prevent further growth from crushing the eggs and to provide suitable food for the larvae. In one case, where sufficient wood had been left for the circulation of sap, the eggs were found crushed between the bark and wood. Adults usually go about in pairs, but only the female does the girdling. This operation starts with the beetle first selecting a patch of bark the desired width for cutting; this is cleaned and the bark eaten. Then a cut is made at the top, then the head moves gently down to the bottom, where a corresponding cut is made; then working from the bottom cut, the wood fibre is raised, and as the piece was cut free to start with at the top, it is already detached when the piece is torn loose to the top cut. Then another cut is made at the top; then at the bottom, and so on until the beetle reaches in as far as it conveniently can. It then moves to either side of this cut, eats off another strip of bark and continues as before (see also p. 200).

On several occasions the author heard these beetles at work on *Pterocarpus* in the mangrove creeks of British Guiana. Although the beetles were too high up to be accessible, the sound of their "sawing" activities, which resembled that made by winding up a cheap watch or mechancial toy, was surprisingly loud and could distinctly be heard many yards away. A typically girdled stem of *Pterocarpus* is shown in fig. 117.

Oncideres (s.g. **Lochmaeodes**) **fasciata** Lucas

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).

Host plants: *Dalbergia nigra* (Zikán and Zikán, 1946); *Parkinsonia aculeata*, *Gossypium* (Bosq, 1942a).

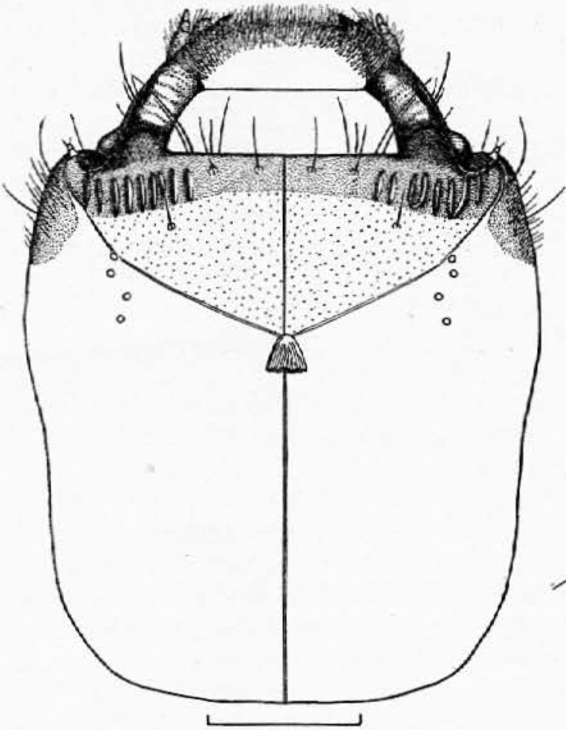


Fig. 114

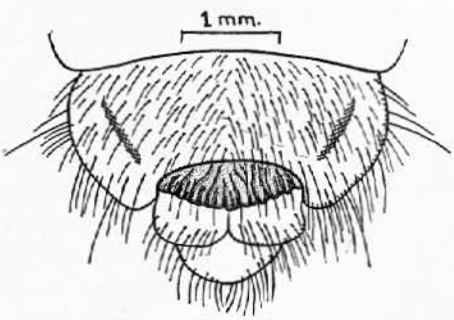


Fig. 115

Figs. 114–115. *Oncideres fasciata* Lucas. Mature larva. Fig. 114. Head. Dorsal aspect. Fig. 115. Abdominal segments 9 and 10. Ventral aspect.

Mature larva (figs. 114–115). Form elongate, almost cylindrical, rather robust. *Head* (fig. 114) moderately depressed, slightly wider before middle and feebly constricted behind middle (maximum head-width 6·5 mm.) frontal sutures pale, rather indistinct; antennal foramen open posteriorly; mouthframe strongly and broadly sclerotised. Frons with front margin broadly ferruginous and with at least sixteen longitudinal, pitchy carinae (absent on median third). Eight to twelve epistomal setae present. Mandible slender, about twice as long as basal width. One pair of ocelli present; lens convex, corneous; pigmented spot indiscernible. Temple broadly ferruginous with a pale-testaceous ocellus-like spot (slightly larger than the true ocellus) ventro-laterally. Hypostoma testaceous, with front margin ferruginous; sutures pitchy, slightly converging. Gular sutures indistinct. Antenna minute, 2-segmented; segment 2 bearing a conical hyaline process. Labrum transversely oval and densely setose anteriorly. Mentum distinct from submentum. Prothorax subrectangular, obliquely slanting anteriorly; pronotum glabrous, shining. *Mesonotum* feebly rugose; *metanotum* with two transverse rows of moniliform tubercles. Prosternum with prosternum bearing numerous long, coarse, reddish setae; eusternum glabrous, rugose. *Abdomen* with each dorsal ampulla with two distinct transverse furrows and four rows of glabrous, moniliform tubercles. Tergite 9 with a sclerotised process. Sternite 9 with a transverse, rather strongly sclerotised, pale ferruginous, crenulate band across hind margin (fig. 115). Anus trilobed, the dorsal lobe rather strongly protuberant and bearing coarse reddish setae. Epipleurum feebly protuberant on all segments. Pleural tubercle with lower sclerotised pit very large and conspicuous, the upper pit minute. *Legs* absent. *Spiracles* with peritreme broadly oval, without distinct marginal chambers. Length up to 52 mm.; maximum breadth (at prothorax) 11·5 mm.

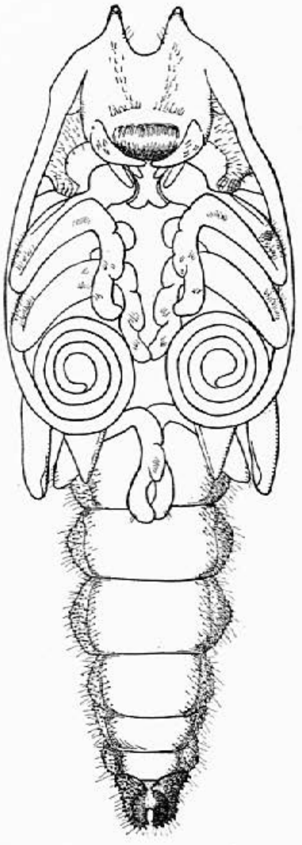


Fig. 116. *Oncideres fasciata* Lucas. Pupa. Ventral aspect.

Pupa (fig. 116). *Head* with vertex almost entirely visible from above, very deeply excavated and produced into a pair of horn-like tubercles at base of each antenna; front and base of clypeus with numerous long fine setae. Antennae extending to between abdominal segments 2 and 3, where they are strongly incurved and each arranged in three or four coils alongside each elytron. Eyes feebly convex, glabrous. Mandibles bearing numerous silky setae near middle of outer face. Labrum with both basal and apical margins very densely fringed with long silky reddish setae. *Prothorax* with sides tuberculate sub-basally, bearing numerous scattered, fine setae, except posterior part of disc, which is glabrous. *Mesonotum* and *metanotum* with several similar setae. Elytra and wings extending to between abdominal segments 3 and 4. *Abdomen* with tergites 1–8 covered with short stout spines (each with a basal seta), except for a median transverse area, which is glabrous. Tergite 9 short, strongly sclerotised, ferruginous, densely spinose and truncate apically; deeply divided ventrally. Sternites with sublateral area bearing groups of minute spines. *Legs* with apices of femora, bases of tibiae and tarsi bearing numerous fine setae; hind femora extending to abdominal segment 3; tibiae placed obliquely to longitudinal axis of body. *Functional spiracles* on abdominal segments 1–6; those on segments 7 and 8 closed and probably non-functional; peritreme narrowly oval and rather thin and raised above general level of cuticle. Length up to 45 mm.; maximum breadth 12·5 mm.

Material studied. 1 L, 1 P, Brazil, xii.1941, F. Plaumann leg., in coll. B.M.

References. Bondar, 1915a (Biol.); Bosq, 1934 (Biol.); 1942a (Biol.); Costa, 1943 (?); Lima, 1955 (Biol.); Zikán and Zikán, 1946 (Biol.).

Oncideres (s.g. **Oncideres**) **guttulata** Thomson

Distribution. NEOTROPICAL REGION: South America (Argentina, Uruguay).

Host plants: *Acacia farnesiana* (Bruch, 1941); *Gossypium* (branches) (Bosq, 1934); *Acacia dealbata*, *Prosopis*, *Acacia cyanophylla* (Bosq, 1942a).

References. Bosq, 1934 (Biol.), 1942a (Biol.); Bruch, 1941 (Biol.); Denier, 1939 (Biol.).

Oncideres (s.g. **Oncideres**) **germari** Thomson

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil, Uruguay).

Host plants: *Prosopis*, *Acacia cavenia* (Bosq, 1942a); *Piptadenia macrocarpa* (Bruch, 1941); "tusca" (Hayward, 1942).

Biology. The habits of this species, which are described in detail by Bruch (1941), are apparently quite typical of this genus of lamiids. Bruch makes the interesting observation that there appears to be some correlation between the girth of the branch and the distance between each egg niche. In one branch measuring 10 mm. in diameter, the incisions were 70–80 mm. apart. Each incision is semilunar, measuring 4–5 mm. in diameter. Oviposition takes place in March, and the life-cycle is eight to ten months in duration.

References. Bosq, 1942a (Biol.); Bruch, 1941 (E fig., L fig., P fig., I fig., Biol. fig.); Hayward, 1942 (Biol.).

Oncideres (s.g. **Oncideres**) **gutturator** (Fabricius)

Distribution. NEOTROPICAL REGION: South America (Argentina).

Host plant: *Acacia* spp. (Bosq, 1934); *Persea persea* (Schrottky, 1909).

References. Bosq, 1934 (Biol.); Denier, 1939 (Biol.); Schrottky, 1909 (Biol.).

Oncideres (s.g. **Oncideres**) **impluviata** (Germar)

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil, Paraguay).

Host plants: *Mimosa sordida*, *Piptadenia rigida*, *Gleditschia amorphoides*, *Bauhinia candicans*, *Piptadenia acacia* (Bosq, 1942a); *Acacia*, *Ilex paraguayensis*, and fruit trees (Wille, 1925); *Acacia decurrens* var. *mollissima* (Lima, 1922).

Biology. These larvae infest recently dead wood which is obtained through the female cutting off branches and stems of various leguminous plants (from one-fifth to one inch in diameter) and ovipositing on the amputated portions. The larval stage lasts seven or eight months and adults emerge from the rotten wood from December to mid-February (Bondar, 1921).

Economic importance. This species is comparatively rare, but on one occasion all the trees of *Acacia decurrens* in a plantation were destroyed.

Control. Fallen branches should be collected and destroyed during the period April to July.

References. Bondar, 1921 (I fig., Biol. fig., Contr.), 1953 (Biol.), 1956 (Biol.); Bosq, 1942a (Biol.); Lima, 1922 (Biol.), 1928 (Biol.); Müller, 1886 (Biol.); Wille, 1925 (Biol.).

Oncideres (s.g. **Oncideres**) **poecila** Bates

[Serruchador]

Distribution. NEOTROPICAL REGION: Mexico, South America (Peru).

Host plant: *Persea* (Wille, 1935).

Biology. Typical girdling is performed by the adults prior to oviposition.

Economic importance. Girdling by adults of this species has caused serious damage to the branches of *Persea* (Wille, 1937).

Control. Wille (1935) suggests the hand collection of adults and the prompt disposal of cut branches.

Reference. Wille, 1935 (Biol., Contr.), 1937 (Biol.).

Oncideres (s.g. **Oncideres**) **repandator** (Fabricius)

Distribution. NEOTROPICAL REGION: South America (British Guiana, French Guiana).

Host plant: *Mangifera* (Bodkin, 1919).

Economic importance. According to Bodkin (1919) this species is a pest of mangos.

Reference. Bodkin, 1919 (Biol.).

Oncideres (s.g. **Oncideres**) **ulcerosa** (Germar) (=**heterocera** Thomson)

Distribution. NEOTROPICAL REGION: South America (Brazil, French Guiana, Paraguay).

Host plants: *Acacia*, *Ilex paraguayensis* and fruit trees (Wille, 1925); *Ancardium occidentale*, *Spondias lutea*, *Mourilia guianensis* and *Mangifera indica* (Bondar, 1953); *Delonyx regia* (Goeldi, 1897).

Adult (fig. 117). Length 20–24 mm. Head, prothorax and elytra fawn, the latter with numerous small spots giving a marbled effect. *Head* (in male) bearing a stout incurved tubercle at base of each antenna. *Prothorax* with a small pair of lateral tubercles. *Elytra* bearing several round, shining black moniliform tubercles near base.

Mature larva. Similar to that of *O. aegrota* Thomson, but differing as follows. *Head* with front margin of frons testaceous, the carinae fine and feebly raised. *Abdomen* with sclerotised pits of pleural tubercle indiscernible. Length up to 30 mm.; maximum breadth (at prothorax) 7 mm.

Pupa. Similar to that of *O. fasciata* Lucas, but distinguishable as follows. *Abdomen* with segment 9 without a median cleft dorsally. *Legs* with tibiae glabrous. Length up to 24 mm.; maximum breadth 8 mm.

Material studied. 2 L, Paraguay, Asuncion, ix.1892, in coll. B.M.; 12 L, 7 P, 2 I, Paraguay, Asuncion, ix.1892, Bohls leg., in coll. U.Z.M.

References. Bondar, 1909 (Biol.), 1915b (Biol.), 1953 (Biol.), 1956 (Biol.); Goeldi, 1897 (Biol.); Wille, 1925 (Biol.).

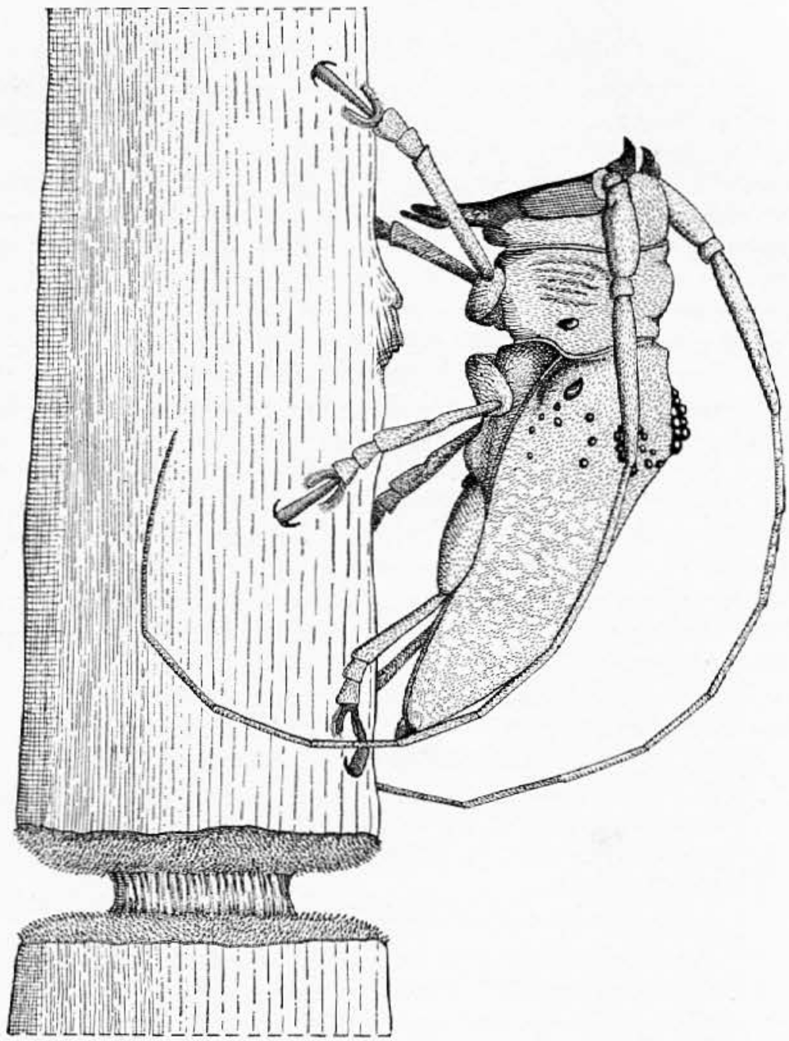


Fig. 117. *Oncideres ulcerosa* (Germar). Adult (male) on twig girdled by female (×5).

Oncideres (s.g. **Lochmaeodes**) **vermiculata** Thomson

Distribution. NEOTROPICAL REGION: South America (Brazil).
Host plant: *Eucalyptus trabuti* (Bondar, 1953).
References. Andrade, 1928 (Biol.); Bondar, 1953 (Biol.), 1956 (Biol.).

Oncideres (s.g. **Oncideres**) **jatai** Bondar

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plant: *Hymenaea* sp. (Bondar, 1953).

Biology. Adults emerge during June and July.

References. Bondar, 1953 (Biol.), 1956 (Biol.); Lima, 1930 (Biol.).

Oncideres (s.g. **Oncideres**) **aegrota** Thomson

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil, Paraguay).

Host plants: *Ocotea*, *Camphora officinarum* (Bosq, 1942a); *Nectandra* sp. (Fonseca, 1931); *Cinnamomum zeylanicum*, *Persea gratissima* (Bondar, 1953).

Mature larva. Similar to that of *O. fasciata* Lucas, but differing as follows. *Head* with front margin of frons testaceous, the carinae testaceous or pale ferruginous. Temple narrowly ferruginous, this area not wider than one-third length of mandible; ocellus-like spot absent. *Abdomen* without a sclerotised band on sternite 9. Length up to 30 mm.; maximum breadth (at prothorax) 6 mm.

Biology. Fonseca (1931) describes the damage to a tree (*Nectandra* sp.) caused by girdling attributed to this species. The bole of the tree was about 7 cm. in diameter and about 4 metres high. At about 2 metres above ground-level the bole had been conspicuously girdled, the excavation being wedge-shaped and measuring 1 cm. deep and ½ cm. at its greatest breadth. Alongside the excavation were a male and female beetle, the former mounted on the latter, which was holding between its mandibles a splinter of wood. Interrupted by the observer's presence, they remained motionless for a few minutes. The female then recommenced to gnaw at the central portion, tearing off more splinters. This completed, it then started to widen the wedge-shaped excavation by tearing off splinters. Probably three or more days were required to complete this girdling.

In a branch which was 5 cm. in diameter four wedges had been excavated, the two larger ones being 4½ cm. long and the two smaller ones being considerably shorter.

Material studied. 1 L, Brazil, xii.1941, from Lauraceae, F. Plaumann leg., in coll. B.M.

References. Bondar, 1915 (Biol.), 1942a (Biol.), 1953 (Biol.), 1956 (Biol.); Fonseca, 1931 (Biol. fig.); Lima, 1955 (Biol.); Müller, 1886 (Biol.).

Oncideres (s.g. **Oncideres**) **albomarginata** Thomson

Distribution. NEOTROPICAL REGION: Mexico, Central America (Nicaragua), South America (British Guiana, French Guiana, Venezuela).

Biology. Bodkin (1919) includes a record of this species destroying the bark of *Cola acuminata.*

Reference. Bodkin, 1919 (Biol.).

Oncideres (s.g. **Oncideres**) **dejeani** Thomson

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plants: *Anona coriacea*, *A. squamosa*, *A. cherimolia* (Bondar, 1953); *Hylopia grandiflora* (Bondar, 1956); *Casuarina* (Araujo, 1937); *Centrolobium tomentosum*, *Hymenaea stilbocarpa*, *Astronium fraxinifolium*, *Patagonula americana*, *Myrocarpus frondosus*, *Cedrela glaziovii*, *Mimosa sordida*, *Broussonetia*?, *Schizolobium excelsum*, *Caesalpinia peltophoroides*, *Croton urucurana*, *Acacia polyphylla*, *Ficus pohliana* *Tapirira marchandii*, *Carpotroche brasiliensis*, *Myrciaria*, *Galipea jasminioides*, *Croton floribundus*, *Tecoma longiflora*, *Luehea divaricata*, *Anacardium occidentale*, *Cupressus glauca*, *Pyrus communis*, *Salix babylonica*, *Eriobotrya japonica*, *Mangifera indica*, *Eriodendron anfractuosum*, *Delonyx regia*, *Citrus aurantium*, *Grevillea robusta* *Casuarina*, *Eucalyptus*, *Ficus benjamina*, *Persea gratissima* (Andrade, 1928).

Parasites. *Cenocoelius necator* Borgmeier (1931).

References. Araujo, 1937 (Biol.); Andrade, 1927 (Biol.), 1928 (Biol.); Bondar, 1953 (Biol.), 1956 (Biol.); Borgmeier, 1931 (Paras.); Ebening, 1950 (Biol.); Heller, 1904 (L, P fig.); Lane, 1944 (Biol. fig.); Lima, 1930 (Biol.), 1955 (Biol.); Ohaus, 1900 (P, Biol.); Thompson, 1943 (Paras.).

Oncideres (s.g. **Oncideres**) **alicei** Lane

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plant: *Acacia jurema* (Bondar, 1953).

Reference. Bondar, 1953 (Biol.), 1956 (Biol.).

Oncideres (s.g. **Oncideres**) **saga** (Dalman) (=**vomicosa** Germar)

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).

Host plants: *Parkia pendula*, *Piptadenia communis*, *Inga* sp., *Albizia moluccana* (Bondar, 1953); *Nectandra*, *Lonchocarpus*, *Acacia* spp. (Bosq, 1942a); *Schizolobium excelsum* (Andrade, 1928).

References. Andrade, 1928 (Biol.); Bondar, 1915b (Biol.), 1953 (Biol.), 1956 (Biol.); Bosq, 1942a (Biol.); Duncan, 1882 (L fig., P fig., I fig., Biol. fig.); Lima, 1930 (Biol.); Müller, 1886 (Biol.).

Oncideres (s.g. **Oncideres**) **amputator** (Fabricius)

Distribution. NEOTROPICAL REGION: Caribbean (Guadeloupe, Jamaica, St. Vincent).

Host plants: *Citrus* (Anonymous, 1913); *Eucalyptus* (Andrade, 1927).

Biology. Twigs are girdled by the female beetle, the egg being deposited in such a way that it will fall to the ground with the twig in which the resulting larva will feed (Anonymous, 1913).

References. Andrade, 1927 (Biol.); Anonymous, 1913 (Biol.); Bondar, 1909 (Biol.); Duncan, 1882 (Biol.); Guilding, 1851 (Biol.); Lima, 1930 (Biol.).

Oncideres (s.g. **Oncideres**) **candida** Dillon and Dillon

Distribution. NEOTROPICAL REGION: Caribbean (Jamaica).

Host plant: *Eucalyptus* (Department of Agriculture, Jamaica).

Economic importance. Adults have recently been observed to cause damage to *Eucalyptus* in the Red Hills district of St. Andrew, Jamaica. They were observed to gnaw through branches of considerable thickness.

Reference. None available.

Oncideres (s.g. **Oncideres**) **cingulata** (Say)

[The Hickory or Pecan Twig Girdler]

Distribution. NEOTROPICAL REGION: Caribbean (Jamaica). NEARCTIC REGION: U.S.A. (including Texas).

Host plants: *Populus*, *Tilia americana*, *Gleditschia*, *Cornus* (Craighead, 1950); *Terminalia catappa* (Ritchie, 1918); *Citrus*, *Rosa* (Gill, 1917); *Carya*, *Hicoria*, *Prunus*, *Pyrus*, *Ulmus*, *Diospyros virginiana*, *Tilia* (Riley, 1880b). According to Vogt (1949), adults have been observed girdling small branches of *Acacia farnesiana* and *Prosopis juliflora* and similar damage, probably by this species, has been seen on *Pithecolobium flexicaule* and *Acacia berlandieri*.

Biology. According to Riley (1880b) both sexes feed on the host plants, but so far as is known only the female girdles the stems. After girdling a particular stem, the female deposits a number of eggs in the distal portion, each egg usually being inserted just beneath a bud. The stem usually, though not always, breaks off through the force of the winter wind, and the larvae feed upon the dead wood as it lies on the ground, tunnelling just beneath the bark, and, when very numerous, leaving little else than the outer bark. Girdling takes place in the autumn. The young larva hatches and bores a short distance into the twig before winter sets in, continues feeding through spring and summer, and pupates in the autumn.

Parasites. Hymenoptera *Pimpla conquisitor* Say (Cushman, 1920); *Tetrastichus oncideridis* Gahan (Gahan, 1932).

Economic importance. Kislanko (1930) states that sometimes this insect causes severe pruning of pecan limbs, especially in orchards that have been somewhat neglected.

Control. Amputated branches and twigs should be collected and burned (Kislanko, 1930).

References. Chu and Hsia, 1937 (Paras.); Craighead, 1923 (L fig., P, Biol), 1950 (Biol. fig.); Cushman, 1920 (Paras.); Felt, 1906 (Biol.); Gahan, 1932 (Paras.); Gill, 1917 (L fig., P fig., I fig., Biol. fig., Contr.); Haldeman, 1853 (Biol.); Kislanko, 1930 (Contr.); Matheny, 1909 (E, L, P, I, Biol. fig.); Matz, 1918 (Biol. fig., Contr.); Packard, 1881 (Biol. fig.), 1890 (Biol. fig.); Quayle, 1938 (Biol.); Riley, 1880b (L fig., P fig., I fig., Biol. fig.); Ritchie, 1918 (Biol.); Scheffer, 1895 (Biol.); Thompson, 1943 (Paras.); Vogt, 1949 (Biol.).

Oncideres (s.g. **Oncideres**) **miniata** Thomson

[Taladro Podador]

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).

Host plants: *Ilex paraguayensis* (Blanchard, 1928); *Acacia* spp. (Bosq, 1934).

Biology. Before ovipositing, adults of this species girdle the young stems of the host plant, an operation which takes about six hours to perform. Usually only stems not exceeding 2 cm. in diameter are selected for this purpose. Pupation takes place in December or January (Blanchard, 1928).

Control. Fallen branches should be destroyed and all ringed ones pruned off.

References. Blanchard, 1928 (I fig., Biol. fig., Contr.); Bosq, 1942a (Biol.).

Oncideres (s.g. **Lochmaeodes**) **tessellata** Thomson

Distribution. NEOTROPICAL REGION: Mexico, Central America (Costa Rica, Guatemala), Caribbean (Trinidad), South America (Colombia, Venezuela).

Host plant: *Saman saman*, *Inga* sp. (Urich, 1913).

Control. As these beetles amputate the stems in which they deposit their eggs, fallen or hanging stems or branches should always be collected and burned whenever the trees are near a cacao estate (Urich, 1913a).

Reference. Urich, 1913a (Biol., Contr.).

Oncideres (s.g. **Oncideres**) **putator** Thomson

[The Huisache Girdler]

Distribution. NEOTROPICAL REGION: Mexico, Central America (British Honduras, Guatemala, Panama). NEARCTIC REGION: U.S.A. (including Arizona, New Mexico, Texas).

Host plants: *Acacia farnesiana*, *A. berlandieri*, *Prosopis juliflora*, *P. glandulosa*, *Parkinsonia aculeata* and *Mimosa lindheimeri* (High, 1915). *Acacia farnesiana* is the preferred host.

Biology. Small branches are severed by the adults for the purpose of oviposition. Adults emerge from September to November. When there is sufficient moisture to permit constant feeding, larval growth is rapid. The larval period is about forty-two weeks in duration. Before pupation a hole is made in the bark for the emergence of the adult. The pupal stage lasts about four weeks and there is one generation a year (High, 1915).

Parasites. Hymenoptera: *Chryseida inopinota* Br., *Eurytoma* sp., *Chaenophanes* sp., *Meteorus* sp. (High, 1915).

Natural enemies. The birds *Dryobates pubescens* and *D. scalaris bairdi*.

Control. Eggs, larvae and pupae should be destroyed by burning infested branches during the period January to August. Hand collection of beetles can also be employed (High, 1915).

References. High, 1915 (E, L, P, I fig., Paras., Contr.); Thompson, 1943 (Paras.).

Oncideres (s.g. **Oncideres**) **schreiteri** Bruch

Distribution. NEOTROPICAL REGION: South America (Argentina).

Host plant: *Piptadenia macrocarpa* (Bosq, 1942a).

Reference. Bosq, 1942a (Biol.).

Oncideres (s.g. **Lochmaeodes**) **sladeni** Gahan

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil, Paraguay).

Host plant: Leguminosae (Bosq, 1942a).

Reference. Bosq, 1942a (Biol.).

Jamesia globifera (Fabricius)

Distribution. NEOTROPICAL REGION: South America (Brazil, British Guiana, French Guiana).

Host plant: Unknown liana (E.A.J.D.).

Mature larva (fig. 118). Strikingly different from those of *Oncideres* species, particularly in the modification of the head-capsule. *Head* (fig. 118) strongly and entirely ferruginous, with the pale frontal sutures very distinct and angled medially; antennal foramen open posteriorly. Frons smooth, not striate. Hypostoma entirely ferruginous, rectangular, at least half as long as broad; gular region with a pale, median cleavage line; a conspicuous punctulate protuberance present near junction of hypostomal suture with occipital foramen. *Prothorax* with pronotum and prosternum glabrous. *Abdomen* with tubercles of ampullae matt, micro-spiculate. Tergite 9 without a sclerotised process; sternite 9 simple. Anus trilobed. Epipleurum moderately protuberant on all segments. Pleural tubercle with upper sclerotised pit only slightly smaller than lower pit. *Legs* absent. *Spiracles* with peritreme broadly oval, without distinct marginal chambers. Length up to 43 mm. maximum; breadth (at prothorax) 8 mm.

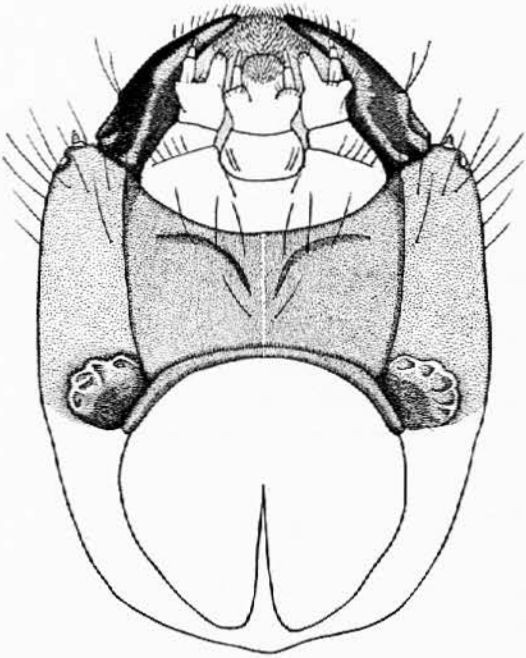


Fig. 118

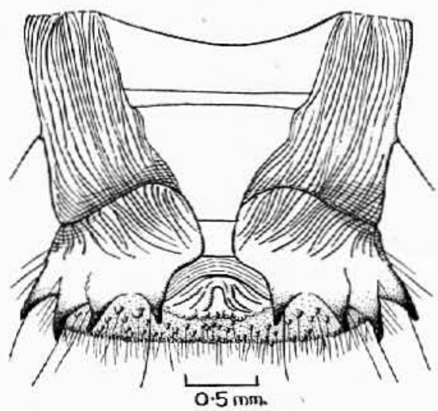


Fig. 119

Fig. 118. *Jamesia globifera* (Fabricius). Mature larva. Head. Ventral aspect.
Fig. 119. *Jamesia globifera* (Fabricius). Pupa. Abdominal sternites 8–10. Ventral aspect.

Pupa (fig. 119). Very similar to that of *Oncideres fasciata* Lucas, but differing as follows. *Legs* with tibiae and tarsi glabrous. *Abdomen* with segment 9 without a median dorsal cleft; similarly spinose but in addition bearing six to eight much larger spines (fig. 119). Length up to 21 mm.; maximum breadth 7 mm.

Material studied. 5 L, 1 P, 1 I, British Guiana, Bartica-Potaro Road, m. 24, 11.iv. 1957, from unknown liana, E.A.J.D. leg., in coll. B.M.

References. None available.

Ecthoea quadricornis (Olivier)

[Serrador de Cacao]

Distribution. NEOTROPICAL REGION: Central America (Costa Rica, Panama), South America (Brazil, French Guiana, Peru, Surinam).

Host plants: *Coffea* (Vayssière, 1935); *Theobroma* (G. Bondar).

Mature larva. Rather similar to those of *Oncideres* species, but as the frons is not longitudinally striate it was difficult to fit this species into the appropriate place in the key; instead it has been eliminated at the end of the key to the LAMIINAE. From larvae of *Oncideres* species it differs as follows. *Head* with front margin of frons smooth, non-striate. Six epistomal setae present. Ocellus with pigmented spot black, very distinct. *Prothorax* with pronotum milky white, strongly contrasting with the anterior, pale testaceous area; prosternum with presternum and eusternum bearing long reddish setae. *Abdomen* with pleural tubercles without sclerotised pits. Length up to 21 mm.; maximum breadth (at prothorax) 5 mm.

Economic importance. Young stems of *Theobroma* and *Coffea* are sometimes extensively girdled by adults of this species.

Material studied. 2 L, 2 I, Brazil, Para, Cameta, iii.1958, G. Bondar leg., in coll. B.M.

Reference. Vayssière, 1935 (I fig., Biol. fig.).

Hypsioma gibbera Serville

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plants: *Enterolobium maximum*, *Machaerium acutifolium* (Acácio Costa Jr.).

Mature larva (fig. 120). Similar to that of *Oncideres fasciata* Lucas, but differing as follows. *Head* (fig. 120) with only six longitudinal carinae across frons; carinae widely spaced, broad and convex in cross-section. *Abdomen* with dorsal ampullae each with only three transverse rows of moniliform tubercles, the anterior row usually incomplete. Pleural tubercles each with a pair of very distinct sclerotised pits. Length up to 38 mm.; maximum breadth (at prothorax) 8·5 mm.

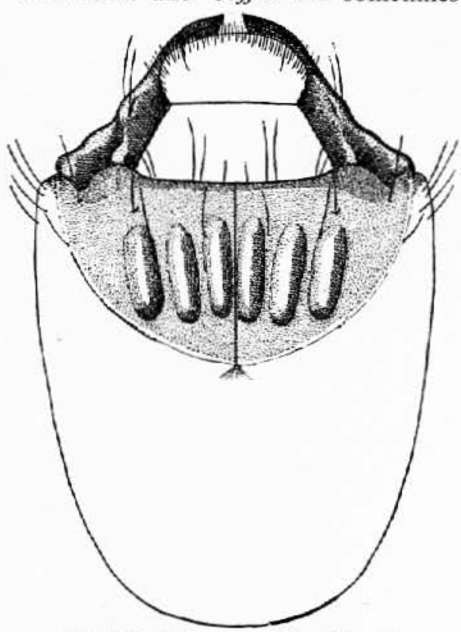


Fig. 120. *Hypsioma gibbera* Serville. Mature larva. Head. Dorsal aspect.

Material studied. 9 L, 2 I, Brazil, Belo Horizonte, ix.1958, Acácio Costa Jr. leg., in coll. B.M.

Reference. None available.

Hypsioma fasciata Thomson

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).

Host plants: *Acacia decurrens molissima* (Lima, 1955); *Acacia polyphylla* (Andrade, 1928).

Reference. Andrade, 1927 (Biol.), 1928 (Biol.); Lima, 1930 (Biol.), 1955 (Biol.).

Hypsioma basalis Thomson

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plant: *Dalbergia nigra* (Zikán and Zikán, 1946).

Reference. Zikán and Zikán, 1946 (Biol.).

Clytemnestra albisparsa (Germar) (=**bonariensis** Thomson)

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil, Paraguay, Uruguay).

Host plant: *Acacia* (Bosq, 1942a).

Biology. Adults cause the same kind of damage as is done by *Oncideres* species.

Reference. Bosq, 1942a (Biol.).

Hypselomus cristatus Perty

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plant: ?*Ipomoea batatas* (Townsend, 1922).

Economic importance. Townsend (1922) records that a certain lamiid has become a serious pest of the sweet potato. It is probably *Hypselomus cristatus* Perty.

Control. Infested tubers should be given to pigs or otherwise destroyed. Tubers should be planted deeply and the shoots banked up with earth. Crop rotation should be practised and slips for planting must be cut off some distance above ground-level (Townsend, 1922).

Reference. Townsend, 1922 (Biol., Contr.).

Merocentrum melzeri (Bondar)

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plant: *Coccoloba ilheense* (Bondar, 1938).

References. Bondar, 1938a (Biol. fig.); Lane, 1939 (Biol.); Lima, 1955 (Biol.).

Psyllotoxus griseocinctus Thomson

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plant: *Psidium guajava* (Zikán and Zikán, 1946).

Reference. Zikán and Zikán, 1946 (Biol.).

Trachysomus fragifer (Kirby)

Distribution. NEOTROPICAL REGION: Mexico, South America (Brazil, French Guiana).

Host plant: *Patagonula americana* (Andrade, 1928).

References. Andrade, 1928 (Biol.); Lima, 1930 (Biol.), 1955 (Biol.); Zikán and Zikán, 1946 (Biol.).

Pogonocherini

Lypsimena fuscata Le Conte (=**Allocoscelis leptis** Bates)

Distribution. NEOTROPICAL REGION: Central America (Panama), Caribbean (Cuba), South America (Argentina, Brazil, Paraguay, Venezuela). NEARCTIC REGION: U.S.A. (New York).

Host plant: *Manihot aipi* (Bosq, 1942a).

Mature larva. No material available. For tribal characters, see Duffy, 1953a.

Reference. Bosq, 1942a (Biol.).

Anisocerini

Onychocerus crassus (Voet) (=**scorpio** (Fabricius))

Distribution. NEOTROPICAL REGION: Caribbean (Grenada, Trinidad), South America (Brazil, British Guiana, French Guiana, Venezuela).

Host plants: *Piptadenia colubrina* (Andrade, 1928); *Spondias mombin*, *Hura crepitans* (E.A.J.D.).

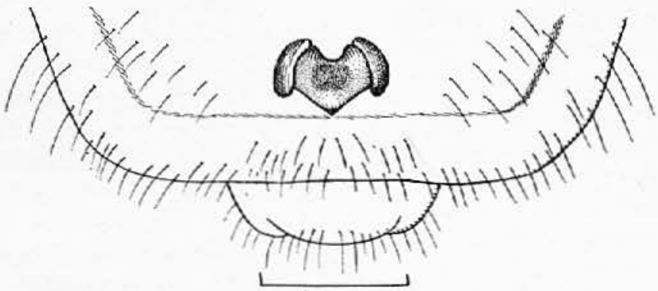


Fig. 121. *Onychocerus crassus* (Voet). Mature larva. Abdominal tergites 9 and 10.

Mature larva (fig. 121). Form moderately robust, elongate, subcylindrical. *Head* moderately depressed, elongate, with sides feebly constricted medially; frontal sutures rather indistinct; antennal foramen open posteriorly; mouthframe broadly and strongly sclerotised, ferruginous. Frons smooth, ferruginous anteriorly, with eight setiferous pores; six epistomal setae present. One pair of distinct ocelli present; lens round, strongly convex; pigmented spot indiscernible. Antenna 3-segmented; segment 3 at least as long as broad. Hypostoma entirely ferruginous, with a very broad, rather deep, transverse impression; posterior margin strongly and broadly labiate; sutures straight, pitchy, slightly converging posteriorly; gular region with a thin, pale, median cleavage line, on each side of which are several setiferous pores. Clypeus bearing several lateral setae. Labrum suborbicular, densely fringed anteriorly with stout golden setae. Maxilla with palp 3-segmented; segment 3 about half length of segment 2; labial palpi with segment 2 about one-third length of segment 1. *Prothorax* with pronotum micro-pubescent posteriorly; prosternum with eusternum and sternellum shining, sparsely setose. *Abdomen* with dorsal and ventral ampullae each with a single transverse furrow and numerous moniliform tubercles which are irregularly arranged and micro-spiculate. Tergite 9 bearing a large, transverse, concave, sclerotised process (fig. 121). Anus trilobed, sparsely setose. Epipleurum moderately protuberant on all segments; segment 7 not broader than segment 6. Pleural tubercles each with a pair of sclerotised pits. *Legs* absent. *Spiracles* with peritreme broadly oval, moderately thick, ferruginous and without marginal chambers. Length up to 40 mm.; maximum breadth (at prothorax) 8·2 mm.

Pupa (fig. 122). *Head* with vertex visible from above, and bearing several stout spines (each with a basal seta); front, clypeus and labrum with short stout spines (each with a basal seta) as figured; clypeus with a deep median fovea at base. Antennae very robust, extending as far as abdominal segment 3, where they are recurved ventrally to terminate between hind tibiae and hind tarsi. Eyes plane, glabrous. Mandibles each with a pair of short spines (each with a basal seta) near middle of outer face. *Pronotum* with sides bearing a pair of stout, rounded, setose tubercles; disc with a large pair of paramedian conical tubercles. *Mesonotum* and *metanotum* each with a series of spines arranged in a "V". Scutellar groove shallow. Elytra and wings extending as far as abdominal segment 3, the former with a sub-basal tubercle. *Abdomen* with tergites 1–6 bearing numerous straight spines (each with a basal seta) arranged more or less in two transverse rows; tergites 7 and 8 with stouter, incurved spines; segment 9 retracted in segment 8. Sternites glabrous. Pleura strongly strigose and bearing stout spines. *Legs* extremely robust, with a transverse subapical row of spines on femora; tibiae and tarsi glabrous. *Functional spiracles* present on segments 1–6; peritreme rather narrowly oval, moderately thick; marginal chambers absent. Length up to 22 mm.; maximum breadth 9·3 mm.

Fig. 122. *Onychocerus crassus* (Voet). Pupa. Ventral aspect.

Biology. The larval galleries are subcortical, the pupal cell being in the outer sapwood (Pl. V, fig. 1).

Material studied. 5 L, 1 P, 2 I, Trinidad, Arima District, 12.vi.1957, from *Hura crepitans*, E.A.J.D. leg., in coll. B.M.; 3 L, 1 P, Trinidad, Tabaquite District, Brickfields, 7.vi.1957, from *Spondias mombin*, E.A.J.D. and F. Peña leg., in coll. B.M.; 4 L, 2 P, Trinidad, Catshill, vii. from *Spondias mombin*, F. Peña leg., in coll. B.M.

References. Andrade, 1928 (Biol.); Lima, 1930 (Biol.), 1955 (Biol.).

Anisocerus scopifer (Germar)

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).

Host plants: *Ficus pohliana* (Andrade, 1928); *Cocos, Diplothemium* (Bondar, 1940).

Economic importance. This species is of no economic importance, as it attacks only palms which have been killed by other causes.

References. Andrade, 1928 (Biol.); Bondar, 1940 (Biol. fig.); Lepesme, 1947 (Biol.); Lima, 1930 (Biol.), 1955 (Biol.).

Polyraphidini

Polyraphis spinosa (Drury)

Distribution. NEOTROPICAL REGION: Caribbean (Trinidad), South America (Brazil, British Guiana, French Guiana).

Host plants: *Cassia pteridophylla*, *Mora excelsa*, *Eperua* sp., *Inga* sp. (E.A.J.D.). *Mora* is the preferred host.

