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A REVISION OF THE TERMITES  
SUBFAMILY NASUTITERMITINAE  
(ISOPTERA, TERMITIDAE) FROM THE  
ETHIOPIAN REGION

W. A. SANDS

BULLETIN OF  
THE BRITISH MUSEUM (NATURAL HISTORY)  
ENTOMOLOGY

Supplement 4

LONDON: 1965

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FROM THE ETHIOPIAN REGION



BY

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# A REVISION OF THE TERMITE SUBFAMILY NASUTITERMITINAE (ISOPTERA, TERMITIDAE) FROM THE ETHIOPIAN REGION

By W. A. SANDS

## CONTENTS

INTRODUCTION . . . . .	4
MATERIAL . . . . .	5
METHODS . . . . .	7
NASUTITERMITINAE Hare: diagnosis . . . . .	8
Phylogeny . . . . .	10
Distribution . . . . .	11
Keys to genera . . . . .	12
<i>Nasutitermes</i> Dudley . . . . .	15
<i>Leptomyxotermes</i> gen. n. . . . .	51
<i>Grallatotermes</i> Holmgren . . . . .	55
<i>Fulleritermes</i> Coaton . . . . .	55
<i>Rhadinotermes</i> gen. n. . . . .	71
<i>Mycterotermes</i> gen. n. . . . .	75
<i>Trinervitermes</i> Holmgren . . . . .	76
<i>Baucaliotermes</i> gen. n. . . . .	138
<i>Eutermellus</i> Silvestri . . . . .	141
<i>Afrosubulitermes</i> Emerson . . . . .	153
<i>Postsubulitermes</i> Emerson . . . . .	155
<i>Verrucositermes</i> Emerson . . . . .	156
<i>Mimeutermes</i> Silvestri . . . . .	158
<i>Tarditermes</i> Emerson . . . . .	166
ACKNOWLEDGMENTS . . . . .	167
BIBLIOGRAPHY . . . . .	168
SPECIES INDEX . . . . .	171

## SYNOPSIS

The subfamily Nasutitermitinae is revised for the Ethiopian Zoogeographical Region. 47 species are recognized, of which 7 are new, in 14 genera, of which 4 are new. 77 names are found to be synonymous, of which 62 are newly established synonyms. 4 species are removed from the subfamily. The phylogeny of the subfamily is discussed, and keys are given to genera and species. The distribution of species and genera is related to the vegetation types. Notes are provided on the biology of the species.

## INTRODUCTION

THIS paper provides a revision of the termite subfamily Nasutitermitinae Hare (1937) (Isoptera, Termitidae) as it occurs in the Ethiopian Zoogeographical Region. The subfamily is characterized by the adaptation of the head capsule of the soldier caste to a chemical defence mechanism: the frons and vertex are produced into a tubular or conical nose terminating in the opening of the frontal gland, which secretes a sticky fluid. In all of the genera included in this paper the soldier mandibles are reduced to vestiges. The more primitive genera with mandibulate soldiers do not occur in Africa, being confined to the Neotropical Region.

The Ethiopian Zoogeographical Region is taken to consist of the continent of Africa, south of the Sahara Desert, and those adjacent parts of the Arabian peninsula in which the climate permits the survival of African species. There are no unquestionable records of the subfamily from Palaearctic Africa; the Malagasy fauna is separate and distinct and is therefore excluded from this revision.

More material is available for study from the African continent than from any other, enabling a more detailed assessment of variation to be made than is possible for any other part of the world. All the species included are endemic to the Ethiopian Region, as are all but 3 of the genera. Of the latter, *Grallatotermes* has only one African species; *Trinervitermes* is primarily African with only 6 little-known species in the Indo-malayan Region; *Nasutitermes* is the only tropicopolitan genus. Monographic treatment of *Nasutitermes* must needs be unbalanced owing to disparities between collections from different regions: for example, a recent revision by Prashad and Sen-Sarma (1959) of 18 species of *Nasutitermes* in the Indian Region refers to only 39 nest series. For these reasons, this revision of a faunal section of the subfamily has been undertaken rather than separate monographs of component genera.

The first African nasute species to be described was *Termes arborum* Smeathman (1781), followed by *T. trinervius* Rambur (1842). Sjöstedt (1900-1904) provided the first revisions and keys and recognized 18 species of African nasutes, all placed in the genus *Eutermes*. By the time Sjöstedt (1926) produced his second revision of the African termites, the numbers had increased to 88 species and 2 subspecies in 5 genera. Emerson (1928) listed 90 species in 7 genera, and Snyder (1949) catalogued 92 species and 4 subspecies in 6 genera. Subsequent modifications and additions have brought this up to 102 species in 11 genera.

In addition to these, species previously synonymized by other authors have been re-determined, with the result that a total of 120 previously described species and subspecies are involved in this revision. In all but 5 of these, the holotype, lectotype, syntypes, paratypes or paralectotypes from the type colony have been examined. Where the type series consists of alate imagos collected at light, as much as possible of the original material has been studied to eliminate the risk of confusion resulting from a mixture of species. Of the 5 species in which types have not been seen, one, *Nasutitermes arborum* (Smeathman) lacks a type specimen and a neotype has been selected. The remaining 4 belong to other subfamilies. These are as

follows: *Trinervitermes bouvieri* Sjöstedt and *T. somaliensis* (Sjöstedt) which belong to *Microtermes* (Macrotermitinae), *T. sudanicus* (Sjöstedt) which is unidentified, and *Nasutitermes profestus* (Sjöstedt) which belongs to *Noditermes* (Termitinae). These determinations are extracted from unpublished notes made by Dr. A. E. Emerson, and the species are therefore omitted from further consideration. From the examination of the remaining 115 type specimens and series, combined with a study of variation in the other material, 77 names have been found to be synonymous, of which 62 are newly established synonyms.

In the subfamily Nasutitermitinae from the Ethiopian Region, I recognize as valid 47 species, of which 7 are new to science and described in this paper. These belong to 14 genera, of which 4 are new, one being completely new to science and the others newly formed genera containing existing species.

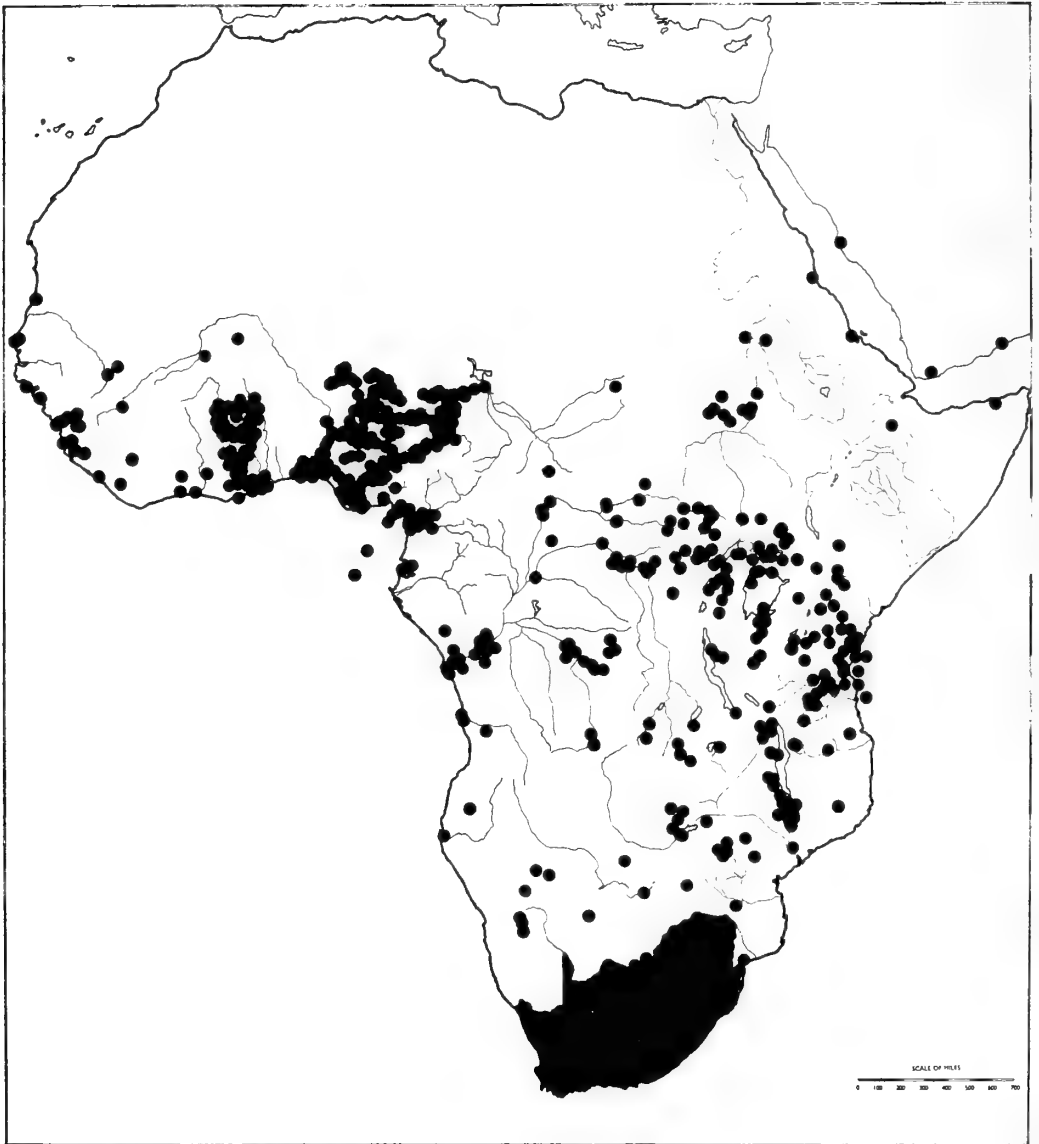
#### MATERIAL

A total of 2401 nest series from all parts of Africa (Map 1), have been examined, each containing from one to several hundred specimens. Much of this material has been collected by the members of the Termite Research Unit (Ministry of Overseas Development) and is deposited at the British Museum (Natural History). A further large collection, made by Dr. A. E. Emerson, is now housed at the American Museum of Natural History. Types and other specimens have been studied on personal visits or as a result of loans of material, through the courtesy of specialists and others mentioned in the acknowledgments, from the following museum collections:

Museum National d'Histoire Naturelle, Paris (Mus. Paris); Musée Royal de l'Afrique Centrale, Tervuren (Mus. Tervuren); Institut Royale des Sciences Naturelles Beligiques, Brussels, Selys Longchamps Collection (Selys Longchamps coll., Inst. R. Sci. Nat., Brussels); Institut des Parcs Nationaux du Congo et du Rwanda, Brussels (Inst. des Parcs Nat. du Congo, Brussels); Institut Français d'Afrique Noire, Dakar (Inst. Franç. d'Afr. Noire, Dakar); Museo Civico di Storia Naturale, Genoa (Mus. Civ. di Stor. Nat., Genoa); Naturhistorisch Museum te Maastricht (Mus. Maastricht); Naturhistoriska Riksmuseum, Stockholm (Naturhist. Riksmus., Stockholm); Zoologisches Staatsinstitut und Zoologisches Museum, Hamburg (Mus. Hamburg); Silvestri Collection, Laboratorio di Zoologia della R. Scuola d'Agricoltura in Portici, Naples (Silvestri coll., Lab. Zool. Sc. Agr., Portici); American Museum of Natural History, New York (A.M.N.H.); National Collection of Isoptera, Plant Protection Research Institute, Pretoria (N.C.I., Pretoria).

The abbreviations given in brackets are those used throughout the text in listing the material examined. The British Museum (Natural History), where abbreviated, is given as B.M.(N.H.). Where the museum of deposit is given in brackets in the text, the specimens concerned have not been examined by the author. Where lectotypes are designated, that of the senior synonym in each case is given separately, whilst those of junior synonyms are included in the lists of type material examined.

The material examined constitutes virtually all of that known to exist in museum collections. In listing material in the text, co-ordinates of latitude and longitude are given for localities not included in the *Times Atlas*, vol. IV.



MAP I. Collecting localities of *Nasutitermitinae*. (The Republic of South Africa has been collected over so extensively that on this scale there would be little space between individually marked localities.)

## METHODS

Nearly two-thirds of the specific names in existence have been found to be synonyms. Most of the descriptions of species published hitherto are based on characters now found to be of little taxonomic usefulness, and omit many which I have found of most value. In relatively few cases are they adequately illustrated. It has therefore been considered desirable to redescribe the majority of the species, and to provide a full set of figures to aid identification. All species originally described in languages other than English are redescribed, together with others in publications that are rare and likely to be inaccessible. Only in the case of fully and recently described species is redescription omitted from this revision, and in some of these, additional or modified characters are given for use in conjunction with the original descriptions.

It should be noted that the degree of detail given in the descriptions which follow varies from genus to genus. This is intentional, because the characters used vary in number and importance; to standardize descriptions on the most detailed pattern throughout would be wasteful of space. The layout is however standardized for easier comparison.

Characters used for the first time or found of greater importance than hitherto recognized are as follows:—

*Imago*: pilosity of head capsule  
proportions of female cerci  
form of molar area of mandibles  
size of ventral scent gland on 5th abdominal sternite of ♀

*Soldier*: distribution of head and other setae

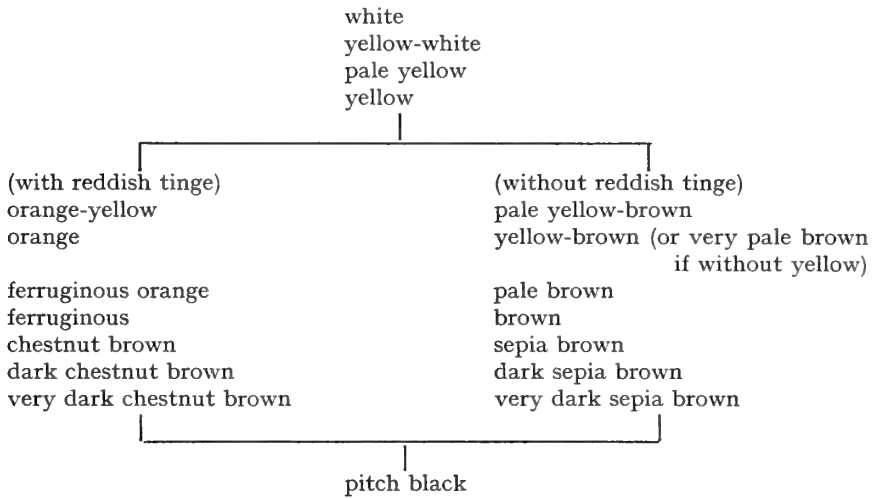
The proportions of the ♀ cerci and scent glands are used, but in the ♂, these features are less diagnostic since all male cerci are slightly longer and all ♂ scent glands distinctly smaller than the ♀. Marginal indentations of thoracic nota have not in general been found of value, nor has imago wing venation. In several genera a very wide range of variation has been encountered in all characters, both of measurement and shape. In others, the degree of variation has been found to be limited in spite of the availability of ample material. Each case of generic or specific status or synonymy has therefore had to be judged on its own merits, and not by the standards of even closely related taxa. These apparent inconsistencies of treatment are further discussed in the section of phylogeny, and under generic and specific headings in the text.

All figures have been drawn with the aid of a camera lucida, from ethanol preserved specimens immersed in ethanol. Only three scales are used, each of the two larger being twice the next smaller. All the illustrations of the entire head capsule of species on the "*Procornitermes* branch" are on the smallest scale, and all other figures are on the middle scale apart from the imago mandibles of species on the "*Paracornitermes* branch" and all the imago fontanelles, which are on the largest scale. Measurements are largely self-explanatory, but it should be noted that in the imago, head width is measured from the extremes of curvature of the eyes as seen in

frontal view of the face, and the length of fore wing includes the stump; in the soldier, head width is the greatest width of the head capsule, and depth of head capsule is taken in profile, excluding the postmentum and measuring vertically from the lower margin to the highest point of curvature of the head capsule, wherever it occurs. The measurements are given in abbreviated form in the keys, as follows:

Head width (across eyes in imago), W; Head length to tip of nose, L; Depth of head, D; Length of hind tibia, T<sub>3</sub>; Greatest diameter of eye, E; Ocellus, O.

In describing colouration, a limited number of terms are applied as consistently as possible according to an arbitrarily decided scale of intensity from white (unsclerotized) to pitch black, as follows:



VEGETATION MAP

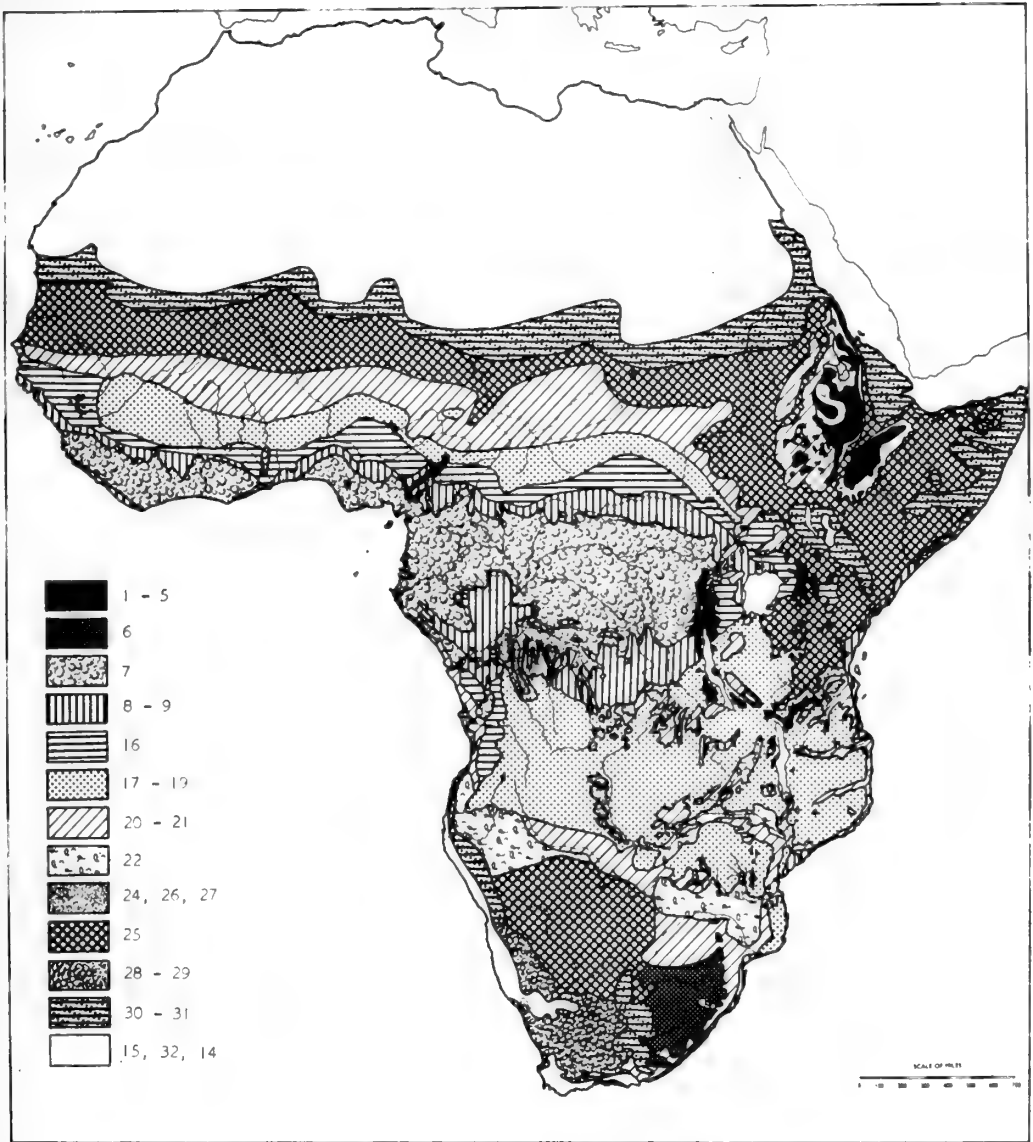
A map is provided of the vegetation zones mentioned in the text. It is based on the vegetation map of Africa south of the Tropic of Cancer prepared for UNESCO by Keay *et al.* (1959), differing in that only the boundaries that are known to have significance in termite distribution are indicated (Map 2).

Subfamily **NASUTITERMITINAE** Hare

Nasutitermitinae Hare, 1937 : 462. Type-genus, *Nasutitermes* Dudley, 1890.

*Imago.* Labrum broader than long, without transverse sclerotized band, tip partly hyaline ; mandibles with apical tooth slightly shorter to distinctly longer than first marginal, left third marginal with anterior edge at most only slightly longer than posterior (up to 1½ times) ; fontanelle commonly slit-like, often bifurcate, sometimes nearly obsolete. Tibial spurs 2 : 2 : 2 (*Syntermes* with 3 : 2 : 2, is not African). Styli absent.

*Soldier.* Head capsule modified to form a proboscis terminating in opening of frontal gland ; mandibles reduced to vestiges, with or without "points". Tibial spurs, 2 : 2 : 2. Styli absent.



MAP 2. Vegetation of Africa showing divisions significant in termite distribution. (1-5), montane types; (6), temperate and subtropical grassland; (7), moist forest at low and medium altitudes; (8-9), forest-savannah mosaic; (16), moist woodlands; (17-19), *Isoberlinia* and *Brachystegia-Julbernardia* woodlands and savannahs; (20-21), relatively dry savannah-woodlands; (22), woodland with abundant *Colophospermum mopane*; (24, 26, and 27), grass steppes; (25), wooded steppe with abundant *Acacia* and *Commiphora*; (28-29), Karoo succulent and subdesert steppe; (30-31), subdesert steppe, tropical and transitional; (15, 32), desert and Cape Macchia, and (14), in Ethiopia only, evergreen thickets.

## PHYLOGENY

The subdivision of the Nasutitermitinae into two branches at an early stage in the evolution of the subfamily was postulated by Ahmad (1950). His phylogeny was based mainly on the " imago-worker " mandible dentition. A detailed study of the soldier mandibles (Sands, 1957) supported Ahmad's fundamental conclusions, but indicated more frequent occurrence of parallel evolutionary trends. Each of the two branches was referred to by the name of its most primitive genus, these being *Procornitermes* and *Paracornitermes*. The genera of the Ethiopian Region are divided between the branches as follows:

" *Procornitermes* branch "

*Nasutitermes* Dudley  
*Leptomyxotermes* gen. n.  
*Grallatotermes* Holmgren  
*Fulleritermes* Coaton  
*Rhadinotermes* gen. n.  
*Mycterotermes* gen. n.  
*Trinervitermes* Holmgren  
*Baicaliotermes* gen. n.

" *Paracornitermes* branch "

*Eutermellus* Silvestri  
*Afrosubulitermes* Emerson  
*Postsubulitermes* Emerson  
*Verrucositermes* Emerson  
*Mimeotermes* Silvestri  
*Tarditermes* Emerson

The two branches are, according to Ahmad, characterized by the long straight cutting edge between first and third marginal teeth of the left " imago-worker " mandible, and the narrower angle between apical and first marginal in the " *Procornitermes* branch ", as contrasted with the shorter sinuate cutting edge, and the wider angle between apical and first marginals in the " *Paracornitermes* branch ". While these distinctions are correct for the species actually chosen by Ahmad to represent the genera, there are many other species belonging to the same genera which do not fit this classification so exactly.

The two branches appear to have arisen because one of them became adapted early to feeding on soil-humus, and has remained so, whilst the other was less specialised, and its members have diverged to fit many " ecological niches ". It has been stated by several authors including Ahmad that the " imago-worker " mandibles do not exhibit clearly identifiable adaptive characteristics related to the food supply. The grounds for disagreement with this statement will be discussed elsewhere; for the present purpose it is sufficient to note that the most characteristic adaptation of soil-humus feeding termites is the loss of transverse grinding ridges on the molar plates, particularly the right one, and their transformation to crushing cups by the development of rounded flanges on both sides. This occurs convergently in the subfamilies Termitinae, Amitermitinae, and Nasutitermitinae, and in the latter is the distinguishing feature of the " *Paracornitermes* " branch. In some genera the ridges are not entirely lost, remaining as differences in sclerotisation of an otherwise smooth surface (Text-figs. 431-450).

The " *Procornitermes* branch " possesses variously modified mandibles, but these always have prominently ridged molar plates (Text-figs. 157-196).

The detailed aspects of phylogeny can only be discussed tentatively in a study based on species from only one zoogeographical region. The genus *Nasutitermes*



includes species which differ markedly, and show resemblances to genera on different subsidiary divisions of the " *Procornitermes* branch ". This suggests a polyphyletic origin for the genus, which needs to be clarified by a study of all the species. In the Ethiopian Region, *N. latifrons*, *N. schoutedeni* and *N. lujae* appear to be derived from ancestors close to the genera *Hirtitermes* and *Havilanditermes* as suggested by Ahmad, whereas *N. kempae* and *N. elegantulus* show resemblances to the Neotropical genera *Diversitermes* and *Parvitermes*. Both *N. latifrons* and *N. kempae* exhibit traces of " instar " polymorphism in soldier and worker.

*Leptomyxotermes doriae* from West Africa appears to be most closely related to the *Hospitalitermes*-*Lacessititermes* group of constricted-headed genera, as is its relative *Grallatitermes africanus* from East Africa. *Leptomyxotermes* also shows traces of soldier polymorphism which have been lost in *Grallatitermes*.

The genera *Fulleritermes* and *Rhadinotermes*, although they have constricted-headed soldiers, are not closely related to *Leptomyxotermes* and *Grallatitermes*. Their affinities are instead to another subsidiary branch of mainly Neotropical genera, including *Velocitermes*, *Tenuirostritermes*, and *Diversitermes*. In *Fulleritermes*, *F. coatoni* has distinctly dimorphic soldiers whereas in *F. contractus* and *F. tenebricus* there are only vestiges of polymorphism, and *F. mallyi* has a single soldier form, as does *Rhadinotermes*. The importance of soldier polymorphism as a character varies greatly. In some genera it appears to be on the point of disappearance and varies between species, whereas in others its presence is well marked, and closely related monomorphic forms must be given separate generic status. Such is the case with *Trinervitermes*, which is always polymorphic though showing intergradations from true dimorphism to near " instar " polymorphism, and *Baucalioitermes* which is truly monomorphic. These genera, and *Mycterotermes*, also appear to be most closely related to the *Tenuirostritermes*-*Diversitermes* branch, which would therefore seem to be the most important subdivision of the " *Procornitermes* branch " of the subfamily.

The collection of new material of humus-feeding species on the " *Paracornitermes* branch " has permitted a more detailed assessment of their relationships. *Eutermellus* is the most primitive genus of the Ethiopian Region.

In some respects, such as the distinctly trilobed soldier labrum, and the " imago-worker " mandibles with a sinuate cutting edge between left first and third marginals, and the right molar plate with vestigial ridges, it appears to be more primitive than the Neotropical *Angularitermes*, in spite of the long points on the soldier mandibles of the latter genus. The relationship of the genera are discussed in detail under their own generic headings.

#### DISTRIBUTION

Representatives of the subfamily are to be found in every vegetation zone from the depths of the tropical rain forests and mangrove swamps to the fringes of the deserts both North and South of the Equator.

In the humid rain forest areas of West Africa and the Congo, *Nasutitermes* is the dominant genus with ten species feeding mainly on dead wood of all kinds.

*Leptomyxotermes* is found in rotting wood, and the humus-feeding genera of the "Paracornitermes branch" are *Afrosubulitermes*, *Postsubulitermes*, *Verrucositermes*, *Tarditermes*, and some species of *Eutermellus* and *Mimeutermes*. In the less moist coastal forests and woodlands of East Africa, the fauna is much reduced, with only two species of *Nasutitermes* and one of *Grallatitermes*. The feeding habits of the latter are not known, but it probably also feeds on wood.

In the tall grass savannah zones adjacent both north and south to the Congo rain forest, the grass feeding "Harvester" genus *Trinervitermes* becomes dominant, with *Fulleritermes* in a subsidiary wood-feeding role. Humus-feeders are restricted to one or two species of *Mimeutermes* and *Eutermellus*, though it is understood that a few related species or genera await description from the southern areas. In East Africa, *Trinervitermes* is present, but *Rhadinotermes* appears to replace *Fulleritermes*, although their feeding habits are probably rather different. No humus-feeding members of the "Paracornitermes branch" are known from East Africa.

As conditions become drier, both northwards and southwards towards the deserts, the faunae become more restricted. Fewer species of *Trinervitermes* are found, and *Fulleritermes* persists, but the humus-feeding genera are not known beyond the limits of the *Isoberlinia* and *Brachystegia-Julbernardia* savannah woodlands, types 17, 18, 19 of Keay *et al.* (1959).

The driest areas of all on the fringes of the deserts have relatively very few species; one or two *Trinervitermes* occur, and the small related genera *Mycterotermes* and *Baucalioitermes* are found in these types in Arabia and South-West Africa respectively.

More detailed accounts of individual distribution are given under generic and specific headings.

In the distribution maps of individual species, the shaded portions show the full extent of the vegetation types from which each species has been recorded. These are not always floristically identical North and South of the Congo forest, but are considered ecologically equivalent. The shaded parts therefore indicate the probable potential distribution in addition to the actual distribution to which the species is confined by biotic or other ecological barriers. Records of specimens that I have examined are shown by black triangles; those of other authors unsubstantiated by redetermination but thought reliable are shown by hollow triangles.

#### KEYS TO GENERA

In the keys which follow, certain characters will be more readily appreciated if reference is made to the appropriate figures. The separation of constricted-headed from other soldier castes is such a case, as also are certain features of the imago mandibles. Although it has become customary to refer to "imago-worker" mandibles, and to use those of the worker to avoid damaging scarce imago material, they are in fact different. The "left mandible index" is the distance between left apical and first marginal teeth divided by the distance from first to third marginals and expressed in decimals. This index usually differs considerably between imago and worker castes, probably indicating the greater degree of food adaptation in the latter. In the humus-feeding species the worker index is greater than the imago, and in the others it is approximately equal to or smaller than the imago. In this revision, the imago mandibles have been used wherever possible, and where worker mandibles have to be used this is noted in the text. The key to imagos has however been arranged so that it can also to a large extent be used to identify workers in spite of their differences. Measurements are given in millimetres.

## IMAGOS

- 1 Left mandible with apical and first marginal teeth subequal, or apical shorter, left mandible index 0.2-0.6 ; molar plate of right mandible with prominent ridges (Text-figs. 157-196) . . . . . 2
- Left mandible with apical tooth longer than first marginal, left mandible index 0.9-3.2 ; molar plate of right mandible without ridges, or ridges vestigial in shining smooth surface (Text-figs. 431-450) . . . . . 8
- 2 Left mandible with cutting edge between first and third marginals entire, straight or at most slightly sinuate . . . . . 3
- Left mandible with cutting edge between first and third marginals indented in front of third marginal . . . . . 6
- 3 Right mandible with posterior cutting edge of first marginal equal to or shorter than posterior cutting edge of second marginal ; molar plate with 9-11 regular ridges  
*NASUTITERMES* (p. 15)
- Right mandible with posterior cutting edge of first marginal longer than posterior cutting edge of second marginal ; molar plate with 5-9 irregular ridges . . . . . 4
- 4 Smaller, W, under 1.28 ; E, under 0.38 ; T<sub>3</sub>, under 1.63. Right molar plate with indented margin at basal end. Colour very dark brown to pitch black  
*RHADINOTERMES* (p. 71)
- Larger, W, over 1.35 ; E, over 0.42 ; T<sub>3</sub>, over 1.63. Right molar plate without pronounced irregularity of outline in surface view. Colour paler, to sepia brown or dark chestnut brown . . . . . 5
- 5 Pilosity of head capsule evenly fine, setae arising from small sockets of regular size with a few larger sockets scattered among them . . . . . *TRINERVITERMES* (p. 76)
- Pilosity of head capsule uneven, sockets of setae varying from small to large, the latter numerous and conspicuous . . . . . *BAUCALIOTERMES* (p. 138)
- 6 Right mandible with molar plate bearing 13-14 ridges and without pronounced irregularity of outline in surface view. Postclypeus weakly inflated, width 3.0 times length . . . . . *GRALLATOTERMES* (p. 55)
- Right molar plate with 7-10 ridges, and with indented margin at basal end. Postclypeus strongly inflated, width 1.7-2.1 times length . . . . . 7
- 7 Eyes large compared with head width, W/E index 2.4. Fontanelle slit-like, not distinctly bifurcate anteriorly. Left mandible with subsidiary tooth between third marginal and molar prominence not visible in the gap between them in surface view. Colour pale brown . . . . . *LEPTOMYXOTERMES* (p. 51)
- Eyes smaller compared with head width, W/E index 3.2-4.5. Fontanelle slightly to distinctly bifurcate anteriorly. Left mandible with subsidiary tooth visible in gap between third marginal and molar prominence in surface view. Colour dark brown to pitch black . . . . . *FULLERITERMES* (p. 55)
- 8 Left mandible with cutting edge between first and third marginals indented in front of third, and sinuate ; left mandible index under 1.4 . . . . . 9
- Left mandible with third marginal absorbed in short cutting edge behind first ; left mandible index over 2.0 . . . . . 11
- 9 Very small, W, 0.56 or less ; T<sub>3</sub>, 0.71 or less. Head shining, pilosity reduced to paired prominent setae on vertex, frons and postclypeus. Pronotum, length at least three-quarters width . . . . . *AFROSUBULITERMES* (p. 153)
- Larger, W, 0.82-0.99 ; T<sub>3</sub>, over 1.00. Head with scattered fine and longer paired setae. Pronotum, length less than three-quarters width . . . . . 10
- 10 Smaller, W, 0.82 ; E, 0.27 ; T<sub>3</sub>, 1.00. Pilosity finer, more sparse, surface of head shining. Fontanelle a pale streak . . . . . *VERRUCOSITERMES* (p. 156)
- Larger, W, 0.85-0.99 ; E, 0.29-0.38 ; T<sub>3</sub>, 1.00-1.20. Pilosity dense, surface of head almost obscured. Fontanelle triangular, dumb-bell-shaped, or nearly obsolete . . . . . *EUTERMELLUS* (p. 141)

- 11 Posterior margin of head capsule narrowly rounded, width behind eyes distinctly less than length to front of postclypeus ; eyes not set out from sides of head. Smaller, W, 0.80 ; pronotum, width, 0.70, length, 0.42 **POSTSUBULITERMES** (p. 155)
- Posterior margin of head capsule broadly rounded, width behind eyes approximately equal to length to front of postclypeus ; eyes slightly to distinctly set out from sides of head. Larger, W, 0.89 or over ; pronotum, width 0.78 or over, length 0.61 or over . . . . . 12
- 12 Larger, W, 1.28-1.35 ; E, 0.41-0.42 ; pronotum, width 1.20-1.23, length 0.68-0.75 ; T<sub>3</sub>, 1.45-1.56. Pilosity sparse, surface of head shining. Colour, head and pronotum yellow . . . . . **TARDITERMES** (p. 166)
- Smaller, W, 0.89-1.12 ; E, 0.29-0.35 ; pronotum, width, 0.78-1.35 ; length, 0.61-1.15 ; T<sub>3</sub>, 0.82-1.06. Pilosity dense, surface of head almost obscured. Colour uniformly dark sepia brown . . . . . **MIMEUTERMES** (p. 158)

## SOLDIERS

- 1 Head capsule more or less constricted or contracted behind antennae (Text-figs. 119-156, 388-395, 414-430, 464-469) . . . . . 2
- Head capsule not constricted or contracted behind antennae (Text-figs. 24-99, 256-296, 338-378, 396-398, 470-478, 497-500) . . . . . 11
- 2 Antennae 14 segmented . . . . . 3
- Antennae 11-13 segmented . . . . . 5
- 3 Vestigial mandibles without points . . . **TRINERVITERMES** minor soldiers (p. 76)
- Vestigial mandibles with distinct points . . . . . 4
- 4 Nose slender, cylindrical. Smaller, T<sub>3</sub>, 1.23-1.73. Colour, yellow to orange  
**LEPTOMYXOTERMES** (p. 51)
- Nose thick, conical, sharply tapered and slightly turned down at tip. Larger, T<sub>3</sub>, 1.96-2.05. Colour dark brown . . . . . **GRALLATOTERMES** (p. 55)
- 5 Head in side view raised behind constriction, above line of nose profile including basal hump if present . . . . . 6
- Head in side view with undulating or convex profile, not raised behind constriction above line of nose . . . . . 7
- 6 Vestigial mandibles without points. Vertex of head without prominent setae (sometimes a pair of minute setae present). Constriction of head weak  
**TRINERVITERMES** minor soldiers (p. 76)
- Vestigial mandibles with small to distinct points. Vertex with single pair of bilaterally placed setae. Constriction of head strong (Text-figs. 130-156)  
**FULLERITERMES** and **RHADINOTERMES** (p. 55)
- 7 Nose shorter than rest of head capsule, measuring from hind margin of antennal socket. Soldiers dimorphic . . . . . **MYCTEROTERMES** (p. 75)
- Nose longer than rest of head capsule, measuring from hind margin of antennal socket. Soldier monomorphic . . . . . 8
- 8 Nose and anterior lobe of strongly constricted head capsule with numerous tubercle-like outgrowths of cuticle, also present on basal antennal segments  
**VERRUCOSITERMES** (p. 156)
- Nose and head without such outgrowths . . . . . 9
- 9 Labrum with anterior corners extended as short lobes, middle of anterior margin bowed outwards producing trilobed appearance. Legs with long prominent setae, 1 on each coxa, 3-6 on each femur and tibia, among shorter more typical setae. Nose somewhat rugose . . . . . **EUTERMELLUS** (p. 141)
- Labrum with anterior margin rounded or at most sinuate. Legs without such setae, or, if one or two present then soldier of minute size, L, 0.98-1.07 ; T<sub>3</sub>, 0.47-0.53. Nose smooth . . . . . 10

- 10 Smaller, L, 0.98-1.07 ; W, 0.37-0.41 ; T<sub>3</sub>, 0.47-0.53. Nose shorter in proportion to rest of head capsule (53 : 47) . . . . . **AFROSUBULITERMES** (p. 153)  
 - Larger, L, 1.39-1.53 ; W, 0.55-0.60 ; T<sub>3</sub>, 0.71-0.79. Nose longer in proportion to rest of head capsule (59 : 41) . . . . . **POSTSUBULITERMES** (p. 155)
- 11 Head capsule in plan view tapering continuously from near back to nose tip, top-shaped or tear-drop-shaped. Nose tip without prominent setae  
 . . . . . **MIMEUTERMES** (p. 158)  
 - Head capsule in plan view not so, nose distinct from rest of head. Nose tip with 4 or more prominent setae . . . . . 12
- 12 Vestigial mandibles with points . . . . . **NASUTITERMES** (p. 15)  
 - Vestigial mandibles without points . . . . . 13
- 13 Labrum with sinuate anterior margin. Head capsule in plan view a rounded rectangle wider than long . . . . . **TARDITERMES** (p. 166)  
 - Labrum with rounded anterior margin. Head capsule in plan view, various, if wider than long, then not a rounded rectangle . . . . . 14
- 14 Head capsule without prominent setae except on nose and occasionally one pair of small setae on vertex. Where minute setae are present, sockets not visible at normal stereomicroscopic magnifications. Soldiers dimorphic or polymorphic  
 . . . . . **TRINERVITERMES** (p. 76)  
 - Head capsule with one pair of setae on vertex, one or two pairs near base of nose, and four at nose tip with smaller setae behind them. Entire head capsule and nose with scattered minute setae with distinct pale sockets. Soldiers monomorphic  
 . . . . . **BAUCALIOTERMES** (p. 138)

### **NASUTITERMES** Dudley, 1890

*Nasutitermes* Dudley, 1890 : 158. Type-species, by subsequent designation (Emerson, 1925 : 379), *Nasutitermes sanchezi* (Holmgren, 1910) = *Nasutitermes costalis* (Holmgren, 1910).

In a recent paper on this genus as it is represented in the Indian region, Prasad and Sen-Sarma (1959) attribute the authorship of the generic name to Banks (1920). They give as their reasons for this change the opinions that (i) the description "soldiers with beak" as given by Dudley (1890) "does not constitute an indication, a definition, or a description", on the grounds that the description is applicable to most genera in the subfamily, and (ii) "the indirect evidence from the termitophiles is untenable". . . . Because the definition "soldiers with beak", though meagre, satisfies the requirement of Article 12 of the International Code, and because all the other nasute genera at present recognized came into being after the establishment of the genus *Nasutitermes* by Dudley, many of them having been included in it as subgenera or species when first described, these arguments are not acceptable. Not only is the definition of the genus valid as it stands, but it is supported by its author's reference to his own earlier paper of 1889, in which a detailed description of nest structure and habits was given, together with illustrations of all castes (pp. 107, fig. 7, and 108, fig. 8). These fully satisfy the requirements of Article 16 (a), sections (i) and (viii). The evidence of the termitophiles is irrelevant to the discussion of the authorship of the genus.

Dudley neither designated a type-species, nor included any nominal species in the genus. Whilst there is little doubt from the evidence of the termitophile *Termitogaster insolens* Casey, mentioned by Dudley, and now known to be host specific,

that the species concerned was *N. corniger* (Motschulsky, 1855), this does not constitute a valid citation of the species under Article 69 (a). Prashad and Sen-Sarma are therefore correct in rejecting the designation of *N. corniger* as the type-species in Snyder (1949).

The first use after Dudley of the generic name *Nasutitermes* was made by Banks (1919) when eight species were cited by name; from among these Banks (1920) proceeded to designate as type-species *Nasutitermes morio* (Latreille, 1805). Emerson (1925) stated that the species name *Termes morio* Latreille was a junior primary homonym of *Termes morio* Fabricius (1793) (now placed in synonymy with *Coptotermes testaceus* (L.)), and had to be replaced by the next available name *Nasutitermes costalis* (Holmgren). This he considered to be synonymous with *N. morio* (Latreille), and therefore was to be the type-species of the genus. The description in Latreille (1805), referred to by both Banks and Emerson is given under the heading "TERMES MORIO; *Termes morio*. Fab.". Clearly Latreille identified his specimens as Fabricius' species, and in so doing did not create a new species. Though the identification has since proved erroneous, the description cannot be held to have designated a new species since no alternative name was proposed. "*Termes morio* Latreille" has therefore never existed as a valid nominal species, and the specific name *morio* cannot be retained for the species which was before Latreille (Article 49). Banks' designation of this as the type-species of *Nasutitermes* was thus in error and must be rejected in favour of the first subsequent designation. *Nasutitermes costalis* (Holmgren) was not among those cited by name by Banks (1919) and was therefore not directly available for designation, Article 69 (a) clauses (i) and (ii).

Article 69 (a) clause (iv) states: "(iv) If an author designates (or accepts another's designation) as type-species a nominal species that was not originally included, and if, but only if, at the same time he synonymizes that species with one of the originally included species, his act constitutes designation of the latter as type-species of the genus".

Emerson (1925) synonymized a number of species described by Holmgren (1910) and chose from among them the name *N. costalis* for the species. One of those synonymized was *N. sanchezi*, which was among those originally included in the genus by Banks (1919). Thus the type-species of *Nasutitermes* in accordance with Article 69 of the International Code must be taken to have been designated by Emerson (1925) as *Eutermes sanchezi* Holmgren, 1910 (= *Eutermes costalis* Holmgren, 1910). *Nasutitermes costalis* (Holmgren) is therefore only type-species by virtue of its containing *N. sanchezi* (Holmgren) as a synonym. The Holotype of *N. sanchezi* was reported by Weidner (1955) to be a soldier caste, in the Zoologischen Staatsinstituts und Zoologischen Museums, Hamburg.

The generic name *Nasutitermes* was first applied to species from the Ethiopian Region by Emerson (1928), who dealt with some species formally, and some informally, without references to their author's names, in comparisons with the formally treated species. I have thought it best in making out specific synonymies to refer the first use of "*Nasutitermes*" to Emerson (1928) only in those species

dealt with formally in that paper, although he clearly regarded all such related species as belonging to the same genus.

*Imago.* Left mandible with apical tooth as long as or slightly shorter than first marginal, distance from apical to first marginals less to slightly more than half distance between first and third marginals (left mandible index 37-54), second marginal obsolete or only represented by slight undulation of cutting edge between first and third marginals; right mandible with apical and first marginals subequal as left, posterior cutting edges of first and second marginals approximately equal in length, molar plate with 9-11 regular transverse ridges, and no marked irregularity of outline in surface view (Text-figs. 157-162). Postclypeus, length slightly less than half width, to a quarter or less of width. Fontanelle, usually pale coloured, slit-like, and forked anteriorly, but in a number of species virtually obsolete, and scarcely different in colour from rest of head capsule, sometimes visible only as an indistinct round or oval mark.

*Soldier.* Monomorphic, though sometimes size differences appear to correspond to instars at which metamorphosis from worker caste took place. Nose a weak to strong cone, not cylindrical in species of Ethiopian Region. Vestigial mandibles usually with points. Head capsule without any pronounced constriction behind antennae.

The characters given in the diagnosis are those which distinguish the genus from others in the Ethiopian Region, and are not intended to be diagnostic on a world scale, neither are the more generalized subfamily characteristics included. Only *Grallatotermes* among the Ethiopian genera has a right molar plate which resembles that of *Nasutitermes*, though certain Neotropical and Oriental genera are similar. *Grallatotermes africanus* Harris differs from *Nasutitermes* in having a long cutting edge to the right second marginal, compared to the space between right apical and first marginal, and a deep indentation of the cutting edge on the left mandible between first and third marginals. The soldier also has a constricted head capsule.

The genus is confined in the Ethiopian Region to rain forest, riverain gallery forest, and forest outliers arising from locally moister conditions, or to moist woodland approaching forest conditions and usually situated near forest. This has resulted in a comparatively sharp division into two faunistic groups of species, one of which, the larger, consisting of ten species, is confined to the forests of the Congo and Guinean zones, including northern Uganda. The second consists of two species, mainly found in the coastal forest and woodlands of East Africa, but extending into Zululand in the South, and one of the two up the Rift Valley through Nyasaland and the western border of Tanganyika to the borders of the Congo and Uganda at Rwindi. The distribution of the species is shown on the maps (Maps 3-12).

#### KEYS TO SPECIES

The increased understanding of the variability of all castes has led to difficulties in constructing suitable keys to species. In the case of the imagos, it has been found necessary to resort to the use of numerical indices to express differences in proportions where actual measurements overlap. Some of the species are represented by very small numbers of specimens, and it is anticipated that discovery of new material may necessitate the reassessment of the validity of key characters in these cases.

#### IMAGOS

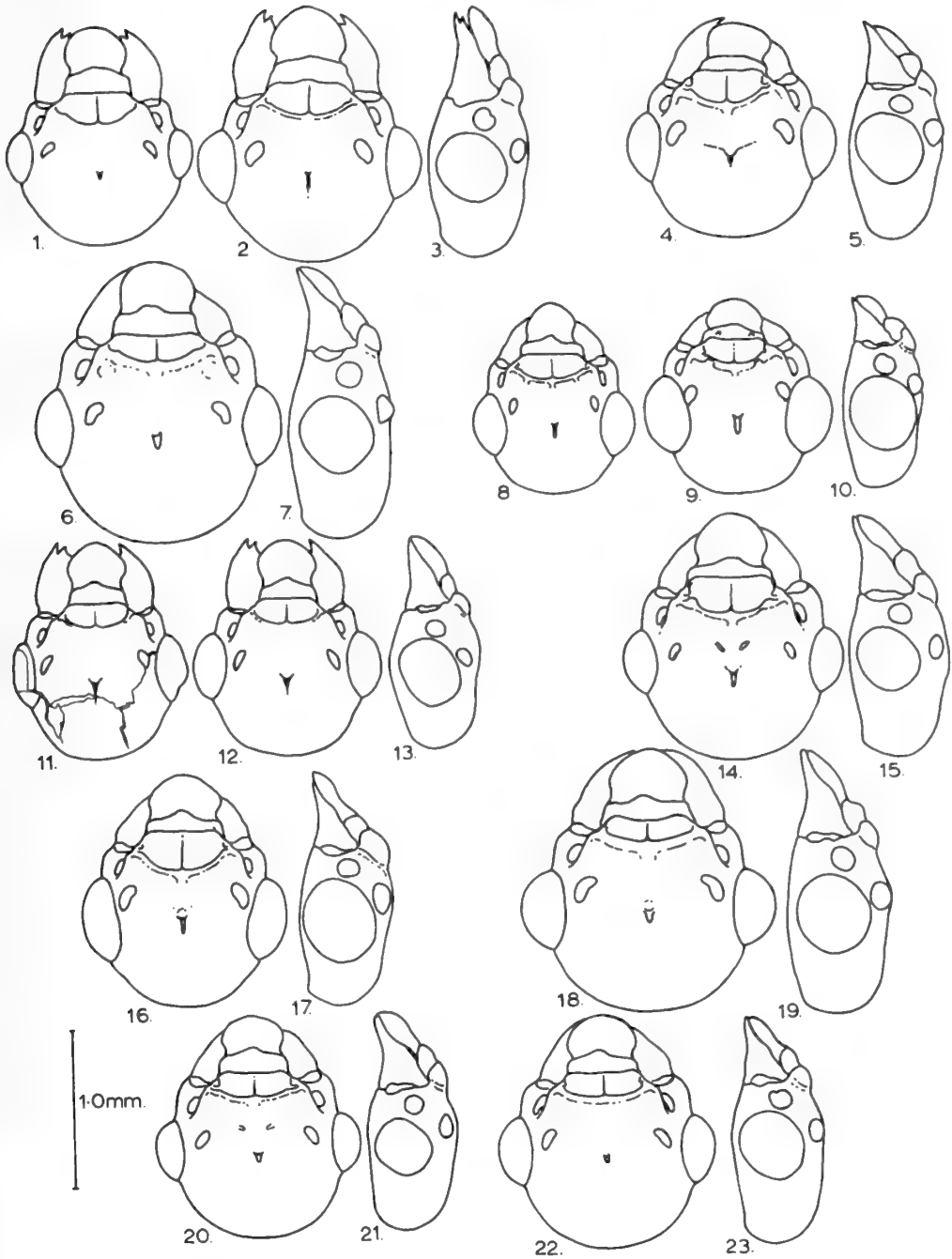
- |   |   |   |
|---|---|---|
| 1 | Postclypeus width 2-3 times length (Text-figs. 1-5, 8-17) . . . . .   | 2 |
| - | Postclypeus width more than 3 times length (Text-figs. 6, 18-23) . . . . .  | 7 |
| 2 | Eyes relatively larger in proportion to head-width, W/E index under 2.6, ocelli closer to eyes, O-E distance 0.01-0.04mm. . . . . | 3 |

- Eyes relatively smaller in proportion to head-width, W/E index over 2.8, ocelli further from eyes, O-E distance 0.04-0.13mm. . . . . 4
- 3 Smaller, W, 1.04-1.18 ; E, 0.41-0.51 ; O, 0.09-0.11 × 0.11-0.14 ; T<sub>3</sub> 1.25-1.38 (W. Afr., Congo, Uganda) . . . . . **elegantulus** (p. 30)
- Larger, W, 1.20-1.36 ; E, 0.48-0.53 ; O, 0.13-0.16 × 0.16-0.20 ; T<sub>3</sub>, 1.38-1.64 (E. Central, S. Afr.) . . . . . **kempae** (p. 39)
- 4 T<sub>3</sub> shorter in proportion to W, T<sub>3</sub>/W index 1.10. . . . . **fulleri** (p. 34)
- T<sub>3</sub> longer in proportion to W, T<sub>3</sub>/W index over 1.15 . . . . . 5
- 5 Lateral extensions of " fork " of fontanelle wide, reaching half way to ocelli . . . . . **camerunensis** (p. 26)
- Lateral extensions of " fork " short . . . . . 6
- 6 Cerci of female shorter than width at base. . . . . **arborum** (p. 20)
- Cerci of female as long as width at base . . . . . **infuscatus** (p. 37)
- 7 Smaller, E under 0.42, W under 1.33 . . . . . **lujae** (p. 45)
- Larger, E over 0.44, W over 1.33 . . . . . 8
- 8 Smaller, W, 1.35-1.40 ; T<sub>3</sub> under 1.68 . . . . . **schoutedeni** (p. 48)
- Larger, W over 1.42 ; T<sub>3</sub> over 1.75 . . . . . 9
- 9 Head capsule width immediately behind eyes approximately equal to length to front of postclypeus . . . . . **latifrons** (p. 41)
- Head capsule width behind eyes slightly less than length to front of postclypeus . . . . . **chrysopleura** (p. 27)

## SOLDIERS

- 1 Whole head capsule and nose with numerous scattered long yellow setae . . . . . **hirticeps** (p. 36)
- Head capsule with few (0-8), more regularly arranged setae, nose with setae concentrated at tip . . . . . 2
- 2 Tip of nose markedly hairy (Text-figs. 40, 54, 65, 70, 74, 80, 82, 91, 96) . . . . . 3
- Tip of nose with 4 prominent setae, and very few small inconspicuous setae behind them, or none (Text-figs. 26, 29, 35, 47, 52, 89) . . . . . 10
- 3 Postmentum with setae scattered over entire surface (sometimes few and small). No long setae on vertex (Text-figs. 78-87) . . . . . **latifrons** (p. 41)
- Postmentum with setae confined to anterior margin. Two bilaterally placed long setae usually present on vertex . . . . . 4
- 4 Antennae 11-12 segmented . . . . . 5
- Antennae 13-14 segmented . . . . . 6
- 5 Head profile convex from change of contour at base of nose backwards, or nearly straight with slight over-all convexity ; numerous small setae on vertex (Text-figs. 39-45) . . . . . **elegantulus** (p. 30)
- Head profile more or less concave, usually slightly angularly so at base of nose ; vertex without such small setae (Text-figs. 51-57) . . . . . **fulleri** (p. 34)
- 6 Nose, measuring from hind margin of antennal socket, shorter than rest of head capsule . . . . . 7
- Nose, measured as above, equal to or longer than rest of head capsule . . . . . 8
- 7 Head profile concave ; nose abruptly tapered at tip (Text-figs. 95-99) (W. Africa, Congo, Uganda) . . . . . **schoutedeni** (p. 48)
- Head profile more or less straight ; nose more slenderly and evenly tapered to tip (Text-figs. 62-68) (E. and Central Africa) . . . . . **infuscatus** (p. 37)
- 8 Smaller, T<sub>3</sub> less than 0.90, head profile convex from change of contour at base of nose backwards, or nearly straight with slight over-all convexity (Text-figs. 39-45) . . . . . **elegantulus** (p. 30)
- Larger, T<sub>3</sub> over 0.90, head profile straight or more or less concave, or sinuate, or straight to well behind base of nose with raised vertex, rarely with very slight over-all convexity, and these much larger, L over 1.61 . . . . . 9





FIGS. 1-23 : *Nasutitermes*, front and side views of imago head capsule. 1-3, *N. arborum*; 4, 5, *N. camerunensis*; 6, 7, *N. chrysopleura*; 8-10, *N. elegantulus*; 11-13, *N. fulleri* (unique morphotype, 12 reconstructed from 11); 14, 15, *N. infuscatus*; 16, 17, *N. kempae*; 18, 19, *N. latifrons*; 20, 21, *N. lujae*; 22, 23, *N. schoutedeni*.

- 9 Larger, L, 1.61-2.05; W, 0.88-1.29; D, 0.61-0.82; T<sub>3</sub>, 0.90-1.28. Head profile straight or slightly concave; rarely with slight over-all convexity (Text-figs. 69-77) (E. and Central Africa) . . . . . **kempae** (p. 39)
- Smaller, L, 1.25-1.63; W, 0.68-0.95; D, 0.49-0.63; T<sub>3</sub>, 0.95-1.18. Head profile straight to well behind base of nose, with vertex raised and rounded (Text-figs. 88-94) (W. Africa, Congo, Uganda) . . . . . **lujae** (p. 45)
- 10 Antennae 12 segmented . . . . . **fulleri** (p. 34)
- Antennae 13 segmented . . . . . 11
- 11 Nose distinctly shorter than rest of head capsule, measuring from hind margin of antennal socket, strongly to very strongly conical in profile (cone angle 18-30 degrees); 2-4 prominent setae on top of head at base of nose. Colour, head capsule ferruginous to chestnut brown, nose brownish black with red tip. (Text-figs. 46-50) . . . . . **ferranti** (p. 32)
- Nose approximately equal to or longer than rest of head capsule, weakly to strongly conical (cone angles 10-25 degrees); no such prominent setae present. Colour, yellow to brown, nose sometimes darker, to chestnut brown . . . . . 12
- 12 Head profile evenly concave; nose weakly to moderately conical (angle 10-15 degrees). Colour brown, often with darker nose, sometimes banded around its base (Text-figs. 34-38) . . . . . **diabolus** (p. 29)
- Head profile straight, slightly sinuate, or raised posteriorly, well behind base of nose; nose moderately to strongly conical (angle 13-25 degrees). Colour orange yellow to ferruginous orange, nose ferruginous to chestnut brown . . . . . 13
- 13 Vertex with two long bilaterally placed setae. Nose tip usually with several smaller setae in addition to the four prominent apical setae (Text-figs. 88-94) . . . . . **lujae** (p. 45)
- Vertex without setae. Nose tip with four prominent apical setae only, or with one or two very inconspicuous additional smaller setae (Text-figs. 24-33) **arborum** (p. 20)

***Nasutitermes arborum*** (Smeathman)

(Text-figs. 1-3, 24-33, 157-159, 198-199; Map 4)

*Termes arborum* Smeathman, 1781 : 141, 161. Type locality : SIERRA LEONE. Type material lost or destroyed.

*Eutermes maculiventris* Sjöstedt, 1904 : 104. Type locality : GABON. **syn. n.**

*Termes (Eutermes) maculiventris* (Sjöstedt) Desneux, 1904a : 43.

*Eutermes (Eutermes) maculiventris* (Sjöstedt) Holmgren, 1912 : 62.

*Eutermes infuscatus* var. *perfusca* Silvestri, 1914 : 35. Type locality : DAHOMEY, Cotonou. **syn. n.**

*Nasutitermes arboreus* (Smeathman) Snyder, 1949 : 266.

*Nasutitermes infuscatus* var. *perfusca* (Silvestri) Snyder, 1949 : 280.

*Nasutitermes maculiventris* (Sjöstedt) Snyder, 1949 : 285.

*Nasutitermes torquatus* (Sjöstedt); Sands, 1957 : 12.

*Imago*. Head capsule dark sepia brown, area between eye and base of mandibles, and postclypeus paler, yellow-brown to brown, postclypeus with darker brown shading from mid-line outwards to a varying extent. Labrum yellow to yellow-brown. Antennae yellow-brown to brown. Pronotum dark sepia brown with slightly paler "T"-shaped mark in middle of front half. Meso- and metanota, pleural and ventral thoracic sclerites yellow-brown to brown. Legs yellow to yellow-brown, slightly darker at ends of femora and bases of tibiae, yellow-brown to brown. Abdominal tergites and lateral parts of sternites sepia brown, middle of abdominal sternites, excepting posterior two or three, yellow to yellow-brown. Wings translucent brown, venation sepia brown.

Posterior margin of head behind eyes distinctly less than semi-circular; fontanelle variable, in ♂, from a short whitish streak, slightly bifurcate at anterior end, to an indistinct mark only slightly paler than rest of head capsule, and in ♀, from a whitish slit to an indistinct pale patch, in both sexes flat to very slightly depressed posteriorly; eyes prominent in proportion to own diameter, though not large relative to head width, W/E index 2.8-3.5 (only one specimen recorded under 3.0), nearly circular to angularly oval; ocelli small to medium sized, separated from eyes by one-third to slightly more than own least diameter, oval; postclypeus moderately inflated, width 2.5 to 3.0 times length, anterior margin nearly straight to distinctly sinuate, posterior margin convex, rounded, slightly sinuate towards outer corners; antennae 15 segmented, II slightly longer than IV, III and V subequal, slightly shorter than IV, III slightly narrower than V.

Cerci of ♀ distinctly shorter than width across base, with somewhat mamilliform tip.

Measurements (25 specimens from 7 localities) in millimetres.

	Range	Mean
Head width across eyes	1.16-1.50	1.32
Greatest diameter of eye	0.35-0.48	0.41
Ocellus . . . . .	0.09-0.14 × 0.13-0.20	0.11 × 0.16
Ocellus to eye . . . . .	0.04-0.10	0.08
Width of pronotum . . . . .	0.93-1.18	1.04
Length of pronotum . . . . .	0.58-0.78	0.66
Length of hind tibia . . . . .	1.38-1.80	1.57
Length of fore wing . . . . .	9.40-14.70	11.40

*Soldiers.* Head capsule orange to ferruginous-orange, nose ferruginous to chestnut-brown. Pronotum and antennae as head capsule. Abdominal tergites and femora of legs yellow, abdominal sternites, tibiae and tarsi pale yellow.

Head capsule in plan view nearly circular, slightly tapering towards front, nose conical. In profile very nearly straight, sometimes very slightly concave or sinuate, nose equal in length or slightly longer than rest of head capsule, measuring from hind margin of antennal socket, angle of nose cone 15-25 degrees; postmentum slightly and evenly convex; antennae 12-13 segmented, usually 13, proportions of segments somewhat variable depending on size, II and IV usually subequal, shorter than V, which may be shorter than or equal to III. Setae on head, excluding appendages, confined to four at tip of nose, with sometimes a very few small fine setae immediately behind them, and a few on anterior margin of postmentum.

Abdominal tergites with scattered minute fine setae, and longer setae on posterior margins of last 3-4 segments; sternites with shorter scattered setae, and long setae on posterior margins.

Measurements (157 specimens from 32 localities) in millimetres.

	Range	Mean
Head length to tip of nose . . . . .	1.33-1.89	1.58
Head width . . . . .	0.75-1.13	0.93
Depth of head capsule . . . . .	0.50-0.75	0.62
Width of pronotum . . . . .	0.40-0.55	0.48
Length of pronotum . . . . .	0.18-0.25	0.20
Length of hind tibia . . . . .	0.93-1.39	1.13

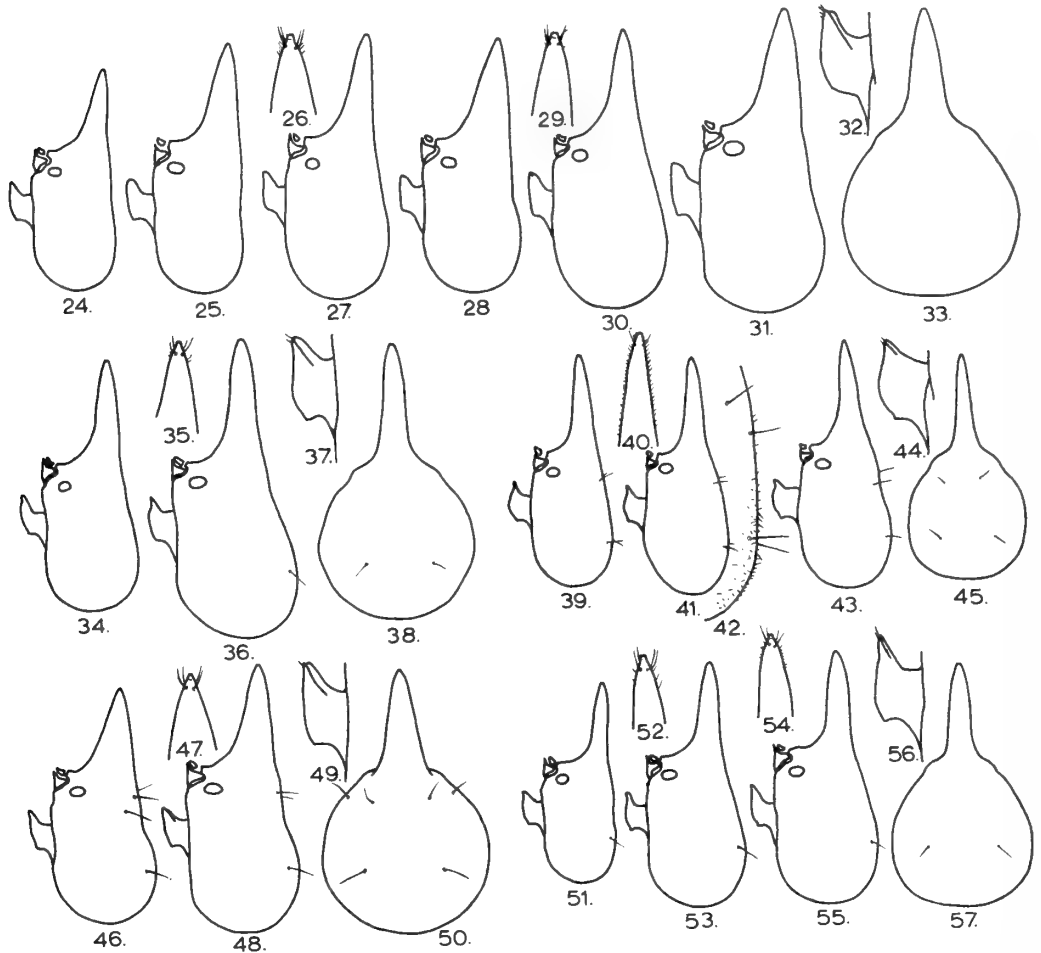
*Variation.* Imagos from the eastern end of the range tend to be slightly larger and to have the postclypeus less clouded with dark brown than those from the west coast of Africa, but the soldiers remain closely similar throughout the range. Soldier variation consists mainly of differences in the thickness of the nose cone, and of minor alterations in the angle of the nose and the degree of straightness of the profile.

The material from which Smeathman (1781) described this species has never been traced, and was probably never sent to any museum. Griffin (1942) records that the specimens of nests sent to Drury by Smeathman arrived in fragments, and

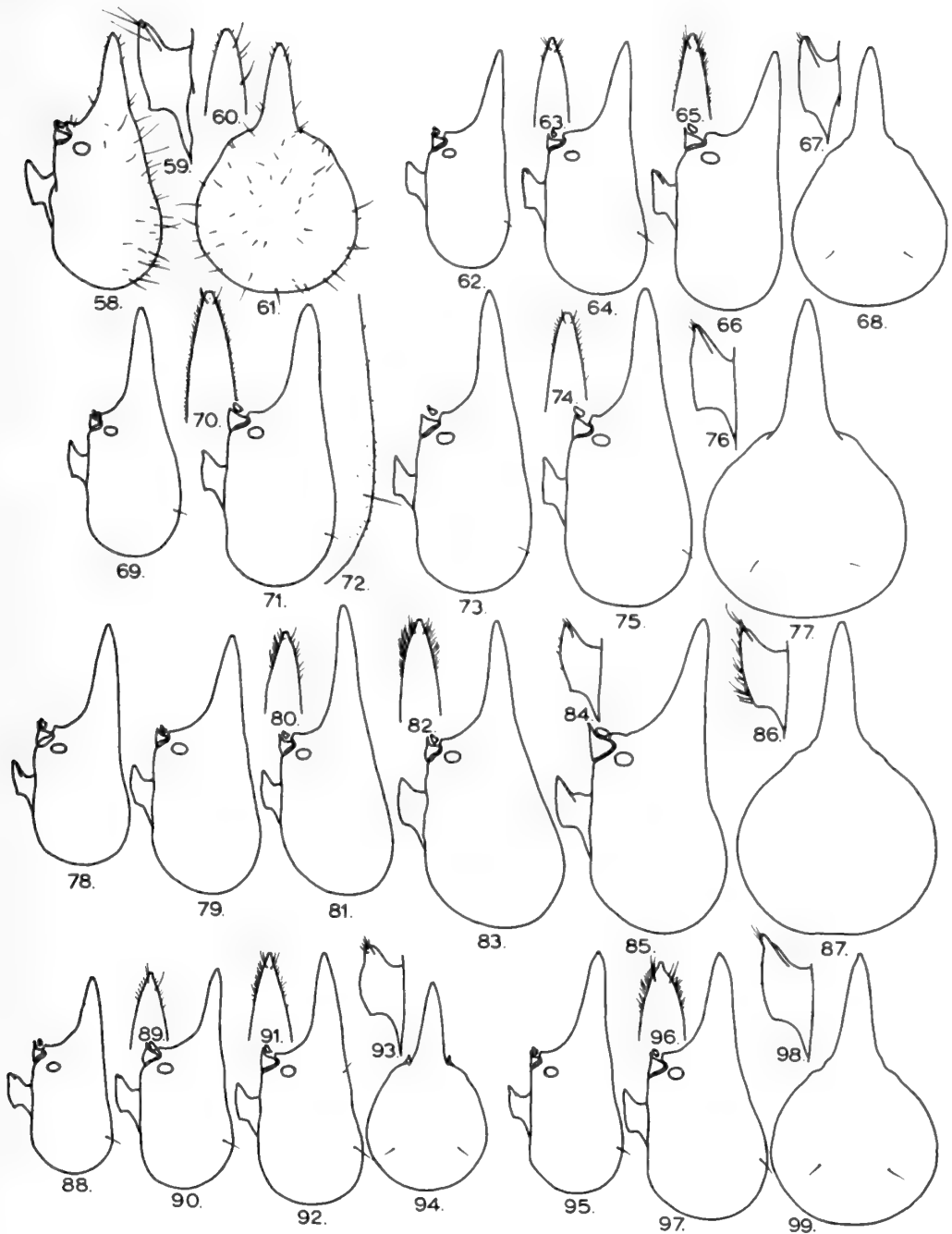
"mouldered to dust", so that no type material either of the termite or its nests now exists.

The commonest truly arboreal species in West Africa has been given various names which appear in the synonymy. It has been collected from a number of places in Sierra Leone, the type locality for *N. arborum*, and I consider it to be the species most likely to have been described by Smeathman under that name.

The name "*Eutermes arborum* (Smeathman)" has been used by several authors, but these references have all been checked back to specimens first identified by Sjöstedt (1900) and, following him, Silvestri (1912). These have been examined, and found to belong to *N. latifrons* (Sjöstedt, 1896). It is most undesirable that the



FIGS. 24-57 : *Nasutitermes*, soldier head capsule, side and plan views, nose tip and postmentum. 24-33, *N. arborum* ; 34-38, *N. diabolus* ; 39-45, *N. elegantulus* ; 46-50, *N. ferranti* ; 51-57, *N. fulleri*.



FIGS. 58-99 : *Nasutitermes*, soldier head capsule, side and plan views, nose tip and postmentum. 58-61, *N. hirticeps* ; 62-68, *N. infuscatus* ; 69-77, *N. kempae* (72, vertex pilosity) ; 78-87, *N. latifrons* ; 88-94, *N. lujae* ; 95-99, *N. schoutedeni*.

name *arborum* Smeath. should be used to replace *latifrons*, for the following reasons : (i) The specimens identified by Sjöstedt and Silvestri were not from the type locality of *N. arborum*. *N. latifrons* has only recently been collected from Sierra Leone for the first time. (ii) *N. latifrons* is not, in general, an arboreal-nesting species, and is unlikely to be that described by Smeathman. It most commonly occurs in dead logs, at the foot of tree trunks, and in the mounds of other species, such as *Cubitermes* spp. and *Thoracotermes*, on the forest floor. (iii) The name *N. latifrons* is well established and widely used for a species which is probably the most widely distributed in the Ethiopian Region.

It would seem that in the interests of stability of nomenclature, it is essential to fix the identity of *N. arborum* by the designation of a Neotype, particularly since another arboreal species, *N. lujae* closely resembles it in both imago and soldier, and is easily confused with it. It is distinguished in the imago by the more prominent postclypeus ; in the soldier by the lack of bilaterally placed long setae on the vertex, and the less hairy nose tip. In *N. fulleri* the single imago morphotype has a proportionately shorter hind tibia, and the soldier has a distinctly hairy nose tip, vertex setae, 12 segmented antennae, and an angularly concave profile. *N. schoutedeni* is separable in both castes by the same characters as *N. lujae*. The East African species *N. infuscatus* is closely similar and difficult to distinguish. The imago often has shallow diverging grooves on the frons anterior to the fontanelle, but these are not always well developed. They are absent in *N. arborum*, in which the ♀ cerci are shorter than their width at the base, whereas in *N. infuscatus* they are as long. The soldier of *N. infuscatus* has usually a more slender nose, with a slightly more hairy tip, and sometimes has setae on the vertex.

The original species-name *arborum* of Smeathman was altered in Snyder (1949) to *arboreus*, presumably with the object of making it an adjective agreeing with the generic name. The name *arborum* is however the genitive plural of *arbor*, giving the meaning "of the trees", and as such is a valid species name. I have therefore reverted to the use of the original form of the name.

Neotype. SIERRA LEONE : Njala (Lat. 8° 6' N., Long. 12° 5' W.), 27.i.1955 (*W. V. Harris* Coll. No. 901). Neotype soldier and other material from same colony in British Museum (Natural History). Morphotype. NIGERIA : Western Region, Benin Province, Sobo Plain, Obanokoro, 9.iii.1957 (*W. Wilkinson* Coll. No. WW571). Morphotype imagos in British Museum (Natural History).

Type material. DAHOMEY : Cotonou, 7.ii.1913 (*F. Silvestri*), syntypes, female imago and soldier, type colony, *N. infuscatus* var. *perfusca* (Silvestri), A.M.N.H. (other syntypes in Silvestri Coll., Lab. Zool. Sc. Agr., Portici).

GABON : No detailed locality (*Aubry-Lecomte*), syntype male imago and soldier, type colony, *N. maculiventris* (Sjöstedt), A.M.N.H., (other syntypes in Naturhist. Riksmus., Stockholm).

Other Material. SIERRA LEONE : Kenema, 12-13.i.1958 (*W. Wilkinson*).

GUINEA : Kakoulima (between Conakry and Kindia), 1912 (*F. Silvestri*), A.M.N.H. ; Nimba Mts., 1957 (*M. Lamotte*), Inst. Franç. d'Afr. Noire, Dakar.

LIBERIA : No detailed locality, 1908 (*Sherer*), A.M.N.H.

GHANA : Yeji, 9.i.1927, Accra, 13.v.1936 (*A. W. J. Pomeroy*) ; Bobiri Forest, 23m. from Kumasi on Accra Road, 21.ii.1959, Kumasi, 22.ii.1959, Ejura, 23.ii.1959, 60m. N. of Ejura on Tamale Road, 24.ii.1959, Awura Forest, 4m. from Ejura on Kintampo Road, 28.iii.1959, 9m. from Nkoranza on Techiman Road, and 12m. N. of Techiman on Wenchi Road, 29.iii.1959 (*W. A. Sands*).

NIGERIA : Western Region ; Sobo Plain, Obanokoro, 8.i.1957, Lagos, Light-house Beach, 10.iv.1957 (*W. Wilkinson*) : Olokemeji, 30m. W. of Ibadan, 8.xii.1957, Agodi, Ibadan, 10.xii.1957, between Shagamu and Ijebu-Ode, 14.xii.1957 (*W. A. Sands*). Eastern Region ; Port Harcourt, 14-16.iii., 1-2.iv.1957, 29m. from Port Harcourt on Owerri Road, 19.iv.1957 (*W. Wilkinson*). Northern Region ; 6m. N. of Minna, 20.xii.1956, 18m. from Bida on Badeggi Road, 24.xii.1956, Idu Forest, 20m. from Abuja on Keffi Road, and Gwagwa Forest, near Abuja, 28.xii.1956, Gwachipe Forest, 12m. from Abuja on Minna Road, 29.xii.1956, Dogon Forest, 65m. from Jos on Kafanchan Road, 8.ii.1957, 6m. N. of Jebba on Mokwa Road, 16.xii.1957, 42m. from Gboko on Oturkpo Road, 26.ii.1958, 22m. from Lokoja on Kabba Road, 10.iii.1958, 23m. from Kabba on Ondo Road, 11.iii.1958 (*W. A. Sands*).

CAMEROUN : Mbalmayo, 7.x.1962 (*G. Becker*), own collection.

REPUBLIC OF CONGO : Brazzaville, 7.vi.1948 (*A. E. Emerson*), A.M.N.H.

CONGO : Basoko, 1909 (*H. Lang* and *J. P. Chapin*) ; 5km. from X-roads near Bilni (near Mambasa, Ituri Forest), 10.v.1948, Stanleyville, 25.v.1948, Yangambi, 30.v.1948 (*A. E. Emerson*) (with *Lang-Chapin* coll., at A.M.N.H.) ; Garamba Nat. Park, 1950 (*H. de Saeger* and *G. Demoulin*), Inst. des Parcs Nat. du Congo, Brussels.

UGANDA : Bwamba, 19.iii.1949, Kigezi, 1947 (*W. V. Harris*) ; 16m. from Kampala on Entebbe Road, 1.iii.1955 (*W. Wilkinson*).

A total of 52 nest series were examined, and all material is in the British Museum (Natural History) unless otherwise stated.

Though common from Sierra Leone to Uganda, this species appears to have a more limited range south-eastwards than some of its congeners. It is found mainly in rain forest or forest outliers in forest-savannah mosaic areas (*Keay et al.*, 1959, vegetation types 7 and 8), though occasionally recorded from true savannah-woodland vegetation when growing under moist conditions near forest. The records of this species from Senegal and the Cape (referring to the Cape of Good Hope) by Hagen (1858), repeated in Snyder (1949), are erroneous. The Cape of Good Hope specimen of the soldier is *Trinervitermes trinervoides* (Sjöstedt), and the Senegal alate specimen does not belong to the subfamily Nasutitermitinae at all, but is probably *Termes* or *Promirotermes*.

The nests of this species are of dark brown, almost black carton, usually situated above ground level in trees or on woody lianes. The carton foraging runways extend in all directions for considerable distances, and it is common to find only the foraging workers and soldiers and to be unable to trace the nest.

***Nasutitermes camerunensis* (Sjöstedt) comb. n.**

(Text-figs. 4, 5, and 201; Map 3.)

*Eutermes camerunensis* Sjöstedt, 1899 : 37. Type locality : CAMEROUN.*Eutermes camerunensis* Sjöstedt : Snyder, 1949 : 349 [not classified].*Microcerotermes* (?) *camerunensis* (Sjöstedt) Weidner, 1955 : 249.

*Imago.* Head capsule chestnut brown, postclypeus, labrum, and antennae bright yellow-brown, almost orange. Pronotum, meso- and metanota, and abdominal tergites brown, pronotum with paler irregular "T"-shaped mark in middle of front half. Legs yellow. Abdominal sternites pale yellow in middle, clouded with pale brown round stigmata. Wings, membrane very pale brown, almost hyaline, slightly iridescent, veins pale brown outlined with sepia brown.

Posterior margin of head behind eyes distinctly less than semi-circular; fontanelle small, pale, but widely bifurcate anteriorly, lateral arms of "fork" reaching half-way to ocelli; eyes prominent, medium-sized, angularly oval, W/E index 2.9; ocelli medium-sized, oval, separated from eyes by half own least diameter or slightly less; postclypeus moderately inflated, width 2.5 times length, anterior margin nearly straight, posterior margin rounded; antennae 15 segmented, II and IV subequal, slightly longer than III and V.

Cerci (both known specimens are ♂) about as long as width across base, mamilliform.

Measurements (2 specimens, holotype and one other) in millimetres.

	Range
Head width across eyes . . . . .	1.34-1.35
Greatest diameter of eye . . . . .	0.46
Ocellus . . . . .	0.13-0.14 × 0.16-0.19
Ocellus to eye . . . . .	0.05-0.06
Width of pronotum . . . . .	1.06-1.10
Length of pronotum . . . . .	0.64-0.69
Length of hind tibia . . . . .	1.61

This species is only known from the holotype imago and one other specimen. The soldier and worker castes are unknown. It was first recognized as belonging to *Nasutitermes* by Emerson, and my attention was drawn to it by his unpublished notes. Since then a further specimen has been found in the collection of the Termite Research Unit, confirming its existence as a separate species. It may be noted that only two species from the mainland of Africa are now known only from the soldier caste, namely *N. diabolus* and *N. ferranti*. Similarly only two are known from the imago alone, *N. camerunensis* and *N. chrysopleura*. In view of the widespread records of all the mainland species now known, it seems probable that these soldiers and imagos belong together in two species, although this cannot be settled until all castes are collected together. It is however possible to predict that if this is correct the most likely combinations would seem to be the soldier of *N. diabolus* with the imago *N. chrysopleura* and the soldier of *N. ferranti* with the imago *N. camerunensis*.

*N. camerunensis* differs from *N. kempae* and *N. elegantulus* in having relatively smaller eyes; the hind tibia is proportionately longer than in *N. fulleri*, and the widely bifurcate fontanelle distinguishes it from *N. arborum* and *N. infuscatus*. In the remaining species the postclypeus is much shorter in proportion to its width.

Material. CAMEROUN : iii.1892 (*H. Brauns*), unique holotype ♂ imago, Mus. Hamburg.

NIGERIA : Eastern Region; Port Harcourt, 15.iii.1957 (*W. Wilkinson*).



*Nasutitermes chrysopleura* (Sjöstedt)

(Text-figs. 6, 7, and 200; Map 3)

*Eutermes chrysopleura* Sjöstedt, 1897 : 126. Type locality : CAMEROUN, Victoria.*Termes (Eutermes) chrysopleura* (Sjöstedt) Desneux, 1904a : 41.*Eutermes chrysopleura* Sjöstedt ; Sjöstedt, 1926 : 324.*Nasutitermes chrysopleura* (Sjöstedt) Snyder, 1949 : 271.

*Imago.* Head capsule brown, postclypeus, antennae yellow-brown. Pronotum pale brown, legs yellow-brown. Abdominal tergites brown, sternites pale brown round stigmata, yellow-brown in middle. Wings missing in cotype. Colours may be faded in old specimen.

Posterior margin of head behind eyes nearly semi-circular ; fontanelle distinct, pale, tapering posteriorly, and concave rather than bifurcate at anterior end ; eyes medium sized, only moderately prominent in proportion to own diameter, nearly circular, W/E index 3.0 ; ocelli medium sized, separated from eyes by half own greatest diameter, oval ; postclypeus weakly inflated, width 3.8 times length, anterior margin nearly straight, posterior margin convex, widely arched, distinctly sinuate towards outer corners ; antennae damaged, II and V sub-equal, slightly shorter than IV, III longer than IV. Meso- and metanota with very wide-angled posterior margins. Cerci very short, only about two-thirds width at base, nearly conical.

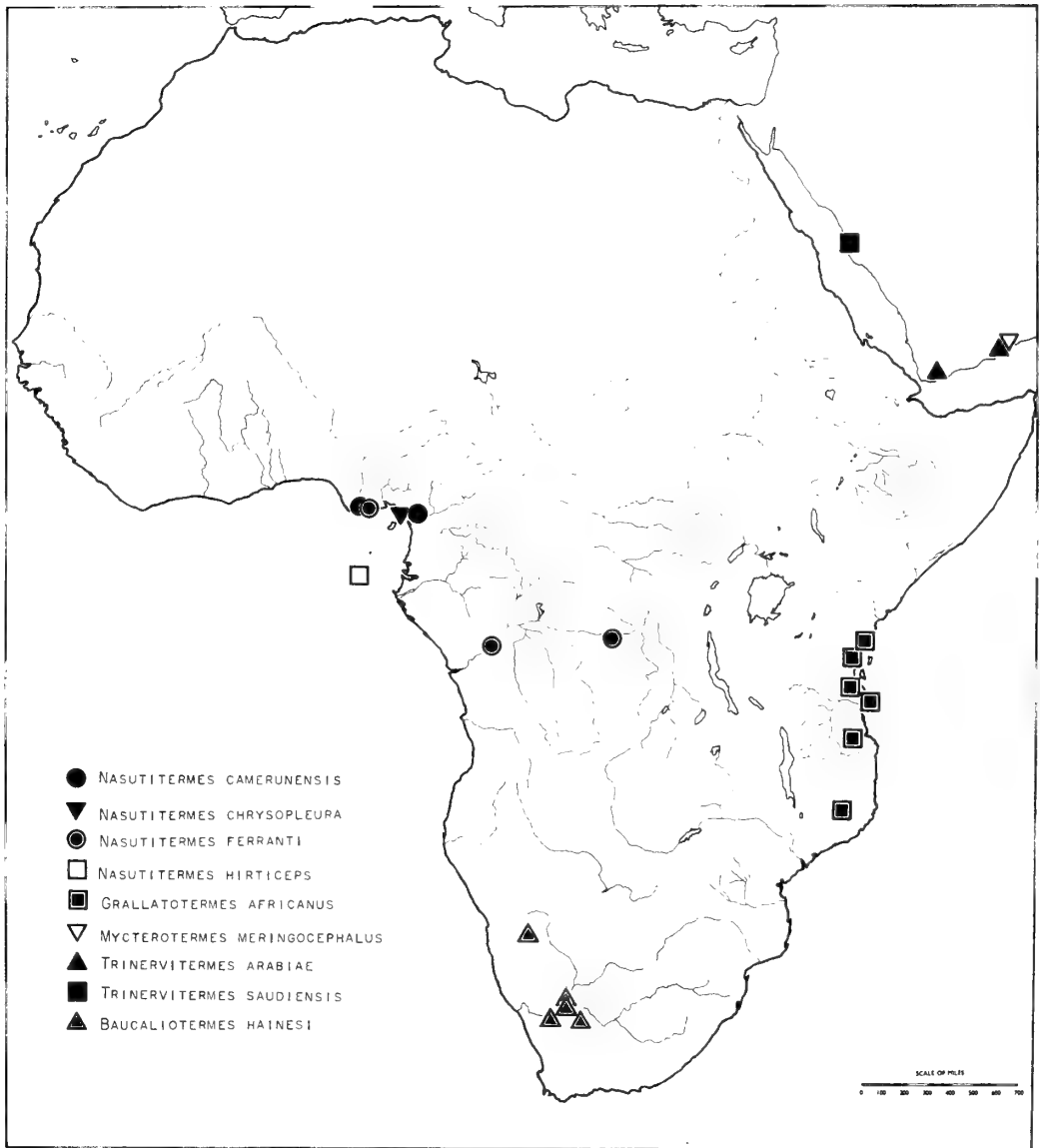
Measurements (single paratype specimen) in millimetres.

Head width across eyes . . . . .	1.53
Greatest diameter of eye . . . . .	0.50
Ocellus . . . . .	0.14 · 0.19
Ocellus to eye . . . . .	0.09
Width of pronotum . . . . .	1.38
Length of pronotum . . . . .	0.83
Length of hind tibia . . . . .	1.95

This species is known only from the type material. It closely resembles *N. latifrons*, which is common in the vicinity of the type locality, and it may ultimately prove to be the same species. There are however certain differences, even from the *N. latifrons* from the same area, and it may be that *N. chrysopleura* is the at present unknown imago of *N. diabolus*. The length of the head capsule to the front of the postclypeus is slightly but distinctly more than its width behind the eyes. In *N. latifrons* these dimensions are equal. The posterior margins of the meso- and metanota are more widely angled in *N. chrysopleura*. Though this is not usually a specific character in *Nasutitermes*, they appear to be consistently more narrowly angled in *N. latifrons*. The posterior margin of the postclypeus in *N. latifrons* tends to be straighter, slightly angled in the middle instead of curved, and not sinuate towards the outer corners. The ♀ cerci are also slightly longer and more mamilliform in *N. latifrons*.

*N. chrysopleura* is therefore retained as a separate species until further specimens are found to clarify its identity. It is unlikely to be confused with any other species, being larger than the rest of those having a short wide postclypeus.

Material. CAMEROUN : Victoria, ix.1873 (*Bucholz*), single paratype ♀ imago, A.M.N.H. (Holotype, in Mus. Greifswald).



MAP 3. "*Procornitermes* branch"; genera and species not mapped individually.

*Nasutitermes diabolus* (Sjöstedt)

(Text-figs. 34-38; Map 5)

*Eutermes diabolus* Sjöstedt, 1907 : 250. Type locality : CONGO, Mukimbungu.*Eutermes (Eutermes) diabolus* Sjöstedt ; Holmgren, 1912 : 62.*Eutermes (Eutermes) torquatus* Sjöstedt, 1924c : 494. Type locality : CONGO, Stanleyville.**syn. n.***Eutermes diabolus* Sjöstedt : Sjöstedt, 1926 : 318.*Eutermes torquatus* Sjöstedt ; Sjöstedt, 1926 : 321.*Nasutitermes (Nasutitermes) diabolus* (Sjöstedt) Emerson, 1928 : 477.*Nasutitermes diabolus* (Sjöstedt) ; Snyder, 1949 : 274.*Nasutitermes torquatus* (Sjöstedt) Snyder, 1949 : 299.*Imago.* Unknown, but see discussion on *N. camerunensis* and *chrysopleura*.

*Soldier.* Head capsule ferruginous to chestnut brown, nose ferruginous, uniform with head capsule, to dark pitchy brown, almost black. Some specimens and colonies have the distal half of the nose ferruginous to chestnut brown, shading paler near the base, and then a distinct brown to dark chestnut brown ring around the base and extending on to the head capsule. All intermediates between this and the uniformly coloured form exist, sometimes in one colony. Pronotum, antennae, legs, and abdominal tergites yellow-brown to brown, abdominal sternites yellow to yellow-brown.

Head capsule in plan view near circular or slightly oval, tapering towards front, nose weakly conical. In profile, evenly concave, sometimes very slightly sinuate at base of nose, nose slightly shorter to slightly longer than rest of head capsule, measuring from hind margin of antennal socket, angle of nose cone 10-15 degrees ; postmentum evenly moderately convex ; antennae 13 segmented, II, III, and V subequal, or III slightly longer, IV distinctly shorter than these. Vertex with a pair of bilaterally placed long setae in some but not all specimens, and a few very fine microscopic setae ; nose with four long setae at tip, and sometimes a very few minute fine setae immediately behind them ; postmentum with a few long setae on anterior margin only.

Abdominal tergites with scattered very short setae, and longer setae on posterior margins of all except first or first and second, those on posterior tergites longer than rest ; sternites with numerous shorter setae and long setae on posterior margins.

Measurements (25 specimens from 9 localities) in millimetres.

	Range	Mean
Head length to tip of nose . . . . .	1.50-1.80 . . . . .	1.60
Head width . . . . .	0.80-1.00 . . . . .	0.87
Depth of head capsule . . . . .	0.58-0.70 . . . . .	0.61
Width of pronotum . . . . .	0.41-0.50 . . . . .	0.45
Length of pronotum . . . . .	0.15-0.20 . . . . .	0.18
Length of hind tibia . . . . .	0.98-1.18 . . . . .	1.05

*Variation.* The shape and size of the soldier caste is less variable than in some other species, but the colour pattern is highly variable. The form with the banded nose was described separately by Sjöstedt (1924) as *N. torquatus*.

References to *N. torquatus* by subsequent authors (Emerson, 1928, and Sands, 1957) are not correct, and are listed in the appropriate synonymies. The darker coloured and longer-nosed specimens of *N. lujae* have sometimes been confused with this species, but they are distinguishable by the more hairy nose tip and the less evenly concave profile. *N. lujae* also always has a pair of bilaterally placed setae on the vertex, and no smaller hairs have been detected in this position. *N. latifrons* is sometimes similar in general shape, but is easily distinguished by the hairy

postmentum, and the usually paler colouration. *N. schoutedeni* has a sharply tapered and distinctly hairy nose tip. *N. kempae* is East African in distribution, and also has a hairy nose tip.

Type Material. CONGO : Mukimbungu, 1906 (*K. E. Laman*), syntype soldiers from type colony, No. 1011, A.M.N.H. (other syntypes in Naturhist. Riksmus., Stockholm) ; Stanleyville, 1913 (*H. Kohl*), syntype soldier from type colony, No. 1037, of *N. torquatus* (Sjöstedt), A.M.N.H. (other syntypes in Naturhist. Riksmus., Stockholm).

Other Material. NIGERIA : Western Region ; Sobo Plain, Obanokoro, 7.iii.1957 (*W. Wilkinson*), B.M.(N.H.). Eastern Region ; 8m. from Port Harcourt on Owerri Road, 10.xii.1957, and Port Harcourt, 18.xii.1957 (*W. Wilkinson*), B.M.(N.H.).

REPUBLIC OF CONGO : Brazzaville, 7.vi.1948 (*A. E. Emerson*), A.M.N.H.

CONGO : 20km. E. of Ndjili and 18km. S. of Leopoldville, 10.vi.1948, Yangambi, 30.v.1948 and Epulu, 23.v.1948 (*A. E. Emerson*) ; Stanleyville, 21.vi.1913 (*H. Kohl*), 18.iii.1948 (*N. A. Weber*), all in A.M.N.H.

A total of 11 nest series were examined.

This species has not been collected further westwards than Western Nigeria, and it seems likely that this is near the limit of its range. It is thus confined to the main forest block of West and Central Africa. It was recorded by Emerson (1928) as being a tree-nesting species, but like the rest of those with this habit, it is most frequently collected from runways on trees, and the nest is not easily located.

### *Nasutitermes elegantulus* (Sjöstedt)

(Text-figs. 8-10, 39-45, 160-162, 202, 203; Map 6)

*Eutermes elegantulus* Sjöstedt, 1911b : 13. Type locality : CAMEROUN, Victoria.

*Eutermes macrophthalmus* Silvestri, 1912 : 240. Type locality : ISLAND OF PRINCIPE, Roca Infante.

*Eutermes* (*Subulitermes*?) *elegantulus* Sjöstedt ; Holmgren, 1912 : 64.

*Eutermes* (*Eutermes*) *macrophthalmus* Silvestri ; Holmgren, 1912 : 62.

*Eutermes* (*Eutermes*) *minusculus* Sjöstedt, 1924 : 40. Type locality : CONGO, Lukula. **syn. n.**

*Eutermes elegantulus* Sjöstedt ; Sjöstedt, 1926 : 309.

*Eutermes macrophthalmus* Silvestri [= *E. elegantulus* Sjöstedt] ; Sjöstedt, 1926 : 309.

*Eutermes minusculus* Sjöstedt ; Sjöstedt, 1926 : 308.

*Nasutitermes* (*Nasutitermes*) *kohli* Emerson, 1928 : 484. Type locality : CONGO, Kandolo, near Stanleyville. **syn. n.**

*Nasutitermes* (?*Nasutitermes*) *minusculus* (Sjöstedt) Emerson, 1928 : 487.

*Nasutitermes elegantulus* (Sjöstedt) Snyder, 1949 : 275.

*Nasutitermes kohli* Emerson ; Snyder, 1949 : 282.

*Nasutitermes minusculus* (Sjöstedt) ; Snyder, 1949 : 288.

*Imago*. Head capsule yellow-brown, with three indistinct streaks on vertex, one in mid-line and two diverging laterally, slightly paler, yellow to pale yellow-brown. Postclypeus, labrum, antennae, pronotum, meso- and metanota, and legs yellow to pale yellow-brown. Abdominal tergites yellow-brown to pale brown, slightly darker at sides than in middle ; sternites yellow to pale yellow-brown, darker round stigmata. Wings translucent, pale yellow-brown, subcosta yellow-brown, radius sector yellow to yellow-brown outlined with brown, other venation pale brown.

Posterior margin of head behind eyes less than semi-circular, distinctly sinuate immediately behind eyes; fontanelle distinct, pale "Y"-shaped, sometimes slightly depressed posteriorly; eyes large to very large relative to head width, W/E index 2.0 to 2.5, but only moderately prominent in proportion to own diameter, slightly angularly oval; ocelli small, from almost touching eyes, to separated from them by less than half own least diameter; postclypeus moderately inflated, width 2.4 to 3.1 times length, anterior margin nearly straight to slightly concave, posterior margin convex, rounded; antennae 15 segmented, II, III, and IV subequal in length, but III slightly thinner.

Cerci of ♀ as long as width across base, conical.

Measurements (14 specimens from 3 localities) in millimetres.

	Range	Mean
Head width across eyes	1.04-1.18	1.12
Greatest diameter of eye	0.41-0.51	0.47
Ocellus . . . . .	0.09-0.11 × 0.11-0.14	0.10 × 0.12
Ocellus to eye . . . . .	0.01-0.04	0.02
Width of pronotum . . . . .	0.85-1.00	0.94
Length of pronotum . . . . .	0.55-0.68	0.61
Length of hind tibia . . . . .	1.25-1.38	1.33
Length of fore wing . . . . .	0.40-1.180	10.62

*Soldier.* Head capsule orange-yellow to orange, nose ferruginous orange to ferruginous. Pronotum and antennae as head capsule. Abdominal tergites and legs yellow to orange-yellow, abdominal sternites pale yellow.

Head capsule in plan view oval, tapering towards front, often slightly "shouldered" behind antennae, nose very weakly conical, and slender. In profile, usually with distinct convex change of contour at base of nose, but sometimes nearly straight or somewhat sinuate, nose approximately equal in length or slightly longer than rest of head capsule measured from hind margin of antennal socket; angle of nose cone 7-15 degrees; postmentum prominent and distinctly convex; antennae 11-13 segmented, 4 out of 5 specimens with 12, proportions of segments in the latter, II and V subequal, IV shorter than these or equal, III shorter than IV; in 13 segmented forms, II and VI subequal longer than V, III and IV shorter than V, sometimes subequal, or III longer than IV. Setae on head consist of a bilaterally placed pair on vertex, two or four across base of nose, and rather hairy nose tip, sometimes with four setae more prominent than those behind them; microscopic short bristle-like setae scattered on vertex, visible in profile; postmentum setae confined to anterior margin.

Abdominal tergites with very short scattered setae, and longer setae on posterior margins, more prominent towards the rear; sternites with more numerous short setae and longer setae on posterior margins.

Measurements (59 specimens from 17 localities) in millimetres.

	Range	Mean
Head length to tip of nose . . . . .	1.18-1.48	1.31
Head width . . . . .	0.59-0.81	0.70
Depth of head capsule . . . . .	0.39-0.55	0.46
Width of pronotum . . . . .	0.33-0.43	0.36
Length of pronotum . . . . .	0.11-0.16	0.13
Length of hind tibia . . . . .	0.70-0.90	0.77

*Variation.* In the imago the main variation is in the relative size of the eyes. Soldier variation is largely in the head profile, and in the development of the small scattered hairs on the vertex, which are sometimes not much in evidence. They are very prone to being rubbed off, and old or battered specimens are likely to have lost most of them.

Only two species show any great resemblance to *N. elegantulus*. The East African species *N. kempae* is similar but larger, and these two would appear to be more closely related to each other and to certain species from other zoogeographical

regions than to any other Ethiopian species. The only species which appears to be somewhat intermediate between these and the other Ethiopian forms is *N. fulleri*, separated from *N. elegantulus* in the soldier by the difference in profile and the lack of small setae on the vertex, and in the alate, by the relatively smaller eyes, with the ocelli more distant from them.

Type Material. CAMEROUN : Victoria, 19.ix.1893 (*Buchholz*), syntype soldier, type colony, *N. elegantulus* (*Sjöstedt*), A.M.N.H.

ISLAND OF PRINCIPE : Roca Infante (*L. Fea*), syntype ♀ imago and soldier, type colony, *N. macrophthalmus* (*Silvestri*), A.M.N.H. (other syntypes in *Silvestri* coll., Lab. Zool., Sc. Agr., Portici).

CONGO : Lukula (*H. Schouteden*), syntype soldier, type colony, *N. minusculus* (*Sjöstedt*), A.M.N.H. (other syntypes in Congo Mus., Brussels) ; Kandolo, near Stanleyville, 13.vii.1913 (*H. Kohl*), paratype soldiers, type colony, *N. kohli* Emerson, A.M.N.H. and B.M.(N.H.) (Holotype in A.M.N.H.).

Other Material. GUINEA : Nimba Mountains, 1957, 3 vials (*M. Lamotte*), Inst. Franç. d'Afr. Noire, Dakar.

GHANA : Bobiri Forest, 23m. from Kumasi on Accra Road, 21.ii.1959, and 9m. from Nkoranza on Techiman Road, 29.iii.1959 (*W. A. Sands*).

NIGERIA : Western Region ; Sobo Plain, Obanokoro, 9.i, 7.iii.1957 (*W. Wilkinson*) ; 30m. from Ijebu-Ode on Benin Road, 12.xii.1957 (*W. A. Sands*). Eastern Region ; 25m. from Enugu on Awgu Road, 2.ii.1957, Nkpoku, 12m. from Port Harcourt on Owerri Road, 17.viii.1957, 8m. from Port Harcourt on Owerri Road, 10.xii.1957, and Port Harcourt, 19.xii.1957 (*W. Wilkinson*). Northern Region ; 18m. from Bida on Badeggi Road, 24.xii.1956, and Idu Forest, 20m. from Abuja on Keffi Road, 28.xii.1956 (*W. A. Sands*).

CAMEROUN : Mbalmayo, 17.x.1962 (*G. Becker*), own collection.

ISLAND OF PRINCIPE : Roca Sundi, 16, 23.ix.1949 (*G. R. Gradwell* and *D. Snow*).

CONGO : Luluabourg, 28.viii.1913 (*Callewaert*) ; Malela, 4.viii.1915 (*J. Bequaert*) ; Epulu, 17.v.1948, 4 vials (*A. E. Emerson*), all in A.M.N.H.

A total of 27 nest series were examined, and all material is in the British Museum (Natural History) unless otherwise stated.

This species is widely distributed throughout the West African and Congo forests, but is never common. It has been recorded as building soft carton nests, but is most frequently found in the nests of other genera, in rotting logs, or in narrow runways on trees. The workings have a reticulate shagreen patterned lining of black carton.

### *Nasutitermes ferranti* (Wasmann)

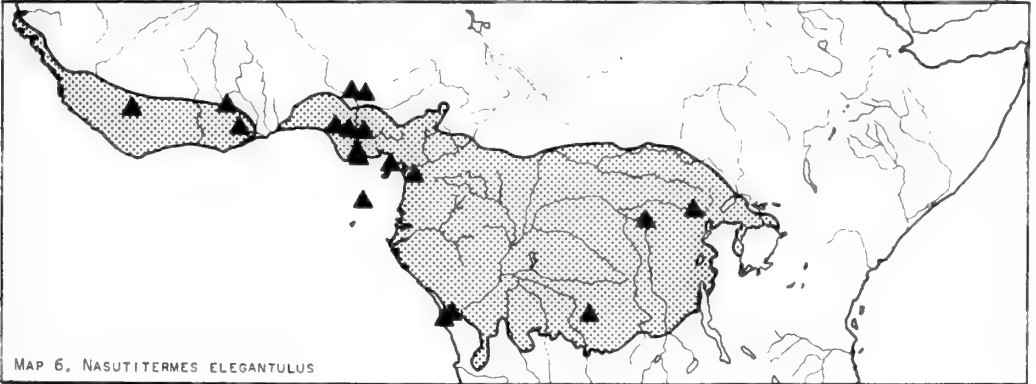
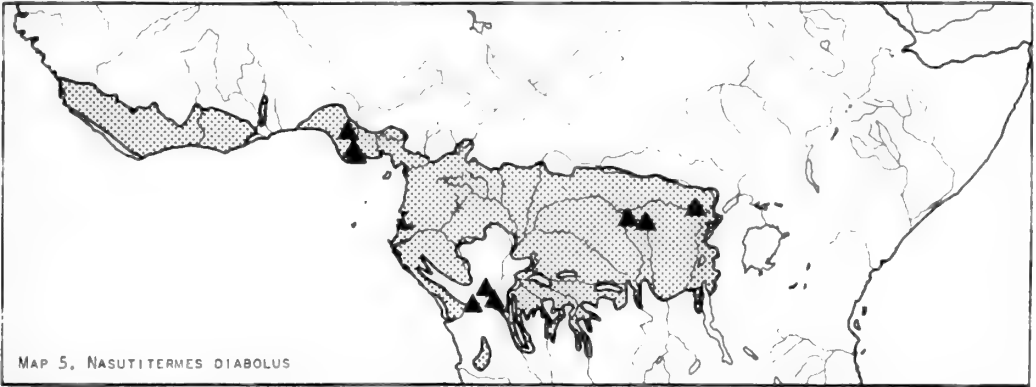
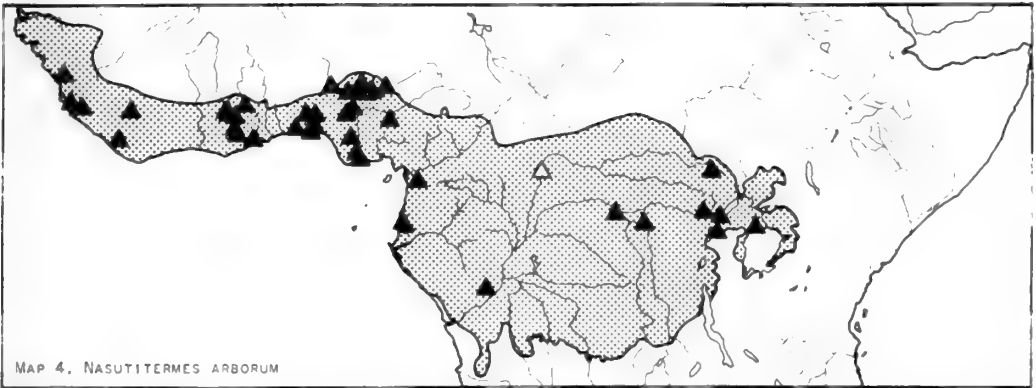
(Text-figs. 46-50; Map 3)

*Eutermes ferranti* Wasmann, 1911 : 167. Type locality : CONGO, Kasai, Sankuru.

*Eutermes (Eutermes) ferranti* Wasmann ; Holmgren, 1912 : 62.

*Eutermes ferranti* Wasmann ; Sjöstedt, 1926 : 310.

*Nasutitermes ferranti* (Wasmann) Snyder, 1949 : 276.



MAPS 4-6. (4), *Nasutitermes arborum*. Vegetation types : 7, 8, and 16 ; (5), *Nasutitermes diabolus*. Vegetation type : 7 ; (6), *Nasutitermes elegantulus*. Vegetation types : 7 and 8.

*Imago.* Unknown, but see discussion on *N. camerunensis* and *N. chrysoptleura*.

*Soldier.* Head capsule ferruginous orange to chestnut brown, nose dark chestnut brown to brownish black, with reddish tip. Pronotum, antennae, and abdominal tergites yellow-brown. Legs yellow, abdominal sternites pale yellow.

Head capsule in plan view nearly circular, nose broadly conical. In profile, near straight or slightly sinuate to well behind base of nose, then raised and rounded to back of head, small hump at base of nose common. Nose distinctly shorter than rest of head capsule, measuring to hind margin of antennal socket, angle of nose cone 18–30 degrees; postmentum weakly convex; antennae 13 segmented, II and V subequal and longer than IV, but shorter than III. Head setae consist of bilaterally placed pair on vertex, two or four across base of nose, four at nose tip, and a few on anterior margin of postmentum; there are also scattered microscopic setae on vertex, only visible at certain angles of illumination.

Abdominal tergites with very sparsely scattered minute setae, and longer setae on posterior margins, four to each tergite arranged in longitudinal rows down abdomen; sternites with sparse short setae, and longer setae on posterior margins, less regularly arranged than on tergites.

Measurements (17 specimens from 4 localities) in millimetres.

	Range	Mean
Head length to tip of nose . . . . .	1.39–1.58 . . . . .	1.49
Head width . . . . .	0.79–1.00 . . . . .	0.92
Depth of head capsule . . . . .	0.54–0.65 . . . . .	0.61
Width of pronotum . . . . .	0.41–0.50 . . . . .	0.44
Length of pronotum . . . . .	0.15–0.20 . . . . .	0.17
Length of hind tibia . . . . .	0.95–1.08 . . . . .	1.02

This species had not been recognized since it was first described, but new material has now been discovered. It is distinct from all other African species, with its short, thick nose tipped with only four setae, and the two or four setae across the base of the nose.

Material. CONGO: Kasai, Sankuru (*E. Luja*), unique holotype soldier, *Nasutitermes ferranti* (Wasmann), Mus. Maastricht.

NIGERIA: Eastern Region; Bonny, i.xii.1957 (*W. Wilkinson*), B.M. (N.H.).

REPUBLIC OF CONGO: Brazzaville, i.iv.1948, and Kipome, 13km. W. of Brazzaville, 8.vi.1948 (*A. E. Emerson*), A.M.N.H.

Though apparently widely distributed, this species must be very rare to be so poorly represented in collections. It has been recorded from soft runs on trees, and from a mound of *Odontotermes scrutor* (Sjöstedt) shared with *Amitermes evuncifer* Silvestri.

### *Nasutitermes fulleri* Emerson

(Text-figs. 11–13, 51–57, 204; Map 7)

*Nasutitermes* (*Nasutitermes*) *fulleri* Emerson, 1928: 483. Type locality: CONGO, Stanleyville.

*Nasutitermes fulleri* Emerson; Snyder, 1949: 276.

*Imago.* Previously undescribed. Head capsule sepia brown, postclypeus paler, yellow-brown, labrum yellow. Pronotum, and abdominal tergites sepia brown, meso- and metanota, pleural and ventral thoracic sclerites and femora brown. Antennae, tibiae and tarsi pale yellow. Abdominal sternites brown laterally, shading to pale yellow-brown in middle. Wings translucent pale brown, subcosta and radius sector yellow-brown, outlined sepia brown, rest of venation brown.



Posterior margin of head less than semi-circular behind eyes, distinctly sinuate immediately behind eyes; fontanelle slightly paler than rest of head, Y-shaped; eyes medium sized relative to head width, W/E index 3.0, not very prominent in proportion to own diameter, slightly angular oval; ocelli rather small, separated from eyes by slightly less than half own least diameter; postclypeus moderately inflated, width 3.0 times length, anterior margin straight, posterior margin convex, rounded; antennae 15 segmented, II slightly longer than III, III than IV, and IV than V.

Cerci of ♀ as long as width across base, mamilliform.

Measurements (unique morphotype ♀) in millimetres.

Head width across eyes . . . . .	approx. 1.26 (damaged)
Greatest diameter of eye . . . . .	0.43
Ocellus . . . . .	0.11 × 0.15
Ocellus to eye . . . . .	0.05
Width of pronotum . . . . .	1.00
Length of pronotum . . . . .	0.60
Length of hind tibia . . . . .	1.38
Length of fore wing . . . . .	10.40

Morphotype. UGANDA: Bwamba, 19.iii.1949 (*W. V. Harris* coll. no. 550).  
Morphotype ♀ imago in British Museum (Natural History).

*Soldier.* The new material now available necessitates some additions to the original description, as follows; nose slightly shorter than rest of head capsule, measured from hind margin of antennal socket, weakly conical, angle of nose cone 7-15 degrees, nose tip with four main setae, and sparsely hairy behind them. Postmentum setae confined to anterior margin.

Measurements (36 specimens from 13 localities) in millimetres.

	Range	Mean
Head length to tip of nose . . . . .	1.23-1.53	1.39
Head width . . . . .	0.65-0.90	0.78
Depth of head capsule . . . . .	0.43-0.60	0.53
Width of pronotum . . . . .	0.35-0.45	0.40
Length of pronotum . . . . .	0.13-0.18	0.17
Length of hind tibia . . . . .	0.75-0.98	0.85

The distinctions between this species and *N. elegantulus* have been given in the discussion on the latter. *N. fulleri* also shows certain similarities to *N. infuscatus*, but is separated in the soldier by the consistently 12 segmented antennae and in the imago by the relatively shorter hind tibia. The unique morphotype female of *N. fulleri* is damaged, and more material is needed to establish fully its relationships, and distinctions from other species.

Material. CONGO: Stanleyville (*H. Kohl*), paratype soldiers, type colony, *N. fulleri* Emerson, A.M.N.H. and B.M.(N.H.) (Holotype in A.M.N.H.); Epulu, II and 23.v.1948, 7 vials (*A. E. Emerson*), A.M.(N.H.).

SIERRA LEONE: Freetown, 8.i.1958 (*W. Wilkinson*), B.M.N.H.

GUINEA: Nimba Mountains, 1957, 2 vials (*M. Lamotte*), Inst. Franç. d'Afr. Noire, Dakar.

NIGERIA: Western Region; Sobo Plain, Obanokoro, 6-7.iii.1957, 2 vials (*W. Wilkinson*), B.M.(N.H.). Northern Region; Idu Forest, 20m. from Abuja on Keffi Road, 28.xii.1956, and Dogon Forest, 65m. from Jos on Kafanchan Road, 8.ii.1957 (*W. A. Sands*), B.M.(N.H.).

CAMEROUN : Im. W. of Calabar Junction on Mamfe-Ikom Road, 27.v.1957  
(*W. Wilkinson*), B.M.(N.H.).

CENTRAL AFRICAN REPUBLIC : Bengessa (Bangassou), Bas Mbomu, 12.iii.1948  
(*N. A. Weber*), A.M.N.H.

UGANDA : Ruwenzori Mountains, 10m. E.N.E. of Bundibugyo, 26.viii.1952,  
2 vials (*G. O. Evans*), B.M.(N.H.).

A total of 10 nest series were examined.

This species occurs from Sierra Leone to Uganda. Its southward distribution appears to be more limited, but this may be a reflection of its scarcity and due to failure of collection rather than absence of the species. It has generally been found in woody debris on the forest floor or in small runways on trees. An arboreal nest has been recorded, but this may not have been of its own construction.

### *Nasutitermes hirticeps* sp. n.

(Text-figs. 58-61; Map 3)

*Imago*. Unknown.

*Soldier*. Head capsule orange, nose ferruginous orange. Pronotum, antennae and abdominal tergites orange-yellow, abdominal sternites and legs yellow.

Head capsule in plan view almost circular, nose conical. In profile sinuate with distinct hump at base of nose, then rather abruptly raised and rounded to back of head; nose distinctly shorter than rest of head capsule, measuring from hind margin of antennal socket, angle of nose cone 11-15 degrees; postmentum moderately and evenly convex; antennae 13 segmented, III and V subequal, IV shorter than these, but slightly longer than II.

Entire body and head capsule including nose with long yellow setae, but confined on postmentum to anterior margin; those on head capsule and nose scattered irregularly, nose tip without any concentration of smaller setae; anterior margin of pronotum with row of long conspicuous setae; those on posterior margins of abdominal sternites longer than other abdominal setae.

Measurements (10 specimens randomly selected from type colony) in millimetres.

	Range	Mean
Head length to tip of nose . . . . .	1.53-1.63	1.57
Head width . . . . .	0.95-1.03	0.99
Depth of head capsule . . . . .	0.65-0.70	0.68
Width of pronotum . . . . .	0.50-0.53	0.51
Length of pronotum . . . . .	0.20-0.23	0.21
Length of hind tibia . . . . .	1.25-1.38	1.30

*N. hirticeps* is quite unlike any other species in the Ethiopian Region, in being conspicuously hairy on both head and body. Its restricted occurrence on a single island on a chain in which both this and other islands also share the mainland fauna, immediately raises the question of possible introduction from elsewhere. In view of the intense activity of the slave trade in that area in times past, such an introduction is not impossible, but a species of *Nasutitermes* would appear a somewhat unlikely candidate for a journey of this type; the distributions of *Coptotermes formosanus* and *Reticulitermes flavipes* do however show that dispersal by human agencies is not confined to Kalotermitidae.

*N. hirticeps* closely resembles several South American species. *N. nigriceps* (Haldeman, 1858) is not readily distinguishable from it except by its darker colouration; in view of the age of the types it is possible there has been some fading in preservation, though the appearance of the specimens does not suggest this. *N. macrocephalus* (Silvestri, 1903) is larger, and the soldier postmentum bears scattered setae, but it is otherwise closely similar.

I consider it desirable in the circumstances to name *N. hirticeps* as a new species in the list for the Ethiopian Zoogeographical Region, with the proviso that further material and information may lead to its inclusion in an already established species from elsewhere.

Holotype soldier. ISLAND OF SAO THOME: Binda, 1918 (*A. F. de Seabra*, "with *Cephalotermes*"), A.M.N.H.

Paratypes, same data as holotype, A.M.N.H. & B.M.(N.H.).

***Nasutitermes infuscatus*** (Sjöstedt)  
(Text-figs. 14, 15, 62-68, 205, 206; Map 8)

*Eutermes infuscatus* Sjöstedt, 1902: 40. Type locality: NYASALAND, Zomba.

*Eutermes usambarensis* Sjöstedt, 1904: 103. Type locality: TANGANYIKA, Usambara Mountains.

*Termes (Eutermes) infuscatus* (Sjöstedt) Desneux, 1904a: 43.

*Termes (Eutermes) usambarensis* (Sjöstedt) Desneux, 1904a: 46.

*Eutermes (Eutermes) infuscatus* Sjöstedt; Holmgren, 1912: 62.

*Eutermes infuscatus* Sjöstedt; Sjöstedt, 1926: 318.

*Eutermes usambarensis* Sjöstedt; Sjöstedt, 1926: 322.

*Nasutitermes infuscatus* (Sjöstedt) Snyder, 1949: 280.

*Nasutitermes usambarensis* (Sjöstedt) Snyder, 1949: 300.

*Imago*. Head capsule chestnut brown, postclypeus and antennae yellow-brown, labrum pale yellow-brown. Pronotum and abdominal tergites chestnut brown, meso- and metanota brown. Abdominal sternites pale brown laterally, narrowly paler, yellow-brown in mid-line. Legs pale yellow-brown.

Posterior margin of head behind eyes nearly semi-circular, only slightly sinuate immediately behind eyes; fontanelle distinct, paler than rest of head, Y-shaped; eyes short oval, moderately prominent in proportion to own diameter but not large relative to head width, W/E index 3.0-3.5; ocelli small, separated from eyes by slightly less than own least diameter; postclypeus moderately inflated, width 2.8-3.0 times length, anterior margin slightly concave or sinuate, posterior margin convex, rounded, distinctly sinuate towards outer corners; antennae 15 segmented, II longer than III and IV which are subequal and slightly longer than V.

Cerci of ♀ as long as width across base, slightly irregularly conical.

Measurements (11 specimens from 4 localities) in millimetres.

	Range	Mean
Head width across eyes	1.20-1.38	1.31
Greatest diameter of eye	0.37-0.44	0.41
Ocellus	0.10-0.11 × 0.14-0.17	0.11 × 0.15
Ocellus to eye	0.07-0.10	0.08
Width of pronotum	1.00-1.13	1.08
Length of pronotum	0.58-0.72	0.68
Length of hind tibia	1.54-1.73	1.63
Length of fore wing	11.60-11.90	11.77

*Soldier.* Head capsule yellow to ferruginous orange, nose orange to ferruginous. Pronotum and antennae yellow to orange-yellow. Abdominal tergites and legs yellow, abdominal sternites pale yellow.

Head capsule in plan view short oval, tapering towards front, nose weakly conical. In profile nearly straight, sometimes slightly concave or sinuate with weak hump at base of nose; nose shorter than rest of head capsule, measuring from hind margin of antennal socket, angle of nose cone 12-15 degrees; postmentum weakly convex; antennae 12-14 segmented, usually 13, II and IV subequal, shorter than V, III longer than V. Head setae confined to four at nose tip with shorter setae behind them, sometimes a bilaterally placed pair on vertex, and several on front margin of postmentum.

Abdominal tergites with very sparse minute setae, and a few fine short setae on posterior margins of some or all segments; sternites with scattered short setae, and longer setae towards posterior margins.

Measurements (22 specimens from 16 localities) in millimetres.

	Range	Mean
Head length to tip of nose . . . . .	1.33-1.70 . . . . .	1.53
Head width . . . . .	0.63-1.05 . . . . .	0.89
Depth of head capsule . . . . .	0.50-0.68 . . . . .	0.60
Width of pronotum . . . . .	0.42-0.64 . . . . .	0.48
Length of pronotum . . . . .	0.17-0.30 . . . . .	0.21
Length of hind tibia . . . . .	0.97-1.33 . . . . .	1.08

*Variation.* The imago has not been found as variable as in some other species. In the soldier caste it is common to find larger soldiers which have slightly different form and proportions from the smaller members of the same colony, with distinct breaks in the range of variation. These are probably derived from a different instar of development, and represent a vestigial or rudimentary dimorphism; they appear only to be found in the more populous colonies.

This species is closely similar to *N. arborum* in certain features of both imago and soldier, and differences have been given under that species. *N. fulleri* is also related, but is separated in the soldier by its 12 segmented antennae, and in the imago by its proportionately shorter hind tibia, and the ocellus being closer to the eye.

Dr. A. E. Emerson has selected and labelled as lectotype one of the type series, but the designation has not been published hitherto:—

Lectotype: NYASALAND: Zomba, iv.1899 (*Cameron*), lectotype imago and paralectotype soldier, *N. infuscatus* (Sjöstedt), Naturhist. Riksmus., Stockholm. Other paralectotype imago and soldier, A.M.N.H.

Type Material. TANGANYIKA: Usambara Mountains, Derema (*Conradt*), syn-type soldiers, *N. usambarensis* (Sjöstedt), Naturhist. Riksmus., Stockholm (others in Berlin Mus.).

Other Material (additional to that recorded in Sands, 1957). CONGO: 8km. N. of Rwindi Camp, 4.v.1948, and Rwindi Camp, 5.v.1948, 3 vials (*A. E. Emerson*), A.M.N.H.

KENYA: Shimba Hills, 4.vi.1952 (*W. A. Sands*) and 13.vi.1952 (*P. B. Kemp*).

TANGANYIKA: Ifakara, 30.ix.1949 (*M. Luscher*), A.M.N.H.; Amani, 7-9.ii.1952, 3 vials, and Mwakijembe, 11.ii.1952 (*W. A. Sands*).

MAFIA ISLAND: 1937 (*W. V. Harris*).

PEMBA ISLAND: Wete, ii.1952 (*Packenham*).

NYASALAND : 15m. from Limbe on Cholo Road, 12.viii.1953, 9m. E. of Mlanje, 18.viii.1953, 2 vials, 12m. E. of Chiradzulu, 21.viii.1953, 25m. from Kota-Kota on Kasungu Road, 17.ix.1953, and 7m. from Nkata Bay on Ekwendeni Road, 22.ix.1953 (*W. A. Sands, W. Wilkinson*).

A total of 32 nest series were examined, and all material is in the British Museum (Natural History) unless otherwise stated.

*N. infuscatus* (Sjöstedt) has been found in the coastal belt of East Africa, and inland up the Great Rift Valley to the borders of the Congo. It has not been found in central Kenya or Tanganyika, and there are no records from the Rift Valley between the northern shoreline of Lake Nyassa and Rwindi. It is thought that it probably occurs in patches of damp woodland on the fringes of all lakes in the Rift Valley, along the western border of Tanganyika.

The nest is commonly arboreal, usually attached to the side of a tree trunk rather than taking the spherical form on a branch or liane seen in some other species.

### *Nasutitermes kempae* Harris

(Text-figs. 16, 17, 69-77, 207, 208; Map 9)

*Nasutitermes kempae* Harris, 1954 : 135. Type locality : TANGANYIKA, Handeni.

*Imago*. Some additions to the original description (*Sands, 1957*) are necessary. W/E index 2.4-2.6; postclypeus inflated, width 2.0-2.3 times length.

Cerci of ♀ slightly shorter to slightly longer than width across base.

Further material has increased the known range of variation in size.

Measurements (14 specimens from 2 localities) in millimetres.

	Range	Mean
Head width across eyes	1.20-1.36	1.27
Greatest diameter of eye	0.48-0.55	0.51
Ocellus	0.13-0.16 × 0.16-0.20	0.14 × 0.19
Ocellus to eye	0.01-0.03	0.02
Width of pronotum	0.94-1.18	1.05
Length of pronotum	0.56-0.72	0.66
Length of hind tibia	1.38-1.64	1.51
Length of fore wing	9.90-12.20	11.18

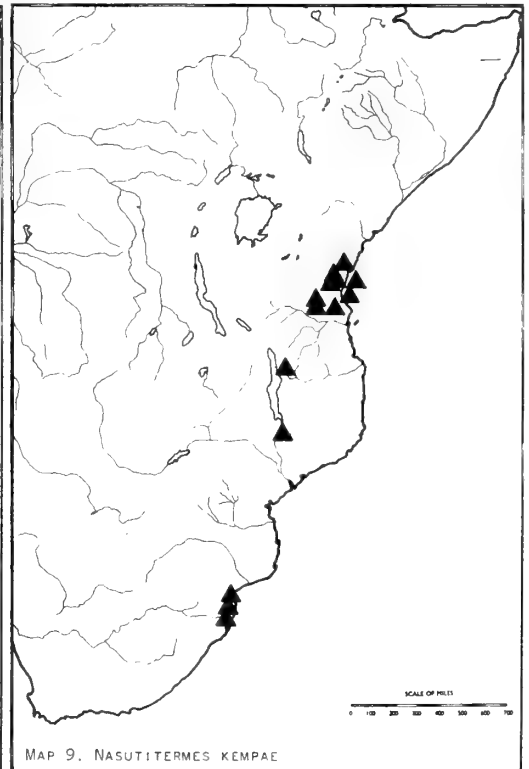
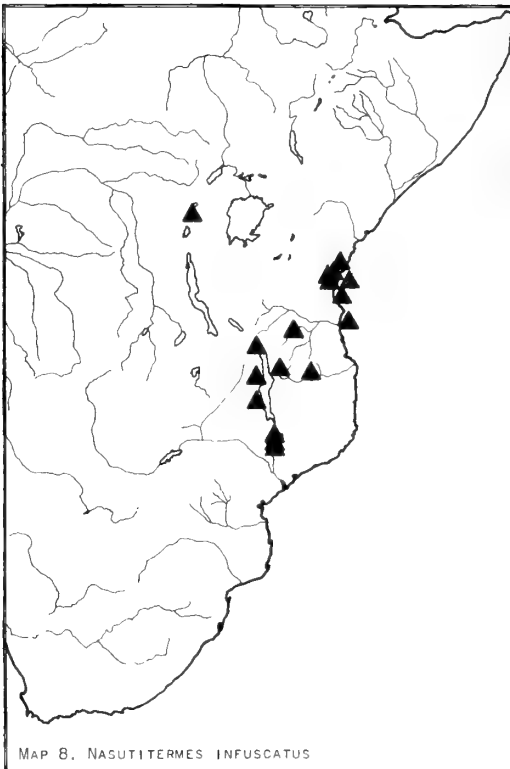
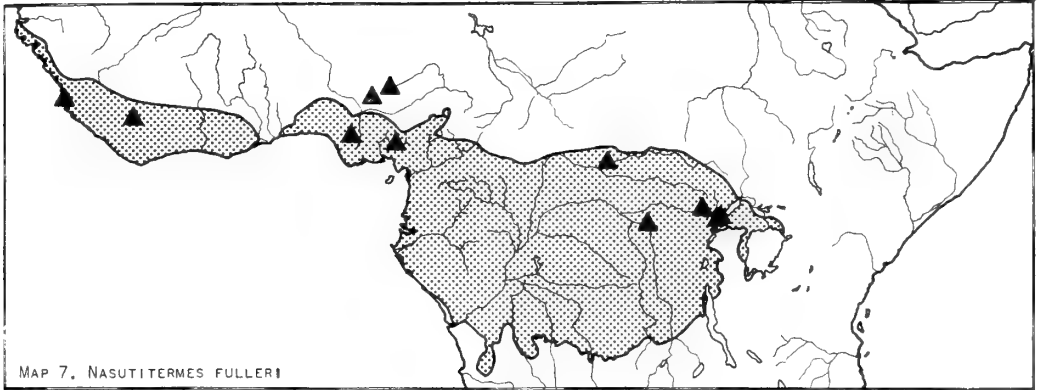
*Soldier*. The following additions to the original description (*Harris, 1954*) are necessary : angle of nose cone, 10-17 degrees; postmentum in profile weakly convex, almost straight. Setae on head consist of a bilaterally placed pair on vertex, sometimes one or two small bristle-like setae at base of nose, and rather hairy nose tip, occasionally with four setae more prominent than those behind them; microscopic small setae scattered sparsely over whole head.

Abdominal tergites with scattered short setae and marginal setae so small and sparse as to appear absent except under high magnification; sternites with sparse short setae, and longer setae on posterior margins.

Measurements (29 specimens from 13 localities) in millimetres.

	Range	Mean
Head length to tip of nose	1.61-2.05	1.78
Head width	0.88-1.29	1.05
Depth of head capsule	0.61-0.82	0.66
Width of pronotum	0.43-0.64	0.53
Length of pronotum	0.15-0.25	0.22
Length of hind tibia	0.89-1.28	1.04

*Variation*. This is another species in which the soldier caste in populous colonies appears to be derived from several instars, indicating a residual or possibly rudimentary polymorphism.



MAPS 7-9. (7), *Nasutitermes fulleri*. Vegetation types : 7 and 8 ; (8), *Nasutitermes infuscatus*. Vegetation types : 7 and 9, and small moist woodland and forest patches in Rift Valley ; (9), *Nasutitermes kempae*. Vegetation types : 7 and 9, and small riverain moist woodland and forest patches inland.

The close relationship of this species to *N. elegantulus* has been discussed under the latter, and its distinctions from other species in an earlier paper (Sands, 1957).

Material (additional to that recorded in Harris, 1954, and Sands, 1957).

MOZAMBIQUE : Lourenço Marques, 31.v.1953 (*E. Giddy*), N.C.I., Pretoria.

REPUBLIC OF SOUTH AFRICA : North Zululand, Ubombo, Lake Sibayi, and Sordwana Bay, 19.xi.1955 (*W. G. H. Coaton*), N.C.I., Pretoria, and B.M.(N.H.) ; Ingwavuma, 29.i.1959 (*W. G. H. Coaton*), N.C.I., Pretoria.

A total of 21 nest series were examined.

The new records from Zululand provide a great but not unexpected southward extension of the range of this species, and these must be very near the limit, since the subtropical climate gives place to the temperate zone only a little further south.

### *Nasutitermes latifrons* (Sjöstedt)

(Text-figs. 18, 19, 78-87, 209-212; Map 10)

*Eutermes latifrons* Sjöstedt, 1896 : 298. Type locality : CAMEROUN, Ekundu.

*Eutermes arborum* (Smeathman) ; Sjöstedt, 1900 : 204.

*Eutermes sjöstedti* Wasmann, 1902 : 716. [n. n. for *E. latifrons* Sjöstedt. Not valid, Desneux 1904 : 151].

*Termes latifrons* (Sjöstedt) Desneux, 1904 : 151.

*Eutermes latifrons* Sjöstedt ; Sjöstedt, 1905 : 19.