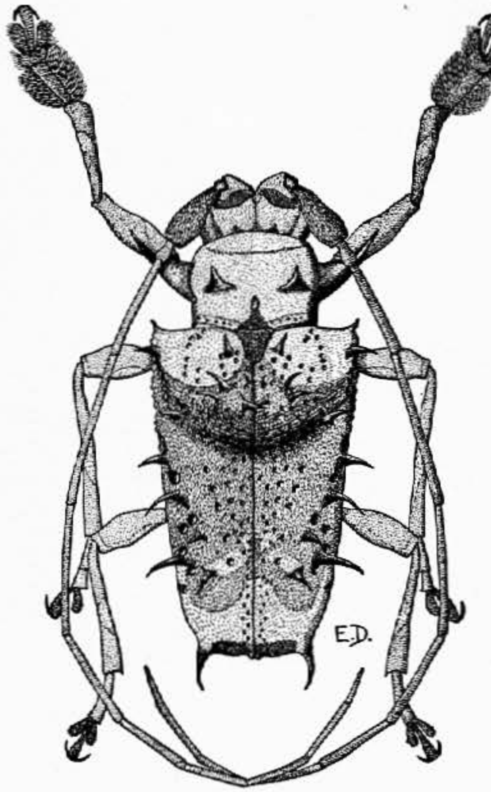


Fig. 123. *Polyraphis spinosa* (Drury). Adult.

Adult (fig. 123). Length 16–30 mm. Head, prothorax and apical fourth of elytra ashy grey, the remainder of elytra violet-brown. *Head* with antennae filiform, not fringed with hairs, more than twice as long as body in male, only slightly longer than body in female. *Prothorax* bearing a pair of very long anteriorly curved lateral spine-like tubercles. *Elytra* bearing several spines as follows. A row of small spines placed close to suture but deficient near base and apex; three large spines on the centro-basal ridges, two on the shoulders and five or six very long spines on the disc.

Mature larva (figs. 124–125). *Head* moderately depressed, with sides feebly constricted at middle; frontal sutures pale but distinct; antennal foramen open posteriorly; mouthframe broadly and moderately strongly sclerotised; six epistomal setae present. Mandible slender, at least twice as long as basal width. One pair of ocelli present; lens round, convex; pigmented spot indistinct. Hypostoma entirely ferruginous, with about

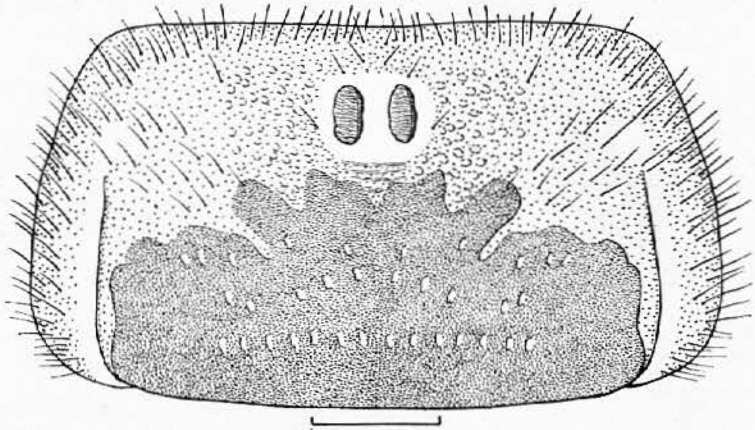


Fig. 124

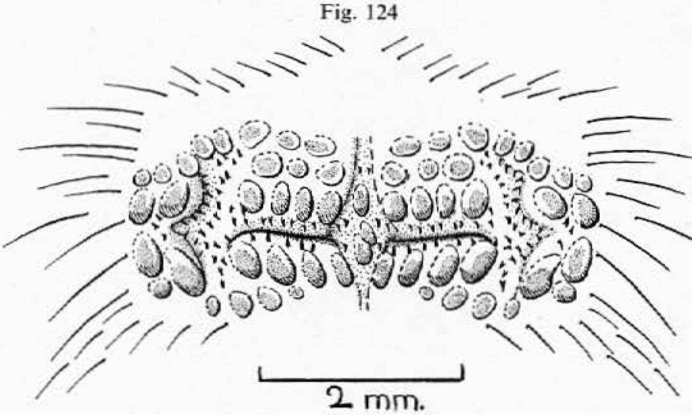


Fig. 125

Figs. 124–125. *Polyraphis spinosa* (Drury.) Mature larva. Fig. 124. Pronotum. Fig. 125. Ampulla of abdominal tergite 6.

six deep setal pores on each side of gula; sutures straight, converging posteriorly. Gula with a pale median cleavage line. Antenna 3-segmented; segment 3 minute but distinctly longer than broad and longer than hyaline supplementary process. Clypeus glabrous. Labrum transversely oval, densely setose anteriorly. Maxilla with segment 3 of palp as long as segment 2; segment 2 of labial palpi much shorter than segment 1. Mentum distinct from submentum. *Prothorax* with pronotum with a pale, glabrous, median circular area anteriorly, on which is a pair of darker, parallel, elongate-oval areas (fig. 124); posterior area ferruginous, densely micro-spiculate; eusternum smooth, glabrous, shining; sternellum matt, micro-spiculate. *Abdomen* (fig. 125) with dorsal ampullae each with a single transverse furrow and three complete and one or two incomplete rows of moniliform, micro-spiculate tubercles; lateral furrows lined with spinules. Tergite 9 without a sclerotised process. Anus trilobed, sparsely setose. Epipleurum moderately protuberant on all segments. Pleural tubercle with a pair of sclerotised pits. *Legs* absent. *Spiracles* with peritreme broadly oval, without marginal chambers. Length up to 48 mm.; maximum breadth (at prothorax) 10·5 mm.

The larval structure of this species suggests that the Polyraphidini may be more closely related to the Acanthoderini than to the Acanthocinini.

Pupa (fig. 126 and Pl. XI, fig. 2). Similar to that of *P. grandini* Buquet, but distinguishable by the more strongly protuberant tubercles on disc of pronotum and the presence of paired spines on abdominal tergite 9. Length up to 31 mm.; maximum breadth 12 mm.

Biology. The larval galleries and pupal cells are subcortical, the latter being in the form of a large, oval, nest-like structure consisting of interlaced wood fibres (Pl. XI, fig. 2).

Material studied. 2 L, 1 I, British Guiana, Bartica District, Skull Point, 10.iv.1957, from *Mora excelsa*, E.A.J.D. leg., in coll. B.M.; 4 L, 2 I, British Guiana, Bartica-Potaro Road, m. 8, 30.iii.1957, from *Cassia pteridophylla*, E.A.J.D. leg., in coll B.M.; 2 L, Trinidad, Tabaquite District, Brickfields, 11.vi.1957, from *Inga* sp., E.A.J.D. leg., in coll. B.M.; 4 L, 1 I, British Guiana, Bartica-Potaro Road, m. 6, from *Eperua* sp., E.A.J.D. leg., in coll. B.M.

Reference. Goedart, 1662 (L fig., P fig., I fig.).

Polyraphis grandini Buquet

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plants: *Eugenia* sp. (Lima, 1922); *Ficus pohliana* (Andrade, 1928); *Urostigma enorme* (Andrade, 1927); *Psidium guajava*, *Myrica jaboticaba* (Bondar, 1912, 1913).

Mature larva. Similar to that of *P. spinosa* Drury, but with posterior area of pronotum coarsely asperate and abdominal ampullae without spinules along lateral furrows. Length up to 30 mm.; maximum breadth 9·5 mm.

Pupa. *Head* with vertex visible from above; bearing several spines as figured. Antennae extending as far as abdominal segment 4, where they are strongly recurved ventrally and directed anteriorly. *Pronotum* with a pair of lateral tubercles, which are very strongly attenuated and slightly curved anteriorly; disc with a few scattered spinules (each with a basal seta). *Mesonotum* and *metanotum* each bearing a pair of oblique rows of spinules arranged more or less in a "V". Scutellar groove feebly impressed. Elytra glabrous; elytra and wings extending as far as abdominal segment 4. *Abdomen* with tergites 1–6 with numerous short straight spines (each with a basal seta). Tergite 7 with numerous inwardly curved spines, which become stouter towards posterior margin. Tergite 8 with a row of spines, the four middle ones much stouter, strongly curved and pointing inwards. Tergite 9 very short, glabrous. Sternites each with a group of fine sublateral setae. Pleura rather strongly protuberant, bearing several spines. *Legs* with apices of femora bearing a row of fine setae; mid and hind femora with sub-basal tubercle short, dentate; hind femora extending to abdominal segment 4; all tibiae more or less at right angles to longitudinal axis of body. *Functional* *spiracles* present on abdominal segments 1–6, the pair on segment 7 being closed and probably non-functional; peritreme very thin, narrowly oval and attenuated ventrally; marginal chambers present on posterior half. Length up to 21 mm.; maximum breadth 8·75 mm.

Biology. The trunks of certain trees are seriously damaged by larvae of this species, which at first excavate irregular, subcortical, zigzag galleries, later penetrating the heartwood. It is usually the base of the trunk which is infested. Pupation takes place between December and February and adults emerge during February and March (Bondar, 1913c).

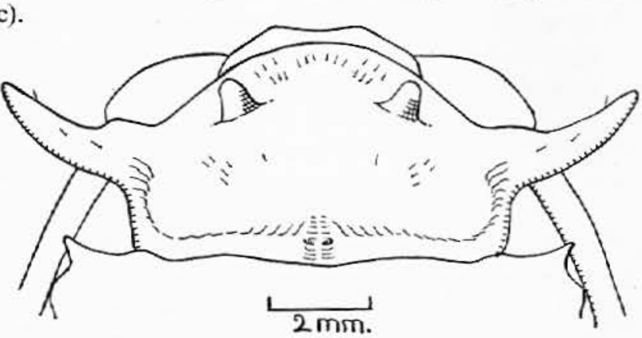


Fig. 126. *Polyraphis spinosa* (Drury). Pupa. Pronotum.

Control. Bondar (1913c) recommends the extraction of young larvae with a piece of wire during the months of April, May and June. As a preventive measure, the tree-trunks should be painted at the end of January with the following mixture: crude carbolineum 100 gms.; lime 1 kilo; water 4 litres.

Material studied. 2 L, 4 P, Brazil, São Paulo, Campinas, 1912, from *Psidium*, G. Bondar leg., in coll. D.Z.S.P.

References. Andrade, 1927 (Biol.), 1928 (Biol.); Bondar, 1912 (?), 1913 (L fig., P fig., I fig., Biol. fig., Contr.); Lima, 1922 (Biol.), 1928 (Biol.), 1930 (Biol.), 1955 (Biol.); Moreira, 1921b (Biol.); Zikán and Zikán, 1946 (Biol.).

Polyraphis spinipennis Laporte

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plants: *Ficus pohliana* (Andrade, 1928); *Psidium guajava*, *Myrcia jaboticaba* (Bondar, 1912, 1913).

References. Andrade, 1928 (Biol.); Bondar, 1912 (Biol.); Lima, 1930 (Biol.), 1955 (Biol.); Novaes, 1927 (Biol.).

Polyraphis angustata Buquet

Distribution. NEOTROPICAL REGION: Central America (Nicaragua), South America (Brazil, British Guiana, Ecuador, French Guiana).

Host plant: Unknown liana.

Mature larva Similar to that of *P. spinosa* (Drury), but without the characteristic design on pronotum and with abdominal ampullae shining and glabrous. Length up to 30 mm.; maximum breadth (at prothorax) 5·1 mm.

Material studied. 1 L, 2 I, British Guiana, Bartica-Potaro Road, m. 24, 13.iv.1957, from unknown climber, E.A.J.D. leg., in coll. B.M.

Reference. None available.

Acanthoderini

Larval Characters

Head slightly to moderately depressed. Mandible with a longitudinal impression on apical third of outer face. Antenna 2- or 3-segmented. Prothorax with pronotum micro-asperate or glabrous. *Abdomen* with dorsal ampullae each with three or four transverse rows of large, glabrous, moniliform tubercles. Segments 7–9 distinctly broader than segment 6. Tergite 9 sometimes with a sclerotised process. Pleural tubercles each with a pair of sclerotised pits.

Larvae of the genus *Acanthoderes* do not conform to the tribal characters possessed by known larvae of the remaining genera (i.e. *Steirastoma*, *Hedypathes*, *Dryoctenes*, *Aegomorphus* and *Oreodera*). In the first place the antenna is only 2-segmented; in addition, the tubercles of the dorsal ampullae are arranged in only three rows. In all other respects *Acanthoderes* conforms perhaps more closely to the Acanthoderini than to the Acanthocinini (mainly on account of the glabrous pronotum and prosternum), although it undoubtedly constitutes a connecting link between both tribes. *Oreodera* appears to be really more characteristic of the Acanthocinini and could easily be classed as such in view of the carinate temples, the micro-spiculate pronotum, the 2-segmented antenna and the unevenly arranged tubercles of the abdominal ampullae.

As in the case of the Acanthocinini, larvae of this tribe are remarkably diverse. The pronotum may be micro-asperate or glabrous, the antenna 2- or 3-segmented, six to twelve or more epistomal setae may be present, and the ninth abdominal segment may sometimes bear a sclerotised process. All known larvae of this tribe, however, possess three rows of large moniliform, glabrous tubercles on each abdominal ampulla.

Acanthoderes lateralis Bates

Distribution. NEOTROPICAL REGION: South America (Brazil, British Guiana, French Guiana).

Host plant: *Alchorneopsis floribunda* (E.A.J.D.).

Mature larva (fig. 127). Form elongate, moderately slender, subcylindrical. *Head* slightly depressed and feebly constricted behind middle. Frons rather broadly and darkly ferruginous; frontal sutures indistinct; antennal foramen open posteriorly; six epistomal setae present. Mandible slender, about twice as long as basal width, and with a longitudinally impressed pore on apical third of outer face. One pair of ocelli present; lens round, strongly convex; pigmented spot indistinct. Hypostoma flat, entirely pale ferruginous, with a pair of setal pores on each side of gula; sutures straight, pitchy, converging posteriorly. Gula with a pale median cleavage line. Antenna 2-segmented; segment 2 bearing a conical hyaline process. Clypeus glabrous. Labrum strongly transversely oval, densely fringed with coarse bristly setae. Maxilla with segment 3 of palp shorter than segment 2. Labial palpi with segment 2 shorter than segment 1. *Prothorax* with posterior half of pronotum rugose, glabrous, shining and subtuberculate. Eusternum and sternellum with numerous flat embossed, glabrous tubercles (fig. 127). *Abdomen* with each dorsal ampulla with two transverse impressions and three rows of glabrous moniliform tubercles; ventral ampullae each with a single transverse impression and two rows of moniliform tubercles. Tergite 9 without a sclerotised process. Anus trilobed, sparsely setose. Epipleurum very strongly protuberant on segments 7–9, these segments distinctly broader than segment 6. Pleural tubercles each with a pair of sclerotised pits. *Spiracles* with peritreme broadly oval, thin, pale ferruginous. Length up to 37 mm.; maximum breadth (at prothorax) 7 mm.

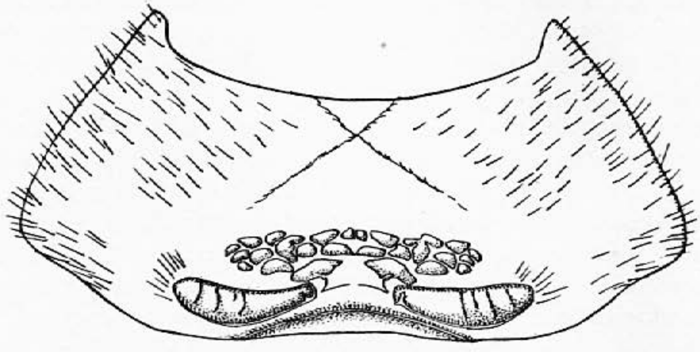


Fig. 127. *Acanthoderes lateralis* Bates. Mature larva. Prosternum.

Material studied. 3 L, 1 I, British Guiana, Bartica District, Caow Creek, 18.iv.1957, from *Alchorneopsis floribunda*, E.A.J.D. leg., in coll. B.M.

Reference. None available.

Acanthoderes daviesi (Swederus)

Distribution. NEOTROPICAL REGION: Central America (British Honduras), South America (Brazil, British Guiana, French Guiana).

Host plant: *Clusia grandiflora* (E.A.J.D.).

Mature larva. Similar to that of *A. lateralis* Bates from which it differs in having at least twelve epistomal setae and a non-tuberculate proeusternum and sternellum. Length up to 40 mm.; maximum breadth (at prothorax) 8 mm.

Biology. The larva excavates a simple linear gallery in the stem of a common liana. Adults emerge in April.

Material studied. 2 L, 1 I, British Guiana, Bartica District, Skull Point, 19.iv.1957, from *Clusia grandiflora*, E.A.J.D. leg., in coll. B.M.

Reference. None available.

Acanthoderes quadrigibba Say

Distribution. NEOTROPICAL REGION: Mexico, Central America (British Honduras, Costa Rica, Panama, Caribbean (Trinidad), South America (Venezuela). NEARCTIC REGION: U.S.A. (including Arizona, Indiana, Louisiana, Massachusetts, New Jersey, New York, North Carolina, Ohio, Pennsylvania). AUSTRALASIAN REGION: Marquesas.

Host plants: *Cedrela mexicana* (E.A.J.D.); *Quercus*, *Castanea*, *Betula*, *Fagus*, *Tilia*, *Acer* (Craighead, 1923).

Mature larva. Very similar to that of *A. daviesi* (Swederus) from which it differs in having only six epistomal setae and a ferruginous mouthframe.

Biology. This species is unusual in that the larval galleries are excavated in the bark, consequently when the bark is removed there is no indication of damage until the inner skin layers are peeled off, when short, shallow, meandering galleries, which are loosely packed with stringy dark brown frass, are exposed. When the larva is full grown it bores into the outer sapwood, where it excavates a short, broad pupal cell. This cell is so neatly plugged at the surface of the sapwood that it is practically undetectable. Thus there may be extensive damage to the bark and outer sapwood without there being any obvious signs of this when the bark is first removed. The pupal cell is shown on Pl. VI, fig. 1.

Economic importance. Extensive damage by this species was recently seen by the author when in Trinidad. In one district many dozens of logs at several sawmills were found to be heavily infested.

Material studied. 8 L, 3 I (reared), Trinidad, Tabaquite District, Brickfields, from *Cedrela mexicana*, 4.vi.1957, E.A.J.D. leg., in coll. B.M.

Reference. Craighead, 1923 (L, Biol.), 1950 (L, Biol.).

Acanthoderes (s.g. **Psapharochrus) jaspidea** (Germar)

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil, Paraguay, Uruguay).

Host plants: *Persea gratissima* (Lima, 1955); *Tabebuia cossinoides*, *Croton piptocalyx*, *Enterolobium timbouva*, ?*Peltophorum vogelianum* (Andrade, 1928); *Dalbergia nigra* (Zikán and Zikán, 1946); *Populus*, *Salix* (Bosq, 1934); *Ficus* (Bosq, 1942a).

References. Andrade, 1927 (Biol.), 1928 (Biol.); Bosq, 1934 (Biol.), 1942a (Biol.); Lima, 1922 (Biol.), 1928 (Biol.), 1930 (Biol.), 1955 (Biol.); Quale, 1938 (Biol.); Zikán and Zikán, 1946 (Biol.).

Acanthoderes (s.g. **Psapharochrus) nigricans** Lameere

Distribution. NEOTROPICAL REGION: South America (Brazil, Venezuela).

Host plant: *Cecropia* sp. (Andrade, 1928).

References. Andrade, 1928 (Biol.); Lima, 1928 (Biol.), 1930 (Biol.), 1955 (Biol.).

Acanthoderes (s.g. **Psapharochrus) borrei** Dugès

Distribution. NEOTROPICAL REGION: Mexico.

Host plant: *Ipomoea murocoides* (Dugès, 1885b).

Biology. Larvae pupate in the dead stems of the host plant, first constructing a cocoon composed of fragments of woody tissue cemented together with a resinous substance present in the stems. All three stages have been collected during the month of January (Dugès, 1885b).

Reference. Dugès, 1885b (L fig., P fig., I fig., Biol.).

Steirastoma breve (Sulzer) (=**depressum** (Fabricius)

[The Cacao Beetle, Aserrador de Cacao or Congoroche]

Distribution. NEOTROPICAL REGION: Caribbean (Grenada, Guadeloupe, Jamaica, Martinique, Puerto Rico, St. Lucia, Trinidad), South America (Argentina, Bolivia, Brazil, British Guiana, Colombia, French Guiana, Peru, Surinam, Venezuela). NEARCTIC REGION: U.S.A. (Florida).

Host plants: *Eriodendron anfranctuosum*, *Hibiscus esculentus* (Guppy, 1911); *Malachra alceifolia* (Myers, 1932); *Chorisia insignis* (Bosq, 1942a); *Chorisia speciosa*,

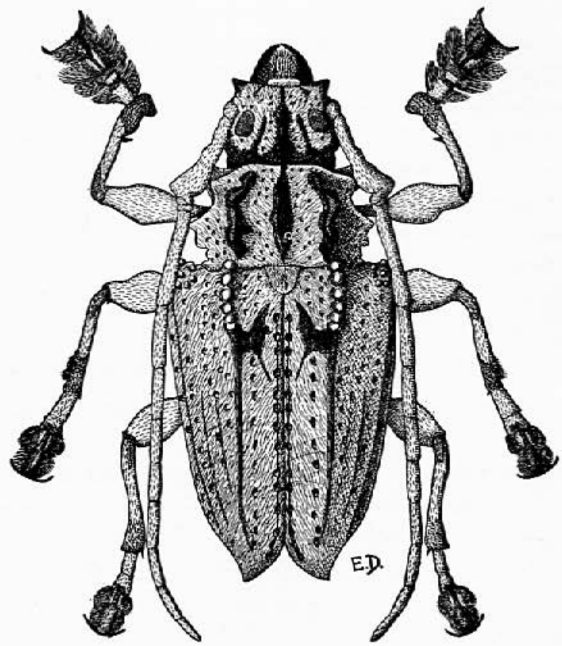


Fig. 128. *Steirastoma breve* (Sulzer). Adult.

Pachira aquatica (Moreira, 1929, Andrade, 1928); *Bombax monguba* (Lima, 1955); *Salix* (F. Monrós); *Theobroma* (Rojas, 1857); *Ceiba pentandra* var. *caribaea*, *Bombax ceiba* (Hall, 1932); *Sterculia caribaea*, *Couroupito guianensis* (Carr, 1894); *Eucalyptus*, *Wistaria* (Wille, 1925); *Cocos nucifera* (Craighead, 1923); *Pachira insignis*, *Hibiscus tiliaceus* (Myers, 1935); *Erythrina umbrosa*, *E. velutina* (Barrett, 1907). *Pachira* and *Theobroma* are the preferred hosts.

Adult (fig. 128). Length 12–30 mm. *Head* black, clothed with greyish pubescence and with three raised ridges, the median one linear, the sublateral pair curved. Antennae about one and one-half times as long as body in male, only slightly longer than body in female; basal segment in male strongly enlarged apically. *Prothorax* bearing five pairs of short, blunt, lateral tubercles; disc with three irregular longitudinal carinae. Elytra sparsely covered with greyish pubescence streaked and spotted with black; centro-basal carinae granulate and strongly curved, but continued posteriorly in the form of a pair of parallel carinae; apices of elytra produced into a stout spine. *Legs* with front tarsi, in male, strongly enlarged.

Mature larva (figs. 129–130). Rather similar to that of *Dryoctenes scrupulosus*. *Head* moderately depressed, with sides strongly rounded and slightly converging posteriorly. Mouthframe strongly sclerotised, pitchy; genae strongly shouldered and protuberant. One pair of ocelli present; lens oval, protuberant; pigmented spot indistinct owing to strong sclerotisation of lens. Clypeus glabrous. Labrum transversely oval, fringed anteriorly with coarse golden setae. Mandible with a distinct

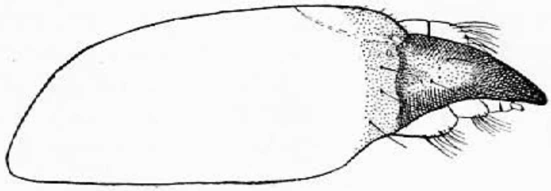


Fig. 129. *Steirastoma breve* (Sulzer). Mature Larva. Head. Lateral aspect.

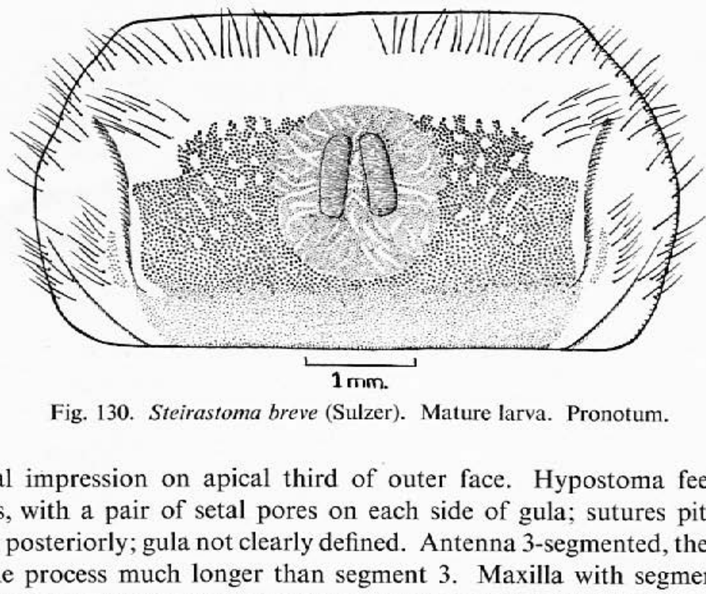


Fig. 130. *Steirastoma breve* (Sulzer). Mature larva. Pronotum.

longitudinal impression on apical third of outer face. Hypostoma feebly convex, ferruginous, with a pair of setal pores on each side of gula; sutures pitchy, slightly converging posteriorly; gula not clearly defined. Antenna 3-segmented, the supplementary hyaline process much longer than segment 3. Maxilla with segment 3 of palp about half length of segment 2; segment 2 of labial palp about half length of segment 1. *Prothorax* (fig. 130) with pronotum densely covered with rather small ferruginous asperities; medially with a circular, pale, embossed area on which is a pair of parallel, elongate-oval, darker areas. Pro-presternum non-asperate sublaterally. *Abdomen* with each dorsal ampullae with two transverse furrows and four rows of moniliform, micro-spiculate tubercles. Tergite 9 without a sclerotised process. Epipleurum strongly protuberant on segments 7–9. Pleural tubercles each with a pair of distinct sclerotised pits. Anus trilobed. *Legs* absent. *Spiracles* with peritreme broadly oval, rather thick and without marginal chambers. Length up to 49 mm.; maximum breadth (at prothorax) 9 mm.

Egg. Form elongate-oval, one pole slightly thickened. Chorion soft, membranous, shining, semitranslucent, pale yellow. Length 1·75–2 mm.; breadth 0·75 mm. (Guppy, 1911).

Biology. Eggs are deposited singly, mainly around the fork or collar of the host plant, each egg having been inserted in a slit-like pit prepared by the female with its mandibles. Sickly or damaged trees are preferred and, in the case of cacao, young trees. In old trees with rough gnarled bark these pits are not easily seen, but in young trees and in *Pachira* they are readily visible. The incubation period is four to five days. The duration of the larval stage varies considerably, being regulated by the quantity and nature of the wood available, but under favourable conditions it is approximately two months. The larva often tunnels beneath the bark in a downward spiral direction, and to trees of from two to eight years old this ringing is often fatal. As the larva tunnels along, the gallery is closely packed behind it with wood particles, the frass being ejected through a small hole in the bark which is soon closed by the gummy exudation to which the frass may adhere. Indications of the activity of this species are (1) the presence of frass adhering to the bark accompanied by the exudation of gummy sap, and (2) the disfigurement of boles and branches in the form of small chafed or scarred areas caused by the mandibles of the beetles in feeding.

The pupa lies at the end of the larval tunnel, with its head facing the exit hole which is plugged with wood fibres. This stage is about twelve days in duration.

Copulation usually takes place about midday. Before genital contact is effected, the male first seizes the female with his front legs, clasping her round the shoulders with his claws, the middle and hind legs gripping the branch. Pairs readily separate at the slightest alarm, and the male frequently takes advantage of the female when she is feeding. When preparing a pit for oviposition, the beetle first clasps the bark with its claws and gnaws into it as deeply as its mandibles will permit. It then moves forward, and with its ovipositor explores and probes the pit in all directions until a satisfactory site is found to receive the egg. The beetle then turns round and closes the aperture by tearing fragments of bark from around the opening and wedging this material into the entrance, which is usually sealed by the flow of gummy sap. Oviposition is usually performed about midday or early afternoon. During the wet season captive adults each laid only one or two eggs in twenty-four hours, but in the dry season for the same period as many as eight eggs were deposited. Although egg-laying does not start until copulation has been performed several times, fertile eggs may be produced for many days after the removal of the male.

The average duration of the adult stage is probably about three months, and there may be three or four generations a year, although as oviposition occurs chiefly in the dry season, there are two main broods annually. Adults eat the bark of young twigs of *Theobroma*, *Pachira aquatica*, *Ceiba*, *Malachra* and *Hibiscus*. As they usually frequent only trees growing in sunny positions, ground shading affords considerable protection to young trees (Guppy, 1911, Urich, 1925).

According to Pickles (1945), recently pruned trees are particularly susceptible to attack. Breeding occurs throughout the year, but there is a pronounced increase of population in the dry season.

As regards damage to the cocoa pod itself, Rojas (1857) states that adults are readily attracted to the juice of ripe pods on which they feed. Hart (1908) records the case of larvae of *S. breve* (Sulzer) feeding upon the sweet pulp of the interior of a cocoa pod. He noted that the larvae, after destroying the pulp, attacked the seeds, which had begun sprouting, and devoured more than 75 per cent of the number in the pod. An adult later emerged.

In a recent paper by Fennah (1954) important information is given concerning (1) the effect of light intensity on the infestation of cacao by this beetle in Trinidad, and (2) the digestion of carbohydrates by adults and larvae. It was found that the number of trees that had been bored by larvae in three cacao clones grown under varying light intensities showed a highly significant increase with increasing light intensity. Under the prevailing degree of larval infestation, no significant differences were established between the clones used or between the manurial treatment given. The numbers of larval galleries was significantly higher in creviced or cut bark than in smooth level bark, but branches too small to accommodate larvae appear to be avoided by ovipositing females. Earlier investigators have shown that the adults prefer exposed trees to shaded ones, and it is assumed that the higher prevalence of galleries in unshaded cacao is due to preferential oviposition on unshaded trees and possibly enhanced larval survival. It is concluded that the population increases most rapidly under conditions directly associated with increased isolation.

Adults of this species feed on the epidermis and chlorophyllous tissues of young but already hardened branches and the larvae feed on the vascular and parenchymatous tissues and also ingest cambial and, sometimes, woody tissue. One of the effects of increased isolation of the trees is an increased carbohydrate content. The ability of adults and larvae to digest carbohydrates was accordingly investigated, with the following results. The pH concentration of the fore part of the alimentary canal of both stages varied from 5·5 to 6·8, and its acidity is assumed to be due largely to organic acids produced by micro-organisms. The results of tests of the action of extracts from the digestive tracts of larvae and adults on various carbohydrate substrates indicated the presence of β-fructosidase (sucrase), α-glucosidase, β-glucosidase, β-galactosidase and amylase in the former and of β-fructosidase and amylase in the latter. Cellulase, cytase and α-galactosidase were absent and no mechanism for the breaking down of lignified tissue was detected. There was no positive evidence that amylase is active in the digestive fluid. Both amylase and sucrase were found to function optimally at the pH usually found in the gut. Amylase activity was depressed by about 25 per cent in the presence of metals at concentrations near the maximum that can be tolerated by cacao trees. The inability of *S. breve* (Sulzer) to digest soluble carbohydrates and the general low level of soluble carbohydrate reserves in the cacao tree indicate that it is to the advantage of this beetle to feed on trees in which carbohydrate is most abundant or carbohydrate metabolism most rapid. This provides a possible explanation for the greater prevalence of the beetle in unshaded cacao.

Parasites. Hymenoptera: *Pseudomphale steirastomae* Girault (Girault, 1916); *Ipobracon peronatus* Cam. (Wilkinson, 1929); *Ipobracon steirastomae* Vier., *I. depressi* Vier. (Myers, 1931b).

Predators. Larvae of the large blue elaterid *Chalcolepidus porcata* L. were commonly found in trees and logs infested with *S. breve* (Sulzer), and they are no doubt highly effective in controlling this longhorn to an appreciable extent (E.A.J.D.).

Economic importance. The economic importance of this species is reflected in the fact that, with the exception of *Hylotrupes bajulus* (Linnaeus), more papers have been written on it than on any other longicorn, although many of them are more repetitive than original. This species is one of the most abundant and certainly the most injurious of the cerambycids to cacao plantations in the Caribbean. Not that it confines itself exclusively to *Theobroma*: it is just as commonly found infesting a number of wild hosts, particularly *Pachira*. In Trinidad the author found this beetle to be extremely abundant on certain estates, where they could be seen copulating and ovipositing on standing and recently felled trees. It was rather surprising to see that the rather archaic practice of preparing traps of freshly cut wild chatang was still widely practised, particularly as there are now perfectly effective insecticidal sprays available. Perhaps the former method was found to be more economical despite the increased labour involved, for wild chatang is more or less ubiquitous and costs nothing. At some of the local sawmills, logs of *Sterculia* were often found to be infested, the larval galleries being almost 1 inch wide and mainly subcortical, and the pupal cell being from $\frac{1}{2}$ to $1\frac{1}{2}$ inches deep in the sapwood. It was later learned that whole plantations of variegated *Hibiscus* have been completely ruined by this longhorn.

Control. Guppy (1911) recommends the use of traps composed of the wood of "Chataigne Maron" (*Pachira aquatica*). The most efficient types appear to be the "suspended" traps and the "leaning" traps and are best used alternately. "Suspended" traps should be hung on branches about 5 to 8 feet above ground-level, and should be made from short lengths of *Pachira*, young branches each fitted with a staple or bent nail and an S hook or length of bent wire. These must be renewed frequently; that is, every two to three weeks in the rainy season and every ten to twelve days in the dry season. If allowed to remain unattended to, the beetle population may be increased instead of decreased. Each branch should be from 1 to 4 inches thick and from 3 to 4 feet long. All trap wood should be burnt at regular intervals.

Sometimes in a plantation certain trees are singled out by this insect and are repeatedly reinfested. These "preferred" trees are, as a consequence, usually neglected and allowed to die. But the habit of repeatedly ovipositing on the same tree can be advantageous to the planter, for by manuring and cultivating such trees they can be used as "decoys", and, with the aid of traps, many beetles can be destroyed. Adults are best jarred from branches by means of a shallow butterfly net, which is much quicker and more reliable than hand picking.

The control measures recommended by Guppy (1911) have been found to produce most effective results. On one plantation in Trinidad a man was detailed to set trap wood (*Pachira*), and after only six days he had collected 2,117 beetles, averaging 352 a day. To get the best results it was found necessary to make small clearings at regular intervals throughout the plantation to let in more light and to prune lightly some of the cacao trees, unless some of their branches had not already been broken through felling operations. It was then found that beetles would flock to these clearings for weeks, and if "Chataigne" traps were put to the root or fork of every second or third cacao tree there was little difficulty in collecting them. The beetles were evidently attracted to the clearings firstly by the light and then by the smell of the cacao sap, but they soon concentrated on the "Chataigne" wood for which they had a decided preference. For traps, wood from 5 to 9 inches in circumference and 2 feet long is best. The bark should be lightly shaved from two sides at first, the other two sides being shaved about three days later. After a week the wood should be destroyed and fresh wood substituted. Gashes made in trunks of standing "Chataigne" trees also produce good results (Anonymous, 1911). Urich (1925) recommends the killing of adults by spraying or painting trees with 5 lb. lead arsenate put in 50 gals. water, to which 10 lb. slaked lime may be added to give a thicker consistency. As repellents to oviposition, one of the following may be painted on trees. Road oil, tar, slaked lime, 1 lb.; lead arsenate paste 2 oz.; water $2\frac{1}{2}$ gals.; or clay and soap wash, in which $\frac{1}{2}$ lb. of soap and enough clay to make a thick paste take the place of slaked lime in the last formula. Trees should be sprayed or painted during the dry season, and larvae removed first. Dead branches should be burnt. Good cultivation renders the trees more resistant to attack.

Wolcott (1933) suggests that larvae should be dug out or killed by probing with a wire (carbon bisulphide may also be found useful). All dead bark should then be removed and the healthy exposed wood tarred or painted. Adults can be hand collected early in the morning, when they are usually found resting on trunks and branches, and killed by throwing into water to which a small amount of kerosene has been added.

As trees growing in strong sunlight are particularly susceptible to attack, considerable protection should be given to young trees by ground shading.

Material studied. 3 L, Trinidad, Arima District, 12.vi.1957, from *Pachira aquatica*, E.A.J.D. leg., in coll. B.M.; 6 L, 1 I, Trinidad, Manzanilla Windbelt Reserve, 14.iii.1957, from *Sterculia* logs, E.A.J.D. leg., in coll. B.M.

References. Andrade, 1927 (Biol.), 1928 (Biol.); Anonymous, 1911 (Contr.); Anstead, 1908 (Biol., Contr.); Ballou, 1906 (L, P, I, Biol., Contr.), 1912 (L fig., Biol., Contr.); Barrett, 1907 (Biol.); Bondar, 1939 (Biol.); Bosq, 1942a (Biol.); Carr, 1894 (Biol., Contr.); Craighead, 1923 (L, Biol.); Evans, 1952 (Biol.); Faber, 1909 (L, Biol., Contr.); Fennah, 1954 (Biol., Contr.); Girault, 1916 (Paras.); Guppy, 1911 (E fig., L fig., P fig., I fig., Biol. fig., Contr. fig.); Hall, 1911 (Biol., Contr.), 1932 (I fig., Biol., Contr.); Hart, 1894 (Biol., Contr.), 1908 (Biol.), 1909 (?); Hely-Hutchinson and Morris, 1891 (Biol., Contr.); Kindt, 1904 (?); Kirkpatrick, 1957 (I fig., Biol.); Landes, 1900 (Biol.); Lima, 1922 (Biol.), 1928 (Biol.), 1930 (Biol.), 1955 (Biol.); McKee, 1944 (Biol.); Moreira, 1921b (I fig., Biol.); Myers, 1931a (Biol.), 1931b (Paras.), 1932 (Paras.), 1935 (Biol.); Pickles, 1945 (Biol., Contr.); Rojas, 1857 (Biol.); Thompson, 1943 (Paras.); Urich, 1894 (Biol.), 1913a (Biol., Contr.), 1913b (Contr.), 1914 (Contr.), 1925 (L fig., P fig., I fig., Biol. fig., Contr.); Wilkinson, 1929 (Paras.); Wille, 1925 (Biol.); Wolcott, 1933 (Biol., Contr.); Wright, 1907 (Biol., Contr.).

Steirastoma meridionale Aurivillius

Distribution. NEOTROPICAL REGION: South America (Brazil).
Host plant: *Chorisia* sp. (Andrade, 1928).

Mature larva. Similar to that of *S. breve* (Sulzer), but differing as follows. *Head* with mouthframe ferruginous. *Prothorax* with pronotum without an embossed median area. *Abdomen* with tubercles of ampullae glabrous. Length up to 31 mm.; maximum breadth (at prothorax) 10·25 mm.

The specific status of this species has been questioned and some authors have regarded it as merely a variety of *S. breve* (Sulzer). A study of the larva indicates that it is, however, a distinct species.

Material studied. 12 L, Brazil, São Paulo, Ipiranga, xii.1927, R. Spitz leg., in coll. D.Z.S.P.

Reference. Andrade, 1928 (Biol.).

Steirastoma stellio Pascoe

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil, British Guiana, Colombia, Paraguay, Uruguay).

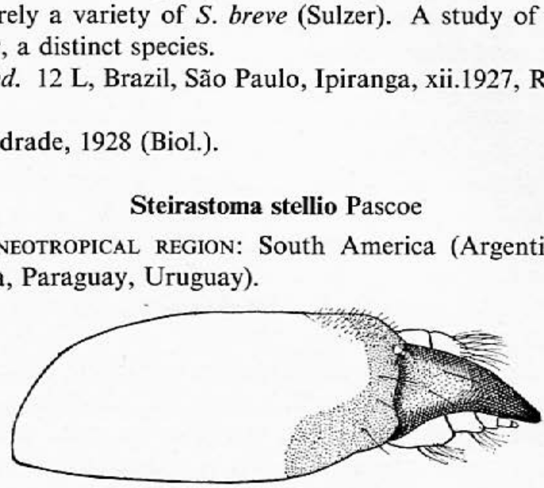


Fig. 131. *Steirastoma stellio* Pascoe. Mature larva. Head. Lateral aspect.

Host plants: *Acacia decurrens mollissima*, ?*Chorisia speciosa* (Lima, 1955); *Acacia cavenia*, *Salix*, *Populus* (Bosq, 1942e); *Acacia polyphylla* (Andrade, 1928); *Catostemma* sp. (E.A.J.D.).

Mature larva (fig. 131). Similar to that of *S. meridionale* Aurivillius from which it differs as follows. *Head* (fig. 131) with testaceous area of frons behind broadly ferruginous front margin rather densely setose, bearing at least forty setae. Antennal foramen immediately above antenna pitchy. Temple with ferruginous anterior part abruptly changing to testaceous posteriorly. Length up to 48 mm.; maximum breadth (at prothorax) 9 mm.

Biology. The larval galleries are subcortical, with the pupal cell up to 1 inch deep in the sapwood.

Material studied. 5 L, 1 I, British Guiana, Bartica District, Skull Point, 20.iv.1957, from *Catostemma* sp., E.A.J.D. leg., in coll. B.M.

References. Andrade, 1927 (Biol.), 1928 (Biol.); Bosq, 1942a (Biol.); Lima, 1930 (Biol.), 1955 (Biol.).

Steirastoma marmoratum (Thunberg)

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil, Paraguay).

Host plants: *Esenbeckia leiocarpa*, *Mangifera indica* (Andrade, 1928); *Ilex paraguayensis* (F. Monrós); *Araucaria angustifolia* (F.P.R.L.); *Nectandra* sp. (F. Plaumann).

Mature larva. Very similar to that of *S. breve* (Sulzer), but differing as follows. *Prothorax* with median, circular, embossed area of pronotum devoid of asperities and with the paired maculae pale and indistinct. *Abdomen* with moniliform tubercles of ampullae glabrous. Length up to 42 mm.; maximum breadth (at prothorax) 8·5 mm.

Material studied. 2 L, Brazil, vii.1941, from *Nectandra* sp., F. Plaumann leg., in coll. B.M.

References. Andrade, 1928 (Biol.); Bosq, 1942a (Biol.); Lima, 1930 (Biol.), 1955 (Biol.).

Aegomorphus aculeatus Buquet

Distribution. NEOTROPICAL REGION: South America (Brazil, British Guiana, French Guiana).

Host plant: *Ocotea acutangula* (E.A.J.D.).

Mature larva (fig. 132). Rather similar to that of *Dryoctenes scrupulosus* (Germar), but distinguishable as follows. *Head* with hypostoma longitudinally curved in cross-section. *Prothorax* with pronotum with posterior area velvety micro-spiculate. *Abdomen* with ampullae each with a single transverse furrow and three to four rows of glabrous moniliform tubercles. Tergite 9 bearing a conspicuous median spine (fig. 132). Epipleurum strongly protuberant on segments 7 and 8. *Spiracles* broadly oval. Length up to 44 mm.; maximum breadth (at prothorax) 9 mm.