*Eutermes pius* Sjöstedt, 1911b : 16. Type locality : CAMEROUN, Victoria. **syn. n.**

*Eutermes (Eutermes) latifrons* Sjöstedt ; Holmgren, 1912 : 62.

*Eutermes (Trinervitermes) pius* Sjöstedt ; Holmgren, 1912 : 65.

*Eutermes (Eutermes) incurvus* Sjöstedt ; 1924a : 41. Type locality : CONGO, Kunungu. **syn. n.**

*Eutermes (Eutermes) ueleensis* Sjöstedt, 1924b : 494. Type locality : CONGO, Haut Uélé, Moto. **syn. n.**

*Eutermes indoensis* Sjöstedt, 1925 : 55. Type locality : REPUBLIC OF CONGO, Indo, Sibiti. **syn. n.**

*Eutermes latifrons* Sjöstedt ; Sjöstedt, 1926 : 311.

*Eutermes incurvus* Sjöstedt ; Sjöstedt, 1926 : 320.

*Eutermes ueleensis* Sjöstedt ; Sjöstedt, 1926 : 317.

*Trinervitermes pius* (Sjöstedt) Sjöstedt, 1926 : 338.

*Eutermes expulsus* Sjöstedt, 1926b : 154. Type locality : CONGO, Bas Uélé, Djamba. **syn. n.**

*Nasutitermes (Nasutitermes) incurvus* (Sjöstedt) Emerson, 1928, p. 478.

*Nasutitermes latifrons* (Sjöstedt) Snyder, 1949 : 283.

*Nasutitermes incurvus* (Sjöstedt) ; Snyder, 1949 : 279.

*Nasutitermes ueleensis* (Sjöstedt) Snyder, 1949 : 300.

*Nasutitermes expulsus* (Sjöstedt) Snyder, 1949 : 276.

*Nasutitermes incurvus* (Sjöstedt) ; Sands, 1957 : 8.

*Imago*. Head capsule dark chestnut brown to dark sepia brown, slightly paler in front of ocelli, postclypeus yellow-brown, labrum yellow, antennae brown. Pronotum dark sepia brown, with slightly paler patch in middle of front half ; meso- and metanota and other thoracic sclerites sepia brown. Legs yellow, darker at tips of femora and bases of tibiae, brown. Abdominal tergites dark sepia brown, lateral parts of sternites sepia brown, paler, yellow-brown in middle. Wing membrane translucent brown, venation sepia brown, radius sector with dark sepia brown line on inner side.

Posterior margin of head behind eyes regularly rounded but less than semi-circular ; fontanelle not conspicuous, variable, from Y-shaped and slightly paler than head capsule, to almost obsolete, or even slightly darker than head ; eyes nearly circular, moderately prominent to prominent in proportion to own diameter, but not large relative to head width, W/E index 2.9-3.4 ; ocelli medium sized, separated from eyes by two-thirds to distinctly more than own least diameter, oval ; postclypeus weakly inflated, width 3.3-4.2 times length, anterior margin slightly concave or weakly sinuate, posterior margin convex, obtusely angular in middle, near straight or slightly curved to outer corners ; antennae 15 segmented, II and IV subequal, slightly longer than III and V which are also subequal.

Cerci of ♀ somewhat mamilliform conical, shorter than broad at base.

Measurements (25 specimens from 7 localities) in millimetres.

	Range	Mean
Head width across eyes	1.43-1.70	1.54
Greatest diameter of eye	0.44-0.55	0.49
Ocellus . . . . .	0.11-0.15 × 0.13-0.21	0.13 × 0.18
Ocellus to eye . . . . .	0.08-0.13	0.10
Width of pronotum . . . . .	1.18-1.43	1.32
Length of pronotum . . . . .	0.70-0.88	0.79
Length of hind tibia . . . . .	1.75-2.13	1.93
Length of fore wing . . . . .	11.40-13.10	12.32

*Soldier*. Head capsule orange-yellow to ferruginous orange, nose ferruginous orange to chestnut brown. Pronotum and antennae as head capsule. Abdominal tergites and femora of legs yellow, abdominal sternites, tibiae and tarsi pale yellow.

Head capsule in plan view varies with size : smaller specimens oval, tapering towards front, medium sized, near circular, largest, wider than length to base of nose, often indented in mid line at back of head, and sometimes with small projection on each side of base of nose ; nose weakly to moderately conical. In profile distinctly concave, with back of head raised and rounded, except in smallest specimens, often somewhat sinuate with slight hump at base of nose ; nose distinctly shorter to distinctly longer than rest of head capsule, measuring from hind margin of antennal socket, often within one colony, angle of nose cone 5-17 degrees ; postmentum slightly convex ; antennae 12-14 segmented, usually 13, proportions vary with size, III long, up to twice II, IV and V subequal, slightly longer than II. Head setae confined to the hairy nose tip and scattered over entire surface of postmentum ; dorsal surface of head capsule without prominent setae.

Abdominal tergites with scattered minute setae, and longer setae on posterior margins of last three or four segments ; sternites with scattered shorter setae, and long setae on posterior margins.

Measurements (144 specimens from 35 localities) in millimetres.

	Range	Mean
Head length to tip of nose . . . . .	1.40-2.11	1.93
Head width . . . . .	0.73-1.35	1.07
Depth of head capsule . . . . .	0.53-0.95	0.76
Width of pronotum . . . . .	0.38-0.65	0.50
Length of pronotum . . . . .	0.13-0.38	0.21
Length of hind tibia . . . . .	0.93-1.73	1.26

*Variation*. Imagos from the eastern end of the range tend to be slightly larger, and to have a slightly paler postclypeus than those from the west coast of Africa, as in certain other species.

The soldiers are more variable than in any other species in size, and in the shape of both profile and plan views of the head. The smallest specimens included in the above range of measurements are somewhat nanitic, but even in the more mature colonies the smaller soldiers may be only 1.55mm. long. The nanitic soldiers have a much less concave profile, with the vertex rather abruptly raised. In mature colonies soldiers apparently derived from more than one instar occur, suggesting a residual or rudimentary polymorphism, as in some other species.



The development of the postmentum setae in the soldier appears to form a cline. They are most numerous in specimens from West Africa, gradually decreasing southwards and eastwards, until in the South-East Congo specimens they are sometimes very sparse. It is necessary where they appear absent to examine numerous specimens, because in most samples, some will usually be found with more than the rest.

The nanitic soldiers of *N. latifrons* have been confused with *N. lujae*, from which they differ in having no vertex setae, 11 or 12 segmented antennae, and usually a few postmentum hairs. *N. schoutedeni* resembles the shorter nosed forms in shape, but also has vertex setae, a much more abruptly tapered nose tip, and usually, no postmentum hairs, though one or two may be present very rarely. *N. kempae* lacks postmentum hairs, often has vertex setae, and usually a straight or slightly convex profile. *N. arborum* usually has a straight profile, but also only four main setae at the nose tip, and none on the postmentum surface.

The imago is distinguishable from most species by its larger size. Differences from *N. chrysopleura* and *N. schoutedeni* are discussed under those species.

Though he described *N. latifrons* in 1896, Sjöstedt (1900) referred further specimens to *N. arborum*, and was followed in this by Silvestri (1912) and subsequent authors. The result has been that all the references to *N. arborum* since its original description have in fact been based on specimens of *N. latifrons*. This has been discussed under *N. arborum*, and the position has been stabilized by the selection of a neotype of the latter.

One of the syntype specimens of *N. latifrons* (Sjöstedt) in the Naturhistoriska Riksmuseet, Stockholm, has been selected and labelled as lectotype by Dr. A. E. Emerson. This is as follows :—

Lectotype : CAMEROUN : Ekundu, 1891 (*Y. Sjöstedt*, No. 964), lectotype ♀ and ♂ paralectotype (other paralectotype in A.M.N.H.).

Type Material. CAMEROUN : Ekundu, 1891 (*Y. Sjöstedt*), paralectotype ♂ imago *N. latifrons* (Sjöstedt), A.M.N.H. Victoria (*Bucholtz*), syntype soldier, *Trinervitermes pius* (Sjöstedt), A.M.N.H. (other syntypes in Naturhist. Riksmus., Stockholm).

REPUBLIC OF CONGO : Indo, Sibiti, 9.ii.1925 (*A. Unsgaard*), syntype soldiers, type colony, *N. indoensis* (Sjöstedt) A.M.N.H. (other syntypes in Naturhist. Riksmus., Stockholm).

CONGO : Kunungu (*H. Schouteden*) syntype soldiers, type colony, *N. incurvus* (Sjöstedt), A.M.N.H. (other syntypes in Mus. Tervuren). Haut Uélé, Moto (*Burgeon*), syntype soldier, type colony, *N. ueleensis* (Sjöstedt) A.M.N.H. (other syntypes, in Naturhist. Riksmus., Stockholm) ; Bas Uélé, Djamba, 17.xii.1924 (*H. Schouteden*), syntype soldier, type colony *N. expulsus* (Sjöstedt) A.M.N.H. (other syntypes in Naturhist. Riksmus., Stockholm).

Other material. PORTUGUESE GUINEA : Cassine, 1.ii.1900 (*L. Fea*), A.M.N.H.

GUINEA : Nimba Mountains, viii.1957, 4 vials (*M. Lamotte*), Inst. Franç. d'Afrique Noire, Dakar.

SIERRA LEONE : 60m. from Freetown, 24.i.1955 (*W. V. Harris*).

GHANA : Aburi, 15.i.1913 (*F. Silvestri*), A.M.N.H. ; Bobiri Forest, 23m. from Kumasi on Accra Road, 2.ii.1955 (*W. V. Harris*), and 21.ii.1959 (*W. A. Sands*) ;

Kumasi, 22.xi.1957 (*W. Wilkinson*) ; 63m. from Accra on Kumasi Road, 18.ii.1959, and 5½m. from Dunkwa on Obuasi Road, 4.iv.1959 (*W. A. Sands*).

NIGERIA : Eastern Region ; Bugeme, 5.i.1957, 25m. from Onitsha on Owerri Road, 11.i.1957, 39m. from Port Harcourt on Owerri Road, 31.i.1957, 3m. from Ikanga on Calabar Road, 22.iv.1957, 29m. from Port Harcourt, on Owerri Road, 19.vi.1957, 8m. from Port Harcourt on Owerri Road, 10.xii.1957, Port Harcourt, 19.xii.1957 (*W. Wilkinson*). Western Region ; Agege, 1914 (*A. D. Peacock*) ; Sapobar and Sapele, 29.iv.1955 (*E. A. J. Duffy*) ; 34m. from Ibadan on Ife Road, 1955 (*B. J. MacNulty*) ; Obanokoro, 31.i.1956 (*D. Kay*) ; Sobo Plain, Obanokoro, 7.iii. and 7.vii. 1957, and Lagos, 10.iv.1957 (*W. Wilkinson*) ; 27m. S. of Ilorin on Oyo Road, 4.xii.1957, 4 vials, 63m. S. of Ilorin on Oyo Road, 4.xii.1957, 2 vials, Ararome near Ibadan, 9.xii.1957, Balogun, 30m. E. of Ibadan on Ife Road, 11.xii.1957, and 30m. from Ijebu-Ode on Benin Road, 12.xii.1957, 2 vials (*W. A. Sands*) ; Ibadan, 1959 (*H. J. Sutton*). Northern Region ; 11m. from Mokwa on Bida Road, 22.xii.1956, 10m. N. of Bida, 23.xii.1956, Idu Forest, 20m. from Abuja on Keffi Road, 28.xii.1956, 2 vials, and Ayangba (Egume), 6.iii.1958 (*W. A. Sands*).

CAMEROON : Yaounde, 2 vials (*Zenker*), A.M.N.H. ; Longji, 3 vials (*Blank*) ; A.M.N.H. ; Edea, A.M.N.H. ; Debundscha (*Linnel*), A.M.N.H. ; Victoria, 6.i.1913, 2 vials (*F. Silvestri*), A.M.N.H. ; Attogondame, 8.vi.1913 (*Escherich*), A.M.N.H. ; Nyong Forest, 30.xi.1949 and 24.ii.1950 (*J. Birket-Smith, J. Dahl*) ; Mbalmayo, 17.x.1962 (*G. Becker*), own collection.

ISLAND OF SAO THOME : 28.vii.1932 (*W. H. T. Tams*).

GABON : Libreville, ii.1913 (*F. Silvestri*), A.M.N.H.

REPUBLIC OF THE CONGO : 13km. W. of Brazzaville, 8.vi.1948, 2 vials (*A. E. Emerson*), A.M.N.H.

CONGO : Stanleyville (*H. Kohl*), A.M.N.H. ; Kasai, Kondue (*E. Luja*), A.M.N.H. ; Sankuru, A.M.N.H. ; Ganda Sundi, Mayumbe, 10.vii.1911, 5 vials, and Limba, 10.vii.1911 (*R. Mayné*), A.M.N.H. ; between Walikale and Lubutu, 25.i.1913 (*J. Bequaert*) ; Lukula, vii.1920, Kai Bumba, 10.x.1920, Eala, i.1921, Luebo, ix.1921, Kidada (Kitobola), 11.1922, and Kasai, Ngombe (*H. Schouteden*), A.M.N.H. ; Stanleyville, 18.iii.1948 (*N. A. Weber*), A.M.N.H. ; Leopoldville, 3.iv.1948, 4 vials, Sona Mpungu, 12.iv.1948, 2 vials, 35km. E. of Mambasa, 10.v.1948, Camp Putnam, Epulu, 12-23.v.1948, 13 vials, Tshopo River, on Epulu Stanleyville Road, 25.v.1948, Stanleyville, 25-27.v.1948, 5 vials, Yangambi, 29.v.1948, 3 vials, Avakubi, on Ituri River. v.1948, 15km. S.W. of Leopoldville, 6.vi.1948, 2 vials, and 20km. E. of Ndjili and 18km. S. of Leopoldville, 10.vi.1948 (*A. E. Emerson*), A.M.N.H. ; Garamba National Park, 26.v.1950 (*G. Demoulin*), Inst. des Parcs Nat. du Congo, Brussels.

SUDAN : Aloma Plateau, Khor Aba, vii-viii.1939 (*N. A. Weber*), A.M.N.H.

UGANDA : Entebbe (*O. John*), A.M.N.H. ; Namanwe, iv.1939 (*G. H. E. Hopkins*) ; Budongo Forest ix.1939 (*C. C. Gowdey*) ; Kyagwe, Lugala Estate, 29.vi.1949, and Budongo Forest, 8.vii.1962, 3 vials (*W. V. Harris*).

A total of 126 nest series were examined, and all material is in the British Museum (Natural History) unless otherwise stated.

This is the commonest and most widely distributed species of *Nasutitermes* in Africa. It is found throughout the forest areas in West Africa and the Congo, and in most forest outliers, or riverain gallery forests, in the adjacent savannah areas.

In none of the material examined of *N. latifrons* was an arboreal nest recorded of the type found in *N. arborum*, *N. lujae*, or *N. schoutedeni*. The great majority of records are from dead logs, hollow or rotten tree trunks, and the mounds of other genera such as *Cubitermes*, *Procubitermes*, *Thoracotermes*, and *Microcerotermes*. Sjöstedt (1926) recorded a nest illustrated by Hegg (1922 : 485, fig. 343), as belonging to this species, but the figure is a photograph of a typical mound of *Thoracotermes*. Runways up trees are frequently recorded, but the nest can only rarely, if ever, be arboreal.

***Nasutitermes lujae* (Wasmann) sp. rev.**

(Text-figs. 20, 21, 88-94, 213, 214; Map II)

*Eutermes lujae* Wasmann, 1911 (August) : 168. Type locality : CONGO, Kasai, Sankuru.  
**sp. rev.** [ex syn. *N. maculiventris* (Sjöstedt, 1926 : 320)].

*Eutermes ekunduensis* Sjöstedt, 1911b (December) : 16. Type locality : CAMEROON, Ekundu.  
**syn. n.**

*Eutermes* (*Eutermes*) *lujae* Wasmann ; Holmgren, 1912 : 62.

*Eutermes* (*Eutermes*) *ekunduensis* Sjöstedt ; Holmgren, 1912 : 62.

*Eutermes* (*Eutermes*) *nanus* Sjöstedt, 1924 : 41. Type locality : CONGO, Barumbu.

*Eutermes* (*Eutermes*) *impetus* Sjöstedt, 1924b : 493. Type locality : REPUBLIC OF CONGO, Brazzaville. **syn. n.**

*Nasutitermes* (*Nasutitermes*) *bequaerti* Emerson, 1928 : 416. New name proposed for *E. nanus* Sjöstedt]. **syn. n.**

*Nasutitermes* (*Nasutitermes*) *santschii* Emerson, 1928 : 484. Type locality : CONGO, Stanleyville. **syn. n.**

*Nasutitermes* (*Nasutitermes*) *torquatus* (Sjöstedt) ; Emerson, 1928 : 481.

*Nasutitermes bequaerti* Emerson ; Snyder, 1949 : 267.

*Nasutitermes ekunduensis* (Sjöstedt) Snyder, 1949 : 275.

*Nasutitermes impetus* (Sjöstedt) Snyder, 1949 : 279.

*Nasutitermes santschii* Emerson ; Snyder, 1949 : 297.

*Imago.* Head capsule dark brown, postclypeus slightly paler, brown. Labrum yellow-brown. Antennae brown. Pronotum dark sepia brown, meso- and metanota, pleural and ventral thoracic sclerites brown. Legs yellow-brown, brown at ends of femora and bases of tibiae. Abdominal tergites dark sepia brown, sternites sepia brown laterally, shading to pale brown in middle. Wings translucent pale brown, venation sepia brown.

Posterior margin of head behind eyes distinctly less than semi-circular ; fontanelle variable, generally inconspicuous, from a pale slit, sometimes weakly bifurcate in front, to a smooth flat patch without setae, of same colour as rest of head capsule, or sometimes slightly depressed posteriorly ; eyes moderately prominent in proportion to own diameter, but not large relative to head width, (W/E index 3.0-3.5) nearly circular, outline slightly angular ; ocelli small, separated from eyes by slightly less to distinctly more than own least diameter ; postclypeus rather weakly inflated, width 3.2 to 3.7 times length, anterior margin nearly straight, posterior margin convex, rounded, very slightly sinuate towards outer corners ; antennae 15 segmented, II longer than IV, IV slightly longer than V, V longer than III.

Cerci of ♀ distinctly shorter than width across base, mamilliform.

Measurements (22 specimens from 5 localities), in millimetres.

	Range	Mean
Head width across eyes	1.18-1.33	1.26
Greatest diameter of eye	0.36-0.42	0.39
Ocellus . . . . .	0.09-0.12 × 0.13-0.18	0.11 × 0.14
Ocellus to eye . . . . .	0.09-0.13	0.10
Width of pronotum . . . . .	0.95-1.18	1.04
Length of pronotum . . . . .	0.60-0.70	0.66
Length of hind tibia . . . . .	1.38-1.65	1.51
Length of fore wing . . . . .	10.90-11.80	11.40

*Soldier.* Head capsule orange-yellow to ferruginous orange, nose ferruginous orange to chestnut brown. Pronotum and antennae, orange-yellow. Abdominal tergites and legs yellow, abdominal sternites pale yellow.

Head capsule in plan view a short oval, tapering slightly towards front, nose conical. In profile straight or very weakly sinuate to well behind base of nose, then slightly but rather abruptly raised and rounded to back of head; specimens with completely straight profile are rare. Nose equal in length or slightly longer than rest of head capsule, measuring from hind margin of antennal socket, angle of nose cone 13-20 degrees; postmentum weakly and evenly convex; antennae 12 or 13 segmented, only one in ten with 12, proportions of segments somewhat variable, in 13 segmented forms, III longer than or equal to II and V, IV shorter than these. Setae on head confined to a bilaterally placed pair on vertex, four at tip of nose with smaller setae behind them, and a few on anterior margin of postmentum.

Abdominal tergites with very short sparsely scattered setae, and longer setae on posterior margins of last three or four segments; sternites with more numerous short setae, and longer setae on posterior margins.

Measurements (59 specimens from 14 localities) in millimetres.

	Range	Mean
Head length to tip of nose . . . . .	1.25-1.63	1.43
Head width . . . . .	0.68-0.95	0.80
Depth of head capsule . . . . .	0.49-0.63	0.56
Width of pronotum . . . . .	0.38-0.48	0.43
Length of pronotum . . . . .	0.15-0.20	0.17
Length of hind tibia . . . . .	0.95-1.18	1.04

*Variation.* The imago is less variable in respect of size and colour than *N. arborum* (Smeath.). Soldier variation consists mainly of slight differences in the thickness and length of the nose and the straightness of the profile. Specimens occasionally occur with one or two setae at the base of the nose in addition to those on the vertex.

The distinctions between this and the closely similar *N. arborum* have been discussed under that species. Darker, thicker-nosed specimens of the soldier have been confused with *N. ferranti*, but this has two or four setae in line across the top of the base of the nose, and only four setae at the nose tip. The smallest specimens of *N. schoutedeni*, with flatter profiles, are very closely similar, but generally have the nose distinctly shorter than the rest of the head capsule, and more abruptly tapered at the tip. The imago of that species is also closely similar, but larger, and has the wing membrane less hairy but with more distinct asters (this character cannot readily be used in a key or illustrated, but is useful if material is available for comparison). The soldier of *N. infuscatus* is similar, but usually has a shorter nose; the imago is quite distinct with a longer more inflated postclypeus.

Sjöstedt (1926) placed the name *Eutermes lujae* Wasmann in synonymy with *E. maculiventris* Sjöstedt. The syntypes from the type colony of both have been

examined, and they are undoubtedly different. The former is the same as the species hitherto called *N. ekunduensis*, and the latter, *N. arborum*. Both *N. lujae* and *N. ekunduensis* were described in 1911, but there is no doubt of the priority of the name *N. lujae* which is now removed from synonymy with *N. arborum* (= *N. maculiventris*).

Type Material. CAMEROUN : Ekundu, 3.xii.1890 (*Y. Sjöstedt*), syntype soldier, type colony, *N. ekunduensis* (*Sjöstedt*), A.M.N.H. (other syntypes in Naturhist. Riksmus., Stockholm).

REPUBLIC OF CONGO : Brazzaville (*Roubaud*), syntype soldier, type colony, *N. impetus* (*Sjöstedt*), A.M.N.H. (other syntypes in Mus. Paris and Naturhist. Riksmus., Stockholm).

CONGO : Kasai, Sankuru, 1907 (*E. Luja*), syntype soldier, type colony, *Eutermes lujae* Wasmann, A.M.N.H. ; Barumbu (*J. Bequaert*), syntype soldiers, type colony, *Eutermes nanus* *Sjöstedt* (*N. bequaerti* Emerson), A.M.N.H. (other syntypes in Naturhist. Riksmus., Stockholm) ; Stanleyville, 1913 (*H. Kohl*), paratype soldiers and ♂ and ♀ imagos, *N. santschii* Emerson, B.M.(N.H.) and A.M.N.H., including type colony, (Holotype in A.M.N.H.).

Other Material. IVORY COAST : Abengouru, xi.1963, 3 vials (*G. Becker*), own collection.

GHANA : 7m. S. of Akumadam on Wenchi-Kumasi Road, i.iv.1959 (*W. A. Sands*), B.M.(N.H.).

CAMEROUN : Nyong Forest, 3.i.1950 (*J. Birket-Smith*, *J. Dahl*), B.M.(N.H.) ; Longji, undated (*Blank*), A.M.N.H. ; Mbalmayo, 17.x.1962 (*G. Becker*), own collection.

CONGO : Kasai, Kondue, 1919 (*E. Luja*) ; Stanleyville, 24.vii.1913, and others (*H. Kohl*) ; Avakubi, 6.i.1914 (*J. Bequaert*) ; Basongo, vii.1921 (*H. Schouteden*) ; Stanleyville, 18.iii.1948 (*N. A. Weber*) ; Camp Putnam, 15.v.1948, 2 vials, Epulu, 15.v.1948, 4m. N. of Camp Putnam, 20.v.1948, 2 vials, Yangambi, 29.v.1948, 3 vials (*A. E. Emerson*), all in A.M.N.H.

UGANDA : Sese Islands, Lake Victoria, Bugalla Island, 1918 (*C. C. Gowdey*), B.M.(N.H.).

A total of 29 nest series were examined.

This species has been recorded from Ghana to Uganda, but is much less common in the north-western parts of its range, and appears to become more numerous in the central and southern Congo Forest. This contrasts with *N. arborum*, and although they have both been collected in the same locality in parts of their range, it would appear that they occupy a similar ecological niche, and that the conditions which suit one may be less favourable to the other. *N. arborum* has certainly been found in drier, more marginal forest outliers, than has *N. lujae*, and a greater tolerance of drier forest conditions would account for its greater abundance in West Africa.

The nest of *N. lujae* is commonly arboreal, and similar to that of *N. arborum* though usually slightly smaller.

***Nasutitermes schoutedeni*** (Sjöstedt)  
(Text-figs. 22, 23, 95-99, 215, 216; Map 12)

- Eutermes* (*Eutermes*) *schoutedeni* Sjöstedt, 1924 : 40. Type locality : CONGO, Basongo.  
*Eutermes* (*Eutermes*) *konduenssis* Sjöstedt, 1924 : 40. Type locality : CONGO, Kasai, Kondue.  
**syn. n.**  
*Eutermes* (*Eutermes*) *putidus* Sjöstedt, 1924 : 40. Type locality : CONGO, Kasai, Kondue.  
**syn. n.**  
*Eutermes* (*Eutermes*) *aethiops* Sjöstedt, 1924 : 41. Type locality : CONGO, Luebo. **syn. n.**  
*Eutermes* (*Eutermes*) *dulcis* Sjöstedt, 1924b : 494. Type locality : CONGO, Haut Uélé, Moto.  
**syn. n.**  
*Eutermes schoutedeni* Sjöstedt ; Sjöstedt, 1926 : 314.  
*Eutermes konduenssis* Sjöstedt ; Sjöstedt, 1926 : 307.  
*Eutermes putidus* Sjöstedt ; Sjöstedt, 1926 : 314.  
*Eutermes aethiops* Sjöstedt ; Sjöstedt, 1926 : 318.  
*Eutermes dulcis* Sjöstedt ; Sjöstedt, 1926 : 297.  
*Nasutitermes chapini* Emerson, 1928 : 480. Type locality : CONGO, Ngayu. **syn. n.**  
*Nasutitermes schoutedeni* (Sjöstedt) Snyder, 1949 : 297.  
*Nasutitermes konduenssis* (Sjöstedt) Snyder, 1949 : 282.  
*Nasutitermes putidus* (Sjöstedt) Snyder, 1949 : 294.  
*Nasutitermes aethiops* (Sjöstedt) Snyder, 1949 : 265.  
*Nasutitermes dulcis* (Sjöstedt) Snyder, 1949 : 274.  
*Nasutitermes chapini* Emerson ; Sands, 1957 : 8.

*Imago.* Previously undescribed. Head capsule dark sepia brown, postclypeus and antennae sepia brown, labrum brown. Pronotum and abdominal tergites dark sepia brown ; meso- and metanota and lateral parts of abdominal sternites sepia brown, legs and middle of abdominal sternites yellow-brown. Wings, membrane pale translucent sepia brown, subcosta and radial sector yellow-brown, radial sector lined posteriorly with dark brown ; other venation brown.

Posterior margin of head capsule behind eyes evenly rounded, less than semi-circular ; fontanelle small, pale, weakly bifurcate in front ; eyes moderately prominent in proportion to own diameter, slightly angular oval, medium sized relative to head width, W/E index 2.9-3.1 ; ocelli medium sized, separated from eyes by a half to threequarters own least diameter ; postclypeus weakly inflated, width 3.6 times length, anterior margin slightly sinuate, posterior convex, almost straight in middle, curved to outer corners ; antennae 15 segmented, II longer than IV, IV longer than V, V longer than III.

Cerci of ♀ about as long as width across base.

Measurements (8 specimens from 2 localities) in millimetres.

	Range	Mean
Head width across eyes	1.33-1.40	1.37
Greatest diameter of eye	0.44-0.46	0.45
Ocellus . . . . .	0.11-0.13 × 0.15-0.18	0.12 × 0.16
Ocellus to eye . . . . .	0.08-0.10	0.08
Width of pronotum . . . . .	1.10-1.17	1.14
Length of pronotum . . . . .	0.66-0.74	0.71
Length of hind tibia . . . . .	1.58-1.68	1.63
Length of fore wing . . . . .	11.50-12.40	11.90

*Morphotype.* IVORY COAST : Abidjan, xi.1949 (*R. Geigy*). *Morphotype* ♀ in American Museum, Natural History.

*Soldier.* Head capsule orange-yellow to ferruginous orange, nose ferruginous to chestnut brown with reddish tip. Pronotum and antennae as head capsule. Abdominal tergites and legs yellow, abdominal sternites pale yellow.

Head capsule in plan view short oval to circular, nose conical with abruptly tapered tip. In profile distinctly concave, often with slight hump at base of nose, back of head raised and rounded. Nose shorter than rest of head capsule, measuring from hind margin of antennal socket, in all but smallest specimens; angle of nose cone 12-15 degrees; postmentum moderately and evenly convex; antennae 12-14 segmented, commonly 13, II and IV subequal, shorter than V, III longer than V. Head setae consist of a bilaterally placed pair on vertex, not always present, a distinctly hairy nose tip, and a few on anterior margin of postmentum; rarely one or two minute setae scattered on rest of postmentum, and usually a few on vertex.

Abdominal tergites with very short scattered setae, and longer setae in four rows on posterior margins of last four segments; sternites with scattered short setae, and six long setae on posterior margin of each segment.

Measurements (39 specimens from 9 localities) in millimetres.

	Range	Mean
Head length to tip of nose . . . . .	1.43-1.75 . . . . .	1.59
Head width . . . . .	0.85-1.13 . . . . .	0.98
Depth of head capsule . . . . .	0.55-0.78 . . . . .	0.68
Width of pronotum . . . . .	0.40-0.57 . . . . .	0.49
Length of pronotum . . . . .	0.18-0.24 . . . . .	0.19
Length of hind tibia . . . . .	1.05-1.36 . . . . .	1.12

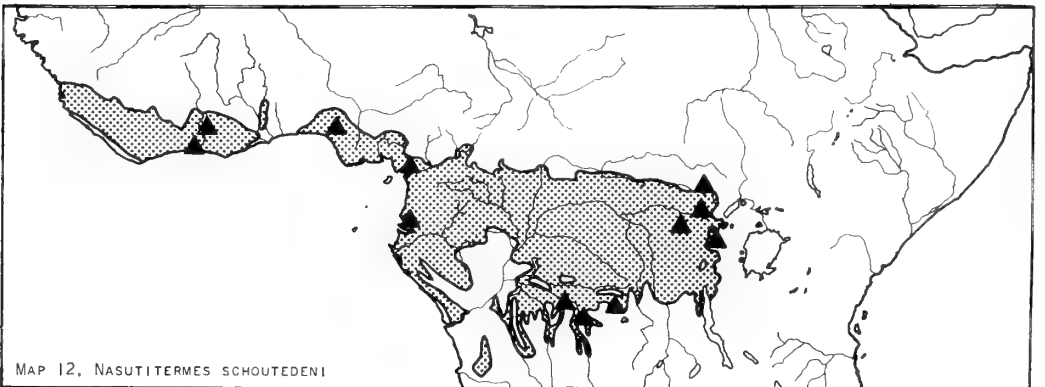
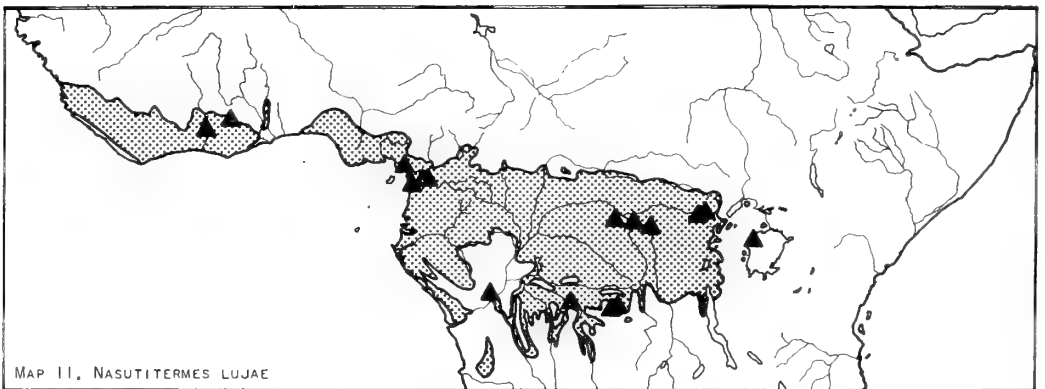
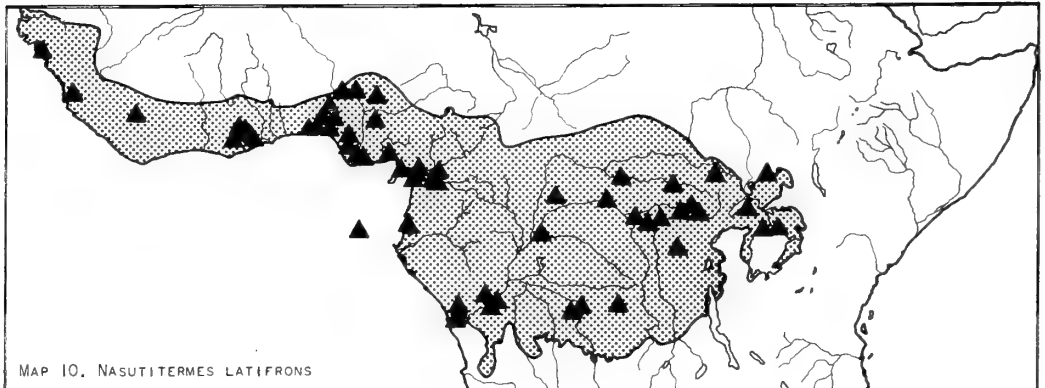
*Variation.* Sjöstedt (1924a) recorded specimens of *N. putidus* ranging in size up to head length 1.96, width 1.35, and depth 0.85 millimetres; no such measurements have been encountered from a wider range of specimens, including paratypes from type colony. The latter fall outside the range given by Sjöstedt, and I therefore consider that his measurements, though not impossible, are probably incorrect; particularly since the measurement of head width for *N. konduensis* is given as 1.35mm., for a length of 1.65mm. and a depth of 0.60mm., and would thus be of quite different proportions from all the other specimens if correct. Paratypes from type colony of *N. konduensis* measured 0.95mm. in width for a length of 1.58mm.

*N. schoutedeni* was described four times under different names in the same paper by Sjöstedt (1924), three times on the same page, and once again in another paper the same year (1924b). The name chosen has page priority, and is not otherwise inappropriate.

It is most closely related to *N. latifrons*, which it closely resembles in the soldier caste, but is distinguishable by the presence of vertex setae, and the absence of postmentum setae except on the anterior margin (with rare exceptions). The imago is smaller, and the wings have setae distributed more or less evenly over membrane and veins, whereas in *N. latifrons* the veins carry a distinct row of setae with a bare border on each side.

The smallest soldiers of *N. schoutedeni* have a straighter head profile, and closely resemble *N. lujae*; some specimens are probably indistinguishable, but *N. schoutedeni* usually has a more abruptly tapered and closely hairy nose tip. The imago is also very like that of *N. lujae*, but larger, with the ocelli closer to the eyes, and the wing membrane is less hairy with larger more distinct asters.

Type Material. CONGO: Basongo, vii.1921 (*H. Schoutedeni*), syntype soldier, type colony, *N. schoutedeni* (Sjöstedt), A.M.N.H. (other syntypes in Naturhist. Riksmus., Stockholm); Kasai, Kondue (*E. Luja*), syntype soldier, type colony, *N. putidus* (Sjöstedt), A.M.N.H. (other syntypes in Congo Mus., Brussels); Luebo, ix.1921 (*H. Schoutedeni*), syntype soldier, type colony, *N. aethiops* (Sjöstedt),



MAPS 10-12. (10), *Nasutitermes latifrons*. Vegetation types : 7, 8, and 16 ; (11), *Nasutitermes lujae*. Vegetation type : 7 ; (12), *Nasutitermes schoutedeni*. Vegetation type : 7.



A.M.N.H. (other syntypes in Naturhist. Riksmus., Stockholm). Haut Uélé, Moto (*L. Burgeon*), syntype soldier, type colony, *N. dulcis* (Sjöstedt), A.M.N.H. (other syntypes in Mus. Tervuren) ; Ngayu, 22.xii.1909 (*H. Lang, J. P. Chapin*), paratype soldiers, type colony, *N. chapini* Emerson, A.M.N.H. and B.M.(N.H.). (Holotype soldier in A.M.N.H.).

Other Material. IVORY COAST : Abengouru, xi.1963, 2 vials (*G. Becker*), own collection.

NIGERIA : Western Region ; 30m. from Ijebu-Ode on Benin Road, 12.xii.1957 (*W. A. Sands*).

CAMEROUN : no data, from N. Holmgren, A.M.N.H. ; Ekododo, 9.ix.1913 (*Escherich*), A.M.N.H.

CONGO : Kasai, Kondue, 2 vials (*E. Luja*) ; Basongo, vii.1921, and Luebo, ix.1921 (*H. Schouteden*) ; Epulu, 17.v.1948 (*A. E. Emerson*), A.M.N.H.

UGANDA : Ankole Province, xi.1939 (*H. B. Johnston*).

A total of 18 nest series were examined, in the British Museum (Natural History) unless otherwise stated.

Although widely distributed from the Ivory Coast to Uganda, this species is not common. The nest is arboreal, more or less spherical, and approximately one foot in diameter.

### **LEPTOMYXOTERMES gen. n.**

(Leptos, Gr. "thin", myxa, Gr., "lamp-nozzle, spout")

Type-species, *Eutermes doriae* Silvestri, 1912 : 242.

*Imago*. Left mandible with apical tooth as long as first marginal, distance from apical to first marginal half distance between first and third marginals (left mandible index .50), cutting edge between first and third marginals with distinct indentation in front of third marginal ; right mandible with apical and first marginal subequal, posterior cutting edge of first marginal about equal to that of second, this being distinctly concave ; right molar plate in surface view with indentation near basal end of anterior margin, posterior margin extending in rounded flange, first molar ridge forming tooth, remaining 6-7 ridges diminishing towards base (Text-figs. 164, 165). Fontanelle slit-like, not clearly bifurcate anteriorly. Eyes and ocelli very large and prominent.

*Soldier*. Monomorphic with traces of dimorphism. Nose cylindrical. Vestigial mandibles with small points. Head capsule sharply constricted behind antennae. Antennae 14 segmented.

This genus is proposed to accommodate the single African forest species *doriae* Silvestri, hitherto included with *Rhadinotermes* in *Coarctotermes*, which is now restricted to the Malagasy species. *Leptomyxotermes* is clearly widely different both ecologically and morphologically from the other African constricted-headed genera. Although it shares with *Fulleritermes* the indentation of the cutting edge between first and third marginals of the left mandible, their proportions are different, and the small tooth connecting the molar prominence to the third marginal is retracted below the level of the groove between them, whereas in *Fulleritermes* and *Rhadinotermes* it is clearly visible in surface view. The concavity of the cutting edge of the second marginal of the right mandible is more pronounced than in the other genera,

and the first and second marginals are in line instead of overlapping slightly. The fontanelle and large eyes are also very distinctive.

***Leptomysotermes doriae* (Silvestri) comb. n.**  
(Text-figs. 100, 101, 119-126, 163-165; Map 13)

*Eutermes doriae* Silvestri, 1912 : 242. Type locality : ISLAND OF FERNANDO POO, Basilé.

*Eutermes (Hospitalitermes) doriae* Silvestri ; Holmgren 1912 : 66.

*Coarctotermes doriae* (Silvestri) Sjöstedt, 1926 : 358.

*Imago.* Head capsule orange-yellow, clouded with brown between eyes and on frons, darkest on upper rim of ocelli ; postclypeus and labrum, yellow, antennae yellow-brown. Pronotum, meso- and metanota, other thoracic sclerites and legs, yellow. Abdominal tergites brown, sternites pale yellow-brown, paler in mid-line. Wings translucent very pale brown, venation brown, darker at base ; radius sector with brown inner margin, and with adjacent yellow streak in distal half of wing.

Posterior margin of head much less than semi-circular behind eyes, slightly sinuate immediately behind eyes ; eyes oval, very prominent, and large relative to head width, W/E index 2.4 ; ocelli large, oval, scarcely separated from eyes ; postclypeus strongly inflated, width 1.8 times length, anterior margin straight, posterior regularly convex ; antennae 15-16 segmented, II and IV subequal, III longer, or II and III subequal, IV shorter.

Cerci of ♀ mamilliform, shorter than width across base.

Pilosity of vertex confined to a few long paired setae.

Measurements (4 specimens from 2 localities) in millimetres.

	Range	Mean
Head width across eyes	1.15-1.20	1.18
Greatest diameter of eye	0.48-0.51	0.50
Ocellus	0.15 × 0.19-0.22	0.15 × 0.20
Ocellus to eye	0.01-0.02	0.01
Width of pronotum	0.97-1.00	0.99
Length of pronotum	0.59-0.68	0.61
Length of hind tibia	1.54-1.66	1.62
Length of fore wing	10.80	

*Soldier.* Head capsule yellow to orange, nose orange to ferruginous. Pronotum, antennae and abdominal tergites orange-yellow, legs and abdominal sternites yellow.

Head capsule in plan view with angularly rounded posterior margin. In profile depressed behind base of nose or straight in front of raised posterior lobe ; nose shorter to longer than rest of head measuring from hind margin of antennal socket, maximum angle of taper 5 degrees ; antennae 14 segmented, elongate, II short, IV, V and VI subequal, longer than II, III longer than these, twice length of II. Setae on head confined to four at nose tip and a bilaterally placed pair on vertex.

Abdominal tergites almost glabrous except for 4-6 long yellow setae on posterior margins of each of last 4-5 segments ; sternites with scattered very sparse short setae and longer setae on posterior margins 3 or more times length of short. Remaining characters given in generic diagnosis.

Measurements (26 specimens from 5 localities) in millimetres.

	Range	Mean
Head length to tip of nose	1.35-1.93	1.67
Head width	0.55-1.00	0.77
Depth of head capsule	0.43-0.75	0.58

	Range	Mean
Width of pronotum . . .	0.43-0.50 . . .	0.47
Length of pronotum . . .	0.18-0.25 . . .	0.21
Length of hind tibia . . .	1.23-1.73 . . .	1.43

*Variation.* The profile view of the soldier is the main feature of variation in this species.

*L. doriae* is unlikely to be confused with any other African species, and its distinguishing features are discussed under the generic heading. It appears to be related far more closely to the *Hospitalitermes* - *Lacessititermes* group of constricted-headed genera than to the *Coarctotermes* - *Fulleritermes* - *Rhadinotermes* group, and in assigning the species to *Hospitalitermes*, Holmgren (1912) was nearer to the truth than subsequent authors. Common features in the soldier are the distribution of setae and the long appendages, and in the imago, the large eyes, pale colour, and not distinctly bifurcate fontanelle, the retracted tooth between left third marginal and molar prominence, and the reduced overlap of right first and second marginals. The right molar plate is however distinctly different; and this, together with the stronger notch in the left mandible, the more concave right second marginal, and the better developed apical teeth, may be an indication of a more primitive position for *L. doriae* in this group.

**Material.** ISLAND OF FERNANDO POO : Basilé, viii.-ix.1901 (*L. Fea*), syntype soldiers, type colony, *L. doriae* (Silvestri), Silvestri coll., Lab. Zool. Sc. Agr., Portici, A.M.N.H., and B.M.(N.H.).

GUINEA : Nimba Mountains, 1957, 4 vials (*M. Lamotte*), Inst. Franç. d'Afr. Noire, Dakar.

SIERRA LEONE : Freetown, 7.i.1958 (*W. Wilkinson*).

IVORY COAST : Banco Forest, 4.ii.1962 (*C. Noirot*).

GHANA : Aburi 1912-13 (*F. Silvestri*), morphotype king, Silvestri coll., Lab. Zool. Sc. Agr., Portici; 20m. S. of Techiman on Kumasi Road, 1.iv.1959 (*W. A. Sands*).

NIGERIA : Western Region; Benin Province, Obanokoro, Sobo Plain, 4.iii.1957; Eastern Region; 53m. from Port Harcourt on Owerri Road, 6.xii.1957, Port Harcourt, 18.xii.1959 (*W. Wilkinson*).

CAMEROUN : Victoria, 1.1913 (*F. Silvestri*), A.M.N.H.

CONGO : Ituri, Beni, Irumu, 24.ii.1948 (*N. A. Weber*), A.M.N.H.

A total of 14 nest series, in the British Museum (Natural History) except where otherwise stated.

*L. doriae* is confined to the rain forests of West Africa and the Congo. It appears to feed almost exclusively on damp, well rotted wood, and to nest in chambers in or under dead logs, or parts of the mounds of other species. It is never common, and the patchy distribution of records reflects the difficulty experienced by collectors rather than the occurrence of the species, which may extend to all parts of the Congo forest.



MAP 13. *Leptomyxotermes doriae*. Vegetation type : 7.

**GRALLATOTERMES** Holmgren

*Eutermes* (*Grallatotermes*) Holmgren 1912 : 65. [Subgenus of *Eutermes* Heer.]

*Grallatotermes* Light, 1930 : 16. Type-species by original designation, *Termes* (*Eutermes*) *grallator* Desneux, 1905.

*Imago*. Left mandible with apical tooth slightly shorter than first marginal, distance between them one quarter of distance between first and third marginals (left mandible index .25), second marginal separated by deep notch in cutting edge in front of third marginal, small subsidiary tooth connecting third marginal and molar prominence retracted behind gap between them when viewed from above ; right mandible with apical and first marginal subequal, posterior cutting edge of first marginal shorter than that of second, not overlapping anterior edge of second (apparent overlap embedded in smooth shining fused surface), molar plate with no marked irregularity of outline in surface view, and 13-14 ridges, diminishing in size posteriorly. Postclypeus short and lightly inflated, length approximately one-third width. Fontanelle pale, roughly T-shaped. Pronotum almost without raised anterior margin. Pilosity of head rather sparse, fine, and uniform, with few more prominent setae.

*Soldier*. Monomorphic. Nose thick but weakly conical, tip sharply tapered. Vestigial mandibles with points. Head capsule slightly constricted behind antennae, setae confined to four at nose tip, and bilaterally placed pairs on postclypeus and vertex.

The imago mandibles of this genus are quite distinct from any others of the subfamily in Africa, in combining the notched cutting edge of the left mandible between first and third marginals with the many-ridged right molar plate. The latter feature is typical of the *Hospitalitermes*-*Grallatotermes* group of constricted-headed genera, as also is the retracted subsidiary tooth between left third marginal and molar prominence. *Leptomyxotermes* has a somewhat similar left mandible, but the molar plate and second marginal of the right mandible are very different. In *Fulleritermes* the subsidiary tooth between left third marginal and molar prominence is well developed and the right molar plate is distinct.

***Grallatotermes africanus*** Harris

(Text-figs. 102, 103, 127-129, 166-168, 217, 218; Map 3)

*Grallatotermes africanus* Harris, 1954 : 135. Type locality : TANGANYIKA, Tanga District, Ngomeni.

Material (additional to that recorded in Harris, 1954). TANGANYIKA : 25m. from Dar es Salaam on Morogoro Road, 21.vii.1954 (*R. M. C. Williams*).

MOZAMBIQUE : Ribauè, 20.v.1932 (*J. Vincent*).

A total of 7 nest series were examined.

The extension of the recorded distribution of this species was not unexpected, and further collecting may show that its distribution is similar to that of *Nasutitermes kempae* Harris, with Zululand as its southernmost extremity.

**FULLERITERMES** Coaton

*Fulleritermes* Coaton, 1962 : 151. Type-species, by original designation, *Eutermes contractus* Sjöstedt, 1913a.

*Imago*. Left mandible with apical tooth as long as first marginal, distance from apical to first marginal more than one-third distance between first and third marginals (left mandible index .36-.43), cutting edge between first and third marginals with notch separating third marginal ;

right mandible with apical and first marginal subequal as left, first marginal with small subsidiary tooth near basal junction with apical, relative lengths of cutting edge of first and second marginals variable ; right molar plate in surface view with very weak to strong indentation near basal end of anterior margin, posterior margin extending in rounded flange, first molar ridge forming stout tooth, remaining 7-9 ridges diminishing towards base (Text-figs. 169-180). Fontanelle slit-like, distinctly bifurcate anteriorly, usually paler than head.

*Soldier.* Mono- or dimorphic. Nose cylindrical or conical. Vestigial mandibles with small to medium-sized points. Head capsule scarcely to sharply constricted behind antennae, posterior lobe commonly more than one-fourth wider than anterior. Antennae 12-13 segmented.

This genus was separated by Coaton (1962) from *Coarctotermes* on the basis of the notched cutting edge in front of the third marginal tooth of the left imago mandible. It contains four species, *contractus* (Sjöstedt), *coatoni* sp. n., *mallyi* (Fuller) and *tenebricus* (Silvestri).

This character is convenient for separating *Fulleritermes* from *Coarctotermes* and *Rhadinotermes*, but it is shared by two other African constricted-headed genera, *Grallatotermes* and *Leptomyxotermes* ; however both these have much larger eyes and ocelli in the imago, and in *Grallatotermes* the right molar plate has many ridges.

Within *Fulleritermes* itself there are specific differences. In *F. mallyi* the left third marginal tooth of the imago is asymmetrical, the anterior edge being longer than the posterior and slightly concave, and the right molar plate scarcely indented in outline. In the other species the left third marginal is equilaterally triangular and the right molar plate deeply indented in outline, with fewer ridges. The soldier caste of *F. mallyi* is also distinct in shape and colour from the other species which closely resemble each other.

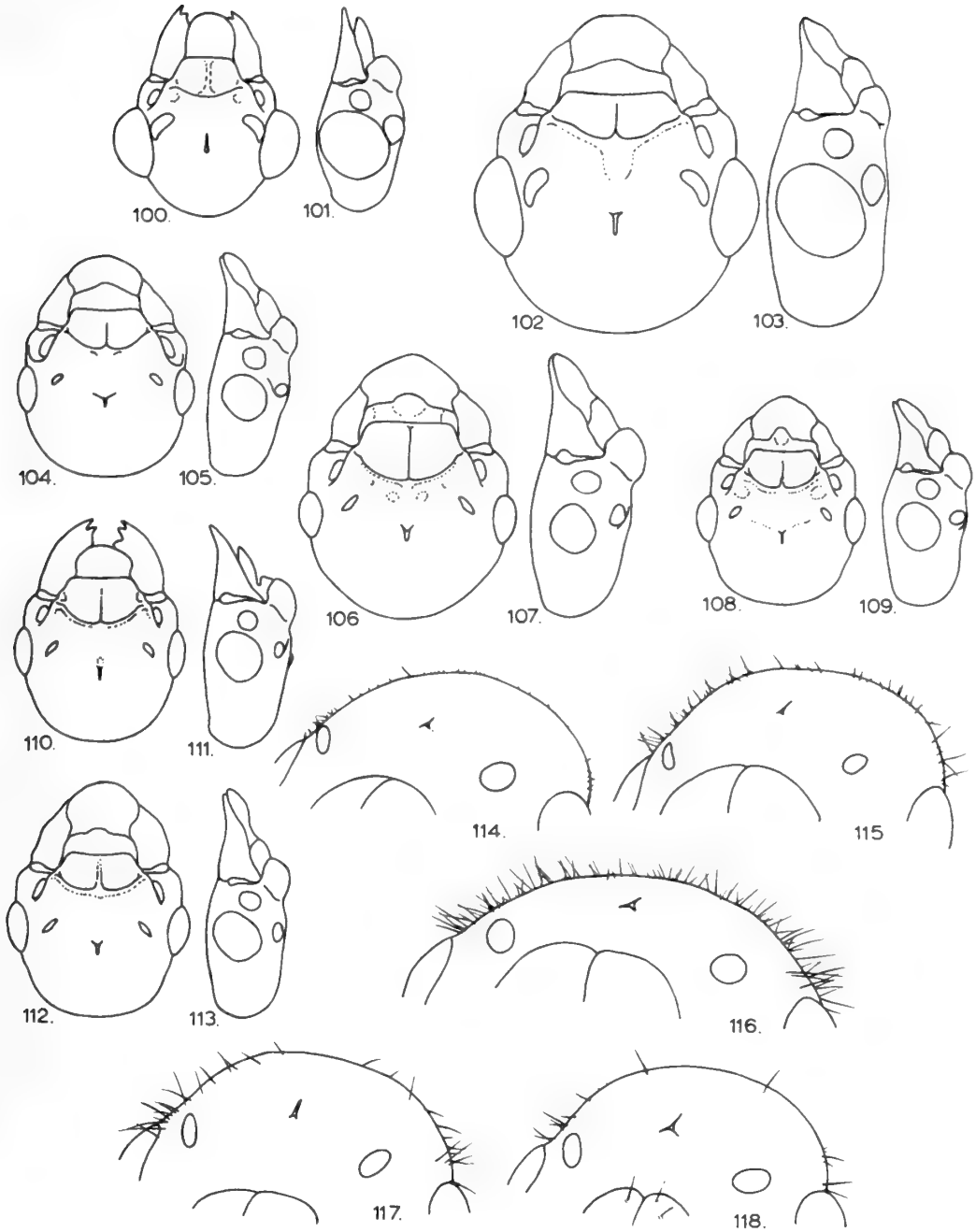
I do not consider it desirable to separate *F. mallyi* generically from the other species at present because further work is required to evaluate fully the importance of these rather small differences in imago mandible characteristics.

The genus occurs in the savannah and other drier open vegetation zones, and only occasionally enters the forest edges, being absent from the depths of true rain forest. Of the four species recognized in this paper, one occurs north of the Congo forest block, one to the south, one in tropical South Africa, (Transvaal, Natal, northern Cape Province) and the last in the Montane and Karroo vegetation of temperate and subtropical South Africa. There is apparently no overlap in their distribution, each exploiting a separate and distinct vegetation type or set of types. The genus appears to occupy a subsidiary or minor ecological " niche " in the termite fauna of these areas, being never found abundantly and usually scarce and difficult to discover. It may however be close to the evolutionary stem from which more abundant specialized genera such as *Trinervitermes* arose. It is absent from East Africa, where *Rhadinotermes* is found, but it is thought that *R. coarctatus* occupies a rather different ecological " niche " because of the differences in its imago and worker mandibles.

#### KEYS TO *FULLERITERMES* AND *RHADINOTERMES*

##### IMAGO (*FULLERITERMES* only)

- 1 Antennae 14 segmented, though with segment III long, sometimes partly subdivided.  
 Wings under 10mm. in length . . . . . 2
- Antennae 15 segmented. Wings over 10mm. in length . . . . . **mallyi** (p. 65)



FIGS. 100-113 : Imago head capsule, front and side views, 114-118, vertex pilosity. 100, 101, *Leptomyxotermes doriae* ; 102, 103, *Grallatotermes africanus* ; 104, 105, 114, *Fulleritermes coatoni* ; 106, 107, 116, *F. mallyi* ; 108, 109, 118, *F. tenebricus* ; 110, 111, 115, *F. contractus* ; 112, 113, 117, *Rhadinotermes coarctatus*.

- 2 Vertex of head viewed diagonally upwards with numerous yellowish bristle-like setae (Text-fig. 115) . . . . . **contractus** (p. 61)
- Vertex with one or two bristles and sparsely scattered shorter hairs, a few more bristles immediately behind eyes (Text-figs. 114, 118) . . . . . 3
- 3 Right mandible with cutting posterior edge of first marginal tooth exposed beyond anterior margin of second marginal, longer (10 : 8) than equivalent cutting edge of second marginal (Text-fig. 171) (S. Africa, S. of Limpopo) . . . **coatoni** sp. n. (p. 58)
- Right mandible with cutting edge of first marginal shorter (8 : 10) than equivalent edge of second marginal (Text-fig. 180) (West Africa to Sudan) . . . **tenebricus** (p. 68)

## SOLDIER

- 1 Nose slender, cylindrical, head capsule in plan view with sides converging towards front and slightly sinuate, scarcely constricted behind antennae . . . **F. mallyi** (p. 65)
- Nose more or less conical, head capsule in plan slightly to distinctly constricted behind antennae . . . . . 2
- 2 Antennae 12 segmented . . . . . 3
- Antennae 13 segmented . . . . . 4
- 3 Colour paler, head capsule orange to ferruginous, nose as head or darker, to pitch black . . . **F. coatoni** sp. n. (p. 58)
- Colour darker, head capsule sepia-brown to pitch black, nose pitch black with reddish tip . . . . . **R. coarctatus** (p. 71)
- 4 Soldiers dimorphic. "Points" of vestigial mandibles small but distinct. Head capsule in plan smoothly and regularly rounded behind constriction . . . **F. coatoni** sp. n. (p. 58)
- Soldiers monomorphic. "Points" of vestigial mandibles minute or absent. Head capsule in plan slightly angularly rounded behind constriction, often weakly sulcate at back . . . . . 5
- 5 West Africa, N. Congo, Sudan . . . . . **F. tenebricus** (p. 68)
- S. Congo, Angola, N. and S. Rhodesia . . . . . **F. contractus** (p. 61)

**Fulleritermes coatoni** sp. n.

(Text-figs. 104, 105, 114, 130–134, 169–171, 219 ; Map 14)

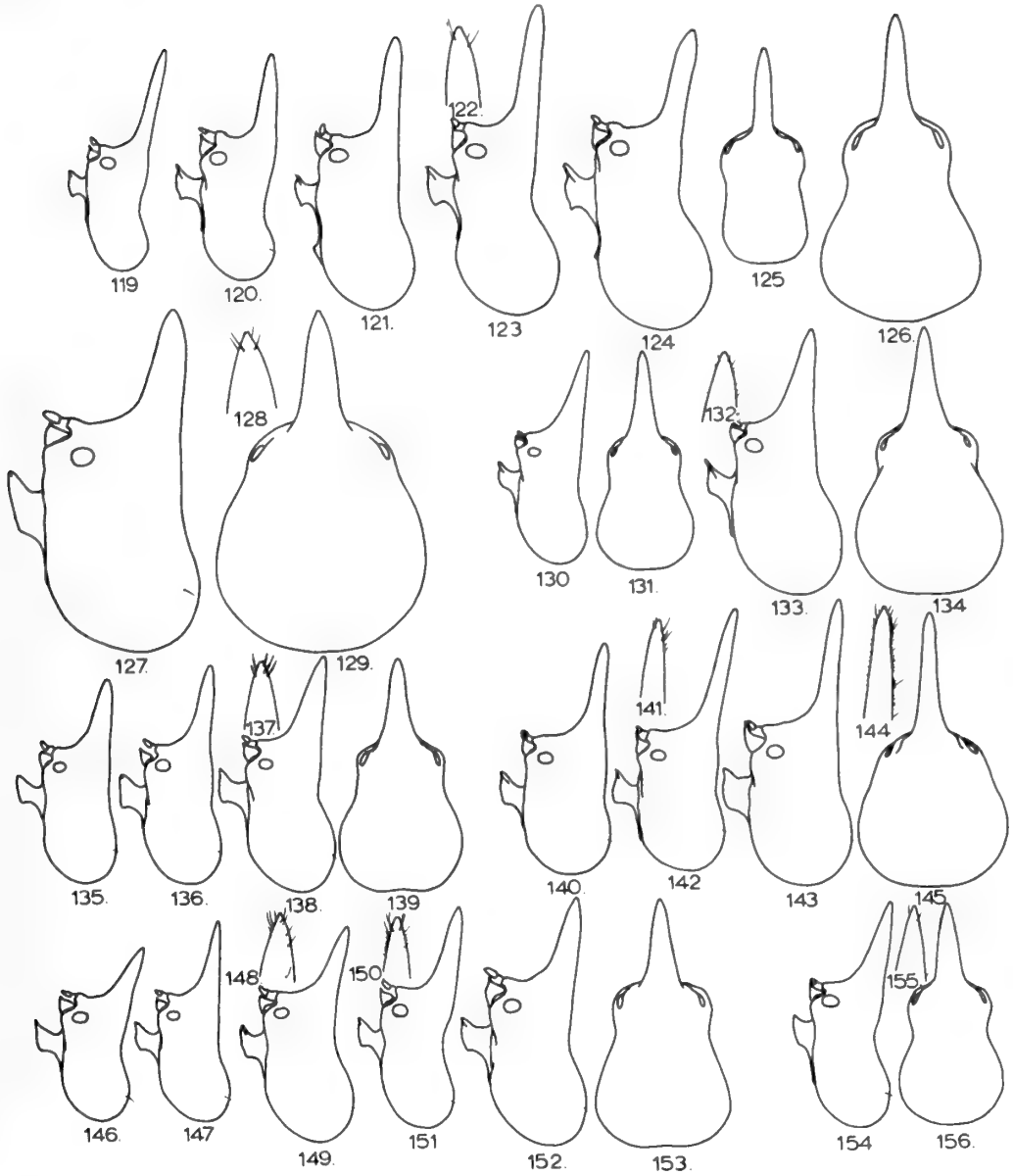
*Coarctotermes contractus* (Sjöstedt) ; Fuller, 1922 : 117.

*Fulleritermes contractus* (Sjöstedt) ; Coaton, 1962 : 152, [part : specimens identified by Fuller (1922) only].

*Imago*. Head capsule very dark brown, almost pitch black, postclypeus and antennae, apart from two yellow-brown basal segments, dark sepia brown, labrum brown posteriorly shading to yellow at tip. Pronotum as head capsule, meso- and metanota and all other thoracic sclerites and legs sepia-brown, except tarsi and tips of tibiae, which are yellow to yellow-brown. Abdominal sclerites sepia-brown except anterior abdominal sternites paler brown in mid-line. Wings translucent brown, darker at base, slightly greenish iridescent ; venation sepia brown or outlined sepia brown towards wing base.

Posterior margin of head almost semi-circular behind eyes ; fontanelle very small, short Y-shaped, scarcely to distinctly paler than rest of head, almost obsolete in some males ; eyes angularly ovoid, not prominent, and small relative to head width, W/E index 3.5–3.8 ; ocelli small, oval, separated from eyes by  $1\frac{1}{2}$  to 2 times own least diameter ; postclypeus strongly inflated, width 1.9–2.0 times length, anterior margin nearly straight, posterior margin convex, rounded ; antennae 14–15 segmented, usually 14, II, V and VI subequal, longer than IV, III twice IV, often partly subdivided ; right mandible with posterior cutting edge of first marginal exposed beyond second, longer than that of second marginal, molar plate moderately indented near base, with 8 ridges.





FIGS. 119-156: Soldier head capsule, side and plan views, and nose tip. 119-126, *Leptomyxotermes doriae*; 127-129, *Grallatotermes africanus*; 130-134, *Fulleritermes coatoni*; 135-139, *F. contractus*; 140-145, *F. mallyi*; 146-153, *F. tenebricus*; 154-156, *Rhadinotermes coarctatus*.

Cerci of ♀ as long as width across base, slightly mamilliform conical.

Pilosity of vertex, one or two long bristle-like setae and sparsely scattered shorter hair-like setae, with a few more bristle-like setae around eyes and ocelli (Text-fig. 114).

Other characters given in generic discussion.

Measurements (11 specimens from 5 localities) in millimetres.

	Range	Mean
Head width across eyes	1.12-1.19	1.16
Greatest diameter of eye	0.31-0.33	0.32
Ocellus . . . . .	0.06-0.09 × 0.09-0.11	0.08 × 0.10
Ocellus to eye . . . . .	0.13-0.15	0.13
Width of pronotum . . . . .	1.02-1.17	1.08
Length of pronotum . . . . .	0.71-0.79	0.74
Length of hind tibia . . . . .	1.38-1.45	1.41
Length of fore wing . . . . .	8.20-9.60	8.99

*Soldiers.* Major soldier: head capsule orange to ferruginous, nose ferruginous orange to pitch black with paler tip. Pronotum, antennae and abdominal tergites brown to sepia-brown, femora of legs brown, tibiae and tarsi yellow. Abdominal sternites pale brown.

Head capsule in plan view constricted behind antennae, posterior margin regularly rounded; nose conical. In profile straight or slightly concave to behind antennal socket, then abruptly raised and rounded; nose shorter than rest of head capsule, measuring from hind margin of antennal socket, angle of nose cone 15-20 degrees; antennae 13 segmented, II and IV subequal, shorter than V, III and VI subequal and longer than V. Head setae consist of 6-8 at nose tip, and a bilaterally placed pair of small setae on vertex, with very few scattered minute setae on dorsal surface.

Abdominal tergites with very sparse scattered minute setae, slightly longer on posterior 2-3 segments; sternites with sparse short setae and longer setae up to 3 times length of short on posterior margins. Minor soldier: colour and pilosity, exactly as in major soldier. Head capsule in plan view more sharply constricted behind antennae. In profile concave, slightly sinuate, or indented in front of smaller posterior lobe of head; nose shorter to equal in length to rest of head capsule, measuring from hind margin of antennal socket, angle of nose cone 10-17 degrees; antennae 12-13 segmented, usually 13.

Measurements (Major and minor soldiers 14 specimens each, from 8 localities) in millimetres.

	Range	Mean
<i>Major soldiers</i>		
Head length to tip of nose . . . . .	1.43-1.61	1.52
Head width . . . . .	0.78-0.89	0.80
Depth of head capsule . . . . .	0.54-0.66	0.58
Width of pronotum . . . . .	0.41-0.49	0.43
Length of pronotum . . . . .	0.18-0.23	0.19
Length of hind tibia . . . . .	1.00-1.17	1.08
<i>Minor soldiers</i>		
Head length to tip of nose . . . . .	1.28-1.44	1.33
Head width . . . . .	0.56-0.66	0.61
Depth of head capsule . . . . .	0.41-0.49	0.45
Width of pronotum . . . . .	0.33-0.37	0.35
Length of pronotum . . . . .	0.13-0.18	0.15
Length of hind tibia . . . . .	0.82-1.02	0.94

*Variation.* Like *F. mallyi*, this species has proved to have relatively little variation over its comparatively short geographical range. The most variable caste is the minor soldier.

This species is retained in *Fulleritermes* in spite of its distinct soldier dimorphism because of its very close similarity in all respects, morphological and ecological, to *F. tenebricus* and *F. contractus*, with which latter species it has in the past been

confused. It is separable from both by the differences of the right imago mandible, and from *F. contractus* by the different pilosity of the vertex. The more rounded posterior lobe of the soldier head distinguishes *F. coatoni* from *F. contractus*, and the points of the vestigial soldier mandibles are often though not always more pronounced. The distinguishing features of *F. mallyi* are discussed under that species.

Holotype ♀ winged imago, allotype ♂, REPUBLIC OF SOUTH AFRICA : Transvaal, Sibasa, 24.x.1959 (*W. G. H. Coaton*), Coll. No. T.M. 6716, N.C.I., Pretoria.

Paratypes, soldiers and workers, same data as holotype, in N.C.I., Pretoria and B.M.(N.H.).

Other paratype material. SOUTHERN RHODESIA : Bulawayo, 13.v.1915 (*Arnold*), N.C.I., Pretoria.

REPUBLIC OF SOUTH AFRICA : Transvaal ; Bronkorstspruit, 6-12.v.1938, 23-24.ix.1957, 26.vii.1960, 10 vials, Warmbad, 12.iv.1938, 25.ix.1957, 3 vials, Groblersdahl, 21.ii.1939, 26.ix.1957, 2 vials, Pietersburg, 25.v.1939, 5.x.1960, Witbank, 30.viii.1959, Schweizer Reneke, 3.x.1956, 2 vials, N.C.I., Pretoria, Potgietersrus, 26.ix.1957, 2 vials, Pretoria, 23-25.ix.1957, 3.x.1960, 5 vials, Sibasa, 8.vii.1960, 3 vials, Waterberg, 3.x.1960, 2 vials, Rustenburg, 1 & 26.ix.1961, 2 vials, Marico, 1.ix.1961 (*W. G. H. Coaton*) ; Pretoria, 12.xi.1957, Sibasa, 30.xii.1959, Waterberg, 6.i.1960, Rustenburg, 6-8.i.1960 (*P. C. Joubert*) ; Sibasa, 15.x.1960, 2 vials, Pietersberg, 2.viii.1961 (*J. L. Sheasby*) ; Soutpansberg, 24.iv.1958 (*J. H. Grobler*) ; Cape Province ; Vryburg, 25.ii.1961, Mafeking, 26.ii.1962, N.C.I., Pretoria (*W. G. H. Coaton*) ; Kimberly, 7.xi.1960 (*P. C. Joubert*) ; Natal ; Entonjaneni, 13.i.1962, 2 vials (*J. L. Sheasby*).

A total of 56 nest series of this species were examined, and material is in the British Museum (Natural History) unless otherwise stated.

*F. coatoni* has been recorded as inhabiting parts of the mounds of various other genera. It appears to be confined to the relatively drier woodlands and wooded steppes included in vegetation type 20 of Keay *et al.* (1959), occurring in Southern Rhodesia and the northern parts of South Africa. Several localities in Cape Province are beyond the mapped limit of type 20 vegetation. Coaton (1962) considers that the species does not occur west of Longitude 24°E., and it therefore seems probable that *F. coatoni* does not extend far into the even drier *Acacia-Commiphora* wooded steppe of type 25. These localities are thus likely to be in the transition zone, or even outliers of type 20 too small to be recorded on the map.

### *Fulleritermes contractus* (Sjöstedt)

(Text-figs. 110, 111, 115, 135-139, 172-174, 220 ; Map 15)

*Eutermes contractus* Sjöstedt, 1913a : 384. Type locality : CONGO, Katanga, Welgelegen.

*Coarctotermes contractus* (Sjöstedt) Fuller, 1922 : 117. [unjustified emendation of generic name *Coarctotermes* Holmgren].

*Coarctotermes contractus* (Sjöstedt) ; Sjöstedt, 1926 : 356.

*Coarctotermes brunneus* Noirot, 1955 : 150. Type locality : ANGOLA, Humpata, Leba. **syn. n.**

*Coarctotermes brunneus* Noirot ; Sands, 1957 : 14.

*Fulleritermes contractus* (Sjöstedt) Coaton, 1962 : 152.

*Fulleritermes brunneus* (Noirot) Coaton, 1962 : 153.

*Imago*. Head capsule pitch black, postclypeus very dark sepia brown, labrum sepia brown with hyaline tip ; antennae sepia brown. Pronotum very dark sepia brown, meso- and meta-nota, other thoracic sclerites and legs (apart from tarsi) sepia brown, tarsi paler brown. Abdominal tergites sepia brown, sternites paler in mid-line. Wings brown, darker at base, green and purple iridescent, venation sepia brown, outlined near base.

Posterior margin of head behind eyes semi-circular ; fontanelle small clear-cut Y-shaped, distinctly paler than head, in profile with small raised bump in front of fork ; eyes angular



MAP 14. *Fulleritermes coatoni*. Vegetation type : 20.

oval, not prominent, small relative to head width, W/E index 3.4-3.5; ocelli small, oval, separated from eyes by about twice own least diameter; postclypeus strongly inflated, width 1.8-2.1 times length, anterior margin slightly concave, posterior margin convex, rounded; antennae 14 segmented, II, V and VI subequal, slightly longer than IV, III twice IV, sometimes partly subdivided; right mandible with posterior cutting edge of first marginal tooth exposed beyond second, shorter than that of second marginal, molar plate deeply indented near base, with 8 ridges.

Cerci of ♀ shorter than width across base, slightly mamilliform conical.

Pilosity of vertex of rather coarse long yellow setae scattered among shorter setae, slightly less dense on "crown". (Text-fig. 115.)

Other characters mentioned in generic diagnosis.

Measurements (3 specimens from 2 localities) in millimetres.

	Range
Head width across eyes . . . . .	0.94-1.10
Greatest diameter of eye . . . . .	0.28-0.31
Ocellus . . . . .	0.06-0.08 × 0.09
Ocellus to eye . . . . .	0.13-0.14
Width of pronotum . . . . .	0.92-1.05
Length of pronotum . . . . .	0.64-0.79
Length of hind tibia . . . . .	1.15-1.43
Length of fore wing . . . . .	7.20

*Soldier.* Head capsule ferruginous orange to sepia brown, nose ferruginous to pitch black with reddish tip. Pronotum, antennae, abdominal tergites and femora of legs sepia brown, abdominal sternites and tibiae and tarsi of legs paler, brown.

Head capsule in plan view, strongly constricted behind antennae, posterior margin usually somewhat angularly rounded and often sulcate in the middle to a varying degree; nose moderately conical. In profile, dorsal surface of nose straight to well behind antennal socket, or slightly sinuate with small hump at base of nose, with or without slight indentation in front of raised and rounded posterior lobe of head; nose shorter, to equal in length to rest of head capsule measuring from hind margin of antennal socket, angle of nose cone 10-20 degrees; antennae 12-13 segmented, usually 13, II and V subequal, slightly longer than IV and shorter than III. Head setae confined to 6-8 at nose tip, and one bilaterally placed pair on vertex.

Abdominal tergites with very sparse, minute scattered setae, slightly longer upon last two; sternites with sparse short setae and longer setae on posterior margins up to twice length of short.

Measurements (30 specimens from 7 localities) in millimetres.

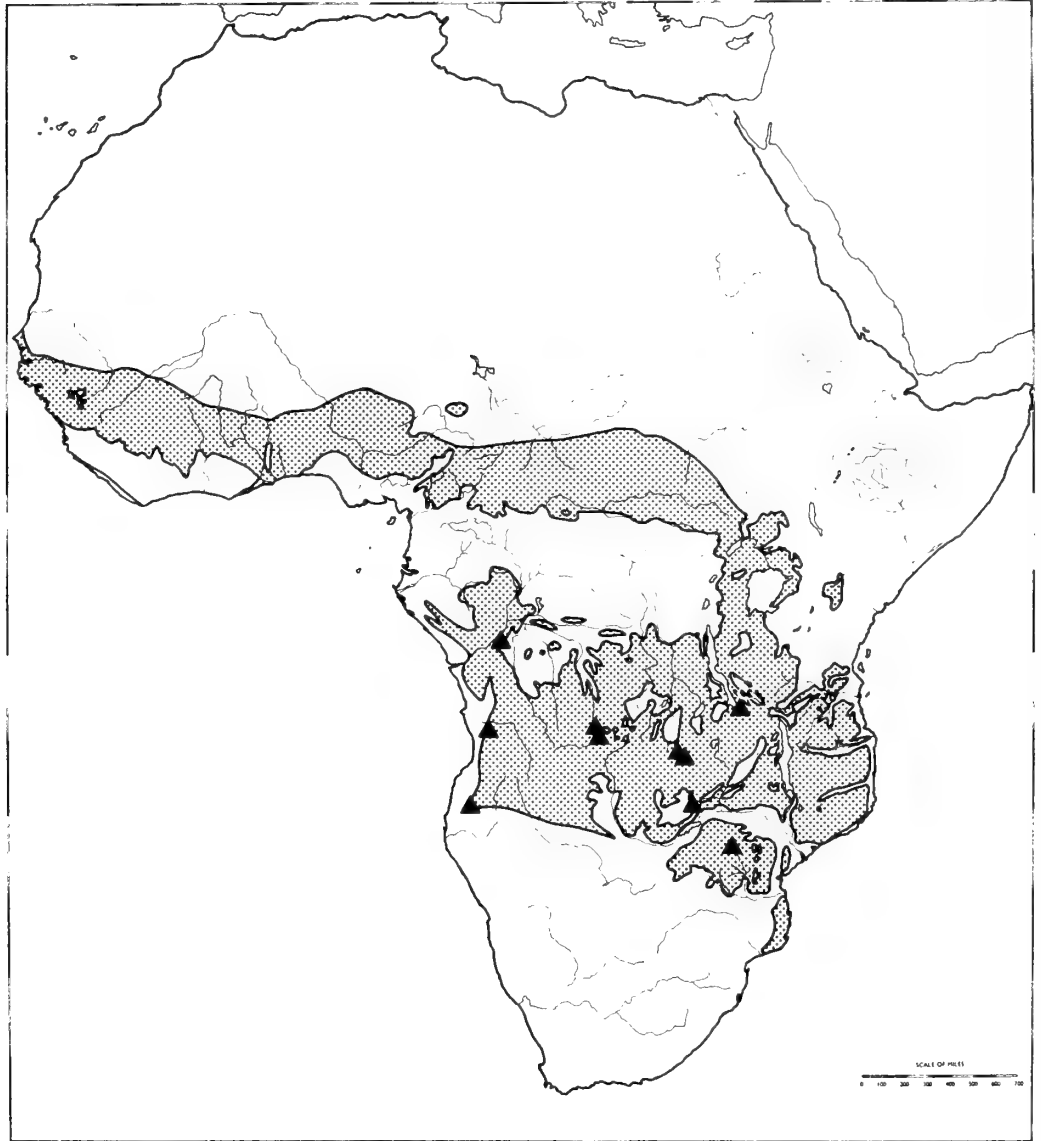
	Range	Mean
Head length to tip of nose . . . . .	1.14-1.50	1.39
Head width . . . . .	0.54-0.83	0.73
Depth of head capsule . . . . .	0.40-0.55	0.50
Width of pronotum . . . . .	0.32-0.45	0.41
Length of pronotum . . . . .	0.15-0.18	0.16
Length of hind tibia . . . . .	0.68-1.05	0.93

*Variation.* Imago variation cannot be assessed. The soldier varies considerably in colour and proportions, though slightly less than in *F. tenebricus*. Angularity of the head capsule and the sulcate posterior margin appear to be commoner at the eastern end of the range, but material from the west is meagre.

The soldiers of *F. contractus* are very difficult to separate from *F. tenebricus*, having a slightly thicker nose on average, slightly less pronounced posterior lobe of the head capsule, and proportionately shorter hind tibia. The ranges of all these characters overlap however. The imagos of *F. contractus* are distinguishable by

the more hairy vertex, the small bump or tubercle in front of the fontanelle, and the wider separation of ocelli from eyes. The distinguishing features from *F. coatoni* are discussed under that species.

A lectotype has been selected from among the syntype series of *F. contractus*, and labelled as such.



MAP 15. *Fulleritermes contractus*. Vegetation types : 8, 16, 18, and 19.

Lectotype : CONGO : Katanga, Welgelegen, 14.vi.1912 (*J. Bequaert*), lectotype queen, paralectotype soldiers and workers, Mus. Tervuren. Other paralectotype soldiers, type colony, A.M.N.H. and B.M.(N.H.).

Type Material. ANGOLA : Humpata, Leba, 17.ix.1949 (*A. de Barros Machado*), paratype soldier, type colony, *F. brunneus* (Noirot), A.M.N.H.

Other Material. CONGO : Leopoldville, Kitona, 9.viii.1959 (*J. Ruelle*), N.C.I., Pretoria ; Katanga, Keyberg, 11° 47' S., 27° 25' E., 19-25.iv.1948, 2 vials (*A. E. Emerson*), A.M.N.H.

ANGOLA : Munhango, 24.x.1927 (*M. Burr*).

NORTHERN RHODESIA : Abercorn, iii.1947 (*P. E. Glover*) ; Lusaka, xi.1963 (*E. N. Cooling*).

SOUTHERN RHODESIA : Salisbury, 1911 (*G. A. K. Marshall*). The last 4 nest series in British Museum (Natural History). 9 nest series were examined.

The habits of this species seem to be similar to those of *F. tenebricus* in the northern savannahs, sharing the mounds of other species and occasionally constructing its own small mound, or carton nest around a branch stump on a tree. It occurs in the savannah zones south of the Congo forest block, comprising vegetation types 8, 16, 18, and 19 of *Keay et al.* (1959), thus having a somewhat more restricted distribution than its northern congener.

### *Fulleritermes mallyi* (Fuller)

(Text-figs. 106, 107, 116, 140-145, 175-177, 221, 222 ; Map 16)

*Tenuirostritermes mallyi* Fuller, 1922 : 115. Type locality : REPUBLIC OF SOUTH AFRICA, Cape Province, Malmesbury.

*Eutermes mallyi* (Fuller) Sjöstedt, 1926 : 310.

*Coarctotermes mallyi* (Fuller) Snyder, 1949 : 311.

*Fulleritermes mallyi* (Fuller) Coaton, 1962 : 152.

The following additions to Fuller's descriptions are necessary :

*Imago*. Posterior margin of head almost semi-circular behind eyes ; eyes small relative to head width, W/E index 3.8-4.4, moderately prominent in proportion to own diameter ; ocelli small, separated from eyes by slightly more than to nearly twice own least diameter ; post-clypeus very strongly inflated, width 1.7-1.8 times length, anterior margin almost straight, posterior regularly convex ; posterior cutting edge of first marginal tooth of right mandible exposed beyond second, longer than that of second marginal.

Cerci of ♀ shorter than width across base, mamilliform.

Pilosity of vertex densely scattered rather long yellow bristle-like setae of varying length, rest of body with yellow hair- and bristle-like setae. Other characteristics described in generic diagnosis.

Measurements (24 specimens from 7 localities) in millimetres.

	Range	Mean
Head width across eyes	1.37-1.43	1.40
Greatest diameter of eye	0.31-0.36	0.34
Ocellus . . . . .	0.09-0.10 × 0.10-0.16	0.09 × 0.13
Ocellus to eye . . . . .	0.10-0.19	0.16

	Range	Mean
Width of pronotum . . . . .	1.22-1.40 . . . . .	1.32
Length of pronotum . . . . .	0.71-0.84 . . . . .	0.80
Length of hind tibia . . . . .	1.63-1.79 . . . . .	1.71
Length of fore wing . . . . .	11.50-14.30 . . . . .	12.71

*Soldier.* Setae on head consist of a bilaterally placed pair on vertex, four at nose tip with sparse shorter setae behind them, and one or two towards base of nose.

Abdominal tergites with very short sparsely scattered setae and longer setae on posterior margins; sternites with more numerous short setae and longer setae on posterior margins 2-3 times length of short.

Antennae, 12 (6 out of 10) to 13 segmented.

Measurements (53 specimens from 16 localities) in millimetres.

	Range	Mean
Head length to tip of nose . . . . .	1.43-1.86 . . . . .	1.59
Head width . . . . .	0.64-0.94 . . . . .	0.82
Depth of head capsule . . . . .	0.43-0.64 . . . . .	0.57
Width of pronotum . . . . .	0.38-0.51 . . . . .	0.44
Length of pronotum . . . . .	0.18-0.28 . . . . .	0.23
Length of hind tibia . . . . .	0.89-1.30 . . . . .	1.12

*Variation.* The 5% size variation shown by the imagos over their entire distribution range is extremely low, and other characters varied similarly little. In the soldier there was more variation in the proportional lengths of nose and head capsule and in antennal length, with slight indications of a cline in these characters from south-west to north-east. Colour varied little in both castes.

Though placed in *Fulleritermes*, the relationships of *F. mallyi* are open to doubt. The long wings and 15 segmented antennae of the imago together with the preponderantly 12 segmented antennae of the soldier, show closer resemblance to *R. coarctatus* than to the other species of its own genus.

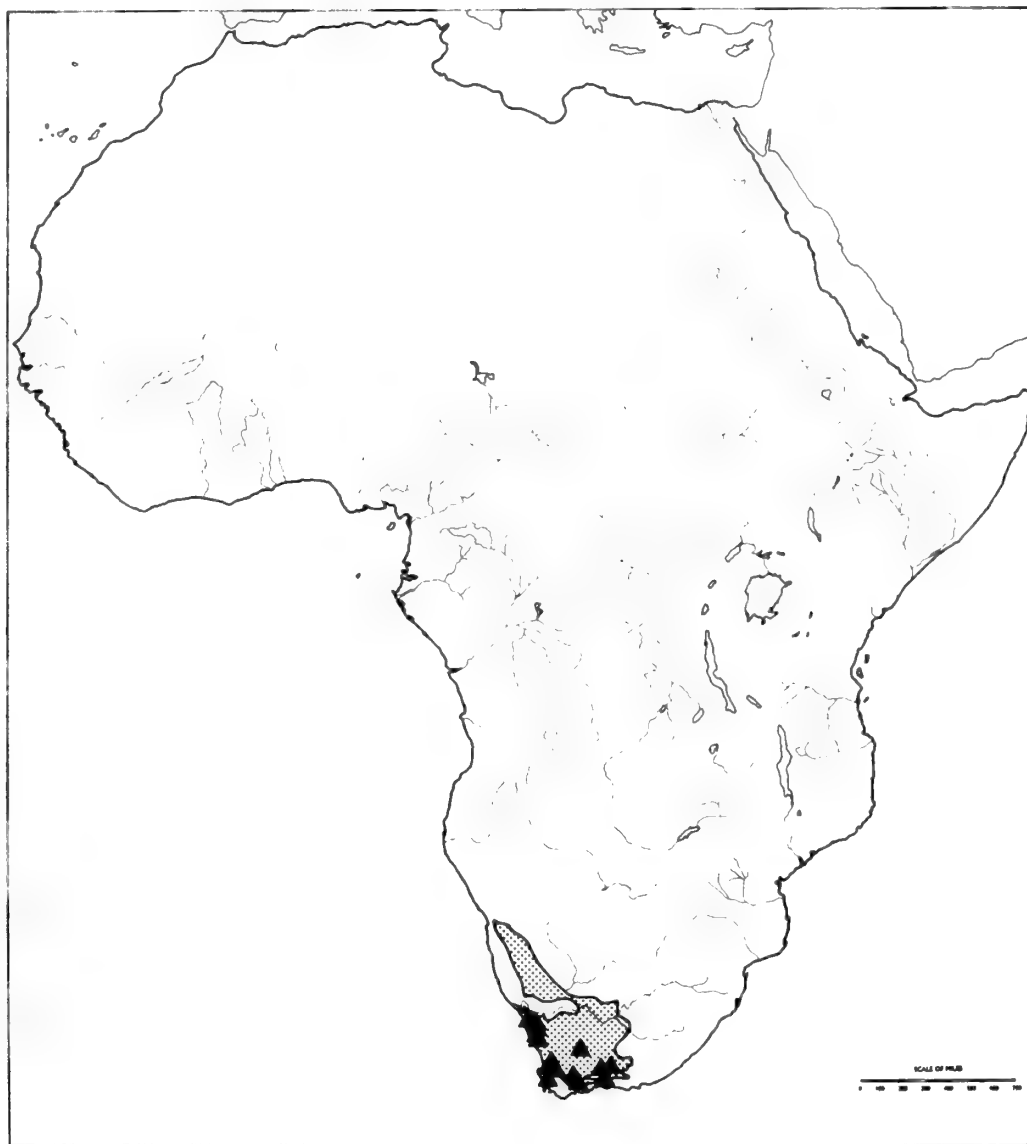
These characters, the slender cylindrical nose and comparatively weak head constriction of the soldier, and the larger size of both imago and soldier castes, distinguish it from other *Fulleritermes* and *R. coarctatus*. It is unlikely to be confused with any other African species.

*Material.* REPUBLIC OF SOUTH AFRICA: Cape Province, Malmesbury, x.1920 (*R. Birch*), syntype female imagos and soldiers, type colony, *F. mallyi* (Fuller), A.M.N.H. (other syntypes in N.C.I., Pretoria); Malmesbury, 19.ii.1956, Clan William, 21.iii.1956-20.ii.1961, 7 vials, Calvinia, 6.x.1956-15.i.1958, 6 vials, Willowmore, 18.ix.1961, 4 vials, Beaufort West, 19.ix.1961, Aberdeen, 20.ix.1961, 3 vials (*W. G. H. Coaton*); Laingsburg, 15.xi.1960, 4 vials, Ladismith, 16.xi.1960 (*P. C. Joubert, H. P. Nieman*); Uniondale, 12.ii.1961, Ceres, 19.ii.1961, Clanwilliam and Calvinia, 20.ii.1961, Namaqualand, 15-19.x.1961, 17 vials, Van Rhynsdorp, 20.x.1961, 5 vials (*J. L. Sheasby, G. F. Pretorius*).

A total of 54 nest series were examined, and material is in the British Museum (Natural History) unless otherwise stated.

This species appears to be confined to the Karroo and related neighbouring vegetation types of Cape Province, South Africa. It has commonly been collected from beneath stones and from mounds of other species such as *Amitermes hastatus* (Haviland).





MAP 16. *Fulleritermes mallyi*. Vegetation types : 28 and 29.

*Fulleritermes tenebricus* (Silvestri)

(Text-figs. 108, 109, 118, 146-153, 178-180, 223, 224 ; Map 17)

*Eutermes tenebricus* Silvestri, 1914 : 44. Type locality : GUINEA, Kakoulima.*Eutermes (Coarctotermes) tenebricus* Silvestri ; Hekh, 1922 : 469.*Coarctotermes tenebricus* (Silvestri) Sjöstedt, 1926 : 355.*Nasutitermes (Coarctotermes) suffuscus* Emerson, 1928 : 496. Type locality : CONGO, near Yakuluku (4° 20' N., 28° 50' E.) **syn. n.***Coarctotermes suffuscus* (Emerson) Snyder, 1949 : 311.

*Imago.* Head capsule dark sepia brown, slightly paler anteriorly ; pale patches in front of ocelli and paler coronal suture sometimes present ; postclypeus sepia brown, labrum yellow to brown, antennae sepia brown. Pronotum as head capsule, meso- and metanota and other thoracic sclerites sepia brown. Femora of legs sepia brown, tibiae brown with yellow tips, tarsi yellow. Abdominal tergites uniformly sepia brown, sternites paler in mid-line. Wing brown, darker at base, translucent when wet, bluish iridescent when dry, venation outlined sepia brown at base, becoming indistinct distally.

Posterior margin of head behind eyes almost semi-circular, slightly sinuate immediately behind eyes ; fontanelle elongate Y-shaped, slightly to distinctly paler than head ; eyes angularly ovoid, not prominent, small relative to head width, W/E index 3.2-3.6 ; ocelli small, oval, separated from eyes by about 1½ times own least diameter ; postclypeus strongly inflated, width 1.8-2.1 times length, anterior margin slightly concave, posterior, regularly convex ; antennae 14 segmented, II, V, and VI subequal, IV slightly shorter than these, III longer, up to twice IV, sometimes partially subdivided ; right mandible with posterior cutting edge of first marginal exposed beyond second, shorter than that of second marginal, molar plate deeply indented near base, with 8 ridges.

Cerci of ♀ slightly mamilliform conical shorter to equal in length to width across base.

Pilosity of vertex, one or two long bristle-like setae and sparsely scattered shorter hair-like setae, with a few more bristle-like setae around eyes and ocelli. (Text-fig. 118.)

Other characters given in generic diagnosis and discussion.

Measurements (18 specimens from 6 localities) in millimetres.

	Range	Mean
Head width across eyes	0.91-1.22	1.06
Greatest diameter of eye	0.29-0.34	0.31
Ocellus . . . . .	0.06-0.09 × 0.10-0.12	0.08 × 0.11
Ocellus to eye . . . . .	0.10-0.14	0.12
Width of pronotum . . . . .	0.88-1.23	1.09
Length of pronotum . . . . .	0.60-0.88	0.75
Length of hind tibia . . . . .	1.25-1.54	1.41
Length of fore wing . . . . .	6.10-9.00	7.42

*Soldier.* Head capsule ferruginous orange, slightly darker posteriorly, to dark chestnut brown, nearly black posteriorly, nose ferruginous to pitch black with reddish tip. Pronotum, antennae, and abdominal tergites brown, femora of legs pale brown, tibiae and tarsi yellow. Abdominal sternites yellow-brown.

Head capsule in plan view strongly constricted behind antennae, posterior margin regularly to somewhat angularly rounded, often sulcate in the middle to varying degree ; nose near cylindrical to moderately conical. In profile dorsal surface of nose straight to well behind antennal socket, or slightly sinuate with small hump at base of nose, with or without slight indentation in front of raised and rounded posterior lobe of head ; nose shorter to slightly longer than rest of head capsule measuring from hind margin of antennal socket, angle of nose cone 5-17 degrees ; antennae 13 segmented, II short, IV, V, and VI progressively slightly longer, III longer up to twice II. Head setae confined to 6-8 at nose tip, one bilaterally placed pair on vertex and sometimes another at base of nose.

Abdominal tergites with very sparse scattered minute hair-like setae slightly longer on posterior margins ; sternites with denser short setae and longer setae up to 3 times length of short on posterior margins.

Measurements (30 specimens from 19 localities) in millimetres.

	Range	Mean
Head length to tip of nose . . . . .	1·15-1·50 . . . . .	1·36
Head width . . . . .	0·59-0·86 . . . . .	0·75
Depth of head capsule . . . . .	0·43-0·61 . . . . .	0·54
Width of pronotum . . . . .	0·38-0·47 . . . . .	0·43
Length of pronotum . . . . .	0·15-0·21 . . . . .	0·17
Length of hind tibia . . . . .	0·94-1·23 . . . . .	1·06

*Variation.* In the imago the variation was chiefly in size with proportions fairly constant. The soldiers have proved highly variable in size, colour, and head profile, but the range has been found indivisible. Angularity of the posterior margin of the head is commoner at the western end of the distribution range.

The relationship of this species to *F. coatoni* and *F. contractus* are mentioned under those species.

*Type Material.* GUINEA : Kakoulima (9° 40' N., 13° 25' W.), 12.viii.1912 (*F. Silvestri*), syntype soldiers, type colony, *F. tenebricus* (*Silvestri*), *Silvestri Coll.*, Lab. Zool. Sc. Agr., Portici, and A.M.N.H.

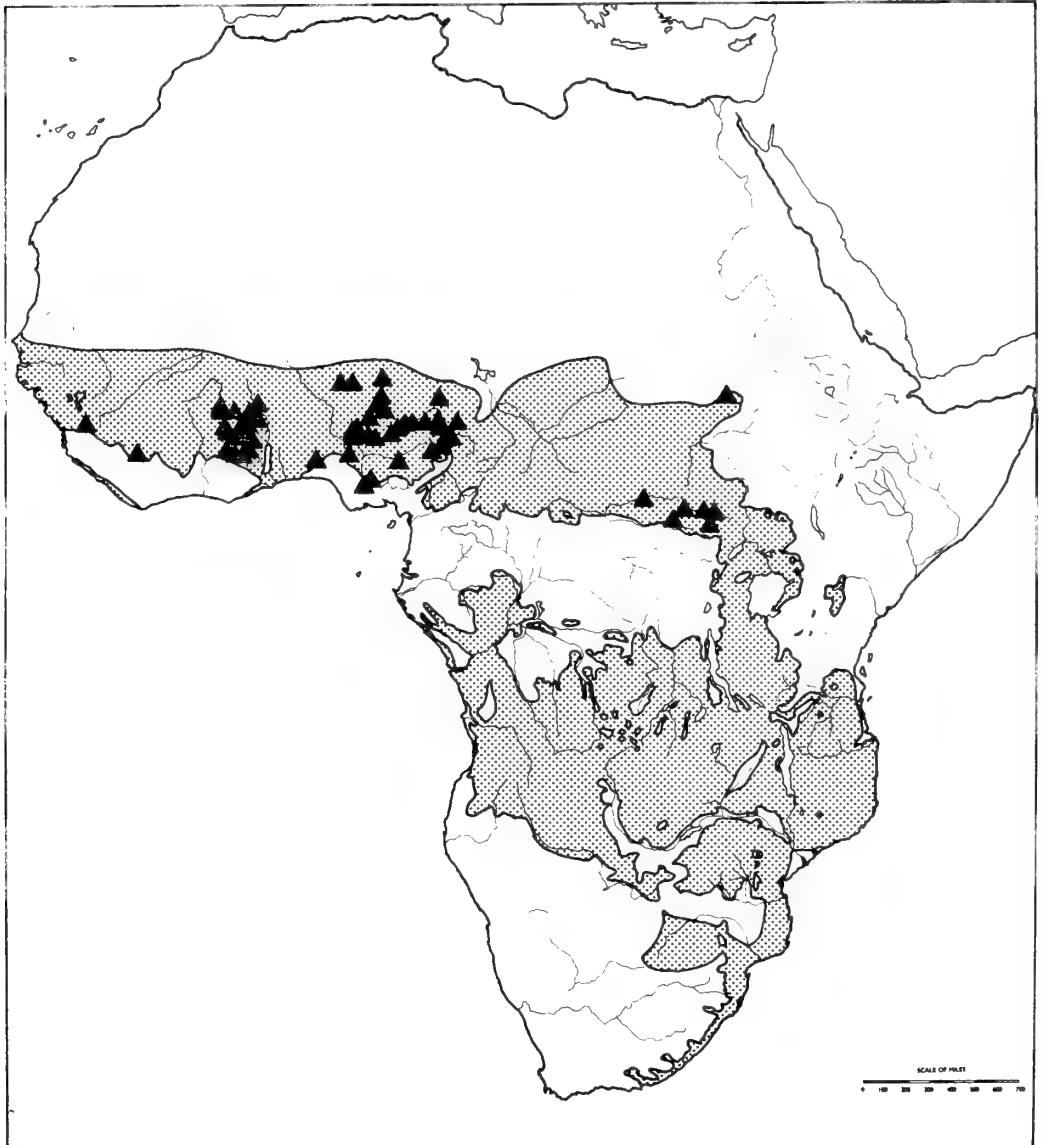
CONGO : near Yakuluku (4° 20' N., 28° 50' E.), xii.1911 (*H. Lang, J. P. Chapin*) paratype soldier, type colony, *F. suffuscus* (*Emerson*), A.M.N.H.

*Other material.* GUINEA : Nimba Mountains, 1957, 10 vials (*M. Lamotte*), Inst. Franc. d'Afr. Noire, Dakar.

GHANA : Yeji, 10.xii.1926 (*A. W. J. Pomeroy*) ; 60m. N. of Ejura on Tamale Road, 24.ii., 12m. S. of Tamale on Kumasi Road, 26.ii., 4m. from Daboya on Tamale Road, 28.ii., 55m. from Tamale on Larabanga Road, 3.iii., 4-15m. from Gambaga on Walewale Road, 5-7.iii., 25m. S.E. of Gambaga on Yendi Road, 14m. from Gambaga on Bawku Road, 6.iii., 20m. from Bolgatanga on Tamale Road, 9.iii., 10m. N. of Bawku, 11.iii., 11m. from Tumu on Navrongo Road, 15.iii., 40m. from Tumu on Lawra Road, 16.iii., Lawra and 9m. N. of Lawra on Nandom Road 18.iii., 6m. N. of Wa on Lawra Road, 19.iii., 24-52m. S. of Wa on Bole Road, 20.iii., 3-23m. from Larabanga on Bole Road, 21-22.iii., 6m. N. of Wangasi-Turu on Tamale Road, 27.iii., 7m. from Nkoranza on Ejura Road, 28.iii., and 25m. N. of Wenchi on Bamboi Road, 30.iii.1959 (*W. A. Sands*).

NIGERIA : Western Region ; Olokemeji, xi.1912 (*F. Silvestri*), A.M.N.H. Eastern Region ; Onitsha, 20.i. and 5.ix.1957 (*W. Wilkinson*) ; 7-12m. from Enugu on Onitsha Road, 2-3.iii.1958 (*W. A. Sands*). Northern Region : 20m. from Zaria on Funtua Road and 30m. from Funtua on Yashi Road, 14.xi., 25m. from Katsina on Daura Road, 19.xi., 71m. from Gusau on Sokoto Road, 22.xi., 2 vials, 45m. from Sokoto on Argungu Road, 23.xi., Zaria, 4.xii., 33m. from Kaduna on Zungeru Road, 20.xii., 16m. S. of Zungeru on Bida Road, 21.xii., Bida, 23.xii., 39m. from Abuja on Bida Road, 24.xii., and Gwagwa Forest near Abuja 28.xii.1956, 5m. from Jos on Bukuru Road, 6.ii., 42-7m. from Jos on Wamba Road, 8.ii., 40m. from Jos on Bauchi Road 11.ii., Bauchi, and 25m. from Bauchi on Jos Road, 12-13.ii., 18, 20, and 29m. from Jos on Pankshin Road, 14.ii., 3.iv., and 25.vii., 16m. from Kaduna

on Zungeru Road, 15.ii., 39m. from Bauchi on Gombe Road 6m. from Gombe on Hinna Road, 9.v., Tula, 37m. S.E. of Gombe, 10.v., 2 vials, 10m. S. of Mayo Faran, 14.v., 34-54m. from Yola on Jalingo Road, 14-16.v., 60m. S.W. of Jalingo on Takum Road 19.v., 15m. N.N.W. of Tibak, Schebschi Mountains, 24.v., 80m. from Yola on Biu Road, 28.v., 32m. from Damaturu on Potiskum Road, 5.vi., and 5m. S. of Yashi on Funtua Road, 3.x.1957, 24m. from Gboko on Makurdi Road, 25.ii., and 22m. from Kabba on Ikole Road, 11.iii.1958 (*W. A. Sands*).



MAP 17. *Fulleritermes tenebricus*. Vegetation types : 8, 16, 17, and 20.

CENTRAL AFRICAN REPUBLIC : Haut Mbomu, Zemio, iii.1948 (*N. A. Weber*), A.M.N.H.

CONGO : Niangara, 20.v.1913 (*H. Lang, J. P. Chapin*) ; Dika,\* 26.iii.1925 (*H. Schouteden*), A.M.N.H. ; Tora, 26.ix.1926, 2 vials (*H. Burgeon*) ; Garamba Nat. Park, 6.vii.1951 (*Miss. de Seager*), Inst. des Parcs Nat. du Congo, Brussels.

SUDAN : Delami, 20.v.1927 (*W. Rutledge*).

A total of 86 nest series were examined and material is in the British Museum (Natural History) except where otherwise stated.

*F. tenebricus* is a species occurring in the Guinean savannah vegetation zones from the forest edge to the relatively dry Sudan type (Keay *et al.*, 1959, vegetation types 8, 16, 17, and 20). In this respect its distribution north of the Congo forest is as wide as the combined distributions of its two congeners *F. coatoni* and *F. contractus* in similar vegetation zones to the south of the forest block. It sometimes constructs a small hard earth mound with dark carton interior but is more commonly found inhabiting parts of mounds constructed by other genera such as *Cubitermes*, *Trinervitermes* and *Macrotermes*. It is also found under stones, in dead branches on trees, and in narrow earth runways which it constructs in foraging.

### **RHADINOTERMES gen. n.**

(*Rhadinus*, Gr., " tapering ")

Type-species, *Eutermes coarctatus* Sjöstedt, 1902a : 304.

*Imago*. Left mandible with apical tooth as long as first marginal or slightly shorter, distance from apical to first marginal about one-third distance between first and third marginals (left mandible index 32-36), second marginal obsolete, cutting edge between first and third marginals entire ; right mandible with apical and first marginals subequal as left, first marginal with small subsidiary " tooth " near basal junction with apical, and with posterior cutting edge exposed beyond anterior edge of second marginal longer than posterior cutting edge of latter ; right molar plate in surface view with weak indentation near basal end of anterior margin, posterior margin extending in rounded flange, first molar ridge forming a stout tooth, 6-7 remaining ridges diminishing towards base (Text-figs. 182, 183). Fontanelle, very narrow slit-like, scarcely bifurcate anteriorly in ♂, more clearly in ♀, slightly to distinctly paler than head.

*Soldier*. Monomorphic. Nose conical. Vestigial mandibles with small points. Head capsule sharply constricted behind antennae, posterior lobe commonly only about one-fourth wider than anterior. Antennae 12 segmented.

This genus is proposed to accommodate the single African mainland species *coarctatus* Sjöstedt, hitherto included, because of similarities in the soldier castes, in the Malagasy genus *Coarctotermes* of which the type-species is *Eutermes clepsydra* Sjöstedt, 1904 : 108. The imago differs from *Rhadinotermes coarctatus* in a number of features. The left mandible index is 30, and the third marginal tooth in fresh

\*A note on the locality Dika, recorded by Emerson (1928) as 7° 50' N., 18° 45' E., i.e. near Ft. Crampel, C. Afr. Rep.

Other localities of this name exist at 4° 25' N., 21° 41' E.; 5° 59' N., 15° 13' E.; 5° 33' N., 20° 00' E., in C. Afr. Rep., at 4° 36' N., 28° 36' E. in Sudan, and in Congo at 4° 17' N., 27° 42' E., and 4° 09' N., 27° 40' E., one of these last probably being that known to *H. Schouteden*.

unworn specimens has been completely absorbed in the cutting edge joining it to the first marginal. The fontanelle is a rounded equilateral triangle with long side arms. It is a very much larger insect, having a head width across eyes of approximately 2mm., and much more prominent eyes and ocelli. The posterior margin of the pronotum is deeply indented. In its general appearance and superficially in its ecology, *R. coarctatus* closely resembles the genus *Fulleritermes* Coaton, 1962 : 151-4 from which it has recently been separated on the basis of the presence in the latter of a notch in the cutting edge in front of the third marginal tooth of the left mandible. This is discussed further under that genus. Other differences such as the greater proportionate length of this cutting edge and also that of the right first marginal in *Rhadinotermes*, and the much less prominent molar regions indicate that this genus is probably adapted to a somewhat different ecological niche, especially since it has been recorded from the same localities as members of *Fulleritermes*.

It is convenient to include *R. coarctatus* in the keys to *Fulleritermes*. The account of distribution follows the specific description.

***Rhadinotermes coarctatus* (Sjöstedt) comb. n.**

(Text-figs. 112, 113, 117, 154-156, 181-183, 225, 226 ; Map 18)

*Eutermes coarctatus* Sjöstedt, 1922a : 304. Type locality : NYASALAND, Zomba.

*Eutermes* (*Coarctotermes*) *coarctatus* Sjöstedt ; Holmgren, 1912 : 65.

*Coarctotermes coarctatus* (Sjöstedt) Fuller 1922 : 118. [Unjustified emendation of generic name.]

*Coarctotermes coarctatus* (Sjöstedt) Sjöstedt, 1926 : 355.

*Coarctotermes coarctatus* (Sjöstedt) ; Sands, 1957 : 14.

*Imago*. Head capsule very dark brown to pitch black, postclypeus and antennae dark sepia brown. Labrum sepia brown, shading to yellow at tip. Pronotum as head capsule, meso- and metanota, pleural and ventral thoracic sclerites dark sepia brown. Legs dark sepia brown apart from paler tips of tibiae and yellow tarsi. Abdominal tergites dark sepia brown, outer ends paler, sternites sepia brown, pale brown in mid-line. Wings translucent pale brown, venation yellow-brown, radius sector with brown streak along posterior margin.

Posterior margin of head almost semi-circular behind eyes ; eyes not prominent, small relative to head width W/E index 3.4-3.8, somewhat angularly ovoid ; ocelli small, oval, separated from eyes by about  $1\frac{1}{2}$  times own least diameter ; postclypeus strongly inflated, width 2.2 times length, anterior margin slightly concave, posterior, indistinct, convex ; antennae 15 segmented, II, IV, and V subequal in length, II thinner, III longer than these.

Cerci of ♀ shorter than width across base, mamilliform.

Pilosity of vertex scattered rather long yellow bristle-like setae rest of body with pale yellow hair- and bristle-like setae. Other characteristics described in generic diagnosis.

Measurements of 8 specimens from 3 localities were given in an earlier paper (Sands, 1957), these being all the material known apart from one nest series described by Fuller (1922) and falling within this size range.

*Soldier*. Head capsule sepia brown to pitch black, nose pitch black with reddish tip. Pronotum, antennae and abdominal tergites sepia brown. Legs, femora brown, tibiae and tarsi yellow to pale brown. Abdominal sternites yellow-brown to brown.

Head profile raised and rounded behind constriction, more or less straight in front. Nose equal in length or shorter than rest of head capsule, measuring from hind margin of antennal

socket, angle of nose cone 10–20 degrees; antennae 12 segmented, II short, IV and V longer, and III subequal or slightly longer than these. Setae on head confined to four at nose tip and bilaterally placed pair on vertex, with a few short curved setae scattered on dorsal surface of head including nose.

Abdominal tergites with very short sparsely scattered setae, and longer setae on posterior margins; sternites with more numerous short setae and longer setae on posterior margins 2–3 times length of short. Remaining characteristics given in generic diagnosis.

Measurements (25 specimens from 16 localities) in millimetres.

	Range	Mean
Head length to tip of nose . . . . .	1·17–1·39 . . . . .	1·28
Head width . . . . .	0·54–0·66 . . . . .	0·60
Depth of head capsule . . . . .	0·40–0·49 . . . . .	0·45
Width of pronotum . . . . .	0·33–0·38 . . . . .	0·36
Length of pronotum . . . . .	0·15–0·18 . . . . .	0·17
Length of hind tibia . . . . .	0·92–1·10 . . . . .	1·01

*Variation.* Imago variation was very slight in the small amount of material known. In the soldier caste small variations in length and angle of nose occur.

The relationships of this species are discussed under the generic heading. It is unlikely to be confused with any species other than small dark specimens of *Fulleritermes contractus*, and then only then in the case of the soldier caste collected alone.

Material (additional to that recorded in Sands, 1957). NYASALAND: Zomba, 1899 (*Cameron*), syntype soldiers and workers, *R. coarctatus* (*Sjöstedt*), A.M.N.H. (other syntypes in Mus. Cambridge, and Naturhist. Riksmus., Stockholm).

NORTHERN RHODESIA: Choma, 16.i.1957, 2 vials, Magoye, 17.i.1957, Lusaka, 19.i.1957, Broken Hill, 20.i.1957 (*W. G. H. Coaton*).

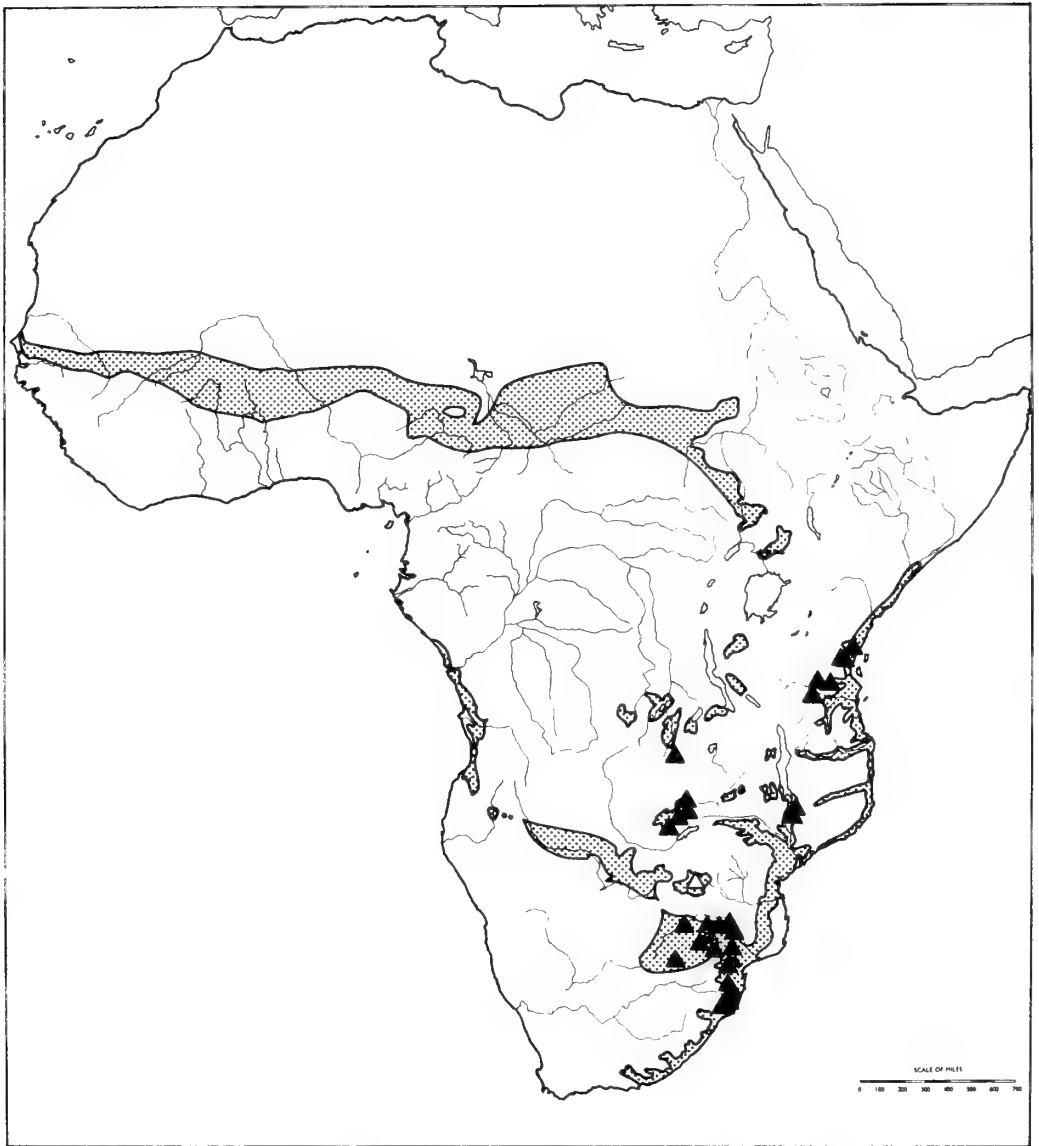
CONGO: Keyberg, 11° 47' S., 27° 25' E., 21.iv.1948 (*A. E. Emerson*), A.M.N.H.

REPUBLIC OF SOUTH AFRICA: Transvaal; Brits, no date (*H. K. Munro*); Sibasa, 5.viii.1959 to 13.x.1960, 8 vials, Barberton, 23–27.iv.1960, 3 vials, Pietersberg, Lydenberg, 5.x.1960, 3 vials, Letaba, 8–16.x.1960, 5 vials, Nelspruit, 21.x.1960, 3 vials, and Soutpansberg, 10.xii.1960 (*W. G. H. Coaton*, *P. C. Joubert*, and *J. L. Sheasby*); Pilgrims Rest, 3.ix.1960, 2 vials (*A. Boonzaaier*); Barberton, 7.x.1960 (*H. P. Nieman*); Potgietersrus, 21.xii.1961 (*P. le S. Milstein*); Natal; Ingwavuma, 13.xii.1959 (*J. Nel*); Ngotshe, Nongoma, 10.i.1962, 5 vials, Mahlabatini, 12.i.62, 2 vials (*J. L. Sheasby*).

SWAZILAND: Hlatikulu, 24.x.1960, 3 vials (*W. G. H. Coaton*).

A total of 56 nest series were examined and material is in the British Museum (Natural History) unless otherwise stated.

*R. coarctatus* has been found in the nests of other species, under stones, and occasionally building a small mound structure of its own. It is restricted to eastern Africa, and its distribution appears to approximate most closely to the rather drier vegetation types coming between the *Brachystegia-Julbernardia* woodland and the *Acacia-Commiphora* steppes, grouped in *Keay et al.* (1959) under vegetation type 20. It also occurs in the coastal savannah-forest mosaic, type 9, which has similar rainfall to type 20. These vegetation types are more widely distributed in fact than can be shown on the map, as small areas fringing the other types around mountain blocks and plateaux, and in valleys.



MAP 18. *Rhadinotermes coarctatus*. Vegetation types : 9 and 20.



**MYCTEROTERMES gen. n.**

(Mycteros, Gr., "beak")

Type-species, *Mycterotermes meringocephalus* sp. n.*Imago.* Unknown.

*Soldier.* Dimorphic. Major soldier, nose short, cylindrical, vestigial mandibles with small but distinct points showing trace of marginal as well as apical tooth; head capsule very weakly constricted behind antennae, vertex and nose with short but distinct bristle-like setae. Minor soldier, as major soldier, except nose weakly conical, head capsule more definitely constricted behind antennae. Antennae probably 13 segmented in major, 12 segmented in minor soldier.

There is no doubt that these specimens belong to a new genus of some phylogenetic importance, being close to but more primitive than *Trinervitermes*, and possibly even ancestral to it. The distinguishing features given in the diagnosis have much in common with the Neotropical genus *Diversitermes* and it appears most probable that *Trinervitermes* arose from this branch of the hypothetical phylogenetic tree in which Ahmad (1950) placed *Velocitermes*, *Tenuirostritermes*, and *Ceylonitermes*, and to which I (Sands, 1957) added *Coarctotermes* sensu lat. (*Fulleritermes*, *Rhadinotermes*, and *Coarctotermes* s. str.). At least 3 of these genera have become adapted to grass feeding and two to grass storage convergently with *Trinervitermes*, occupying equivalent ecological niches in their respective zoogeographical areas (Neotropical, Ethiopian, and Malagasy). Other genera of similar habits and appearance from the Australian region have not been studied in detail but may also be related.

*Mycterotermes* is unlikely to be confused with any genus other than *Trinervitermes* in the area covered by this revision. Its occurrence in Western Aden brings it into the Ethiopian Zoogeographical Region.

***Mycterotermes meringocephalus* sp. n.**

(Text-figs. 388-395; Map 3)

*Imago.* Unknown.

*Soldiers.* Major; Head capsule orange-yellow, nose ferruginous. Antennae yellow, pronotum and abdominal tergites yellow-brown. Abdominal sternites and legs pale yellow.

Head capsule in plan view tapering slightly towards front, sides slightly sinuate behind antennae, posteriorly weakly sulcate in mid-line, nose cylindrical to near base. In profile level from tip of nose to downward curve at back of head, with slight hump at base of nose and very weak constriction behind antennae; nose distinctly shorter than rest of head capsule, measuring from hind margin of antennal socket. Antennae, broken, II and IV subequal and shorter than V, III nearly twice as long as II.

Abdominal tergites with sparse fine minute setae, sternites with sparse shorter setae and longer setae on posterior margins.

Minor; as major soldier except antennae, II shorter than III, IV, and V which are subequal.

Remaining characters given in generic diagnosis.

Measurements (Unique holotype major soldier, 2 minor soldiers).

	Major soldier	Minor soldiers
Head length to tip of nose	1.63	1.22
Head width	1.00	0.54
Depth of head capsule	0.59	0.38

	Major soldier	Minor soldiers
Width of pronotum	0.51	0.41
Length of pronotum	0.23	0.18
Length of hind tibia	both broken	0.94-1.00

Since this is a monotypic genus, its relationships have already been discussed under the generic heading. There is a slight possibility that the imagos described as *Trinervitermes saudiensis* sp. n. from Jiddah belong to this species, in view of their unusually wide fontanelle and small eyes, but this cannot be settled without further collecting.

Holotype, major soldier, ADEN PROTECTORATE : Burum, W. of Mukalla, 12.xii. 1951 (*W. V. Harris*, coll. no. 796), in B.M.(N.H.).

Morphotype and one paratype minor soldiers, same data as holotype, also in B.M.(N.H.).

It is recorded as found with *Trinervitermes arabiae* Harris in small loose sand heaps over narrow exit holes.

### **TRINERVITERMES** Holmgren

*Eutermes* (*Trinervitermes*) Holmgren, 1912 : 59 [Subgenus of *Eutermes* Heer].

*Trinervitermes* Fuller, 1921 : 19 [full generic status]. Type species, by subsequent designation (Sjöstedt, 1926 : 325), *Trinervitermes trinervius* (Rambur, 1842).

Holmgren (1912) on first creating the subgenus, *Eutermes* (*Trinervitermes*) included a total of sixteen species, but did not designate the type-species. Fuller (1921) raised *Trinervitermes* to full generic status, consequent on the substitution by Banks (1919) of the name *Nasutitermes* for *Eutermes* s. str. as used by Holmgren (1912), but again, did not designate a type-species. *Termes trinervius* Rambur, 1842 was designated by Sjöstedt (1926) as type-species of the genus *Trinervitermes*. This choice was unfortunate because the unique holotype of *T. trinervius* (Ramb.) is a pinned dried ♂, from which the head capsule has been removed or lost, and the species is the most confused in the genus as a result of subsequent misidentifications. There is however no doubt of its correct assignment to the genus, in spite of its somewhat uncertain specific identity. The usage of *Trinervitermes* as a genus or subgenus was subject to some variation between 1921 and 1951, but it is now generally accepted as having full generic status.

*Imago*. Left mandible with apical tooth as long as or slightly shorter than first marginal, distance from apical to first marginal slightly less to slightly more than one-third distance between first and third marginals (left mandible index 0.29-0.41), second marginal obsolete, cutting edge between first and third marginals straight ; right mandible with apical and first marginal subequal as left, cutting posterior edge of first marginal distinctly longer than that of second marginal, molar plate with no marked irregularity of outline in surface view, and 5-9 transverse ridges, first much larger than rest, forming a blunt tooth, the more posterior ridges less prominent (Text-figs. 185-195). Postclypeus length slightly less to slightly more than half width. Fontanelle pale coloured, slit-like, forked anteriorly, to approximately triangular, lateral arms

dilated terminally or tapering. Pilosity of head capsule rather evenly fine, arising from small sockets of regular size with a few larger scattered sockets among them.

*Soldier.* Dimorphic in most species, with traces of subdivision of "major" and "minor" or almost complete inter-gradation occurring in some colonies or local populations of some species. Nose cylindrical to strongly conical. Vestigial mandibles usually without points. Head capsule without any constriction behind antennae, and devoid of prominent setae except on nose (major soldier only, minor soldier often has constricted head capsule).

The longer cutting edges of the imago mandibles, and the right molar plate, distinguish this genus from *Nasutitermes*. The only genus closely resembling *Trinervitermes* in this respect is *Baucaliotermes* gen. nov., included in *Trinervitermes* by Emerson (1960) but differing in having monomorphic soldiers and certain other features.

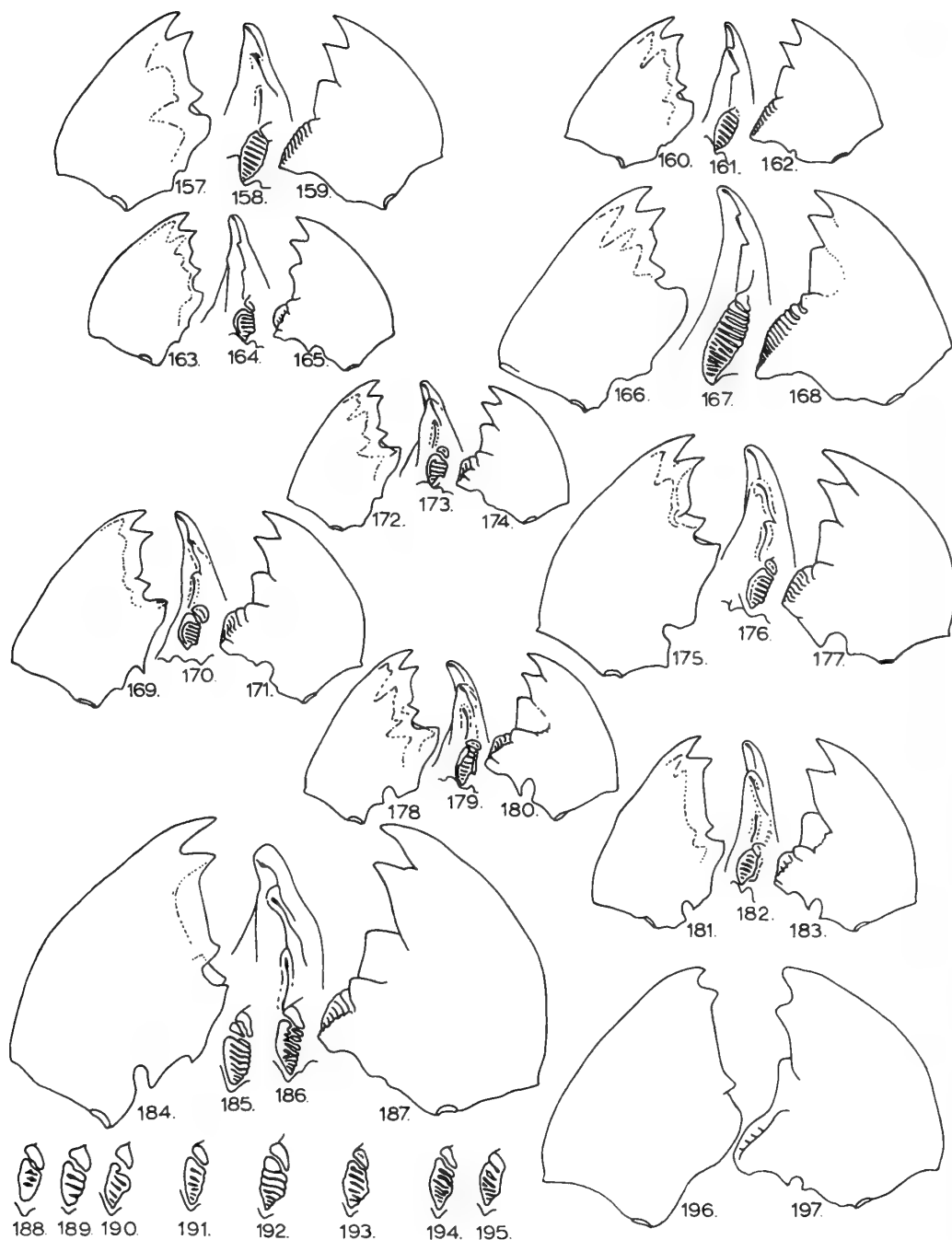
The genus is mainly grass and leaf feeding and occurs only in the savannah and steppe vegetation types, (Keay *et al.*, 1959). Wherever agricultural practices have degraded the vegetation to grassland in the fringes of the forest zones, *Trinervitermes* has been found, though it has not been recorded from similar areas deep in the forest. Conversely, in equatorial western Uganda, the recent degradation of a forest barrier to grassland has not yet led to the mingling of the West African species to the north of it, with the East and Central African species to the south.

There are four groups of species which are recognizable as differing in their geographical distribution. The "West African" group reaches northern Uganda and the Sudan. The "East African" group includes species both widespread (*T. rapulum* and *T. dispar*) and more restricted (*T. gratiosus* and *T. bettonianus*). There is a single "Central African" species, *T. rhodesiensis*, and one in South Africa, *T. trinervoides*. The distributions of the East, Central, and South African species overlap to a considerable extent, as can be seen from a comparison of maps 20, 25, 26, and 29.

*Trinervitermes* is the most difficult genus in the Nasutitermitinae, and perhaps in the order Isoptera. In both imagos and soldiers there is wide variation, and few reliable taxonomic characters; some are of value for one or two species, and valueless for the rest. The majority of those used by earlier workers in the genus have been abandoned as useless, and a number of new features are used for the first time. Unlike the genus *Nasutitermes*, the species are represented by numerous specimens.

An interesting result is that the localised operation of distinctive genes or gene complexes has been observed in certain species, for example: the partial or complete suppression of the outer corners of the imago pronotum, or the development of unusually large ocelli. Both of these occurred in a number of colonies of *T. dispar* from the same or nearby localities.

In the case of the soldier caste, only the major soldiers are identifiable to species. It would be possible to key the minor soldiers to groups of species, but these would be too large to be of practical value; even in the case of the major soldiers, the key is based on the characters of the majority, since there are specimens of several species which cannot be reliably identified in the absence of their imago. On the other hand, some species are more readily separated in the soldier caste than in the imago.

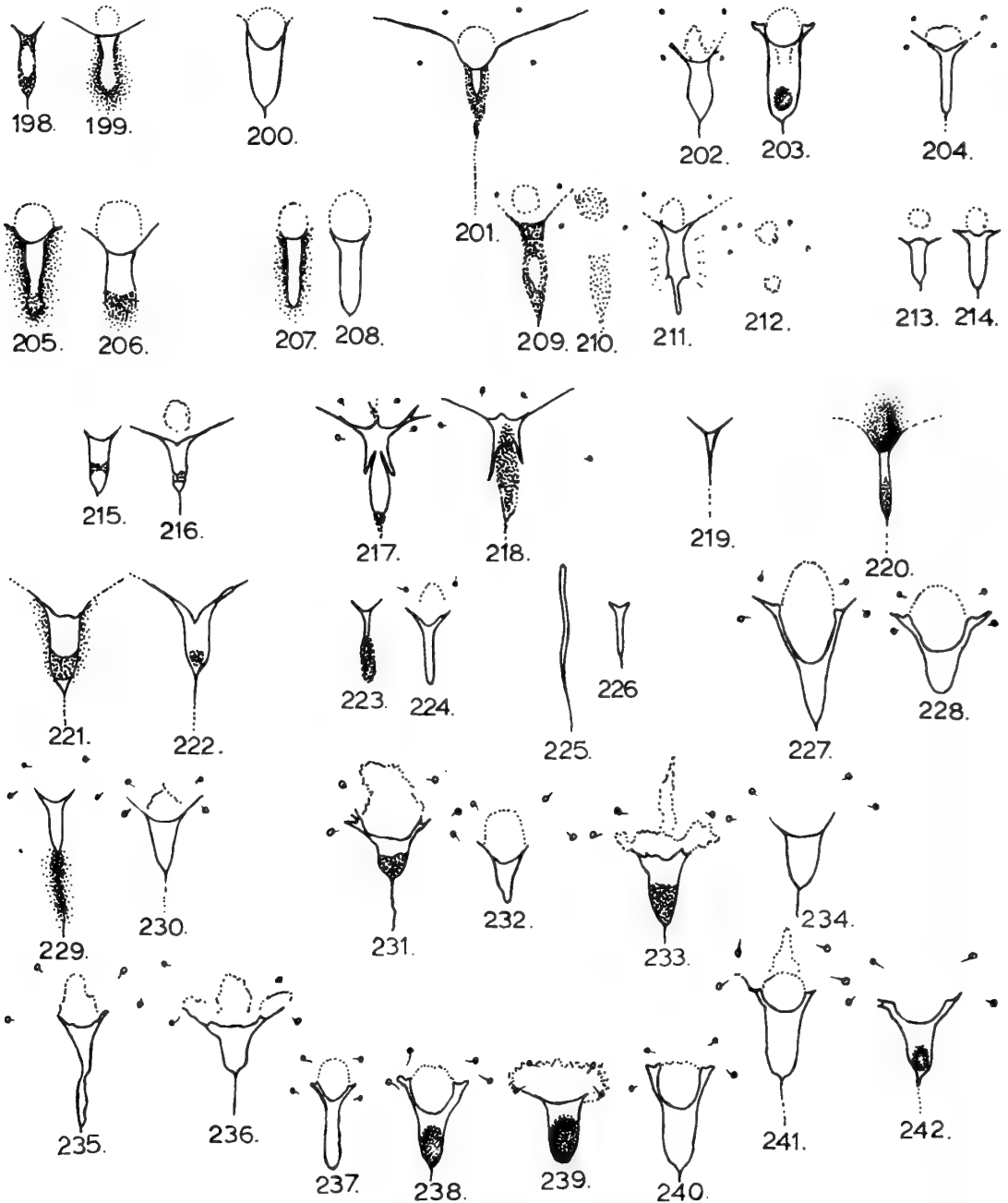


FIGS. 157-197: Imago mandibles of "Procornitermes branch", showing details of right molar plate. 157-159, *Nasutitermes arborum*; 160-162, *N. elegantulus*; 163-165, *Leptomoxotermes doriae* (late nymph); 166-168, *Grallatotermes africanus*; 169-171, *Fulleritermes coatoni*; 172-174, *F. contractus*; 175-177, *F. mallyi*; 178-180, *F. tenebricus*; 181-183, *Rhadinotermes coarctatus*; 184-187, *Trinervitermes trinervoides*; 188-190, *T. bettonianus*; 191, *T. dispar*; 192, *T. graciosus*; 193, *T. rapulum*; 194, 195, *T. rhodesiensis*; 196, 197, *Baucaliotermes hainesi*.