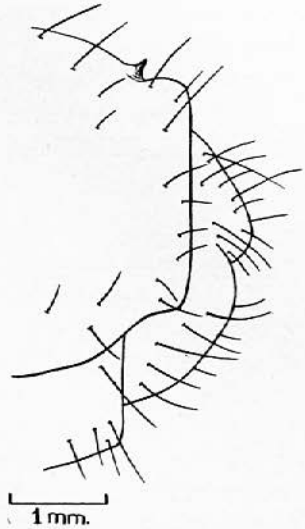


Fig. 132. *Aegomorphus aculeatus* Buquet. Mature larva. Posterior part of abdominal segment 9. Lateral aspect.

Biology. The larval galleries and pupal cells extend deep into the sapwood. Adults emerge in March (E.A.J.D.).

Material studied. 1 L, 1 I, British Guiana, Bartica District, 27.iii.1957, from log of *Ocotea acutangula*, E.A.J.D. leg., in coll. B.M.

Reference. None available.

Aethomerus lacordairei Bates

Distribution. NEOTROPICAL REGION: Caribbean (Trinidad), South America (Brazil).

Host plants: *Eperua jenmanni*, *Mora excelsa* (E.A.J.D.).

Mature larva. Similar to those of *Aegomorphus* and *Oreodera*, but differing in having the pronotum entirely shining and glabrous, subfossal tooth-like tubercles, and irregularly arranged tubercles on the abdominal ampullae. Length up to 31 mm.; maximum breadth (at prothorax) 6·1 mm.

Biology. The larval galleries are subcortical, but the pupal cells are from ½ to 1 inch deep in the sapwood. Adults emerge in March and April (E.A.J.D.).

Economic importance. Larvae of this species cause extensive but superficial damage to logs in sawmills.

Material studied. 4 L, 1 I, Trinidad, Melajo Reserve, 12.iii.1957, from *Mora excelsa*, E.A.J.D. leg., in coll. B.M.; 8 L, 2 I, Trinidad, Melajo Reserve, 13.iii.1957, from *Mora excelsa*, E.A.J.D. leg., in coll. B.M.

Reference. None available.

Alphus subsellatus (White)

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plant: *Ficus pohliana* (Andrade, 1928).

Biology. In Brazil, Anonaceae are frequently infested with larvae of this species which mine the cambium of trunks and branches, pupating in the wood (Bondar, 1928b).

Control. Mechanical extraction of the larvae is recommended.

References. Andrade, 1928 (Biol.); Bondar, 1928b (I fig., Biol., Contr.); Lima, 1930 (Biol.), 1955 (Biol.).

Dryoctenes scrupulosus (Germar)

Distribution. NEOTROPICAL REGION: South America (Argentina, Bolivia, Brazil, Paraguay, Venezuela).

Host plants: *Ceiba pubiflora*, *Brachychiton populneum* (Bosq, 1942a); *Bombax* sp., *Chorisia speciosa*, *Pachira aquatica* (Moreira, 1918); *Chorisia insignis* (Bruch, 1942); *Citrus* (Wille, 1925); *Ficus* (Bosq, 1934); *Spondias* sp.

Mature larva. Form elongate, rather robust, subcylindrical. *Head* moderately depressed, with sides straight and slightly converging posteriorly; antennal foramen open posteriorly; mouthframe strongly sclerotised, pitchy. Genae strongly shouldered and protuberant. One pair of ocelli present; lens oval, protuberant, ferruginous; pigmented spot indiscernible owing to sclerotisation of lens. Clypeus glabrous. Labrum transversely oval, fringed anteriorly with coarse golden setae. Mandible with a distinct longitudinal impression on apical third of outer face. Hypostoma flat, ferruginous, with one or two distinct setiferous pores on each side of gular region; hypostomal sutures curved. Gular region with a pale median cleavage line. Antenna 3-segmented; segment 2 quadrate; segment 3 elongate, cylindrical, bearing apical setae; supplementary process conical hyaline. Maxilla with segment 3 of palp conical, slightly elongate, about half as long as segment 2. Labial palpi with segment 2 elongate, about one-third length of segment 1. *Prothorax* with a transverse row of long, pale, silky setae just behind front margin; pronotum bearing numerous rounded asperities, and with a pair of short, curved, sublateral impressions. *Mesonotum* and *metanotum* sparsely micro-spiculate. Propresternum ferruginous and coarsely asperate sublaterally. *Abdomen* with each dorsal ampulla micro-spiculate and with two transverse furrows and four rows of moniliform tubercles which are not interrupted medially. Tergite 9 without a sclerotised process. Epipleurum strongly protuberant on segments 7–9. Pleural tubercles broadly oval and with a pair of very distinct sclerotised pits. Anus trilobed, each lobe bearing a few long, pale, silky setae. *Legs* absent. *Spiracles* with peritreme rather narrowly oval; several subcontiguous marginal chambers present on posterior half only. Length up to 65 mm.; maximum breadth (at prothorax) 13 mm.

Pupa (figs. 133–134). *Head* with vertex visible from above, not excavate between antennal tubercles around which are a few large spines. Clypeus with a distinct transverse impression across base and bearing two pairs of slightly shorter spines. Labrum with two groups of very short spines (each with a long basal seta). Antennae extending as far as abdominal segment 2, where they are recurved ventrally, forming a single cell, and directed anteriorly to terminate alongside head, the apices pointing outwards. Eyes feebly convex, bearing a few stout spines. Mandibles each with a pair of short spines (each with a basal seta) near middle of outer face. Pronotum (fig. 133) with lateral tubercles long, acutely pointed and very broad basally; bearing numerous spines as figured. *Mesonotum* with two pairs of small spines. *Metanotum* with two oblique rows of spines; scutellum moderately protuberant, glabrous; scutellar groove distinct. Elytra glabrous; elytra and wings extending as far as abdominal segment 4. *Abdomen* with tergites 1–6 each with numerous long, stout, straight spines (each with a basal seta) which are arranged more or less in three transverse bands, the middle one short. Tergites 7 and 8 with spines as figured. Tergite 9 (fig. 134) with a

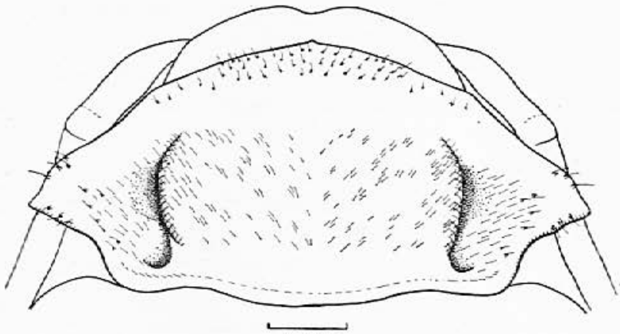


Fig. 133

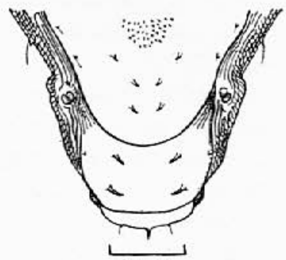


Fig. 134

Fig. 133. *Dryoctenes scrupulosus* (Germar). Pupa. Head and pronotum. Dorsal aspect.
Fig. 134. *Dryoctenes scrupulosus* (Germar). Pupa. Abdominal segments 7–9. Dorsal aspect.

stout median spine; urogomphi absent. Sternites bearing a few minute setae sublaterally. Pleura moderately protuberant. *Legs* with femora clavate; each femur with a group of subapical spines; middle and hind femora each with a long tuberculate process near base; 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 rather broadly oval, thin, and slightly raised above general level of cuticle. Length up to 35 mm.; maximum breadth 12·75 mm.

Egg. Form oblong-elliptical, fusiform, with one pole less rounded than the other. Chorion smooth, shining, white. Length 2–2·5 mm.; breadth 0·67 mm. (Bruch, 1942).

Biology. When ovipositing, the female first gnaws an incision in the bark with its mandibles and then introduces the egg into a cavity with its ovipositor, this operation taking four or five minutes. The pupal period lasts fifteen to twenty days and adults emerge in November. The life-cycle is annual (Bruch, 1942). The pupal cell is shown on Pl. VII, fig. 3.

Material studied. 4 L, Venezuela, 14.v.1947, from *Spondias* sp., in coll. U.S.N.M.; 2 L, 1 P, 1 I, Brazil, São Paulo, ii.1949, from *Bambax* sp., W. Maluf leg., in coll. D.D.S.V.; 2 L, 1 P (dry), Argentina, Tucuman, 21.vii.1924, R. Schreiter leg., in coll. Fundación Miguel Lillo, Tucuman.

References. Andrade, 1928 (Biol.); Bosq, 1934 (Biol.), 1942a (Biol.); Bruch, 1942

(E fig., L fig., P fig., I fig., Biol.); Lima, 1922 (Biol.), 1928 (Biol.), 1930 (Biol.), 1955 (Biol.); Moreira, 1918 (Biol.), 1921b (I fig., Biol. fig.); Novaes, 1929 (Biol.); Wille, 1925 (Biol.).

Hedypathes betulinus (Klug)

[Taladro Grande. Taladro de la Yerba Mate]

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil, Paraguay). Host plant: *Ilex paraguayensis* (Moreira, 1929).

Mature larva. Very similar to those of *Steristoma* species from which it differs as follows. *Head* with frontal sutures indiscernible behind antennal foramen. *Abdomen* with spiracular peritreme circular or subcircular, and completely lined with subcontiguous marginal chambers. Length up to 38 mm.; maximum breadth (at prothorax) 11 mm.

Biology. Larvae of this species infest both the stems and branches of the host plant.

Economic importance. Larvae of this species cause serious damage to "yerba mate".

Control. Blanchard (1928) suggests that severely infested plants should be uprooted and burned; in other cases such measures as pruning off the infested portions, the injection of carbon bisulphide into the holes (which should then be sealed up), the prevention of oviposition by means of a repellent and the hand collection of adults are all effective.

Material studied. 15 L, 2 I, Brazil, Corrientes, 1925, Finch leg., in coll. B.M.

References. Blanchard, 1928 (L fig., I fig., Biol. fig., Contr.); Bosq, 1934 (Biol.); Costa, 1943 (?); Lima, 1930 (Biol.), 1955 (Biol.); Ogloblin, 1929 (Biol. (the larva figured is actually that of *Mordella ogloblini* Pic.)).

Oreodera (s.g. **Orepdera**) **glauca** (Linnaeus)

Distribution. NEOTROPICAL REGION: Mexico, Central America (Guatemala, Nicaragua, Panama), Caribbean (Bahamas Is., Dominica, Guadeloupe, Hispaniola, Jamaica, Puerto Rico, St. Lucia), South America (Argentina, Brazil, British Guiana, French Guiana, Venezuela).

Host plants: *Ficus pohliana* (Andrade, 1928); *Pterocarpus* (E.A.J.D.).

Adult (Pl. VI, fig. 3). Length 15–30 mm. Elytra entirely silvery grey or fawn, except for the conspicuous, transverse, narrow, post-median band and the lateral margins which are dark brown. Legs fawn, with apical half of tibiae and tarsi (except basal half of first segment) dark brown. *Head* with antennae filiform, much longer than body in both sexes and fringed with hairs beneath. *Prothorax* with three prominent tubercles arranged in a triangle on disc. *Elytra* narrowed from shoulders to apex. *Legs* with femora strongly clavate; front tibiae of male bent near apices and the first tarsal segment strongly elongate.

Mature larva. Form elongate, slender, subcylindrical. *Head* slightly depressed, strongly sclerotised, with mouthframe broadly ferruginous. Frontal sutures pale, angled medially; antennal foramen very narrowly open posteriorly. Six epistomal setae present. Temple with a conspicuous longitudinal carina placed between antennal foramen and ocellus. Mandible slender, slightly more than twice as long as broad and without a pore on apical third of outer face. One pair of distinct ocelli present; lens rather large, round; pigmented spot distinct. Hypostoma flat, entirely ferruginous; gular area represented by a pale median line; at least four setal pores present on each side of gular area, hind margin thick, slightly raised. Antenna 2-segmented; segment 2 bearing a conical, hyaline process. Clypeus glabrous. Labrum transversely oval, ferruginous and densely fringed anteriorly with bristly setae. Maxilla with segment 3 of palp much shorter than segment 2. Labial palpi with segment 2 less than half length of segment 1. *Prothorax* with posterior half of pronotum densely velvety micro-pubescent; eusternum non-tuberculate, smooth, glabrous; sternellum non-tuberculate, dull, micro-pubescent. *Abdomen* with each dorsal ampulla with a single V-shaped, transverse impression and bearing numerous shining, glabrous, moniliform tubercles irregularly arranged. Tergite 9 without a sclerotised process. Anus trilobed, sparsely setose. Epipleurum slightly more protuberant on segments 7–9. Pleural tubercles each with a pair of sclerotised pits. *Spiracles* with peritreme broadly oval, moderately thick, pale ferruginous, with numerous subcontiguous chambers on posterior half. Length up to 45 mm.; maximum breadth (at prothorax) 6·5 mm.

Biology. Before pupating at a depth of about 1 inch in the sapwood, the larva first excises an elliptical disc of bark and plugs the entrance to the pupal cell with coarse wood fibres (Pl. VI, fig. 3). The adult emerges some distance away from the excised area (E.A.J.D.).

Material studied. 2 L, 1 I, British Guiana, North West District, Baromanni, Arikoua Creek, 9.v.1957, from *Pterocarpus*, E.A.J.D. leg., in coll. B.M.

References. Andrade, 1928 (Biol.); Lima, 1930 (Biol.), 1955 (Biol.).

Oreodera (s.g. **Oreodera**) **quinquetuberculata** (Drapier)

Distribution. NEOTROPICAL REGION: South America (Argentine, Brazil).

Host plant: *Prunus persica* (Lima, 1955).

Reference. Lima, 1955 (Biol.).

Oreodera bituberculata Bates

Distribution. NEOTROPICAL REGION: South America (Brazil, British Guiana, French Guiana).

Host plants: *Alchorneopsis floribunda*, *Himatanthus articulatus* (E.A.J.D.).

Reference. None available.

Tapeinini

Tapeina transversifrons Thomson

Distribution. NEOTROPICAL REGION: Mexico, Central America (British Honduras, Costa Rica, Guatemala, Nicaragua, Panama), Caribbean (Trinidad), South America (Venezuela).

Host plant: ? *Inga* sp.

Mature larva. *Head* moderately depressed, with sides feebly constricted at middle and converging posteriorly. Antennal foramen open posteriorly with a conical process (analogous to the subfossal process of prionine larvae?) immediately behind the ventral articulation of the mandible; mouthframe ferruginous; frons smooth; six epistomal setae present; gena smooth, rounded. One pair of ocelli present; lens round, convex; pigmented spot indistinct. Hypostoma entirely ferruginous, swollen, the anterior half sloping down to front margin; gular region with a pale, median, slightly irregular cleavage line, on each side of which are about six setal pores. Antenna 2-segmented. Maxilla with segment 3 of palp slightly shorter than segment 2; labial palpi with segment 2 slightly shorter than segment 1. *Prothorax* with pronotum ferruginous anteriorly; shining, smooth, glabrous posteriorly; eusternum and sternellum shining, smooth and glabrous. *Abdomen* with ampullae feebly bilobed and covered with glabrous, shining, moniliform tubercles. Tergite 9 bearing a small vertical median process near posterior margin. Epipleurum protuberant on segments 7–9. Pleural tubercles each with a pair of sclerotised pits. Anus trilobed. *Legs* absent. *Spiracles* with peritreme circular, rather thick and without marginal chambers. Length up to 16 mm.; maximum breadth (at prothorax) 4·9 mm.

Although larvae were found associated with adults of this species, there is some doubt whether they are in fact the same species, especially as two of them seem rather large for so small an adult.

Biology. Adults may often be found in large numbers under slightly loosened bark of a number of trees.

Material studied. 6 L, 2 I, Trinidad, Tabaquite, Brickfields, 5.vi.1957, from *Inga* sp., E.A.J.D. leg., in coll. B.M.

Reference. None available.

Tapeina dispar Serville

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plant: *Dalbergia nigra* (Zikán and Zikán, 1946).

Reference. Zikán and Zikán, 1946 (Biol.).

Acrocinini

Acrocinus longimanus (Linnaeus)

[Mouche Bagasse. The Harlequin Beetle. The Jak-tree Borer]

Distribution. NEOTROPICAL REGION: Mexico, Central America (British Honduras, Costa Rica, Guatemala, Nicaragua, Panama), Caribbean (Barbados, Trinidad), South America (Argentina, Brazil, British Guiana, Ecuador, French Guiana, Paraguay, Venezuela).

Host plants: *Inga*? (Bates, 1861); *Ficus glabrata*, *F. pohliana*, *F. elastica*, *Lonchocarpus spruceanus*, *Artocarpus integrifolia*, *A. incisa*, *Guazuma ulmifolia*, *Chorisia speciosa*, *Caryocar brasiliensis* (Bondar, 1925, 1926, Andrade, 1928); *Enterolobium timbouva* (Fagundes, 1928); *Urostigma enorme* (Zikán and Zikán, 1946); *Castilla elastica* (Ballou, 1945); *Chlorophora tinctoria* (Bosq, 1942a); *Brosimum alicastrum* (F. Peña); *B. paraense*, *Ficus* sp., *Ficus gleasoni*, *Parahancornia amapa* (E.A.J.D.).

Adult (Pl. IX, fig. 1). Length 43–75 mm. Head, prothorax and elytra black, with an elaborate design of greenish yellow and pink or crimson markings. *Head* with antennae considerably longer than body in both sexes. *Prothorax* with a pair of long spine-like tubercles laterally. *Elytra* with basal third very coarsely punctured; bearing a minute spine on each shoulder and a pair of spines at each apex. *Legs* with front femora and tibiae very strongly produced, much longer than the body in the male, the former with a broad subapical crimson band.

Mature larva (fig. 135 and Pl. IX, fig. 2). Form robust, elongate, cylindrical. *Head* (fig. 135) strongly elongate and depressed, widest at anterior third, with sides almost straight and converging appreciably posteriorly. Frontal sutures very indistinct; antennal foramen closed behind. Mouthframe very strongly and broadly sclerotised and pitchy. Frons pitchy anteriorly, ferruginous posteriorly, and with a transverse linear impression (interrupted medially) near front margin. Six epistomal setae

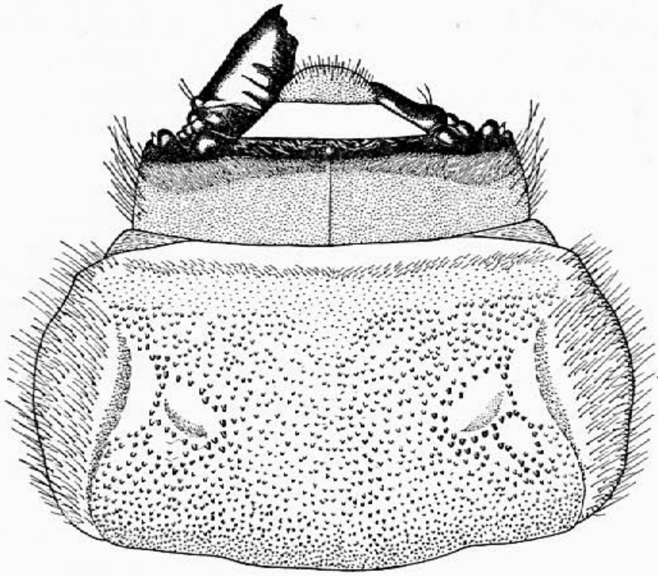


Fig. 135. *Acrocinus longimanus* (Linnaeus). Mature larva. Head and prothorax. Dorsal aspect.

present. One pair of ocelli present; lens round, feebly convex, ferruginous and rather indistinct owing to sclerotisation of surrounding cuticle; temple with one to three protuberant rounded tubercles behind ocellus. Hypostoma flat, ferruginous, usually with several large oval granules near middle of front margin; sutures distinct, curved; gular region undefined. Clypeus often with one or two pairs of lateral setae. Labrum transversely oval, ferruginous; fringed anteriorly with numerous coarse bristly pale setae. Antenna 2-segmented, strongly retracted; basal membrane pale, sharply contrasting with surrounding pitchy cuticle; second segment bearing a minute, conical, hyaline process. Mandible elongate, slender, glabrous or almost so. Maxilla with segment 3 of palp about half length of segment 2. Labial palpi with segment 2 about half length of segment 1. Mentum distinct from submentum. *Prothorax* (fig. 135) with pronotum covered with numerous large coarse conical or moniliform asperities; front and sublateral margins densely fringed with fine silky setae; pronotum delimited laterally by lateral grooves and anterolaterally by a pair of short curved impressions. Postnotal fold absent. Prosternum with eusternum and sternellum nearly as coarsely asperate as pronotum. *Mesonotum* bearing only a few small asperities. *Metanotum* with numerous conical asperities around the transverse furrow. *Abdomen* with each dorsal ampulla bearing two transverse furrows, one pair of sublateral and one pair of lateral furrows; densely covered with numerous asperities which are slightly smaller and more pointed than those on pronotum. Tergite 9 without a sclerotised process, and about half as long as segment 8. Epipleurum slightly protuberant on all segments; pleural tubercle broadly oval and each with a pair of distinct semicircular sclerotised pits. Anus trilobate, setose. *Legs* absent. *Spiracles* with peritreme rather broadly oval, without marginal chambers. Length up to 140 mm.; maximum breadth (at prothorax) 25 mm.

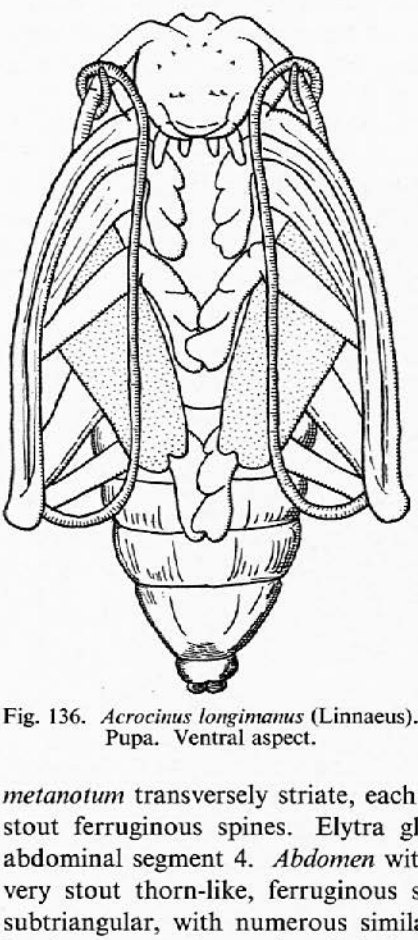


Fig. 136. *Acrocinus longimanus* (Linnaeus). Pupa. Ventral aspect.

Pupa (fig. 136 and Pl. VI, fig. 2). *Head* with vertex visible from above and rather deeply excavate between antennal tubercles, glabrous; front with three or more pairs of stout ferruginous spines; clypeus with a deep transverse impression across base and bearing one or two pairs of very stout spines. Labrum strongly sclerotised around outer margin. Eyes feebly convex, glabrous. Antennae extremely long, extending as far as abdominal segment 5, where they are strongly recurved ventrally and (in the female) directed anteriorly as far as the eyes, where they are again recurved round the base of each antenna. *Pronotum* with sides bearing basally a pair of long, slightly curved, spine-like tubercles; disc bearing numerous scattered spines. *Mesonotum* and *metanotum* transversely striate, each bearing two oblique rows (arranged in a V) of stout ferruginous spines. Elytra glabrous; elytra and wings extending as far as abdominal segment 4. *Abdomen* with tergites 1–6 each with two transverse rows of very stout thorn-like, ferruginous spines (each with a subapical seta). Tergite 7 subtriangular, with numerous similar spines. Tergite 8 short, strongly transverse, bearing two or three pairs of similar spines. Tergite 9 very short, glabrous, without a sclerotised process. Sternites glabrous. Pleura strongly protuberant. *Legs* with front femora and tibiae extremely long and extending posteriorly, their apices reaching (at least in the female) apices of hind femora; hind femora extending as far as abdominal segment 5, but strongly projecting laterally; apices of all femora bearing a few small spines. *Functional spiracles* present on abdominal segments 1–6; peritreme narrowly oval, thin, ferruginous and not raised above general level of cuticle. Length up to at least 55 mm.; maximum breadth (at prothorax) 24 mm.[1]

[1] In male specimens the front legs are appreciably longer.

Egg. The eggs are white, elongate-oval, measuring 8–9 mm. long and 2 mm. in diameter. The incubation period is about ten days (Bondar, 1929c).

Biology. Rojas (1857) and Candèze (1861) maintain that adults cling to the boles of living *Ficus* trees in order to feed on the milky sap. Wood (1883) mentions that they are strongly attracted to the juice secreted by *Bagassa guianensis*; this fact is apparently well known to collectors who deliberately wound these trees in order to attract large numbers of beetles. Artificial light also attracts this insect.

The very long fore-legs of the adult are used in traversing the branches of the trees among which it lives. Its movements under these circumstances are slow but not ungraceful, but when placed on the ground it drags itself along awkwardly and laboriously as a sloth would do under similar circumstances. The photograph (fig. 2) on Plate VI shows how compactly the pupa of this awkwardly built beetle lies within the pupal cell. Bates (1861) states that it has the habit of bending its long legs rigidly in self-defence on being disturbed.

According to Bondar (1929c) the subcortical larval gallery, which is between 1½ and 2 metres long, encircles the trunk, causing the tree to die. Before ovipositing the female makes horizontal incisions in the bark about 20 mm. wide and 8 mm. deep. Trees which are selected for oviposition are frequently infested with a bracket fungus (*Fomes* sp.), and when adults are clinging to this it is difficult to detect their presence, so closely do their colours blend. At one laying, which lasts two to three days, the female deposits fifteen to twenty eggs. Each larval gallery has a series of frass ejection holes. When the larva has attained maturity (i.e. within seven or eight months), it tunnels in a downward direction for a distance of about 12 cm. and then excavates a shallow pupal cell extending upwards. The orifice of the entrance, which measures 30–35 mm. by 20 mm., is plugged with wood fibres. After pupation, which lasts about four months, the adult emerges through a fresh hole, which is from 4 to 8 cm. above the entrance hole. The presence of this second hole above the one plugged with fibres indicates that the adult has emerged. Pupation takes place at a depth of about 4 inches. The larval stage lasts about seven to eight months. Adults are on the wing from September to November. The life-cycle is annual (Bondar, 1929c).

Numerous infestations of this species have recently been seen by the author in Trinidad and British Guiana. In the case of an infested standing *Ficus*, the shallow, broad larval galleries were confined at first to the outer sapwood, but were too deep to be regarded as merely subcortical; they descended in a spiral formation from 2 to 4 inches wide and about ¼ inch deep, thus giving the surface of the sapwood from which the bark had loosened and fallen away a carved, ridged appearance which was both conspicuous and impressive (Pl. XIII, figs. 1 and 3). The galleries of the mature larvae were comparatively enormous and extended from 5 to 10 inches deep into the heartwood. In the course of a few hours many mature larvae were extracted and the total larval population must have run into hundreds. At the base of the tree was a pile of frass reminiscent of a wood ants' nest and large enough to fill at least two ½ cwt. sacks. The pupal cells were plugged with extremely coarse shreds averaging 1½ inches long and 2 mm. thick, the excised discs of bark were roughly 6 inches in diameter, and the oval emergence holes were at least 1½ inches at their greatest diameter. The egg niches were unusually conspicuous, being about ½ inch long, slightly curved crescentic and completely penetrating the bark. In Trinidad the main emergence period is from June to August (E.A.J.D.).

Economic importance. In Brazil this species is commonly found in wild fig trees. Injured trees or those which have been recently felled are preferred. In the case of *Artocarpus*, perfectly healthy trees in some districts have been attacked, but this appears to be exceptional (Bondar, 1926).

In the case of British Guiana and Trinidad, this species was found to be widespread, and locally abundant. So great is the scale of damage that infestation is invariably fatal to the tree. It is doubtful whether perfectly healthy trees are ever attacked, and, as most of its hosts are of little commercial value as timber, this longhorn cannot at present be regarded as a really serious pest (E.A.J.D.).

Control. Where there is evidence of larval depredations (i.e. piles of wood dust on ground at base of trunk), the bark should be removed to expose the larvae. If the larvae have already pupated, the pupae may be killed by introducing a stout curved wire through the plug into the pupal cell (Bondar, 1929c).

Material studied. 8 L, 2 P, Trinidad, Arima, Blanchisseuse Road, 21.iii.1957, from *Ficus* sp., E.A.J.D. and F. Peña leg., in coll. B.M.; 8 L, 2 P, British Guiana, Bartica District, 25.iv.1957, from *Ficus* sp., E.A.J.D. leg., in coll. B.M.; 2 L, 1 I, Trinidad, Southern Watershed Reserve, vii.1957, from *Brosimum alicastrum*, F. Peña leg., in coll. B.M.; 1 L, Ecuador, Iguarassu, G. A. Ramage leg., in coll. B.M.; 2 L, Mexico, in coll. B.M.; 4 L, 1 I, Ecuador, Guayaguil, from *Castilloa* in coll. B.M.; 4 L, Brazil, São Paulo, Piassaguéra, iv.1913, H. Luederwaldt leg., in coll. D.Z.S.P.; 1 P (dry), no data, in coll. B.M.

References. Andrade, 1927 (Biol.), 1928 (Biol.); Ballou, 1945 (Biol.); Bates, 1861 (Biol.); Bertoni, 1918 (Biol.); Bondar, 1925 (L fig., P fig., I fig., Biol. fig.), 1926a (L fig., P fig., I fig.), 1929c (L fig., P fig., I fig., Biol. fig.), 1938b (L fig., P fig., I fig., Biol., Contr.); Bosq, 1942a (Biol.); Candèze, 1861 (L fig., Biol.); Craighead, 1923 (L); Goeldi, 1894 (Biol.); Grégoire, 1957 (I, Physiol.); Lacordaire, 1830 (Biol.); Lepesme, 1945 (Biol.); Lima, 1922 (Biol.), 1928 (Biol.), 1930 (Biol.), 1955 (Biol.); Lucas, 1878 (Biol.); Packard, 1880 (L fig.); Piza, 1929 (Biol.); Rojas, 1857 (Biol.), 1866 (Biol.); Wille, 1925 (Biol.); Wood, 1883 (Biol.), 1889 (Biol.); Zikán and Zikán, 1946 (Biol.).

Macropophora accentifer (Olivier) (=**Acrocinus accentifer** (Olivier)

[Arlequim Pequeno]

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil, Paraguay, ?Venezuela).

Host plants: *Cedrela brasiliensis*, *Citrus aurantium* (Bondar, 1913a); *Morus alba*, *Cedrela fissilis*, *Persea gratissima*, *Ficus pohliana*, *Ecclinusa ramiflora*, *Securinega guaraiuva*, *Citrus* spp., *Sapium aucuparium*, *S. biglandulosum*, *Esenbeckia febrifuga*, *Cordia curossarica*, *C. verbenacea*, *Prunus persica*, *Croton urucurana* (Andrade, 1928; Lima, 1955); *Aleurites moluccana* (Silva, 1940); *Astronium fraxinifolium* (Acácio Costa, Jr.).

Biology. Oviposition takes place in spring and summer, and eggs are usually deposited at the base of the trunk in cavities prepared by the female with its mandibles.

Larvae feed at first subcortically, later entering the wood to pupate. The pupal cell is about 50 mm. long, 25 mm. broad and 10 mm. deep, and is plugged at the entrance with compressed wooden fibres. According to Moreira (1914) the larva pupates with its head facing towards the centre of the branch, the adult, in emerging, gnawing its way out of the opposite side. The duration of the larval period is about a year, and pupation takes place between July and September, the adults emerging from August to October, sometimes later (Bondar, 1913a, 1929a; Moreira, 1914).

Economic importance. This species is responsible for serious damage to a number of trees in Brazil, particularly *Citrus aurantium*. It is capable of completely destroying a *Citrus* plantation within three or four years (Bondar, 1913a, 1929a).

Control. Control measures should be undertaken during May or June. The lower parts of the tree-trunks should be carefully examined and the bore holes exposed. A little carbon bisulphide should then be injected into the hole with a syringe and the hole immediately stopped up with a plug. This treatment is fatal to the larva, pupa and adult. Benzine is also effective. As a preventive measure, the trunk should be smeared with a mixture of the following: crude carbolineum 1 part; quicklime 10 parts; water 40 parts. The lime should first be dissolved in a little water, the rest then added, and the carbolineum well stirred in (Bondar, 1913a, 1929a).

Reference. Andrade, 1927 (Biol.), 1928 (Biol.); Araujo, 1939 (Biol., Contr.); Autuori, 1936 (I fig., Biol. fig., Contr.); Bondar, 1913a (L fig., I fig., Biol. fig., Contr. fig.), 1914 (L fig., I fig., Biol. fig.), 1915a (L fig., I fig., Biol. fig. Contr. fig.), 1929a (L fig., I fig., Biol. fig., Contr. fig.); Bosq, 1934 (Biol.), 1942a (Biol.); Fonseca and Autuori, 1932 (Biol.); Lima, 1922 (Biol.), 1928 (Biol.), 1930 (Biol.), 1955 (Biol. fig., Contr. fig.); Moreira, 1912 (?), 1914 (L fig., P fig., I fig., Biol. fig.), 1921b (L fig., P fig., I fig., Biol. fig., Contr.); Novaes, 1927 (Biol.); Pierce, 1917 (Biol.); Quayle, 1938 (Biol.); Silva, 1940 (L fig., P fig., I fig., Biol. fig.); Wille, 1925 (Biol.).

Macropophora trochlearis (Linnaeus)

Distribution. NEOTROPICAL REGION: South America (Brazil, British Guiana, Ecuador, French Guiana).

Host plants: *Protium decandrum*, *Astronium ulei*, *Piratinera guianensis*, *Virola surinamensis*, *Pterocarpus* sp. (E.A.J.D.).

Adult (fig. 137). Length 23–33 mm. Head, prothorax and elytra covered with greyish-green pubescence, the latter with black and yellow comma-shaped markings. *Head* with antennae filiform, appreciably longer than body in female and at least twice as long as body in male; segment 3 very long and fringed with setae. *Prothorax* with a pair of stout lateral tubercles and three conical tubercles on disc. *Elytra* slightly narrowed and truncate posteriorly.

Mature larva (fig. 138). Similar to that of *Acrocinus longimanus* (Linnaeus), but differing as follows. *Head* (fig. 138) with antennal foramen open posteriorly; mouth-frame ferruginous; temples with a row of four rounded, protuberant tubercles behind ocellus. Hypostoma with a pair of paramedian depressions, each bearing three or four setal pores. Clypeus glabrous. *Prothorax* with posterior area of pronotum matt, densely velvety micro-spiculate; eusternum glabrous; sternellum micro-spiculate. Length up to 60 mm.; maximum breadth (at prothorax) 12 mm.

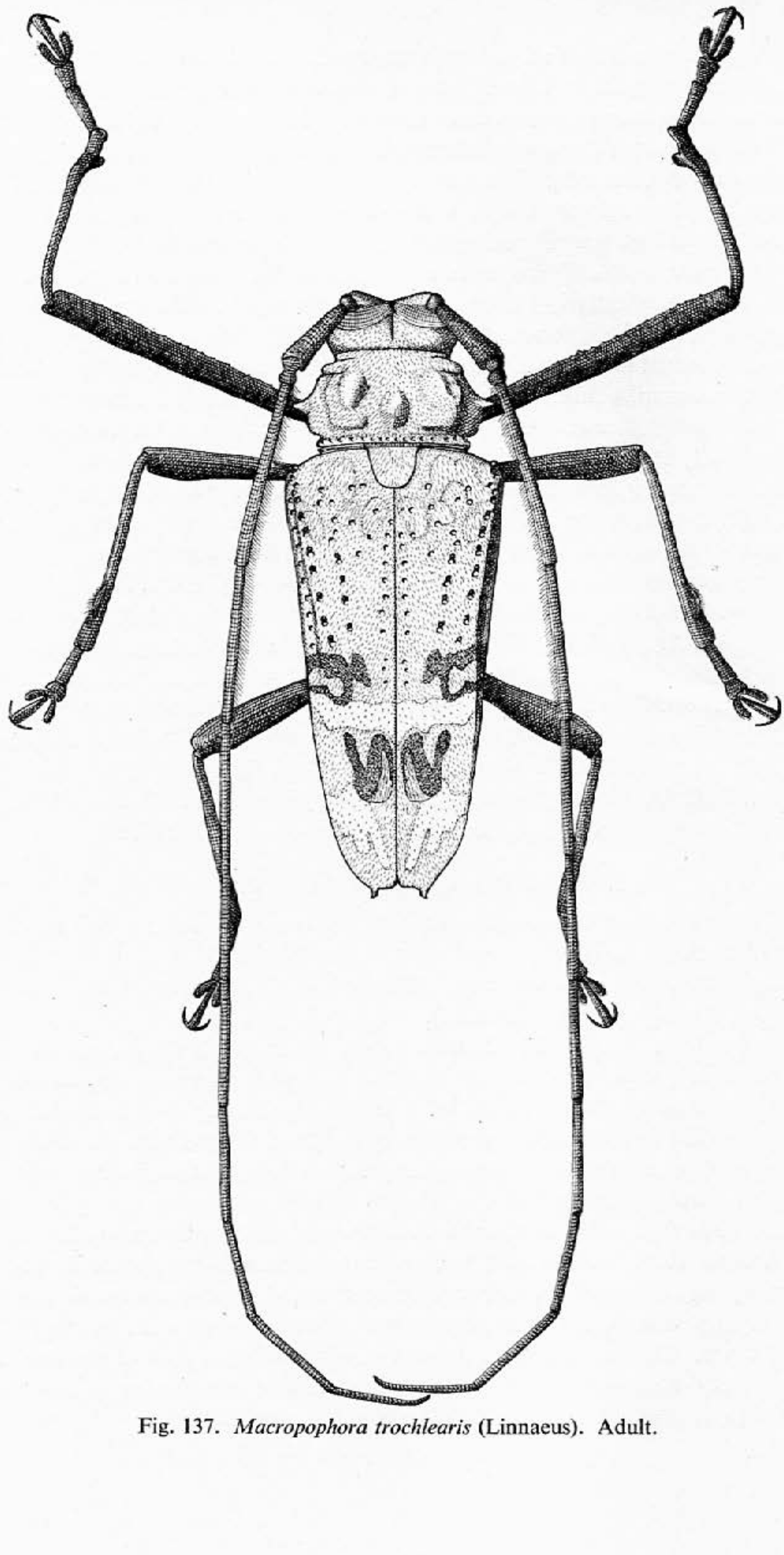


Fig. 137. *Macropophora trochlearis* (Linnaeus). Adult.

Biology. The larval galleries and pupal cells are very similar to those of *Acrocinus longimanus* (Linnaeus), but only from one-half to two-thirds the size. They extend deep into the sapwood and heartwood. The pupal cell is elongate-oval, about $2\frac{1}{2}$ inches long and parallel to the longitudinal axis of the log; at the entrance it is plugged with coarse wood fibres (see Pl. X).

Economic importance. The author has recently seen in British Guiana numerous infestations of this species in various commercial timbers, particularly *Virola* ("dalli" or "banak"), which is exported to Surinam for conversion into plywood.

Many recently felled trees had been completely ruined, the heartwood having been extensively tunnelled.

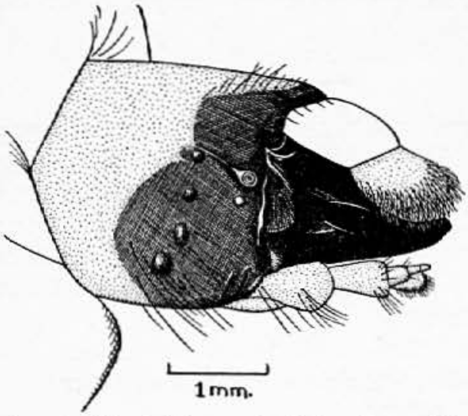


Fig. 138. *Macropophora trochlearis* (Linnaeus). Mature larva. Head. Lateral aspect.

Material studied. 3 L, British Guiana, Bartica District, Caow Creek, 4.iv.1957, from *Piratinera guianensis*, E.A.J.D. leg., in coll. B.M.; 4 L, 1 I, British Guiana, North West District, Baromanni, Arikous Creek, 9.v.1957, from *Pterocarpus* sp., E.A.J.D. leg., in coll. B.M.; 5 L, 1 I, British Guiana, North West District, Baromanni, Arikoua Creek, 9.v.1957, from *Virola surinamensis*, E.A.J.D. leg., in coll. B.M.; 6 L, 1 I, British Guiana, Batica-Potaro Road, 25.iv.1957, from *Astronium ulei*, E.A.J.D. leg., in coll. B.M.; 2 L, 1 I, British Guiana, Bartica-Potaro Road, m. 24, 26.iv.1957, from *Protium decandrum*, E.A.J.D. leg., in coll. B.M.

Reference. None available.

Acanthocinini

Larval Characters

Form variable but usually depressed and slender. *Head* moderately to very strongly depressed and moderately to strongly elongate, with sides abruptly constricted before or at middle; antennal foramen open or closed posteriorly. Gula with sutures not raised, but with a small rugose area on each side (each bearing two to six setae); six epistomal setae present. One pair of ocelli present; pigmented spot indistinct. Mentum distinct from submentum. Antenna 2-segmented and bearing a conical hyaline process. Maxillary palp 2- or 3-segmented. *Prothorax* with posterior area of pronotum remarkably variable, being completely glabrous in *Lepturges*, velvety micro-pubescent or micro-spiculate in the majority of genera and rather coarsely asperate in *Lagocheirus*, which appears to form a connecting link between this tribe and the Polyraphidini. *Abdomen* with ampullae similarly variable, ranging from tuberculate and glabrous (*Exocentrus*) to non-tuberculate and micro-spiculate (*Acanthocinus*). Abdominal tergite 9 usually without a sclerotised process, except in *Lagocheirus*, *Lepturges* (pars) and *Trypanidius*, which have a median spine, and *Oedopeza*, *Astyochus* and *Toronaeus*, which have a transverse carina, and *Chaetanes*, *Eutrypanus* and *Carphina*, which have a broader sclerotised process. Epipleurum very strongly protuberant, at least on abdominal segments 7–9. Pleural tubercles each with a pair of sclerotised pits (single in *Nyssodrys*). *Spiracles* broadly oval to circular, with posterior margin of peritreme bearing numerous subcontiguous marginal chambers.

Lagocheirus araneiformis (Linnaeus)

[The Almácigo Borer]

Distribution. NEOTROPICAL REGION: Mexico, Central America (British Honduras, Costa Rica, Guatemala, Nicaragua, Panama), Caribbean (Antigua, Cuba, Grenada, Guadeloupe, Havana, Hispaniola, I. Tobago, Jamaica, Puerto Rico, St. Barthélemy, St. Vincent, Trinidad, Virgin Is. (St. Thomas), South America (Argentina, Bolivia, Brazil, British Guiana, Colombia, Ecuador, French Guiana, Peru, Venezuela). NEARCTIC REGION: U.S.A. (Florida). HAWAIIAN REGION: Hawaiian Is. AUSTRALASIAN REGION: Society Is., Tahiti.