## KEY TO SPECIES

## IMAGOS

- 1 Ocellus separated from compound eye by more than two-fifths of own width (i.e. shortest diameter) . . . . . 2  
 - Ocellus separated from compound eye by two-fifths of own width or less . . . . . 4
- 2 Frons usually with two shallow diverging depressions in front of fontanelle. Smaller, head width across eyes (W), 1.45-1.83; greatest diameter of compound eye (E), 0.43-0.58; hind tibia length ( $T_3$ ), 1.81-2.24 . . . . . 3  
 - Frons without such depressions. Larger, W, 1.61-2.03; E, 0.42-0.56;  $T_3$ , 2.02-2.47 . . . . . *trinervoides* (p. 132)
- 3 Fontanelle with short lateral arms. Compound eye larger in proportion to head width, W/E index 3.0-3.5. Ocellus separated from eye by up to half own width. Female cerci longer than basal breadth . . . . . *rapulum* (p. 110)  
 - Fontanelle lateral arms long, reaching almost half way to ocelli. W/E index 3.5-3.9. Ocellus separated from eye by half own width or more. Female cerci as long as basal breadth . . . . . *saudiensis* (p. 120)
- 4 Antennae 15-16 segmented . . . . . 5  
 - Antennae 17-18 segmented . . . . . 14
- 5 Scent gland on fifth abdominal sternite of female large, over 1.0mm. wide, over 0.25mm. long; that of male smaller, approximately as female of other species . . . . . 6  
 - Scent gland on fifth abdominal sternite of female smaller, under 0.9mm. wide, under 0.23mm. long; that of male, smaller than female . . . . . 7
- 6 Molar plate of right mandible with 5-6 ridges, posterior ridges obsolescent, sometimes unevenly shaped. Smaller, W, 1.55-1.82; E, 0.47-0.59;  $T_3$ , 1.98-2.43. Antennae 15 segmented, sometimes with a basal segment partially subdivided . . . . . *bettonianus* (p. 84)  
 - Molar plate of right mandible with 8-9 ridges. Larger, W, 1.80-1.96; E, 0.58-0.60;  $T_3$ , 2.32-2.50. Antennae, 63% of specimens 16 or more segmented . . . . . *gratiosus* (p. 97)
- 7 Antennae 16 segmented or if 15, with one or more basal segments partially subdivided . . . . . 8  
 - Antennae 15 segmented . . . . . 10
- 8 Vertex with three diverging pale streaks or patches on darker ground colour. W. Africa, N. Congo, N. Uganda, Sudan . . . . . *togoensis* (p. 122)  
 - Vertex without such streaks, though sometimes clouded or patched with paler colour in one area. East Africa, S. Congo, Central and S. Africa . . . . . 9
- 9 Frons usually with two shallow diverging depressions anterior to fontanelle. Postclypeus, width 1.9-2.2 times length . . . . . *rapulum* (p. 110)  
 - Frons without such depressions, though sometimes with single median shallow depression. Postclypeus, width 2.2-2.5 times length . . . . . *rhodesiensis* (p. 114)
- 10 Compound eye, greatest diameter under 0.50 . . . . . 11  
 - Compound eye, greatest diameter 0.50 or more . . . . . 12
- 11 Frons usually with two shallow diverging depressions in front of fontanelle; fontanelle short broad Y-shaped or U-shaped, margins often indistinct. Postclypeus, width 1.9-2.2 times length. Larger, W, 1.45-1.83; E, 0.47-0.58;  $T_3$ , 1.81-2.20 . . . . . *rapulum* (p. 110)  
 - Frons without paired depressions, sometimes with single median shallow depression in front of fontanelle, sometimes flat; fontanelle slender Y-shaped, sometimes with dark patch at posterior end. Postclypeus, width 2.1-2.5 times length. Smaller W, 1.35-1.58; E, 0.43-0.50 (one only recorded);  $T_3$ , 1.63-1.99 . . . . . *dispar* (p. 87)



FIGS. 198-242: Imago fontanelle. 198, ♂, 199, ♀, *Nasutitermes arborum*; 200, ♀, *N. chrysopleura*; 201, ♂, *N. camerunensis*; 202, ♂, 203, ♀, *N. elegantulus*; 204, ♀, *N. fulleri*; 205, ♂, 206, ♀, *N. infuscatus*; 207, ♂, 208, ♀, *N. kempae*; 209, 210, ♂, 211, 212, ♀, *N. latifrons*; 213, ♂, 214, ♀, *N. lujae*; 215, ♂, 216, ♀, *N. schoutedeni*; 217, ♂, 218, ♀, *Grallatitermes africanus*; 219, ♂, ♀, *Fulleritermes coatoni*; 220, ♂, ♀, *F. contractus*; 221, ♂, 222, ♀, *F. mallyi*; 223, ♂, 224, ♀, *F. tenebricus*; 225, ♂, 226, ♀, *Rhadinotermes coarctatus*; 227, ♂, 228, ♀, *Trinervitermes bettonianus*; 229, ♂, 230, ♀, *T. dispar*; 231, 232, ♂, 233, 234, ♀, *T. geminatus*; 235, ♂, 236, ♀, *T. graciosus*; 237, 238, ♂, 239, 240, ♀, *T. occidentalis*; 241, ♂, 242, ♀, *T. oconomus*.

- 12 Frons usually with two shallow diverging depressions in front of fontanelle . . . . . 13  
 - Frons without such depressions, though sometimes with single median depression (see also 9 above) . . . . . **rhodesiensis** (p. 114)
- 13 Eye relatively smaller, W/E index 3.0-3.5. Postclypeus more inflated, width 1.9-2.2 times length. Ocelli separated from compound eyes by one-fifth to one-half own shortest diameter. East, Central, South Africa. . . . . **rapulum** (p. 110)  
 - Eye relatively larger, W/E index 2.6-3.0. Postclypeus less inflated, width 2.2-2.6 times length. Ocelli separated from compound eyes by one-tenth to one-fifth own shortest diameter. W. Africa, N. Congo, S. Sudan, N. Uganda **occidentalis** (p. 100)
- 14 Pilosity of "forehead" consisting of a "pelt" or "mat" of short, curved setae of even length, with scattered long setae 3-5 times longer than these (Text-figs. 383, 385). Scent gland on fifth abdominal sternite of female smaller, width usually under 0.9mm., length under 0.2mm. (some *T. trinervius* larger, approach the larger dimensions of *T. oeconomus*) . . . . . 15  
 - Pilosity of "forehead" uneven, setae generally straight or slightly curved, length variable from very short to long, not forming an even "pelt" (Text-fig. 384). Scent gland on fifth abdominal sternite of female larger, width over 1.0mm., length over 0.3mm. (some *T. geminatus* have more uneven pilosity, but these have the small scent gland on the fifth female abdominal sternite) . . . . . 16
- 15 Postclypeus, more strongly inflated, width 2.2-2.4 times length. Eyes larger in proportion to head width, W/E index 2.3-2.9. Cerci of female usually longer than basal breadth, some equal . . . . . **trinervius** (p. 127)  
 - Postclypeus, less inflated, width 2.4-2.8 times length. Eyes smaller in proportion to head width, W/E index 2.7-3.0. Cerci of female shorter than basal breadth, rarely equal . . . . . **geminatus** (p. 92)
- 16 Pilosity of "forehead" sparse and fine. Postclypeus more inflated, width 2.0-2.3 times length. Ocelli separated from eyes by one-sixth to two-fifths own shortest diameter. Cerci of female as long as basal breadth, or shorter. East Africa, S. Uganda, S. Congo, N. Angola . . . . . **gratiosus** (p. 97)  
 - Pilosity of "forehead" abundant and coarse (Text-fig. 384). Postclypeus less inflated, width 2.3-2.6 times length. Ocelli separated from eyes by one-fifteenth to one-quarter own shortest diameter. Cerci of female longer than basal breadth. W. Africa across to N. Uganda and Sudan . . . . . **oeconomus** (p. 105)

## SOLDIERS (MAJOR SOLDIERS ONLY)

- 1 Nose in profile cylindrical or weakly conical (angle of cone 0-14 degrees) . . . . . 2  
 - Nose in profile moderately to strongly conical (angle of cone 15-25 degrees) . . . . . 11
- 2 Nose tip distinctly hairy . . . . . 3  
 - Nose tip with four prominent setae at most, often fewer or none, and with a few minute, pale setae behind them, or none . . . . . 6
- 3 Antennae 13 segmented . . . . . 4  
 - Antennae 14 segmented . . . . . 5
- 4 Fontanelle large, 0.05mm. to over 0.1mm. across. Nose in profile more broadly conical towards base. Head capsule in plan view "shouldered" behind base of antennae (Text-figs. 282-289) . . . . . **occidentalis** (p. 100)  
 - Fontanelle small 0.03-0.05mm. across. Nose in profile evenly tapered to near base. Head capsule evenly rounded in plan view (Text-figs. 351-358, 376-378) **T. arabiae** (p. 82) and **togoensis** (p. 122)
- 5 Nose usually as long as or longer than rest of head capsule measuring from hind margin of antennal socket. South Africa, parts of South-Central Africa **trinervoides** (p. 132)  
 - Nose usually shorter than rest of head capsule, measuring from hind margin of antennal socket. West Africa, N. Congo, across to Sudan, N. Uganda . . . . . 12

- 6 Head capsule in plan view "shouldered" behind base of antennae . . . . . 7  
 - Head capsule outline various, not "shouldered" in front . . . . . 8
- 7 Head capsule in profile rising from base of nose above antennal socket in almost a straight line to near highest point, before downward curve to occiput. Nose always shorter than rest of head capsule, measuring from hind margin of antennal socket (Text-figs. 338-343) . . . . . **rapulum** (p. 110)  
 - Head capsule in profile scarcely rising in a curve from base of nose to behind antennal socket, then commencing convex curve to highest point, continuous with downward curve to occiput. Nose often equal, sometimes longer than rest of head capsule, measuring as above, sometimes shorter (Text-figs. 344-350) . . . . . **rhodesiensis** (p. 114)
- 8 Hind tibia under 1.39mm. in length . . . . . **dispar** (p. 87)  
 - Hind tibia over 1.39mm. in length . . . . . 9
- 9 Paler coloured, head capsule yellow to ferruginous, nose darker, orange to chestnut brown, with paler tip. West Africa, N. Congo, Sudan, N. Uganda . . . . . **oeconomus** (p. 105)  
 - Darker coloured, head capsule ferruginous to pitchy brownish black, nose darker than head, chestnut brown to jet black with red tip . . . . . 10
- 10 Head capsule in profile rising from base of nose in front of antennal socket more or less straight to highest point of head, nose always shorter than rest of head capsule. East Africa, Southern Congo, Angola . . . . . **gratiosus** (p. 97)  
 - Head capsule in profile scarcely rising in a curve to behind antennal socket, then convex to highest point. Nose often equal to or longer than rest of head capsule. West Africa, N. Congo, Sudan, N. Uganda . . . . . **trinervius** (p. 127)
- 11 Antennae 12-13 segmented. E. and Central Africa . . . . . **bettonianus** (p. 84)  
 - Antennae 14 segmented. W. Africa, N. Congo, Sudan, N. Uganda . . . . . 12
- 12 Middle abdominal tergites, seen in profile, with distinct (though minute) setae over entire surface. Colour of head capsule usually darker, ferruginous orange, to dark sepia brown, nose darker with red tip (Text-figs. 270-275) . . . . . **geminatus** (p. 92)  
 - Middle abdominal tergites, seen in profile, with setae so minute and pale as to appear absent except at high magnifications. Colour of head capsule usually paler, yellow to ferruginous, nose darker, orange to chestnut brown, with paler tip (Text-figs. 290-296) . . . . . **oeconomus** (p. 105)

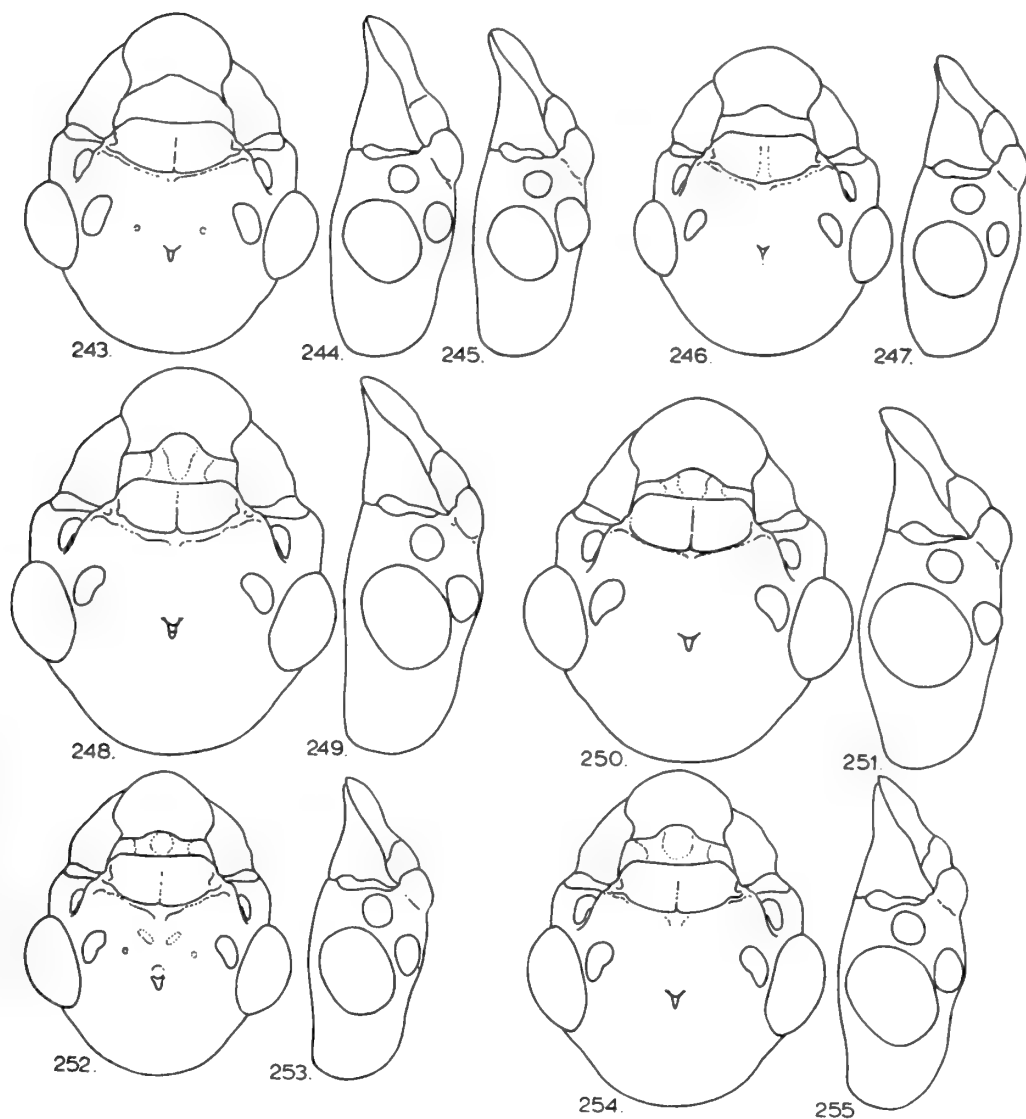
### *Trinervitermes arabiae* Harris

(Text-figs. 376-378 ; Map 3)

*Trinervitermes arabiae* Harris, 1957 : 430. Type locality : WESTERN ADEN PROTECTORATE, Dhala.

The soldier caste of this species is indistinguishable taxonomically from *T. togoensis* (Sjöstedt), but the nearest recorded locality of the latter is in Uganda, a distance of about 1,000 miles. In the absence of the imago caste and of examples of the soldier from intermediate localities, I consider it undesirable to reduce *T. arabiae* to a synonym at present. It may be noted however, that evidence from other genera shows that species typically found in the Guinean to Sahel vegetation zones (Keay *et al.*, 1959, types 8, 16, 17, 20, and 25) also occur in South-West Arabia.





FIGS. 243-255 : *Trinervitermes*, front and side views of imago head capsule. 243-245, *T. bettonianus* ; 246, 247, *T. dispar* ; 248, 249, *T. geminatus* ; 250, 251, *T. gratiosus* ; 252, 253, *T. occidentalis* ; 254, 255, *T. oeconomus*.

*Trinervitermes bettonianus* (Sjöstedt)

(Text-figs. 188-190, 227, 228, 243-245, 256-261; Map 29)

*Eutermes bettonianus* Sjöstedt, 1905 : 19. Type locality : KENYA, Athi River.*Eutermes segelli* Sjöstedt, 1907a : 26. Type locality : TANGANYIKA, Boma ngombe, Kilimanjaro area.*Eutermes (Trinervitermes) bettonianus* Sjöstedt ; Holmgren 1912 : 64.*Eutermes (Trinervitermes) segelli* Sjöstedt ; Holmgren 1913 : 348.*Eutermes (Trinervitermes) ruficeps* Holmgren, 1913 : 343. Type locality : TANGANYIKA, Amani.  
**syn. n.***Eutermes crassinasus* Sjöstedt, 1914 : 6. Type locality : MOZAMBIQUE, Zambesi, Villa Fontes.  
**syn. n.***Trinervitermes bettonianus* (Sjöstedt) Sjöstedt, 1926 : 332.*Trinervitermes segelli* (Sjöstedt) Sjöstedt, 1926 : 326.*Trinervitermes crassinasus* (Sjöstedt) Sjöstedt, 1926 : 326.*Trinervitermes ruficeps* (Holmgren) Sjöstedt, 1926 : 327.*Nasutitermes (Trinervitermes) bettonianus* (Sjöstedt) Emerson, 1928 : 492.*Trinervitermes bettonianus* (Sjöstedt) ; Snyder, 1949 : 323.*Trinervitermes crassinasus* (Sjöstedt) ; Sands, 1957 : 21.

*Imago.* Some additions to the previous description (Sands, 1957) are necessary. Eyes medium sized relative to head width, W/E index 2.9-3.4 ; ocelli separated from eye by one-eighth to one-third own least diameter ; postclypeus width 2.0-2.5 times length ; molar plate of right mandible with 5-6 ridges, posterior ridges somewhat atrophied.

Pale coloured "scent" gland on anterior margin of fifth abdominal sternite of ♀ very large, 1.07-1.33mm. wide, 0.28-0.51mm. long ; cerci of ♀ slightly shorter to slightly longer than width across base, conical or slightly mamilliform. Pilosity of vertex uneven, not forming a "pelt" or "mat".

Measurements (34 specimens from 13 localities) in millimetres.

	Range	Mean
Head width across eyes	1.55-1.82	1.68
Greatest diameter of eye	0.47-0.59	0.53
Ocellus . . . . .	0.20-0.24 × 0.22-0.31	0.21 × 0.26
Ocellus to eye . . . . .	0.03-0.06	0.04
Width of pronotum . . . . .	1.39-1.85	1.57
Length of pronotum . . . . .	0.88-1.22	1.03
Length of hind tibia . . . . .	1.98-2.43	2.13
Length of fore wing . . . . .	14.2-22.3	17.95

*Soldiers.* The range of variation now includes the more rounded head capsule in plan view previously ascribed to *T. crassinasus*. Antennae 12-13 segmented, 4 out of 5 with 12.

Measurements (Major soldier, 119 specimens from 35 localities ; minor soldier, 40 specimens from 25 localities) in millimetres.

<i>Major Soldiers</i>		Range	Mean
Head length to tip of nose . . . . .		1.93-2.49	2.21
Width of head . . . . .		0.97-1.43	1.20
Depth of head . . . . .		0.72-1.07	0.90
Width of pronotum . . . . .		0.54-0.72	0.63
Length of pronotum . . . . .		0.22-0.32	0.27
Length of hind tibia . . . . .		1.11-1.57	1.34
<i>Minor Soldiers</i>		Range	Mean
Head length to tip of nose . . . . .		1.33-1.82	1.58
Width of head . . . . .		0.57-0.93	0.75
Depth of head . . . . .		0.43-0.70	0.57

<i>Minor Soldiers</i>	Range	Mean
Width of pronotum . . .	0.40-0.54 . . . . .	0.47
Length of pronotum . . .	0.18-0.25 . . . . .	0.22
Length of hind tibia . . .	0.95-1.40 . . . . .	1.18

The relationships of this species have been discussed in an earlier paper, Sands (1957). Since then, specimens have been examined of the soldier caste of *T. rhodesiensis* and *T. occidentalis* which approach *T. bettonianus* in shape, but differ in the former by the less conical nose and the latter by the larger fontanelle; both have 13-14 segmented antennae. The imagos of these species differ in having much smaller "scent" glands on the ♀ fifth sternites.

Lectotypes have been designated from the existing syntype material of *T. bettonianus* (Sjöstedt), and *T. crassinus* (Sjöstedt), as indicated below, the designation for the senior synonym being given separately.

Lectotype: KENYA: Athi River, 8-19.v.1899 (*C. S. Betton*), lectotype ♂ imago, *T. bettonianus* (Sjöstedt), in B.M.(N.H.). (Paralectotype imagos in Naturhist. Riksmus., Stockholm.)

Type Material. TANGANYIKA: Amani, (*Morstatt*), syntype soldier, type colony, *T. ruficeps* (Holmgren), A.M.N.H. (Other syntypes in Mus. Stuttgart.)

MOZAMBIQUE: Villa Fontes, 1914 (*H. Swale*), lectotype soldier and paralectotype soldier, type colony, *T. crassinus* (Sjöstedt), B.M.(N.H.). (Other paralectotype soldiers from type colony in Naturhist. Riksmus., Stockholm.)

Other Material (additional to that recorded in Sands, 1957). KENYA: Machakos, 17.ii.1951 (*W. V. Harris*); Ruiru, 11.iii.1951, Thika, Ngong (*R. C. H. Sweeney*); Thika, 15.v.1952, Ngong, 16.vi.1953 (*W. A. Sands*).

TANGANYIKA: Ukerewe Is., 1938 (*W. V. Harris*); Mwanza, 4.ix.1948, Amani, 4.ix.1949, 11.x.1950, and 4.i.1952, Itigi, 8.ix.1949, Singida, 10.ix.1949, Ngomeni, 19.v.1951 (*P. B. Kemp*); Tanga, 1950, 4 vials, Pangani, 20.ii.1951 (*R. C. H. Sweeney*), Hakara, 10.vii.1949, Kwirow, 20.vii.1949, and Madidi, 24.vii.1949 (*M. Luscher*), A.M.N.H.

NYASALAND: nr. Ft. Johnstone, 23-24.viii.1953, 2 vials, 2m. from Bilila on Ft. Johnstone Road, 27.viii.1953, 20m. from Ft. Johnstone on Zomba Road, 28.viii.1953, 1m. W. of Lake Shirwa, 31.viii.1953, Namatalu Hill, 1.xi.1953, 2 vials (*W. A. Sands*, *W. Wilkinson*).

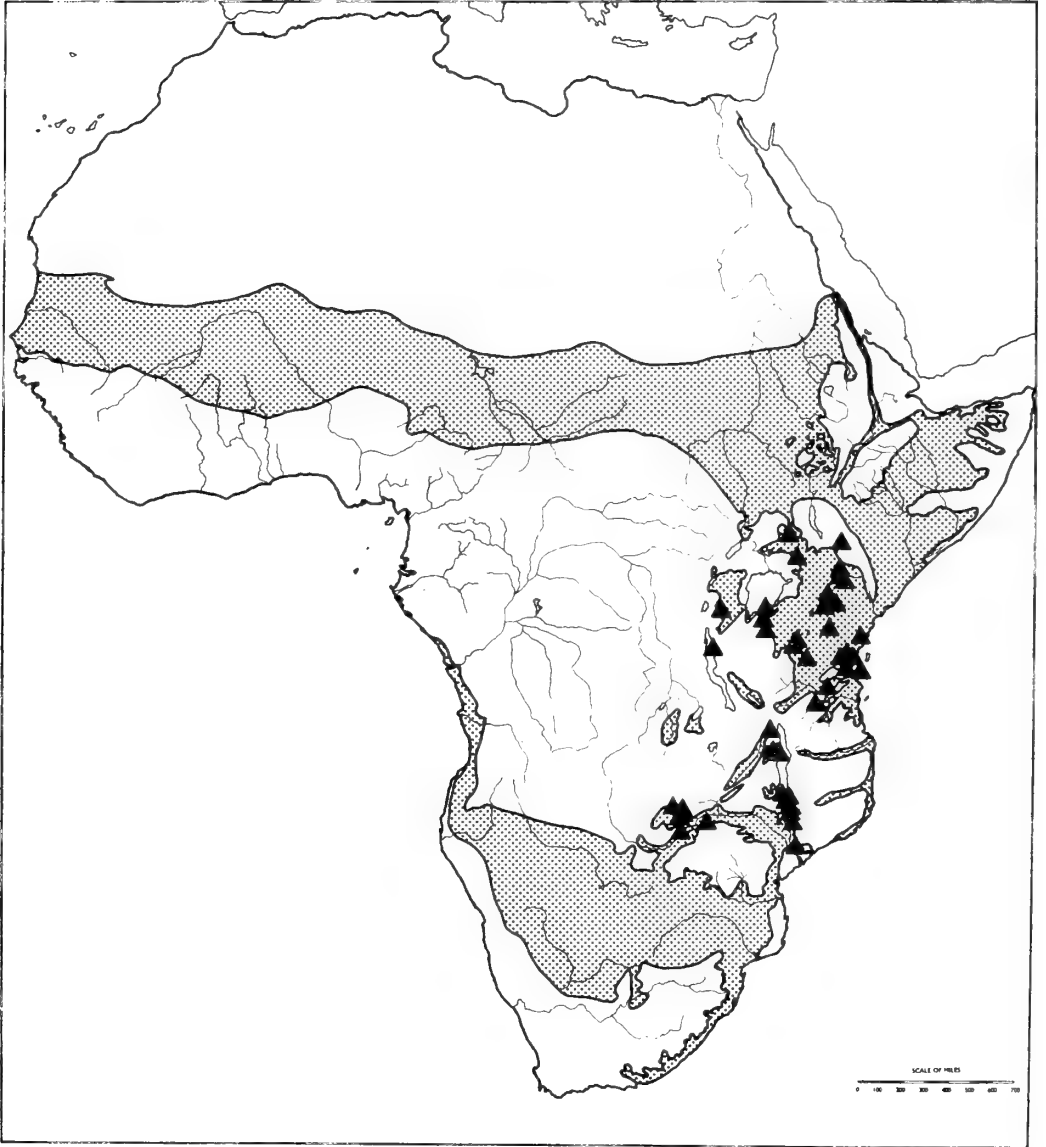
NORTHERN RHODESIA: Choma, Siamambo 10.i.1957, 2 vials, near Kafue River bridge between Lusaka and Mazabuka, 18.i.1957, 2 vials, 26m. from Broken Hill on Lusaka Road, 20.i.1957, 4m. N. of Lusaka, 19.i.1957 (*W. G. H. Coaton*).

SOUTHERN RHODESIA: Rekomitjie, 6.x.1964 (*M. G. Bingham*).

A total of 79 nest series were examined, and all material is in the British Museum (Natural History) unless otherwise stated.

The distribution and biology of this species were discussed in an earlier paper, Sands (1957). Further study and new records suggest that *T. bettonianus* does not extend far to the south of the valley of the River Zambesi. Areas of apparently

suitable vegetation types occur considerably further south, but it has not been collected, whereas its less conspicuous congener, *T. dispar*, has been recorded from Natal.



MAP 19. *Trinervitermes bettonianus*. Vegetation types : 9, 20, 22, and 25.

*Trinervitermes dispar* (Sjöstedt)

(Text-figs. 191, 229, 230, 246, 247, 262-269; Map 20)

*Eulermes dispar* Sjöstedt, 1920a : 303. Type locality : NYASALAND, Zomba.*Eulermes gemellus* Sjöstedt, 1920a : 303. Type locality : REPUBLIC OF SOUTH AFRICA.**syn. n.***Termes (Eulermes) dispar* (Sjöstedt) Desneux, 1904a : 41.*Termes (Eulermes) gemellus* (Sjöstedt) Desneux 1904a : 42.*Eulermes dispar* Sjöstedt; Sjöstedt, 1904 : 107.*Eulermes gemellus* Sjöstedt; Sjöstedt, 1904 : 98.*Eulermes kulloensis* Sjöstedt, 1912 : 13. Type locality, ETHIOPIA, Eritrea, Mt. Kullo, Maggio.**syn. n.***Eulermes (Trinervitermes) dispar* Sjöstedt; Holmgren, 1912 : 64.*Eulermes (Trinervitermes) gemellus* Sjöstedt; Holmgren, 1912 : 65.*Eulermes katangensis* Sjöstedt, 1913 : 382. Type locality, CONGO, Katanga, Elizabethville.**syn. n.***Eulermes (Trinervitermes) erythrae* Holmgren, 1913 : 345. Type locality : ETHIOPIA, Eritrea.**syn. n.***Eulermes grootfonteinsis* Sjöstedt, 1914a : 86. Type locality : SOUTH WEST AFRICA, Grootfontein. **syn. n.***Trinervitermes umzinduzii* Fuller, 1922 : 114. Type locality : REPUBLIC OF SOUTH AFRICA, Natal, Pietermaritzburg. **syn. n.***Trinervitermes dispar* (Sjöstedt) Fuller, 1922 : 108.*Trinervitermes gemellus* (Sjöstedt) Fuller, 1922 : 110.*Trinervitermes kulloensis* (Sjöstedt) Sjöstedt, 1926 : 328.*Trinervitermes katangensis* (Sjöstedt) Sjöstedt, 1926 : 328.*Trinervitermes erythrae* (Holmgren) Sjöstedt, 1926 : 327.*Trinervitermes grootfonteinsis* (Sjöstedt) Sjöstedt, 1926 : 330.*Trinervitermes eldirensis* Ghidini, 1941 : 33. Type locality : ETHIOPIA, El Dire. **syn. n.**

*Imago.* Some additions to the previous description (Sands, 1957) are necessary. Eyes medium sized relative to head width, W/E index 2.90-3.3; ocelli separated from eye by slightly less than one-sixth to slightly less than two-fifths own shortest diameter; postclypeus width 2.1-2.5 times length; molar plate of right mandible with 7-8 ridges.

Pale coloured "scent" gland on anterior margin of fifth abdominal sternite of ♀ very small, 0.45-0.54mm. wide, 0.15-0.18mm. long; cerci of ♀ distinctly longer than width across base, conical.

Pilosity of vertex uneven, not forming a "pelt" or "mat".

Measurements (41 specimens from 17 localities) in millimetres.

	Range	Mean
Head width across eyes	1.35-1.58	1.44
Greatest diameter of eye	0.42-0.50	0.46
Ocellus . . . . .	0.15-0.20 × 0.17-0.26	0.18 × 0.22
Ocellus to eye . . . . .	0.03-0.06	0.04
Width of pronotum . . . . .	1.20-1.48	1.32
Length of pronotum . . . . .	0.76-0.97	0.84
Length of hind tibia . . . . .	1.63-1.99	1.77
Length of fore wing . . . . .	14.00-18.90	16.10

*Soldiers.* The following additions to the previous description of the major soldier are necessary: nose cylindrical to moderately conical, angle of cone 0-20 degrees, usually less than 14 degrees. Head capsule in plan view rounded oval, rarely slightly shouldered behind antennae. Nose tip with four prominent setae, and a few minute pale setae behind them.

Measurements (Major soldiers, 151 specimens from 39 localities, minor soldiers, 28 specimens from 13 localities).

<i>Major Soldier</i>	Range	Mean
Head length to tip of nose . . . . .	1.71-2.23 . . . . .	2.02
Width of head . . . . .	0.93-1.36 . . . . .	1.05
Depth of head . . . . .	0.68-0.99 . . . . .	0.84
Width of pronotum . . . . .	0.54-0.68 . . . . .	0.58
Length of pronotum . . . . .	0.18-0.25 . . . . .	0.23
Length of hind tibia . . . . .	1.04-1.39 . . . . .	1.19
 <i>Minor Soldier</i>	 Range	 Mean
Head length to tip of nose . . . . .	1.18-1.61 . . . . .	1.41
Width of head . . . . .	0.43-0.64 . . . . .	0.53
Depth of head . . . . .	0.36-0.50 . . . . .	0.43
Width of pronotum . . . . .	0.38-0.47 . . . . .	0.41
Length of pronotum . . . . .	0.13-0.20 . . . . .	0.16
Length of hind tibia . . . . .	0.82-1.18 . . . . .	1.01

A darker coloured form of the imago with dusky pronotum has been recorded from South Africa, but it is less variable in size and shape than most other species. It only overlaps in size range with *T. bettonianus* and *T. rapulum* among East African species, and *T. occidentalis* and *T. togoensis* among West African.

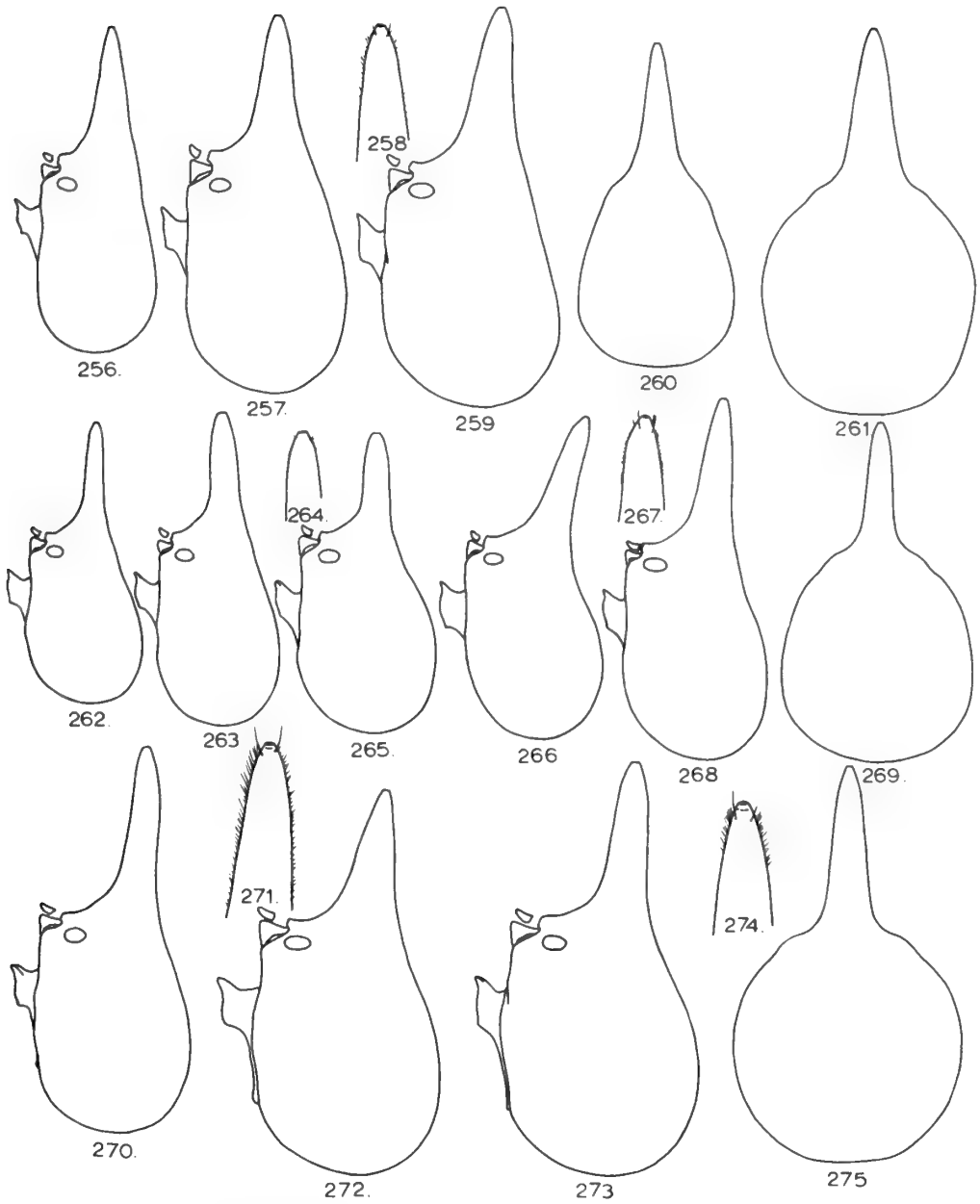
*T. dispar* differs from *T. bettonianus* in the very much smaller "scent" gland on the ♀ fifth abdominal sternite, in the narrower fontanelle, and in the 7-8 ridges on the right molar plate. *T. rapulum* differs in the shape of the fontanelle, in the somewhat more inflated postclypeus, and in most specimens, in having two small diverging depressions in front of the fontanelle, though these are not always present. *T. togoensis* has usually 16 segmented antennae, and three diverging pale coloured streaks on the vertex; *T. occidentalis* has larger eyes.

The range of variation in the soldier caste overlaps with *T. rhodesiensis*, *T. rapulum*, and *T. togoensis*. Some specimens of *T. rhodesiensis* and *T. rapulum* are indistinguishable from some *T. dispar*, but *T. togoensis* is usually separable by the more densely hairy nose tip, and the other two species by slight differences of profile and plan view of the head capsule, given in the key.

Type Material. ETHIOPIA: Eritrea, Mt. Kullo 1871 (*Antinori*), *T. kulloensis* (Sjöstedt), ♂ imago specimen labelled "co-typus", unique, Mus. Civ. Stor. Nat., Genoa. The additional material recorded by Sjöstedt as deposited at the Naturhist. Riksmus., Stockholm, was reported in September 1962, to be lost; Eritrea (*Escherich*), syntype soldiers from type colony, *T. erythrae* (Holmgren) A.M.N.H. and B.M.(N.H.); El Dire, 18.v.1939 (*G. M. Ghidini*), paratype soldiers from type colony, *T. eldirensis* Ghidini B.M.(N.H.) and A.M.N.H. (Holotype in Mus. Civ. Stor. Nat., Genoa.)

NYASALAND: Zomba (*Cameron*), syntype soldiers, *T. dispar* (Sjöstedt) Naturhist. Riksmus., Stockholm.

CONGO: Katanga, Elizabethville (*J. Bequaert*), syntype soldiers, type colony, *T. katangensis* (Sjöstedt) A.M.N.H. (other syntypes listed by Sjöstedt (1926) as in Naturhist. Riksmus., Stockholm).



FIGS. 256-275 : *Trinervitermes*, soldier head capsule, side and plan views, and nose tip.  
 256-261, *T. bettonianus* ; 262-269, *T. dispar* ; 270-275, *T. geminatus*.

SOUTH-WEST AFRICA : Grootfontein 7.vi.1911 (*W. Michaelsen*), syntype soldiers, type colony, *T. grootfonteinsis* (Sjöstedt) A.M.N.H. (other syntypes, in Mus. Hamburg and Naturhist. Riksmus., Stockholm).

REPUBLIC OF SOUTH AFRICA : No other data. Syntype soldiers, type colony *T. gemellus* (Sjöstedt), A.M.N.H. and Naturhist. Riksmus., Stockholm ; Natal, Pietermaritzburg xi.1918 (*E. Warren*), syntype ♀ imago and soldiers from type colony *T. umzinduzii* Fuller, B.M.(N.H.) and A.M.N.H. (other syntypes at N.C.I., Pretoria) ; Transvaal, Pretoria, Meukleneuk Hill 22.x.1914 (*C. Fuller*), " Paratype " soldiers, *T. pretoriensis* Fuller, vial number F.491, not type colony, not same species as type colony, A.M.N.H. and N.C.I., Pretoria.

Other Material (additional to that recorded in Sands, 1957). SOMALI REPUBLIC : Bender Kassim, 9.i.1952 (*E. J. Van Ingen*).

KENYA : Rumuruti, 8.x.1950 (*W. V. Harris*) ; Marsabit, 6.3.53 (*W. A. Sands*) ; Taveta (*Kirby*), A.M.N.H.

UGANDA : Karamoja Distr., Toror Hills, near Kotido, 8.x.1952 (*W. A. Sands*) ; Ankole Distr., Luentobo, 1947 (*W. V. Harris*).

TANGANYIKA : Mkweme, near Kahama, 13.viii.1948 and 18.iii.1949, Tabora, 7.ix.1948, Tongoni, near Tanga, 25.x.1950 and Pare Mountains near Kihurio, 21.v.1952 (*P. B. Kemp*) ; Igalula, 21.xii.1934, Kahama, v.1935 (*W. V. Harris*) ; Mkasu, 26.vii.1949 (*M. Luscher*), A.M.N.H.

NYASALAND : 17m. W. of Blantyre, 20.viii.1953, 18m. from Ft. Johnstone on Farringdon Road, 24.viii.1953, 36m. N. of Mzimba 28.ix.1953 (*W. A. Sands*, *W. Wilkinson*).

NORTHERN RHODESIA : Siamambo, Choma, 10, 11, and 14.i.1957, 3 vials, 15-19m. from Kitwe on Ndola Hill Road, 23-24.i.1957, 3 vials, and Samfya, Lake Bangueulu, 27.i.1957 (*W. G. H. Coaton*) ; Sikalongo, 11.viii.1959 (*E. N. Cooling*).

SOUTHERN RHODESIA : Salisbury, 1911 (*G. A. K. Marshall*), Mt. Darwin, 15.vi.1949 (*G. H. Bunshi*).

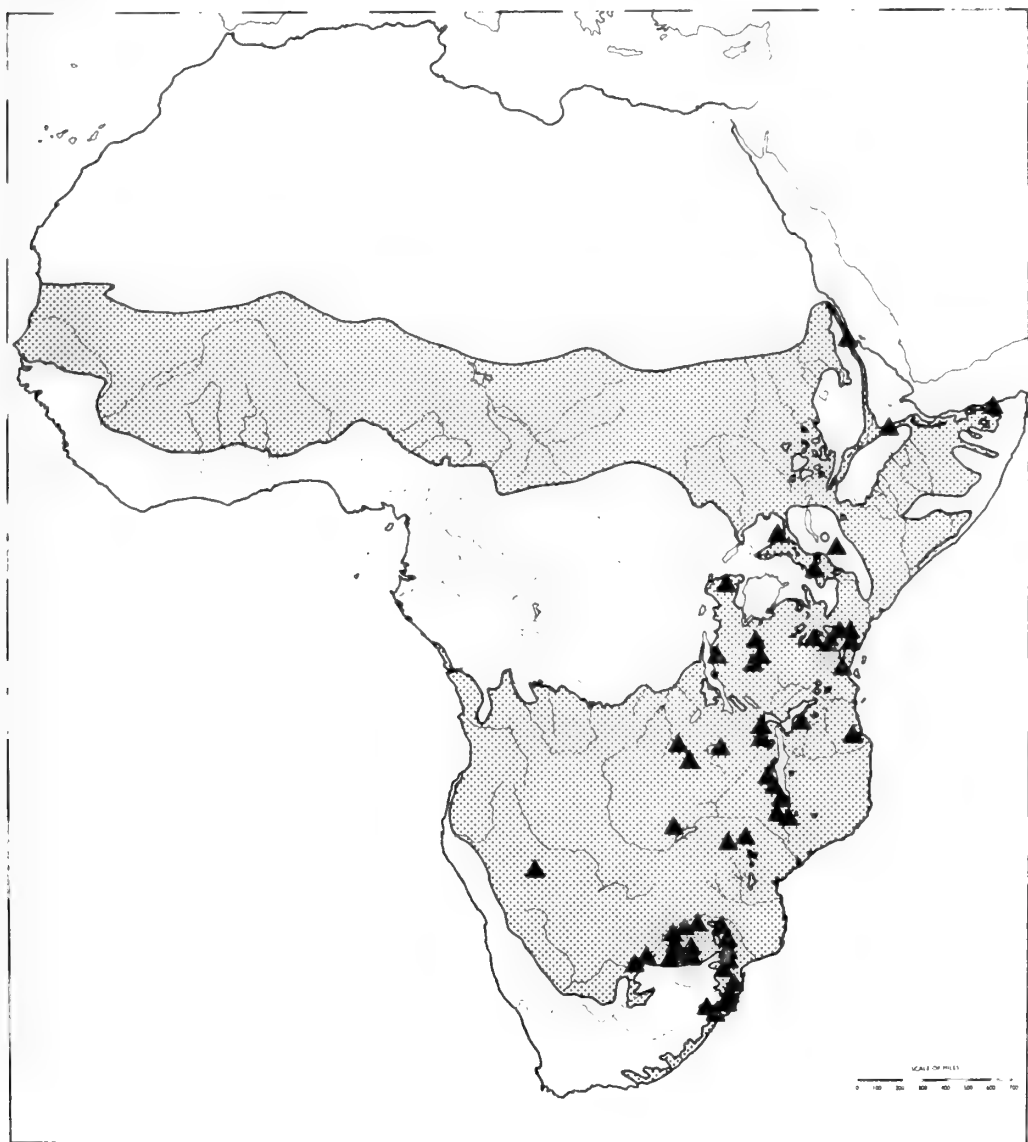
SWAZILAND : 3m. S. of Komati River, Piggs Peak to Mbabane Road, 23.x.1960, and 6m. from Gollel on Hluti Road, 25.x.1960 (*J. L. Sheasby*) ; 4m. from Stegi on Gollel Road, 24.x.1960 (*W. G. H. Coaton*).

REPUBLIC OF SOUTH AFRICA : Transvaal, Witbank, 3.ix.1939, Krugersdorp, 1.x.1956, Groblersdahl, 15.xi.1956, Warmbad, 25.ix.1957, 2 vials, Waterberg, 25.ix.1957, and 27.ix.1961, Potgietersrus, 26.ix.1957, 2 vials, Pilgrims Rest, 27-28.x.1959, 3 vials, Soutpansberg, 10.x.1960, 3 vials, Nelspruit, 21.x.1960, 2 vials (*W. G. H. Coaton*) ; Barberton, 29.xi.1956, and Sibasa, 5-10.viii.1959, 4 vials (*J. H. Grobler*) ; Marico, 4.x.1961 (*G. F. Pretorius*). Natal, Lower Umfolosi, 11.xi.1922 (*R. H. Harris*) ; Hlabisa, 7.iii.1937 (*C. Jacot*) ; Ubombo, 21.xi.1955, Mtuzini, 28.x.1957, Ingwavuma, 14.xii.1959, 2 vials ; Pietermaritzburg, 5.x.1957, 7 vials (*A. Hewett*, *D. Fletcher*) ; Ndwedwe, 11.xii.1959 and Richmond, 14.xii.1959 (*P. C. Joubert*) ; Nongoma, 10.i.1962, Entonjaneni, 13.i.1962 and Nkandhla, 14.i.1962 (*J. L. Sheasby*), Cape Province, Mafeking, 6.x.1961 (*G. F. Pretorius*).

A total of 111 nest series were examined, and all material is in the British Museum (Natural History) unless otherwise stated.



This species is distributed over a much greater area than was recorded in a previous paper (Sands, 1957), from Mount Kullo in northern Eritrea, to southern Natal. It appears to be found mainly in vegetation types ranging from savannah woodland with *Brachystegia* and *Julbernardia* to wooded steppe with *Acacia* and *Commiphora* (Keay *et al.*, 1959, types 9, 18, 19, 20, 25, and 26). These areas are shaded on the map. It has only rarely been found in *Colophospermum mopane* woodland (Type 22).



MAP 20. *Trinervitermes dispar*. Vegetation types : 18, 19, 20, and 22.

It appears to fill an equivalent ecological niche to *T. togoensis* with which its distribution only marginally overlaps, and its exclusion from the Guinean and Sudan vegetation zones may result partly from the biotic barrier caused by this similarity.

***Trinervitermes geminatus* (Wasmann)**

(Text-figs. 231-234, 248, 249, 270-275, 385; Map 21)

*Eutermes geminatus* Wasmann, 1897 : 170. Type locality : GHANA.

*Termes* (*Eutermes*) *geminatus* (Wasmann) Desneux, 1904a : 42.

*Eutermes geminatus* Wasmann ; Sjöstedt, 1904 : 40, 44.

*Eutermes* (*Trinervitermes*) *geminatus* Wasmann ; Holmgren, 1912 : 64.

*Eutermes* (*Trinervitermes*) *grossus* Sjöstedt, 1924b : 493. Type locality : MAURITANIA (probable), "Côte Atlantique du Sahara". **syn. n.**

*Trinervitermes grossus* (Sjöstedt) Sjöstedt, 1926 : 342.

*Trinervitermes geminatus* (Wasmann) Sjöstedt, 1926 : 343.

*Trinervitermes ebenerianus* Sjöstedt, 1925a : 73. Type locality : SUDAN, "Tanguru". **syn. n.**

*Trinervitermes ibidanicus* Sjöstedt, 1926 : 347. Type locality : NIGERIA, Ibadan. **syn. n.**

*Trinervitermes ebenerianus* Sjöstedt ; Sands, 1957 : 24.

*Imago.* Head capsule, central part of frons and vertex brown to dark chestnut brown, vertex with three diverging yellow-brown streaks ; postclypeus, labrum, anterior part of frons behind postclypeus and in front of ocelli, area surrounding antennae and eyes and extending to a point behind eyes also paler, orange-yellow to yellow-brown. Antennae orange-yellow to orange. Pronotum orange-yellow to brown. Meso- and metanota, other thoracic sclerites and legs yellow to yellow-brown. Abdominal tergites brown to chestnut brown round stigmata, slightly paler in middle, distinctly paler towards lateral margins ; sternites yellow to yellow-brown, shaded brown round stigmata. Wings translucent very pale yellow-brown to brown, subcosta and radius sector yellow to yellow-brown, partially outlined brown at base, membrane behind radius sector with yellow to orange streak, rest of venation narrowly yellow-brown to brown.

Posterior margin of head capsule behind eyes much less than semi-circular, slightly sinuate immediately behind eyes ; fontanelle distinct, paler than head, V- or inverted A-shaped, sometimes slightly depressed posteriorly, lateral arms often but not always dilated terminally ; area of fontanelle usually partly occluded posteriorly by pigmented cuticle only slightly paler than head, length including occluded portion approximates to twice breadth at base of lateral arms ; eyes oval, moderately prominent in proportion to own diameter, and medium-sized relative to head width, W/E index 2.7-3.0 ; ocelli medium sized to large, oval, separated from eyes by one-sixth to nearly one-third own least diameter ; postclypeus moderately inflated, width 2.4-2.8 times length, anterior margin slightly concave or sinuate, rarely nearly straight, posterior margin convex, rounded ; molar plate of right mandible with 7-8 ridges, antennae usually 17 segmented, II, IV, V, and VI subequal, VI slightly longer, III longer up to nearly twice these, sometimes divided to produce 18 segmented forms.

Pale coloured "scent" gland on anterior margin of fifth abdominal sternite of ♀ medium sized, 0.64 to 0.80mm. wide, 0.15 to 0.18mm. long ; cerci of ♀ female shorter than or equal to width across base, conical.

Pilosity on vertex consists of short curved setae of rather even length tending to form a "pelt" or "mat", with scattered setae 3-5 times as long. (Text-fig. 385.)

Measurements (31 specimens from 5 localities) in millimetres.

	Range	Mean
Head width across eyes	1.78-2.03	1.88
Greatest diameter of eye	0.59-0.72	0.65
Ocellus . . . . .	0.20-0.26 × 0.24-0.34	0.22 × 0.27
Ocellus to eye . . . . .	0.02-0.06	0.05
Width of pronotum . . . . .	1.60-1.89	1.76
Length of pronotum . . . . .	1.00-1.18	1.10
Length of hind tibia . . . . .	2.43-2.80	2.58
Length of fore wing . . . . .	17.90-21.90	19.90

*Soldiers.* Major soldier : head capsule ferruginous orange to dark sepia brown, commonly ferruginous to chestnut brown, nose chestnut brown to pitch black, with red tip. Pronotum and antennae yellow-brown, meso- and metanota pale yellow-brown, legs yellow. Abdominal tergites pale brown to sepia brown, sternites pale yellow.

Head capsule in plan view short oval, circular, or slightly wider than length, nose conical. In profile near straight to distinctly concave, with back of head rising from above antennal socket, and rounded ; nose equal in length to distinctly shorter than rest of head capsule, measuring from hind margin of antennal socket, angle of nose cone, 8-22 degrees ; antennae 14 segmented, proportions of basal segments somewhat variable with size, usually II and V subequal, III and IV subequal and longer than II and V. Head setae confined to hairy nose tip ; dorsal surface of head capsule without prominent setae.

Middle abdominal tergites with scattered minute setae, distinctly visible in profile, posterior tergites with longer setae. Sternites with short backwardly directed scattered setae, and longer downward or slightly forward directed setae on posterior margins, arranged approximately in longitudinal rows 3 on each side of mid-line of abdomen, longer setae about 2-3 times length of shorter.

Minor soldier : Colour as darker specimens of major soldier, antennae 13-14 segmented, proportions of basal segments variable.

Measurements (Major soldiers, 57 specimens from 13 localities, minor soldiers, 8 specimens from 5 localities).

<i>Major Soldiers</i>		Range	Mean
Head length to tip of nose . . . . .		2.17-2.64	2.40
Head width . . . . .		1.17-1.73	1.45
Depth of head capsule . . . . .		0.84-1.22	1.02
Width of pronotum . . . . .		0.56-0.75	0.68
Length of pronotum . . . . .		0.25-0.36	0.32
Length of hind tibia . . . . .		1.57-2.19	1.84
<i>Minor Soldiers</i>		Range	Mean
Head length to tip of nose . . . . .		1.51-2.04	1.70
Head width . . . . .		0.59-1.00	0.75
Depth of head capsule . . . . .		0.49-0.77	0.60
Width of pronotum . . . . .		0.38-0.51	0.47
Length of pronotum . . . . .		0.20-0.26	0.23
Length of hind tibia . . . . .		1.40-1.76	1.59

*Variation.* The full range of variation in colour and form in both imagos and soldiers is sometimes found within a comparatively restricted locality. On the other hand, specimens from the extremes of the geographical range, over 3,000 miles apart, are clearly of the same species, and no character clines have been detected, though a tendency has been noticed for specimens from the moister parts of West Africa to be darker in colour.

*T. geminatus* in some of its forms, very closely resembles its sympatric congeners, *T. oeconomus* and *T. trinervius*. It is readily distinguishable from *T. oeconomus* in the ♀ imago by the much smaller abdominal "scent" gland and the shorter cerci,

also in most specimens by the differing pilosity of the vertex ; the ♂ is less readily separable because the ♂ cerci of all species are longer than in the ♀, and the ventral "scent" glands are smaller. The soldiers are usually darker in colour, and have visible small setae on the middle abdominal tergites, but specimens which are virtually indistinguishable do occur.

*T. geminatus* is more readily distinguished from *T. trinervius* in the soldier caste, by the distinctly more hairy nose tip, and usually by the darker pigmentation of the abdominal tergites. The imagos are less easily separable, having usually proportionately smaller eyes and less inflated postclypeus ; in addition, the cerci of the ♀ *T. trinervius* are usually longer, and somewhat irregular in outline, and the shorter vertex setae very regular in length. There is little likelihood of confusion with any other species apart from the larger, darker soldiers of *T. togoensis*, but some individuals in any nest series of this species have 13 segmented antennae with the basal segments only partially or not subdivided.

Dr. A. E. Emerson has selected and labelled a specimen from the type series as lectotype, but the designation has not been published hitherto :

Lectotype : GHANA : no other data, lectotype pinned major soldier, *T. geminatus* (Wasmann) (in Mus. Maastricht). Paralectotypes, Naturhist. Riksmus., Stockholm, and A.M.N.H.

Type Material. MAURITANIA (Probable) : " Côte Atlantique du Sahara " no date (*A. Gruvel*), syntype soldier, from type colony *T. grossus* (Sjöstedt), A.M.N.H. (other syntypes, Mus. Paris, and Naturhist. Riksmus., Stockholm).

GHANA : no other data. Paralectotype soldiers from type colony, *T. geminatus* (Wasmann), A.M.N.H.

NIGERIA : Ibadan, 5.viii.1922 (*A. W. J. Pomeroy*), syntype imagos and soldiers from type colony *T. ibidanicus* Sjöstedt, A.M.N.H. (other syntypes, Naturhist. Riksmus., Stockholm).

SUDAN : "Tanguru" (=Tungaru, 10° 14' N, 30° 42' E), 7.iv.1914 (*R. Ebner*), syntype soldiers from type colony *T. ebenerianus* Sjöstedt, A.M.N.H. (other syntypes Mus. Vienna and Naturhist. Riksmus., Stockholm).

Other Material. SIERRA LEONE : Samaia, 29.v.1948 (*F. A. Squires*).

GHANA : Accra, 29.vi.1926 (*A. W. J. Pomeroy*) ; 1926 (*W. H. Patterson*) ; Achimota, 21.i.1955 (*W. V. Harris*) ; Prampram, 16.xi.1955, 54m. from Accra on Ada Road, 17.xi.1955, Afienya, and Nungoa, near Accra, 13-16.vi.1956, 10 vials (*W. Belfield*) ; 30m. N.E. of Accra, iii.1958 (*R. Hamilton*) ; 12m. from Accra on Kumasi Road, 18.ii.1959, 12m. S. of Tamale on Kumasi Road, 27.ii.1959, 5m. and 16m. from Daboya on Tamale Road, 28.ii.1959, 2 vials, 28m. from Tamale on Bolgatanga Road, 1.iii.1959, 55m. from Tamale on Larabanga Road, 3.iii.1959, 35m. from Tamale on Yendi Road, 4.iii.1959, 4m. from Gambaga on Walewale Road, 5.iii.1959, 25m. S.E. of Gambaga on Yendi Road, and 17m. N.E. of Gambaga on Bawku Road, 6.iii.1959, 20m. from Bolgatanga on Bawku Road, 8.iii.1959, 20m. from Bolgatanga on Tamale Road, and 9m. from Bolgatanga on Navrongo Road, 9.iii.1959, 31m. from Navrongo on Tumu Road, 13.iii.1959, 11m. from Tumu on

Navrongo Road, 15.iii.1959, 9m. from Lawra on Nandom Road, 18.iii.1959, 6m. from Wa on Lawra Road, 19.iii.1959, and 52m. from Wa on Bole Road, 20.iii.1959 (*W. A. Sands*).

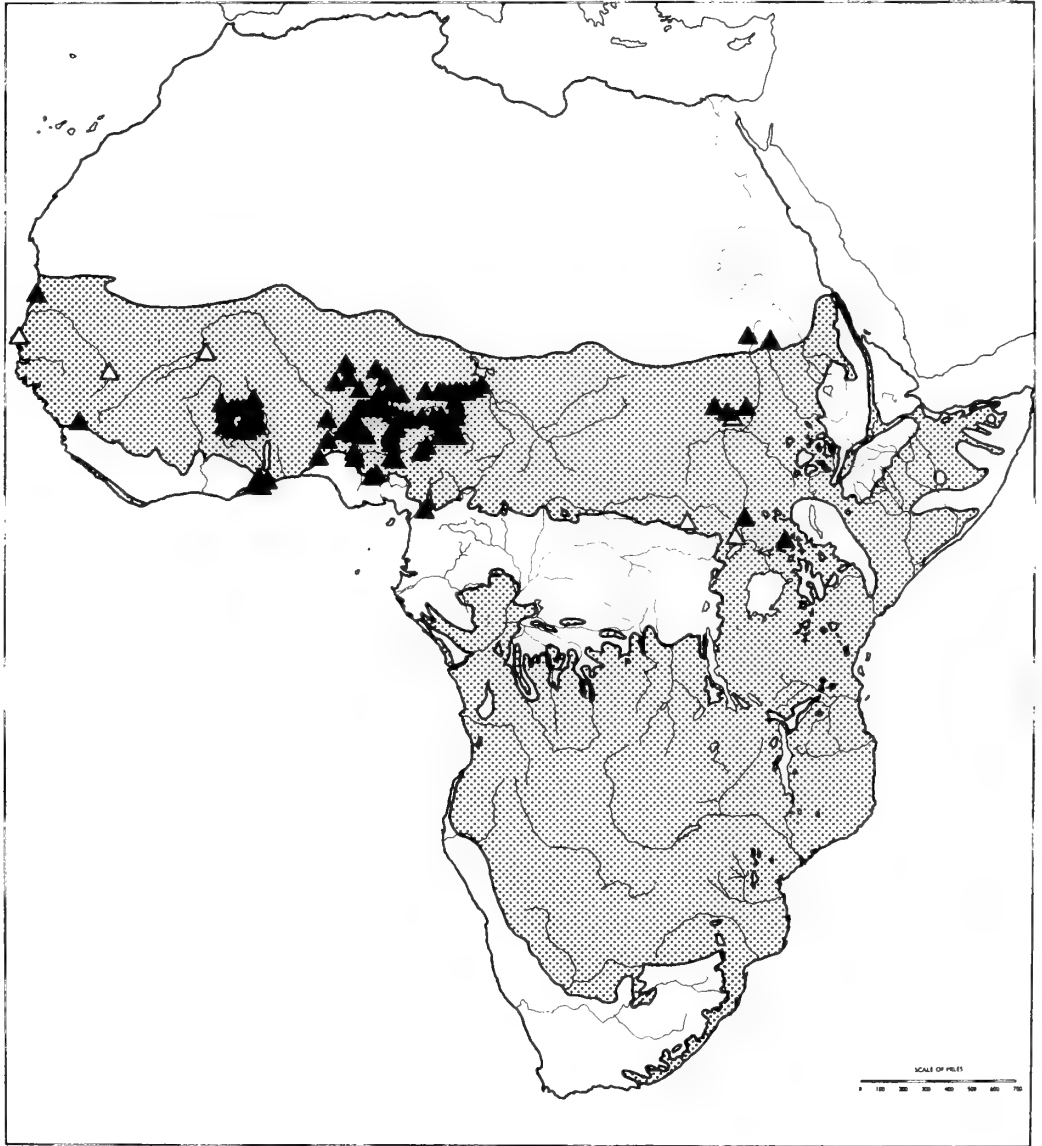
UPPER VOLTA : 15m. N. of Bawku (Ghana), 11.iii.1959 (*W. A. Sands*).

NIGERIA : Eastern Region ; 14m. from Enugu on Abakaliki Road, 1.ii.1957, and 13m. from Awgu on Okigwe Road, 2.ii.1957 (*W. Wilkinson*). Northern Region ; Katsina, 1933 (*Anon*) ; 60m., 100m., and 140m. from Kaduna on Jos Road, 4 vials, 125m. S. of Jos, 2 vials, Kano, 2 vials, 5m. S. of Funtua, 7m. S. of Zaria, 13m. S. of Makurdi, 1954 (*B. J. McNulty*) ; Kano, 21.ii.1955, and Samaru, 23.ii.1955 (*W. V. Harris*) ; 20m. N.W. of Zaria on Funtua Road, 14.ii.1956, 6 vials, 30m. N. of Funtua on Yashi Road, 14.xi.1956, 3 vials, 43m. E. of Kano, Gaya River, 17.xi.1956, 21m. W. of Kano on Katsina Road, 18.xi.1956, 5 vials, 3-9m. N. of Kafin Soli on Katsina Road, 20.xi.1956, 3 vials, 41m. N.W. of Katsina on Jibya-Gusau Road, 21.xi.1956, 4m. W. of Gusau on Sokoto Road, 22.xi.1956, 28-44m. from Sokoto on Argungu Road, 23.xi.1956, 5 vials, 25m. from Sokoto on Gusau Road, 25.xi.1956, 30-35m. N. of Sokoto on Illela Road, 26.xi.1956, 2 vials, 18m. from Kaduna on Zaria Road, 8.xii.1956, 16, 18, 33, 68, and 76m. from Kaduna on Zungeru Road, 18.xii.1956, 5 vials, 27 and 45m. from Zungeru on Kaduna Road, 19.xii.1956, 2 vials, 26m. from Minna on Zungeru Road, 20.xii.1956, 3 vials, 16m. S. of Zungeru on Bida Road, 21.xii.1956, 41m. from Mokwa on Bida Road, 22.xii.1956, Bida, 23.xii.1956, 40m. from Abuja on Bida Road, 24.xii.1956, Diko, 10m. from Abuja, 27 and 31.xii.1956, 2 vials, Kудару, on Zaria-Jos Road, 5.ii.1957, 2 vials, 4m. E. of Bukuru, 7.ii.1959, 42m. from Jos on Wamba Road, 8.ii.1957, 16, 40, and 75m. from Jos on Bauchi Road, and Bauchi, 11-13.ii.1957, 7 vials, 18m. from Jos, on Pankshin Road, 14.ii.1957, 32m. from Jos on Kaduna Road, 5.iv.1957, 39m. from Bauchi on Gombe Road, 7.v.1957, Gombe, and 6-30m. E. of Gombe, 9.v.1957, 6 vials, 40m. S.E. of Gombe on Numan Road, 10.v.1957, 2 vials, 92m. from Gombe on Numan Road, 11.v.1957, 6m. from Numan on Yola Road, 11.v.1957, Yola, 13.v.1957, near Mayo Faran, 14.v.1957, 2 vials, Faro River, E. of Yola, 15.v.1957, 2 vials, 54m. from Yola on Jalingo Road, 16.v.1957, 2 vials, 125m. S.W. of Jalingo on Takum Road via Beli, 18.v.1957, 50m. S. of Jalingo, 19.v.1957, 35 and 80m. from Yola on Biu Road, 28.v.1957, 3 vials, near Biu, 29.v.1957, 2 vials, 55m. N. of Biu on Damaturu Road, 29.v.1957, Maiduguri, and 20-43m. from Maiduguri on Potiskum Road, 31.v.1957, and 1.vi.1957, 4 vials, 43-50 and 77m. from Maiduguri on Fort Lamy Road, 3.vi.1957, 3 vials, 3, 32, and 55m. from Damaturu on Potiskum Road, 5.vi.1957, 4 vials, 30m. from Potiskum on Kano Road, 6.vi.1957, 4m. S. of Ilorin on Oyo Road, 4.xii.1957, 45m. S. of Jos on Wamba Road, 23.ii.1958, 85m. from Makurdi on Wamba Road, 24.ii.1958, 24m. from Gboko on Makurdi Road, 25.ii.1958, 30m. from Lokoja on Okene Road, 8.iii.1958, 47m. from Lokoja on Kabba Road, 10.iii.1958, Samaru, near Zaria, 3.ii.1956, 10.ix.1957, vi, vii.1959, 12 vials (*W. A. Sands*) ; Bussa, 1.xii.1961 (*J. McMahon*).

SUDAN : Kadugli, 1.vii. to xii.1952, 7 vials (*R. C. H. Sweeney*) ; 100m. N. of Malakal, 1952 (*R. H. Gunn*) ; 20m. W. of Omdurman, 3.i.1963 (*J. Cloudsley Thompson*).

UGANDA : 40m. from Moroto on Soroti Road, 12.x.1952 (*W. A. Sands*) ; 3m. from Moyo on Arua Road, 22.ii.1952 (*W. Wilkinson*).

A total of 187 nest series were examined and all material is in the British Museum (Natural History) unless otherwise stated.



MAP 21. *Trinervitermes geminatus*. Vegetation types : 8, 16, 17, 20, 21, 25, and possibly also 31.

*T. geminatus* (Wasmann) has previously been recorded as West African in distribution (Snyder, 1949). The amalgamation of the species listed in the synonymy, and much new material, has made it clear that it extends from the extreme west coast of Africa, across to the foothills of the Ethiopian Massif, in the Guinean, Sudan, and Sahel savannah-woodland vegetation zones (Keay *et al.*, 1959, types 8, 16, 17, 20, and 25). It is, in fact, the most abundant species in these areas, where it builds a small mound from a few inches to two or three feet in diameter and height. The biology of this species has been described in detail under its better-known synonym, *T. ebenerianus* Sjöstedt, in earlier papers (Sands, 1961, 1961a, 1963).

### *Trinervitermes graciosus* (Sjöstedt)

(Text-figs. 192, 235, 236, 250, 251, 276–281; Map 22)

*Eutermes* (*Trinervitermes*) *graciosus* Sjöstedt, 1924 : 42. Type locality : CONGO, Luluabourg.

*Eutermes* (*Trinervitermes*) *carbo* Sjöstedt, 1924 : 42. Type locality : CONGO, Luluabourg.

#### syn. n.

*Trinervitermes graciosus* (Sjöstedt) Sjöstedt, 1926 : 349.

*Trinervitermes carbo* (Sjöstedt) Sjöstedt, 1926 : 351.

*Imago*. Head capsule, central part of frons and vertex pale brown to brown ; vertex with three diverging yellow-brown streaks, middle one dilated terminally immediately behind fontanelle ; postclypeus, labrum, anterior margin of frons behind postclypeus, around antennal socket, and a triangular area behind eye paler, yellow brown. Antennae yellow-brown. Pronotum yellow, meso- and metanota yellow with posterior margins yellow-brown, other thoracic sclerites pale yellow, legs yellow, bases of tibiae shaded darker, yellow-brown. Abdominal tergites yellow-brown ; sternites yellow, yellow-brown round stigmata. Wings, membrane translucent pale yellow-brown, subcosta yellow, and radius sector yellow, partially outlined yellow-brown, rest of venation narrowly yellow-brown.

Posterior margin of head behind eyes much less than semi-circular, slightly sinuate immediately behind eyes ; fontanelle distinct, pale Y- or inverted A-shaped, lateral arms sometimes somewhat dilated terminally ; eyes oval, prominent in proportion to own width, and medium sized relative to head width, W/E index 2.8–3.1 ; ocelli medium sized, separated from eyes by one-fifth to two-fifths own diameter ; postclypeus inflated, width 2.0–2.3 times length, anterior margin slightly concave, posterior convex, rounded ; molar plate of right mandible with 8–9 ridges ; antennae, among eleven specimens examined, four had 15 segments, five 16, and two 17, proportions of basal segments variable.

Pale coloured "scent" gland on anterior margin of fifth abdominal sternite of ♀ large, 1.15mm. wide, 0.38mm. long ; cerci of ♀ shorter than or equal to width across base, conical.

Pilosity of vertex fine, silky, sparse, and of uneven length, not forming a "pelt" or "mat", head capsule appears more shining than in many species.

Measurements (11 specimens from 5 localities) in millimetres.

	Range	Mean
Head width across eyes	1.80–1.96	1.89
Greatest diameter of eye	0.58–0.68	0.64
Ocellus . . . . .	0.20–0.22 × 0.23–0.29	0.21 × 0.27
Ocellus to eye . . . . .	0.04–0.08	0.06
Width of pronotum . . . . .	1.65–1.85	1.79
Length of pronotum . . . . .	1.00–1.18	1.12
Length of hind tibia . . . . .	2.32–2.50	2.36
Length of fore wing . . . . .	17.30–23.20	20.79

*Soldiers.* Major soldier : head capsule orange-yellow to chestnut brown, nose ferruginous orange to pitch black with very short red tip. Antennae orange-yellow to orange. Pronotum yellow-brown to brown, meso- and metanota yellow to yellow-brown, legs yellow. Abdominal tergites yellow-brown to brown, sternites pale yellow to yellow.

Head capsule in plan view short oval to circular, nose weakly conical. In profile distinctly concave, with back of head rising from base of nose in front of antennal socket, and rounded ; nose distinctly shorter than rest of head capsule, measuring from hind margin of antennal socket, angle of nose cone, 5-12 degrees ; antennae 13-14 segmented, two out of three specimens with 14, many of those with 13 have basal segments partially subdivided, proportions variable. Head setae confined to nose tip, these few, short, and fine apart from 4 apical setae.

Abdominal tergites apart from posterior one or two almost devoid of setae ; sternites with sparse scattered short backwardly directed setae about half length of longer setae on posterior margins, approximately in longitudinal rows, 2 or 3 on each side of mid-line, directed downwards and slightly forwards.

Minor soldiers : colour as major soldiers. Antennae 12-13 segmented, proportions of basal segments variable.

Measurements (Major soldiers, 64 specimens from 21 localities, minor soldiers, 14 specimens from 8 localities) in millimetres.

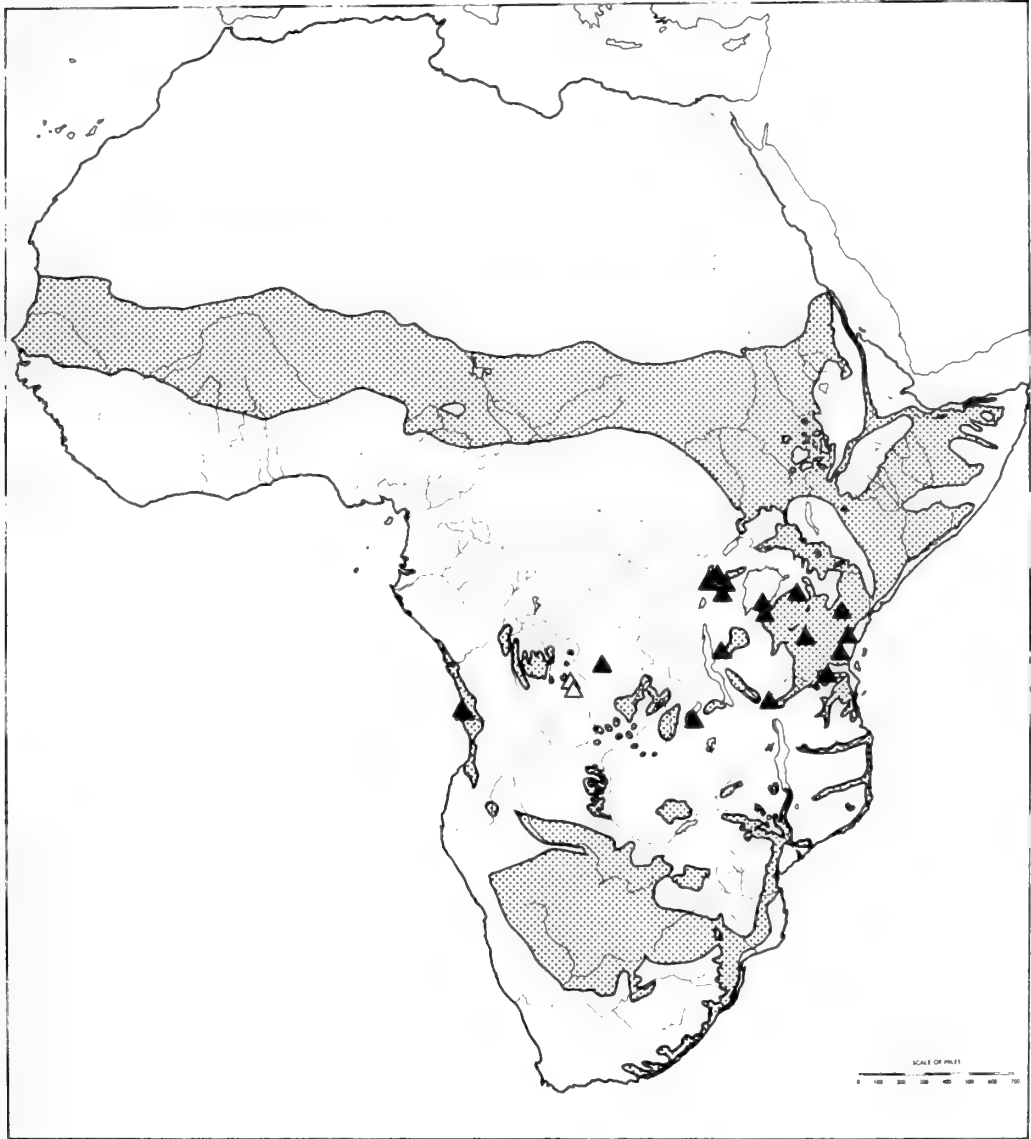
<i>Major Soldier</i>		Range	Mean
Head length to tip of nose	.	2.11-2.93	2.47
Head capsule width	.	1.18-1.81	1.49
Depth of head capsule	.	0.86-1.25	1.07
Width of pronotum	.	0.61-0.84	0.72
Length of pronotum	.	0.29-0.43	0.36
Length of hind tibia	.	1.54-1.96	1.72
<i>Minor Soldier</i>		Range	Mean
Head length to tip of nose	.	1.61-1.94	1.80
Head capsule width	.	0.75-1.06	0.89
Depth of head capsule	.	0.57-0.82	0.66
Width of pronotum	.	0.47-0.61	0.54
Length of pronotum	.	0.22-0.25	0.24
Length of hind tibia	.	1.22-1.68	1.41

*Variation.* The soldier caste is not always clearly divided into "major" and "minor" categories, intermediates being found in the largest colonies.

Sjöstedt (1924) in describing *T. gratiosus* referred only to the major soldier, although the material from the type colony included the imago which he described subsequently (1926). The lectotype of this species therefore should be selected from among the soldier syntypes. *T. carbo* was described immediately after *T. gratiosus* on the same page of the same paper, from specimens from the same locality. In this case the imago alone was described, and the soldiers stated to be very near *T. gratiosus*. The description of the imago is clearly not a *Trinervitermes*, and the specimens were identified by Dr. A. E. Emerson (in unpublished notes) as *Cubitermes minitabundus* (Sjöstedt). Sjöstedt placed the species in *Trinervitermes* on the basis of the soldier caste, however, and the lectotype would therefore again be selected from among the soldier syntypes.

The resemblance between *T. gratiosus* and its partially sympatric congener *T. bettonianus* was discussed in an earlier paper (Sands, 1957 : 19). It also resembles the "West African" *T. oeconomus* and shorter-nosed paler soldiers of *T. trinervius*. *T. oeconomus* is distinguishable in the imago by the more pilose head capsule, less





MAP 22. *Trinervitermes gratiosus*. Vegetation types : 20, 24, 25, 26, and 27.

inflated postclypeus, longer ♀ cerci, and ocelli nearer the eyes. The differing distribution is the only consistent feature on which to separate the soldiers, though the majority of *T. gratiosus* are darker than *T. oeconomus* and paler than *T. trinervius*, with a shorter nose than either.

Type Material. CONGO : Luluabourg, no date (*P. Callewaert*), syntype imagos and soldiers, type colony, *T. gratiosus* (Sjöstedt), Naturhist. Riksmus., Stockholm,

and A.M.N.H. (others in Mus. Tervuren.) ; Luluabourg, no date (*P. Callewaert*), syntype soldiers, type colony, *T. carbo* (Sjöstedt), A.M.N.H. (others in Naturhist. Riksmus., Stockholm.)

Other Material (additional to that listed in Sands, 1957). CONGO : Gihinga, 14.vii.1941 (*H. Bredo*) ; Rwindi River, no date (*H. Kirby*), A.M.N.H.

ANGOLA : Sao Paola de Loanda, 22.ii.1913 (*F. Silvestri*), A.M.N.H. ; 4m. S. of Luanda, 23.vii.1949 (*G. R. Gradwell, D. Snow*), B.M.(N.H.).

KENYA : 1° 25' S., 35° 10' E., to 1° 38' S., 35° 17' E., ii.1948 (*N. A. Weber*), A.M.N.H.

A total of 24 nest series were examined.

It has been noted (Sands, 1957) that this species tolerates drier conditions than many, and the additional records are from relatively dry areas also.

The type locality, Luluabourg, is well within the forest-savannah mosaic zone (Keay *et al.*, 1959, type 8) on the southern border of the rain forest, and thus appears to be in more moist conditions, but there are in that area many patches of dry grass steppe on Kalahari sand, and other drier savannah types (Keay *et al.*, 1959, types 20 and 24). *T. gratiosus* appears to occur in these, though absent from the surrounding moister savannah woodland, where *T. rhodesiensis* is the common species.

Sjöstedt (1926) recorded *T. carbo* from Haut Uélé, but this must be a misidentification since *T. gratiosus* is an East and Central African species.

### *Trinervitermes occidentalis* (Sjöstedt)

(Text-figs. 237-240, 252, 253, 282-289 ; Map 23)

*Eutermes occidentalis* Sjöstedt, 1904 : 93. Type locality : PORTUGUESE GUINEA, Bissau.

*Termes* (*Eutermes*) *occidentalis* (Sjöstedt) Desneux, 1904a : 44.

*Eutermes* (*Trinervitermes*) *occidentalis* Sjöstedt ; Holmgren, 1912 : 64.

*Trinervitermes occidentalis* (Sjöstedt) Sjöstedt, 1926 : 332.

*Trinervitermes auritervae* Sjöstedt, 1926a : 3. Type locality : GHANA, Keta. **syn. n.**

*Trinervitermes maudanicus* Sjöstedt, 1926b : 156. Type locality : CONGO, Haut Uélé, Mauda. **syn. n.**

*Nasutitermes* (*Trinervitermes*) *bettonianus* subsp. *sulciceps* Emerson, 1928 : 493. Type locality : CONGO, Garamba. **syn. n.**

*Nasutitermes* (*Trinervitermes*) *lutzi* Emerson, 1928 : 494. Type locality : CONGO, Niangara. **syn. n.**

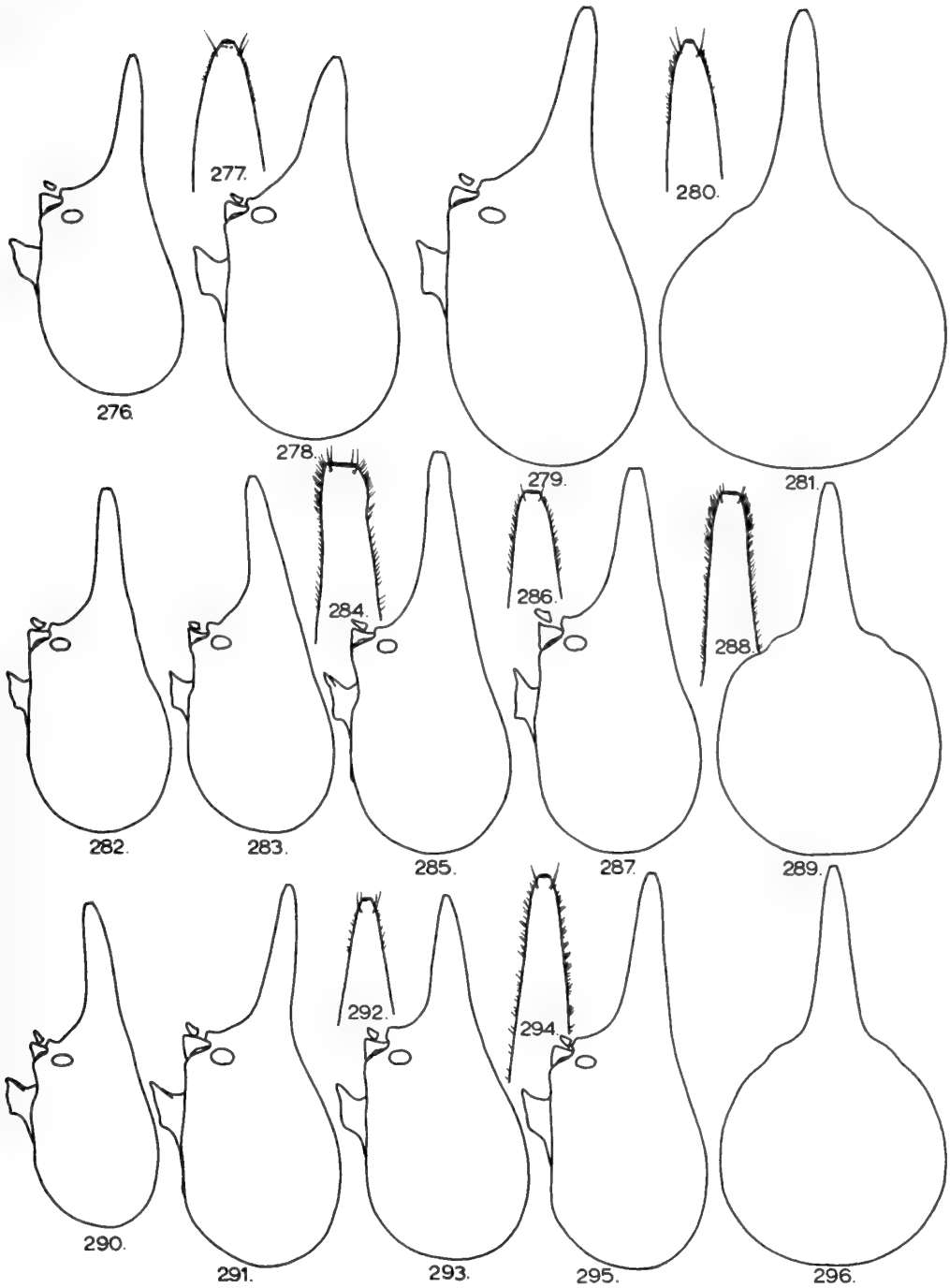
*Trinervitermes bettonianus* subsp. *sulciceps* (Emerson) Snyder, 1949 : 323.

*Trinervitermes lutzi* (Emerson) Snyder, 1949 : 328.

*Trinervitermes auritervae* Sjöstedt ; Sands, 1957 : 16.

*Imago*. Head capsule brown to chestnut brown ; vertex with two or three indistinct diverging yellow-brown patches or streaks, or sometimes one median pale patch, postclypeus, labrum, areas in front of ocelli and small area behind each eye paler yellow-brown to brown. Antennae yellow. Pronotum yellow to yellow-brown, meso- and metanota, other thoracic sclerites and legs yellow. Abdominal tergites brown, darker sepia-brown around stigmata ; sternites pale yellow to yellow-brown, brown around stigmata. Wings translucent pale brown, subcosta and radius sector yellow, the latter outlined sepia-brown at base, fading to yellow-brown distally ; bright orange streak in membrane behind radius sector ; rest of venation brown.

Posterior margin of head capsule behind eyes much less than semi-circular, slightly sinuate immediately behind eyes ; fontanelle Y-shaped, often slightly depressed posteriorly, length



FIGS. 276-296 : *Trinervitermes*, soldier head capsule, side and plan views, and nose tip.  
 276-281, *T. graciosus* ; 282-289, *T. occidentalis* ; 290-296, *T. oeconomus*.

two to four times breadth, lateral arms short or very short, sometimes dilated terminally; frons with two small diverging depressions in front of fontanelle; eyes commonly oval, moderately to distinctly prominent in proportion to own diameter, and medium-sized relative to head width, W/E index 2.6-3.0; ocelli medium sized, near circular to short oval, separated from eyes by one-tenth to one-fifth own least diameter; postclypeus moderately inflated, width 2.2-2.6 times length, anterior margin straight or weakly concave, posterior margin convex, often more rounded towards outer corners, sometimes slightly obtusely angular in middle; molar plate of right mandible with 7 ridges; antennae with 15 segments, only one specimen recorded with III partially subdivided, usually III longer up to twice II, IV longer than II and shorter than III, V, and VI subequal, about as long as II but stouter.

Pale coloured "scent" gland on anterior margin of fifth abdominal sternite of ♀ small, 0.56-0.64mm. wide, 0.11-0.13mm. long; cerci of ♀ as long as, or longer than basal width, conical or slightly mamilliform.

Pilosity of vertex of uneven length, not forming a "pelt" or "mat".

Measurements (22 specimens from 4 localities) in millimetres.

	Range	Mean
Head width across eyes	1.48-1.75	1.57
Greatest diameter of eye	0.53-0.63	0.57
Ocellus	0.19-0.25 × 0.24-0.29	0.21 × 0.26
Ocellus to eye	0.03-0.04	0.03
Width of pronotum	1.33-1.68	1.48
Length of pronotum	0.80-1.08	0.93
Length of hind tibia	1.98-2.38	2.21
Length of fore wing	14.10-20.30	17.07

*Soldiers.* Major soldier: head capsule orange-yellow to ferruginous orange, commonly orange, nose ferruginous-orange to chestnut brown with red tip, commonly ferruginous. Pronotum, meso- and metanota orange yellow, antennae and legs yellow. Abdominal tergites yellow-brown to brown, sternites pale yellow.

Head capsule in plan view slightly to distinctly "shouldered" behind antennae, rounded posteriorly, length equal to or slightly more than width, posterior margin often slightly sulcate in middle; nose weakly conical, often with curved taper increasing towards base. In profile variable from near straight to distinctly concave with back of head rising from behind antennal socket and rounded; nose equal in length to shorter than rest of head capsule, usually with curved taper increasing from near cylindrical tip to distinctly conical base (resembling an inverted trumpet), fontanelle large, 0.05-0.10mm. in diameter; antennae 12-14 segmented, 87% with 13, one recorded with 14, proportions of basal segments variable, usually III longer up to twice II and IV, V and VI longer than these, shorter than III. Prominent head setae, confined to densely hairy nose tip, dorsal surface of head capsule only with very sparse microscopic short setae. Middle abdominal tergites almost devoid of setae, those on posterior two short and sparse. Sternites with short, sparse backwardly directed setae, one-sixth to one-third length of longer setae on posterior margins approximately in longitudinal rows, 2 or 3 on each side of mid-line, directed downwards or slightly forwards. Minor soldiers: colour as major soldiers except nose usually chestnut brown. Antennae 12 segmented.

Measurements (Major soldiers, 92 specimens from 24 localities, minor soldiers 26 specimens from 20 localities) in millimetres.

<i>Major Soldiers</i> :	Range	Mean
Head length to tip of nose	1.90-2.50	2.21
Head width	1.05-1.54	1.26
Depth of head capsule	0.78-1.07	0.92
Width of pronotum	0.50-0.68	0.58
Length of pronotum	0.23-0.29	0.25
Length of hind tibia	1.20-1.55	1.37

<i>Minor Soldiers</i> :	Range	Mean
Head length to tip of nose . . . . .	1.35-1.79 . . . . .	1.51
Head width . . . . .	0.55-0.80 . . . . .	0.64
Depth of head capsule . . . . .	0.45-0.64 . . . . .	0.52
Width of pronotum . . . . .	0.35-0.47 . . . . .	0.41
Length of pronotum . . . . .	0.15-0.22 . . . . .	0.19
Length of hind tibia . . . . .	1.08-1.33 . . . . .	1.19

*Variation.* In the imago caste this is comparatively slight, whereas in the soldier there is considerable variation in profile view, both in degree of straightness, and in the shape of the nose. The latter arises mainly from differences in the point at which the curved taper begins, resulting in approximately conical, inverse trumpet-shaped, or almost cylindrical forms : there is sometimes also a slight hump at the base of the nose. The vestigial soldier mandibles occasionally bear small points. This appears to be a species more tolerant of higher altitudes up to 5,000 feet, and these specimens are larger than those from lower down.

The imago is readily distinguished from sympatric congeners in nearly all cases by the 15 segmented antennae, those few *T. togoensis* which have only 15 segments usually having III partially subdivided on at least one side, and shorter female cerci. The East and Central African species *T. rhodesiensis* and *T. rapulum* are not easily separable from *T. occidentalis*. *T. rhodesiensis* usually lacks small depressions on the frons, 50% of specimens have 16 segmented antennae, and the eyes are relatively smaller in many cases. The characters given in the key are sufficient in the majority of cases to distinguish *T. rapulum*. In the soldier caste, the large fontanelle and hairy nose tip distinguish *T. occidentalis* from the other two species. The latter character was not recognized in an earlier paper (Sands, 1957) with the result that specimens of *T. rhodesiensis* were attributed in error to *T. lutzi*, now found to be a synonym of *T. occidentalis*.

A lectotype has been selected for the junior synonym *T. auriterrae* as indicated below.

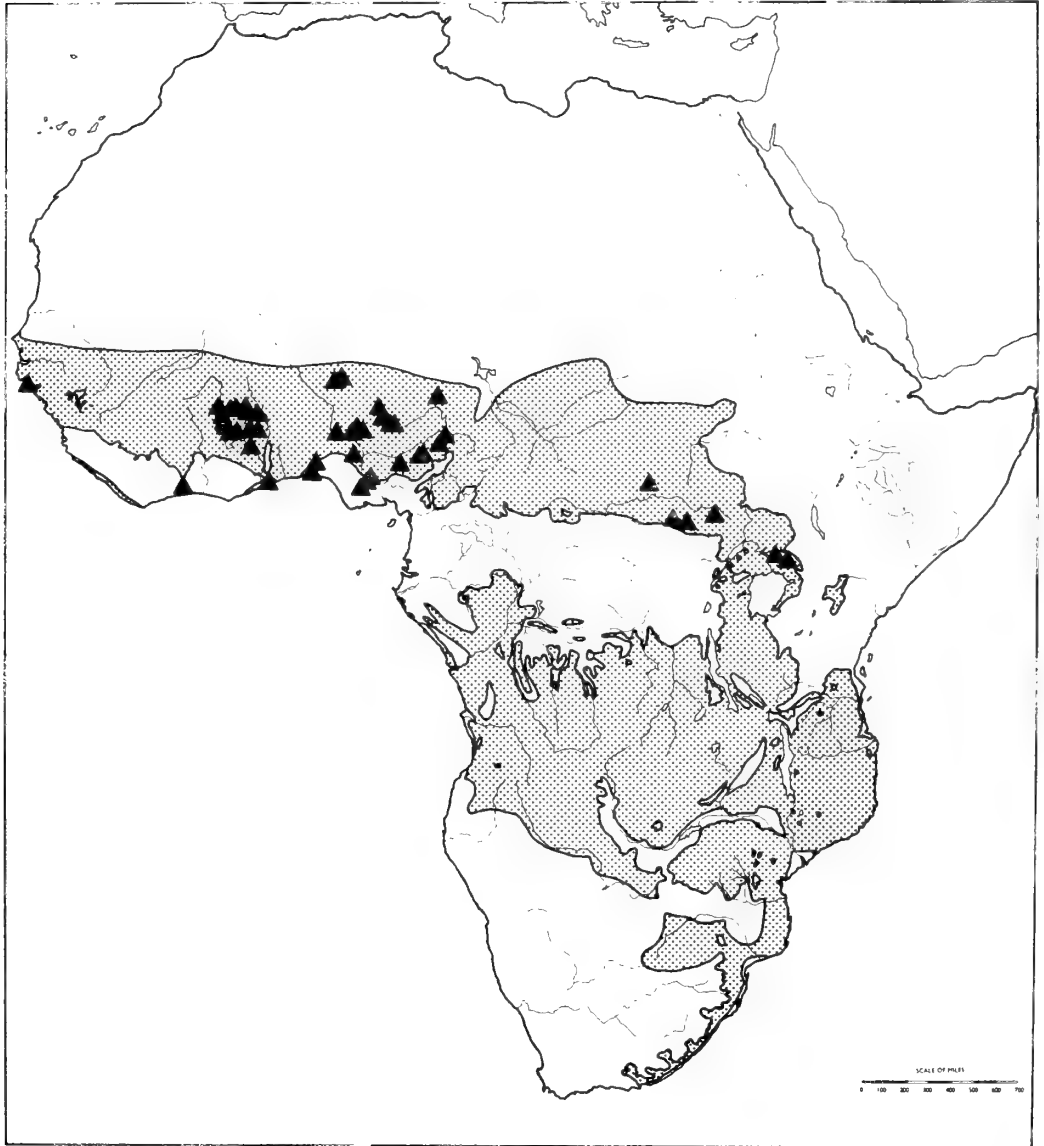
Type Material. PORTUGUESE GUINEA : Bissau, 4.x.1898 (*H. Ehrhardt*), syntype ♂ and ♀ imagos, *T. occidentalis* (Sjöstedt), A.M.N.H. (Other syntypes in Mus. Hamburg and Naturhist. Riksmus., Stockholm.)

GHANA : Keta, 1926 (*W. H. Patterson*), lectotype soldier and paralectotypes, *T. auriterrae* Sjöstedt, B.M.(N.H.) (other paralectotypes from type colony in the Naturhist. Riksmus., Stockholm).

CONGO : "Haut Uélé" Mauda, 1925 (*H. Schouteden*). From the dates of Schouteden's travels in 1925, Mauda must be near to Arebi since he was in both localities on the same day. Arebi is in the Kibale-Ituri district, not the adjoining Haut Uélé as stated by Sjöstedt. Syntype soldier, type colony, *T. maudanicus* Sjöstedt, B.M.(N.H.) (other syntypes in Mus. Tervuren, Naturhist. Riksmus., Stockholm, and A.M.N.H.) ; Garamba, vii.1912 (*H. Lang* and *J. P. Chapin*), paratype soldiers, type colony, *T. bettonianus* s. sp. *sulciceps*, Emerson, A.M.N.H. (Holotype in A.M.N.H.) ; Niangara, 3° 40' N., 26° 50' E., 20.v.1913 (*H. Lang*, *J. P. Chapin*), paratype soldiers, type colony, *T. lutzi* Emerson, B.M.(N.H.) and A.M.N.H. (Holotype soldier in A.M.N.H.)

Other Material. IVORY COAST : Dabou, 50km. W. of Abidjan, 1962-4, 8 vials (*P. Bodot*).

GHANA : 2m. W. of Adafon, 7.xi.1955 (*W. Belfield*) ; 10m. N. of Yeji on Tamale-Kumasi Road, 25.ii.1959, 12m. S. of Tamale on Kumasi Road, 27.ii.1959, 35m. from Tamale on Yendi Road, 4.iii.1959, 5m. from Nakpanduri on Gambaga Road, 6.iii.1959, 20m. from Bolgatanga on Tamale Road, 9.iii.1959, Navrongo, 12.iii.1959,



MAP 23. *Trinervitermes occidentalis*. Vegetation types : 8, 16, 17, and 20.

2 vials, 31m. from Navrongo on Tumu Road, 13.iii.1959, 11m. from Tumu on Navrongo Road, 15.iii.1959, 6m. from Tumu on Lawra Road, 16.iii.1959, 9m. N. of Lawra on Nandom Road, 18.iii.1959, 6m. N. of Wa on Lawra Road, 19.iii.1959, 24 and 52m. S. of Wa on Bole Road, 20.iii.1959, 2 vials, 3m. from Larabanga on Bole Road, 22.iii.1959, 22m. from Larabanga on Tamale Road, 24.iii.1959 (*W. A. Sands*).

**NIGERIA** : Western Region ; Ibadan, 1937 (*F. Toovey*), A.M.N.H. ; Lagos, Lighthouse Beach, 9.iv.1957 (*W. Wilkinson*). Eastern Region ; Enugu, ii.1955 (*W. V. Harris*) ; Onitsha, 5.iv.1957 (*W. Wilkinson*) ; 7 and 12m. from Enugu on Onitsha Road, 2-3.iii.1958, 2 vials, Enugu, xii.1958 (*W. A. Sands*). Northern Region ; 28 and 44m. from Sokoto on Argungu Road, 23.xi.1956, 3 vials, 26m. from Minna on Zungeru Road, 20.xii.1956, Mokwa, 21.xii.1956, 2 vials, 39m. from Abuja on Bida Road, 24.xii.1956, Diko, 10m. W. of Abuja, 27.xii.1956, 22m. from Kaduna, on Kachia Road, 30.i.1957, 5m. from Jos on Bukuru Road, 7.ii.1957, 5m. from Bukuru on Vom Road, 7.ii.1957, 34m. from Yola on Jalingo Road, 14.v.1957, 114-125m. S.W. of Jalingo on Takum Road, via Beli, 18.v.1957, 2 vials, Adamawa, Tiba, 10m. N.W. of Tibak, 24.v.1957, 5 vials, and Gangoro 25.v.1957, 32m. from Damaturu on Potiskum Road, 5.vi.1957, Samaru near Zaria, 10.ix.1957, and vi-vii. 1959, 3 vials, 4m. from Gboko on Oturkpo Road, 26.ii.1958, 2 vials, and 47m. from Lokoja on Kabba Road, 10.iii.1958 (*W. A. Sands*).

**CENTRAL AFRICAN REPUBLIC** : Haut Mbomu, Djema, 6° 5' N., 25° 12' E., iii.1948 (*N. A. Weber*), A.M.N.H..

**CONGO** : Garamba, 25.i.1950 (*H. de Saeger*), Inst. des Parcs Nat. du Congo, Brussels.

**UGANDA** : Mbale, 6.xi.1937, Serere, x.1948 (*W. V. Harris*).

A total of 68 nest series were examined, and all material is in the British Museum (Natural History) unless otherwise stated.

*T. occidentalis* is one of the typically "Guinean" species, occurring in savannah vegetation zones ranging from moist savannah patches in forest zones, to the moderately dry "Sudan" savannah from the west coast across to the Sudan and Uganda (Keay *et al.*, 1959, types 8, 16, 17, and 20). Its nest and feeding habits have been described elsewhere (Sands, 1961, 1961a). Though never abundant in any habitat and usually very scarce compared with the other four sympatric species, it is thought to be one of the most primitive of the genus, sharing with *T. rapulum* the habit of feeding on woody material in addition to the more usual grass and leaves.

### *Trinervitermes oeconomus* (Trägårdh)

(Text-figs. 241, 242, 254, 255, 290-296, 384 ; Map 24)

*Eutermes oeconomus* Trägårdh, 1904 : 23. Type locality : **SUDAN**, Kaka.

*Eutermes mobilis* Sjöstedt, 1904 : 91. Type locality : **MALI**, Alahina. **syn. n.** [ex syn. *T. trinervius* (Rambur) ; Snyder, 1949 : 332].

*Termes* (*Eutermes*) *oeconomus* (Trägårdh) Desneux, 1904a : 44.

*Termes* (*Eutermes*) *mobilis* (Sjöstedt) Desneux, 1904a : 43.

*Eutermes tchadensis* Sjöstedt, 1911b : 14. Type locality : **CHAD**, "Tchari-Tchad" [probably Ft. Lamy area]. **syn. n.**

- Eutermes (Trinervitermes) oconomus* Trägårdh ; Holmgren, 1912 : 64.  
*Eutermes (Trinervitermes) mobilis* Sjöstedt ; Holmgren, 1912 : 65.  
*Eutermes (Trinervitermes) tchadensis* Sjöstedt ; Holmgren, 1912 : 68.  
*Eutermes schubotzianus* Sjöstedt, 1914b : 93. Type locality : CHAD, Ft. Crampel. **syn. n.**  
*Eutermes (Trinervitermes) schubotzianus* Sjöstedt ; Hegh, 1922 : 693.  
*Trinervitermes oconomus* (Trägårdh) Sjöstedt, 1925a : 73.  
*Trinervitermes tchadensis* (Sjöstedt) Sjöstedt, 1926 : 353.  
*Trinervitermes schubotzianus* (Sjöstedt) Sjöstedt, 1926 : 383.  
*Trinervitermes mobilis* (Sjöstedt) Sjöstedt, 1926 : 353.

*Imago.* Head capsule, central part of frons and vertex brown to dark chestnut brown ; vertex with three diverging yellow-brown streaks ; postclypeus, and area surrounding eyes, extending to a point behind eyes and to mandible base in front, yellow-brown ; labrum and antennae yellow to yellow-brown. Pronotum yellow to yellow-brown, meso- and metanota, other thoracic sclerites and legs yellow. Abdominal tergites brown to dark chestnut brown, slightly darker round stigmata, with yellow to yellow-brown border, and slightly paler towards lateral corners of front margin ; sternites yellow to yellow-brown, brown round stigmata. Wings translucent pale brown, subcosta and radius sector yellow, paler distally, latter outlined brown at base, membrane between them shaded brown for short distance from suture ; membrane behind radius sector with or without orange-yellow streak ; rest of venation narrowly yellow-brown to brown.

Posterior margin of head capsule behind eyes much less than semi-circular, slightly sinuate immediately behind eyes ; fontanelle distinct, usually Y-shaped with lateral arms dilated terminally, sometimes slightly depressed or occluded posteriorly, length approximately twice breadth at base of lateral arms ; eyes slightly angularly oval and moderately prominent in proportion to own diameter, medium-sized relative to head width, W/E index 2.6-3.0 ; ocelli medium sized to large, separated from eyes by one-fifteenth to one-fourth own least diameter ; postclypeus moderately inflated, width 2.3 to 2.5 times length, anterior margin nearly straight, posterior margin convex, rounded ; molar plate of right mandible with 7-8 ridges ; antennae 17 segmented, II, IV, and V subequal, VI slightly and III distinctly longer than these.

Pale coloured "scent" gland on anterior margin of fifth abdominal sternite of ♀ large, 0.97-1.07mm. wide, 0.26-0.41mm. long ; cerci of ♀ longer than wide across base, conical.

Pilosity of vertex of varying length, setae not forming a "pelt" or "mat" (Text-fig. 384).

Measurements (40 specimens from 9 localities) in millimetres.

	Range	Mean
Head width across eyes	1.72-1.95	1.82
Greatest diameter of eye	0.58-0.74	0.66
Ocellus . . . . .	0.19-0.25 × 0.25-0.31	0.22 × 0.28
Ocellus to eye . . . . .	0.02-0.05	0.03
Width of pronotum . . . . .	1.58-1.95	1.69
Length of pronotum . . . . .	0.98-1.18	1.09
Length of hind tibia . . . . .	2.30-2.68	2.48
Length of fore wing . . . . .	16.10-20.80	18.61

*Soldiers.* Major soldier ; head capsule yellow to ferruginous, commonly orange-yellow, nose orange to chestnut brown with reddish tip. Antennae and pronotum orange-yellow, meso- and metanota, and legs yellow. Abdominal tergites brown, sternites pale yellow.

Head capsule in plan view short oval or circular, nose conical. In profile near straight to distinctly concave, with back of head rising from above antennal socket, and rounded ; nose equal in length to distinctly shorter than rest of head capsule, measuring from hind margin of antennal socket, angle of nose cone 5-18 degrees ; antennae 13-14 segmented, only one in twenty with 13, proportions of basal segments variable, in 13 segmented forms, II and IV subequal, shorter than V and VI which are also subequal, III twice II and IV, in 14 segmented, III, V and VI subequal, IV slightly longer and II slightly shorter. Head setae confined to four



at nose tip with smaller setae behind them, sometimes very sparse; dorsal surface of head without prominent setae. Middle abdominal tergites with very sparse scattered minute setae, scarcely visible in profile, only slightly longer on posterior tergites. Sternites with short backward directed scattered setae, and longer downward or slightly forward directed setae on posterior margins, arranged approximately in 6 longitudinal rows, 3 or more times length of shorter setae.

Minor soldier; head capsule orange-yellow to reddish chestnut brown, nose ferruginous orange to brownish black with red tip. Antennae 13-14 segmented, proportions of basal segments variable.

Measurements (Major soldiers, 60 specimens from 20 localities, minor soldiers, 11 specimens from 9 localities) in millimetres.

<i>Major Soldiers :</i>	Range	Mean
Head length to tip of nose . . . . .	1.95-2.65 . . . . .	2.33
Head width . . . . .	1.13-1.63 . . . . .	1.39
Depth of head capsule . . . . .	0.80-1.08 . . . . .	0.97
Width of pronotum . . . . .	0.55-0.73 . . . . .	0.65
Length of pronotum . . . . .	0.23-0.36 . . . . .	0.30
Length of hind tibia . . . . .	1.40-1.82 . . . . .	1.64
<i>Minor Soldiers :</i>	Range	Mean
Head length to tip of nose . . . . .	1.50-1.82 . . . . .	1.66
Head width . . . . .	0.64-0.82 . . . . .	0.74
Depth of head capsule . . . . .	0.50-0.64 . . . . .	0.57
Width of pronotum . . . . .	0.43-0.50 . . . . .	0.46
Length of pronotum . . . . .	0.18-0.25 . . . . .	0.22
Length of hind tibia . . . . .	1.20-1.50 . . . . .	1.40

*T. oeconomus* is similarly variable to its sympatric congeners, with which it is easily confused. It is distinguishable in the ♀ imago from *T. geminatus* by the larger "scent" gland on the fifth sternite and the longer cerci, and from both this and *T. trinervius* by the uneven vertex pilosity. In the soldier caste, *T. trinervius* is much darker in colour and has few nose setae. Most *T. geminatus* are also darker, with slightly more prominent abdominal setae, but indistinguishable specimens do occur. Larger, paler specimens of *T. togoensis* have been found to occur at greater altitudes, and these sometimes have 14 segmented soldier antennae, thus also becoming indistinguishable from *T. oeconomus*. Of the allopatric species, the closest is *T. graciosus*, in which the imago has a more inflated postclypeus, ocelli usually further from the eyes, and shorter female cerci. The paler coloured soldiers of this species are almost indistinguishable from *T. oeconomus*, except that the nose tip of the latter has more setae in the majority of specimens.

The synonymy of this species is straight-forward apart from *T. mobilis*, which was described from imagos collected at light. The syntype material consists of two species, the larger of which corresponds to the original description, the smaller being *T. togoensis*. Snyder (1949) synonymised *T. mobilis* with *T. trinervius*, but the accepted usage of the latter is for the species also named *T. posselensis* and *T. carbonarius*. This I regard as correct and therefore use the next oldest name, *T. oeconomus* for the species to which the specimens named *T. mobilis* by Sjöstedt also belong.

A specimen has been selected and labelled by Dr. A. E. Emerson as lectotype for the junior synonym, *T. tchadensis*, but the designation has not been published hitherto. It is given under the type material heading.

Type Material. SUDAN : Kaka, iii.1901 (*I. Trägårdh*), syntype soldier from type colony, *T. oeconomus* (*Trägårdh*), A.M.N.H. (other syntypes in Naturhist. Riksmus., Stockholm).

MALI : Alahina, (near Toukoto?), vi.1903 (*Kermorgant*), syntype imago from type series, *T. mobilis* (*Sjöstedt*), A.M.N.H. (other syntypes in Mus. Paris and Naturhist. Riksmus., Stockholm).

CHAD : Tchari-Tchad, no date, (*no collector*), paralectotype soldier from type colony, *T. tchadensis* (*Sjöstedt*), A.M.N.H. (lectotype soldier and other paralectotypes, in Naturhist. Riksmus., Stockholm).

CENTRAL AFRICAN REPUBLIC : Fort Crampel, 6.i.1911 (*A. Schubotz*), paratype soldier from type colony, *T. schubotzianus* (*Sjöstedt*), A.M.N.H. (Holotype soldier and other paratype, in Mus. Hamburg, other paratypes in Naturhist. Riksmus., Stockholm.)

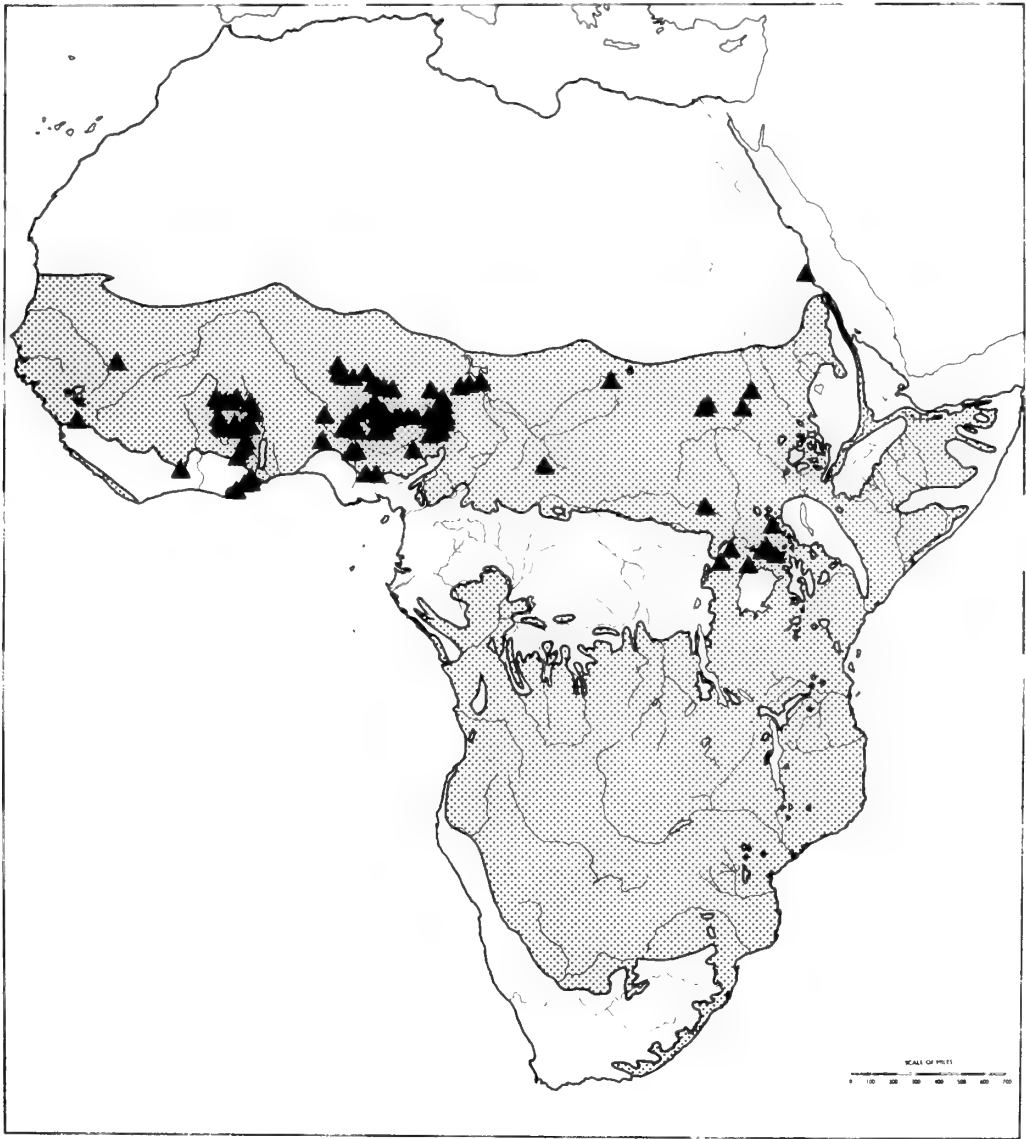
Other Material. SIERRA LEONE : Samaia, 24.v.1948 (*F. A. Squires*).

IVORY COAST : Toumodi, 120km. N.W. of Abidjan, 1962-1964, 3 vials (*P. Bodot*).

GHANA : Cape Coast Castle, no date (*G. Williams*) ; Accra, 26.v-29.vi.1926, 3 vials (*A. W. J. Pomeroy*) ; Nungua, 16.i. and 21.vi.1956, 3 vials, Achimota, 19.i.1953 and 6.i.1956, 3 vials (*W. Belfield*) ; Accra, 16.ii.1959, 11½m. from Accra on Kumasi Road, 18.ii.1959, 2 vials, Ejura, 21.ii.1959, 33-60m. N. of Ejura on Tamale Road, 24.ii.1959, 2 vials, 10m. N. of Yeji on Tamale Road, 25.ii.1959, 12m. S. of Tamale on Kumasi Road, 26.ii.1959, 5 and 16m. from Daboya on Tamale Road, 28.ii.1959, 2 vials, 30m. from Tamale on Larabanga Road, 3.iii.1959, 35m. from Tamale on Yendi Road, 4.iii.1959, 25m. S.E. of Gambaga on Yendi Road, 6.iii.1959, Volta Bridge on Bolgatanga-Bawku Road, 8.iii.1959, Navrongo, 12.iii.1959, 29m. from Navrongo on Tumu Road, 13.iii.1959, 12m. N. of Navrongo, 14.iii.1959, 11m. from Tumu on Navrongo Road, 15.iii.1959, 40m. from Tumu on Lawra Road, 16.iii.1959, 9m. N. of Lawra on Nandom Road, 18.iii.1959, 24 and 52m. from Wa on Bole Road, 20.iii.1959, 3 vials, 3m. from Larabanga on Bole Road, 22.iii.1959, 12m. from Accra on Takoradi Road, 7.iv.1959 (*W. A. Sands*).

NIGERIA : Eastern Region, Enugu, 12.xi.1955 (*W. V. Harris*) ; Abakaliki, 28.v.1957 (*W. Wilkinson*) ; Northern Region ; Yashi, 3.ix.1954, 2 vials, Kano, 4.ix.1954 (*B. J. McNulty*) ; 43m. E. of Kano, Gaya River, 17.xi.1956, 31m. W. of Kano on Katsina Road, 18.xi.1956, Katsina, 18.xi.1956, Kaura Namoda, 21.xi.1956, 71m. from Gusau on Sokoto Road, 22.xi.1956, 25m. from Sokoto on Gusau Road, 25.xi.1956, 30m. N. of Sokoto on Illela Road, 26.xi.1956, Samaru, near Zaria, 3.xi.1956, 2 vials, and 14.v.1959, 18m. from Kaduna on Zaria Road, 8.xii.1956, 2 vials, 33m. from Kaduna on Zungeru Road, 18.xii.1956, 45m. from Zungeru on Kaduna Road, 19.xii.1956, 29m. from Minna on Zungeru Road, 20.xii.1956, 2 vials, 16m. from Zungeru on Bida Road, 21.xii.1956, 3 vials, 41m. from Mokwa on Bida Road, 22.xii.1956, 39m. from Abuja on Bida Road, 24.xii.1956, 22m. from Kaduna on

Kachia Road, 30.i.1957, Kuduru on Zaria-Jos Road, 5.ii.1957, 4 vials, 5m. from Jos on Bukuru Road, 6.ii.1957, 2 vials, Naraguta, near Jos, 10.ii.1957, 16 and 40m. from Jos on Bauchi Road, 11.ii.1957, 4 vials, 25m. from Bauchi on Jos Road, 13.ii.1957, 50m. from Kaduna on Jos Road, 15.ii.1957, Afaka, 16m. from Kaduna on Zungeru Road, 28.ii.1957, 4 vials, 24-32m. from Jos on Kaduna Road, 3.iv.1957, 4 vials,



MAP 24. *Trinervitermes oeconomus*. Vegetation types : 8, 16, 17, 20, 21, and 25, and possibly also 31.

7-39m. from Bauchi on Gombe Road, 7.v.1957, 3 vials, Gombe, and 30m. E. of Gombe, 8-9.v.1957, 5 vials, 22m. from Gombe on Numan Road, 10.v.1957, 2 vials, 40-52m. S.E. of Gombe on Numan Road, 10.v.1957, 5 vials, 92m. from Gombe on Numan Road, 11.v.1957, 2 vials, 6m. from Numan on Yola Road, 12.v.1957, 24-34m. from Yola on Jalingo Road, 14.v.1957, 4 vials, 54 and 75m. from Yola on Jalingo Road, 16.v.1957, 2 vials, 3m. from Jalingo on Yola Road, 17.v.1957, 125m. S.W. of Jalingo on Takum Road via Beli, 18.v.1957, 35 and 80m. from Yola on Biu Road, 28.v.1957, 2 vials, 15 and 55m. N. of Biu on Damaturu Road, 29.v.1957, 2 vials, Maiduguri, 1.vi.1957, 43m. from Maiduguri on Fort Lamy Road, 3.vi.1957, 32m. from Damaturu on Potiskum Road, 5.vi.1957, 2 vials, 4m. S. of Ilorin on Oyo Road, 4.xii.1957, 45m. S. of Jos on Wamba Road, 23.ii.1958, 2 vials, 12m. from Keffi on Makurdi Road, 24.ii.1958, 30m. from Lokoja on Okene Road, 8.iii.1958, Lokoja, 9.iii.1958 (*W. A. Sands*); Bussa, 1.xii.1961 (*J. McMahon*).

CONGO : Garamba Nat. Park, 29.ix.1951 (*H. de Saeger*), Inst. des Parcs Nat. du Congo, Brussels.

SUDAN : Renk, 4.vii.1909 (*H. H. King*); Darfur Province, Kulme, 12° 36' N., 23° 27' E., 26.vi.1921 (*H. Lynes*); Port Sudan, vi.1939 (*F. M. Telford*); Lake Keilak, 30.vi.1952, Kadugli, 22.vii.1952 (*R. C. H. Sweeney*).

UGANDA : additional to those recorded in Sands (1957); Serere, 17.vii.1939 (*P.R.S.*), Fort Portal, ii.1948 (*N. A. Weber*), A.M.N.H.; 15m. from Kampala on Masindi Road, 7.xi.1955 (*R. M. C. Williams*).

LIBYA? : " Tripoli ", no date (*Walker*).

A total of 146 nest series were examined and all material is in the British Museum (Natural History) unless otherwise stated.

*T. oeconomus* was recognized by Sjöstedt (1925a) as occurring from the Sudan across to Ghana, and further records have extended the range to include vegetation types ranging from forest-savannah mosaic, to the Sahel and even in the case of the Port Sudan record, subdesert steppe (*Keay et al.*, 1959, types 8, 16, 17, 20, 25, and 31). The specimen recorded as *T. trinervius* by Walker (1853) from " Tripoli " has been examined, and is undoubtedly *T. oeconomus*. There must be considerable doubt attached to the locality from which it was recorded. According to Capra (1938), no other *Trinervitermes* has been found in North Africa, and it seems probable that this specimen originated in the Sudan.

The wide distribution of this species may partly be explained by its habit of commonly building its low wide mound in shaded or sheltered locations, and often occupying parts of mounds of various species of *Macrotermitinae*.

### *Trinervitermes rapulum* (Sjöstedt)

(Text-figs. 193, 297, 298, 308-313, 338-358; Map 25)

*Eutermes rapulum* Sjöstedt, 1904 : 99. Type locality : TANGANYIKA, Tanga.

*Termes (Eutermes) rapulum* (Sjöstedt) Desneux, 1904a : 44.

*Eutermes (Trinervitermes) rapulum* Sjöstedt; Holmgren, 1912 : 65.

- Eutermes (Trinervitermes) dispar* form *zuluensis* Holmgren, 1913d : 340. Type locality : REPUBLIC OF SOUTH AFRICA, Zululand, Mfolosi Drift, Mkosi. **syn. n.**
- Eutermes (Trinervitermes) dispar* form *disparioides* Holmgren, 1913 : 342. Type locality : REPUBLIC OF SOUTH AFRICA, Zululand. Mhlazinga.
- Trinervitermes zuluensis* (Holmgren) Fuller, 1922 : 113 [including *Trinervitermes dispar* form *disparioides* Holmgren as a synonym].
- Trinervitermes pretoriensis* Fuller 1922 : 114. Type locality : REPUBLIC OF SOUTH AFRICA, Pretoria. **syn. n.**
- Trinervitermes rapulum* (Sjöstedt) Sjöstedt, 1926 : 348.

Additions to the previous descriptions (Sands, 1957) of both imago and soldier castes are necessary.

*Imago.* Head capsule, central part of frons and vertex yellow-brown to dark chestnut brown, vertex often with median pale patch, pale yellow to yellow-brown ; postclypeus, labrum, antennae, and area surrounding eye, ocellus and antennal socket paler, pale yellow to yellow-brown. Pronotum yellow to yellow-brown, other thoracic sclerites and legs yellow. Abdominal tergites yellow to brown, often darker round stigmata, sternites pale yellow to yellow, sometimes brown round stigmata. Wings translucent pale brown, subcosta and radius sector, outlined brown at base ; membrane behind radius sector with orange streak ; rest of venation outlined brown.

Posterior margin of head capsule behind eyes much less than semi-circular, slightly sinuate immediately behind eyes ; fontanelle rather small, shape varies in ♂ from U- to near Y-shaped, ♀ from Y-shaped to triangular with concave anterior margin, lateral arms short, not dilated terminally ; frons usually with two small diverging depressions in front of fontanelle ; eyes prominent in proportion to own diameter but not large relative to head width, W/E index 3.0-3.5 ; ocelli separated from eyes by one-fifth to more than half own least diameter ; postclypeus width 1.9-2.2 times length ; molar plate of right mandible with 7-8 ridges ; antennae, 70% of specimens with 15 segments, 30% with 16.

Pale coloured "scent" gland on anterior margin of ♀ fifth abdominal sternite small, 0.56-0.71mm. wide, 0.15-0.20mm. long ; cerci of ♀ as long as or longer than basal width, slightly mamilliform.

Pilosity of vertex of uneven length, not forming a "pelt" or "mat".

Measurements (38 specimens from 11 localities) in millimetres.

	Range	Mean
Head width across eyes	1.45-1.83	1.64
Greatest diameter of eye	0.47-0.58	0.52
Ocellus . . . . .	0.15-0.23 × 0.20-0.30	0.19 × 0.24
Ocellus to eye . . . . .	0.03-0.10	0.06
Width of pronotum . . . . .	1.25-1.70	1.49
Length of pronotum . . . . .	0.78-1.05	0.93
Length of hind tibia . . . . .	1.81-2.20	2.02
Length of fore wing . . . . .	14.30-22.10	17.31

*Soldiers.* Major soldier : head capsule yellow to ferruginous orange, nose ferruginous to pitch black with red tip, antennae pale yellow to orange-yellow. Pronotum, meso- and meta-nota yellow to yellow-brown, legs pale yellow to yellow. Abdominal tergites yellow to brown, sternites pale yellow.

Head capsule in plan view slightly "shouldered" behind antennae, rounded posteriorly, nose cylindrical to weakly conical. In profile distinctly concave, with lowest point above or slightly in front of antennal socket, rising in a weak curve or nearly straight line to highest point near back of head, before downward curve to occiput ; nose shorter than rest of head, measuring from hind margin of antennal socket, angle of nose cone 0-14 degrees.

Head setae consist of four at nose tip with a few smaller setae behind them, and occasionally scattered sparse minute setae on vertex. Middle abdominal tergites with scattered small setae,

longer on posterior segments, sternites with short backward directed setae up to one-third length of longer downward or slightly forward directed setae on posterior margins, arranged in 4-6 longitudinal rows.

Minor soldier : colour as major soldier except nose always dark, antennae 12-13 segmented, usually 12.

Measurements (Major soldiers, 74 specimens from 18 localities, minor soldiers, 9 specimens from 6 localities) in millimetres.

	Range	Mean
<i>Major Soldiers :</i>		
Head length to tip of nose . . . . .	1·85-2·33 . . . . .	2·10
Head width . . . . .	1·07-1·50 . . . . .	1·30
Depth of head capsule . . . . .	0·75-1·07 . . . . .	0·91
Width of pronotum . . . . .	0·54-0·71 . . . . .	0·61
Length of pronotum . . . . .	0·22-0·29 . . . . .	0·25
Length of hind tibia . . . . .	1·07-1·53 . . . . .	1·25
<i>Minor Soldiers :</i>		
Head length to tip of nose . . . . .	1·43-1·62 . . . . .	1·49
Head width . . . . .	0·57-0·64 . . . . .	0·60
Depth of head capsule . . . . .	0·45-0·54 . . . . .	0·48
Width of pronotum . . . . .	0·40-0·45 . . . . .	0·42
Length of pronotum . . . . .	0·18-0·22 . . . . .	0·19
Length of hind tibia . . . . .	1·04-1·25 . . . . .	1·11

*T. rapulum* is extremely difficult to separate from *T. rhodesiensis* in many samples of both imago and soldier castes, and these may be regarded as siblings, being partially sympatric. Most but not all imagos of *T. rapulum* have small diverging depressions on the frons, and are slightly smaller, with a slightly more inflated postclypeus than *T. rhodesiensis*; the fontanelle is often smaller and slightly differently shaped (Text-figs. 308-313). Soldiers of *T. rapulum* have usually a shorter nose and a slightly different profile, but specimens occur which are virtually indistinguishable from some *T. rhodesiensis*. Where the two species occur together in one locality, they are usually recognizably different, and the difficulty arises when attempting identification of meagre material of only one. Comparisons with *T. dispar* and *T. occidentalis* are made in the discussion of those species.

Type Material. TANGANYIKA : Tanga, no date (*v. Reden*), syntype soldiers, type colony, *T. rapulum* (Sjöstedt), Naturhist. Riksmus., Stockholm (other syntypes in Mus. Berlin and A.M.N.H.).

REPUBLIC OF SOUTH AFRICA : Natal, Zululand, Mfolosi Drift, Mkosi, 1905 (*I. Trägårdh*), syntype ♂ imago, type colony, *T. zuluensis* (Holmgren), A.M.N.H. (other syntypes stated by Holmgren to be in Mus. Göteborg); Transvaal, Pretoria, Meukleneuk Hill, 3.x.1916 (*C. Rudolph*), paratype ♀ imagos, type colony *T. pretoriensis* Fuller, B.M.(N.H.). (Holotype in N.C.I., Pretoria.)

Other Material (additional to that recorded in Sands (1957)). TANGANYIKA : Dar-es-salaam, no date (*Regner*); Iringa, 8.i.1935, 2 vials (*H. Kirby*), A.M.N.H.

SOUTHERN RHODESIA : Salisbury, iv.1917 (*R. W. Tucker*); also 6.iv. and 3.vii. 1949, and 5.xii.1950 (*G. H. Bunslé*); Guluene River, 21° 41' S., 31° 47' E., 13.ix. 1962 (*J. C. Felton*).

REPUBLIC OF SOUTH AFRICA : Transvaal; Letaba, 23.ix.1919 (*C. Fuller*). Olifant River, x.1927 (*H. Lang*), A.M.N.H.; Pietersburg, 8.xii.1936, Groblersdal,

26.ix.1957, Marico, 2.ix.1961 (*W. G. H. Coaton*) ; Nelspruit, 15.xi.1958, Marico, 5.xii.1958, Sibasa, 29-30.1959, 2 vials, Waterberg, 6.i.1960 (*P. C. Joubert*) ; Soutpansberg, 10.viii.1960 (*J. L. Sheasby*) ; Lydenburg, 7.ix.1961 (*L. J. de Weerd*) ; Warmbad, 2.x.1961 (*G. F. Pretorius*) ; Natal, Ubombo, i.1926 (*Collins*) ; also 8.xii.1959, 2 vials (*W. G. H. Coaton*).