Host plants: *Ficus* (Craighead, 1923); *Saccharum officinarum* (Smith, 1921); *Spondias mombin* (Becker, 1953b); *Bursera simaruba* (Martorell, 1945); *Hura crepitans*, *Sapium aucuparium* (E.A.J.D.).

Adult (fig. 139). Length 14–28 mm. Head, prothorax and elytra light brown, the latter each with a dark brown, subtriangular lateral area which is narrowly margined posteriorly with white. *Head* with antennae filiform, slightly longer than body in female and about twice as long as body in male. *Prothorax* with a pair of stout lateral tubercles and disc with a row of three tubercles. *Elytra* truncate apically.

Mature larva (fig. 140). Very similar to that of *L. obsoletus* Thomson from which it differs mainly in having very much coarser spicules on the abdominal ampullae. Length up to 32 mm.; maximum breadth (at prothorax) 8·5 mm.

Pupa. Extremely similar to that of *L. obsoletus* Thomson, particularly in the number and distribution of spines. The only constant difference appears to be in the shape of the spiracular peritreme, which in this species is broadly rounded at its extremities. Length up to 24 mm.; maximum breadth 9 mm.

Biology. According to Becker (1953b), the peak of emergence in Guatemala occurs between the middle and the end of April, at the beginning of the rainy season. Adults become active at dusk; in the daytime they seek seclusion. Larvae feed subcortically on the cambium, superficially grazing the inner bark and the outer sapwood. Before boring into the sapwood to pupate, the larva gnaws in the bark a circular groove about 4–5 mm. in diameter. In so doing, the larva eats away the cambium and pushes the frass slightly beyond the boundary of the excision. Sometimes the larva gnaws so near to the surface of the bark that the disc is completely excised and falls away, but often it is only partly excised, in which case it is pushed out by the emerging adult. In thick stems the discs are usually round (20–35 mm. in

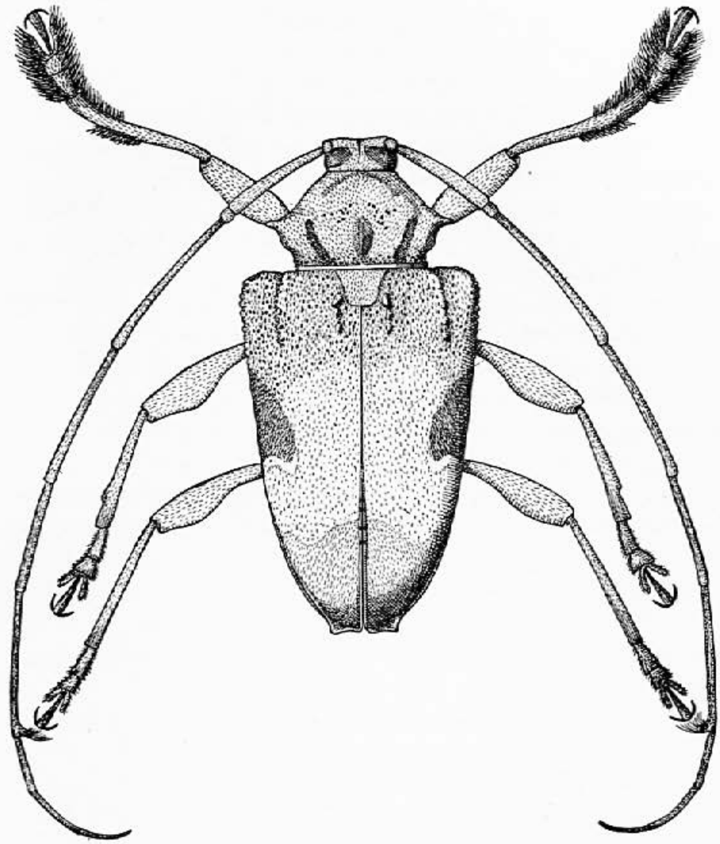


Fig. 139. *Lagocheirus araneiformis* (Linnaeus). Adult.

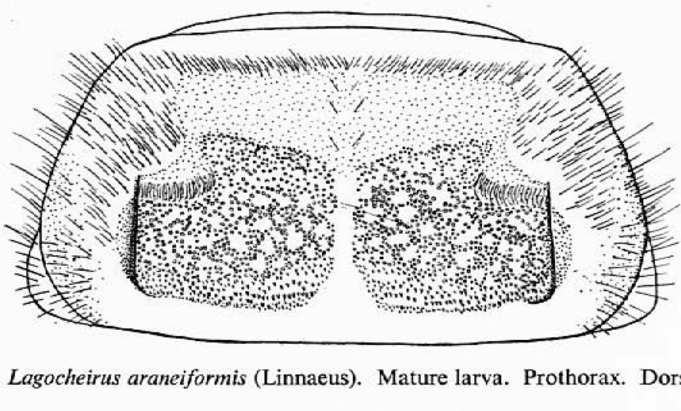


Fig. 140. *Lagocheirus araneiformis* (Linnaeus). Mature larva. Prothorax. Dorsal aspect.

diameter), but in thin stems they are mostly oval (22–35 mm. in diameter). This accomplished, the larva then tunnels into the sapwood where an elongate-elliptical gallery is excavated (4×9–10 mm.), the entrance of which is plugged with wooden shavings. The pupal cell lies 1 or 2 cm. deep in the sapwood. The emergence hole is subelliptical, one half being less convex than the other. The average dimensions are 9×6 mm. Some adults emerge inside the excised area of bark (i.e. close to the plugged larval gallery), others well beyond the excised area.

This characteristic damage has been described and illustrated earlier by Whitney (1942), Wolcott (1942), Beard (1942) and Martorell (1945), who had observed this species infesting *Bursera*.

Similar but much larger excisions are made by the larvae of certain African species of this subfamily (see Duffy, 1957, p. 183, Pl. IV, figs. 1 and 2).

This curious habit of excising discs of bark was recently observed by the author whilst in Trinidad. Typical excisions are shown on Pl. XII, figs. 1–3. In some cases the discs of bark were almost 1 inch thick. The larval galleries were found to be broad, shallow, subcortical and packed with coarse, shredded wood fibres. Before pupation the larvae were seen in the act of excising the discs of bark, the average dimensions being $1\frac{1}{2} \times 1$ inch; the central entrance to the pupal cell was plugged with a protuberant wad of shredded fibres torn from the surrounding sapwood. In some cases examined these excisions were numerous throughout the whole length of a 55-foot, nine-month-felled log.

Oviposition occurs usually only on freshly cut logs or branches, seldom on living, healthy trees (E.A.J.D.).

Predators. Larvae of the introduced elaterid *Chalcolepidus silbermanni* Chevrolat are predacious on larvae of this cerambycid.

Economic importance. In 1921 it was estimated that 5 per cent of the standard variety of sugar-cane was destroyed by this species in the Virgin Islands, only ripe canes being attacked (Smith, 1921).

Control. Wolcott (1933) suggests the cutting off and burning of all infested shoots (recognisable by their stunted growth and their abnormally swollen tissue). In the case of sugar-cane infestation, Smith (1921) recommends that, after harvesting, all rotten canes should be carted away and burned or passed through a mill to destroy the larvae.

Material studied. 6 L, 6 P, 3 I, Trinidad, South West Region, vii.1957, from *Bursera simaruba*, F. Peña leg., in coll. B.M.; 3 L, 1 I, Trinidad, Port-of-Spain (sawmills), 29.v.1957, from *Sapium aucuparium*, E.A.J.D. leg., in coll. B.M.; 8 L, 1 I, Trinidad, Arena Reserve, 12.iii.1957, from *Spondias mombin*, E.A.J.D. leg., in coll. B.M.; 3 L, 3 P, 1 I, St. Estéban, 7.xii.1891, Meinerd leg., in coll. U.Z.M.; 6 L, 2 P, 1 I, Trinidad, Arena Reserve, 4.vi.1957, from *Spondias mombin*, E.A.J.D. leg., in coll. B.M.; 6 L, 2 P, 1 I, Trinidad, Tabaquite, Brickfields, 7.vi.1957, from *Spondias mombin*, E.A.J.D. leg., in coll. B.M.; 3 L, 1 I, Trinidad, Arima District, 12.vi.1957, from *Hura crepitans*, F. Peña leg., in coll. B.M.

References. Beard, 1942 (Biol. fig.); Becker, 1953b (I fig., Biol. fig.); Craighead, 1923 (L fig., Biol.); Duffy, 1953a (Biol.); Grégoire, 1957 (I, Physiol.); Martorell, 1945 (I fig., Biol. fig.); Smith, 1921 (Biol., Contr.); Whitney, 1942 (I fig., Biol. fig.); Wilson, 1923 (Biol.); Wolcott, 1933 (Biol., Contr.), 1941 (Biol.), 1951 (I fig., Biol.).

Lagocheirus undatus undatus (Voet) (=**obsoletus** Thomson)

[El Tuétano]

Distribution. NEOTROPICAL REGION: Mexico, Central America (British Honduras, Guatemala, Nicaragua), Caribbean (Cuba). HAWAIIAN REGION: Hawaiian Is. PALAEARCTIC REGION: Loo Choo Is.

Host plants: *Plumeria rubra*, *Hibiscus*, *Allamanda*, *Araucaria*, *Euphorbia multiformis*, *Pseudopanax*, *Aleurites*, *Manihot glaziovi* (Duffy, 1953b); *Manihot utilissima*, *M. aipi* (Cunliffe, 1916).

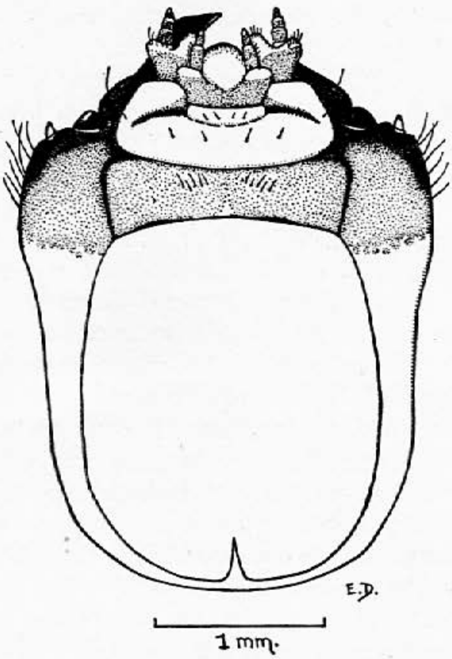


Fig. 141

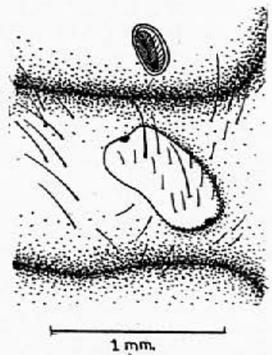


Fig. 142

Figs. 141–142. *Lagocheirus undatus undatus* (Voet). Mature larva. Fig. 141. Head. Ventral aspect. Fig. 142. Spiracle and pleural tubercle. Lateral aspect.

Mature larva (figs. 141–142). *Head* (fig. 141) strongly depressed with sides slightly constricted just before middle (maximum head-width 3·1 mm.) and slightly converging posteriorly; antennal foramen open behind; mouthframe ferruginous, very strongly and rather broadly sclerotised; frons with eight setiferous pores and numerous minute setae. Genae strongly shouldered and protuberant, strongly sclerotised, pitchy and rugose. One pair of ocelli present; lens ferruginous; pigmented spot indistinct. Hypostoma flat, smooth, ferruginous; sutures pitchy and slightly curved; gular region with a pale cleavage line on each side of which is a rugose area bearing four to six setae. Antenna 2-segmented; segment 2 bearing a conical hyaline process. Maxillae strongly sclerotised, with palpi 3-segmented; segment 3 about two-thirds length of segment 2. *Prothorax* with anterolateral regions with numerous long, ferruginous setae; posterior half of pronotum covered with semicircular asperities, with small, scattered, lenticular, glabrous areas. *Abdomen* with ampullae with a single transverse impression, a conspicuous pair of lateral furrows and a broad rather deep longitudinal furrow; non-tuberculate, dull, velvety micro-spiculate. Tergite 9 without a sclerotised process. Epipleurum protuberant on segments 7–9 only. Pleural tubercle (fig. 142) broadly oval, with a pair of sclerotised pits and at least ten setae. Anus trilobate. *Legs* absent. *Spiracles* with peritreme round, thick, testaceous. Length up to 34 mm.; maximum breadth (at prothorax) 6·5 mm.

Pupa. Head with vertex visible from above and deeply excavate between antennae; bearing a few short spines (each with a basal seta) behind base of each antenna; front with groups of two to four spines near base of each antenna, half-way between and at inner margin of each eye and at base of clypeus. Antennae extending as far as abdominal segment 5, where (in the female only?) they are strongly recurved and directed anteriorly to terminate alongside mid-coxae. Eyes feebly convex, glabrous. Mandibles each with a spine near middle of outer face. Labrum slightly transverse, with front margin strongly rounded and glabrous or almost so. *Pronotum* strongly transverse, with sides bearing a pair of stout tubercles; numerous short spines present, especially along front margin. *Mesonotum* smooth with about six small spines. *Metanotum* smooth, with four to six spines on each side of the scutellar groove, which is shallow. Elytra each with a conspicuous spine near base. Elytra and wings extending as far as abdominal segment 4. *Abdomen* with tergites 1–6 with anterior half with a median, oval, tuberculate, spinose protuberance and posterior half with a transverse row (interrupted medially) of short spines. Tergite 7 bearing numerous, much stouter, incurved spines. Tergite 8 with similar spines; tergite 9 very short, truncate apically and bearing a pair of large incurved spines (urogomphi?). Sternites glabrous. Pleura rather strongly protuberant, rugose. *Legs* with fore- and mid-femora strongly clavate, each femur with a row of spines near apex; mid- and hind femora each with a long tuberculate process near base; hind femora extending to abdominal segment 4; hind tibiae with a row of spines; all tibiae more or less at right angles to longitudinal axis of body. *Functional spiracles* present on abdominal segments 1–6, where they are placed laterally; peritreme rather narrowly oval, moderately thick and slightly raised above general level of cuticle. Length up to 21 mm.; maximum breadth (at prothorax) 9·5 mm.

Biology. In Hawaii, according to Bridwell (1920), this cerambycid attacks unhealthy or injured stems of *Euphorbia multiformis*. After destroying the main stem and branches while the plant is living, it then pupates therein.

Economic importance. Lavae of this species cause considerable damage where cassava is grown. They tunnel into the stems, lowering the vitality of the plant and decreasing the yield.

Control. As the adults eat the foliage, spraying with Paris green or lead arsenate is effective, using 1 lb. of the former to 50 gals. of water, or 1 lb. of the latter to 15–25 gals. of water. All infested stems, however, should be cut away and burnt during February, March and April (Cunliffe, 1916).

Material studied. 8 L, 3 P, 1 I, Honolulu, 22.viii.1951, from dead branches of breadfruit tree; 1 L, 1 P, 1 I, Niu Valley, Oahu, 30.x.1928, O. H. Swezey leg., in coll. B. Bishop Mus., Honolulu.

References. Bridwell, 1920 (Biol.); Cardin, 1911 (E fig., L fig., P. fig., Biol. fig.); Cunliffe, 1916 (Biol., Contr.); Duffy, 1953b (L fig., P, Biol.).

Lagocheirus tuberculatus tuberculatus (Fabricius)

Distribution. NEOTROPICAL REGION: Mexico, Central America (British Honduras, Costa Rica, Guatemala, Nicaragua, Panama), Caribbean (Jamaica).

Host plants: *Virola koschnyi*, *Symphonia globulifera* (Duffy, 1953a).

Reference. Duffy, 1953a (Biol.).

Archlagocheirus funestus (Thomson) (=**Lagocheirus funestus** Thomson)

Distribution. NEOTROPICAL REGION: Mexico.

Host plants: *Opuntia*, ?*Acacia* sp. (in Australia).

Economic importance. This Mexican species has been used in the past in an effort to control prickly pear, both in Australia and South Africa. 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 natural enemies (ants, spiders, lizards, etc.) and the infrequent rainfall.

References. Duffy, 1957 (Biol.); Lepesme, 1950b (Biol.), 1956 (Biol.); Pettey, 1946 (Biol.), 1953 (Biol.).

Oedopeza pogonocheroides Serville

Distribution. NEOTROPICAL REGION: Mexico, Central America (British Honduras, Guatemala, Nicaragua, Panama, Caribbean (Trinidad), South America (Argentina, Brazil, British Guiana, French Guiana).

Host plants: *Mora excelsa*, *Saman saman*, *Pithecolobium saman* (E.A.J.D.).

Mature larva. Similar to that of *Eutrypanus incertus* Bates, but differing in the structure of the sclerotised process on tergite 9. Length up to 24 mm.; maximum breadth (at prothorax) 4·1 mm.

Pupa. Similar to that of *Acanthocinus triangulifer* Erichson, but differing as follows. Elytra each with three to five spinules arising from a sub-basal, elongate tubercle. Abdominal segments 7 and 8 less strongly produced. Length up to 17 mm.; maximum breadth 5·5 mm.

Biology. The larval galleries and pupal cells are subcortical, the latter comprising shallow, oval concavities in the outer sapwood or inner bark or both, surrounded by a barrier of interlaced wood fibres. Adults emerge in March and June (E.A.J.D.).

Material studied. 8 L, 1 I, Trinidad, Manzanilla Windbelt Reserve, 14.iii.1957, from *Mora excelsa*, E.A.J.D. leg., in coll. B.M.; 4 L, 2 P, 1 I, British Guiana, North West District, Hosororo, 14.v.1957, from unknown host, E.A.J.D. leg., in coll. B.M.; 6 L, 2 P, 1 I, Trinidad, Ortoire District, 7.vi.1957, E.A.J.D. leg., in coll. B.M.; 8 L, 2 P, 2 I, Trinidad, Melanjo Reserve, 13.iii.1957, from *Mora excelsa*, E.A.J.D. leg., in coll. B.M.; 5 L, Brazil, 30.viii.1948, from *Pithecolobium saman*, in coll. U.S.N.M.; 4 L, 1 P, 1 I, Trinidad, Port-of-Spain, Zoological Gardens, 14.vi.1957, from *Saman saman*, E.A.J.D. leg., in coll. B.M.

Reference. None available.

Oedopeza umbrosa (Germar) (=**litigosa** Bates)

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).
Host plant: *Ficus pohliana* (Andrade, 1928).
References. Andrade, 1928 (Biol.); Lima, 1930 (Biol.), 1955 (Biol.).

Astyochus tenebrosus Bates

Distribution. NEOTROPICAL REGION: Central America (Guatemala).
Host plants: *Pinus rudis*, *Cupressus* (Becker, 1953c).
Mature larva (fig. 143). Similar to that of *Toronaeus figuratus* Bates from which it differs in having a carinate hypostoma and the abdominal ampullae only partly micro-spiculate. Length 45 mm.; maximum breadth 8 mm.

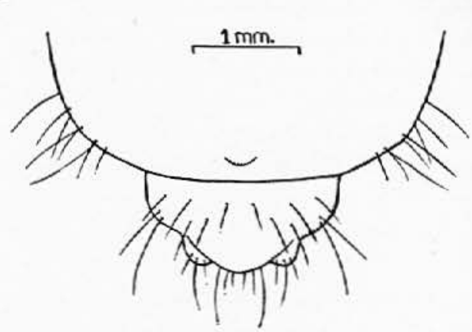


Fig. 143. *Astyochus tenebrosus* Bates. Mature larva. Abdominal tergites 9 and 10.

Biology. This species infests stumps of recently felled trees, particularly those which have been crudely felled by natives. Larvae feed subcortically and the pupal cell lies about 1 cm. deep in the sapwood. The emergence hole of the adult is irregularly rounded and measures 4–7 mm. in diameter. Adults emerge shortly before the rainy season, larvae, pupae and adults having been collected from under bark early in March.

Material studied. 1 L, Guatemala, Desconsuelo, 10.iii.1951, G. Becker leg., in coll. Becker.

References. Becker, 1953c (L fig., I fig., Biol. fig.); Schwerdtfeger, 1955 (Biol.).

Astyochus sallei Candèze

Distribution. NEOTROPICAL REGION: South America (Venezuela).
Reference. Candèze, 1861 (L fig., P fig., I fig.).

Astyochus dorsalis (Germar)

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).
Host plants: *Persea gratissima*, *Pera glabrata*, *Cybistax antisyphilitica*, ?*Tecoma*, *Ficus* sp. (Travassos, 1932); *Enterolobium maximum* (Acácio Costa Jn.).
References. Lima, 1955 (Biol.); Travassos, 1932 (Biol.).

Toronaeus figuratus Bates

Distribution. NEOTROPICAL REGION: South America (Brazil, British Guiana, French Guiana).

Host plant: *Trattinickia rhoifolia* (E.A.J.D.).

Mature larva. Very similar to that of *Oedopeza pogonocheroides* Serville, particularly in the structure of the process on abdominal tergite 9. It may be distinguished, however, by the non-micro-spiculate proeusternum and the smooth, shining, ferruginous mouthframe. Length up to 20 mm.; maximum breadth (at prothorax) 4·75 mm.

Pupa. Similar to those of *Oedopeza* and *Acanthocinus*, but more closely resembling the latter from which it differs in having two sub-basal spines on the elytra and the basal third of tergite 7 bearing only two to six spines. Length up to 16 mm.; maximum breadth 5·1 mm.

Biology. The larval galleries and pupal cells are subcortical, the latter comprising oval concavities in the inner bark or outer sapwood, each being surrounded by a barrier of interlaced wood fibres. Adults emerge in April (E.A.J.D.).

Material studied. 3 L, 4 P, 2 I, British Guiana, Bartica-Potaro Road, m. 24, 11.iv.1957, from *Trattinickia rhoifolia*, E.A.J.D. leg., in coll. B.M.

Reference. None available.

Chaetanes setiger Bates

Distribution. NEOTROPICAL REGION: Central America (Nicaragua, Panama), South America (Brazil, British Guiana, Ecuador, French Guiana).

Host plant: *Swartzia benthamiana* (E.A.J.D.).

Fig. 144. *Chaetanes setiger* Bates. Mature larva. Abdominal tergites 9 and 10.

Mature larva (fig. 144). Similar to that of *Eutrypanus incertus* Bates, but differing as follows. *Abdomen* with ampullae non-tuberculate, dull, micro-spiculate; tergite 9 (fig. 144) bearing a subvertical, keel-shaped, sclerotised process. Length up to 34 mm.; maximum breadth (at prothorax) 5 mm.

Pupa. Similar to that of *Alcidion bispinum* Bates from which it differs mainly in the tibiae, which are devoid of spines, the presence of a conspicuous median spine on sternite 8, and its larger size (length up to 16 mm.; maximum breadth 5·75 mm.).

Biology. The larval galleries and pupal cells are subcortical, the latter comprising shallow, oval concavities in the outer sapwood, which are surrounded by a barrier of interlaced wood fibres. Adults emerge in April (E.A.J.D.).

Material studied. 4 L, 3 P, 1 I, British Guiana, Bartica-Potaro Road, m. 24, 15.iv.1957, from *Swartzia benthamiana*, E.A.J.D. leg., in coll. B.M.

Reference. None available.

Eutrypanus incertus Bates

Distribution. NEOTROPICAL REGION: South America (Brazil, British Guiana, French Guiana).

Host plant: *Eschweilera sagotiana* (E.A.J.D.).

Mature larva (fig. 145). Larvae of this genus and *Chaetanes* and *Carphina* are at once distinguishable from the remainder of the Acanthocinini by the presence of a

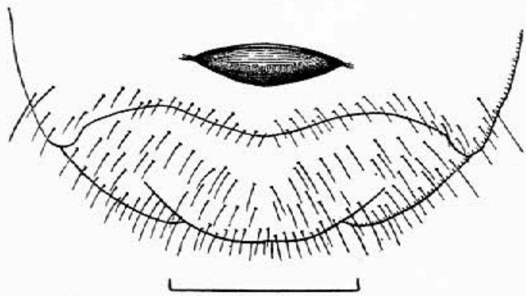


Fig. 145. *Eutrypanus incertus* Bates. Mature larva. Abdominal tergite 9.

large, broad, sclerotised process on abdominal tergite 9, which may possibly act as a stridulatory organ. *Head* strongly elongate, strongly depressed and slightly broader posteriorly, with sides feebly constricted medially; antennal foramen closed posteriorly; frons with front margin broadly ferruginous and feebly transversely carinate. Genae strongly shouldered and protuberant. One pair of ocelli present; lens oval, sclerotised; pigmented spot indiscernible. Clypeus and labrum rather strongly sclerotised, the former glabrous, the latter fringed anteriorly with fine setae. Hypostoma flat, ferruginous, feebly transversely carinate and bearing two pairs of setae on each side of gular region; hypostomal sutures straight, parallel, pitchy; gular region indiscernible. Antenna 2-segmented; segment 2 quadrate, bearing a conical hyaline process. Maxillary palpi 3-segmented; segment 3 slightly shorter than segment 2; labial palpi with segment 2 slightly more than half length of segment 1. *Prothorax* with a transverse fringe of setae just behind front margin; pronotum with posterior two-thirds matt, micro-pubescent. Proeusternum and sternellum matt, micro-pubescent. *Abdomen* with dorsal ampullae covered with rather large, oval, shining, glabrous, moniliform tubercles. Tergite 9 (fig. 145) bearing a large, transverse, labiate process posteriorly, which is very finely transversely striate and strongly recurved anteriorly. Epipleurum strongly protuberant on segments 7 and 8. Pleural tubercles broadly oval, each with a pair of sclerotised pits. Anus trilobed. *Legs* absent. *Spiracles* with peritreme circular, ferruginous, very thick and strongly raised above general level of cuticle. Length up to 20 mm.; maximum breadth (at prothorax) 5 mm.

Pupa. Similar to those of *Exocentrus* spp., but differing as follows. Elytra each with a pair of sub-basal setae. *Abdomen* with tergites 1 and 2 very much shorter than those on tergites 3–5. Tergite 7 with numerous (more than twenty-five) spines. Size much larger; length up to 15 mm.; maximum breadth 5 mm.

Biology. The larval galleries and pupal cells are entirely subcortical, the latter consisting of a shallow concavity (in the inner bark or outer sapwood), lined with an oval barricade of interlaced fibrous shreds. Adults emerge in April and May (E.A.J.D.)

Material studied. 8 L, 3 P, 2 I, British Guiana, Bartica-Potaro Road, 6 m. W. of m. 30, 12.iv.1957, from logs of *Eschweilera sagotiana*, E.A.J.D. leg., in coll. B.M.

Reference. None available.

Caphina sp.

Host plant: *Buchenaria capitata* (E.A.J.D.).

Mature larva (fig. 146). Extremely similar to that of *Eutrypanus incertus* Bates from which it may be distinguished by the process on abdominal tergite 9, which is subtriangular, not recurved, and bears a strong transverse carina across middle (fig. 146). Length up to 21 mm.; maximum breadth (at prothorax) 5·1 mm.

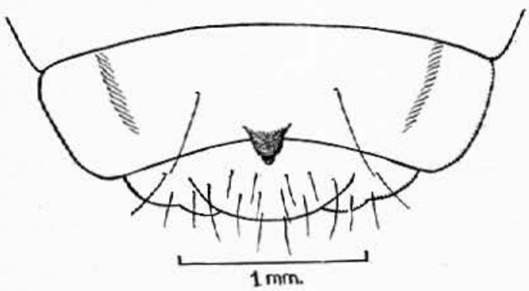


Fig. 146. *Caphina* sp. Mature larva. Abdominal tergites 9 and 10.

Pupa. Similar to that of *Acanthocinus triangulifer* Erichson from which it differs mainly in the very much shorter tergite 8.

Biology. The larval galleries and pupal cells are subcortical, the latter in a shallow oval concavity in the outer sapwood, which is surrounded by a barrier of interlaced wood fibres. Adults emerge in June (E.A.J.D.).

Material studied. 3 L, 1 P, 1 I, Trinidad, Arena Reserve, 13.vi.1957, from beneath bark of logs of *Buchenaria capitata*, E.A.J.D. leg., in coll. B.M.

Nyssodrys porifera Bates

Distribution. NEOTROPICAL REGION: Central America (Panama).
Host plant: *Virola koschnyi* (Duffy, 1953a).
Reference. Duffy, 1953a (Biol.).

Nyssodrys ophthalmica Lameere

Distribution. NEOTROPICAL REGION: Caribbean (Trinidad), South America (British Guiana, Venezuela).

Host plants: *Gossypiospermum praecox* (Duffy, 1953a); *Pratium insigne* (E.A.J.D.); *Fagara trinitensis* (F. Peña).

Mature larva (fig. 147). Readily distinguishable from other acanthocinine genera by the following characters. *Head* (fig. 147) with front margin of frons and front margin of hypostoma transversely carinate; temples longitudinally carinate. *Abdomen* with ampullae bearing shining, glabrous, moniliform tubercles. Pleural tubercles with only the upper sclerotised pit distinct. Length up to 24 mm.; maximum breadth (at prothorax) 5·4 mm.

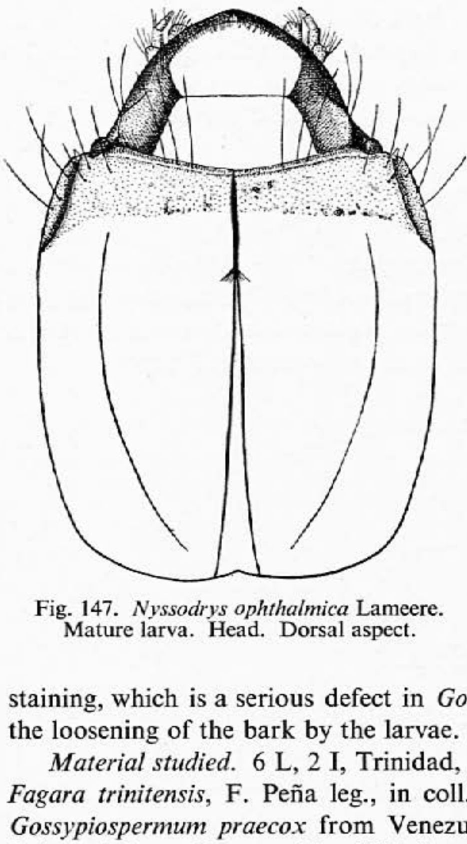


Fig. 147. *Nyssodrys ophthalmica* Lameere. Mature larva. Head. Dorsal aspect.

In view of the carinate temples and unusual pigmentation of the frons, this genus may prove to have stronger affinities with the Colobothenini than any other genus of the Acanthocinini.

Biology. The pupa cell is a shallow concavity in the inner side of the bark; it is plugged at the entrance with extremely fine shreds of wood fibres in the form of overlapping circular or semicircular discs (Pl. VII, fig. 2). This species was found to be locally abundant in Trinidad (E.A.J.D.).

Economic importance. No technical injury is caused to timber by this species. It is possible, however, that extensive blue staining, which is a serious defect in *Gossypiospermum*, may be encouraged through the loosening of the bark by the larvae.

Material studied. 6 L, 2 I, Trinidad, Southern Watershed Reserve, vii.1957, from *Fagara trinitensis*, F. Peña leg., in coll. B.M.; 1 L, England, in imported logs of *Gossypiospermum praecox* from Venezuela, 20.x.1955, in coll. F.P.R.L.; 3 L, 2 I, Trinidad, Arena Reserve, 30.v.1957, from *Pratium insigne*, E.A.J.D. leg., in coll. B.M.; 7 L, 6 P, 2 I, Trinidad, Manzanilla Windbelt Reserve, 14.iii.1957, from unknown host, F. Peña leg., in coll. B.M.

Reference. Duffy, 1953a (Biol.).

Nyssodrys spreta Bates

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plant: *Theobroma* (pods) (Bondar, 1939).

Reference. Bondar, 1939 (Biol.).

Nyssodrys deleta Bates

Distribution. NEOTROPICAL REGION: Mexico, Central America (Guatemala, Nicaragua, Panama), South America (Brazil, British Guiana, French Guiana, Peru).

Host plant: *Pterocarpus* sp. (E.A.J.D.).

Mature larva. Similar to that of *N. ophthalmica* Lameere, but unique in its possession of curious protuberant tubercles on the meso- and meta-alar areas. In addition, the temples of the head are smooth. Length up to 15 mm.; maximum breadth (at prothorax) 4·5 mm.

Biology. The larval galleries are broad, shallow and subcortical, being loosely filled with coarse fibres. Pupation occurs 2 to 4 inches deep in the sapwood. Adults emerge in June (E.A.J.D.).

Material studied. 1 L, 1 I, British Guiana, Baromanni, Arikoua Creek, 10.v.1957, from *Pterocarpus* sp., E.A.J.D. leg., in coll. B.M.

Reference. None available.

Nyssodrys lignaria Bates

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil, Paraguay).

Host plants: *Holocalyx glaziovii* (Andrade, 1928); *Theobroma* (pods) (Bondar, 1939); *Inga luschnatiana* (Bosq, 1942a).

References. Andrade, 1928 (Biol.); Bondar, 1939 (Biol.); Bosq, 1942a (Biol.); Lima, 1930 (Biol.), 1955 (Biol.).

Acanthocinus (s.g. **Acanthocinus**) **obliquus** J. Leconte var. **chihuahuae** Casey

Distribution. NEOTROPICAL REGION: Mexico, Central America (Guatemala).

Host plant: *Pinus* (Becker, 1953c).

Mature larva. No material available. The following is a description of *A. aedilis* (Linnaeus), which should be essentially similar. Form elongate, slender, depressed. *Head* (fig. 148) strongly depressed with sides slightly constricted before middle, and slightly converging posteriorly; antennal foramen closed behind; mouthframe very strongly and rather broadly sclerotised, the transverse, dorsal ferruginous band as broad as half length of clypeus; frons with a transverse row of eight setiferous pores, behind which it is freely sclerotised and testaceous. Genae strongly shouldered and protuberant, strongly sclerotised and pitchy and with a conspicuous transverse furrow immediately in front of ocellus; broadly rugose and ferruginous posteriorly. One pair of ocelli present; lens ferruginous, pigmented spot indistinct owing to sclerotisation of gena. Clypeus with two to four widely separated, longitudinal impressions. Hypostoma flat, smooth, testaceous, with front and hind margins ferruginous; sutures ferruginous and slightly curved. Gular region with a pale ventral cleavage line, on each side of which is a ferruginous rugose area bearing four to six setae. Antenna (fig. 149) 2-segmented; segment 2 subquadrate and bearing a small conical, hyaline process. Maxilla (fig. 150) strongly sclerotised, with palpi 3-segmented; segment 3 tapering, about two-thirds length of segment 2; palpifer with outer margin strongly rounded and protuberant. Labial palpi with segment 2 cylindrical, about one-third length of segment 1. Mentum distinct from submentum. *Prothorax* with a transverse row of setae just behind front margin; posterior region of pronotum with two ferruginous areas of very fine dense spicules, with numerous interspaced, glabrous spots. *Abdomen* with ampullae with one transverse furrow, a conspicuous pair of lateral

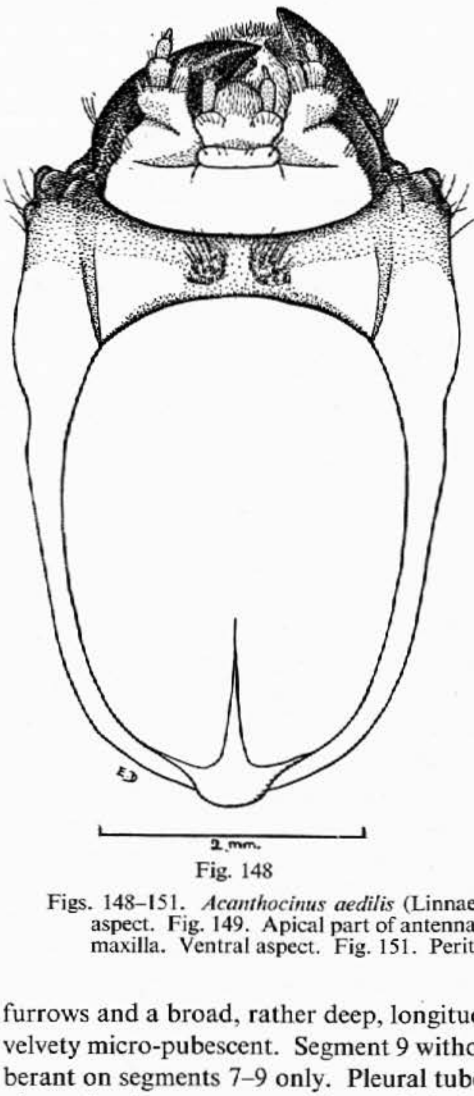


Fig. 148

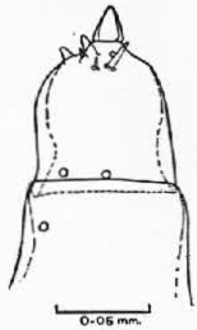


Fig. 149

Fig. 151

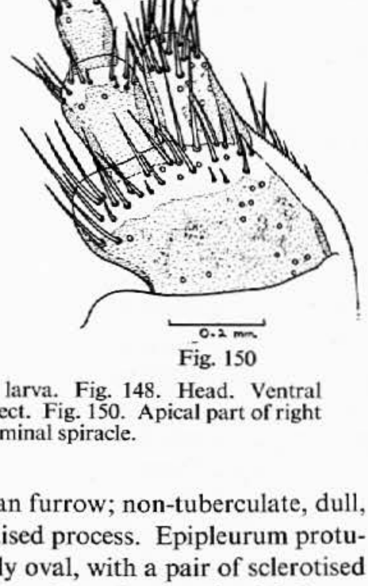


Fig. 150

Figs. 148–151. *Acanthocinus aedilis* (Linnaeus). Mature larva. Fig. 148. Head. Ventral aspect. Fig. 149. Apical part of antenna. Lateral aspect. Fig. 150. Apical part of right maxilla. Ventral aspect. Fig. 151. Peritreme of abdominal spiracle.

furrows and a broad, rather deep, longitudinal, median furrow; non-tuberculate, dull, velvety micro-pubescent. Segment 9 without a sclerotised process. Epipleurum protuberant on segments 7–9 only. Pleural tubercle broadly oval, with a pair of sclerotised pits and at least ten setae. Anus trilobed. *Legs* absent. *Spiracles* round, with five to eight marginal chambers on posterior half of peritreme (fig. 151). Length up to 37 mm.; maximum breadth (at prothorax) 6·5 mm.

Pupa. No material available. The following is a description of that of *A. aedilis* (Linnaeus), which should be very similar. *Head* with vertex visible from above and deeply excavated between antennae; bearing a few minute spines (each with a fine basal seta); front with a few scattered similar spines, smooth; clypeus with a deep transverse impression at base and two or three spines near each basal angle. Antennae (fig. 152) extending as far as abdominal segment 7, where, in the female, they are

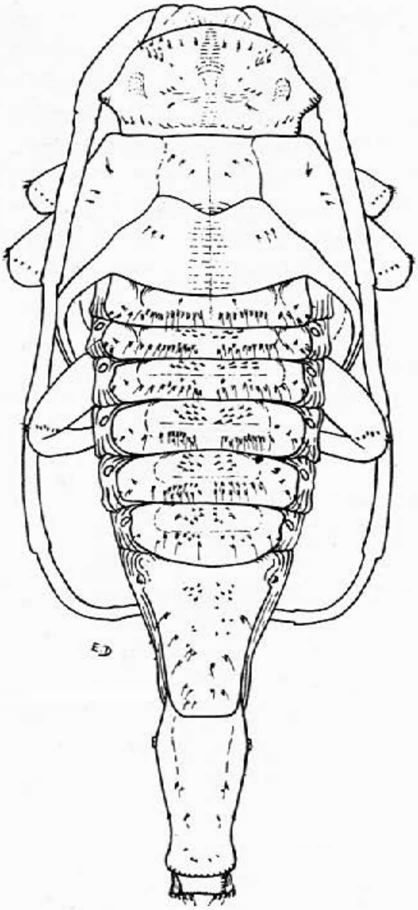


Fig. 152

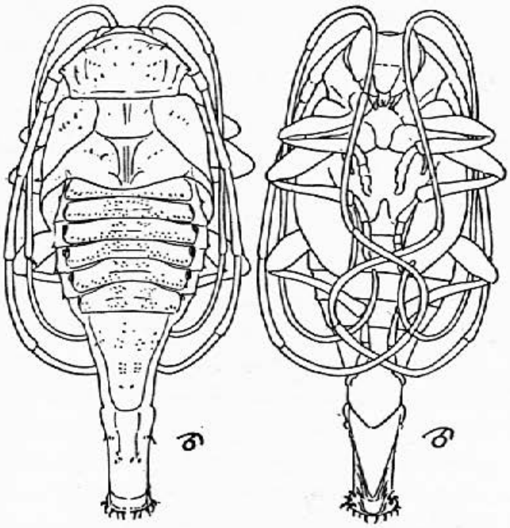


Fig. 153

Fig. 152. *Acanthocinus aedilis* (Linnaeus). Female pupa. Dorsal aspect.
Fig. 153. *Acanthocinus aedilis* (Linnaeus). Male pupae. Dorsal and ventral aspects (Kemner, 1922).

strongly recurved and directed anteriorly to terminate near their basal segments; in the male (fig. 153) they are crossed beneath abdominal segment 7, then directed anteriorly to just beyond vertex of head, where they are strongly recurved and directed posteriorly to near the base of abdominal segment 7, where they again recurved to terminate near apices of elytra. Eyes feebly convex, glabrous. Mandibles with one or two setae near middle of outer face. Labrum transverse and with front margin slightly rounded; glabrous or almost so. *Pronotum* with sides bearing a pair of tubercles; numerous short spines are present, mostly near front angles; an elongate-oval protuberance present near each lateral tubercle. *Mesonotum* smooth and with about six short spines; scutellum depressed, glabrous. *Metanotum* smooth, except near scutellar groove, where it is transversely striate; bearing about six spines; scutellar groove indistinct. Elytra each with a conspicuous spine near base and sometimes with two or three smaller spines near by. Elytra and wings extending as far as abdominal segment 4. *Abdomen* with tergites 1–6 with posterior half bearing a transverse row (interrupted medially) of slender spines; each anterior half of tergites bearing two groups of spines which are curved inwards. Tergite 7 strongly elongate and bearing numerous scattered spines. Tergite 8 extremely elongate and with a few similar spines. Tergite 9 very short, truncate apically, and bearing about six inwardly curved spines. Sternites glabrous. Pleura rather strongly protuberant, strongly rugose and bearing a minute seta. *Legs* with fore- and mid-femora clavate; each femur with a row of spines near apex; mid- and hind femora each with a long tuberculate process near base; hind femora extending to abdominal segment 4; all tibiae more or less 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, where they are placed laterally; peritreme rather narrowly oval, moderately thick and very slightly raised above general level of cuticle. Length up to 24 mm.; maximum breadth 6·25 mm.

Biology. Larvae, pupae and adults of this species have been collected from under the bark of a fallen pine. Larvae pupate in late April and adults emerge in May (Becker, 1953c).

References. Becker, 1953c (Biol.); Schwerdtfeger, 1955 (Biol.).

Acanthocinus triangulifer (Erichson) (=**Eutrypanus triangulifer** (Erichson))

Distribution. NEOTROPICAL REGION: South America (Brazil, Peru).

Host plant: *Nectandra* sp. (F. Plaumann).

Mature larva. Form elongate, very slender, subcylindrical. *Head* strongly depressed and strongly elongate, with sides feebly but distinctly constricted just before middle and slightly converging posteriorly; front margin of frons rather broadly ferruginous and transversely carinate; six epistomal setae present; antennal foramen closed posteriorly. Genae strongly shouldered, protuberant, ferruginous; temples not carinate. Ocelli indiscernible. Hypostoma with front margin ferruginous and transversely carinate and with a pair of setal pores on each side of gula; sutures ferruginous, straight, slightly converging; gula rather broad, triangular. Antenna 2-segmented; segment 2 quadrate, and bearing a small conical process. Maxilla with segment 3 of palp shorter than segment 2. *Prothorax* with posterior area of pronotum pale testaceous and finely micro-spiculate, this area not interrupted medially. Eusternum indistinctly defined; sternellum finely micro-spiculate. *Abdomen* with ampullae matt, velvety micro-spiculate, non-tuberculate. Tergite 9 without a sclerotised process. Epipleurum protuberant on segments 7–9 only. Pleural tubercles broadly oval, each with a pair of sclerotised pits. Anus trilobed. *Legs* absent. *Spiracles* with peritreme pale, thick and circular. Length up to 30 mm.; maximum breadth (at prothorax) 4·8 mm.

The larva of this species is atypical in that it has a transverse, carinate frons and hypostoma.

Pupa (fig. 154). *Head* (too mutilated for description). *Mesonotum* smooth, with about six short spines; scutellum depressed, glabrous. *Metanotum* smooth, except scutellar groove, which is transversely striate and bearing about six large and two or three smaller spines arranged roughly in two oblique rows to form a V. Elytra each with a conspicuous spine near base. Elytra and wings extending as far as abdominal segment 4. *Abdomen* with tergites 1–6 with posterior half bearing paired groups of numerous straight, ferruginous spines directed posteriorly; anterior half of tergites 3–6 with similar but less numerous spines, which are pointing inwards. Tergite 7 extremely elongate and strongly produced posteriorly and bearing numerous scattered spines as figured (fig. 154). Tergite 8 strongly elongate, bearing similar spines. Tergite 9 very short, truncate apically and bearing four pairs of stout, inwardly curved spines. Sternites glabrous. *Legs* with femora clavate, each with a row of stout spines (each with a basal seta) near apex; hind femora with a long slender, tuberculate process near base; hind femora extending to abdominal segment 4; all tibiae more or less 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, where they are placed laterally; peritreme thin, pale, broadly oval and rather strongly raised above general level of cuticle. Length up to 24 mm.; maximum breadth (at prothorax) 5·75 mm.

Material studied. 2 L, 1 P, Brazil, xii.1941, from *Nectandra* sp., F. Plaumann leg., in coll. B.M.

Reference. None available.

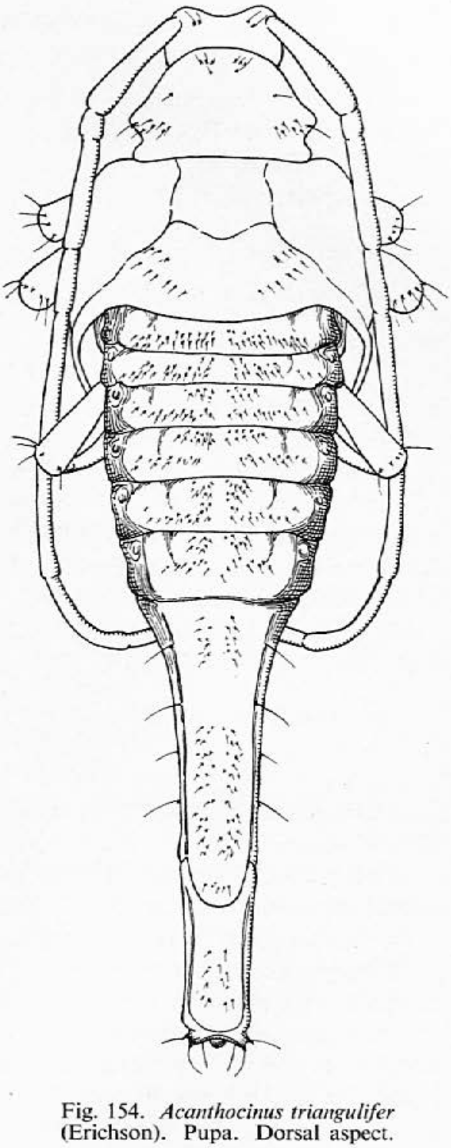


Fig. 154. *Acanthocinus triangulifer* (Erichson). Pupa. Dorsal aspect.

Leptostylus argentatus Jacq. du Val

Distribution. NEOTROPICAL REGION: Caribbean (Cuba, Hispaniola, Puerto Rico). NEARCTIC REGION: U.S.A. (Florida).

Host plants: *Zanthoxylum flavum* (Wolcott, 1941a); *Conocarpus erecta* (Schwarz, 1888).

References. Martorell, 1945 (Biol.); Schwarz, 1888 (Biol.); Wolcott, 1941a (Biol.), 1951 (Biol.).

Leptostylus biustus J. Leconte

[Tuétano]

Distribution. NEOTROPICAL REGION: Caribbean (Cuba, Hispaniola (including Haiti)). NEARCTIC REGION: U.S.A. (Canada, Florida, Illinois, Louisiana, New Jersey, New York, Texas, Virginia).

Host plants: *Yucca* sp. (Wolcott, 1933); *Manihot utilissima*, *M. aipi* (Cunliffe, 1916).

Biology. This species mines the shoots and stems of the host plants.

References. Cardin, 1911 (Biol. fig.); Cunliffe, 1916 (Biol.); Wolcott, 1933 (Biol.).

Leptostylus pleurostictus Bates

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plant: *Citrus aurantium* (Bondar, 1929a).

Biology. The habits of this species are similar to those of *Macropophora accentifer* (Olivier), for the larvae of both these species feed subcortically, entering the wood only to pupate. *L. pleurostictus* Bates, however, deposits its eggs only in bark which is either dead or has been injured and the larvae always feed in the subcortical layer of the dead wood only (Fonseca and Autouri, 1932).

References. Araujo, 1939 (Biol.); Bondar, 1929a (Biol. fig.); Fonseca and Autouri, 1932 (Biol.); Lima, 1930 (Biol.), 1955 (Biol.); Quayle, 1938 (Biol.).

Leptostylus praemorsus (Fabricius)

[The Lime Tree Bark Borer]

Distribution. NEOTROPICAL REGION: Mexico, Caribbean (Antigua, Dominica, Grenada (?), Guadeloupe, St. Barthélemy, St. Lucia), Bermuda.

Host plants: *Poinciana* (? *Delonix*) (Ogilvie, 1928); *Lagerstroemia indica*, *Juniperus bermidiana*, *Bauhinia monandra*, *Delonix regia*, *Citrus limonia*, *C. sinensis*, *Eriobotrya japonica*, *Eugenia uniflora* (Waterston, 1940).

Biology. The eggs are deposited only in dead or dying portions of the trees, but the resulting damage by the larvae usually increases the amount of dead wood, thus hastening the death of the tree. Trees may be attacked in the stem near ground-level and in decaying stubs produced by pruning operations. In the case of *Citrus limonia* and *C. sinensis* in Bermuda, the main characteristic of infestation was the rapid spread of larval damage. In several instances it was noticed that the larvae had girdled the branches subcortically without any external indications being revealed; in fact, even heavily infested branches were laden with fruit and healthy foliage. Larvae can, however, be located by the presence of dead or shrunken patches of bark, darker in colour, with minute wood fibres protruding through cracks in the bark.

In addition to *Citrus* species this beetle is particularly injurious to recently killed trees or branches of *Juniperus bermudiana*, the larvae stripping off the bark and gouging out shallow galleries in the white wood. Adults often seclude themselves under the leaf sheaths of the Bermuda Palmetto (*Sabal bermudiana*) (Waterston, 1940).

Economic importance. This species is a pest of lime and *Citrus* trees in the West Indies. It is often seen in association with Red Root disease in which case it is apparently confined to diseased tissue, but may attack apparently healthy trees (Ballou, 1915).

Control. The only effective method once a tree is infested is to cut out the larvae with a sharp pointed knife, which should be done in late summer. The injured bark should be trimmed back to the healthy green tissue, the exposed wood being thoroughly cleaned and painted with pruning paint. All loppings should be burned.

To discourage infestation, trees should be maintained in good condition. The application of a nitrogenous fertiliser will assist recovery; this should be placed about 2 feet away in a circle round the tree 3 feet wide, and forked into the soil. In severe infestations this naphthalene repellent is recommended: fish or whale oil soap 25 lb.; water $1\frac{1}{2}$ gals.; flaked naphthalene $12\frac{1}{2}$ lb.; flour 2 lb.

Dissolve soap in hot water and stir in the flour. Add flaked naphthalene and heat to 180° F. until quite dissolved. Cool and store in sealed containers. For use, thin to consistency of paint and apply to trunks and branches with brush (Waterston, 1940).

References. Anonymous, 1913 (Biol.); Ballou, 1912 (Biol., Contr.), 1913 (Biol.), 1915 (Biol.); Evans, 1952 (Biol.); Ogilvie, 1928 (Biol.); Pierce, 1918 (Biol.); Waterston, 1940 (Biol., Contr.), 1941 (Biol.).

Leptostylus bruchi Melzer

Distribution. NEOTROPICAL REGION: South America (Argentina).
Host plants: *Ligustrum sinense*, *Ficus*, *Manihot aipi*, *Juglans* (Bosq, 1942a).
Reference. Bosq, 1942a (Biol.).

Leptostylus gundlachi Fisher

Distribution. NEOTROPICAL REGION: Caribbean (Puerto Rico).
Host plants: *Erythrina glauca* (pods) (Wolcott, 1951).
Reference. Wolcott, 1951 (Biol.).

Ozineus prolixus Melzer

Distribution. NEOTROPICAL REGION: South America (Brazil).
Host plant: *Manihot palmata* (Pyenson, 1938).

Mature larva (fig. 155). Similar to those of *Acanthocinus*, but differing as follows. *Head* capsule less elongate; epicranial halves each with a row of four pigmented setal pores situated immediately behind the pale median part of the frontal suture (fig. 155); hypostomal plates entirely ferruginous. *Abdomen* with ampullae bearing moniliform tubercles which are shining and glabrous. Length up to 19 mm.; maximum breadth (at prothorax) 4 mm.

Pupa (fig. 156). Similar to those of *Acanthocinus*, but differing as follows. *Head* with antennae extending to only just beyond hind femora before being recurved ventrally to terminate near front coxae. Elytra without a sub-basal spine, but with an elongate-oval, raised tubercle. Length up to 10·5 mm.; maximum breadth 6·7 mm.

Economic importance. Larvae of this species have been boring in the stems of *Manihot* and killing them (Pyenson, 1938).

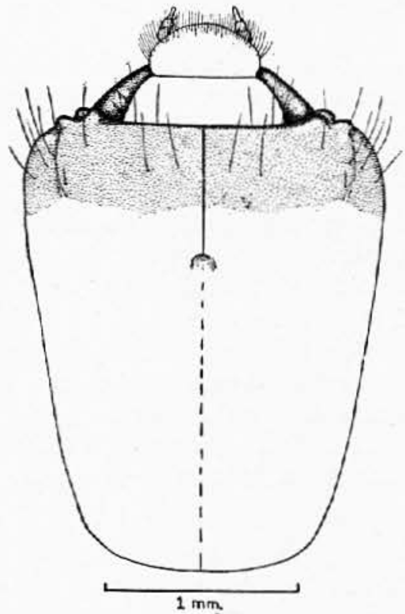


Fig. 155

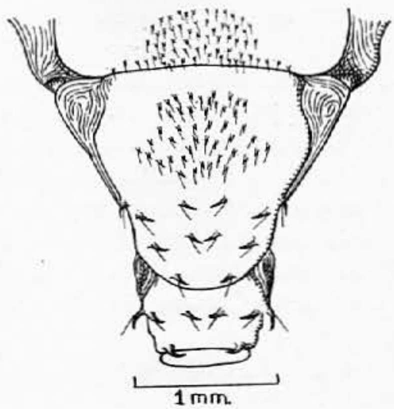


Fig. 156

Fig. 155. *Oxineus prolixus* Melzer. Mature larva. Head. Dorsal aspect.
Fig. 156. *Ozineus prolixus* Melzer. Pupa. Posterior segments of abdomen. Dorsal aspect.

Material studied. 3 L, 3 P, Brazil, 11.vii.1949, from stems of *Manihot*, in coll. U.S.N.M.

References. Lima, 1955 (Biol.); Pyenson, 1938 (Biol.).

Ozineus arietinus Bates

Distribution. NEOTROPICAL REGION: Mexico, Central America (Guatemala, Nicaragua, Panama).

Host plant: *Entanda polystachia*.

Reference. Goeldi, 1897 (Biol.).

Atrypanius albocinctus Melzer

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plant: *Ficus* sp. (F. Plaumann).

Mature larva. Similar to that of *Nyssodrys*, but with temples striate instead of with a single carina, front margin of frons and hypostoma non-carinate, and ampullae matt and micro-spiculate. Length up to 16 mm.; maximum breadth (at prothorax) 3·5 mm.

Pupa. Resembling that of *Exocentrus* sp. from which it differs in having much shorter antennae, shorter femoral tubercles and densely spinose tergites. Length up to 10·5 mm.; maximum breadth 4·5 mm.

Material studied. 5 L, 1 P, Brazil, xii.1941, from *Ficus* sp., F. Plaumann leg., in coll. B.M.

Reference. None available.

Lepturges guadeloupensis Fleutiaux and Sallé

Distribution. NEOTROPICAL REGION: Caribbean (Cuba, Grenada, Guadeloupe, Puerto Rico, The Grenadines (Mustique)).

Host plants: *Vachellia farnesiana* (pods), *Capparis flexuosa* (branches); adults have been collected on *Rhizophora mangale* (Martorell, 1945); *Delonix regia*, *Hibiscus*, *Acacia farnesiana* (pods) (Wolcott, 1951).

Mature larva. From its position in the key it will be realised that this larva is not typical of the Acanthocinini. Moreover, it has not been possible to include it in the main section of this tribe owing to the complete absence of micro-pubescence or micro-spiculi on the pronotum. It does, however, possess the facies of a typical acanthocinine larva and, according to Craighead (1923), the larva of *L. spermophagus* Fisher has a pronotum which is micro-pubescent posteriorly. Two-segmented maxillary palpi are unusual in this tribe, although they do occur in the genus *Exocentrus*.

The larva of *L. sejunctimacula* Bates has since become available and proved to be a typical acanthocinine, with a micro-spiculate pronotum and 3-segmented maxillary palpi (see p. 255).

Natural enemies. These beetles are eaten by the Puerto Rican tody (*Todus mexicanus* Lesson) and also by the common lizard (*Anolis cristatellus* Duméril and Bibron) (Martorell, 1945).

Material studied. 6 L, Puerto Rico, San Juan, from *Delonix regia*, W. A. Hoffman leg., in coll. U.S.N.M.

References. Martorell, 1945 (Biol.); Wolcott, 1936 (Biol.), 1951 (Biol.).

Lepturges mancus Melzer

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).

Host plants: *Ficus*, "tasi" (? *Inga* sp.) (Bosq, 1942a).

Reference. Bosq, 1942a (Biol.).

Lepturges sejunctimacula Bates

Distribution. NEOTROPICAL REGION: Central America (Guatemala, Panama), South America (Brazil, British Guiana).

Host plant: *Catostemma* sp. (E.A.J.D.).

Mature larva. Distinguishable from other acanthocinine larvae (except *Trypanidius*) by the presence of a slender spine on abdominal tergite 9. *Head* with temples rather broadly ferruginous, smooth. One pair of distinct ocelli present; lens round, convex; pigmented spot indistinct. Antenna 2-segmented. Hypostoma entirely ferruginous. Gular region with a distinct pale, median cleavage line. Maxillary palpi 3-segmented. *Prothorax* with posterior part of pronotum with a rather small, subtriangular, micro-spiculate area; eusternum shining, glabrous. *Abdomen* with ampullae covered with shining, glabrous, moniliform tubercles. Tergite 9 bearing a slender spine-like process. Pleural tubercles each with a pair of sclerotised pits. *Spiracles* with peritreme circular and lined with subcontiguous marginal chambers on posterior half. Length up to 12 mm.; maximum breadth (at prothorax) 3·1 mm.

Pupa Head with vertex visible from above, moderately deeply excavate between antennal tubercles. Front with nine small spines (each with a long basal seta). Clypeus with four to six similar spines across base; labrum with two rows of fine setae. Antennae extremely long, extending as far as abdominal segment 5, where they are strongly recurved ventrally and directed anteriorly as far as eyes, where (in the male) they are again recurved to terminate alongside apices of mid-femora. Eyes feebly convex, sometimes with one or two setae. Mandibles each with a pair of fine setae near middle of outer face. *Pronotum* bearing a pair of very feebly defined sub-basal tubercles; anterior and lateral margins fringed with scattered fine setae; disc bearing a pair of paramedian slender spines. *Mesonotum* and *metanotum* with scattered fine setae. Elytra with scattered setae as figured. *Abdomen* with tergites 2–6 each with a group of slender spines and with numerous fine setae laterally as figured. Tergite 7 strongly elongate, with spines stouter and pointing inwards; setae more numerous. Tergite 8 with two pairs of much stouter but similar spines. Tergite 9 bearing a slender vertical spine medially. Sternites and pleura bearing numerous fine setae. *Legs* with femora bearing a row of subapical spines; femora, tibiae and tarsi with numerous scattered setae; hind femora with a short tuberculate process near base, extending to between abdominal segments 4 and 5. *Functional spiracles* present on abdominal segments 1–6; peritreme broadly oval, thin, pale; posterior half lined with subcontiguous marginal chambers. Length up to 11 mm.; maximum breadth (at prothorax) 4·5 mm.

Biology. The larval galleries and pupal cells are subcortical. Adults emerge in April and May.

Material studied. 3 L, 2 P, 1 I, British Guiana, Bartica District, Skull Point, 20.iv.1957, from *Catostemma* sp., E.A.J.D. leg., in coll. B.M.

Reference. None available.

Oectropsis latifrons Blanchard

Distribution. NEOTROPICAL REGION: South America (Chile).

Host plant: *Lathraea caustica* (G. Kuschel).

Mature larva. Rather similar to that of *Lepturges guadeloupensis* Fleutiaux & Sallé in that the maxillary palpi are 2-segmented and the pronotum is devoid of microspiculi. It is, however, readily distinguishable from *Lepturges* and all other acanthocinine genera by the extremely strongly protuberant, bilobed ampullae on abdominal segments 5–7. Length up to 10 mm.; maximum breadth (at prothorax) 2 mm.

Material studied. 3 L, Chile, Santiago, Las Cruces, 26.iv.1957, from *Lithraea caustica*, G. Kuschel leg., in coll. B.M.

Reference. None available.

Trypanidius melancholicus (Serville)

Distribution. NEOTROPICAL REGION: Central America (British Honduras, Guatemala, Nicaragua), Caribbean (Trinidad), South America (Brazil, British Guiana, Ecuador, French Guiana).

Host plants: *Alchornea triplinerva*, *Jenipa americana* (E.A.J.D.); *Rollinia* sp. (F. Peña).

Mature larva (fig. 157). Similar to those of *Xylergates* from which it differs as follows. *Head* with temples smooth. *Abdomen* with tergite 9 bearing a short, stout, sclerotised, longitudinally striate spine (fig. 157). Length up to 26 mm.; maximum breadth (at prothorax) 6·2 mm.

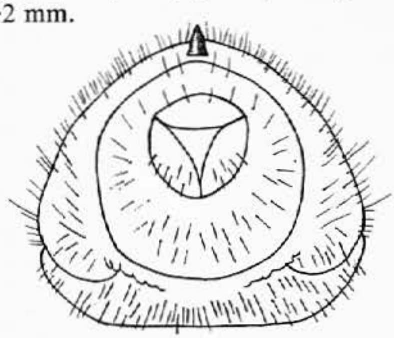


Fig. 157. *Trypanidius melancholicus* (Serville). Mature larva. Abdominal segments 9 and 10. Caudal aspect.

Pupa. Very similar to those of *Lagocheirus* species, the main differences being in the size and distribution of the spines. *Abdomen* with tergite 9 bearing four small straight spines. *Legs* with tibiae glabrous. Length up to 17 mm.; maximum breadth 7·1 mm.

Biology. Adults emerge from April to June. Discs of bark about $\frac{3}{4}$ inch in diameter are excised by the larvae before pupation, which takes place $\frac{1}{4}$ to $\frac{1}{2}$ inch in the sapwood (Pl. II, fig. 1).

Parasites. A large number of larvae were found to be parasitised by dipterous larvae.

Material studied. 4 L, 1 P, 1 I, Trinidad, Catshill, vi.1957, from *Rollinia* sp., F. Peña leg., in coll. B.M.; 5 L, 2 P, 1 I, British Guiana, Bartica-Potaro Road, m. 24, 26.iv.1957, from *Alchornea triplinerva*, E.A.J.D. leg., in coll. B.M.

References. None available.

Trypanidius dimidiatus Thomson

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).

Host plant: *Salix* (Bosq, 1934).

Reference. Bosq, 1934 (Biol.).

Trypanidius proximus Melzer

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).

Host plant: *Salix* (Bosq, 1942a).

Reference. Bosq, 1942a (Biol.).

Xylergates sp. (**hilaris** Dejean?)

Distribution. NEOTROPICAL REGION: South America (British Guiana).
Host plant: *Eschweilera sagotiana* (E.A.J.D.).

Mature larva (fig. 158). Rather similar to that of *Oedopeza pogonocheroides* Serville from which it differs in having the temples broadly ferruginous and coarsely transversely striate (fig. 158), and the mandibles long and slender. Length up to 26 mm.; maximum breadth (at prothorax) 5·1 mm.

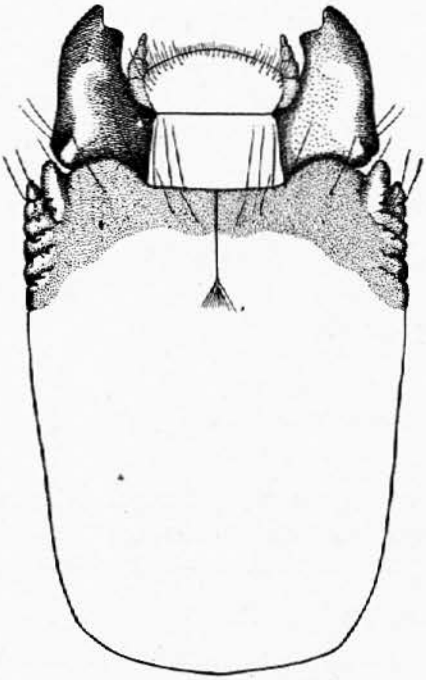


Fig. 158

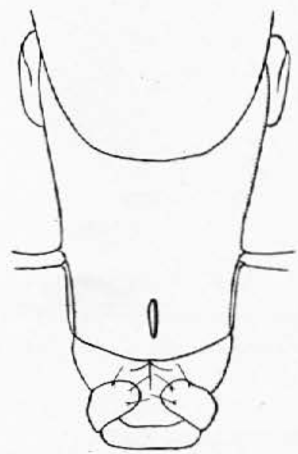


Fig. 159

Fig. 158. *Xylergates* sp. (*hilaris* Dejean?). Mature larva. Head. Dorsal aspect.
Fig. 159. *Xylergates* sp. (*hilaris* Dejean?). Pupa. Abdominal sternites 8 and 9.

Pupa (fig. 159). Similar to that of *Eutrupanus incertus* Bates, but distinguishable by the much smaller spines on abdominal tergite 8 and, in the female only, the presence of a longitudinal, median, ferruginous carina on sternite 8 (fig. 159).

Biology. The larval galleries and pupal cells are subcortical, the latter comprising shallow oval concavities in the outer sapwood and surrounded by a nest-like barrier of interlaced wood fibres. Adults emerge in April and May (E.A.J.D.).

Material studied. 5 L, 2 P, 2 I, British Guiana, Bartica-Potaro Road, m. 24, 11.iv.1957, from log of *Eschweilera sagotiana*, E.A.J.D. leg., in coll. B.M.

Reference. None available.

Xylergates praetor (Dejean)

Distribution. NEOTROPICAL REGION: South America (British Guiana, French Guiana).
Host plant: *Eschweilera sagotiana* (E.A.J.D.).

Mature larva. Apparently indistinguishable from that of *X. hilaris* Dejean. Length up to 40 mm.; maximum breadth (at prothorax) 7·75 mm.

Pupa (fig. 160). Very similar to that of *X. hilaris* Dejean from which it differs, in the female only, in having abdominal segment 7 much more strongly elongate (fig. 160). A male specimen is not available, but presumably it is without a carina on sternite 8 as is the case in the male pupa of *X. hilaris* Dejean.

Biology. The larval galleries and pupal cells are subcortical, the latter comprising shallow oval concavities in the outer sapwood and surrounded by a barrier of interlaced wood fibres. Adults emerge in April (E.A.J.D.).

Material studied. 2 L, 3 P, 3 I, British Guiana, Bartica-Potaro Road, m. 24, 13.iv.1957, from *Eschweilera sagotiana*, E.A.J.D. leg., in coll. B.M.

Reference. None available.

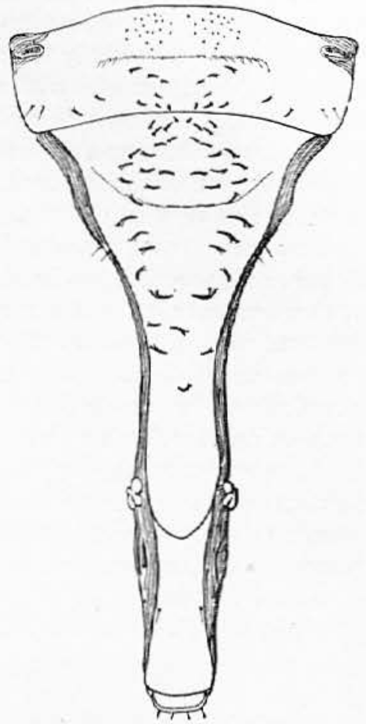


Fig. 160. *Xylergates praetor* (Dejean). Pupa. Abdominal tergites 6–10.

Xylergates lacteus Bates

Distribution. NEOTROPICAL REGION: South America (Brazil, British Guiana, French Guiana).

Host plant: *Mora excelsa* (E.A.J.D.).

Reference. None available.

Alcidion bispinum Bates

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).

Host plant: *Theobroma* (pods) (Bondar, 1939).

Mature larva. Form elongate, very slender, subcylindrical. *Head* strongly depressed and elongate, with sides feebly constricted just before middle and distinctly converging posteriorly. Front margin of frons broadly ferruginous, non-carinate; six epistomal setae present. Antennal foramen closed posteriorly. Genae strongly shouldered, ferruginous. One pair of ocelli present; lens large, oval; pigmented spot indistinct; temples smooth, non-carinate. Hypostoma ferruginous, with a transverse row of four setal pores (two each side of gula); sutures straight, slightly converging; gula indistinct. Antenna 2-segmented. Maxilla with segment 3 of palp slightly shorter than segment 2. *Prothorax* with posterior area of pronotum finely velvety micro-spiculate, this area not interrupted medially. Eusternum sparsely setose; sternellum micro-spiculate. *Abdomen* with ampullae bearing glabrous, shining, moniliform tubercles. Tergite 9 without a sclerotised process. Epipleurum strongly protuberant on segments 7–9 only. Pleural tubercles each with a pair of sclerotised pits. Anus trilobed. *Legs* absent. *Spiracles* with peritreme pale, thick, circular.

From the larva of *Oedopeza pogonocheroides* Serville it may be distinguished by the shining, sparsely setose proeusternum and the glabrous, tuberculate abdominal ampullae. Length up to 12 mm.; maximum breadth (at prothorax) 3 mm.

Pupa. *Head* with vertex visible from above, rather deeply excavated between bases of antennal tubercles, around which are three or four spines (each arising from a conical papilla and with a long basal seta); front with at least four similar spines; clypeus similar. Antennae extending as far as abdominal segment 5, where they are strongly recurved ventrally to terminate alongside front coxae. Eyes feebly convex, glabrous. Mandibles each with a pair of long setae near middle of outer face. *Pronotum* with sides bearing a pair of sub-basal, obtusely pointed tubercles; anterior and lateral margins bearing a few conical papillae (each with a small spine and long seta). *Mesonotum* and *metanotum* each with two converging oblique rows of similar papillae; scutellar groove very distinct. Elytra glabrous, but with an elongate-oval, raised tubercle near base; elytra and wings extending as far as abdominal segment 4 *Abdomen* with tergites 1–6 bearing several short spines (each with a long basal seta), arranged more or less in two transverse rows. Tergite 7 rather strongly elongate, bearing three rows of stout incurved spines on posterior half. Tergite 8 short, strongly transverse, with slightly stouter, incurved spines. Sternites each with a pair of sub-lateral setae. Pleura rather strongly protuberant. *Legs* with femora bearing subapically a row of spinules (each with a basal seta); tibiae with three or four similar spinules; 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 broadly oval, very thin, pale and strongly raised above general level of cuticle. Length up to 10·25 mm.; maximum breadth 4·25 mm.

Material studied. 1 L, 1 P, Brazil, x.1941, F. Plaumann leg., in coll. B.M.

Reference. Bondar, 1939 (Biol.).

Alcidion privatum Pascoe

Distribution. NEOTROPICAL REGION: Central America (Guatemala, Nicaragua, Panama), South America (Argentina, Colombia).

Host plant: *Cereus* spp. (Bosq, 1934).

Reference. Bosq, 1934 (Biol.).

Alcidion bicristatum Bates

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil, Paraguay).

Host plants: *Solanum auriculatum* (Blanchard, 1945); *Cyphomandra betacea*, *Capsicum annuum* (Acácio Costa Jr.); ? *Vernonia polyanthes*, ? *Eupatorium*, ? *Boehmeria caudata*, *Solanum racemiflorum* (Lima, 1955); *S. grandiflorum* (Andrade, 1928); *S. melongena* (Pyenson, 1938); *Nicotiana*, *Solanum tuberosum* (Bosq, 1942a); *Ficus* sp. (Travassos, 1932).

Adult. Length 8–15 mm. Almost entirely light brown. *Prothorax* without lateral tubercles, but with three blunt tubercles on disc. *Elytra* with a pair of short, dark brown, longitudinal carinae sub-basally; apices acutely produced and obliquely truncate.

Economic importance. The egg plant (*Solanum melongena*) is attacked by larvae of this species, which bore up and down the stems thereby killing them (Pyenson, 1938).

Blanchard (1945) reports damage to leaves of tobacco plants by adults of this species, although it is not clear whether these plants are ever infested with larvae.

References. Andrade, 1928 (Biol.); Blanchard, 1945 (Biol.); Bosq, 1942a (Biol.); Duffy, 1953a (Biol.); Lima, 1930 (Biol.), 1955 (Biol.); Pyenson, 1938 (Biol.); Travassos, 1932 (Biol.).

Alcidion cereicola Fisher

Distribution. NEOTROPICAL REGION: South America (Argentina).

Host plant: *Cereus* sp. (Fisher, 1936).

References. Bosq, 1942a (Biol.); Fisher, 1936 (Biol.).

Alcidion deletum Bates

[The Egg-plant Stem-borer]

Distribution. NEOTROPICAL REGION: South America (British Guiana, French Guiana).

Host plant: *Solanum melongena* (Cleare, 1931).

Egg. Form elongate, one end being more pointed than the other and one side slightly more convex than the other. Length 1·7 mm.; breadth 0·5 mm. (Cleare, 1931).

Biology. Eggs are usually deposited singly, but sometimes in twos or threes, under the bark of the stem, usually close to the nodes. As many as seven ova may be deposited by a single female during a period of twenty-four hours, the deposition of three ova in this period not being unusual. The incubation period was found to vary from three to seven days. The duration of the larval stage, as observed under laboratory conditions, ranged from thirty-six to seventy-seven days. Mature larvae destroy the entire pith in the areas of the stem they occupy, which may be for a distance of 3 or 4 inches. In cases of heavy infestation, one larva will attack another, particularly if the latter is in the prepupal stage. Before pupation the larva blocks its gallery both above and below itself with tightly compacted fibrous strands torn from the walls; the interior of the cell is smooth and ovoid in shape. The pupal stage lasts six to eight days, and adults remain within the stem for a further two to ten days. In emerging the adult gnaws a circular hole about 5 mm. in diameter. Adults have been collected in the field during April, May and June and, in the laboratory, in March, April, June, September, October and December. It is therefore probable that they are to be found throughout the year. The life span of the adult has been observed to vary between 3 and 161 days. Feeding takes place in the early morning and early evening. The life-cycle, under laboratory conditions, was found to vary between 53 and 96 days. There are probably three or four broods a year, with an overlapping of generations (Cleare, 1931).

Parasites. Hymenoptera: *Ipobracon waterstoni* Cam. (Cleare, 1931).

Economic importance. Although attack by this beetle may not prove fatal to the plant, it certainly curtails productivity, and also appears to shorten the period of production. The stems of the egg-plant are injured by both the larvae and adults. Plants of all ages are attacked, even stems of ½ inch or less in diameter. In fact, infestation usually commences in young stems, the larvae continuing their development as the stems increase in size. It is possible to find all stages of this beetle in a single plant. Larvae feed on the pith by excavating longitudinal galleries. Injury by the adult is caused both through emergence and feeding. The circular holes made in emerging often cause the stem to split and also provide a means of entry for organisms which may seriously affect the plant. The adults feed mainly on young tender shoots, gnawing at small areas of bark (Cleare, 1931).

Control. Cleare (1931) suggests that the practice of cutting back the plants and running them over another season should be discontinued. Although this would necessitate more frequent planting, a greater yield would be obtained to compensate for extra labour entailed. Unless plants are cut close to the ground, many larvae are left in the old stumps, and this seems to build up the population.

In addition to replanting, all old plants should be collected and burnt. In view of the overlapping of generations, replanting may be undertaken at any time of the year.

References. Cleare, 1931 (E fig., L fig., P fig., I fig., Biol. fig., Contr.); Evans, 1952 (Biol.).

Probatius sp.

Mature larva. Very similar to that of *Hyperplatys spinipennis* Fisher from which it may be distinguished by the matt, micro-pubescent sternellum of the prothorax. Length up to 15 mm.; maximum breadth (at prothorax) 3·1 mm.

Material studied. 2 L, Brazil, F. Plaumann leg., in coll. B.M.

Lophopoeum timbouvae Lameere

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil, Paraguay).

Host plants: *Enterolobium timbouva*, *Prosopis alba* (Bruch, 1940); *Inga luschnatiana*, *Hymenaea courbaril*, *Tamarindus indica* (Lima, 1955); *Lecythis pisonis* (Zikán and Zikán, 1946); *Enterolobium contortisiliquum*, *Prosopis kuntzei* (Bosq, 1942a); *Gleditsia amorphoides* (Bohls).

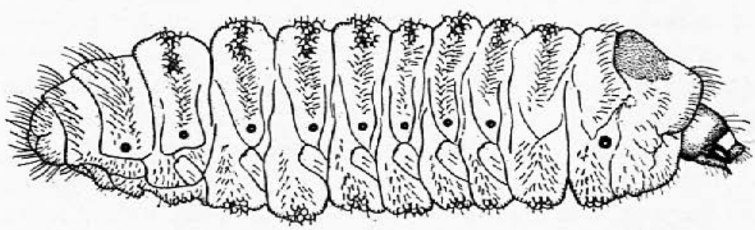


Fig. 161. *Lophopoeum timbouvae* Lameere. Mature larva. Lateral aspect.

Mature larva (fig. 161). *Head* scarcely depressed, with sides feebly constricted behind middle; antennal foramen open posteriorly; temples smooth; mouthframe rather strongly sclerotised, ferruginous. One pair of distinct ocelli present; lens round, strongly convex, protuberant; pigmented spot indistinct. Clypeus glabrous. Hypostoma transversely rectangular, ferruginous; a pair of minute paramedian pits (each with a long seta) present; sutures pitchy, parallel; gular region with a broad, pale, median cleavage line. Antenna 2-segmented, segment 2 bearing a pair of hyaline conical processes. Mandibles moderately slender. Maxilla with segment 3 of palp slightly longer than segment 2. Labial palpi with segment 2 slightly longer than segment 1. *Prothorax* with posterior half of pronotum dull, micro-spiculate; eusternum and sternellum shining, glabrous or very sparsely setose. *Abdomen* with ampullae very feebly bilobed and covered with shining, glabrous, moniliform tubercles. Tergite 9 without a sclerotised process. Anus trilobed. *Legs* absent. Pleural tubercles each with only a single (upper) sclerotised pit. *Spiracles* with peritreme round, thick, pale and completely lined internally with subcontiguous marginal chambers. Length up to 14 mm.; maximum breadth (at prothorax) 3·5 mm.

Closely related to the genera *Alcidion* and *Hyperplatys*, but unique amongst the Acanthocinini in having the body-form cylindrical, short and stout and slightly curved, thus resembling a bruchid larva. This unusual form is characteristic of larvae which have the specialised habit of infesting seed-pods.

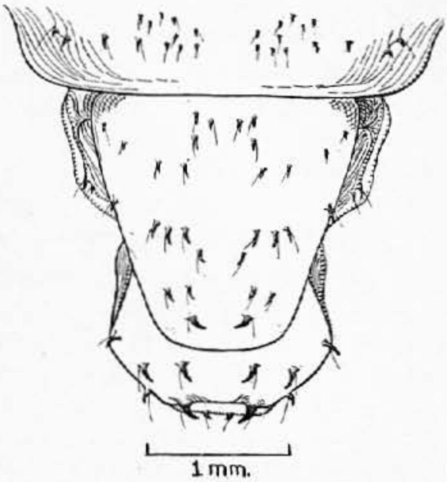


Fig. 162. *Lophopoeum timbouvae* Lameere. Pupa. Posterior abdominal segments. Dorsal aspect.

Pupa (fig. 162). Very similar to that of *Ozineus prolixus* Melzer, but differing as follows. *Head* with base of clypeus bearing a row of only four setae. *Abdomen* with tergite 9 bearing four curved spines (fig. 162). Length up to 13 mm.; maximum breadth 5·2 mm.

Biology. Larvae of this species are found in seed-pods of various Leguminosae, the seeds of which they infest.

Material studied. 7 L, 6 P, 2 I, Paraguay, 30.viii.1892, from fruits of *Gleditsia amorphoides*, Bohls leg., in coll. U.Z.M.

References. Bosq, 1934 (Biol.), 1942a (Biol.); Bruch, 1940 (L fig., P fig., I fig., Biol. fig.); Lima, 1955 (L fig., P fig., I fig., Biol. fig.); Zikán and Zikán, 1946 (Biol.).

Amniscus polyraphoides (White)

Distribution. NEOTROPICAL REGION: South America (Peru, Venezuela).
Host plant: *Pyrus malus*.
Reference. Wille, 1940 (Biol.).

Anisopodus curvilineatus White

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plants: *Urostigma enorme*, *Ficus pohliana* (Zikán and Zikán, 1946).

Reference. Zikán and Zikán, 1946 (Biol.).

Anisopodus phlangodes (Erichson)

Distribution. NEOTROPICAL REGION: Mexico, Central America (Guatemala, Nicaragua, Panama), South America (Brazil, French Guiana, Peru).

Host plants: *Pera glabrata*, ?*Ficus* sp. (Travassos, 1932).

References. Lima, 1955 (Biol.); Travassos, 1932 (Biol.).

Anisopodus canus Bates

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil, Uruguay).

Host plants: *Ligustrum sinense* (attacked by *Hylesinus oleiperda* (Fabricius)), *Ficus*, *Pinus* (Bosq, 1942a).

Reference. Bosq, 1942a (Biol.).

Hyperplatys spinipennis Fisher

Distribution. NEOTROPICAL REGION: South America (Brazil).

Mature larva. Very similar to that of *Oedopeza pogonocheroides* Serville, from which it differs in having the antennal foramen open posteriorly, and a distinct gular cleavage line. Length up to 11 mm.; maximum breadth (at prothorax) 2·75 mm.

Pupa. Similar to that of *Ozineus prolixus* Melzer, but differing as follows. *Pronotum* subquadrate, with spines more robust than those on tergite 8. Elytra with sub-basal tubercles feebly protuberant. *Legs* with sub-basal tubercles of hind femora short and produced postero-laterally. Length up to 7 mm.; maximum breadth 2·1 mm.

Material studied. 2 L, 1 P, Brazil, ix.1941, F. Plaumann leg., in coll. B.M.

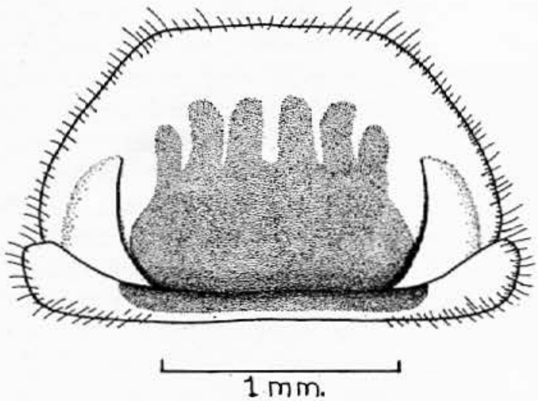
Reference. None available.

Exocentrus

There are a few South American representatives of this genus but no larvae or pupae are available. Those of an African species are here described.

Mature larva (figs. 163–164). Form elongate, very slender, subcylindrical. *Head* (fig. 164) 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 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, glabrous, 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. *Prothorax* (fig. 163) entirely micro-granulate, testaceous, and with a transverse row of setae just behind front margin; posterior part of pronotum more darkly testaceous and velvety micro-spiculate, 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, sparsely setose. *Abdomen*



1 mm.

Fig. 163

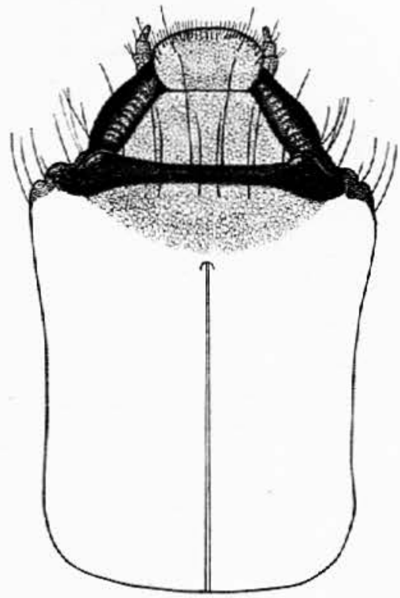


Fig. 164

Fig. 163. *Exocentrus* sp. Mature larva. Prothorax. Dorsal aspect.
Fig. 164. *Exocentrus* sp. Mature larva. Head. Dorsal aspect.

entirely micro-granulate; dorsal ampullae each with a single transverse furrow and two rows of glabrous, moniliform tubercles, which are interrupted medially by a broad, shallow, longitudinal furrow. Tergite 9 without a sclerotised process. 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. Length up to 9·5 mm.; maximum breadth (at prothorax) 2·1 mm.