A total of 42 nest series were examined, and all material is in the British Museum (Natural History) unless otherwise stated.



MAP 25. *Trinervitermes rapulum*. Vegetation types : 9, 20, and 22.

*T. rapulum* shares with *T. occidentalis* the features of comparative rarity and primitive habit of feeding at least partly on woody material. It appears to have a restricted distribution along the east coast of Africa, where it is usually found in somewhat dry conditions, (Keay *et al.*, 1959, vegetation types 20, 22), though there are also records from the moister coastal savannah (type 9). It has not often been recorded from the true *Brachystegia-Julbernardia* woodland (type 18), though its close similarity to *T. rhodesiensis* may have led to a few records being wrongly assigned to that species. *T. rapulum* and *T. occidentalis* may be relic members of the genus, less well adapted to grass feeding in the savannah zones than commoner congeners.

### *Trinervitermes rhodesiensis* (Sjöstedt)

(Text-figs. 194, 195, 299-300, 314-319, 344-350 ; Map 26)

- Eutermes rhodesiensis* Sjöstedt, 1911a : 186. Type locality : SOUTHERN RHODESIA, Salisbury.  
*Eutermes brutus* Sjöstedt, 1911b : 13. Type locality : CONGO, Mukimbungu. **syn. n.** [ex syn. *T. bettonianus* (Sjöstedt) ; Emerson, 1928 : 492].  
*Eutermes (Trinervitermes) brutus* Sjöstedt ; Holmgren, 1912 : 65.  
*Eutermes (Trinervitermes) rhodesiensis* Sjöstedt ; Holmgren, 1912 : 65.  
*Eutermes agricola* Sjöstedt, 1913a : 380. Type locality : CONGO, Katanga, Mufungwa. **syn. n.**  
*Eutermes rufonasalis* Sjöstedt, 1913a : 383. Type locality : CONGO, Katanga, Sankisia. **syn. n.**  
*Eutermes (Trinervitermes) roseni* Holmgren, 1913 : 344. Type locality : RHODESIA [according to Holmgren], CONGO, Banana [according to Sjöstedt, 1926 : 336]. **syn. n.**  
*Eutermes (Trinervitermes) kalaharicus* Holmgren, 1913 : 346. Type locality : BECHUANALAND PROT., Kalahari, Kooa, Sekgoma-Khakea. **syn. n.**  
*Trinervitermes gemellus* form *kalaharicus* (Holmgren) Fuller, 1922 : 110.  
*Trinervitermes abassas* Fuller, 1922 : 114. Type locality : REPUBLIC OF SOUTH AFRICA, Namaqualand, Abassas on Orange River. **syn. n.**  
*Trinervitermes thermarum* Fuller, 1922 : 114. Type locality : REPUBLIC OF SOUTH AFRICA, Transvaal, Warmbad. **syn. n.**  
*Eutermes (Trinervitermes) diplacodes* Sjöstedt, 1924 : 41. Type locality : CONGO, Boma, [syn. *T. roseni* (Holmgren) Emerson, 1928 : 491].  
*Eutermes (Trinervitermes) muneris* Sjöstedt, 1924 : 42. Type locality : CONGO, Boma. [syn. *T. roseni* (Holmgren) Emerson, 1928 : 491].  
*Eutermes (Trinervitermes) loubetsiensis* Sjöstedt, 1924c : 496. Type locality : REPUBLIC OF CONGO, Loubetsi. **syn. n.**  
*Trinervitermes rhodesiensis* (Sjöstedt) Sjöstedt, 1926 : 346.  
*Trinervitermes brutus* (Sjöstedt) Sjöstedt, 1926 : 331.  
*Trinervitermes agricola* (Sjöstedt) Sjöstedt, 1926 : 329.  
*Trinervitermes rufonasalis* (Sjöstedt) Sjöstedt, 1926 : 334.  
*Trinervitermes roseni* (Holmgren) Sjöstedt, 1926 : 336.  
*Trinervitermes loubetsiensis* (Sjöstedt) Sjöstedt, 1926 : 333.  
*Trinervitermes lutzi* Emerson ; Sands, 1957 : 25.

*Imago.* Head capsule, central part of frons and vertex brown to dark chestnut brown, vertex with median pale patch, yellow to brown, sometimes partly subdivided into indistinct streaks ; area surrounding eyes and antennal socket, in front of ocelli, and bordering posterior margin of postclypeus yellow to yellow-brown ; postclypeus and labrum yellow to yellow-brown, antennae yellow. Pronotum yellow to yellow-brown, sometimes darker at edges, meso- and metanota, other thoracic sclerites and legs yellow. Abdominal tergites yellow to yellow-



brown, clouded brown around stigmata, middle tergites sometimes narrowly brown between stigmata; sternites yellow, yellow-brown round stigmata. Wings translucent pale brown, subcosta and radius sector outlined brown at base, posterior outline of radius sector becoming orange distally; membrane behind radius sector with orange streak.

Posterior margin of head capsule behind eyes much less than semi-circular, slightly sinuate immediately behind eyes; fontanelle distinct, usually rather long slender Y-shaped, with lateral arms often but not always dilated terminally, length often more than twice breadth at base of lateral arms; eyes short oval, prominent in proportion to own diameter, medium sized relative to head width, W/E index 2.8-3.4; ocelli medium-sized, separated from eyes by one-seventh to two-fifths own least diameter; postclypeus moderately inflated, width 2.2-2.5 times length, anterior margin slightly concave, posterior margin convex, more strongly rounded laterally, more lightly arched in middle; molar plate of right mandible with 7-8 ridges; antennae 15-16 segmented, approximately half with each, basal segments variable, in 15 segmented, II and V subequal, IV and VI subequal and slightly longer, III longer than these, in 16 segmented, II and IV subequal, III and VI subequal and slightly longer, V slightly longer still.

Pale coloured "scent" gland on anterior margin of fifth abdominal sternite of ♀ medium-sized, 0.69-0.90mm. wide, 0.13-0.23mm. long; cerci of female longer than width across base, conical.

Pilosity of vertex of varying length, setae not forming a "pelt" or "mat".

Measurements (30 specimens from 10 localities) in millimetres.

	Range	Mean
Head width across eyes	1.60-1.84	1.70
Greatest diameter of eye	0.50-0.59	0.54
Ocellus	0.16-0.23 × 0.21-0.30	0.19 × 0.25
Ocellus to eye	0.03-0.08	0.06
Width of pronotum	1.43-1.73	1.56
Length of pronotum	0.88-1.08	0.98
Length of hind tibia	1.93-2.43	2.17
Length of fore wing	16.40-20.10	18.33

*Soldiers.* Major soldier: head capsule orange-yellow to ferruginous, nose ferruginous to chestnut brown with reddish tip. Antennae, legs, and abdominal sternites yellow, pronotum, meso- and metanota, and abdominal tergites orange-yellow to brown.

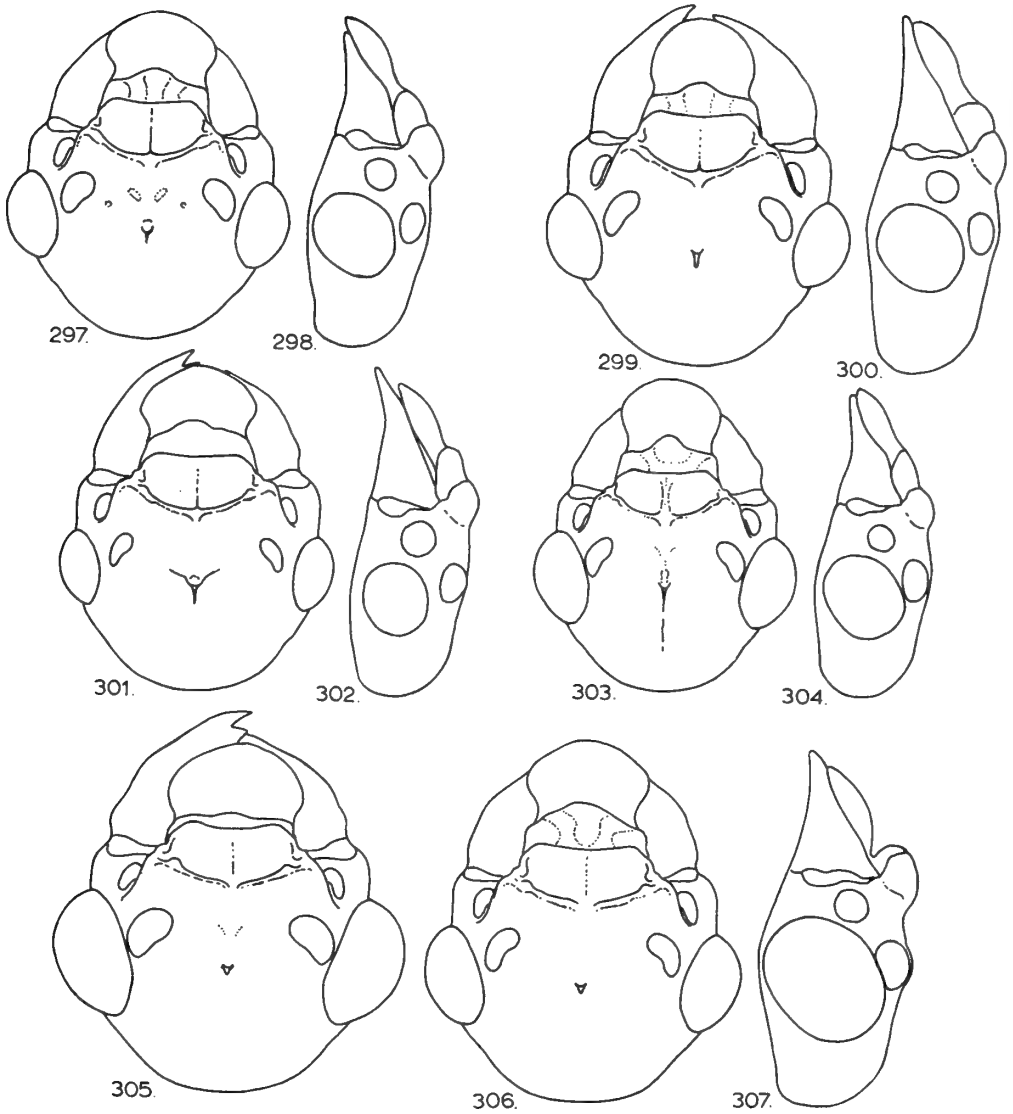
Head capsule in plan view, slightly "shouldered" behind antennae, nose cylindrical to weakly conical. In profile usually distinctly concave, but near straight, slightly humped, or only rising in slight curve, to behind antennal socket, then more strongly curved to highest point and evenly down to occiput; nose slightly longer to distinctly shorter than rest of head capsule, measuring from hind margin of antennal socket, angle of nose cone 0-14 degrees.

Antennae 13-14 segmented, 7 out of 8 with 13, II and IV subequal and longer than V and VI, III longer up to twice II, when 14 segmented, II, III, IV and V subequal.

Head setae consist of four at nose tip with smaller setae behind them, usually few but sometimes more numerous. Middle abdominal tergites with scattered small setae, only longer on posterior margin of last tergite; sternites with scattered short backward, and longer downward and forward directed setae, the latter on posterior margins and 3 or more times length of shorter. Minor soldier: colour as major soldier, antennae usually 12 segmented.

Measurements (Major soldiers, 63 specimens from 17 localities, minor soldiers, 9 specimens from 7 localities) in millimetres.

<i>Major Soldiers</i> :	Range	Mean
Head length to tip of nose	1.98-2.55	2.28
Head width	1.08-1.50	1.28
Depth of head capsule	0.78-1.14	0.94
Width of pronotum	0.53-0.74	0.62
Length of pronotum	0.20-0.32	0.27
Length of hind tibia	1.16-1.68	1.41



FIGS. 297-307 : *Trinervitermes*, front and side views of imago head capsule. 297, 298, *T. rapulum* ; 299, 300, *T. rhodesiensis* ; 301, 302, *T. saudiensis* ; 303, 304, *T. togoensis* ; 305-307, *T. trinervius*.

Minor Soldiers :	Range	Mean
Head length to tip of nose . . . . .	1.50-1.79 . . . . .	1.65
Head width . . . . .	0.61-0.78 . . . . .	0.69
Depth of head capsule . . . . .	0.50-0.64 . . . . .	0.57
Width of pronotum . . . . .	0.38-0.54 . . . . .	0.45
Length of pronotum . . . . .	0.18-0.23 . . . . .	0.20
Length of hind tibia . . . . .	1.08-1.39 . . . . .	1.27

*Variation.* In the imago, the fontanelle is sometimes partly occluded posteriorly by cuticle of slightly darker pigmentation than that surrounding it ; this has been observed in specimens from the lower Congo, and from the Transvaal. There may occasionally be small diverging depressions in front of the fontanelle, but these are not as common as in *T. rapulum*. In the soldier, specimens from the lower Congo tend to have slightly more conical noses than those from Rhodesia and S. Africa, but there is considerable overlap.

The difficulty of separating this species from *T. rapulum* has been stated under that species. Imagos of *T. rhodesiensis* often have paler cuticle behind the entire width of the posterior margin of the postclypeus, whereas in *T. rapulum* the darker pigmentation of the frons extends to this margin in the middle.

The specimens attributed to *T. lutzi* in an earlier paper (Sands, 1957) were based on comparison of the soldier castes alone. These are closely similar, but in *T. rhodesiensis* the fontanelle is smaller and the nose tip less hairy, a character not then recognized. The differences of the imagos of *T. occidentalis* and *T. bettonianus* have been discussed under those species. The large setae around the imago fontanelle noted in that paper are not a constant feature of the species.

A lectotype has been selected for *T. rhodesiensis* and labelled accordingly :

Lectotype soldier : SOUTHERN RHODESIA : Salisbury, 1911 (*G. A. K. Marshall*), and paralectotype from type colony, *T. rhodesiensis* (Sjöstedt), B.M.(N.H.) (other paralectotypes in A.M.N.H., and Naturhist. Riksmus., Stockholm).

Type Material. CONGO : Mukimbungu, 1904 (*K. E. Laman*), syntype soldiers, type colony, *T. brutus* (Sjöstedt), A.M.N.H. (other syntypes in Naturhist. Riksmus., Stockholm) ; Katanga, Mufungwa, 12.xii.1911 (*J. Bequaert*), syntype soldiers, type colony, *T. agricola* (Sjöstedt), A.M.N.H. and Naturhist. Riksmus., Stockholm ; Sankisia, 16.viii.1911 (*J. Bequaert*), syntype soldiers, type colony, *T. rufonasalis* (Sjöstedt), A.M.N.H. (other syntypes in Naturhist. Riksmus., Stockholm) ; Boma, viii.1920, and Moanda, 28.viii.1920 (*H. Schouteden*), syntype soldiers, *T. diplacodes* (Sjöstedt), A.M.N.H. (other syntypes in Naturhist. Riksmus., Stockholm) ; Boma 4.xi.1913 (*Styckzynski*), syntype soldiers, type colony, *T. muneris* (Sjöstedt) A.M.N.H., and Naturhist. Riksmus., Stockholm.

REPUBLIC OF CONGO : Loubetsi, approx. 3° 40' S., 12° 15' E., no date (*A. Nillson*), syntype soldiers, type colony, *T. loubetsiensis* Sjöstedt, A.M.N.H. (other syntypes in Naturhist. Riksmus., Stockholm).

BECHUANALAND : Kooa, Sekgoma Khakea, no date (*A. Schulze*), syntype, *T. kalaharicus* Holmgren, A.M.N.H.

REPUBLIC OF SOUTH AFRICA : Namaqualand, Abassas on Orange River, iii.1921 (*J. H. C. Kraphal*), paratype ♂ imagos, *T. abassas* Fuller, B.M.(N.H.) (Holotype and other paratypes in N.C.I., Pretoria) ; Transvaal, Warmbad, xii.1916 (*C.*

*Rudolph*), paratype ♀ imagos, *T. thermarum* Fuller, B.M.(N.H.) (Holotype and other paratypes in N.C.I., Pretoria.)

Other Material. REPUBLIC OF CONGO : 13km. W. of Brazzaville, 8.vi.1948, 2 vials (*A. E. Emerson*), A.M.N.H.

CONGO : Luluabourg, no date (*P. Callewaert*) ; Mukimbungu, 1904 (*K. E. Laman*) ; Boma, 4.xi.1913 (*Styckzynski*) ; Thysville, i.vi.1915 (*H. Lang, J. P. Chapin*) ; also 3.vi.1915, 2 vials, and Matadi, 18.vi.1915 (*J. Bequaert*) ; Boma, 10-12.viii.1920, 4 vials, and Moanda, viii.1920 (*H. Schoutededen*) ; Gihinga, 14.viii.1941 (*H. Bredo*) ; Sona Mpangu, 10-12.iv.1948, 7 vials, and 18km. S. of Leopoldville, 9.vi.1948 (*A. E. Emerson*), all in A.M.N.H.

ANGOLA : St. Antonio, viii.1915 (*H. Lang, J. P. Chapin*), A.M.N.H. ; Porto Alexandre, 1954 (*J. Balfour-Browne*).

NORTHERN RHODESIA : Lake Mweru, Masenka Flats, 8.viii.1942 (*H. Bredo*), A.M.N.H. ; Abercorn, iii.1947, and xi.-xii.1948, 6 vials (*P. E. Glover*).

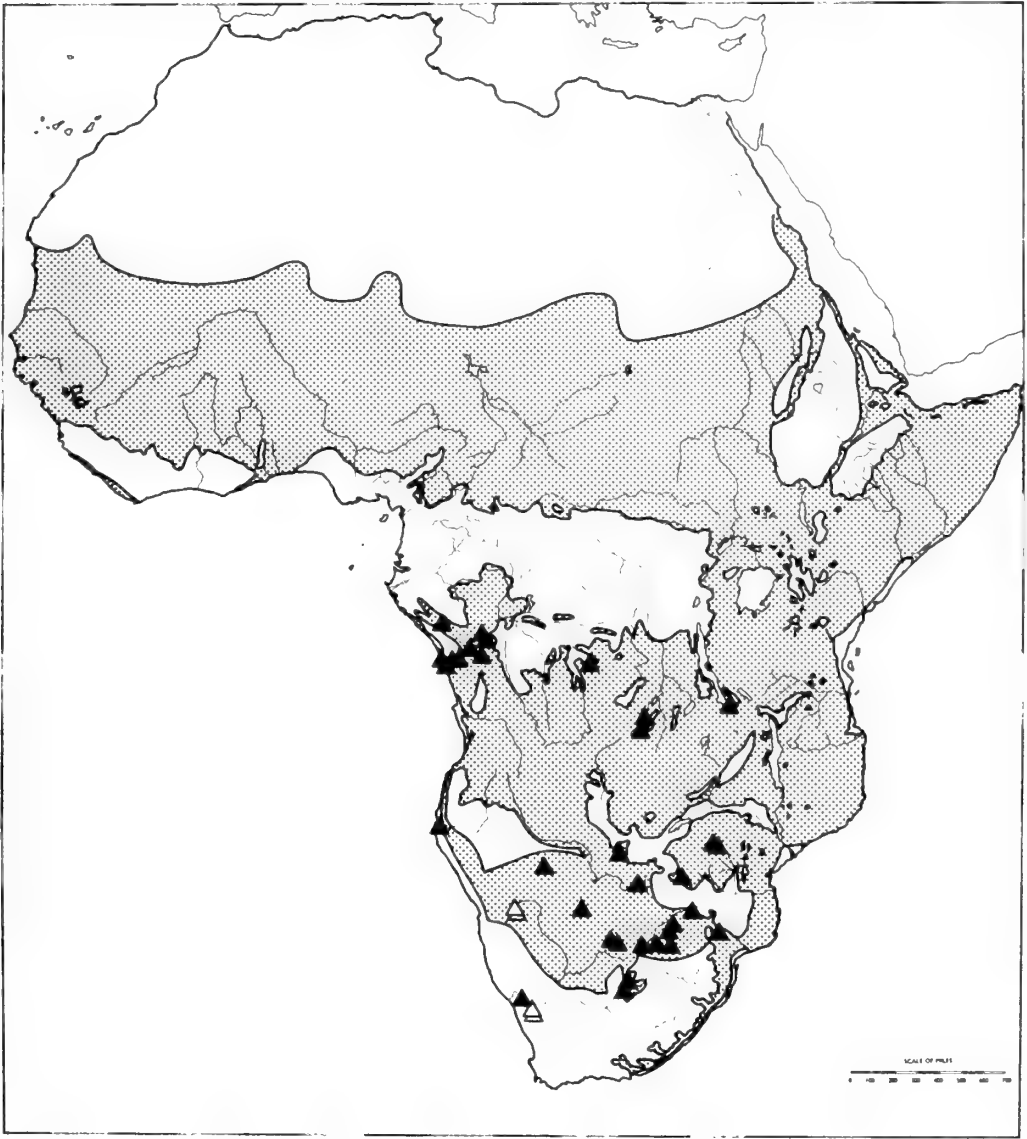
SOUTHERN RHODESIA : Salisbury, no date (*W. Barbrook*) ; ditto, 1911 (*G. A. K. Marshall*) ; Worldsvew, 1920 (*C. W. Mally*) ; Concession, 20.v.1927 (*R. Jack*).

BECHUANALAND : Topsis, 11.ii.1921 (*C. E. Godman*) ; Tsukutsa Pan, 3.viii.1924 (*C. W. Mally*) ; Tsotsoroga Pan, viii.1930, and Makarikari Pan, 5.viii.1930 (*H. Lang*), A.M.N.H. ; Gantsena Pan, 1955, and 60m. S. of Ghanzi, viii.1955 (*R. Story*).

REPUBLIC OF SOUTH AFRICA : Cape Province ; Taungs, 3.x.1956, Barkly West, 4.x.1956 (*W. G. H. Coaton*). Transvaal ; Potgeitersrust, 17.ix.1918, and Letaba, 20.ix.1918 (*C. Fuller*) ; Waterberg, 25.ix.1957, and Soutpansburg, 11.x.1960 (*W. G. H. Coaton*) ; Soutpansburg, 1.i.1960, Waterberg, 6.i.1960, and Marico, 9.i.1960, 2 vials (*P. C. Joubert*) ; Rustenburg, 4.x.1961 (*G. F. Pretorius*).

A total of 64 nest series were examined and all material is in the British Museum (Natural History) unless otherwise stated.

The distribution range of *T. rhodesiensis* overlaps to a limited extent with its sibling congener, *T. rapulum*, in Southern Rhodesia and the Transvaal. *T. rhodesiensis* covers the *Brachystegia-Julbernardia* savannah woodland and the other savannah gradations to semi-desert, from the southern border of the Congo forest southwards to the beginnings of the Karroo, Macchia, and temperate grasslands of the Cape. The East-West barrier separating the species from the Zambesi northwards appears to approximate to the Great Rift Valley. A few of the most South-Western records are from areas mapped by Keay *et al.*, (1959) as desert, but these are near the Orange River and it is presumed that the conditions are locally subdesert, and that full desert would constitute an ecological barrier. The distribution of *T. rhodesiensis* to the south of the Congo Rain forest approximates in climatic and vegetation range to that of *T. oeconomus* (Träg.) to the north.



MAP 26. *Trinervitermes rhodesiensis*. Vegetation types : 8, 16, 18, 19, 20, 25, and 31.

*Trinervitermes saudiensis* sp. n.

(Text-figs. 301, 302, 320, 321; Map 3.)

*Imago.* Colouration uncertain due to fading in old dried specimens, but thought to be similar to *T. rapulum*.

Posterior margin of head capsule behind eyes less than semi-circular, slightly sinuate immediately behind eyes; fontanelle distinct, Y-shaped, lateral arms long, reaching almost half-way to ocelli, slender but slightly dilated at point where termination occurs in other species; frons with two diverging depressions in front of fontanelle, or these united; eyes very short oval, moderately prominent in proportion to own diameter, small relative to head width, W/E index 3.5-3.9; ocelli medium sized, separated from eyes by more than half to more than three-quarters own least diameter; postclypeus moderately to strongly inflated, width 2.1-2.4 times length, anterior margin slightly concave, posterior margin convex, rounded, slightly arched in middle; molar plate of right mandible with 7-8 ridges; antennae 15 segmented, II, IV, and V subequal, III and VI subequal and slightly longer than these.

Pale coloured "scent" gland on anterior margin of fifth ♀ abdominal sternite small; cerci of ♀ as long as width across base, slightly mamilliform conical.

Pilosity of vertex of varying length, not forming a "pelt" or "mat".

Measurements (10 specimens from 1 locality) in millimetres.

	Range	Mean
Head width across eyes	1.61-1.76	1.66
Greatest diameter of eye	0.43-0.48	0.46
Ocellus . . . . .	0.16-0.18 × 0.20-0.25	0.17 × 0.22
Ocellus to eye . . . . .	0.10-0.13	0.11
Width of pronotum . . . . .	1.38-1.61	1.48
Length of pronotum . . . . .	0.84-0.94	0.90
Length of hind tibia . . . . .	2.04-2.24	2.17
Length of fore wing . . . . .	15.50-16.30	15.73

*Soldiers.* Unknown.

*T. saudiensis* is separable from *T. dispar* and *T. rapulum* by the proportionately smaller eyes, with the ocelli more distant from them, and the shorter ♀ cerci. The same characters apart from the cerci distinguish it from *T. togoensis* and *T. occidentalis*. The wide spreading lateral arms of the fontanelle are unlike any other *Trinervitermes* except some *T. trinervoides*.

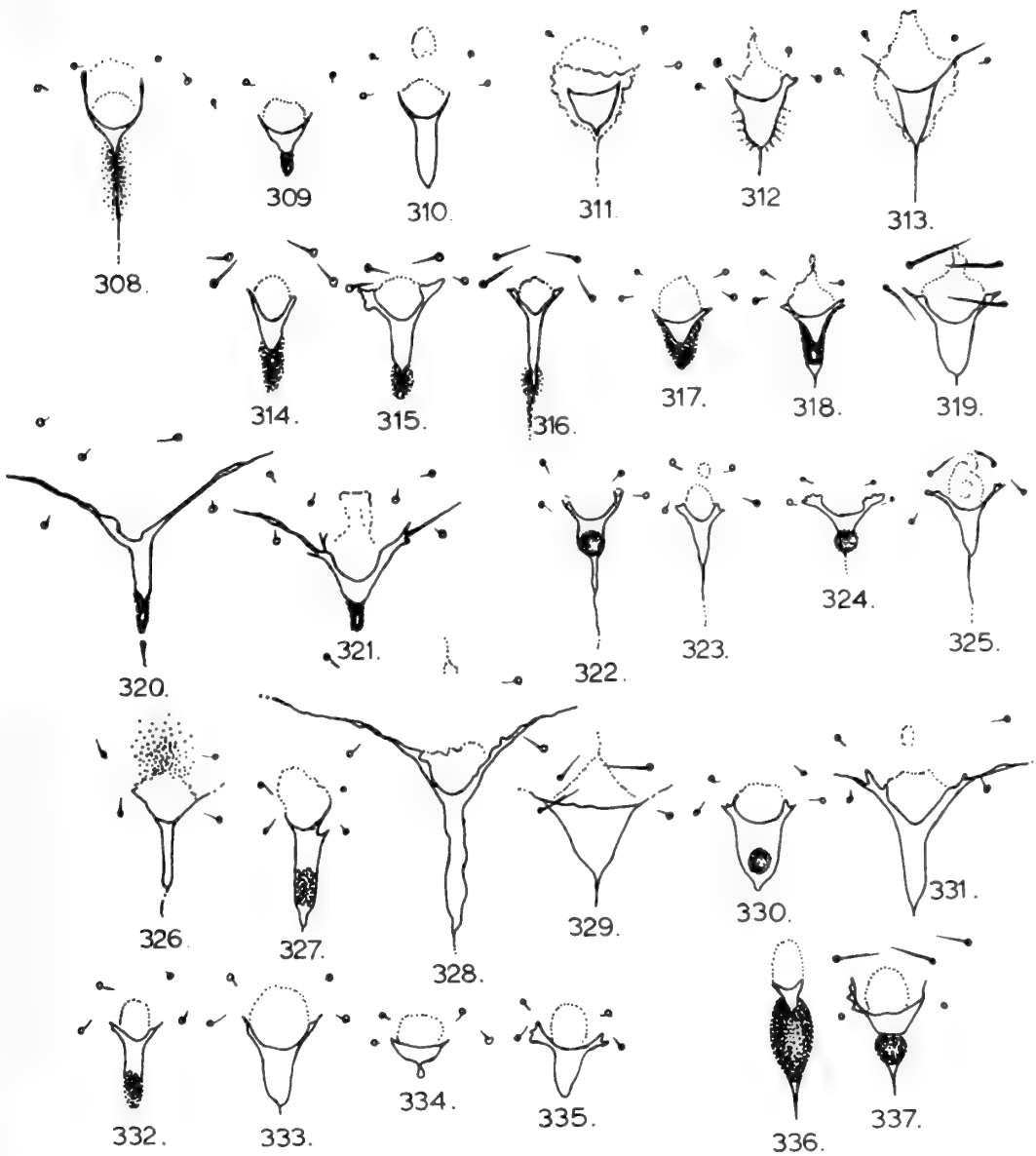
*T. saudiensis* is described here because it is so distinct from the other species of the Ethiopian Zoogeographical Region and because the existence of a further *Trinervitermes* species in the Arabian Peninsula is an important link in the distribution of the genus in Africa and India. I consider it most improbable that this species is the imago of *T. arabiae*. The various primitive features such as the wide branched fontanelle, small eyes widely separated from ocelli, the long postclypeus, slightly mamilliform cerci and small ventral scent gland, are shared with several other species, but none shows such a combination of features common to the rest, suggesting that this species may be close to the ancestral form of the genus. There is a possibility that this is the at present unknown imago caste of *Mycterotermes meringocephalus*, which might be expected to show a similar combination of features.

Two vials of this species were studied.

Holotype ♂, SAUDI ARABIA: Jidda, 24.xi.1926 (*H. St. J. B. Philby*), B.M.(N.H.).

Allotype ♀, same data as holotype, B.M.(N.H.).

Paratypes ♂, same data as above and also 3.ii.1934 (*G. L. Bates*), B.M.(N.H.).



FIGS. 308-337: Imago fontanelle. 308-310, ♂, 311-313, ♀, *Trinervitermes rapulum*; 314-316, ♂, 317-319, ♀, *T. rhodesiensis*; 320, ♂, 321, ♀, *T. saudiensis*; 322, 323, ♂, 324, 325, ♀, *T. togoensis*; 326-328, ♂, 329-331, ♀, *T. trinervoides*; 332, 333, ♂, 334, 335, ♀, *T. trinervius*; 336, ♂, 337, ♀, *Baucaliotermes hainesi*.

*Trinervitermes togoensis* (Sjöstedt)

(Text-figs. 303, 304, 322-325, 351-358 ; Map 27)

*Eutermes togoensis* Sjöstedt, 1899 : 37. Type locality : GHANA, Trans-Volta Togoland, Ho.*Eutermes terricola* Trägårdh, 1904 : 31. Type locality : SUDAN, Kaka. **syn. n.***Termes (Eutermes) togoensis* (Sjöstedt) Desneux, 1904a : 45.*Termes (Eutermes) terrestris* Desneux, 1904a : 45 [new name for *E. terricola* Trägårdh, presumably (not stated) on grounds of homonymy with *Termes (Termes) terricola* Sjöstedt, 1902].*Eutermes togoensis* Sjöstedt ; Sjöstedt, 1904 : 27 and 87.*Eutermes terricola* Trägårdh ; Sjöstedt, 1904 : 39 and 96.*Eutermes (Trinervitermes) togoensis* Sjöstedt ; Holmgren, 1912 : 62.*Eutermes (Trinervitermes) terricola* Trägårdh ; Holmgren, 1912 : 64.*Eutermes suspensus* Silvestri, 1914 : 41. Type locality : GUINEA, Kakoulima. **syn. n.***Trinervitermes terricola* (Trägårdh) Sjöstedt, 1926 : 326.*Trinervitermes suspensus* (Silvestri) Sjöstedt, 1926 : 329.*Trinervitermes togoensis* (Sjöstedt) Sjöstedt, 1926 : 331.*Trinervitermes nigriensis* Sjöstedt, 1926 : 333. Type locality : MALI, Belia. **syn. n.**

*Imago.* Head capsule, central part of frons and vertex brown to dark sepia brown ; vertex with two or three diverging paler streaks, middle one often indistinct or absent ; postclypeus, labrum, area between eye and mandible base, and tapering streak above each eye orange-yellow to brown, pale area in front of eye sometimes extending in front of ocelli and bordering posterior margin of postclypeus ; antennae orange-yellow to brown. Pronotum orange-yellow to yellow-brown, sometimes shaded brown at anterior corners, meso- and metanota yellow to orange-yellow ; other thoracic sclerites and legs yellow. Abdominal tergites brown to dark chestnut brown, darker round stigmata and paler on anterior corners, sternites pale yellow, sometimes brown round stigmata. Wings translucent pale brown, subcosta and radius sector yellow, partly outlined brown at base, membrane behind radius sector with yellow streak ; rest of venation narrowly brown or outlined brown.

Posterior margin of head capsule much less than semi-circular behind eyes, slightly sinuate immediately behind eyes ; fontanelle small, paler than head, short Y- or inverted A-shaped, sometimes with small depression in front or behind, or partly occluded posteriorly by darker cuticle, lateral arms often dilated terminally ; eyes oval, weakly to moderately prominent in proportion to own diameter, medium sized relative to head width, W/E index 2.5-3.2 ; ocelli medium sized oval, touching eyes, to separated from them by one-third own least diameter ; postclypeus moderately inflated, width 2.3-2.6 times length, anterior margin somewhat concave, posterior margin convex, rounded, sometimes slightly indistinct in middle ; molar plate of right mandible with 6-8 ridges ; antennae 15-16 segmented, rarely 17, one in five with 15 but usually with basal segments partly subdivided, in 16 segmented form II, III, V, and VI are subequal and longer than IV.

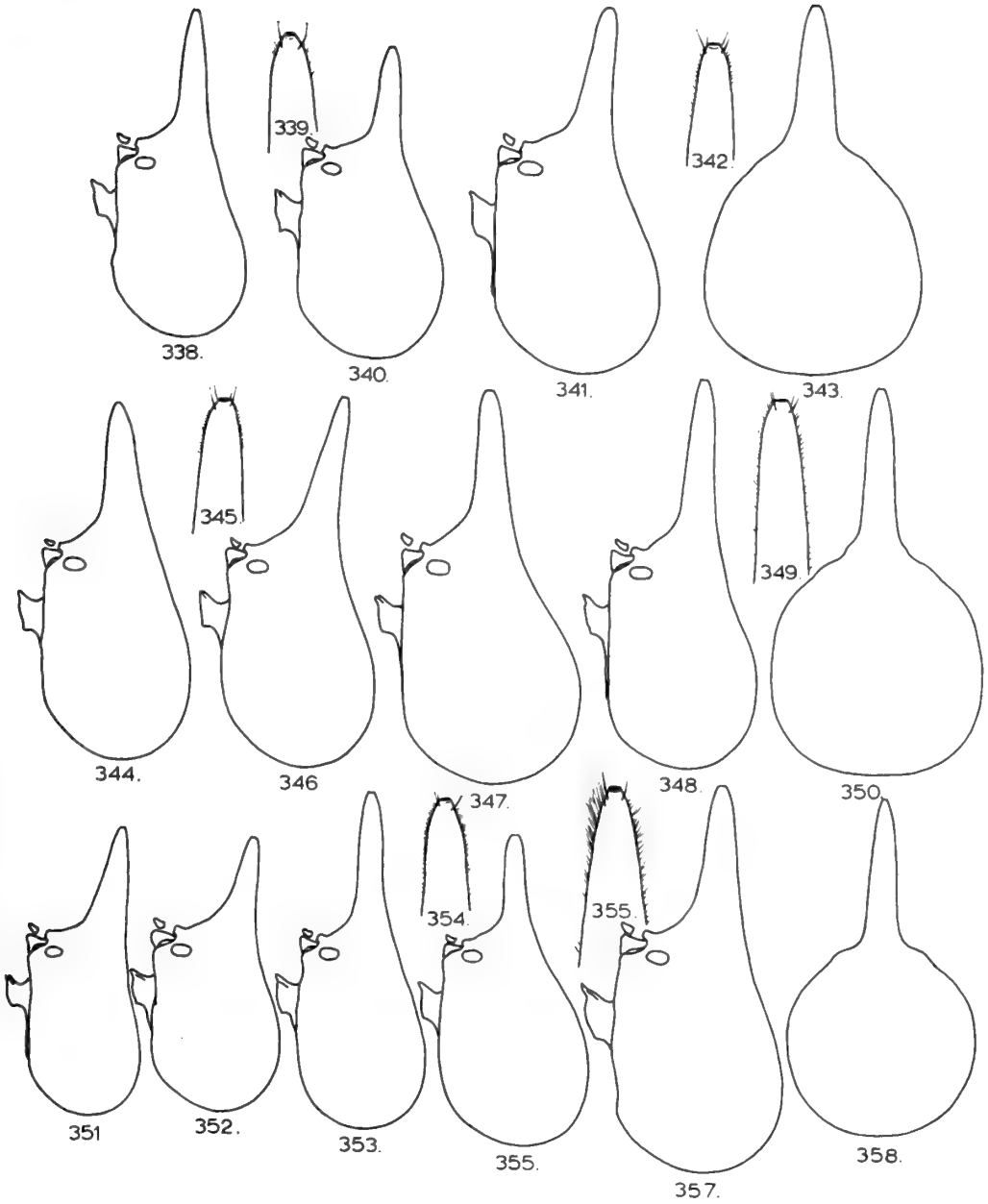
Pale coloured "scent" gland on anterior margin of fifth abdominal sternite of ♀ small, 0.35-0.64mm. wide, 0.13mm. long ; cerci of ♀ slightly shorter to slightly longer than width across base, conical.

Pilosity on vertex of varying length, setae not forming a "pelt" or "mat".

Measurements (36 specimens from 12 localities) in millimetres.

	Range	Mean
Head width across eyes	1.43-1.76	1.56
Greatest diameter of eye	0.50-0.63	0.55
Ocellus . . . . .	0.15-0.22 × 0.20-0.28	0.19 × 0.24
Ocellus to eye . . . . .	0.00-0.05	0.03
Width of pronotum . . . . .	1.30-1.59	1.43
Length of pronotum . . . . .	0.83-1.05	0.91
Length of hind tibia . . . . .	1.95-2.43	2.20
Length of fore wing . . . . .	14.20-21.00	17.14





FIGS. 338-358 : *Trinervitermes*, soldier head capsule, side and plan views, and nose tip. 338-343, *T. rapulum* ; 344-350, *T. rhodesiensis* ; 351-358, *T. togoensis*.

*Soldiers.* Major soldier : head capsule orange to chestnut brown, nose ferruginous to pitch black with red tip. Antennae and pronotum orange-yellow, meso- and metanota and legs yellow. Abdominal tergites yellow to brown, sternites yellow.

Head capsule in plan view short oval, circular, to slightly broader than long, nose near cylindrical to moderately conical. In profile near straight to distinctly concave with head rising from above or behind antennal socket in even curve to highest point and down to occiput ; nose much shorter than rest of head capsule, measuring from hind margin of antennal socket, up to equal in length, angle of nose cone 0-16 degrees. Antennae 13-14 segmented, 9 out of 10 with 13. IV and V subequal, longer than II and shorter than III.

Head setae confined to distinctly to sparsely hairy nose tip. Abdominal tergites with scattered minute setae, slightly longer on posterior three. Sternites with short backward directed setae and longer downward or forward directed setae on posterior margins, arranged approximately in 6 longitudinal rows, 3 or more times length of shorter setae.

Minor soldier : colour as the darker major soldiers, antennae 12-13 segmented, about equally divided between the two.

Measurements (Major soldiers, 70 specimens from 18 localities, minor soldiers, 13 specimens from 13 localities) in millimetres.

<i>Major Soldiers :</i>		Range	Mean
Head length to tip of nose . . . . .		1.70-2.43 . . . . .	2.01
Head width . . . . .		0.95-1.58 . . . . .	1.17
Depth of head capsule . . . . .		0.68-1.07 . . . . .	0.84
Width of pronotum . . . . .		0.48-0.77 . . . . .	0.55
Length of pronotum . . . . .		0.20-0.36 . . . . .	0.24
Length of hind tibia . . . . .		1.23-1.71 . . . . .	1.39
<i>Minor Soldiers :</i>		Range	Mean
Head length to tip of nose . . . . .		1.35-1.63 . . . . .	1.46
Head width . . . . .		0.53-0.68 . . . . .	0.59
Depth of head capsule . . . . .		0.43-0.53 . . . . .	0.47
Width of pronotum . . . . .		0.38-0.45 . . . . .	0.39
Length of pronotum . . . . .		0.18-0.20 . . . . .	0.18
Length of hind tibia . . . . .		1.03-1.28 . . . . .	1.21

*Variation.* In the imago, there are sometimes small diverging depressions or a single median depression on the frons, but these are usually absent or indistinct. The soldier caste is especially variable in nose length, with a tendency for specimens from the western end of the range to be generally longer than those from the east. Particularly noticeable in this species is the tendency for specimens from higher altitudes to be larger than those from low.

The imago of *T. togoensis* is not likely to be confused with other species except in a very small number of cases where the antennae are 15 segmented without appreciable subdivision of III, when it resembles *T. occidentalis*, and *T. dispar*. *T. occidentalis* has rather more prominent eyes, usually longer ♀ cerci, and a differently shaped fontanelle ; *T. dispar* has smaller eyes, lacks diverging pale streaks on the vertex, and usually has a shorter hind tibia and longer ♀ cerci.

In the soldier caste, some specimens of *T. dispar*, *T. oeconomus* and *T. geminatus* are almost indistinguishable from *T. togoensis*, but the nose tip is usually less hairy in *T. dispar*, the middle abdominal tergites have fewer minute setae in *T. oeconomus*, and the antennae of *T. geminatus* are always 14 segmented.

Specimens have been selected and labelled as lectotypes of *T. togoensis* and *T. nigeriensis* by Dr. A. E. Emerson, but the designations have not been published hitherto ; that of the senior synonym is given separately :

Lectotype : GHANA : Trans-Volta Togoland, Ho, 1892 (*Rossmann*), lectotype ♀ imago, *T. togoensis* (Sjöstedt), Mus. Hamburg, and paralectotype ♀ imago, Naturhist. Riksmus., Stockholm.

Type Material. SUDAN : Kaka, 1901 (*I. Trägårdh*), syntype soldier, type colony, *T. terricola* (Trägårdh), A.M.N.H. (other syntypes in Naturhist. Riksmus., Stockholm).

GUINEA : Kakoulima, 9° 40' N., 13° 25' W., 1912-13 (*F. Silvestri*), holotype ♀ imago and paratype soldiers, *T. suspensus* (Silvestri), Silvestri Coll., Lab. Zool., Sc. Agric., Portici.

MALI : Belia, 15° 26' N., 1° 45' W., no date (*R. Chudeau*), lectotype ♀ imago, *T. nigeriensis* (Sjöstedt), Mus. Paris. (Paralectotypes in Mus. Paris and Naturhist. Riksmus., Stockholm).

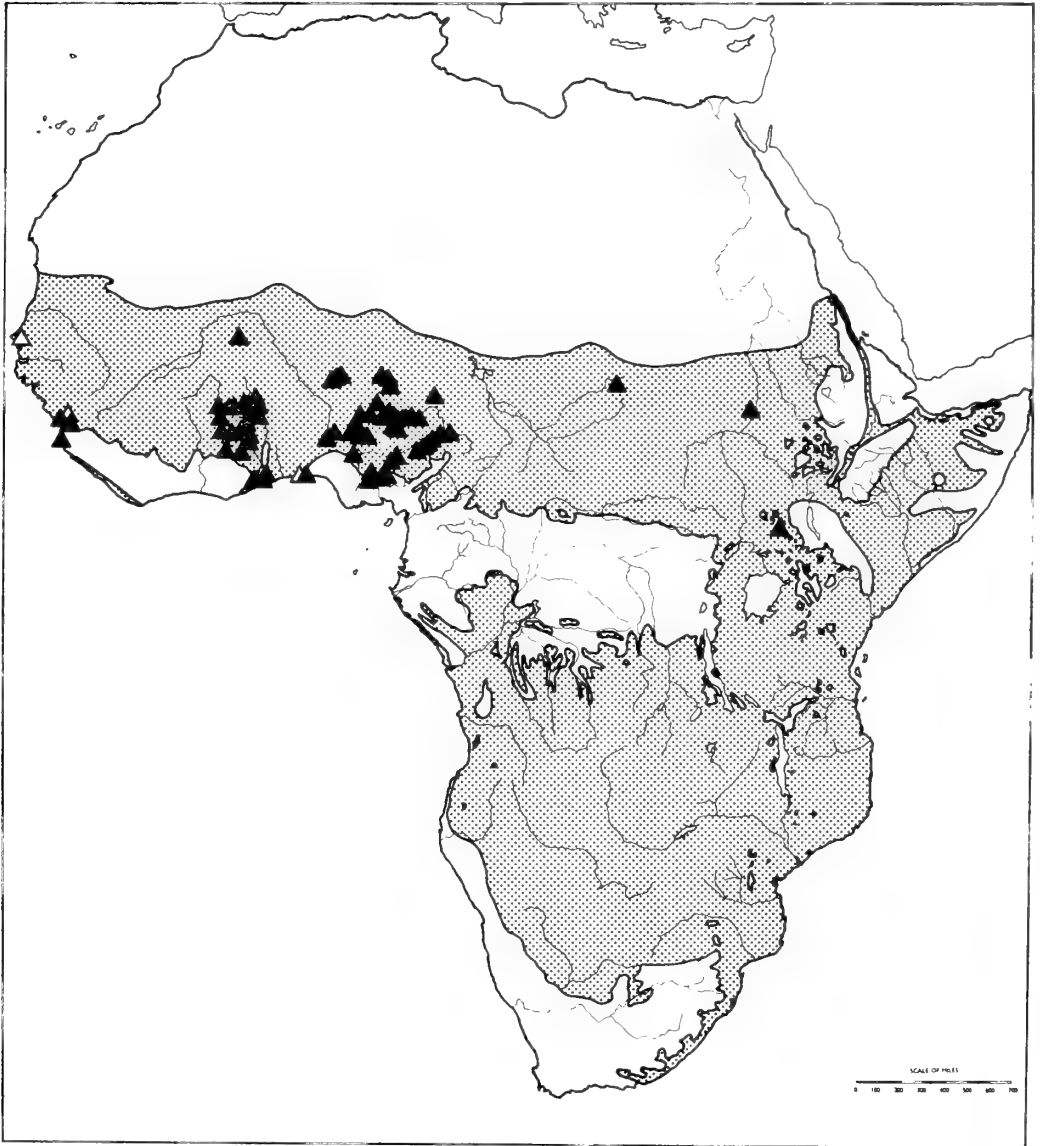
Other Material. SIERRA LEONE : Cape S. Leone, 1858 (*J. Foxcroft*) ; Samaia, 24.v.1948 (*F. A. Squires*) ; Freetown, Brookfields, 27.v.1956 (*P. F. Prevett*) ; and 9.i.1958 (*W. Wilkinson*).

GHANA : 45m. from Accra on Ada Road, 16.ii.1955 (*W. Belfield*) ; 11½m. from Accra on Kumasi Road, 18.ii.1959, 33m. N. of Ejura on Tamale Road, 24.ii.1959, 10m. N. of Yeji on Tamale Road, 25.ii.1959, 16m. from Daboya on Tamale Road, 28.ii.1959, 28m. from Tamale on Bolgatanga Road, 1.iii.1959, 55m. from Tamale on Larabanga Road, 3.iii.1959, 4 and 15m. from Gambaga on Wale Wale Road, 5.iii.1959, and 7.iii.1959, 4 vials, 25m. S.E. of Gambaga on Yendi Road, and 17m. N.E. of Gambaga on Bawku Road, 6.iii.1959, 20m. from Bolgatanga on Bawku Road, 8.iii.1959, 12m. N. of Navrongo, 14.iii.1959, 11m. from Tumu on Navrongo Road, 15.iii.1959, 6 and 40m. from Tumu on Lawra Road, 16.iii.1959, 2 vials, Lawra, and 9m. N. of Lawra on Nandom Road, 18.iii.1959, 3 vials, 6m. N. of Wa on Lawra Road, 19.iii.1959, 52m. S. of Wa on Bole Road, 20.iii.1959, 22m. from Larabanga on Tamale Road, 24.iii.1959, 41m. S. of Tamale on Kumasi Road, 27.iii.1959, 25m. N. of Wenchi on Bamboi Road, 30.iii.1959 (*W. A. Sands*).

UPPER VOLTA : 15m. N. of Bawku (Ghana), 11.iii.1959 (*W. A. Sands*).

NIGERIA : Western Region ; Lagos, Lighthouse beach, 9.iv.1957 (*W. Wilkinson*). Eastern Region ; 14m. from Enugu on Abakaliki Road, 1.ii.1957, Abakaliki, and 40m. from Abakaliki on Ikom Road, 27.v.1957 (*W. Wilkinson*) ; 12m. from Enugu on Onitsha Road, 2.iii.1958, 2 vials, and 20m. from Enugu on Oturkpo Road, Nsukka Hills, 5.iii.1958 (*W. A. Sands*). Northern Region ; Sokoto, ii.1955 (*W. I. Harris*) ; Kano, xi.1957 (*R. A. Blease*) ; 25m. from Katsina on Daura Road, 19.xi.1956, 28 and 42m. from Sokoto on Argungu Road, 23.xi.1956, 2 vials, 11-18m. from Kaduna on Zungeru Road, 8.xii.1956 and 28.ii.1957, 4 vials, 70m. from Kaduna on Zungeru Road, 18.xii.1956, 2 vials, 26m. from Minna on Zungeru Road, 20.xii.1956, 16m. S. of Zungeru on Bida Road, and Mokwa, 21.xii.1956, 4m. N. of Bida, 23.xii.1956, 26m. from Abuja on Bida Road, 24.xii.1956, Abuja, 31.xii.1956, 22m. from Kaduna on Kachia Road, 30.i.1957, 2 vials, 4-16m. from Jos on Bauchi and Bukuru Roads, 6-11.ii.1957, 5 vials, 40m. from Jos on Bauchi Road, 11.ii.1957, Bauchi, and 25m. from Bauchi on Jos Road, 12-13.ii.1957, 18-24m. from Jos on Pankshin Road, 14.ii.-3.iv.1957, 9 vials, 56m. from Kaduna on Jos Road, 15.ii.1957,

25-32m. from Jos on Kaduna Road, 5.iv.1957, 2 vials, 39m. from Bauchi on Gombe Road, 7.v.1957, Yola, 13.v.1957, 54m. from Yola on Jalingo Road, 16.v.1957, 7, 45, and 53m. S.W. of Jalingo on Takum Road, 17.v.1957, 3 vials, 125m. and 114m. S.W. of Jalingo on Takum Road via Beli, 18.v.1957, 3 vials, 55m. from Damaturu on Potiskum Road, 5.vi.1957, 4m. S. of Ilorin on Oyo Road, 4.xii.1957, 5m. S. of Kunya on Kano Road, 4.x.1957, 24m. from Gboko on Makurdi Road, 25.ii.1958,



MAP 27. *Trinervitermes togoensis*. Vegetation types : 8, 16, 17, 20, and 25.

4m. from Gboko on Oturkpo Road, 26.ii.1958, 30m. from Lokoja on Okene Road, 8.iii.1958, Samaru, near Zaria, vi-vii.1959, 8 vials (*W. A. Sands*).

SUDAN : Darfur Province, Kulme, 12° 30' N., 23° 27' E., 6 and 26.vii.1921, 2 vials (*H. Lynes*).

UGANDA : Karamoja Distr., Toror Hills, near Kotido, 8.x.1952 (*W. A. Sands*).

A total of 108 nest series were examined, and all material is in the British Museum (Natural History) unless otherwise stated.

*T. togoensis* is another of the species which extend from the extreme West Coast of Africa across the "Guinean" and "Sudan" vegetation zones (*Keay et al.*, 1959 types 8, 16, 17, and 20) to the Sudan and Uganda.

Its biology and feeding habits have been described in detail in other papers (*Sands*, 1961, 1961a). It seldom builds a mound structure of its own, being commonly found in the mounds of other *Trinervitermes* species, or those of *Cubitermes*, *Thoracotermes* (record of *Silvestri*, 1914), *Macrotermes*, *Pseudacanthotermes*, and *Odontotermes*. In this respect it appears to occupy a closely similar ecological niche to that of *T. dispar* in the East and Central Africa fauna.

### *Trinervitermes trinervius* (Rambur)

(Text-figs. 305-307, 332-335, 371-375, 383 ; Map 28)

*Termes trinervius* Rambur, 1842 : 308. Type locality : SENEGAL.

*Termes (Eutermes) trinervius* Rambur ; Hagen, 1858 : 216.

*Eutermes trinervius* (Rambur) Sjöstedt, 1900 : 198.

*Eutermes holmgreni* von Rosen, 1912 : 224. Type locality : LIBERIA. [syn. *T. trinervius* (Rambur) Sjöstedt, 1926 : 340].

*Eutermes (Trinervitermes) trinervius* (Rambur) ; Holmgren, 1912 : 64.

*Eutermes (Trinervitermes) holmgreni* von Rosen ; Holmgren, 1912 : 65.

*Eutermes posselensis* Sjöstedt, 1914b : 94. Type locality : CHAD, Fort Possel. **syn. n.**

*Termes (Eutermes) trinervius* Rambur ; Desneux, 1915 : 9.

*Trinervitermes trinervius* (Rambur) Fuller, 1922 : 107.

*Trinervitermes posselensis* (Sjöstedt) Sjöstedt, 1926 : 348.

*Trinervitermes carbonarius* Sjöstedt, 1926b : 158. Type locality : CONGO, Haut Uélé, Mauda. **syn. n.**

*Trinervitermes carbonarius* Sjöstedt ; Sands, 1957 : 20.

*Imago*. Head capsule, frons and vertex dark chestnut to very dark sepia brown, area surrounding eye, extending to point behind and to mandible base in front paler, yellow-brown to brown ; vertex with three diverging paler streaks, and area in front of ocelli brown ; labrum yellow, postclypeus yellow-brown, clouded with brown ; antennae yellow-brown. Pronotum orange yellow to brown, meso- and metanota and other thoracic sclerites yellow, legs orange-yellow, slightly darker at base of tibia. Abdominal tergites dark sepia brown with yellow-brown margin of varying width, paler at anterior corners and sometimes in middle ; sternites yellow to orange-yellow, brown around stigmata. Wings translucent pale brown, subcosta and radius sector orange-yellow, outlined brown at base, posterior outline of radius sector continuing to near wing tip ; membrane behind radius sector with indistinct yellow-brown streak ; rest of venation narrowly brown or outlined brown.

Posterior margin of head capsule much less than semi-circular behind eyes, slightly sinuate immediately behind eyes; fontanelle pale, sharply contrasting with surrounding cuticle, Y-shaped, to short triangular owing to occlusion of posterior part by pigmented cuticle, lateral arms short, sometimes dilated terminally; eyes oval, moderately prominent in proportion to own diameter, medium sized to large relative to head width, W/E index 2.4-2.9, ocelli medium sized to large, oval, separated from eyes by one-fourteenth to three-tenths own least diameter; postclypeus moderately inflated, width 2.3-2.4 times length, anterior margin near straight to slightly concave, posterior margin convex, rounded, sometimes slightly indistinct or with slight bulge in middle; molar plate of right mandible with 7-8 ridges; antennae 17 segmented, II and III subequal, longer than VI, IV and V subequal and shorter than IV.

Pale coloured "scent" gland on anterior margin of fifth abdominal sternite of ♀ medium-sized, 0.70-1.02mm. wide, 0.20-0.30mm. long; cerci of ♀ equal to or longer than width across base, conical with somewhat irregular outline.

Pilosity on vertex consists of short curved setae of even length forming a "pelt" or "mat", and scattered longer setae among them. (Text-fig. 383).

Measurements (22 specimens from 7 localities) in millimetres.

	Range	Mean
Head width across eyes	1.78-2.17	1.85
Greatest diameter of eye	0.65-0.85	0.74
Ocellus . . . . .	0.20-0.29 × 0.26-0.35	0.24 × 0.30
Ocellus to eye . . . . .	0.02-0.06	0.04
Width of pronotum . . . . .	1.63-2.07	1.86
Length of pronotum . . . . .	1.03-1.15	1.11
Length of hind tibia . . . . .	2.33-2.86	2.49
Length of fore wing . . . . .	16.40-21.50	19.96

*Soldiers.* Major soldier: head capsule, chestnut brown to nearly pitch black, nose dark chestnut brown to pitch black with reddish tip; antennae yellow-brown. Pronotum, anterior lobe yellow-brown, posterior lobe, meso- and metanota, legs and abdominal sternites yellow; abdominal tergites yellow to brown.

Head capsule in plan view short oval to slightly wider than length, nose near cylindrical to weakly conical. In profile distinctly concave, with back of head rising from above or slightly behind antennal socket, and evenly rounded; nose slightly shorter to distinctly longer than rest of head capsule, measuring from antennal socket, angle of nose cone 5-10 degrees; antennae 13-14 segmented, 6 out of 7 with 14, II, IV, V, and VI subequal and slightly shorter than III, in 13 segmented forms III longer and usually partly subdivided. Head setae confined to 4 at nose tip and very few small pale setae behind these; dorsal surface of head capsule without prominent setae, sometimes minute traces of bilaterally placed pair on vertex present.

Middle abdominal tergites with scattered minute setae, visible in profile, longer on posterior two tergites; sternites with short backward and longer downward and forward directed setae, the latter on posterior margins and 2 or more times length of shorter.

Minor soldier: colour as major soldier, antennae 12-14 segmented, proportions of basal segments variable.

Measurements (Major soldiers, 64 specimens from 19 localities, minor soldiers, 6 specimens from 4 localities) in millimetres.

<i>Major Soldiers</i> :	Range	Mean
Head length to tip of nose . . . . .	2.11-2.70	2.47
Head width . . . . .	1.18-1.73	1.48
Depth of head capsule . . . . .	0.86-1.20	0.88
Width of pronotum . . . . .	0.53-0.74	0.68
Length of pronotum . . . . .	0.28-0.38	0.32
Length of hind tibia . . . . .	1.48-2.01	1.78

<i>Minor Soldiers</i> :	Range	Mean
Head length to tip of nose . . . . .	1·73-2·04 . . . . .	1·90
Head width . . . . .	0·78-0·94 . . . . .	0·86
Depth of head capsule . . . . .	0·58-0·72 . . . . .	0·65
Width of head capsule . . . . .	0·43-0·55 . . . . .	0·50
Length of pronotum . . . . .	0·20-0·29 . . . . .	0·24
Length of hind tibia . . . . .	1·39-1·68 . . . . .	1·54

*Variation.* In the imago, there are sometimes small diverging depressions on the frons. The large variation in eye size results in specimens of very different general appearance, and there is some indication of a cline in this character from moister to drier areas, the largest eyes occurring in the moister southern vegetation types.

The "major" and "minor" soldier castes are not always distinctly separable. It appears to be characteristic of the largest colonies that a complete gradation of intermediate forms develops.

The imago of *T. trinervius* closely resembles that of *T. geminatus*, but is usually darker in colour, with larger eyes, a slightly more inflated postclypeus and longer ♀ cerci; there is however an overlap in all these characters, and since the two species are sympatric, they constitute a further example of near-siblings among termites. The soldiers are usually distinguishable by the more hairy nose tip and darker coloured abdominal tergites of *T. geminatus*. *T. oeconomus* is also closely similar in the imago, but is distinguished by the vertex pilosity.

Among allopatric species, only the darker soldiers of *T. gratiosus* closely resemble *T. trinervius*, and are in some cases virtually indistinguishable, though usually much shorter-nosed.

The close similarity of *T. trinervius* to *T. geminatus* and *T. oeconomus* has in the past led to confusion which has arisen mainly because the unique holotype ♂ imago lacks the head. Rambur (1842) omitted mentioning the head or its absence, while including it in descriptions of other species; it can thus be presumed that the holotype was headless when he described it. Hagen (1858) noted the deficiency.

Walker (1853) described as *T. trinervius* a specimen of *T. oeconomus* labelled "Tripoli", but this must have come from tropical Africa, probably the Sudan. The reference of Sjöstedt (1900) is included in the synonymy because of the change of genus involved; the specimens described were probably again *T. oeconomus*, though some from South Africa were included. The specimens described by Silvestri have not been examined, but would appear to have been *T. geminatus*; some of the material collected by Silvestri in Senegal was however *T. trinervius*.

I have found no reliable specific characters in the pronotum shape, colour, or pilosity, nor are the outlines of meso- and metanota of any value in *Trinervitermes*. The legs are not distinctive in closely related species, and the abdominal characters occur in the ♀. I therefore think it unlikely that the use of Rambur's name will ever be finally settled by examination of the holotype. The general appearance, the colouration, and the shape of the ♂ cerci of this specimen, though not conclusive, appear to me to be most consistent with the species hitherto known as *T. posselensis* of which *T. carbonarius* is a junior synonym. In spite of usage by some authors subsequent to Rambur, I consider it inadvisable to use *T. trinervius* as senior synonym to *T. oeconomus*, since that species is well known and established under its present name, with adequate type material and several junior synonyms.

Type Material. SENEGAL : no detailed locality, no date, holotype, unique headless ♂ imago, *T. trinervius* (Rambur), Selys Longchamps coll., Inst. R. Sci. Nat., Brussels.

CENTRAL AFRICAN REPUBLIC : Fort Possel, xi.1910 (*H. Schubotz*), syntype soldiers, type colony, *T. posselensis* (Sjöstedt), A.M.N.H. (other syntypes in Mus. Hamburg and Naturhist. Riksmus., Stockholm).

CONGO : " Haut Uélé ", Mauda, 27.ii.1925 (*H. Schouteden*). [See discussion on Type locality of *T. maudanicus* Sjöstedt.] Syntype soldiers, type colony, *T. carbonarius* Sjöstedt, Naturhist. Riksmus., Stockholm (other syntypes in Mus. Tervuren).

Other Material. SENEGAL : Dakar, 2.viii.1912 (*F. Silvestri*), A.M.N.H.

GUINEA : Conakry, 8.viii.1912 (*F. Silvestri*), A.M.N.H. ; Mt. Nimba, 1957, 4 vials (*M. Lamotte*), Inst. Franc. d'Afr. Noire, Dakar.

SIERRA LEONE : Cape S. Leone, 1858 (*J. Foxcroft*).

LIBERIA : 1908 (*Scherer*), A.M.N.H. [? paratype *E. holmgreni* von Rosen].

IVORY COAST : Dabou, 50km. W. of Abidjan, 1962-1964, 12 vials (*P. Bodot*).

GHANA : 36m. from Accra on Ada Road, 18.ii.1955, Nungua, 16.ii.1955, and 14-16.vi.1956, 5 vials (*W. Belfield*) ; Accra and 11½m. from Accra on Kumasi Road, 14-16.vi.1959, 60m. N. of Ejura on Tamale Road, 24.ii.1959, 16m. from Daboya on Tamale Road, 28.ii.1959, 55m. from Tamale on Larabanga Road, 3.iii.1959, Volta Bridge on Bolgatanga-Bawku Road, 8.iii.1959, 12m. N. of Navrongo, 14.iii.1959, 11m. from Tumu on Navrongo Road, 15.iii.1959, 6m. from Tumu on Lawra Road, 16.iii.1959, 9m. N. of Lawra on Nandom Road, 18.iii.1959, 52m. from Wa on Bole Road, 20.iii.1959, 22m. from Larabanga on Tamale Road, 24.iii.1959, 16m. from Nkoranza on Kintampo Road, 28.iii.1959 (*W. A. Sands*).

NIGERIA : Western Region ; Lagos, Ebute Metta, 7.v.1936 (*T. Scott*). Northern Region ; 13m. S. of Makurdi, 1954, 18m. from Kaduna on Zaria Road, 1954, 60m. from Kaduna on Jos Road, 1954, and 7m. S. of Zaria, 1954 (*J. B. MacNulty*) ; 17m. S. of Zungeru on Bida Road, 21.xii.1956, 40m. from Abuja on Bida Road, 24.xii.1956, 20m. from Abuja on Keffi Road, Idu, 28.xii.1956, 18-22m. from Kaduna on Kachia Road, 30.i.1957, 4 vials, Kудару, on Zaria-Jos Road, 5.ii.1957, 4 vials, 5m. from Jos on Bukuru Road, and 6m. from Jos on Bauchi Road, 6.ii.1957, 42m. from Jos on Wamba Road, 8.ii.1957, 18m. from Jos on Pankshin Road, 14.ii.1957, 50 and 56m. from Kaduna on Jos Road, 15.ii.1957, 2 vials, 11m. from Kaduna on Zungeru Road, 28.ii.1957, 24m. from Jos on Pankshin Road, 3.iv.1957, and 27.x.1957, 2 vials, 25-32m. from Jos on Kaduna Road, 5.iv.1957, 2 vials, 7m. from Bauchi on Gombe Road, 7.v.1957, 3m. from Jalingo on Yola Road, 17.v.1957, 114m. S.W. of Jalingo on Takum Road via Beli, 18.v.1957, 4-6m. S. of Ilorin on Oyo Road, 4.xii.1957, 2 vials, 12m. from Keffi on Makurdi Road, 24.ii.1958, 4m. from Gboko on Oturkpo Road, 26.ii.1958, 22m. from Lokoja on Kabba Road, 10.iii.1958, and Samaru, near Zaria, 10.ix.1957, vi-vii.1959, 4 vials (*W. A. Sands*).