Pupa (fig. 165). 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) directed anteriorly as far as the eyes, where they are again recurved and directed posteriorly to terminate alongside apices of elytra. Eyes feebly convex, glabrous. Mandibles 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, pale spines (each with a 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 with third. Tergite 8 short, strongly transverse, 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.

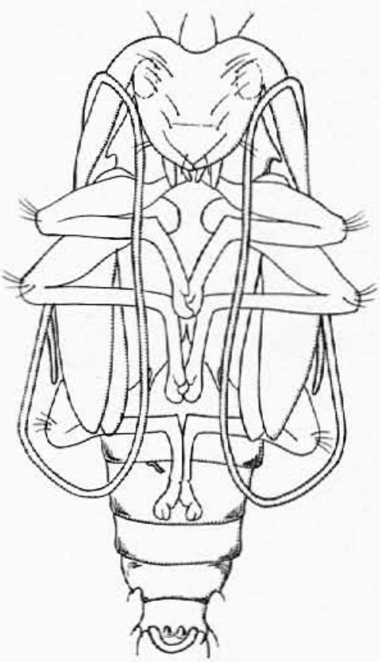


Fig. 165. *Exocentrus* sp. Pupa. Ventral aspect.

Pentheochaetes argentinus Mendes

Distribution. NEOTROPICAL REGION: South America (Argentina).
Host plant: *Bauhinia* (Bosq, 1942a).
Reference. Bosq, 1942a (Biol.).

Colobotheini

Cathexia longimana (Pascoe)

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).

Mature larva (fig. 166). Form elongate, slender, subcylindrical. *Head* (fig. 166) scarcely depressed, with sides feebly constricted behind middle and slightly converging posteriorly; antennal foramen closed posteriorly; mouthframe rather strongly and very broadly sclerotised; frons with a pair of transverse oval, sclerotised, ferruginous plates (forming an unusual and characteristic pattern) behind the broadly ferruginous front margin (fig. 166); temples smooth; six epistomal setae present. Ocelli indiscernible owing to sclerotisation of gena. Hypostoma flat, almost entirely ferruginous and with a pair of paramedian pits each bearing two setae; sutures slightly converging posteriorly; gular region undefined. Antenna 2-segmented; segment 2 quadrate, bearing a conical, hyaline process. Maxilla with segment 3 of palp as long as segment 2; labial palpi with segment 2 slightly shorter than segment 1. *Prothorax* with posterior part of pronotum micro-spiculate, this area bearing scattered, glabrous, elongate, lenticular spots; eusternum and sternellum matt, micro-spiculate. *Abdomen* with ampullae feebly bilobed, each lobe covered with glabrous, shining, moniliform tubercles. Tergite 9 without a sclerotised process. Epipleurum rather feebly protuberant on all segments. Pleural tubercles each with a pair of minute sclerotised pits. Anus trilobed. *Legs* absent. *Spiracles* with peritreme thin, round and pale.

Material studied. 3 L, Brazil, x.1941, F. Plaumann leg., in coll. B.M.

Reference. None available.

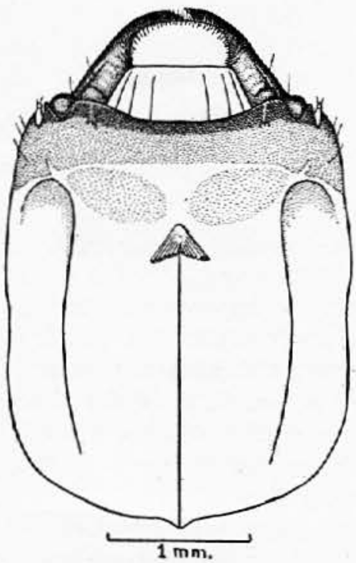


Fig. 166

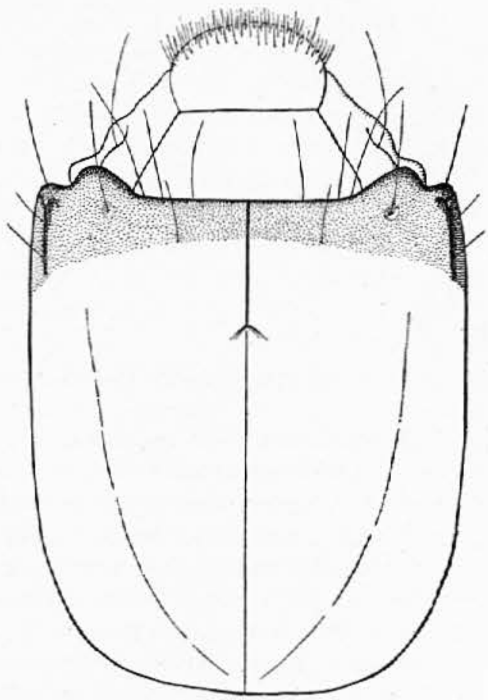


Fig. 167

Fig. 166. *Cathexia longimana* (Pascoe). Mature larva. Head. Dorsal aspect.
Fig. 167. ?*Priscilla hypsiomoides* Thomson. Mature larva. Head. Dorsal aspect.

Priscilla hypsiomoides Thomson

Distribution. NEOTROPICAL REGION: Central America (Nicaragua, Panama), South America (Brazil, French Guiana).

Mature larva (fig. 167). *Head* (fig. 167) strongly depressed with antennal foramen closed posteriorly; mouthframe rather strongly sclerotised; frons smooth, with a transverse row of eight setiferous pores, the setae shorter than those on front margin, which are six in number; temple with a conspicuous longitudinal carina which extends from immediately behind antennal foramen to the posterior limit of the ferruginous band across frons. Ocelli indiscernible or absent. Clypeus glabrous, as long as labrum. Hypostoma flat, micro-granulate and bearing two setae on each side of gular region; hypostomal sutures ferruginous, straight, parallel. Gular region testaceous, triangular. Antenna 2-segmented; segment 2 quadrate and bearing a small conical hyaline process. Maxillae with palpi 3-segmented; segment 1 distinctly longer than segment 2, segment 2 slightly longer than segment 3. Labial palpi with segment 1 almost twice as long as segment 2. Mentum distinct from submentum. *Prothorax* entirely testaceous, with a transverse row of setae just behind front margin; posterior part more darkly testaceous and entirely velvety micro-spiculate, except for several

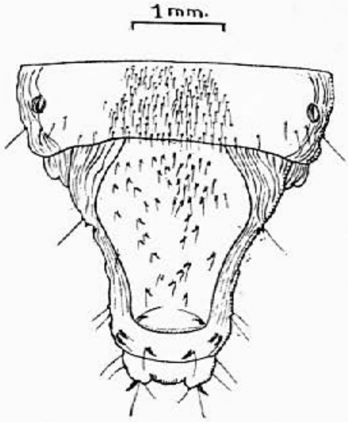


Fig. 168. *Priscilla hypsiomoides* Thomson. Pupa. Posterior part of abdomen. Dorsal aspect.

lenticulate glabrous spots and a pair of sublateral, oblique impressions anteriorly. *Mesonotum* micro-granulate anteriorly. *Metanotum* micro-granulate on each side of the transverse furrow, which is non-tuberculate. Prosternum with presternum smooth, sparsely setose; sternellum micro-spiculate. *Abdomen* smooth, glabrous; dorsal and ventral ampullae each with a single transverse furrow around which are several irregularly shaped, elongate tubercles which are coarsely and densely micro-spiculate. Tergite 9 without a sclerotised process. Epipleurum strongly protuberant on last three segments only. Pleural tubercles broadly oval, each with only a single sclerotised pit. Anus trilobed. *Legs* absent. *Spiracles* with peritreme round, pale and bearing numerous marginal chambers on posterior half. Length up to 22 mm.; maximum breadth (at prothorax) 4·5 mm.

The identity of the larval material available is questionable. The head-capsule, in particular, is much more characteristic of the Acanthocinini than of the Colobothenini (based on *Cathexia* and *Colobothea*). The pupa, however, appears to be correctly associated.

Pupa (fig. 168). *Head* with vertex visible from above, with vertex deeply but narrowly excavate between antennal tubercles, where three pairs of long setae are present; frons with a row of four setae beneath which is a pair of similar setae; clypeus with a broad, deep, transverse impression across base and bearing six very stout setae, each arising alongside a conical spinule. Antennae extending as far as abdominal segment, where they are strongly recurved ventrally to terminate alongside base of mandibles. Eyes feebly convex, each with a pair of long setae near inner margin; dorsal lobes almost contiguous. Mandibles each with a pair of setae on middle of outer face. *Pronotum* with sides bearing a pair of sub-basal, rounded tubercles, disc sparsely setose, anterior margin fringed with numerous long, ferruginous setae (each arising from a minute conical spinule). *Mesonotum* and *metanotum* with similar setae, those on latter arranged in a "V" formation. Elytra glabrous; elytra and wings extending as far as abdominal segment 4. *Abdomen* with tergites 1–6, each with numerous short, straight spines (each with a basal seta), which become larger and less numerous towards lateral margins. Tergite 7 slightly elongate, subtriangular, with much larger, slightly curved spines which are directed towards centre of disc. Tergite 8 short, transverse, with four pairs of stouter, incurved spines. Tergite 9 very short, transverse, bearing four pairs of curved spines. Sternites glabrous. Pleura rather strongly protuberant. *Legs* with femora clavate, each with a row of stout subapical setae; hind femora extending as far as abdominal segment 5, and each with a very long digitiform process near base; all tibiae arranged more or less obliquely to longitudinal axis of body and each bearing a pair of median setae. *Functional spiracles* present on abdominal segments 1–6; peritreme subcircular, thin, appreciably raised above general level of cuticle. Length up to 11 mm.; maximum breadth 4·2 mm.

Material studied. 2 L, 1 P, Costa Rica, Farm Hamburg am Reventazon, 6.ii.1936; F. Nevermann leg., in coll. Z.M.H.

Reference. None available.

Colobothea sp.

Mature larva. Similar to that of *Cathexia longimana* (Pascoe), but differing as follows. *Head* marked with several curved striae. *Abdomen* with ampullae microspiculate and without moniliform tubercles. Length up to 28 mm.; maximum breadth (at prothorax) 4 mm.

Material studied. 3 L, 1 I, British Guiana, Bartica-Potaro Road, m. 24, 11.iv.1947, from unknown climber, E.A.J.D. leg., in coll. B.M.

Colobothea emarginata (Olivier)

Distribution. NEOTROPICAL REGION: South America (Brazil).
Host plants: *Morus alba*, *Artocarpus integrifolia* (Silva and Almeida, 1941).
References. Lima, 1955 (Biol.); Silva and Almeida, 1941 (I fig., Biol. fig.).

Colobothea lateralis Bates

Distribution. NEOTROPICAL REGION: South America (Brazil).
Host plants: *Dalbergia nigra* (Zikán and Zikán, 1946).
Reference. Zikán and Zikán, 1946 (Biol.).

Saperdini

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 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 ampullae finely asperate, bearing two transverse furrows and a distinct longitudinal, median furrow. Segment 9 without a sclerotised process. Epipleurum protuberant on all segments. Pleural tubercle oval, without sclerotised pits but bearing several setae.

Saperda spp.

No material is available of the neotropical species of this genus, but generic characters are given in the keys, p. 27 and p. 40.

Mature larva. The following is a description of the palaearctic *Saperda carcharias* (Linnaeus). *Head* depressed, with sides subparallel, slightly constricted before middle and broadly rounded at base; antennal foramen closed behind; mouthframe rather

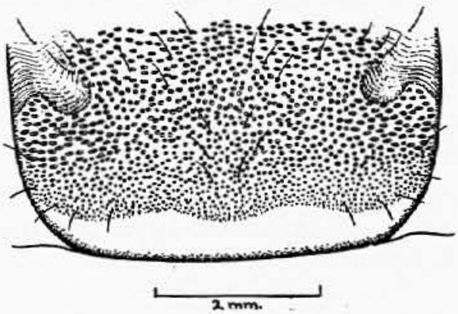


Fig. 169

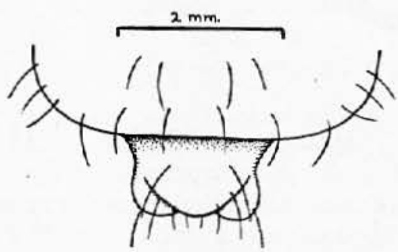


Fig. 171

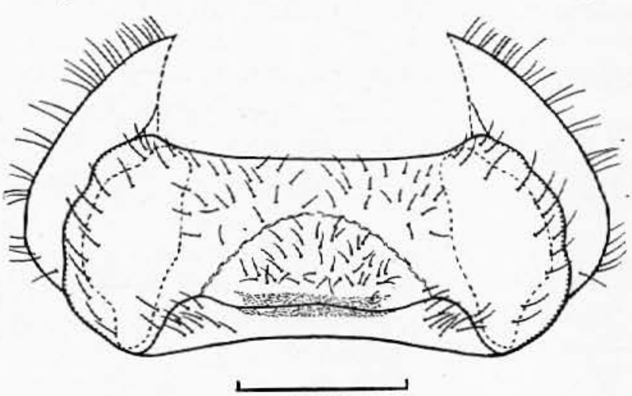


Fig. 170

Figs. 169–171. *Saperda carcharias* (Linnaeus). Mature larva. Fig. 169. Posterior part of pronotum. Fig. 170. Prothorax. Ventral aspect. Fig. 171. Posterior part of abdomen. Dorsal aspect.

strongly and broadly sclerotised, with the transverse, ferruginous band as broad as clypeus; frons with a transverse row of eight to ten setae; six epistomal setae present; genae strongly shouldered, sclerotised and pitchy. One pair of ocelli present; lens circular, strongly protuberant; pigmented spot indistinct. Clypeus with two or three pairs of lateral setae. Hypostoma slightly bulging, smooth, testaceous, with front and hind margins ferruginous; sutures ferruginous and slightly curved. Gula indiscernible, with one or two setae present on each side of gula region. Antenna 2-segmented; segment 2 quadrate and bearing a tapering hyaline process. Maxilla strongly sclerotised, with a 3-segmented palp; segment 3 tapering, slightly longer than segment 2; lobe very elongate, nearly as long as palp; palpifer elongate, subparallel-sided. Labial palpi with segment 2 cylindrical, about two-thirds length of segment 1. Mentum setose, not distinct from submentum. *Prothorax* obliquely slanting and sclerotised anteriorly; posterior region of pronotum (fig. 169) covered with coarse, individually distinguishable asperities of varying size; sublateral impressions shallow. Presternum (fig. 170) not asperate but with scattered stout setae. Posterior margin of eusternum and anterior margin of sternellum with a transverse band of asperities. *Abdomen* with dorsal ampullae with two curved, transverse furrows and a distinct narrow, median furrow; each ampulla rather densely covered with short blunt asperities. Segment 9 without a sclerotised process. Epipleurum protuberant on all segments. Pleural tubercle oval, with several setae, but without sclerotised pits. Anus (fig. 171) strongly protuberant, trilobate. *Legs* absent. *Spiracles* with peritreme thick, pale and broadly oval.

Ataxiini

Ataxia alboscutellata Fisher

Distribution. NEOTROPICAL REGION: Caribbean (Cuba, Porto Rico).

Host plant: *Gossypium* (Wolcott, 1941a).

References. Hargreaves, 1948 (Biol.); Wolcott, 1941a (Biol.), 1951 (Biol.).

Asyngenes chalceolus Bates

Distribution. NEOTROPICAL REGION: Central America (Guatemala), South America (Argentina, Brazil, Venezuela).

Host plant: *Ficus* (Bosq, 1942a).

Reference. Bosq, 1942a (Biol.).

Ptericoptini

Bisaltes bimaculatus Aurivillius

Distribution. NEOTROPICAL REGION: South America (Argentina, Bolivia, French Guiana).

Host plant: *Solanum glaucum* (Bosq, 1942a).

Biology. In the Argentine adults emerge during December and damage the inflorescences of the host plant.

Reference. Bosq, 1942a (Biol.).

Ptericoptus dentipennis (Latreille)

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plant: *Ipomoea batatas* (Bondar, 1931).

Biology. Branches infested with larvae of this lamiid usually wither and die. Damage is also caused by the adults which feed on the young tender stems. The life-cycle is only a few months in duration (Bondar, 1931).

References. Bondar, 1931 (Biol.); Lima, 1955 (Biol.).

Ptericoptus acuminatus (Fabricius)

(=**dorsalis** Serville)

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).

Host plant: *Ipomoea batatas* (Bosq, 1942a).

Reference. Bosq, 1942a (Biol.).

Ptericoptus hybridus s.sp. **meridionalis** Breuning

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil, Paraguay).

Host plants: *Ipomoea batata* (?) (Bosq, 1942a).

Reference. Bosq, 1942a (Biol.).

Desmiphorini

Desmiphora cucullata Thomson

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).

Host plants: *Cybistax antisyphilitica* (Travassos, 1932); *Tectona grandis*, Bignoniaceae, Verbenaceae (Silva and Almeida, 1941).

Economic importance. This species causes considerable damage to teak.

References. Lima, 1955 (Biol.); Silva and Almeida, 1941 (I fig., Biol. fig.); Travassos, 1932 (Biol.).

Desmiphora hirticollis (Olivier)

Distribution. NEOTROPICAL REGION: Mexico, Central America (British Honduras, Guatemala, Nicaragua, Panama), Caribbean (Cuba, Grenada, St. Vincent), South America (Argentina, Brazil, Colombia, French Guiana, Venezuela).

Host plant: *Sapium biglandulosum* (Andrade, 1928).

References. Andrade, 1928 (Biol.); Lima, 1930 (Biol.), 1955 (Biol.).

Desmiphora cirrosa Erichson

Distribution. NEOTROPICAL REGION: Mexico, Central America (Guatemala, Nicaragua, Panama), South America (Argentina, Bolivia, Brazil, Paraguay, Peru).

Host plant: *Platanus* (Bosq, 1942a).

Reference. Bosq, 1942a (Biol.).

Aereneini

Aerenea quadriplagiata Boheman

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil, Paraguay, Uruguay).

Host plants: *Xanthium strumarium*, *Amaranthus muricatus* (Bosq, 1942a).

Reference. Bosq, 1942a (Biol.).

Hippopsini, Spalacopsini and **Adetini**

The larvae of these three tribes are remarkable and represent strikingly aberrant forms in the LAMIINAE. They all possess several fundamental characters and unusual characteristics in common and there is no doubt that they are all closely related to the palaearctic Agapanthiini. The main characters in common are: Form very elongate, slender, curved, cylindrical. *Head* salient, oval in cross-section; occipital foramen postero-ventral. One pair of ocelli present. *Mesosternum* and *metasternum* strongly protuberant. *Abdomen* with segment 9 enlarged, densely setose and usually with a caudal process. *Spiracles* with inner margin of peritreme entirely lined with sub-contiguous marginal chambers.

Spalacopsini

Dorcasta (=**Bebelis**) **lignosa** (Thomson)

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).
Host plant: *Cayaponia ficifolia* (branches) (Bosq, 1942a).
Reference. Bosq, 1942a (Biol.).

Dorcasta implicata Melzer

Distribution. NEOTROPICAL REGION: South America (Argentina).
Host plant: *Ipomoea bonariensis* (Bosq, 1942a).
Reference. Bosq, 1942a (Biol.).

Adetini

Adetus muticus Thomson

Distribution. NEOTROPICAL REGION: Mexico, Central America (British Honduras, Guatemala, Nicaragua, Panama), South America (Argentina, Brazil, French Guiana, Paraguay).

Host plant: *Sechium edule* (Lima, 1955).

Mature larva (fig. 172). Form elongate, slender, cylindrical. *Head* thick, oval in cross-section, retracted in prothorax; sides parallel, strongly constricted posteriorly; antennal foramen open posteriorly; frons with anterior half ferruginous; frontal sutures pale, distinct; epicranial halves entirely ferruginous except laterally; six epistomal setae present. One pair of ocelli present; lens round, feebly convex, pigmented spot indistinct. Hypostoma ferruginous, with anterior half steeply sloping down to anterior margin, the posterior half developed into a pair of obtusely rounded protuberances; sutures distinct, pitchy, subparallel; gular region with a distinct pale, median cleavage line. Antenna 2-segmented; segment 2 bearing a tapering hyaline process. Maxilla with palp 2-segmented. Labial palpi with segment 2 as long as segment 1. Mentum not distinct from submentum. Mandible tridentate apically. *Prothorax* with a testaceous transverse band just behind front margin; pronotum milky white, micro-granulate, non-striate; prosternum bearing laterally a pair of large

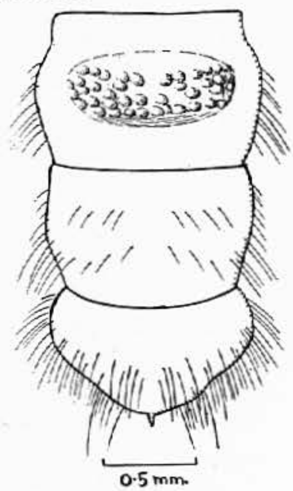


Fig. 172. *Adetus muticus* Thomson. Mature larva. Abdominal segments 7–9. Dorsal aspect.

testaceous spots; eusternum elliptical, well defined, bearing a few setae. *Abdomen* with dorsal ampullae on segments 1–4 or 5 with a single transverse furrow and two rows of large, glabrous, moniliform tubercles; ampullae on segments 5 or 6–7 with only one (posterior) row of tubercles, which are much larger than those on preceding segments; sternites similar. Segment 8 smooth, glabrous. Segment 9 swollen, as wide and high as segment 8, rather densely setose, truncate posteriorly and bearing a short, stout, claw-like caudal spine (fig. 172), which in early-instar larvae is straight and spine-like. Epipleurum slightly protuberant on all segments; pleural tubercles each with a pair of sclerotised pits. Anus trilobed. *Legs* vestigial. *Spiracles* with peritreme thick, circular and entirely lined internally with subcontiguous marginal chambers. Length up to 15 mm.; maximum breadth (at prothorax) 2·6 mm.

Larvae of this tribe show stronger affinities to the Hippopsini than to the Apomecynini, next to which this tribe has been placed on the basis of adult classification. The affinities of this tribe to the Cloniocerini (see Duffy, 1957, p. 258) are very close, but the latter is clearly more closely related to the Apomecynini than to the Hippopsini. The characters common to the Adetini and Hippopsini are the swollen, densely setose, truncate abdominal segment 9 and the spiracular peritreme, which is entirely lined internally with marginal chambers.

Pupa. *Head* completely visible from above, not excavated between bases of antenna; clypeus with six pairs of long setae. Eyes feebly convex, each bearing two or three setae. Labrum subtriangular, with about four setae across middle. Mandibles each with two stout setae. Antennae extending as far as abdominal segment 3, where they terminate. *Pronotum* bearing several scattered fine setae, which are most numerous around the posterior angles. *Mesonotum* and *metanotum* each with a few fine scattered setae; scutellum glabrous, non-protuberant; scutellar groove coarsely striate. Elytra and wings extending as far as abdominal segment 4. *Abdomen* with tergites 2–7 each with three transverse rows of stout spines which become progressively larger posteriorly. Tergite 8 short with a transverse row of about six median, subcontiguous, smaller spines, also a pair of sublateral, a pair of lateral and a minute pair of postero-median spines. Tergite 9 very short, bearing three groups of numerous stiff setae. Sternites with sublateral groups of similar setae. *Legs* with femora, tibiae and tarsal claws bearing several setae which are most numerous on the femora; hind femora extending to abdominal segment 3. *Functional spiracles* present on abdominal segments 1–6; peritreme broadly oval; anterior half appreciably thickened. Length up to 12 mm.; maximum breadth 2·9 mm.

Material studied. 1 L, 1 P, Brazil, São Paulo, ix.1928, from *Sechium edule*, C. R. Fisher leg., in coll. D.D.S.A.; 2 L, Costa Rica, San José, 12.iii.1925, F. Nevermann leg., in coll. F.I.E.

References. Bosq, 1942a (Biol.); Lima, 1955 (Biol.).

Adetus socius Melzer

Distribution. NEOTROPICAL REGION: South America (Brazil).
Host plant: *Solanum racemiflorum* (Lima, 1955).
Reference. Lima, 1955 (Biol.).

Adetus similis Bruch

Distribution. NEOTROPICAL REGION: South America (Argentina, Paraguay).
Host plants: *Cayaponia ficifolia* (Bruch, 1939).
References. Bosq, 1942a (Biol.); Bruch, 1939 (L fig., P fig., I fig., Biol. fig.).

Adetus subellipticus Bates

Distribution. NEOTROPICAL REGION: Central America (Guatemala).
Host plants: Cucurbitacae.
Reference. Craighead, 1923 (L fig., Biol.).

Hippopsini

Hippopsis lemniscata (Fabricius)

Distribution. NEOTROPICAL REGION: Mexico, Central America (Guatemala, Nicaragua, Panama), South America (Argentina, Brazil, Venezuela). NEARCTIC REGION: U.S.A. (Florida, New York, Ohio, Texas).

Host plants: *Erechtites valerianaefolia*, ?*Ageratum conyzoides* (Lima, 1955); *Ambrosia* (Craighead, 1923); *Sesamum indicum* (Ballou, 1945).

Mature larva. No material available, but according to the description given by Craighead (1923) it is very similar to that of *Adetus muticus* Thomson, differing as follows. *Abdomen* with ventral ampullae absent. Segment 9 without a sclerotised process.

Biology. According to Craighead (1923), stems of *Ambrosia* are completely hollowed out by larvae of this species. Pupation occurs in a cell at the base of the stem. The life-cycle is completed in one year and adults emerge during June and July.

References. Ballou, 1945 (Biol.); Craighead, 1923 (L fig., P, Biol.); Lima, 1955 (Biol.).

Spalacopsini

Dorcasta acuta Pascoe (=**geometrica** Bates)

Distribution. NEOTROPICAL REGION: Mexico, Central America (Costa Rica, Guatemala, Panama), South America (Argentina, Brazil).

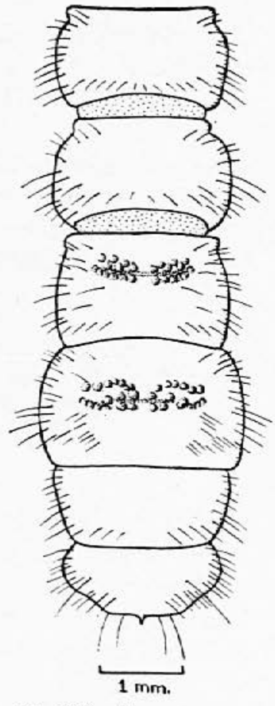


Fig. 173. *Dorcasta acuta* Pascoe. Mature larva. Abdominal segments 5–10. Dorsal aspect.

Mature larva (fig. 173). Very similar to that of *Adetus muticus* Thomson, but differing as follows. *Abdomen* with ampullae present only on tergites 1–2 and 6–7; ampulla on tergite 7 with two rows of rather small moniliform tubercles (fig. 173). Tergite 9 bearing a minute slender spine (fig. 173). Length up to 12·2 mm.; maximum breadth (at prothorax) 2·2 mm.

Pupa (fig. 174). Rather similar to that of *Adetus muticus* Thomson, but differing as follows. *Head* with antennae recurved ventrally and terminating alongside front coxae. *Abdomen* with tergites 3–6 each with numerous short spines (each with a long basal seta) on posterior half. Tergites 7–8 with a posterior row of very much stouter spines. Segment 9 (fig. 174) densely setose, with a deep median longitudinal cleft terminating posteriorly in a styliform process.

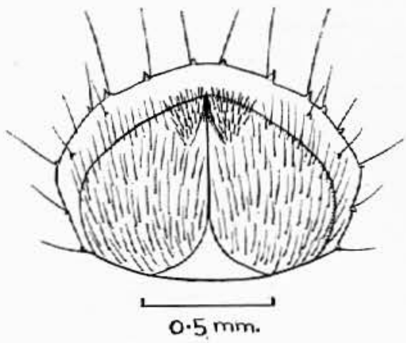


Fig. 174. *Dorcasta acuta* Pascoe. Pupa. Abdominal segment 9. Ventral aspect.

Material studied. 4 L, 1 P, Costa Rica, San José, 17.iv.1935, F. Nevermann leg., in coll. F.I.E.

Reference. None available.

Emphytoeciini

Emphytoecia versicolor (Boheman) (=**Phytoecia sanguinicollis** Burmeister)

Distribution. NEOTROPICAL REGION: South America (Argentina, Uruguay).

Host plant: *Xanthium strumarium* (Bosq, 1942a).

Reference. Bosq, 1942a (Biol.).

Emphytoeciosoma daguerrei Melzer

Distribution. NEOTROPICAL REGION: South America (Argentina).

Host plant: *Verbena bonariensis*.

Reference. Bosq, 1942a (Biol.).

Hemilophini

Adesmus borgmeieri Bondar

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plants: *Ceiba pentandra*. The native host is a species of *Bombax* or *Quararibea* (Bondar, 1938).

Biology. Oviposition takes place on slender branches of living healthy trees. The tunnelling of the young larvae cause the terminal part of the branches to die (Bondar, 1938).

References. Bondar, 1938 (I fig., Biol.); Lane, 1939 (Biol.); Lima, 1955 (Biol.).

Cirrhicera leuconota (Castelnau)

Distribution. NEOTROPICAL REGION: Mexico.

Biology. Sallé (1883) merely states that adults are found on various plants.

Reference. Sallé, 1883 (Biol.).

Phoebe cava (Germar)

Distribution. NEOTROPICAL REGION: South America (Brazil).
Host plants: *Psidium guajava, Prunus domestica* (Bondar, 1954).
References. Bondar, 1953 (Biol.); Lima, 1955 (Biol.).

Phoebe phoebe (Serville)

Distribution. NEOTROPICAL REGION: South America (Brazil).
Host plant: *Citrus aurantium* (Silva, 1955).
Biology. Larvae bore along the twigs from the tips downwards, causing the leaves to shrivel up. Adults emerge from October to December.
Reference. Silva, 1955 (I fig., Biol. fig., Contr.).

Aerenicini

Aerenica canescens (Klug)

Distribution. NEOTROPICAL REGION: South America (Brazil).
Host plant: *Schizolobium excelsum* (Andrade, 1928).
References. Andrade, 1928 (Biol.); Lima, 1930 (Biol.), 1955 (Biol.).

Phaula thomsoni Lacordaire

Distribution. NEOTROPICAL REGION: South America (Brazil).
Host plant: *Jacaranda mimosaefolia* (Andrade, 1928).
Mature larva. No material available. The following is a description of an unknown species of this genus. Form moderately robust, cylindrical. *Head* thick, scarcely depressed, moderately elongate, subparallel-sided; antennal foramen distinctly open posteriorly; frons strongly sclerotised, entirely ferruginous, strongly contrasting with the pale frontal sutures, and bearing eight setal pores; six epistomal setae present. One pair of ocelli present; lens strongly convex; pigmented spot large, distinct. Hypostoma flat, ferruginous; four pairs of setal pores present; sutures distinct, pitchy, almost straight; gular region with a distinct, pale, median cleavage line. Antenna 2-segmented; segment 2 bearing a tapering hyaline process. Maxilla with segment 3 acutely conical, nearly as long as segment 2. Labial palpi with segment 2 cylindrical, about two-thirds length of segment 1. Mentum distinct from submentum. *Prothorax* with pronotum feebly striate posteriorly and pale bluish white, thereby contrasting with the surrounding testaceous cuticle; prosternum strongly sclerotised and ferruginous except the subtriangular eusternum, which is testaceous. *Abdomen* with each dorsal ampulla with two transverse furrows and four rows of moniliform glabrous tubercles; ventral ampullae each with a single furrow and two rows of tubercles. Segment 9 (fig. 175) slightly longer than segment 8, bearing numerous stout, spine-like setae (which are much coarser than those on preceding segments) and a long thick, curved, rod-like process, which is strongly sclerotised, ferruginous and bifid apically. Epipleurum slightly protuberant on all segments. Plural tubercles without sclerotised pits. Anus trilobed, the dorsum of segment 10

being strongly sclerotised and ferruginous. *Legs* absent. *Spiracles* with peritreme broadly oval, the posterior margin thickened and equipped with a pair of subcontiguous, digitiform chambers. Length up to 35 mm.; maximum breadth (at prothorax) 10·25 mm.

This larva shows close affinities to the Apomecynini which, although placed near the Niphonini on the basis of adult classification, has recently been shown (Duffy, 1957) to be closely related to the Agapanthiini. The main characters common to the Aerenicini and the Apomecynini are the thick, strongly sclerotised head-capsule and the presence of stout, spine-like setae on abdominal segment 9.

Fig. 175. *Phaula* sp. Mature larva. Posterior part of abdomen showing terminal spine and sclerotised areas.

Pupa. *Head* with vertex visible from above, broadly and rather shallowly excavated between bases of antennae and bearing a few fine setae; clypeus with two to four basal setae; labrum with a pair of sub-basal setae. Antennae extending as far as abdominal segment 2, where they are recurved ventrally to terminate alongside maxillary palpi. Eyes feebly convex. Mandibles each with a pair of setae near middle of outer face. *Pronotum* without lateral tubercles and bearing a few scattered spinules (each with a basal seta). *Mesonotum* with a few fine setae above scutellum, which is feebly protuberant. *Metanotum* with a few scattered setae on each side of the distinct scutellar groove. Elytra and wings extending as far as abdominal segment 4. *Abdomen* with tergites 1–7 each bearing a transverse row of about eight stout, acutely pointed spines (each with a basal seta). Tergite 8 terminal, broadly rounded and explanate laterally and bearing a row of about ten similar spines. Abdominal segment 9 short, strongly transverse and placed ventrally, being concealed from above by segment 8; bearing paramedially two groups of dense reddish setae. Sternites bearing a few scattered fine setae. *Legs* with femora bearing two to four fine apical setae; hind femora extending to abdominal segment 4; tarsal claws each with a single fine seta. *Functional spiracles* present on abdominal segments 1–6, the pairs on segments 7 and 8 being closed and probably non-functional; peritreme slot-like, rather thin, very feebly sclerotised and strongly raised above general level of cuticle.

Biology. Bondar (1956) refers to an unidentified cerambycid which causes severe damage to *Jacaranda*. The illustration of the larva indicates that the species in question belongs to the genus *Phaula*. These larvae feed only in healthy trees, making longitudinal galleries with frass ejection holes. The life-cycle lasts two years, adults appearing in October and November.

Material studied. 2 L, 1 P, Brazil, São Paulo, Piracicaba, 1913, G. Bondar leg., in coll. D.Z.S.P.; 1 L (no data), in coll. B.M.

References. Andrade, 1928 (Biol.); Bondar, 1915b (L fig., I fig., Biol. (of *Phaula* sp.); Duffy, 1953 (L fig., Biol. (of *Phaula* sp.)); Lima, 1930 (Biol.), 1955 (Biol.).

Hoplistonichus bondari Melzer

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plant: *Jacaranda mimosaefolia* (Bondar, 1937).

Biology. Larvae of this species infest healthy trees, making longitudinal galleries with frass ejection holes. The larval period is two years in duration. Adults emerge in October and November (Bondar, 1937).

Reference. Bondar, 1937 (L, Biol. fig.).

Aerenicopsis championi Bates

Distribution. NEOTROPICAL REGION: Mexico, Central America (Panama).

Host plant: *Lantana camara* (Krauss).

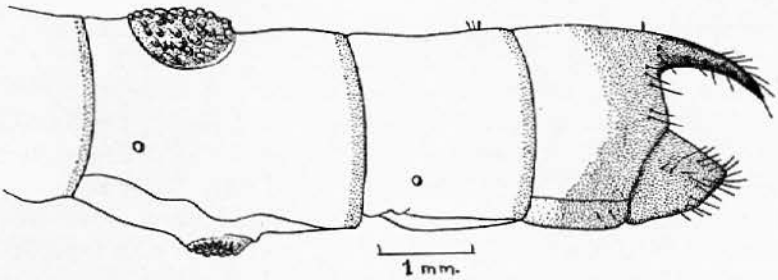


Fig. 176. *Aerenicopsis championi* Bates. Mature larva. Abdominal segments 7–10. Lateral aspect.

Mature larva (fig. 176). Rather similar to that of *Phaula* sp., but differing as follows. Form extremely slender. *Head* with frons very deeply pitted with coarse setal pores. *Abdomen* with ampullae on segments 6 and 7 very much larger than those on segments 3–5 (fig. 176). Epipleurum very feebly protuberant on all segments. *Spiracles* with paired chambers produced beyond outer margin of peritreme. Length up to 34 mm.; maximum breadth (at prothorax) 4·5 mm.

Material studied. 10 L, Mexico, Veracruz, 14.xii.1955, from branches of *Lantana camara*, N. L. H. Krauss leg., in coll. U.S.N.M.

Reference. None available.

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 tubercles without sclerotised pits. *Spiracles* with marginal chambers.

Eupogonius petulans Melzer

Distribution. NEOTROPICAL REGION: South America (Argentina, Brazil).
Host plant: *Araujia* (branches) (Bosq, 1942a).
Reference. Bosq, 1942a (Biol.).

Tetraopini

Larval Characters[1]

Very closely related to the Estolini from which it differs in the following characters. *Head* with mouthframe broadly pitchy. *Prothorax* with pronotum partly matt and micro-spiculate; prosternum bearing numerous long bristly setae. *Abdomen* with ampullae micro-spiculate.

Tetraopes tetrophthalmus (Forster)

Distribution. NEOTROPICAL REGION: Mexico. NEARCTIC REGION: U.S.A., Canada.
Host plants: *Asclepias cornuti* (Devereaux, 1878), *A. syriaca* (Haldeman, 1853).

Mature larva. Form elongate, moderately slender, cylindrical. *Head* thick, not depressed, with sides feebly constricted behind middle; antennal foramen open posteriorly; mouthframe strongly and broadly sclerotised, pitchy. Ocelli indiscernible. Six epistomal setae present. Clypeus glabrous. Hypostoma feebly convex, ferruginous to pitchy; sutures pitchy, slightly converging posteriorly. Gular region undefined. Antenna 2-segmented; segment 2 bearing a conical hyaline process. Mandibles rather short and stout. Maxilla with palp 2-segmented; labial palpi with segment 2 longer than segment 1. Mentum distinct from submentum. *Prothorax* with pronotum partly matt and micro-spiculate posteriorly. Prosternum bearing numerous long bristly setae. *Abdomen* with ampullae tuberculate and micro-spiculate. Tergite 9 unarmed. Anus trilobed. *Legs* absent. *Spiracles* with peritreme circular, the posterior half lined with a series of subcontiguous chambers. Length up to 22 mm.; maximum breadth (at prothorax) 5 mm.

Material studied. 2 L, New Hampshire, 17.xi.1896, C. V. Riley leg., in coll. U.Z.M.

References. Craighead, 1923 (L fig., Biol.); Devereaux, 1878 (Biol.); Haldeman, 1853 (Biol.).

Estolini

Larval Characters

Like the Apomecynini, which this tribe most closely resembles, there are stronger affinities to the Agapanthiini than to the Niphonini, near which this tribe has been placed on the basis of adult classification. The characters in common with the Apomecynini and Agapanthiini are the thick, strongly sclerotised head-capsule and the setose ninth abdominal segment which is subtruncate posteriorly.

Estola albocincta Melzer

Distribution. NEOTROPICAL REGION: South America (Brazil, Paraguay, Peru).
Host plant: *Nicotiana paniculata* (Weyrauch).

[1] These characters are also applicable to the Neartic species of *Tetrops*.

Mature larva. Form rather slender, cylindrical. *Head* thick, scarcely depressed, widest just before middle, with sides rather strongly rounded; antennal foramen open posteriorly; frons ferruginous anteriorly; frontal sutures indistinct, with eight setiferous pores; six epistomal setae present. One pair of ocelli present, lens strongly convex, pigmented spot very distinct. Hypostoma gradually sloping down to front margin and rather strongly convex; two pairs of paramedian setiferous pores present; sutures distinct, slightly incurved. Gular region with a distinct, broad, pale, median cleavage line. Antenna 2-segmented; segment 2 bearing a tapering hyaline process. Maxillary palp 2-segmented; segments 1 and 2 subequal in length. Labial palpi with segment 2 attenuated, as long as segment 1. Mentum distinct from submentum. *Prothorax* pale testaceous, smooth; posterior area of pronotum finely longitudinally striate; eusternum well defined, sparsely setose. *Abdomen* with each dorsal and ventral ampulla covered with glabrous, shining, moniliform tubercles which are irregularly arranged. Segment 9 without a sclerotised process, rather densely setose, subtruncate posteriorly and with a pair of sublateral, curved, linear impressions. Epipleurum feebly protuberant on all segments. Pleural tubercle without sclerotised pits. Anus trilobed. *Legs* absent. *Spiracles* with peritreme round, thick, with several subcontiguous marginal chambers on posterior half. Length up to 14 mm.; maximum breadth (at prothorax) 4 mm.

From the larvae of the Apomecynini it may be distinguished by the distinct submentum, the 2-segmented maxillary palpi and the presence of numerous marginal chambers on the spiracular peritreme.

Material studied. 3 L, Peru, near Lima, 22.iii.1952, in stems of *Nicotiana paniculata*, W. Weyrauch leg., in coll. B.M.

Reference. None available.

Estola attenuata Fisher

Distribution. NEOTROPICAL REGION: Caribbean (Jamaica).

Host plant: *Solanum melanogena* (Edwards, 1938).

Reference. Edwards, 1938 (Biol.).

Calliini

Callia (s.g. **Callia**) **axillaris** (Dalman)

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plant: *Dalbergia nigra* (Zikán and Zikán, 1946).

Reference. Zikán and Zikán, 1946 (Biol.).

Gryllicini

Gryllica melzeri Bondar

Distribution. NEOTROPICAL REGION: South America (Brazil).

Host plant: *Coccoloba ilheense* (Bondar, 1938).

Biology. Oviposition takes place on slender branches of healthy trees. Before the eggs are deposited, however, the female girdles the branch in the same way as do species of *Oncideres*. Adults of both sexes feed on the tender bark (Bondar, 1938).

Reference. Bondar, 1938 (I fig., Biol. fig.).

Hebestolini

Rumacon (Spegazziniella) canescens (Bruch)

Distribution. NEOTROPICAL REGION: South America (Argentina).

Host plant: *Alnus jerullensis* (Bosq, 1942a).

References. Bosq, 1942a (Biol.); Bruch, 1926 (?).

CATALOGUE OF HOST PLANTS OF NEOTROPICAL CERAMBYCIDAE

In the course of listing the host plants of each species considerable difficulty has been experienced in many cases owing to the widespread use of vernacular names in most of the South American journals. Many of these vernacular names refer in fact to two or more often totally unrelated genera. For example, "aca" could refer either to *Lucuma* or *Calophyllum*. Moreover, a vernacular name can sometimes refer to a whole group of plants, as in "vassoura". For this reason it has been necessary, in some cases, to use vernacular names, the suggested scientific names being given in brackets whenever possible.

Abies numidica. *Rhagium inquisitor.*

Abies sp. *Elaphidion villosum, Hylotrupes bajulus, Monochamus titillator.*

"aca" (=either *Lucuma* or *Calophyllum*). *Callichroma distinguendum, C. phyllopus, C. pseudovittatum.*

Acacia aroma. *Oncideres germari.*

Acacia berlandieri. *Oncideres cingulata* (?), *O. putator.*

Acacia bonariensis. *Ancylocera cardinalis.*

Acacia brindsi. *Megacyllene erythropa.*

Acacia catechu. *Xystrocera globosa.*

Acacia cavenia. *Anoploderma wagneri, Oncideres germari, Steirastoma stellio, Torneutes bouchanti, T. pallidipennis.*

Acacia confusa. *Xystrocera globosa.*

Acacia cyanophylla. *Oncideres guttulata.*

Acacia dealbata. *Oncideres guttulata.*

Acacia decurrens. *Curtomerus flavus, Macrodontia flavipennis, Parandra glabra.*

Acacia decurrens mollissima. *Achryson surinamum, Chlorida festiva* (?), *Coccoderus novempunctatus, Criodion tomentosum, Hypsioma fasciata, Octoplon flavopictum, Oncideres impluviata, Steirastoma stellio, Trichophorus interrogationis, T. lippus.*

Acacia farnesiana. *Curtomerus flavus, Lepturges guadeloupensis, Lissonotus flavocinctus, Oncideres cingulata* (?), *O. guttulata, O. putator, Torneutes pallidipennis.*

Acacia jurema. *Oncideres alicei.*

Acacia modesta. *Xystrocera globosa.*

Acacia mollissima. *Xystrocera globosa.*

Acacia nilotica. *Hylotrupes bajulus.*

Acacia polyphylla. *Achryson surinamum, Chlorida festiva, Eburodacrys longilineata, Hypsioma fasciata, Oncideres dejeani, Steirastoma stellio.*

Acacia visco. *Torneutes pallidipennis.*

Acacia spp. *Achryson surinamum, Batocera rufomaculata, Eburodacrys dubitata, Lissonotus andalgalensis, Neoclytus pusillus, Oncideres gutturator, O. impluviata, O. miniata, O. saga, O. ulcerosa, Clytemnestra albisparsa, Archlagocheirus funestus* (?).

Acer pseudo-platanus. *Stenodontes dasytomus.*

Acer spp. *Acanthoderes quadrigibba, Eburia quadrigeminata, Elaphidion villosum.*

Achras sapota. *Callichroma velutinum, Tomopterus vespoides.*

Acrocarpus fraxinifolius. *Xystrocera globosa.*

Acrocomia sp. *Macrodontia flavipennis.*

Adenanthera pavonina. *Xystrocera globosa.*

Adina cordifolia. *Batocera rufomaculata.*

Aesculus sp. *Gracilia minuta.*

Ageratum conyzoides. *Hippopsis lemniscata* (?).

Albizia chinensis. *Xystrocera globosa.*

Albizia falcara. *Xystrocera globosa.*

Albizia lebbeck. *Batocera rufomaculata, Chlorida festiva, Elaphidion irroratum, E. spinicorne, Xystrocera globosa.*

Albizia lucida. *Xystrocera globosa.*

Albizia moluccana. *Compsa vana, Megacyllene falsa, Oncideres saga.*

Albizia odoratissima. *Xystrocera globosa.*

Albizia procera. *Xystrocera globosa.*

Alchornea iricurana. *Rhopalophora collaris.*

Alchornea triplinerva. *Trypanidius melancholicus.*

Alchornea sidaefolia. *Chlorida festiva.*

Alchorneopsis floribunda. *Acanthoderes lateralis, Oreodera bituberculata.*

Aleurites fordi. *Diploschema rotundicolle.*

Aleurites moluccana. *Macropophora accentifer.*

Aleurites sp. *Lagocheirus undatus.*

Alexa leiopetala. *Megacyllene cayennensis, Stenodontes spinibarbis.*

Allamanda sp. *Lagocheirus undatus.*

Alnus jerullensis. *Rumacon canescens.*

Alnus sp. *Hylotrupes bajulus, Neoptychodes trilineatus, Parandra expectata, Stenodontes spinibarbis.*

Amaranthus muricatus. *Aerenea quadriplagiata.*

Ambrosia sp. *Hippopsis lemniscata.*

Amphirrhox longifolia. *Brasilianus plicatus* (?).

Amyris sp. *Protosphaerion insulare.*

Anacardium occidentale. *Nyssicus quadrinus, Oncideres dejeani, O. ulcerosa.*

Anona cherimolia. *Oncideres dejeani.*

Anona coriacea. *Oncideres dejeani.*

Anona squamosa. *Oncideres dejeani.*

Anona sp. *Sphallenum setosum.*

Araucaria angustifolia. *Steirastoma marmoratum.*

Araucaria araucana. *Microplophorus calverti, Parandra araucana.*

Araucaria brasiliensis. *Parandra glabra.*

Araucaria sp. *Compsa livida, Lagocheirus undatus.*

Araujia sp. *Eupogonius petulans.*

Artocarpus altilis. *Batocera rufomaculata.*

Artocarpus incisa. *Acrocinus longimanus.*

Artocarpus integer. *Batocera rufomaculata.*

Artocarpus integrifolia. *Acrocinus longimanus, Colobothea emarginata, Taeniotes scalaris.*

Asclepias cornuti. *Tetraopes tetrophthalmus.*

Asclepias syriaca. *Tetraopes tetrophthalmus.*

Asimina sp. *Batocera rufomaculata.*

Aspidosperma polyneuron. *Megacyllene falsa, Hemilissa gummosa, Stenodontes spinibarbis.*

Aspidosperma sp. *Achryson surinamum, Brasilianus lacordairei, B. murinus, Parandra glabra, Stizocera plicicollis, Trachyderes succinctus.*

Astronium fraxinifolium. *Brasilianus mexicanus, Chlorida festiva, Macropophora accentifer, Oncideres dejeani.*

Astronium ulei. *Brasilianus lacordairei, Macropophora trochlearis.*

Attalea compta. *Macrodontia cervicornis.*

Attalea funifera. *Macrodontia cervicornis.*

Avicennia nitida. *Elaphidion irroratum.*

Azorella yareta. *Schreiteria bruchi.*

"bacupary" (most probably *Rheedia brasiliensis* but could be *Erythroxylum, Salacia* or *Pradocia*). *Callichroma distinguendum.*

Balfourodendron riedielanum. *Megacyllene acuta.*

Bambusa. *Cyphosterna bicolor.*

Barringtonia acutangula. *Batocera rufomaculata.*

Bauhinia acuminata. *Batocera rufomaculata, Xystrocera globosa.*

Bauhinia candicans. *Oncideres impluviata.*

Bauhinia monandra. *Leptostylus praemorsus.*

Bauhinia sp. *Cycnidolon mucoriferum, Pentheochaetes argentinus.*

Berberis buxifolia. *Callisphyris macropus.*

Berberis darwinii. *Callisphyris macropus.*

Betula spp. *Acanthoderes quadrigibba, Elaphidion villosum* (?), *Gracilia minuta, Rhagium inquisitor.*

BIGNONIACEAE. *Desmiphora cucullata.*

Bixa orellana. *Derancistrus thomae.*

Boehmeria caudata. *Alcidion bicristatum* (?).

Bombax ceiba. *Steirastoma breve.*

Bombax malabaricum. *Batocera rufomaculata, Xystrocera globosa.*

Bombax monguba. *Steirastoma breve.*

Bombax sp. *Adesmus borgmeieri* (?), *Dryoctenes scrupulosus.*

Brachychiton populneum. *Dryoctenes scrupulosus.*

Brosimum alicastrum. *Acrosinus longimanus.*

Brosimum paraense. *Acrocinus longimanus.*

Broussonetia papyrifera. *Batocera rufomaculata.*

Broussonetia sp. *Oncideres dejeani.*

Brownea latifolia. *Neoclytus regularis.*

Brya sp. *Achryson surinamum, Chlorida festiva.*

Buchenaria capitata. *Caphina* sp., *Eburodacrys sulphureosignata.*

Bucida buceras. *Curtomerus flavus, Neoclytus araneiformis.*

Bulnesia arborea. *Megacyllene guttata.*

Bursera gummifera. *Stenodontes maxillosus.*

Bursera simaruba. *Lagocheirus araneiformis.*

Byrsonima stipulacea. *Callipogon cinnamomeus.*

Cabralea cangerana. *Diploschema rotundicolle, Odontocera flavicauda.*

Caesalpinia echinata. *Coccoderus novempunctatus, Eburodacrys sexmaculata, Trachyderes succinctus, T. thoracicus.*

Caesalpinia ferrea. *Disaulax hirsuticornis, Eburodacrys sexmaculata, Trachyderes succinctus, T. thoracicus.*

Caesalpinia peltophoroides. *Coccoderus novempunctatus, Oncideres dejeani.*

Cajanus indicus (see also "guindo"). *Sphallenum setosum.*

Calophyllum (see "aca").

Camphora officinarum. *Oncideres aegrota.*

Camptosema pinnatum. *Acyphoderes arulentus.*

Canavalia sp. *Sphallenum setosum.*

Capparis flexuosa. *Lepturges guadeloupensis.*

Capsicum annuum. *Alcidion bicristatum.*

Carica papaya. *Batocera rufomaculata.*

Carpotroche brasiliensis. *Coccoderus novempunctatus, Oncideres dejeani.*

Carya sp. *Chion cinctus, Elaphidion villosum, Oncideres cingulata, Stenodontes dasytomus, Stromatium fulvum.*

Caryocar brasiliensis. *Acrocinus longimanus.*

Cassia fistula. *Coccoderus novempunctatus, Mallosoma zonatum.*

Cassia glauca. *Xystrocera globosa.*

Cassia grandis. *Eburodacrys sexmaculata.*

Cassia pteridophylla. *Polyraphis spinosa.*

Cassia strobilacea. *Coccoderus novempunctatus.*

Cassia sp. *Stromatium fulvum.*

Castanea sp. *Acanthoderes quadrigibba, Chion cinctus, Eburia quadrigeminata, Elaphidion villosum, Nathrius brevipennis, Praxithea derourei, Phymatodes lividus, Trachyderes thoracicus.*

Castilloa elastica. *Acrocinus longimanus.*

Castilloa sp. *Taeniotes scalaris.*

Casuarina equisetifolia. *Chlorida festiva, Curtomerus flavus, Elaphidion nanum.*

Casuarina sp. *Oncideres dejeani.*

Catostemma commune. *Stenodontes spinibarbis.*

Catostemma sp. *Steirastoma stellio, Lepturges sejunctimacula.*

Cayaponia ficifolia. *Adetus similis, Dorcasta lignosa.*

Cecropia sp. *Acanthoderes nigricans.*

Cedrela brasiliensis. *Macropophora accentifer.*

Cedrela fissilis. *Diploschema rotundicolle, Macropophora accentifer.*

Cedrela glaziovii. *Diploschema rotundicolle, Oncideres dejeani.*

Cedrela mexicana. *Acanthoderes quadrigibba, Derancistrus thomae.*

Cedrus atlantica. *Rhagium inquisitor.*

Cedrus sp. *Psalidognathus friendi, P. sallei, Stromatium fulvum.*

Ceiba pentandra. *Adesmus borgmeieri, Batocera rufomaculata, Macrodontia cervicornis, Steirastoma breve.*

Ceiba pubiflora. *Dryoctenes scrupulosus.*

Celastrus scandens. *Elaphidion villosum.*

Celtis laevigata. *Achryson surinamum.*

Celtis spp. *Chion cinctus, Compsocerus equestris, Eurymerus eburoides, Paromoeocerus barbicornis.*

Centrolobium tomentosum. *Oncideres dejeani.*

Ceratonia siliqua. *Gracilia minuta, Nathrius brevipennis.*

Cercidium. *Achryson surinamum.*

Cercis canadensis. *Elaphidion villosum.*

Cereus spp. *Alcidion cereicola, A. privatum.*

"Chañar". *Anoploderma d'orbignyi, Calocomus desmaresti.*

Chlorophora tinctoria. *Achryson surinamum, Acrocinus longimanus, Neoptychodes trilineatus.*

Chorisia insignis. *Dryoctenes scrupulosus, Steirastoma breve.*

Chorisia speciosa. *Acrocinus longimanus, Dryoctenes scrupulosus, Steirastoma breve, S. stellio* (?).

Chorisia sp. *Steirastoma meridionale.*

Chrysophyllum raminiflorum. *Brasilianus mexicanus.*

Cinnamomum zeylanicum. *Oncideres aegrota.*

Citrus aurantium. *Ancylocera cardinalis, Coleoxestia spinipennis, C. waterhousei, Diploschema rotundicolle, Dorcadocerus barbatus, Eburia octoguttata, Elaphidion inerme, Gracilia minuta, Hexoplon ctenostomoides, Leptostylus pleurostictus, Macropophora accentifer, Oncideres dejeani, Phoebe phoebe, Rhopalophora collaris, Stenodontes spinibarbis.*

Citrus deliciosa. *Diploschema rotundicolle.*

Citrus limon. *Rhopalophora collaris.*

Citrus limonia. *Leptostylus praemorsus.*

Citrus medica. *Diploschema rotundicolle.*

Citrus sinensis. *Leptostylus praemorsus.*

Citrus spp. *Dendrobias mandibularis, Dryoctenes scrupulosus, Eburia sordida, Eburodacrys vittata, Elaphidion glabratum, E. villosum, Hexoplon ctenostomoides, Macropophora accentifer, Neoclytus cordifer, Oncideres amputator, O. cingulator, Stenodontes spinibarbis, S. damicornis, Trachyderes bilineatus, T. succinctus, T. striatus, T. thoracicus, T. variegatus.*

Clathrotropis brachypetala. *Chlorida festiva.*

Climbers or climbing plants. See "lianas".

Clusia grandiflora. *Acanthoderes daviesi.*

Clusia rosea. *Elaphidion mutatum, E. tomentosum.*

Coccoloba ilheense. *Gryllica melzeri, Merocentrum melzeri.*

Coccolobis uvifera. *Curtomerus flavus.*

Cocos nucifera. *Batocera rufomaculata, Macrodontia cervicornis, Steirastoma breve.*

Cocos sp. *Ancistrotus cumingi* (?), *Anisocerus scopifer, Curtomerus flavus* (?).

Coffea sp. *Ecthoea quadricornis.*

Colubrina rufa. *Chlorida costata, Diploschema rotundicolle.*

Conium maculatum. *Hylotrupes bajulus.*

Conocarpus erecta. *Elaphidion nanum, Leptostylus argentatus.*

Cordia curossarica. *Macropophora accentifer.*

Cordia verbenacea. *Macropophora accentifer.*

Cornus sp. *Oncideres cingulata.*

Corylus sp. *Gracilia minuta, Hylotrupes bajulus, Nathrius brevipennis, Stromatium fulvum.*

"Cosabe". *Taranomis bivittatus.*

Couepia versicolor. *Callichroma vittatum.*

Couroupito guianensis. *Steriastoma breve.*

Crataegus sp. *Gracilia minuta.*

Crinodendron spp. *Ansistrotus cumingi.*

Croton cryptocalyx. *Diploschema rotundicolle.*

Croton floribundus. *Diploschema rotundicolle, Oncideres dejeani.*

Croton piptocalyx. *Acanthoderes jaspidea.*

Croton urucurana. *Diploschema rotundicolle, Macropophora accentifer, Oncideres dejeani.*

Cryptocharia peumo. *Ancistrotus cumingi.*

Cupressus glauca. *Oncideres dejeani.*

Cupressus spp. *Astyochus tenebrosus, Eburia quadrigeminata, Nathrius brevipennis, Phrynidius* sp.

CUCURBITACEAE. *Adetus subellipticus.*

Cybistax antisyphilitica. *Astyochus dorsalis, Desmiphora cucullata, Quercivir zikani* (?).

Cydonia sp. *Callisphyris vespa, Megacyllene spinifera, Praxithea derourei.*

Cyphomandra betacea. *Alcidion bicristatum.*

Cytisus spinosus. *Stromatium fulvum.*

Dalbergia nigra. *Acanthoderes jaspidea, Callia axillaris, Colobothea lateralis, Hypsioma basalis, Oncideres fasciata, Stenodontes spinibarbis, Stictosomus reticulatus, Stizocera plicicollis* (?).

Dalbergia sissoo. *Batocera rufomaculata.*

Datura sp. *Curtomerus flava.*

Delonyx regia. *Coccoderus novempunctatus, Leptostylus praemorsus, Lepturges guadeloupensis, Oncideres dejeani, O. ulcerosa.*

Diospyros kaki. *Neoclytus pusillus.*

Diospyros virginiana. *Oncideres cingulata.*

Diplothemium sp. *Anisocerus scopifer.*

Dolichos (?) **lablab.** *Sphallenum setosum.*

Drypetes variabilis. *Brasilianus lacordairei.*

Dyera costulata. *Batocera rufomaculata.*

Ecclinusa ramiflora. *Brasilianus mexicanus, Macropophora accentifer.*

Entanda polystachia. *Ozineus arietinus.*

Enterolobium contortisiliquum. *Lophopoeum timbouvae.*

Enterolobium maximum. *Astyochus dorsalis, Hypsioma gibbera.*

Enterolobium monjolo. *Chlorida festiva* (?).

Enterolobium timbouva. *Acanthoderes jaspidea, Acrocinus longimanus, Lophopoeum timbouvae, Orthoschema ventrale.*

Enterolobium sp. *Mecometopus palmatus* (?).

Eperua falcata. *Brasilianus lacordairei, B. plicatus.*

Eperua jenmanni. *Aethomerus lacordairei.*

Eperua sp. *Polyraphis spinosa, Pyrodes auratus.*

Erechtites valerianaefolia. *Hippopsis lemniscata.*

Eriobotrya japonica. *Leptostylus praemorsus, Oncideres dejeani.*

Eriodendron anfractuosum. *Oncideres dejeani, Steirastoma breve.*

Erythrina glauca. *Leptostylus gundlachi.*

Erythrina indica. *Batocera rufomaculata.*

Erythrina umbrosa. *Steirastoma breve.*
Erythrina velutina. *Steirastoma breve.*
Erythrina sp. *Trachyderes succinctus.*
Erythroxylum pulchrum. *Callichroma distinguendum* (?), *Diploschema rotundicolle.*
Erythroxylum sp. (see "bacupary").
Eschweilera sagotiana. *Eutrypanus incertus, Xylergates praetor, X.* sp.
Esenbeckia febrifuga. *Macropophora accentifer.*
Esenbeckia leiocarpa. *Hemilissa gummosa, Steirastoma marmoratum.*
Esenbeckia sp. *Epropetes latifascia.*
Eucalyptus camaldulensis. *Phoracantha semipunctata.*
Eucalyptus crebra. *Phoracantha semipunctata.*
Eucalyptus diversicolor. *Phoracantha semipunctata.*
Eucalyptus exserta. *Eurymerus eburoides.*
Eucalyptus globulus. *Phoracantha semipunctata.*
Eucalyptus leucoxylon. *Phoracantha semipunctata.*
Eucalyptus longifolia. *Phoracantha semipunctata.*
Eucalyptus robusta. *Phoracantha semipunctata.*
Eucalyptus saligna. *Phoracantha semipunctata.*
Eucalyptus salubris. *Phoracantha semipunctata.*
Eucalyptus sideroxylon. *Phoracantha semipunctata.*
Eucalyptus tereticornis. *Phoracantha semipunctata, Sphallenum spadiceum.*
Eucalyptus trabuti. *Oncideres vermiculata.*
Eucalyptus triantha. *Phoracantha semipunctata.*
Eucalyptus viminalis. *Phoracantha semipunctata.*
Eucalyptus spp. *Ancistrotus cumingi, Callideriphus laetus, Curtomerus flavus, Oncideres amputator, O. candida, O. dejeani, Paramallocera ilinizae, Phoracantha semipunctata, Phymatioderus bizonatus, Steirastoma breve, Stenodontes spinibarbis, Trachyderes bilineatus, T. striatus, T. succinctus, T. thoracicus, T. variegatus.*
Eugenia jambolana. *Batocera rufomaculata.*
Eugenia pitanga. *Erosida gratiosa* (?).
Eugenia uniflora. *Leptostylus praemorsus.*
Eugenia sp. *Polyraphis grandini.*
Eupatorium sp. *Alcidion bicristatum* (?).
Euphorbia multiformis. *Lagocheirus undatus.*

Fagara trinitensis. *Nyssodrys ophthalmica.*
Fagus sp. *Acanthoderes quadrigibba, Eburia quadrigeminata, Stromatium fulvum.*
Ficus benghalensis. *Batocera rufomaculata.*
Ficus benjamina. *Oncideres dejeani, Oxymerus aculeatus, O. confusus.*
Ficus carica. *Batocera rufomaculata, Coleoxestia spinipennis, Dorcadocerus barbatus, Eburia pilosa, Neoptychodes trilineatus, Taeniotes insularis, T. scalaris.*
Ficus elastica. *Acrocinus longimanus, Batocera rufomaculata.*
Ficus glabrata. *Acrocinus longimanus.*
Ficus gleasoni. *Acrocinus longimanus, Parandra punctata.*
Ficus glomerata. *Batocera rufomaculata.*
Ficus infectoria. *Batocera rufomaculata.*
Ficus laevigata. *Elaphidion insulare.*
Ficus pohliana. *Acrocinus longimanus, Alphus subsellatus, Anisocerus scopifer, Anisopodus curvilineatus, Callichroma chloe, Macropophora accentifer, Megacyllene acuta, M. falsa, Oedopeza umbrosa, Oncideres dejeani, Oreodera glauca, Polyraphis grandini, P. spinipennis.*
Ficus religiosa. *Batocera rufomaculata.*
Ficus tjakela. *Batocera rufomaculata.*
Ficus spp. *Acanthoderes jaspidea, Achryson surinamum, Acrocinus longimanus, Alcidion bicristatum, Anisopodus phlangodes* (?), *Astyochus dorsalis, Asyngenes chalceolus, Atrypanius albocinctus, Batocera rufomaculata, Callichroma auricoma, Compsocerus equestris, Ctenoscelis atra, Dryoctenes scrupulosus, Gracilia minuta, Heterachtes bonariensis, Lagocheirus araneiformis, Lepturges mancus, Nathrius brevipennis, Neoptychodes trilineatus, Paromoeocerus barbicornis, Stromatium fulvum, Taeniotes scalaris, Trachyderes bilineatus, T. striatus, T. succinctus, T. thoracicus, T. variegatus.*
Fitzroya cupressoides. *Microplophorus magellanicus.*
Flacourtia ramontchi. *Tropidosoma spenceri.*
Fraxinus sp. *Eburia quadrigeminata.*
Fruit trees. *Compsocerus equestris, Elaphidion spinicorne, E. villosum, Megacyllene acuta, Oncideres impluviata, O. ulcerosa, Trachyderes dimidiatus, T. striatus.*

Galipea jasminoides. *Oncideres dejeani.*

Garuga pinnata. *Batocera rufomaculata.*

Genista scorpius. *Hylotrupes bajulus.*

Gleditschia armorphoides. *Lophopoeum timbouvae, Oncideres impluviata.*

Gleditschia sp. *Elaphidion villosum, Oncideres cingulata.*

Gossypiospermum praecox. *Nyssodrys ophthalmica.*

Gossypium sp. *Ataxia alboscutellata, Calocomus desmaresti, Oncideres fasciata, O. guttulata, Oxymerus obliquatus.*

Grevillea robusta. *Oncideres dejeani.*

Grewia tiliifolia. *Xystrocera globosa.*

Guaiacum officinale. *Elaphidion nanum, Neoclytus cacicus.*

Guarea trichiloides. *Praxithea derourei.*

Guazuma ulmifolia. *Acrocinus longimanus, Stenodontes bituberculata.*

"guindo" (probably *Cajanus indicus* or *Nothofagus betuloides*). *Trachyderes sulcatus.*

Gunnera chiliensis. *Aconopterus cristatipennis.*

Helietta cuspidata. *Brasilianus plicatus.*

Henrietella fascicularis. *Derancistrus thomae.*

Hevea brasiliensis. *Batocera rufomaculata.*

Hevea sp. *Callipogon cinnamomeus.*

Hibiscus esculentus. *Steirastoma breve.*

Hibiscus tiliaceus. *Steirastoma breve.*

Hibiscus sp. *Lagocheirus undatus, Lepturges guadeloupensis.*

Hicoria sp. *Chion cinctus, Eburia quadrigeminata, Oncideres cingulata.*

Himatanthus articulatus. *Oreodera bituberculata.*

Holocalyx glaziovii. *Megacyllene falsa, Nyssodrys lignaria.*

Hura crepitans. *Lagocheirus araneiformis, Onychocerus crassus.*

Hylopia grandiflora. *Oncideres dejeani.*

Hymenaea courbaril. *Lophopoeum timbouvae.*

Hymenaea stilbocarpa. *Oncideres dejeani, Periboeum paucispinum.*

Hymenaea sp. *Oncideres jatai.*

Ilex paraguayensis. *Hedypathes betulinus, Oncideres impluviata, O. miniata, O. ulcerosa, Steirastoma marmoratum.*

Inga (?) **cylindrica.** *Criodion angustatum.*

Inga edulis. *Achryson surinamum, Compsa squalida, Neoclytus rufus, Phormesium virgulatum.*

Inga fagifolia. *Criodion angustatum.*

Inga luschnatiana. *Lophopoeum timbouvae, Nyssodrys lignaria.*

Inga vera. *Coccoderus novempunctatus, Neoclytus araneiformis.*

Inga spp. (see also "tasi"). *Acrocinus longimanus* (?), *Callipogon cinnamomeus, Coccoderus novempunctatus, Criodion tomentosum, Lepturges mancus, Oncideres saga, O. tessellata, Polyraphis spinosa, Tapeina transversifrons* (?), *Trachyderes succinctus.*

Inocarpus edulis. *Neoptychodes trilineatus.*

Ipomoea batatas. *Hypselomus cristatus* (?), *Ptericoptus acuminatus, P. dentipennis, P. hybridus* (?).

Ipomoea bonariensis. *Dorcasta implicata.*

Ipomoea murocoides. *Acanthoderes borrei.*

Jacaranda caroba. *Callichroma equestre.*

Jacaranda copaia. *Callipogon cinnamomeus.*

Jacaranda cuspidifolia. *Ancylocera cardinalis.*

Jacaranda decurrens. *Eurymerus eburoides, Pantomallus morosus.*

Jacaranda mimosaefolia. *Hoplistonichus bondari, Megacyllene falsa, Phaula thomsoni.*

Jacaranda puberula. *Quercivir zikani* (?).

Jacaranda semiserrata. *Quercivir zikani* (?).

Jacaranda sp. *Anoplomerus rotundicollis.*

Jenipa americana. *Trypanidius melancholicus.*

Jessenia weberbaueri. *Macrodontia cervicornis* (?).

Juglans sp. *Chion cintus, Elaphidion villosum* (?), *Leptostylus bruchi, Nathrius brevipennis, Stromatium fulvum.*

Juniperus bermudiana. *Leptostylus praemorsus.*

Lagerstroemia indica. *Elaphidion mutatum, Leptostylus praemorsus.*

Laguncularia racemosa. *Elaphidion irroratum.*

Lannea grandis. *Batocera rufomaculata.*

Lantana camara. *Aerenicopsis championi.*

Larix sp. *Rhagium inquisitor.*

Laurus nobilis. *Nathrius brevipennis.*

Lecythis pisonis. *Lophopoeum timbouvae.*

LEGUMINOSAE. *Criodion fulvopilosum, C. tomentosum, Metopoicoilus quadrispinosus. Oncideres sladeni.*

lianas. *Jamesia globifera, Polyraphis angustata.*

Libocedrus chilensis. *Microplophorus magellanicus.*

Ligustrum sinense. *Anisopodus canus, Leptostylus bruchi.*

Ligustrum sp. *Nathrius brevipennis.*

Lindera benzoin. *Elaphidion villosum* (?).

Lithraea caustica. *Oectropsis latifrons, Phymatioderus bizonatus.*

Lomatia obliqua. *Microplophorus magellanicus.*

Lonchocarpus spruceanus. *Acrocinus longimanus, Metopoicoilus quadrispinosus.*

Lonchocarpus sp. *Oncideres saga.*

Lucuma (see "aca").

Luehea divaricata. *Coleoxestia spinipennis, Oncideres dejeani.*

Machaerium acutifolium. *Hypsioma gibbera.*

Machaerium stipitatum. *Metopoicoilus quadrispinosus.*

Maclura aurantiaca. *Elaphidion villosum.*

Malachra alceifolia. *Steirastoma breve.*

Malus pumila. *Gracilia minuta.*

Malus sp. *Paramallocera ilinizae, Praxithea derourei.*

Mangifera indica. *Batocera rufomaculata, Chlorida festiva, Oncideres dejeani, O. ulcerosa, Steirastoma marmoratum.*

Mangifera sp. *Batocera rufomaculata, Oncideres repandator.*

Manihot aipi. *Lagocheirus undatus, Leptostylus bruchi, Lypsimena fuscata.*

Manihot glaziovi. *Lagocheirus undatus.*

Manihot palmata. *Ozineus prolixus.*

Manihot utilissima. *Lagocheirus undatus, Leptostylus biustus.*

Manilkara bidentata. *Callichroma velutinum, Tomopterus larroides.*

Melia azedarach. *Diploschema rotundicolle, Elaphidion collare, E. spinicorne, Praxithea derourei.*

Melicocca bijuga. *Stenodontes bituberculata.*

Miconia guianensis. *Callipogon cinnemomeus, Stenodontes spinibarbis.*

Mimosa bracatinga. *Eburodacrys sexmaculata, Paromoeocerus barbicornis, Trachyderes succinctus.*

Mimosa lindheimeri. *Oncideres putator.*

Mimosa sordida. *Callichroma equestre, Eburodacrys sexmaculata, Oncideres dejeani, O. impluviata, Paromoeocerus barbicornis.*

Mimosa sp. *Coleoxestia annulipes.*

Mimusops (?) elata. *Coleoxestia waterhousei.*

Mora excelsa. *Aethomerus lacordairei, Megaderus stigma, Neoclytus rufus, Oedopeza pogonocheroides, Polyraphis spinosa, Trachyderes succinctus, Xylergates lacteus.*

Morera aurantiaca. *Nathrius brevipennis.*

Moringa pterygosperma. *Batocera rufomaculata.*

Morrenia brachystephana (see "tasi").

Morus alba. *Colobothea emarginata, Macropophora accentifer, Taeniotes scalaris, Trachyderes rufipes, T. succinctus.*

Morus indica. *Batocera rufomaculata.*

Morus spp. *Nathrius brevipennis, Neoptychodes trilineatus, Stromatium fulvum.*

Mourilia guianensis. *Oncideres ulcerosa.*

Musa sp. *Batocera rufomaculata.*

Myrcia jaboticaba. *Dorcadocerus barbatus, Eburodacrys vittata, Eurymerus eburoides, Polyraphis grandini, P. spinipennis, Rathymoscelis melzeri.*

Myrciaria sp. *Dorcadocerus barbatus, Eburodacrys vittata, Eurymerus eburoides, Oncideres dejeani, Trachyderes thoracicus.*

Myristica surinamensis. *Brasilianus plicatus.*

Myrocarpus frondosus. *Acyphoderes crinita, Oncideres dejeani.*

Myroxylon peruiferum. *Acyphoderes peruiferum, Psygmatocerus wagleri.*

MYRTACEAE. *Chrysoprasis punctiventris, Criodion sommeri.*

Myrtus luma. *Cheloderus childreni.*

Nectandra spp. *Acanthocinus triangulifer, Achryson surinamum, Cycnidolon mucoriferum, Eburydacrys sexguttata, Euryprosopus angustissimus, Meroscelisus zikani, Neoclytus centurio, N. famelicus, Obrium vicinum, Octoplon ruficaudatum, Oncideres aegrota, O. saga, Phormesium quadrinotatum, Quercivir zikani, Steirastoma marmoratum.*

Nicotiana paniculata. *Estola albocincta.*

Nicotiana sp. *Alcidion bicristatum, Curtomerus flavus.*

Nothofagus antarctica. *Cheloderus penai, Microplophorus magellanicus, Sibylla dancoi.*

Nothofagus betuloides (see "guindo").

Nothofagus dombeyi. *Callisphyris semicalignathus, Calydon submetallicum, Cheloderus childreni, Chenoderus octomaculatus, Grammicosum flavofasciatum, Microplophorus magellanicus, Oxypeltus quadrispinosus, Sibylla coemeteri.*

Nothofagus nitida. *Hephaestion sp., Lautarus concinnus.*

Nothofagus obliqua. *Calydon submetallicum, Chenoderus testaceus, Grammicosum flavofasciatum.*

Nothofagus pumilio. *Oxypeltus quadrispinosus.*

Ochroma lagopus. *Batocera rufomaculata.*

Ocotea acutangula. *Aegomorphus aculeatus.*

Ocotea pretiosa. *Ctenoscelis acanthopus.*

Ocotea rodiaei. *Callipogon cinnamomeus, Stenodontes spinibarbis.*

Ocotea sp. *Oncideres aegrota.*

Olea sp. *Nathrius brevipennis.*

Opuntia imbricata. *Moneilema rugosipennis.*

Opuntia spp. *Archlagocheirus funestus, Moneilema opuntiae, M. vittata.*

orchard trees. *Derobrachus geminatus.*

Ormosia coutinhoi. *Stenodontes spinibarbis.*

Oxytheca ambelanifolia. *Callichroma auricoma, Tomopterus bispeculifer.*

Pachira aquatica. *Dryoctenes scrupulosus, Steirastoma breve.*

Pachira insignis. *Steirastoma breve.*

palms. *Ctenoscelis acanthopus.*

Parahancornia amapa. *Acrocinus longimanus.*

Parkia pendula. *Oncideres saga.*

Parkinsonia aculeata. *Oncideres fasciata, O. putator, Trachyderes sulcatus.*

Parkinsonia sp. *Chion cinctus, Dendrobias mandibularis.*

Patagonula americana. *Oncideres dejeani, Trachysomus fragifer.*

Peltophorum vogelianum. *Acanthoderes jaspidea* (?).

Peltoygne pubescens. *Callipogon cinnamomeus.*

Peltogyne sp. *Brasilianus mexicanus.*

Peltophorum ferrugineum. *Neoclytus rufus.*

Pentaclethra macroloba. *Mecometopus jansoni.*

Pera glabrata. *Anisopodus phlangodes, Astyochus dorsalis, Chrysoprasis linearis* (?).

Persea gratissima. *Acanthoderes jaspidea, Astyochus dorsalis, Eburodacrys sexguttata, Macropophora accentifer, Oncideres aegrota, O. dejeani, Phormesium quadrinotatum, Trachyderes succinctus.*

Persea persea. *Oncideres gutturator.*

Persea sp. *Batocera rufomaculata, Derobrachus asperatus, Oncideres poecila.*

Peumus boldus. *Ancistrotus cumingi.*

Phaseolus lunatus. *Sphallenum setosum.*

Phoebe sp. *Parandra glabra.*

Picea spp. *Hylotrupes bajulus, Monochamus titillator, Rhagium inquisitor.*

Pimenta officinalis. *Curtomerus flavus, Neoclytus longipes.*

Pinus ayacahuite. *Tetropium guatemalenum* (?).

Pinus canariensis. *Hylotrupes bajulus.*

Pinus caribaea. *Hylotrupes bajulus.*

Pinus halepensis. *Hylotrupes bajulus, Nathrius brevipennis.*

Pinus palustris. *Hylotrupes bajulus.*

Pinus maritima. *Hylotrupes bajulus.*

Pinus pinaster. *Ancistrotus cumingi.*

Pinus pinea. *Hylotrupes bajulus.*

Pinus ponderosa. *Ergates spiculatus, Hylotrupes bajulus.*

Pinus radiata. *Hylotrupes bajulus.*

Pinus rudis. *Astyochus tenebrosus, Callipogon barbatum, Leptura aliena, Tetropium beckeri, T. guatemalenum, T. opacum, T. schwerdtfegeri.*

Pinus sylvestris. *Hylotrupes bajulus.*

Pinus taeda. *Hylotrupes bajulus.*

Pinus tenuifolia. *Arhopalus obsoletus.*

Pinus spp. *Acanthocinus obliquus, Compsocerus equestris, Derobrachus brunneus, Hylotrupes bajulus, Monochamus titillator, Nathrius brevipennis, Rhagium inquisitor, Trichoderes pini.*

Piptadenia acacia. *Oncideres impluviata.*

Piptadenia colubrina. *Onychocerus crassus.*

Piptadenia communis. *Coccoderus novempunctatus, Criodion tomentosum, Oncideres saga, Trachyderes octolineatus.*

Piptadenia macrocarpa. *Eburodacrys sexmaculata, Oncideres germari, O. schreiteri, Oxymerus pallidus.*

Piptadenia rigida. *Oncideres impluviata.*

Piptadenia sp. *Brasilianus lacordairei, Trichophorus electus, T. interrogationis.*

Piratinera guianensis. *Macropophora trochlearis.*

Pistacia lentiscus. *Nathrius brevipennis, Stromatium fulvum.*

Pithecolobium flexicaule. *Oncideres cingulata* (?).

Pithecolobium saman. *Calocomus desmaresti, C. morosus, Oedopeza pogonocheroides.*

Platanus orientalis. *Batocera rufomaculata.*

Platanus sp. *Desmiphora cirrosa, Stromatium fulvum.*

Platymenia reticulata. *Eburodacrys sexmaculata.*

Platyopuntia sp. *Moneilema rugosipennis.*

Plumeria rubra. *Lagocheirus undatus.*

Podocarpus andina. *Epipodocarpus andinus.*

Poinciana regia (see *Delonyx regia*).

Poinciana sp. *Leptostylus praemorsus.*

Populus dilitata. *Stenodontes spinibarbis.*

Populus spp. *Acanthoderes jaspidea, Ancistrotus cumingi, Heterachtes bonariensis, Hylotrupes bajulus, Lissonotus andalgalensis, Megacyllene spinifera, Oncideres cingulata, Stenodontes spinibarbis, Steirastoma stellio.*

Pouteria egregia. *Callichroma velutinum.*

Pouteria ovata. *Callichroma vittatum.*

Pradocia (see "bacupary").

Pratium insigne. *Nyssodrys ophthalmica.*

Prosopis alba. *Calocomus desmaresti, C. morosus, Lophopoeum timbouvae.*

Pratium insigne. *Nyssodrys ophthalmica.*

Prosopis dulcis. *Megacyllene erythropa.*

Prosopis glandulosa. *Oncideres putator.*

Prosopis juliflora. *Achryson surinamum, Euryscelis suturalis, Oncideres cingulata, O. putator.*

Prosopis kuntzei. *Lophopoeum timbouvae.*

Prosopis nigra. *Calocomus desmaresti, C. morosus, Dorcadocerus barbatus.*

Prosopis nigra-gris. *Megacyllene spinifera.*

Prosopis spp. *Achryson lutarium, A. surinamum, Brasilianus lacordairei, Megacyllene spinifera, Oncideres germari, O. guttulata.*

Protium decandrum. *Macropophora trochlearis.*

Prunus armeniaca. *Stromatium fulvum.*

Prunus capollin. *Paramallocera ilinizae.*

Prunus domestica. *Phoebe cava, Ptaxithea derourei.*

Prunus malus. *Callisphyris vespa.*

Prunus persica. *Diploschema rotundicolle, Macropophora accentifer, Oreodera quinquetuberculata, Trachelissa maculicollis, Trachyderes bilineatus, Xystrocera globosa.*

Prunus spp. *Ancylosternus morio, Callideriphus laetus, Compsocerus equestris, Elaphidion collare, E. villosum, Nathrius brevipennis, Oncideres cingulata, Oxymerus luteus, Trachyderes dimidiatus, T. sulcatus, T. thoracicus, Tropidosoma spenceri.*

Pseudopanax sp. *Lagocheirus undatus.*

Pseudotsuga mucronata. *Ergates spiculatus.*

Pseudotsuga taxifolia. *Hylotrupes bajulus* (?).

Psidium guajava. *Acyphoderes aurulentus, Chlorida festiva, Dorcadocerus barbatus, Eurymerus eburoides, Phoebe cava, Polyraphis grandini, P. spinipennis, Praxithea derourei, Psyllotoxus griseocinctus, Rhatymoscelis melzeri, Sphallenum setosum, Sphecomorpha rufa, Trachyderes succinctus, T. thoracicus.*

Pterocarpus sp. *Macropophora trochlearis, Nyssodrys deleta, Oreodera glauca.*

Pyrus communis. *Neoclytus curvatus, Oncideres dejeani.*

Pyrus malus. *Amniscus polyraphoides, Chion cinctus, Neoclytus unicolor.*

Pyrus spp. *Ancylosternus morio, Oncideres cingulata, Paramallocera ilinizae, Praxithea derourei, Trachyderes thoracicus.*

Quararibea sp. *Adesmus borgmeieri* (?).

Quercus ilex. *Stromatium fulvum.*

Quercus mirbecki. *Nathrius brevipennis.*

Quercus pedunculata. *Phymatioderus bizonatus.*

Quercus tinctoria. *Elaphidion villosum.*

Quercus virens. *Elaphidion inerme.*

Quercus spp. *Acanthoderes quadrigibba, Cheloderus childreni, Chion cinctus, Eburia quadrigeminata, Gracilia minuta, Hylotrupes bajulus, Nathrius brevipennis, Phymatodes lividus, P. varius, Praxithea, derourei, Rhagium inquisitor, Stenodontes dasytomus.*

Quilloja saponaria. *Strongylaspis limae.*

Rhamnidium elaeocarpum. *Chlorida costata, Diploschema rotundicolle.*

Rhamnus alternus. *Gracilia minuta.*

Rheedia brasiliensis (see "bacupary").

Rhizophora sp. *Eburodacrys sulphureosignata.*

Rhus glabra. *Elaphidion villosum* (?).

Rhus typhina. *Elaphidion villosum* (?).

Rhus sp. *Elaphidion villosum.*

Ribes. *Callisphyris macropus, C. vespa.*

Robinia pseud-acacia. *Achryson surinamum, Grammicosum signaticolle, Orion patagonus, Stenodontes spinibarbis.*

Robinia sp. *Eburia quadrigeminata, Nathrius brevipennis.*

Rollinia sp. *Trypanidius melancholicus.*

ropes (see "lianas").

Rosa canina. *Gracilia minuta, Nathrius brevipennis.*

Rosa spp. *Callideriphus laetus, Elaphidion collare, Ibidion plagiatum, Nathrius brevipennis, Oncideres cingulata, Oxymerus luteus, Praxithea derourei.*

Rubus spp. *Callisphyris macropus, Gracilia minuta.*

Ruprechtia sp. *Acyphoderes baeri.*

Saccharum officinarum. *Lagocheirus araneiformis.*

Salacia (see "bacupary").

Salix babylonica. *Compsocerus equestris, Oncideres dejeani, Stenodontes spinibarbis, Trachyderes dimidiatus.*

Salix humboldtiana. *Stenodontes spinibarbis.*

Salix spp. *Acanthoderes jaspidea, Chion cinctus, Compsocerus equestris, Gracilia minuta, Nathrius brevipennis, Paramoeocerus barbicornis, Steirastoma breve, S. stellio, Stenodontes dasytomus, Trypanidius dimidiatus, T. proximus.*

Saman saman. *Oedopeza pogonocheroides, Oncideres tessellata.*

SAPINDACEAE. *Ommata poecila.*

Sapindus divaricatus. *Diploschema rotundicolle.*

Sapindus sp. *Chion cinctus.*

Sapium aucuparium. *Lagocheirus araneiformis, Macropophora accentifer.*

Sapium biglandulosum. *Desmiphora hirticollis, Macropophora accentifer.*

Sassafras sp. *Elaphidion villosum* (?).

Saxifraga sp. *Callisphyris macropus.*

Schizolobium excelsum. *Aerenica canescens, Oncideres dejeani, O. saga.*

Schnopsis sp. *Achryson surinamum.*

Schwartzia langsdorfii. *Psygmatocerus wagleri.*

Sechium edule. *Adetus muticus.*

Securinega guaraiuva. *Macropophora accentifer.*

Semecarpus anacardium. *Batocera rufomaculata.*

Senecio sp. *Stereomerus pachypezoides.*

Sesamum indicum. *Hippopsis lemniscata.*

Shorea robusta. *Batocera rufomaculata.*

Sida (see "vassoura").

Simaba multiflora. *Parandra punctata.*

Solanum auriculatum. *Alcidion bicristatum.*

Solanum glaucum. *Bisaltes bimaculatus.*

Solanum grandiflorum. *Alcidion bicristatum.*

Solanum leontocarpum. *Brasilianus plicatus.*

Solanum melanogena. *Alcidion bicristatum, A. deletum, Chlorida festiva, Estola attenuata.*

Solanum racemiflorum. *Adetus socius, Alcidion bicristatum.*

Solanum tuberosum. *Alcidion bicristatum.*

Spondias dulcis. *Batocera rufomaculata, Neoptychodes trilineatus.*

Spondias lutea. *Oncideres ulcerosa.*

Spondias mombin. *Lagocheirus araneiformis, Onychocerus crassus.*

Spondias pinnata. *Batocera rufomaculata.*

Spondias sp. *Dryoctenes scrupulosus.*

Sponia micrantha. *Brasilianus mexicanus.*

Stahlia monosperma. *Chlorida festiva.*

Sterculia caribaea. *Steirastoma breve.*

Sterculia colorata. *Batocera rufomaculata.*

Sterculia villosa. *Batocera rufomaculata.*

Strychnus sp. *Neoclytus pusillus.*

Suaeda divaricata. *Achryson maculatum.*

Swartzia benthamiana. *Chaetanes setiger.*

Swietenia sp. *Chlorida festiva.*

Symphonia globulifera. *Brasilianus lacordairei, B. plicatus, Lagocheirus tuberculatus.*

Syzygium cumini. *Batocera rufomaculata.*

Tabebuia cossinoides. *Acanthoderes jaspidea, Diploschema rotundicolle.*

Tabebuia pallida. *Stizocera vanzwaluwenburgi.*

Tamarindus indica. *Achryson surinamum, Chrysoprasis nymphula, Coccoderus novempunctatus, Eburodacrys sexmaculata, Lophopoeum timbouvae.*

Tamarix spp. *Hylotrupes bajulus.*

Tapirira marchandii. *Oncideres dejeani.*

"tasi" (*Inga* sp. (?)). *Lepturges mancus.*

Tecoma caraiba. *Quercivir zikani* (?).

Tecoma longiflora. *Oncideres dejeani.*

Tecoma sp. *Astyochus dorsalis* (?), *Callipogon armillatus.*

Tectona grandis. *Desmiphora cucullata.*

Terminalia catappa. *Oncideres cingulata.*

Terminalia obovata. *Eburodacrys sulphureosignata.*

Theobroma spp. *Alcidion bispinum, Callichroma elegans, Chlorida festiva, Ctenoscelus acanthopus, Ecthoea quadricornis, Nyssodrys spreta, N. lignaria, Steirastoma breve, Taeniotes farinosa, Trachyderes succinctus* (?), *Xystrocera globosa.*

Tibouchina estrellensis. *Brasilianus plicatus.*

Tilia americana. *Oncideres cingulata.*

Tilia sp. *Acanthoderes quadrigibba, Megacyllene acuta, Oncideres cingulata.*

Trattinickia rhoifolia. *Brasilianus plicatus, Toronaeus figuratus.*

Trema micrantha. *Brasilianus plicatus, B. mexicanus.*

Triplaris surinamensis. *Chlorida festiva, Odontocera fasciatus.*

"tusca" (possibly *Acacia aroma*). *Oncideres germari.*

Ulmus crassifolia. *Achryson surinamum.*

Ulmus spp. *Eburia quadrigeminata, Gracilia minuta, Oncideres cingulata, Stromatium fulvum.*

"unha de boi". *Criodion tomentosum.*

Urostigma enorme. *Acrocinus longimanus, Anisopodus curvilineatus, Polyraphis grandini.*

Vachellia farnesiana. *Lepturges guadeloupensis.*

"vassoura" or "vassourinha" (various plants, particularly species of *Sida* (Malvaceae)). *Megacyllene mellyi.*

Verbena bonariensis. *Emphytoeciosoma daguerrei.*

VERBENACEAE. *Desmiphora cucullata.*

Vernonia diffusa. *Chrysoprasis linearis* (?).

Vernonia polyanthes. *Alcidion bicristatum* (?).

Viburnum opulus. *Nathrius brevipennis.*

Virola koschnyi. *Lagocheirus tuberculatus, Nyssodrys porifera.*

Virola surinamensis. *Macropophora trochlearis.*

Virola sp. *Trachyderes hilaris.*

Vitis sp. *Elaphidion villosum, Ibidion plagiatum, Trachyderes sulcatus.*

Vochysia hondurensis. *Ozodes multituberculatus.*

Wistaria sinensis. *Nathrius brevipennis.*

Wistaria sp. *Elaphidion villosum, Steirastoma breve.*

Xanthium strumarium. *Aerenea quadriplagiata, Emphytoecia versicolor.*

Xanthoxylum sp. *Elaphidion nanum.*

Xylia xylocarpa. *Xystrocera globosa.*

Xylosoma sp. *Curtomerus flavus* (?).

Yucca sp. *Leptostylus biustus.*

Zanthoxylum flavum. *Elaphidion mutatum, Leptostylus argentatus.*

Ziziphus lotus. *Nathrius brevipennis.*

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APPENDIX

ADDITIONAL SPECIES

Since submitting this monograph for publication, material representing a few additional species has been received and is here discussed.

PRIONINAE

Anocolini

Microplophorus magellanicus Blanchard

Pupa. Distinguishable from all other neotropical prionid pupae by the presence of numerous stout, ferruginous spines on the scutellum, which is strongly protuberant.

Material studied. 1 P, S. America, Chile, 22.ii.1956, from *Nothofagus dombeyi*, G. Kuschel leg., in coll. B.M.

CERAMBYCINAE

? Bimiini

? **Hephaestion** sp.

Mature larvae. Form extremely elongate, rather slender, cylindrical. *Head* with mouthframe broadly and strongly sclerotised; frons and temples pale testaceous, rather densely setose; four epistomal setae present. Antenna 3-segmented. Mandible gouge-shaped. Labrum and elytra membranous, testaceous. Three pairs of subcontiguous ocelli present, behind which are three additional pairs of widely separated ocelli; pigmented spots in the latter indiscernible. Hypostoma with a transverse row of three to four coarse setae on each side of gula. Maxilla with segment 2 of palp elongate, slightly longer than segment 3. Submentum sclerotised and strigose.

Prothorax with anterior margin of pronotum with a transverse band of very stout setae; posterior area embossed, coarsely longitudinally striate, glabrous; eusternum and sternellum micro-spiculate. *Abdomen* with segments 4–9 strongly elongate; ampullae micro-spiculate, non-tuberculate. Tergite 9 without a sclerotised process. Anus trilobate. *Legs* pale ferruginous, robust. Spiracles with peritreme narrowly oval to slot-like, the posterior half produced into a large, striate, comb-like process resembling a miniature scallop shell, comprising a series of marginal chambers. Length up to 70 mm.; maximum breadth (at prothorax) 7·1 mm.

The examination of larvae suspected as being of a species of *Hephaestion* has shown that the occipital foramen and mandibles are typical of the CERAMBYCINAE, and that no characters suggestive of the LEPTURINAE, other than perhaps the presence of six pairs of ocelli, are present. This larva may be distinguished at once from all other larvae of this subfamily by its uniquely modified spiracles and the presence of six pairs of ocelli. It will be interesting to see whether this kind of spiracle is characteristic of the Bimiini as a whole.

Material studied. 2 L, S. America, Chile, x.1958, from living *Nothofagus nitida*, G. Kuschel leg., in coll. B.M.

LAMIINAE

Pogonocherini

Acanopterus cristatipennis Blanchard

Distribution. NEOTROPICAL REGION: S. America (Chile).

Host plant. *Gunnera chiliensis* (dead dry leaf stems).

Mature larva. The larva of this species runs down to couplet 13 in the key, next to *Aethomerus*, from which it differs as follows: *Head* without subfossal processes. Length up to 20 mm.; maximum breadth (at prothorax) 3·1 mm.

Material studied. 6 L, S. America, Chile, 1958, from *Gunnera chiliensis*, G. Kuschel leg., in coll. B.M.

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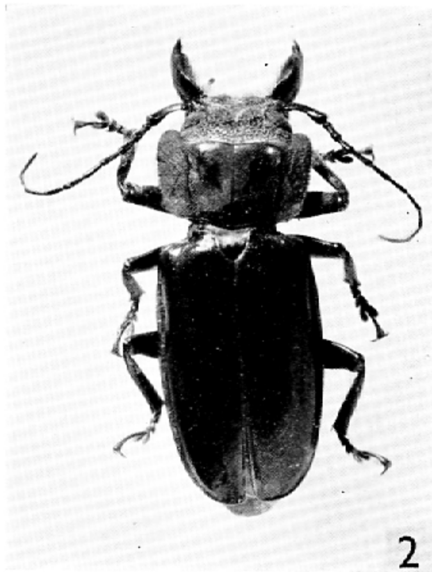
Page numbers in italics refer to keys only, and those in clarendon type to descriptions and biology of species. Synonyms are given in italics. For names of host plants, see Catalogue, pp. 283–293.

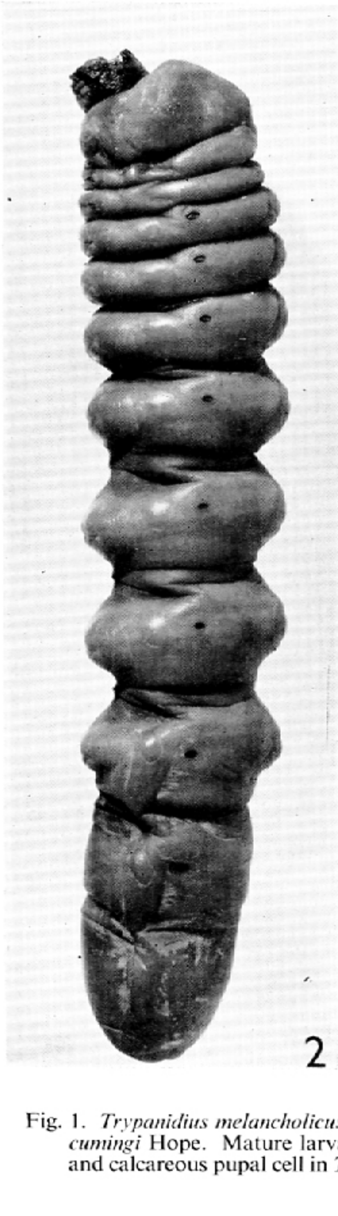
PLATES

PLATE I



Figs. 1–3. *Stenodontes spinibarbis* (Linnaeus). Fig. 1. Mature larva. Fig. 2. Adult. Fig. 3. Larva in *Ocotea rodiaei* (E.A.J.D.).

PLATE II



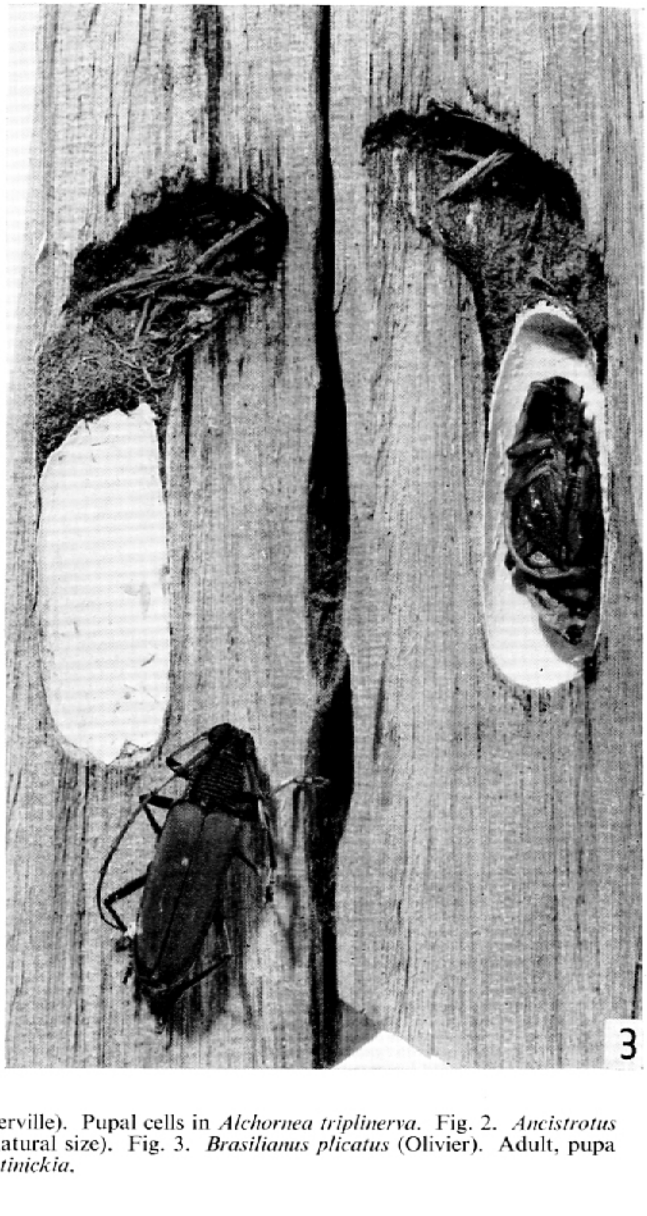
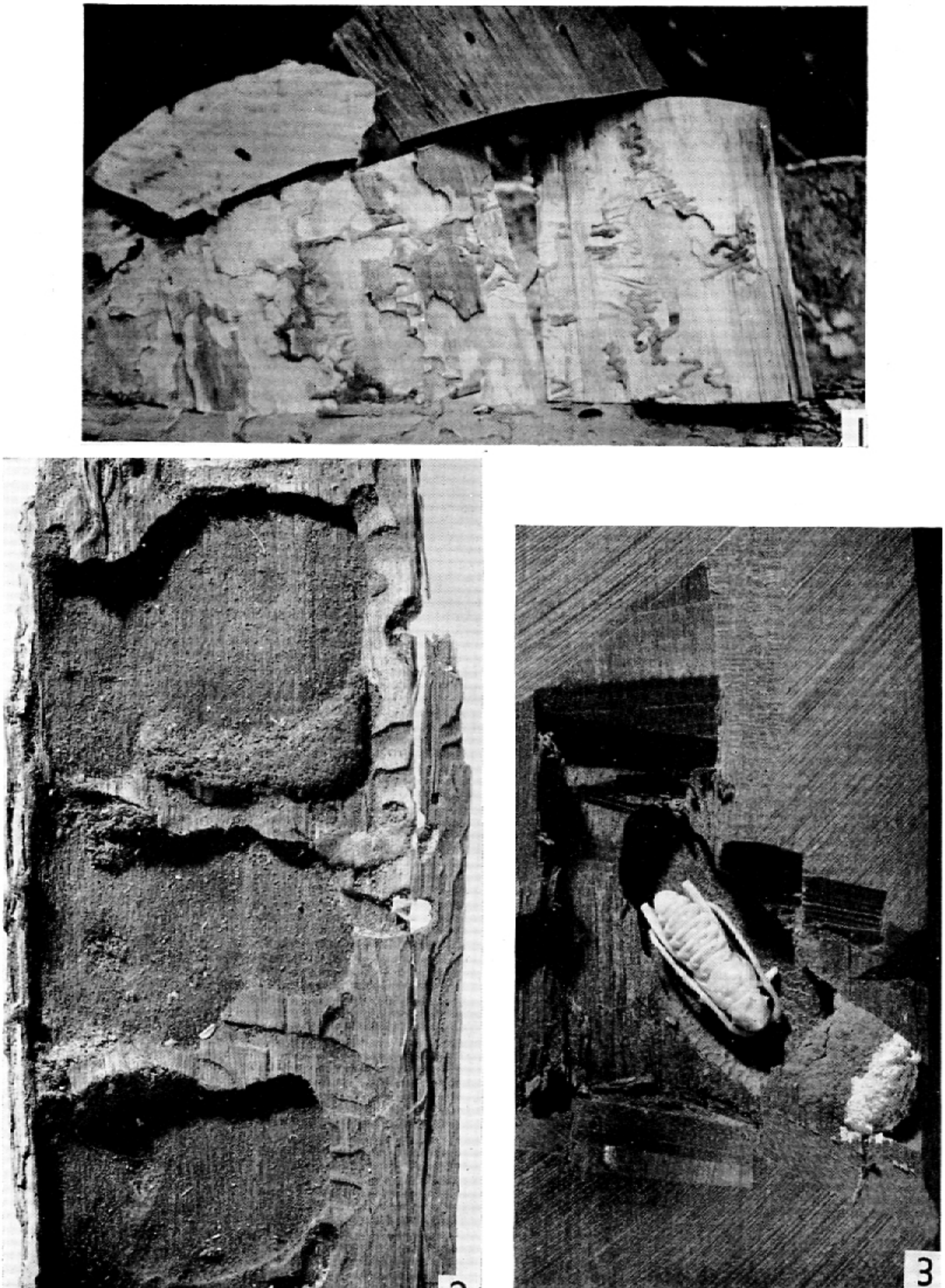


Fig. 1. *Trypanidius melancholicus* (Serville). Pupal cells in *Alchornea triplinerva*. Fig. 2. *Ancistrotus cumingi* Hope. Mature larva (natural size). Fig. 3. *Brasilianus plicatus* (Olivier). Adult, pupa and calcareous pupal cell in *Trattinickia*.

PLATE III



Figs. 1–3. *Callichroma velutinum* (Fabricius). Fig. 1. Sections of a log of *Manilkara* showing larval galleries extending through (top left) sapwood and (top right) heartwood (E.A.J.D.). Fig. 2. Inner surface of *Manilkara* bark showing characteristic excavations by young larvae. Fig. 3. Pupa and pupal cell in heartwood of *Manilkara*.

PLATE IV

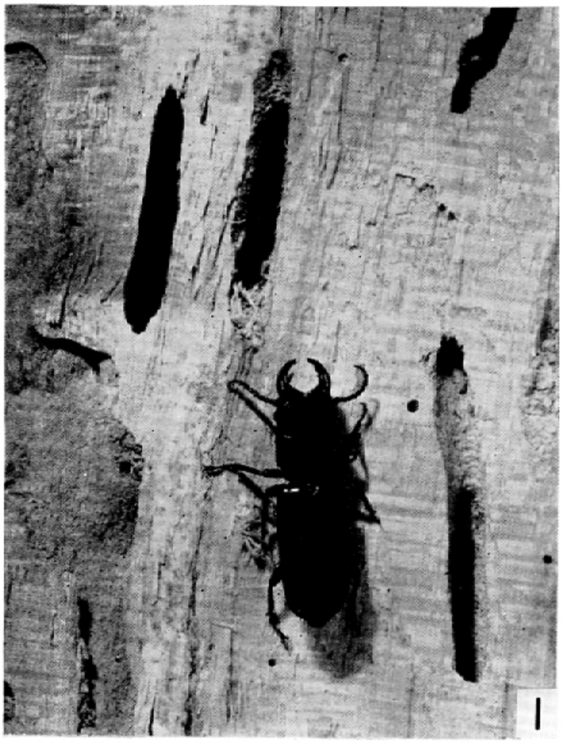


Fig. 1. *Parandra punctata* White. Adult and larval galleries in *Ficus gleasoni*. Fig. 2. *Magacyllene guttata* (Chevrolat). Adult and subcortical larval gallery in *Bulnesia arborea*. Fig. 3. *Tomopterus larroides* White. Subcortical larval galleries in bark of *Manilkara bidentata*.

PLATE V

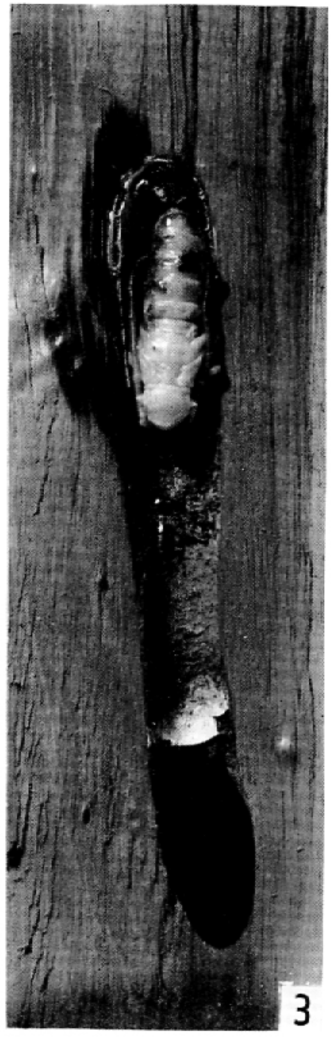


Fig. 1. *Onychocerus crassus* (Voet). Pupal cell in *Spondias mombin*. Figs. 2–3. *Brasilianus lacordairei* (Gahan). Fig. 2. Adult on section of *Astronium ulei* with bark partially removed to show broad larval gallery and entrance to pupal cell. Fig. 3. Pupal cell in heartwood, showing calcareous cocoon, frass barrier and operculum.

PLATE VI

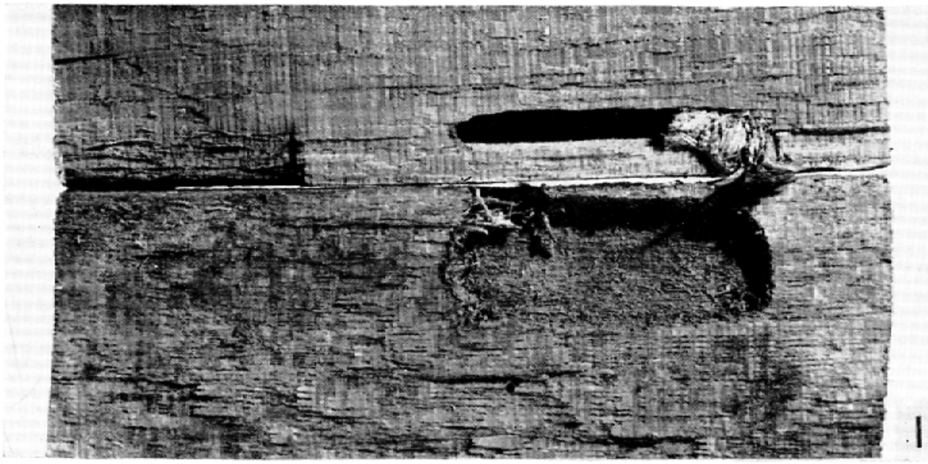
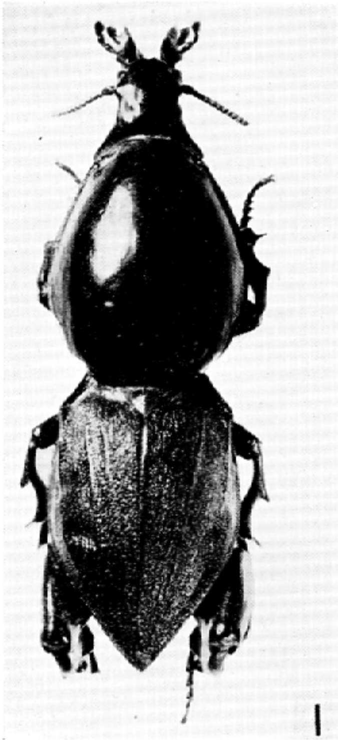
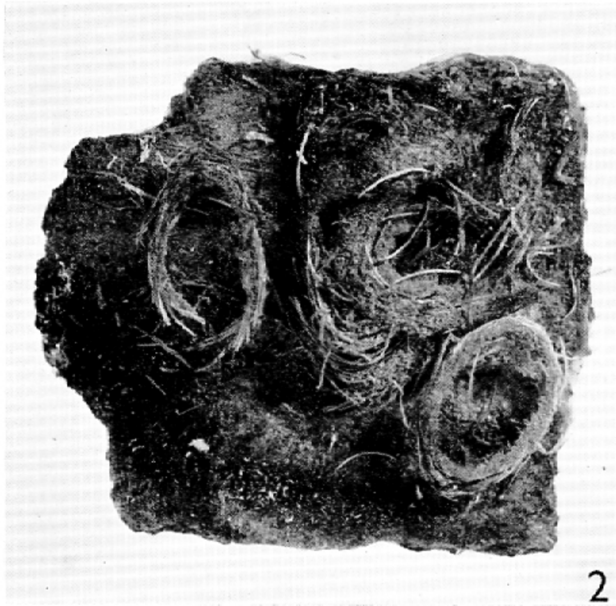
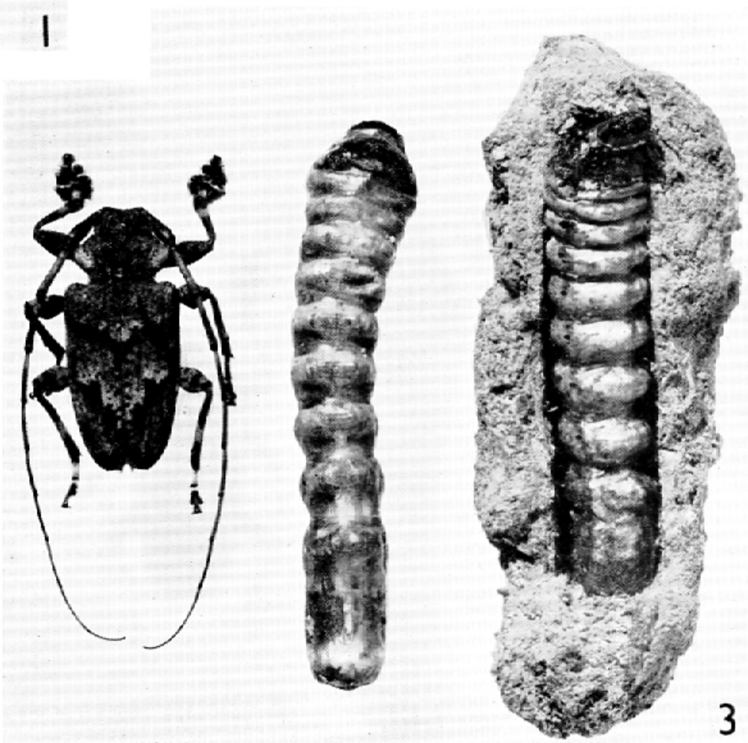


Fig. 1. *Acanthoderes quadrigibba* Say. Section of *Cedrela mexicana* split open to show pupal cell. Fig. 2. *Acrocinus longimanus* (Linnaeus). Pupa and pupal cell. Fig. 3. *Oreodera glauca* (Linnaeus). Section of *Pterocarpus* showing adult and bark excised by larva.

PLATE VII







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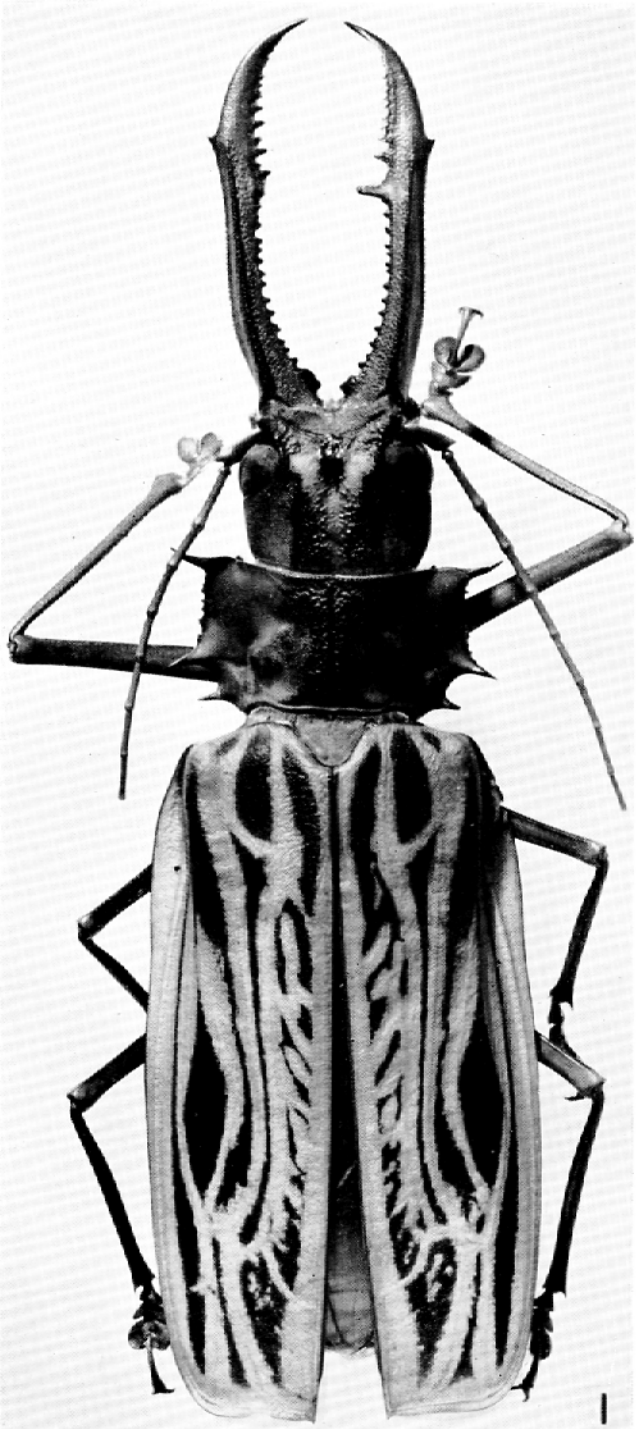
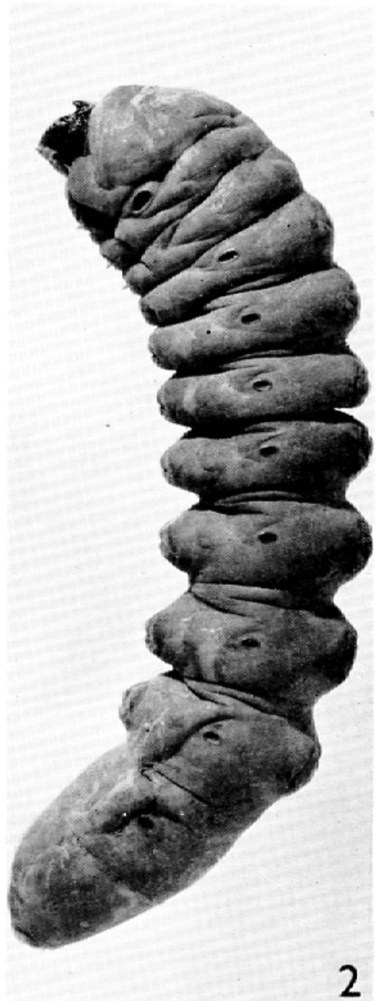
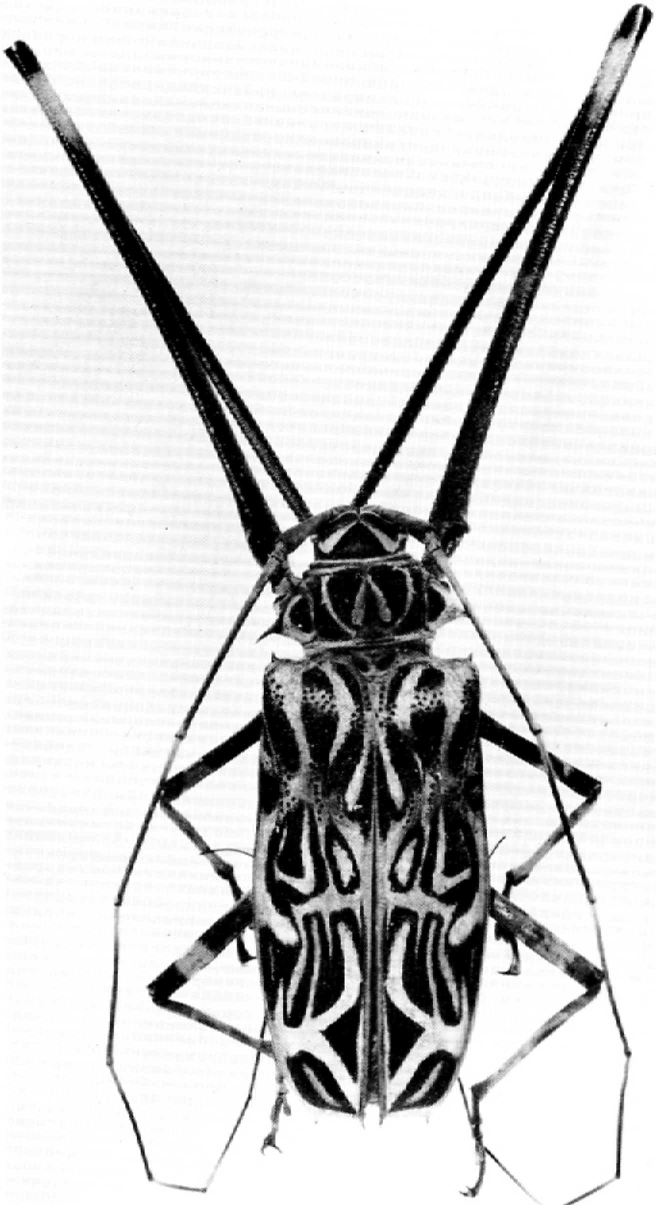




Figs. 1–2. *Macrodontia cervicornis* (Linnaeus). Fig. 1. Adult (natural size). Fig. 2. Larva (natural size).

PLATE IX



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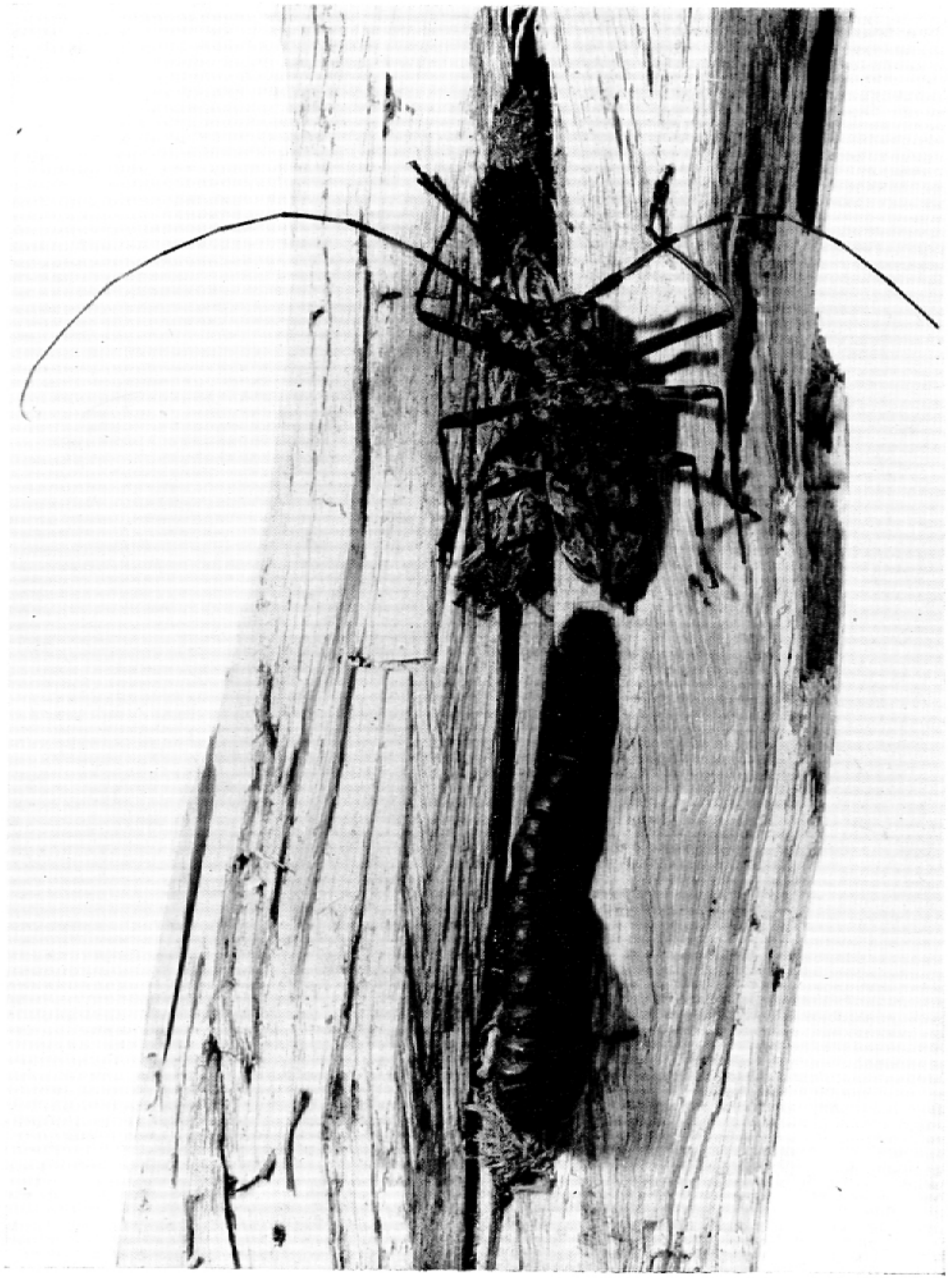
Figs. 1–2. *Acrocinus longimanus* (Linnaeus). Fig. 1. Adult (natural size). Fig. 2. Larva (natural size.)

PLATE X

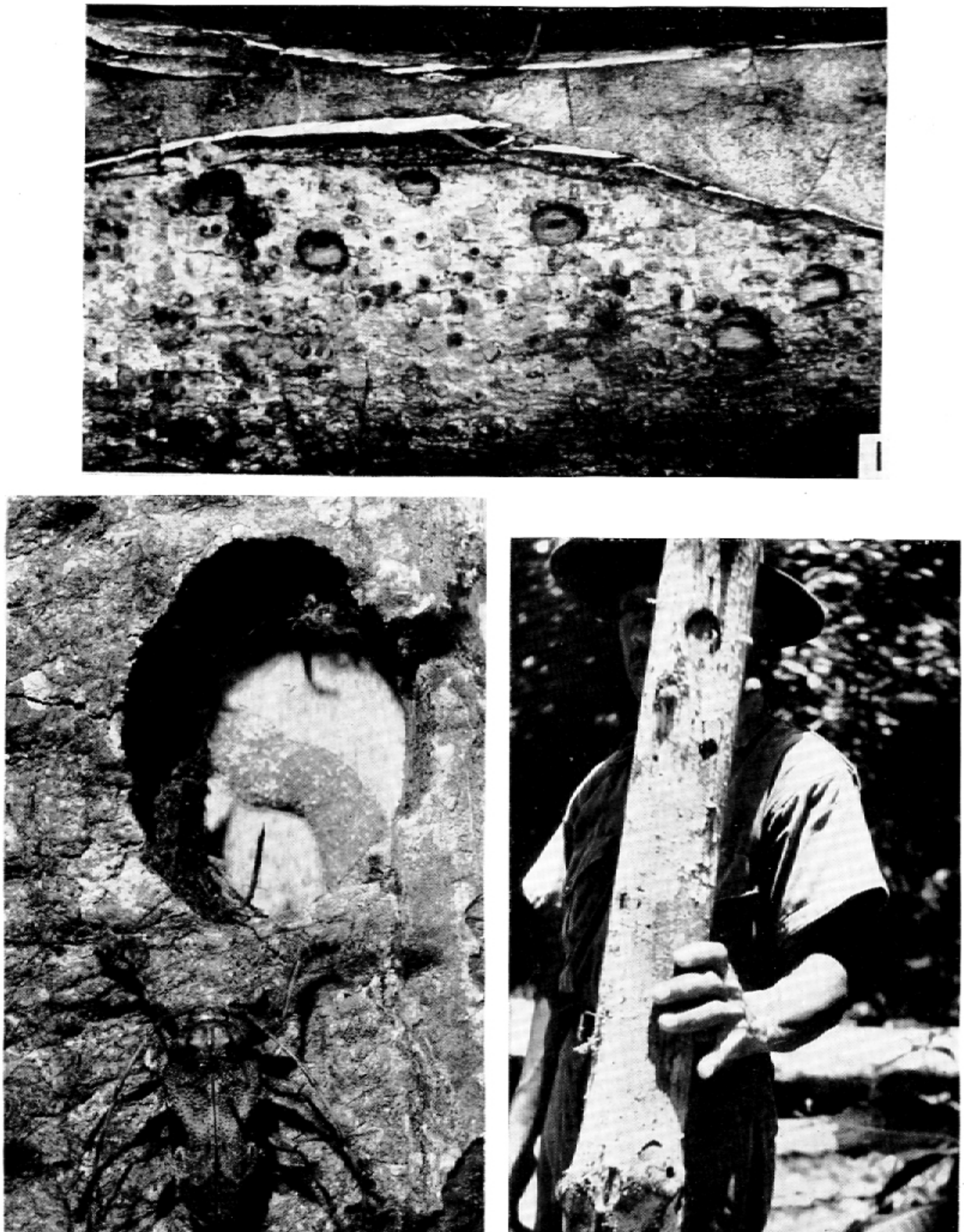


Macropophora trochlearis (Linnaeus). Adult, larva and pupal cells in *Piratinera* (natural size).

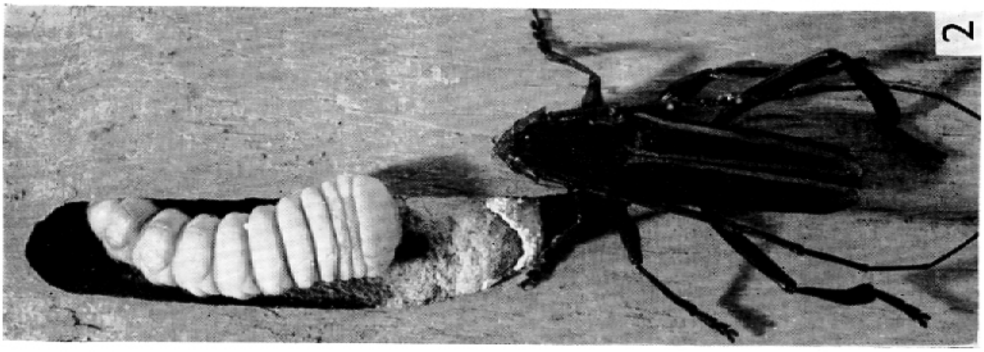
PLATE XI

Figs. 1–3. *Polyraphis spinosa* (Drury). Fig. 1. Log of *Mora excelsa* with bark removed to show larval galleries (E.A.J.D.). Fig. 2. Pupal cell with pupa. Fig. 3. Pupal cells beneath bark of *Mora excelsa* (E.A.J.D.).

PLATE XII



Figs. 1–3. *Lagocheirus araneiformis* (Linnaeus). Characteristic excisions made by mature larvae (E.A.J.D.).



Figs. 1 and 3. *Acrocinus longimanus* (Linnaeus). Bole of *Ficus* showing characteristic subcortical larval galleries (E.A.J.D.). Fig. 2. *Callichroma auricoma* (Linnaeus). Adult, mature larva and pupal cell in *Oxytheca*.