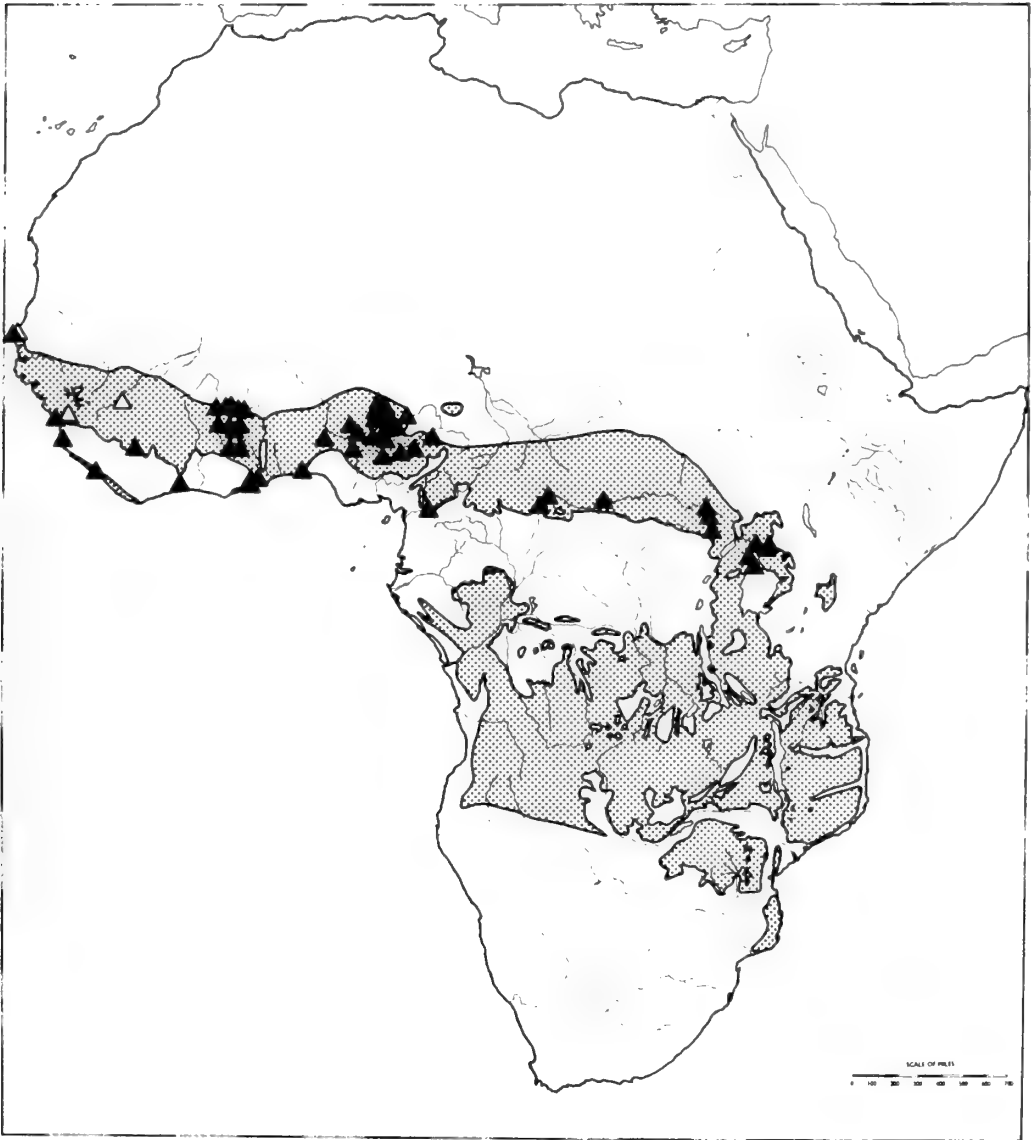
CAMEROUN : Near Mbalmayo, Presidency halt, 18.x.1962 (*G. Becker*), own collection.



CENTRAL AFRICAN REPUBLIC : Bangui, 1948 (*A. E. Emerson*), Bangassou, iii.1948 (*N. A. Weber*), A.M.N.H.

CONGO : Faradje, 1912 (*H. Lang, J. P. Chapin*), A.M.N.H. ; Garamba Nat. Park, 30.vii.1952 (*H. de Saeger*), Inst. des Parcs Nat. du Congo, Brussels.

UGANDA : Ngotokwe, Lango, iii.1942, and Serere, x.1948 (*W. V. Harris*) ; Lale,



MAP 28. *Trinervitermes trinervius*. Vegetation types : 8, 16, and 17.

Lake Kyoga near Soroti, 15.x.1952 (*W. A. Sands*) ; Kampala, iv.1955, 55 and 58m. from Kampala on Masindi Road, 2 vials, 7.xi.1955 (*R. M. C. Williams*).

A total of 92 nest series were examined, and all material is in the British Museum (Natural History) unless otherwise stated.

The biology of this species has been discussed under its junior synonym *T. carbonarius* in earlier papers (Sands, 1961, 1961a). It is another of the species occurring in the Guinean savannah vegetation zones (Keay *et al.*, 1959, types 8, 16, and 17). Unlike its sympatric congeners, its northward limit is the beginning of the drier Sudan savannah (Keay *et al.*, type 20). It has therefore only been recorded from Uganda at the eastern end of its range, because the southern parts of the Sudan have been neglected by collectors.

### *Trinervitermes trinervoides* (Sjöstedt)

(Text-figs. 184–187, 326–331, 359–370, 379–382 ; Map 29)

*Eutermes trinervoides* Sjöstedt, 1911a : 186. [Type locality not stated].

*Eutermes* (*Trinervitermes*) *trinervoides* Sjöstedt ; Holmgren, 1912 : 65.

*Eutermes trinervoides* Sjöstedt ; Sjöstedt, 1913 : 720. Type locality : REPUBLIC OF SOUTH AFRICA, Cape Province, Laingsburg.

*Eutermes* (*Trinervitermes*) *trinerviformis* Holmgren, 1913 : 336. Type locality : REPUBLIC OF SOUTH AFRICA, Natal, Pinetown. **syn. n.**

*Eutermes* (*Trinervitermes*) *auriceps* Holmgren, 1913 : 338. Type locality : REPUBLIC OF SOUTH AFRICA, Natal, Pinetown.

*Eutermes* (*Trinervitermes*) *bulbiceps* Holmgren, 1913 : 339. Type locality : REPUBLIC OF SOUTH AFRICA, Natal, Pinetown.

*Eutermes* (*Trinervitermes*) *dubius* Holmgren, 1913 : 339. Type locality : REPUBLIC OF SOUTH AFRICA, Natal, Avoca.

*Eutermes hentschelianus* Sjöstedt, 1914a : 88. Type locality : SOUTH WEST AFRICA, " Otjosondyombo " [probably Otjosongombe, 20° 31' S., 17° 18' E.]. **syn. n.**

*Trinervitermes trinervoides* (Sjöstedt) Fuller, 1922 : 108, 110.

*Trinervitermes trinerviformis* Holmgren Fuller, 1922 : 111.

*Trinervitermes auriceps* [= *T. trinerviformis*] Holmgren Fuller, 1922 : 111.

*Trinervitermes bulbiceps* Holmgren [= *T. trinerviformis*] Fuller, 1922 : 111.

*Trinervitermes dubius* Holmgren [= *T. trinerviformis*] Fuller, 1922 : 111.

*Trinervitermes gemellus* subsp. *thomsoni* Fuller, 1922 : 111. Type locality : REPUBLIC OF SOUTH AFRICA, Cape Province, Somerset West, Pearston. **syn. n.**

*Trinervitermes havilandi* Fuller, 1922 : 113. Type locality : REPUBLIC OF SOUTH AFRICA, Natal, Haviland Rail. [" *Termes trinervius* Rambur " Haviland, 1898 : 421]. **syn. n.**

*Trinervitermes fuscus* Fuller, 1922 : 113. Type locality : REPUBLIC OF SOUTH AFRICA, Transvaal, Warmbaths. **syn. n.**

*Trinervitermes kurumanensis* Fuller, 1922 : 113. Type locality : REPUBLIC OF SOUTH AFRICA, Bechuanaland, Kuruman. **syn. n.**

*Eutermes* (*Trinervitermes*) *messor* Sjöstedt, 1924a : 257. [n. n. for *T. havilandi* Fuller, reduced to synonymy, Snyder, 1949 : 326.]

*Trinervitermes bulbiceps* Holmgren ; Sjöstedt, 1926 : 342. [ex syn. *T. trinerviformis*.]

*Trinervitermes dubius* Holmgren ; Sjöstedt, 1926 : 342. [ex syn. *T. trinerviformis*.]

*Trinervitermes auriceps* Holmgren [= *T. trinervoides*]; Sjöstedt, 1926 : 346. [ex syn. *T. trinerviformis*.]

*Trinervitermes hentschelianus* (Sjöstedt) Sjöstedt, 1926 : 344.

*Nasutitermes* (*Trinervitermes*) *messor* (Sjöstedt) Emerson, 1928 : 416.

*Trinervitermes hilli* Snyder and Emerson ; in Snyder, 1949 : 327. [n. n. for *Eutermes* (*Trinervitermes*) *bulbiceps* Holmgren, junior primary homonym of *Eutermes* (*Eutermes*) *bulbiceps* Holmgren.] **syn. n.**

*Imago*. Head capsule, frons and vertex yellow-brown to dark sepia brown, sometimes paler around eyes, in front of ocelli, and bordering posterior margin of postclypeus ; vertex with or without one to three diverging paler streaks ; labrum yellow, postclypeus yellow to yellow-brown, strikingly paler than head in dark forms ; antennae yellow to yellow-brown. Pronotum yellow to sepia brown, meso- and metanota yellow to yellow-brown, other thoracic sclerites and legs yellow. Abdominal tergites brown, sepia brown around stigmata ; sternites pale yellow, brown around stigmata. Wings translucent yellow-brown to brown, subcosta and radius sector yellow to brown, outlined brown to dark brown at base ; membrane behind radius sector with a very weakly developed yellow streak or none ; rest of venation narrowly brown or outlined brown.

Posterior margin of head capsule behind eyes varies from distinctly less than semi-circular to nearly semi-circular, very weakly or not sinuate immediately behind eyes ; fontanelle pale, contrasting with surrounding cuticle especially in dark forms, usually elongate Y-shaped, lateral arms short to long, often dilated terminally, middle of fontanelle sometimes slightly depressed ; eyes very short oval, prominent in proportion to own diameter, but small to medium-sized relative to head width, W/E index 3.3-3.9, ocelli small to medium-sized, separated from eyes by from slightly over one-third to more than own least diameter ; postclypeus moderately to strongly inflated, width 1.8-2.4 times length, anterior margin straight or slightly concave, posterior margin convex, evenly rounded ; molar plate of right mandible with 8-10 ridges, usually 9 ; antennae 15-17 segmented, proportions of basal segments variable, partly subdivided in 15 segmented forms.

Pale coloured "scent" gland on anterior margin of ♀ fifth abdominal sternite small, 0.46-0.56mm. wide, 0.13-0.20mm. long ; cerci of ♀ slightly shorter to slightly longer than width across base, conical or slightly mamilliform.

Pilosity of vertex rather sparse, of varying length, setae not forming a "pelt" or "mat".

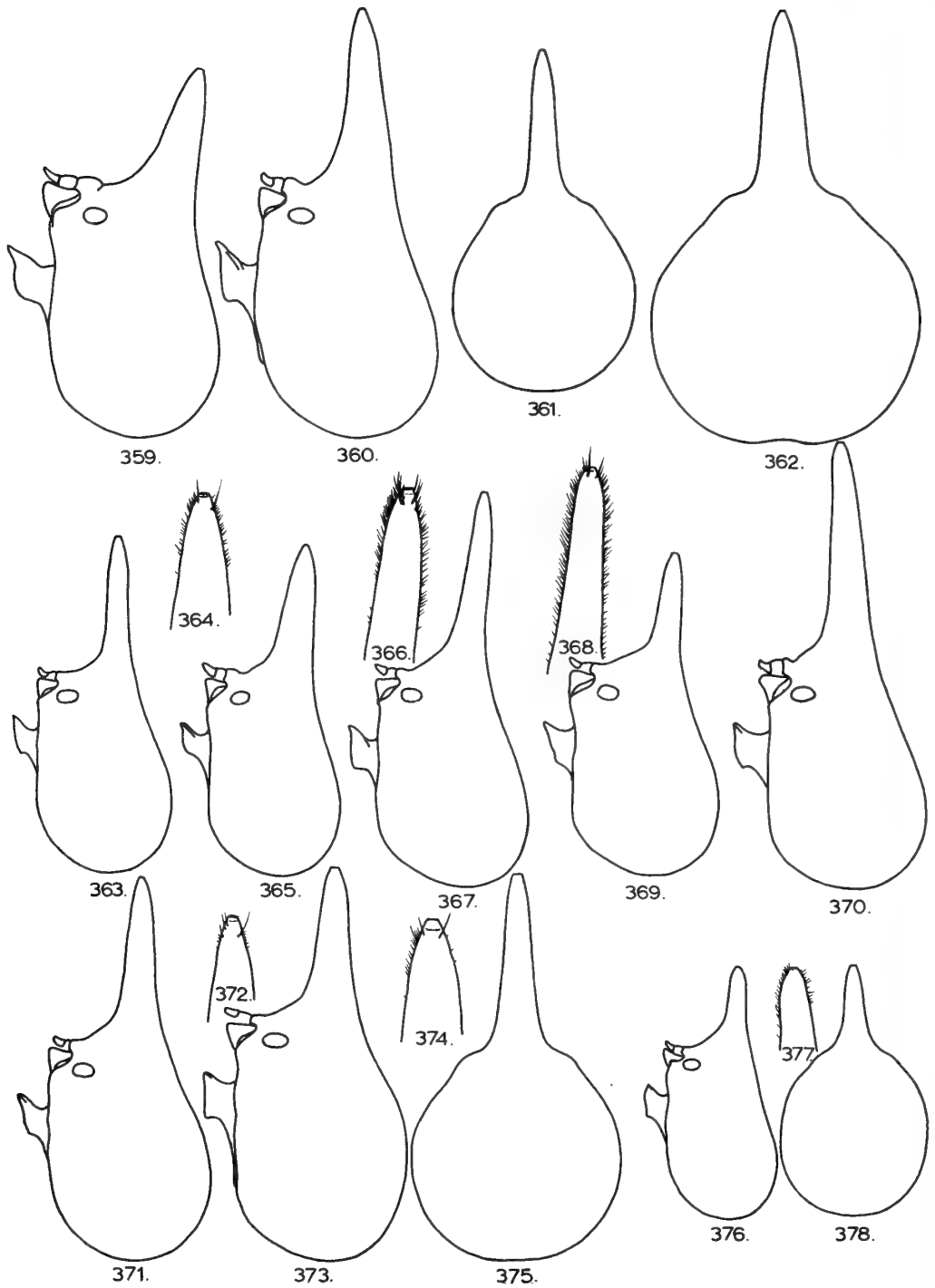
Measurements (43 specimens from 25 localities) in millimetres.

	Range	Mean
Head width across eyes	1.61-2.03	1.80
Greatest diameter of eye	0.43-0.56	0.50
Ocellus . . . . .	0.10-0.23 × 0.16-0.25	0.18 × 0.24
Ocellus to eye . . . . .	0.07-0.15	0.10
Width of pronotum . . . . .	1.48-1.94	1.66
Length of pronotum . . . . .	0.92-1.18	0.99
Length of hind tibia . . . . .	2.02-2.47	2.26
Length of fore wing . . . . .	15.30-22.60	19.37

*Soldiers*. Major soldier : head capsule orange-yellow to ferruginous, nose ferruginous orange to pitch black with red tip ; antennae yellow to yellow-brown. Pronotum, meso- and metanota, legs and abdominal sternites yellow, abdominal tergites yellow to brown.

Head capsule in plan view, short oval to wider than long, often with posterior median indentation in larger specimens, nose cylindrical to weakly conical. In profile distinctly concave to well behind antennal socket, convex curve to occiput most pronounced at posterior extremity of head ; nose distinctly shorter to distinctly longer than rest of head capsule measuring from hind margin of antennal socket, angle of nose cone 0-14 degrees ; antennae 14 segmented, II, III, IV, V, and VI subequal, rarely 13 segmented, when III nearly twice II. Head setae mainly confined to hairy nose tip ; bilaterally placed pair of minute setae sometimes present on vertex.

Abdominal tergites with scattered minute setae and longer setae on hind margins, becoming more pronounced on posterior tergites ; sternites with scattered shorter backwardly directed



FIGS. 359-378 : *Trinervitermes*, soldier head capsule, side and plan views, and nose tip.  
 359-370, *T. trinervoides* ; 371-375, *T. trinervius* ; 376-378, *T. arabiae*.

setae, up to two-thirds length of long fine setae on posterior margins directed downwards and slightly forwards.

Minor soldiers : as major soldiers, except head capsule in plan more oval, sometimes slightly constricted behind antennae.

Measurements (Major soldiers, 56 specimens from 20 localities, minor soldiers, 15 specimens from 8 localities) in millimetres.

<i>Major Soldiers :</i>	Range	Mean
Head length to tip of nose . . . . .	2.04-2.96 . . . . .	2.45
Head width . . . . .	1.09-1.76 . . . . .	1.32
Depth of head capsule . . . . .	0.78-1.17 . . . . .	0.91
Width of pronotum . . . . .	0.55-0.84 . . . . .	0.65
Length of pronotum . . . . .	0.26-0.46 . . . . .	0.34
Length of hind tibia . . . . .	1.43-2.45 . . . . .	1.75
<i>Minor Soldiers :</i>	Range	Mean
Head length to tip of nose . . . . .	1.64-2.00 . . . . .	1.86
Head width . . . . .	0.78-1.00 . . . . .	0.82
Depth of head capsule . . . . .	0.59-0.75 . . . . .	0.65
Width of pronotum . . . . .	0.48-0.61 . . . . .	0.52
Length of pronotum . . . . .	0.18-0.25 . . . . .	0.24
Length of hind tibia . . . . .	1.38-1.89 . . . . .	1.54

*Variation.* The range of variation in this species is very great : specimens from different localities may differ from each other more than some genuine species from other parts of the African continent.

In the imago, the extremes of colour have been given, but there is also variation in the distribution of lighter and darker shades of pigmentation on head and body. The variation in shape of head capsule, size of eyes and ocelli, and degree of inflation of postclypeus may combine with colour patterns to produce a very different appearance. The soldier caste often provides more reliable identification in this species.

There appear to be variant forms of imago and soldier castes occurring more frequently in certain ecological conditions, especially those associated with altitude. Several of these forms were given specific names by earlier authors, on the basis of the more limited samples of material available to them. These variants appear to be locally stable in limited populations, but it must be emphasized that in the large amount of material now examined, every gradation of intermediate between them has been found, and in addition a number of other minor forms of only very local importance have been observed.

In the most distinctive of these variants the imago head is dark brown and the pronotum sepia brown, associated with a soldier caste in which the nose is rather short, slender, and dark in colour. This was described by Fuller (1922) as *fuscus*, and appears commonest at altitudes from 3,000-5,000 feet.

The name *trinervoides* was applied by Sjöstedt (1911a) to another form, most frequent in the southern part of Cape Province, at moderate to low altitudes. The imago head capsule is more broadly rounded posteriorly, and chestnut brown in colour ; the pronotum is yellow. The associated soldiers have a rather short, thicker nose, though a thinner-nosed form was described by Fuller (1922) as *gemellus* subsp. *thomsoni*. In these southern specimens the postclypeus is often more inflated than in those from further north.

The third important variant is that in which the soldier caste is large with the nose longer than the rest of the head ; the imago is similar in shape to *fuscus* although generally larger, with *trinervoides*-type colouration, and often with larger eyes in proportion to its size than the southern specimens. This form has been named *hentschelianus* (Sjöstedt), *trinerviiformis* (Holmgren), *haviglandi* and *kurumanensis* Fuller, and *hilli* Snyder and Emerson, from various localities. It appears to be most common in the rather dry *Acacia-Commiphora* wooded steppe and the slightly less dry intermediate savannah (Keay *et al.*, 1959, vegetation types 25 and 20)

of the more northern Cape Province and Transvaal at altitudes from 1,600 to 3,000-4,000 feet. It also occurs in parts of Natal and the Orange Free State.

In the moist lowlands of Zululand the smallest and palest coloured specimens are found, and these if placed alongside the *fuscus* form appear completely dissimilar. The gradual change can be followed inland with specimens from increasing altitudes through Natal to the uplands of Transvaal.

I have considered retaining the specific names of the synonyms to designate subspecies ; in view of the occurrence of every gradation of intermediate between the variants, and of apparent exceptions to the geographical distributions outlined above, I believe it is inadvisable to do so at present.

The situation in *T. trinervoides* would seem to be as follows :

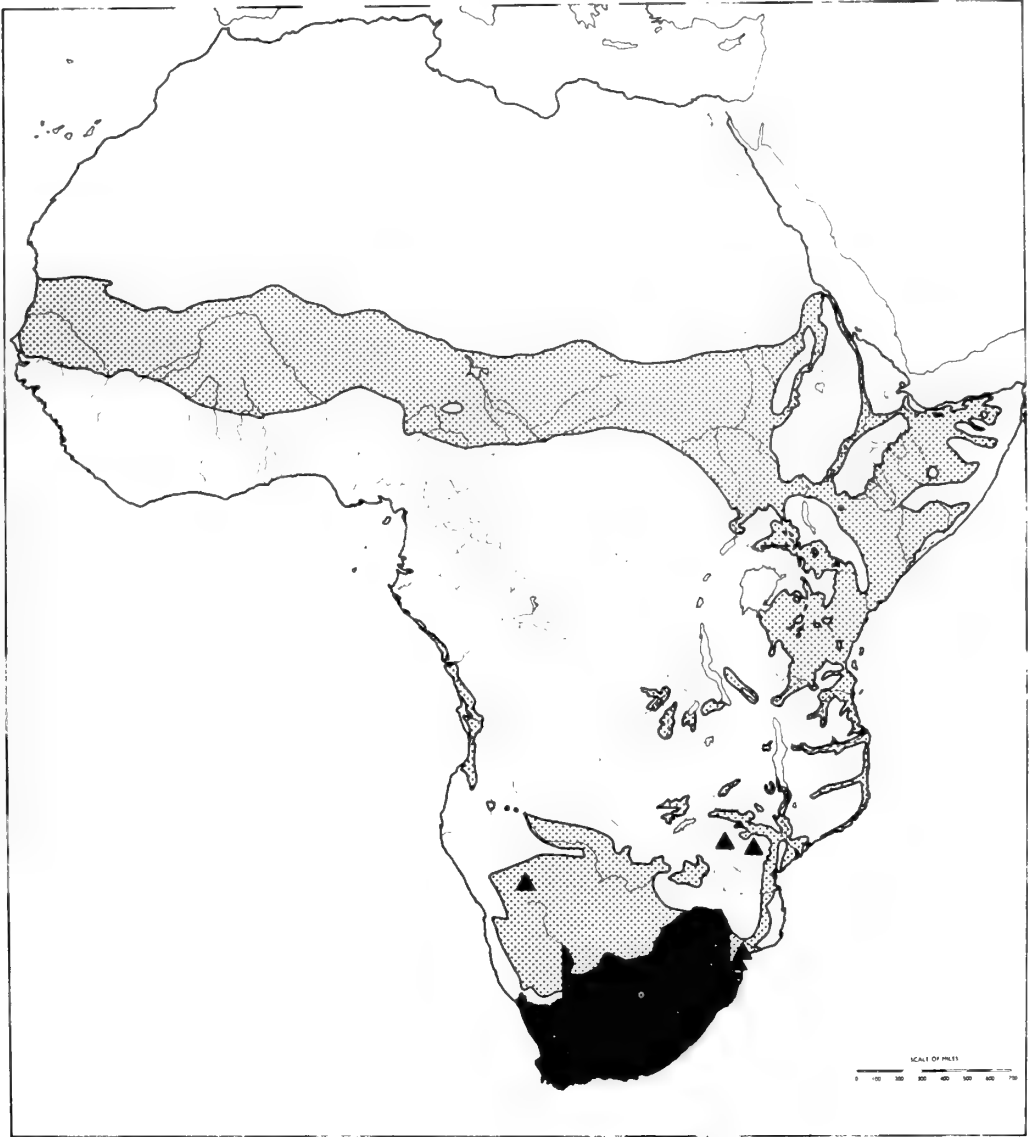
It is the only species of *Trinervitermes* inhabiting the limits of subtropical and temperate South Africa. In so doing it has left behind congeners which might compete with it. South Africa has a very wide range of ecological conditions, which have given rise to correspondingly wide variation in this species. Whether or not the forms recognized constitute true allopatric subspecies, sections of one or more clines, or genetically heterogeneous variants of similar appearance induced by similar ecological conditions in different areas (" polytopic " subspecies, Mayr, 1953) can only be shown by further studies. It may be noted that a "*fuscus*"-like form of *T. dispar* has also been found at an altitude of 3,000-5,000 feet in Natal, perhaps lending weight to the latter suggestion. It has also been observed that the nose-length of soldiers of all species and genera tends to be greater in the drier steppe vegetation of the interior.

The smaller specimens of *T. trinervoides* resemble *T. rapulum* in both imago and soldier castes. In addition to the characters given in the keys, the imago has usually a larger and differently shaped fontanelle and the head viewed from above is straight between the ocelli rather than indented in the middle around the fontanelle. The soldier has a much more hairy nose tip, and is distinguished from both *T. rapulum* and *T. rhodesiensis* by the rounder plan view of the head capsule. The imago differs from *T. rhodesiensis* in having the ocelli further from the eye, and the ventral "scent" gland distinctly smaller.

The larger, more typical specimens of *T. trinervoides* are unlikely to be confused with either of their partly sympatric congeners. The 9 or 10 ridges on the molar plate of the right imago mandible are a useful additional character, and the ♀ cerci are usually shorter.

Type Material. REPUBLIC OF SOUTH AFRICA : Cape Province, Laingsburg, no date (*Brunnthaler*), syntype ♀ imago and soldiers, type colony, *T. trinervoides* (Sjöstedt), A.M.N.H., (other syntypes in Naturhist. Riksmus., Stockholm) ; Natal, Pinetown, 1905 (*I. Trägårdh*), syntype soldier, type colony, *T. trinerviformis* Holmgren, A.M.N.H. and B.M.(N.H.), (other syntypes in Naturhist. Riksmus., Stockholm) ; Cape Province, Somerset West, Pearston, xi.1920 (*F. Thomsen*), syntype ♀ imago and soldier, type colony, *T. gemellus* ssp. *thomseni* Fuller, A.M.N.H. (other syntypes in N.C.I., Pretoria) ; Natal, Haviland Rail, 1894 (*G. D. Haviland*), syntype soldiers from type colony, *T. havilandi* Fuller, A.M.N.H. and B.M.(N.H.),

(other syntypes in N.C.I., Pretoria) ; Transvaal, Warmbaths, xi.1920 and De Wildt, xi.1920 (*C. Fuller*), syntype ♂ and ♀ imagos and soldiers, *T. fuscus* Fuller, A.M.N.H. and B.M.(N.H.), (other syntypes in N.C.I., Pretoria) ; Cape Province, Kuruman, xi.1916 (*F. Thomsen*), syntype soldiers, type colony, *T. kurumanensis* Fuller, A.M.N.H. and B.M.(N.H.), (other syntypes in N.C.I., Pretoria) ; Natal, Haviland Rail, 1894 (*G. D. Haviland*), syntype queen and soldiers, type colony,



MAP 29. *Trinervitermes trinervoides*. Vegetation types : 6, 9, 15, 20, 25, 28, and 29.

*E.(T). messor* Sjöstedt, A.M.N.H. and B.M.(N.H.) ; Natal, Pinetown, 1905 (*I. Trägårdh*), syntype, type colony, *T. hilli* Snyder and Emerson (*T. bulbiceps* Holmgren), A.M.N.H. (other syntypes in Naturhist. Riksmus., Stockholm).

SOUTH WEST AFRICA : "Otjosondyombo am Eiab", vi.1909 (*O. Hentschel*) [probably Otjosongombe, 20° 31' S., 17° 18' E.], syntype soldiers, type colony, *T. hentschelianus* (Sjöstedt), A.M.N.H., (other syntypes in Mus. Hamburg and Naturhist. Riksmus., Stockholm).

Other Material. SOUTHERN RHODESIA : Salisbury, 16.xii.1936, and Inyanga, i.1939 (*A. Cuthbertson*).

MOZAMBIQUE : Chinavane, Lourenzo Marques, 18.xii.1918 (*C. Fuller*) ; 17.x.1952 (*W. V. Harris*).

SWAZILAND : no data (*J. B. Buchanan*) ; N. of Umbuluzi R., vi.1921 (*C. Fuller*) ; 7 and 13m. from Mbabane on Bremersdorp Road, and 2m. from junction of Piggs Peak and Lochiel-Mbabane Roads, 8.vi.1956 (*J. H. Gröbler*) ; Piggs Peak to Komati R., 22-3.x.1960, 4 vials, 4m. from Stegi on Gollel Road, 24.x.1960, 2 vials, 6m. from Gollel on Hluti Road, 9m. from Goedgegund on Mankaiana Road, and 2m. from Mankaiana on Mbabane Road, 25.x.1960 (*W. G. H. Coaton* and *J. L. Sheasby*).

BASUTOLAND : no detailed locality, 1.xii.1939 (*no collector*).

REPUBLIC OF SOUTH AFRICA : In addition to that already at the B.M.(N.H.), all the material from the N.C.I., Pretoria has been received and examined. This covers every part of the Republic, and there is no point in giving details of localities or collectors, although a list is available at the B.M.(N.H.). The numbers examined have been as follows : Transvaal, 123 nest series ; Orange Free State, 83 nest series ; Cape Province, 406 nest series. A total of exactly 800 nest series of this species were examined, and all material is in the British Museum (Natural History) unless otherwise stated.

*T. trinervoides* is the commonest species south of the River Limpopo in subtropical and temperate South Africa, and its most northerly records are from Salisbury, Southern Rhodesia. It covers a wide range of climatic and vegetation types, from the dry subdesert steppe of the interior of Cape Province to the moist tropical coastal savannah forest mosaic of Natal and Mozambique (*Keay et al.*, 1959, types 6, 9, 15, 20, 25, 28, 29, and 30).

The mounds of this species have been described as varying from hemispherical up to 6 feet in diameter, to columnar, 6 feet high. Quantities of cut grass are stored in the mounds as in many other species.

### **BAUCALIOTERMES gen. n.**

(Baucalion, Gr. "narrow-necked bottle").

Type-species, *Subulitermes hainesi* Fuller.

*Imago*. Left mandible with apical and first marginal teeth subequal, distance from apical to first marginal (worn specimen) slightly less than one-third distance between first and third marginals (index .30), second marginal obsolete, cutting edge between first and third marginals entire, straight ; right mandible with apical and first marginal subequal as left, cutting posterior edge of first marginal longer than that of second marginal, molar plate with no marked irregu-



larity in surface view, and 7-8 transverse ridges, first much larger than rest, forming a blunt tooth, the more posterior ridges less prominent. Postclypeus, length slightly less than half width. Fontanelle in ♂, small, pale, irregularly Y-shaped; in ♀, trapezoid with lateral arms extending from anterior corners and slightly dilated terminally; both sexes with smooth shallowly depressed area behind fontanelle coloured as rest of head. Pilosity of head capsule uneven, sockets of varying size from small to large, the latter numerous and conspicuous.

*Soldier.* Monomorphic. Nose very thin and cylindrical, at most slightly tapering. Vestigial mandibles without points. Head capsule not constricted. Antennae 12-14 segmented, usually 14. Sockets of minute setae clearly visible as pale spots scattered over entire head capsule including nose.

This genus is named to accommodate the single species *B. hainesi*, known only from the arid areas of Cape Province, South Africa, which was first described in the genus *Subulitermes* and latterly transferred to *Trinervitermes*. However, the coarser pilosity with more conspicuous seta sockets distinguishes it from all known *Trinervitermes*, and in addition the distribution of the lighter coloured areas of the imago head does not agree with that genus. In the soldier, the visible seta sockets are again the main distinguishing feature, being absent in *Trinervitermes*, which also has a dimorphic soldier caste. It is expected that when fresh winged imagos of *Baucalioitermes* are discovered, further generic differences will become clearer; for example, in the queen secondary sclerotizations of the abdomen obscure the outlines of the "scent" gland on the front margin of the 5th abdominal sternite, but it appears to be very small, and absent in the king. In *Trinervitermes* this gland is clearly visible even when not large.

These two genera are closely related, as is shown by the similarity of imago and worker mandibles, which are distinct from other genera of the Ethiopian Zoogeographical Region.

### *Baucalioitermes hainesi* (Fuller) **comb. n.**

(Text-figs. 196, 197, 336, 337, 386, 387, 396-398; Map 3)

*Subulitermes hainesi* Fuller, 1922 : 115. Type locality : REPUBLIC OF SOUTH AFRICA, Cape Province, Steinkopf, Wolfdoon, Kenhardt.

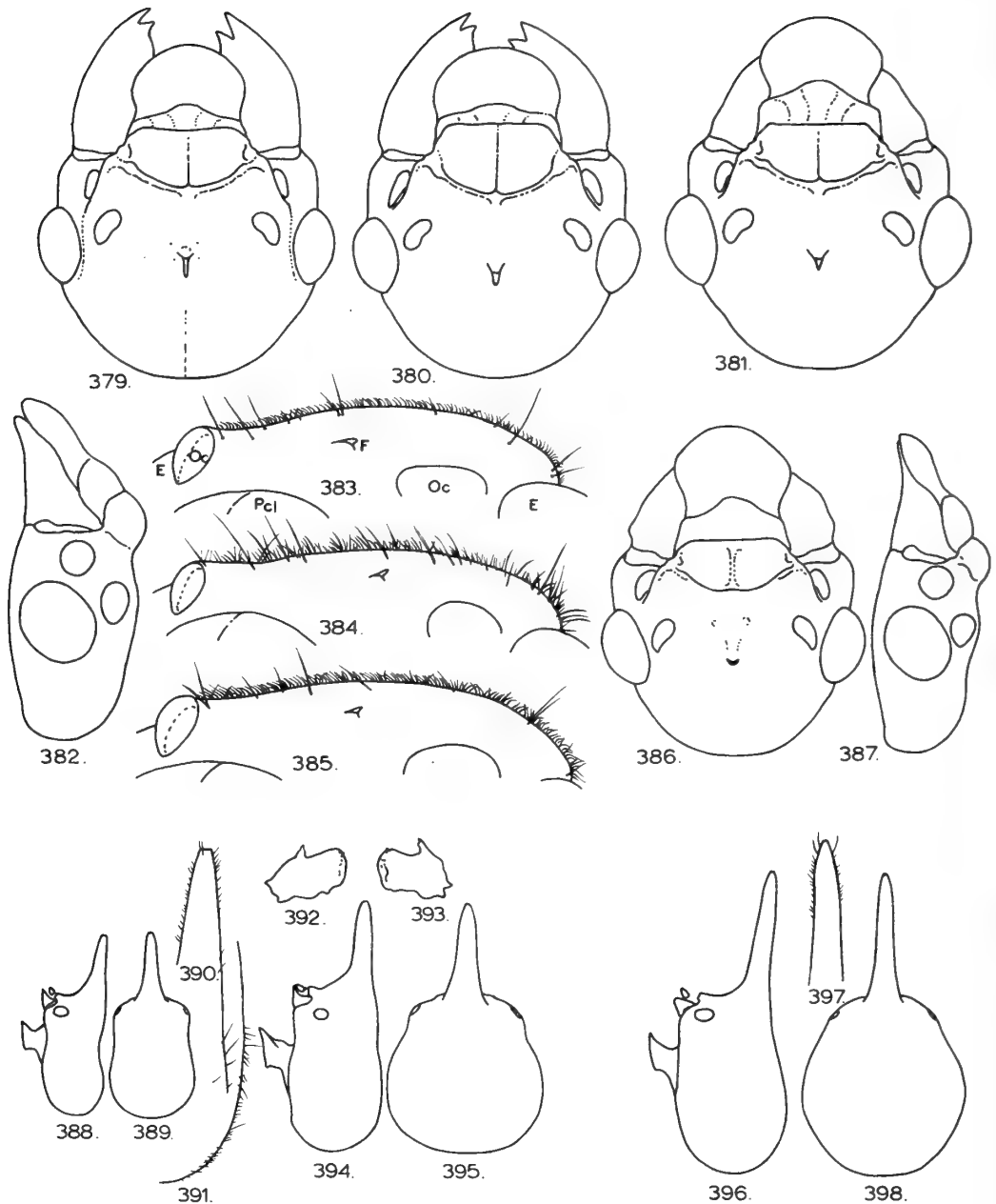
*Eulitermes hainesi* (Fuller) Sjöstedt, 1926 : 310.

*Subulitermes hainesi* Fuller; Snyder, 1949 : 339.

*Trinervitermes hainesi* (Fuller) Emerson, 1960 : 2.

*Imago.* Previously undescribed. Head capsule chestnut brown, but probably faded in morphotype queen and king; vertex with faint diverging streaks scarcely paler than rest; postclypeus yellow clouded brown posteriorly, labrum yellow. Area between eye, antennal socket, and lower margin of head, extending along latter a little behind eye in rounded patch, yellow-brown. Antennae pale yellow. Pronotum yellow, yellow-brown in front of pale Y-shaped median patch, meso- and metanota yellow; other thoracic sclerites and legs pale yellow. Abdominal tergites brown; sternites pale yellow-brown, brown around stigmata.

Posterior margin of head capsule behind eyes much less than semi-circular, slightly sinuate immediately behind eyes; eyes somewhat angularly oval, moderately prominent in proportion to own diameter, small relative to head width, W/E index 3.2-3.4; ocelli small, oval, separated from eyes by under one-third to over two-fifths own least diameter; postclypeus moderately inflated, width 2.0-2.4 times length, anterior margin nearly straight, posterior margin convex, rounded; antennae broken, II and V subequal, and longer than III which is longer than IV.



FIGS. 379-398 : 379-382, *Trinervitermes trinervoides*, front and side views of imago head capsule ; 383-385, *Trinervitermes* vertex pilosity (383, *T. trinervius*, 384, *T. oeconomus*, 385, *T. geminatus*) ; 386, 387, and 396-398, *Baicalitermes hainesi*, imago and soldier head capsules ; 388-395, *Mycterotermes meringocephalus*, head capsules of major and minor soldiers (391, vertex pilosity, 392, 393, major soldier mandibles).

Cerci of ♀ longer than width across base, conical.

Other characters are given in the generic diagnosis.

Measurements (2 specimens from 1 locality) in millimetres.

	Range
Head width across eyes . . . . .	1·61-1·66
Greatest diameter of eye . . . . .	0·47-0·53
Ocellus . . . . .	0·16 × 0·23
Ocellus to eye . . . . .	0·05-0·07
Width of pronotum . . . . .	1·45-1·53
Length of pronotum . . . . .	0·82-0·92
Length of hind tibia . . . . .	2·09-2·12

Morphotype : REPUBLIC OF SOUTH AFRICA : 70m. from Kliprand on Pofadder Road, 8.iv.1963 (*A. Barnard* and *J. N. Diederichs*), morphotype queen in N.C.I., Pretoria.

*Soldier*. Head capsule brown to dark sepia brown, paler around antennal socket, nose sepia brown to pitch black with yellow-brown to ferruginous tip. Pronotum and antennae yellow, legs yellow-white. Abdominal tergites yellow-brown, sternites pale yellow.

Head capsule in plan view short oval, tapering slightly towards front. In profile concave, back of head raised and rounded well behind antennal socket ; nose equal to or slightly longer than rest of head capsule, measuring from hind margin of antennal socket ; antennae, in 14 segmented form, III and V subequal, II similar length but thicker, IV and VI subequal and longer than these.

Head setae consist of a bilaterally placed pair on vertex, one or two pairs near base of nose, four at nose tip with smaller setae behind them, and minute setae scattered over entire head capsule and nose. Abdominal tergites with scattered very short setae becoming longer on hind margins and posterior segments ; sternites with short setae, and longer on hind margins.

Measurements (18 specimens from 3 localities) in millimetres.

	Range	Mean
Head length to tip of nose . . . . .	1·63-2·09	1·87
Head width . . . . .	0·79-1·15	0·98
Depth of head capsule . . . . .	0·59-0·79	0·68
Width of pronotum . . . . .	0·46-0·56	0·51
Length of pronotum . . . . .	0·23-0·28	0·25
Length of hind tibia . . . . .	1·25-1·79	1·55

The relationships and distinctive features of *B. hainesi* have been discussed under the generic heading.

Material. REPUBLIC OF SOUTH AFRICA : Bushmanland, Wolfdoon, and Wortel, near Gella, 1 and 5.ix.1917 (*F. Thomsen*), syntype soldiers, *B. hainesi* (Fuller), A.M.N.H. and B.M.(N.H.) ; 16m. from Pella on Springbok Road, 15.x.1961 (*J. L. Sheasby*) ; 70m. from Kliprand on Pofadder Road, 8.iv.1963, further vial with king (*A. Barnard*, *J. N. Diederichs*).

### **EUTERMELLUS** Silvestri

*Eutermellus* Silvestri, 1912 : 243.

*Eutermes* (*Eutermellus*) Holmgren, 1912 : 64.

*Eutermellus* Sjöstedt, 1926 : 358.

Type species, by original designation, *Eutermellus convergens* Silvestri, 1912.

*Imago*. Left mandible with apical tooth distinctly longer than first marginal, but distance between them slightly shorter than that from first to third marginals (left mandible index

.96-.98), cutting edge between the latter sinuate and indented in front of third marginal, which is approximately equilateral, small subsidiary tooth just visible in gap between third marginal and molar prominence; right mandible, apical and first marginal as left, second marginal small but distinct with concave posterior edge, molar plate in surface view without basal indentation, asymmetrical with large posterior rounded flange and smaller anterior, weakly ridged. Postclypeus inflated, width 1.8-2.5 times length. Fontanelle variable, Y-shaped, triangular, dumb-bell-shaped or near obsolete. Eyes scarcely to distinctly set out from sides of head. Pilosity of head not particularly regular in length, with numbers of conspicuous long setae tending to occur in symmetrical pairs. Pronotum, sides weakly convergent to rounded posterior margin, length approximately two-thirds width.

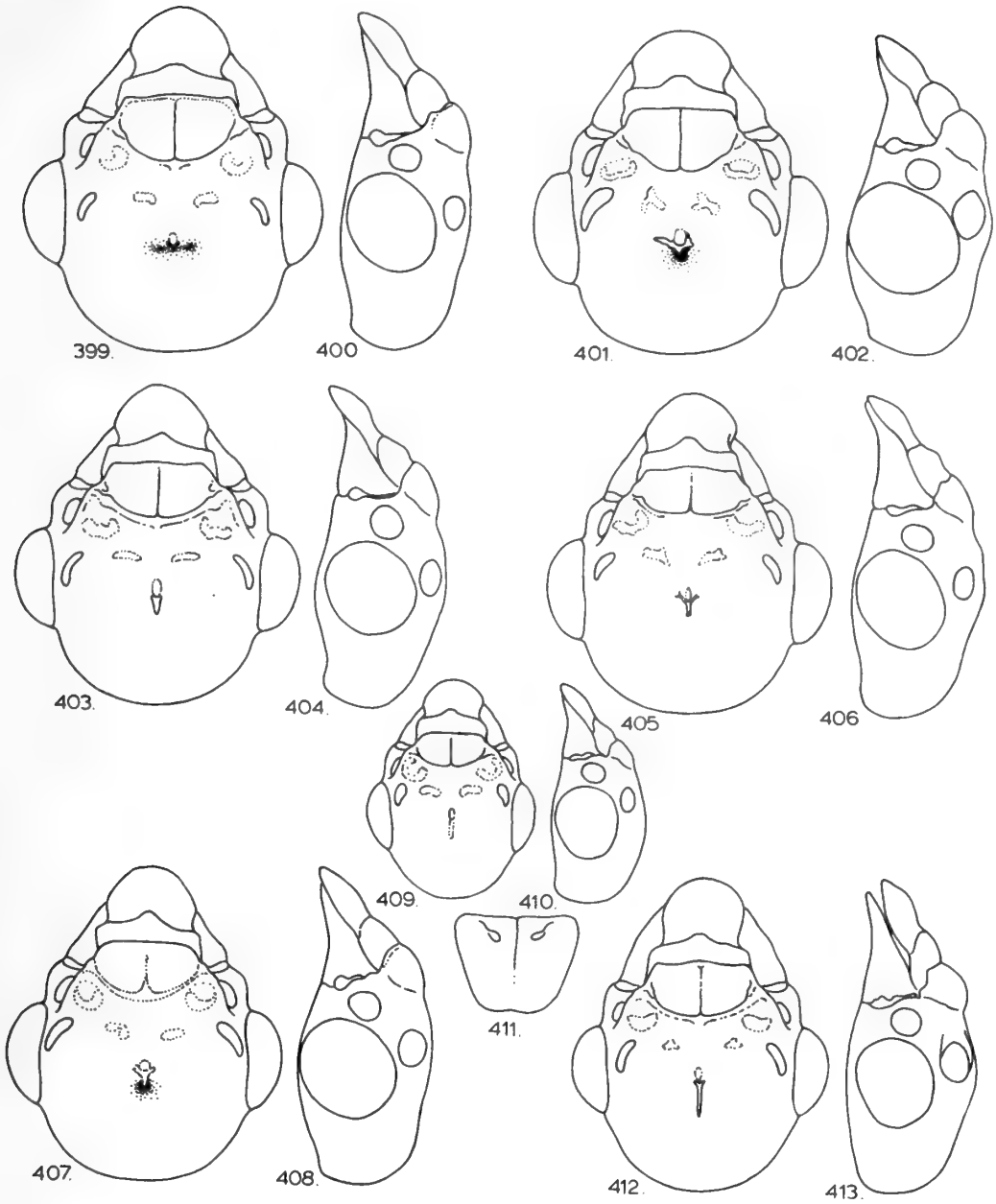
*Soldier*. Monomorphic. Nose conical to cylindrical, tapering to fine point, distinctly rugose. Vestigial mandibles with minute points or without, labrum with tri-lobed anterior margin. Head capsule very weakly to moderately constricted behind antennae. Antennae 13 segmented. Head and nose with scattered fine very short setae, longer at nose tip, and conspicuous longer setae arranged approximately in two rows, one in front and one behind the constriction, front row with 4-10 setae; posterior row with 2-10. Rest of body with scattered setae of irregular length, longer on posterior margins of tergites and sternites, and towards rear of abdomen, legs with conspicuous long setae, 1 on each coxa, 3-6 on each femur and tibia, among the shorter more typical setae.

*Worker*. Mandibles as imago except apical tooth longer in proportion (left mandible index 1.24-1.62) and molar areas more pronounced.

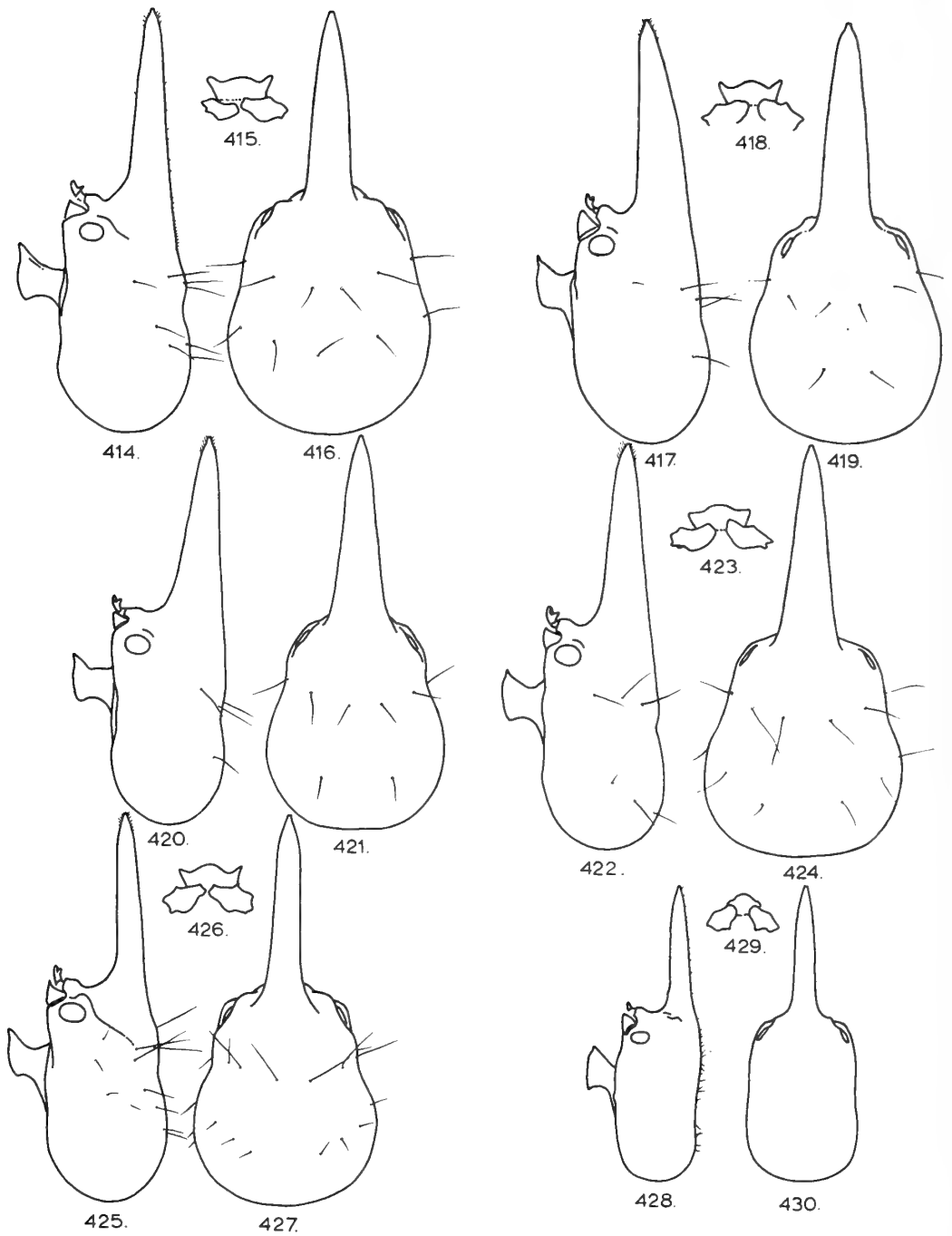
*Eutermellus* is in many respects the least specialized member of the "*Paracornitermes*-branch" occurring in Africa, as shown by the imago and worker mandibles, the typically Y-shaped fontanelle of some species, the tri-lobed soldier labrum and the generally more numerous setae. The soldier mandibles were described in detail in another paper (Sands, 1956). It is distinguishable from *Verrucositermes* and *Afrosubulitermes* in the imago by its denser pilosity, and in the latter case by its greater size. The soldier is separated from these two genera both by its general shape and size, and by the numerous prominent setae on head, body, and legs.

*Eutermellus* as used here includes three new species and is of interest because the inter-specific variation appears to indicate relationships to other genera. *E. undulans* has a slender nose in the soldier, combined with an imago in which the eyes are not noticeably set out from the sides of the head capsule, and the posterior margin of the postclypeus is indistinct, merging in profile with the line of the frons. This suggests affinities with *Afrosubulitermes* and *Postsubulitermes*. Other species such as *E. abruptus* and *E. bipartitus* have the eyes set out from the sides of the head in a similar manner to *Verrucositermes* and *Mimeuterme*s, whilst in *E. convergens* and *E. aquilinus* the more conical nose of the soldier and almost unconstricted head capsule also suggest a relationship to *Mimeuterme*s. These distinctions between the species, though interesting, are not very marked, especially in the soldier castes. Though separable on the basis of the material known at present, from widely spaced localities, it is possible that some of the species named here might be found to be synonymous if further material were to be collected.

This genus has been recorded from both the Congo and West African rain forests and from the adjacent savannah zones, but not from the savannah south of the Congo nor from East or South Africa. It is found in the mounds of other genera of termites and builds none of its own.



FIGS. 399-413 : Imago head capsule, front and side views. 399, 400, *Eutermellus abruptus* ; 401, 402, *E. aquilinus* ; 403, 404, *E. bipartitus* ; 405, 406, *E. convergens* ; 407, 408, *E. undulans* ; 409-411, *Afrosubulitermes congoensis* (411, pronotum, plan view) ; 412, 413, *Postsubulitermes parviconstrictus*.



FIGS. 414-430: Soldier head capsule, side and plan views, labrum, and mandibles. 414-416, *Eutermellus abruptus*; 417-419, *E. aquilinus*; 420, 421, *E. bipartitus*; 422-424, *E. convergens*; 425-427, *E. undulans*; 428-430, *Afrosubulitermes congoensis*.

## KEYS TO SPECIES

## IMAGOS

- 1 Ocelli smaller,  $0.07-0.09 \times 0.10-0.13$ , separated from eyes by half own least diameter or more . . . . . 2
- Ocelli larger,  $0.09-0.11 \times 0.13-0.16$ , separated from eyes by less than half own least diameter . . . . . 3
- 2 Fontanelle a pale streak, slightly to distinctly bifurcate in front. Postclypeus less inflated, width 2.5 times length . . . . . **convergens** (p. 149)
- Fontanelle minute, triangular or 3 spots arranged in triangle, slightly paler than head capsule. Postclypeus more inflated, width 2.0-2.1 times length . . . . . **abruptus** (p. 145)
- 3 Larger; W,  $0.93-0.99$ ; E,  $0.34-0.38$ . Fontanelle irregularly bilobed, sometimes divided into 3 spots, distinctly paler than head. Postclypeus more inflated, width 1.8-1.9 times length, anterior margin straight, posterior arched in middle, sinuate towards outer corners . . . . . **aquilinus** (p. 147)
- Smaller; W,  $0.85-0.88$ ; E,  $0.31-0.33$ . Fontanelle an elongate rounded triangle, slightly paler than head, or almost obsolete. Postclypeus less inflated, width 2.1 times length, anterior margin very slightly convex or sinuate, posterior regularly rounded indistinct. . . . . 4
- 4 Eyes,  $0.31$ ; Ocelli,  $0.09 \times 0.13$ ;  $T_3$ ,  $1.20$ . Fontanelle an elongate rounded triangle (S. Congo) . . . . . **bipartitus** (p. 148)
- Eyes,  $0.33$ ; Ocelli,  $0.10 \times 0.14$ ;  $T_3$ ,  $1.00-1.09$ . Fontanelle almost obsolete (Guinean savannah, W. Africa) . . . . . **undulans** (p. 150)

## SOLDIERS

- 1 Posterior lobe of head capsule behind constriction with 1-2 pairs of long conspicuous setae, nose thicker, conical, profile nearly straight . . . . . **aquilinus** (W. Africa, p. 147) and **bipartitus** (S. Congo, p. 148)
- Posterior lobe of head capsule with 3-5 pairs of long conspicuous setae. In two of three species, nose cylindrical or thinner conical, profile undulating; remaining species, nose conical, profile nearly straight . . . . . 2
- 2 Nose thicker conical, profile nearly straight.  $T_3$  shorter,  $0.57-0.72$  (one only over 0.70). Antennal socket almost without ridge on dorsal side . . . . . **convergens** (p. 149)
- Nose thinner, cylindrical or conical, profile undulating.  $T_3$  longer,  $0.70-0.82$ . Antennal socket usually with ridge on dorsal side . . . . . 3
- 3 Highest point of "hump" at nose base vertically above middle of postmentum in profile, and abruptly depressed behind (Congo forest species) . . . . . **abruptus** (p. 145)
- Highest point of "hump" in front of middle of postmentum, profile more evenly undulating. (Guinean savannah species, W. Africa) . . . . . **undulans** (p. 150)

***Eutermellus abruptus* sp. n.**

(Text-figs. 399, 400, 414-416, 431-433, 479-481; Map 30)

*Imago*. Head capsule sepia brown with paler markings on frons, postclypeus and antennae yellow-brown, labrum yellow. Pronotum, meso- and metanota brown, other thoracic sclerites and legs yellow. Abdominal tergites brown, sternites yellow-brown.

Posterior margin of head capsule behind eyes evenly rounded, slightly less than semi-circular, turned slightly outwards at eye rim; fontanelle, paler than head capsule, minute triangular or three spots arranged in triangle; eyes oval, slightly set out from sides of head, prominent in proportion to own diameter and large relative to head width, W/E index 2.6-2.9; ocelli small

oval, separated from eyes by about half own least diameter or slightly more ; postclypeus moderately inflated, width about twice length, anterior margin sinuate, posterior convex, evenly rounded ; antennae 15 segmented, II, IV and V subequal, III shorter.

Pilosity of head rather even and dense, but not sufficiently so to form a " pelt " or " mat ", pronotum and abdominal pilosity similar, longer towards margins of sclerites.

Measurements (3 specimens from 2 localities) in millimetres.

	Range
Head width across eyes . . . . .	0.88-0.94
Greatest diameter of eye . . . . .	0.33-0.35
Ocellus . . . . .	0.08-0.09 × 0.11-0.13
Ocellus to eye . . . . .	0.04-0.05
Width of pronotum . . . . .	0.73-0.79
Length of pronotum . . . . .	0.49-0.54
Length of hind tibia . . . . .	1.10-1.23

*Soldier.* Head capsule pale yellow to yellow, nose orange-yellow to orange, rest of body cuticle pale yellow.

Head capsule in plan view weakly constricted behind antennae, posterior margin evenly or slightly angularly rounded ; nose thin, weakly conical. In profile undulating with distinct hump at base of nose, to nearly straight with depression in front of evenly rounded posterior lobe, highest point of hump vertically above middle of postmentum, and somewhat abruptly depressed behind ; antennae, II, III and V subequal, IV shorter, antennal socket usually with small ridge over dorsal rim.

Conspicuous setae of head consist of six in three pairs in line across base of nose in front of constriction, and six in three pairs similarly arranged on posterior lobe behind constriction.

Measurements (7 specimens from 3 localities) in millimetres.

	Range	Mean
Head length to tip of nose . . . . .	1.25-1.40	1.34
Head width . . . . .	0.61-0.73	0.67
Depth of head capsule . . . . .	0.38-0.46	0.42
Width of pronotum . . . . .	0.34-0.38	0.36
Length of pronotum . . . . .	0.13-0.14	0.13
Length of hind tibia . . . . .	0.71-0.83	0.74

*E. abruptus* differs from *E. bipartitus* in the imago in having the ocelli slightly more distant from the eyes, and a differently shaped fontanelle ; the head capsule has a slightly more broadly rounded posterior margin. The soldier of *E. abruptus* has a thinner nose and more numerous head setae. Differences from *E. aquilinus*, *E. convergens* and *E. undulans* are discussed under those species.

Holotype ♀ imago, CONGO : Njili, 18km. from Leopoldville, 11.vi.1948 (*A. E. Emerson*), in American Museum of Natural History.

Morphotype soldier, same data, A.M.N.H.

Paratype soldiers from type colony, same data, in A.M.N.H. and British Museum (Nat. Hist.).

Other paratype material. CONGO : Sona Mpangu, 10.iv.1948, soldiers and workers, A.M.N.H. and B.M.(N.H.), and Camp Putnam, 1° 24' N., 28° 36' E., 18.v.1948, 2 vials, one containing soldiers and workers, and the other, two imagos that flew to light (*A. E. Emerson*), allotype ♂ imago in A.M.N.H.



*Eutermellus aquilinus* sp. n.

(Text-figs. 401, 402, 417-419, 482, 483; Map 30)

*Imago.* Head capsule sepia brown with paler markings on frons, postclypeus and antennae yellow-brown, labrum yellow. Pronotum brown, meso- and metanota and femora yellow-brown, tibiae and tarsi yellow. Abdominal tergites brown, sternites yellow-brown. Wing membrane translucent very pale brown, venation brown.

Posterior margin of head capsule behind eyes rounded, more strongly curved towards sides, and turned slightly outwards at eye rim; fontanelle pale, irregularly bilobed with triangular middle section, lateral arms variable in length and shape, sometimes separated from middle section; eyes scarcely set out from sides of head, oval, prominent in proportion to own diameter and large relative to head width, W/E index 2.5-2.8; ocelli large, oval, separated from eyes by less than one-third own least diameter; postclypeus strongly inflated, width 1.8-1.9 times length, anterior margin straight, posterior, convex, arched in middle, sinuate towards outer corners; antennae 15 segmented, II, IV, and V subequal, III very small.

Pilosity of head rather even and dense but not sufficiently so to form a "pelt" or "mat", pronotum and abdominal pilosity similar, longer setae towards margins of sclerites.

Measurements (8 specimens from 2 localities) in millimetres.

	Range	Mean
Head width across eyes	0.93-0.99	0.94
Greatest diameter of eye	0.34-0.38	0.36
Ocellus . . . . .	0.10-0.11 × 0.14-0.16	0.10 × 0.15
Ocellus to eye . . . . .	0.02-0.03	0.02
Width of pronotum . . . . .	0.71-0.78	0.74
Length of pronotum . . . . .	0.50-0.56	0.53
Length of hind tibia . . . . .	1.08-1.20	1.12
Length of fore wing . . . . .	7.60-8.60	8.12

*Soldier.* Head capsule pale yellow to yellow, nose orange-yellow to orange, rest of body cuticle pale yellow.

Head capsule in plan view scarcely constricted behind antennae, posterior margin somewhat angularly rounded, nose rather thick, weakly conical. In profile almost straight or slightly convex, sometimes weakly humped at base of nose; antennae, II, III, and V subequal, IV shorter. Conspicuous setae of head consist of six in three pairs arranged approximately in line across base of nose in front of "constriction" and one or two pairs on vertex behind constriction.

Measurements (8 specimens from 2 localities) in millimetres.

	Range	Mean
Head length to tip of nose . . . . .	1.28-1.38	1.32
Head width . . . . .	0.60-0.65	0.62
Depth of head capsule . . . . .	0.39-0.45	0.41
Width of pronotum . . . . .	0.35	
Length of pronotum . . . . .	0.13	
Length of hind tibia . . . . .	0.68-0.70	0.70

*E. aquilinus* is separable from *E. bipartitus* in the imago by the larger size, differently shaped fontanelle, more inflated postclypeus, and by the eyes being less distinctly set out from the sides of the head. The soldiers have, however, been found indistinguishable, and in this case the distribution is the only criterion. In the imago caste of the other species, *E. convergens* has the ocelli more distant from the eyes, a less inflated postclypeus, and a differently shaped fontanelle, *E. undulans* is smaller, with almost obsolete fontanelle and a differently shaped head capsule, and *E. abruptus* has smaller ocelli, more distant from the eyes, and a different fontanelle. The soldiers are all very much alike, but the remaining species all have

3-5 pairs of long setae on the vertex behind the constriction, and *E. abruptus* and *E. undulans* have thinner noses with different profile.

Holotype ♀ imago, allotype ♂, morphotype soldier, and paratypes from type colony. GHANA : 20m. from Bolgatanga on Tamale Road, 9.iii.1959 (*W. A. Sands*, Coll. No. S.2364), in British Museum (Natural History).

Other paratype material. GHANA : Awura, 4m. from Ejura on Kintampo Road, 28.iii.1959 (*W. A. Sands*), soldiers and workers.

NIGERIA : Northern Region ; Samaru, 7m. from Zaria on Funtua Road, 17.v. 1959 (*W. A. Sands*), imagos. Both in B.M.(N.H.).

This species has been recorded from the edge of the forest-zone to the Northern Guinean savannah (*Keay et al.*, 1959, vegetation types 8, 16, and 17).

### *Eutermellus bipartitus* (Sjöstedt)

(Text-figs. 403, 404, 420, 421, 484 ; Map 30)

*Eutermes bipartitus* Sjöstedt, 1911 : 168. Type locality : CONGO, Mukimbungu.

*Eutermes (Coarctotermes) bipartitus* Sjöstedt ; Holmgren, 1912 : 65.

*Eutermellus bipartitus* (Sjöstedt) Sjöstedt, 1926 : 358.

*Imago*. Colour probably faded in old specimen. Described by Sjöstedt as having head capsule chestnut brown, dorsal sclerites pale red-brown.

Posterior margin of head capsule evenly rounded, less than semi-circular, turned slightly outwards at eye rim ; fontanelle pale, elongate triangular, somewhat rounded, with indistinct oval mark in front ; eyes oval, slightly but distinctly set out from sides of head, prominent in proportion to own diameter and fairly large relative to head width, W/E index 2.9 ; ocelli medium-sized, oval, separated from eyes by slightly more than one-third own least diameter ; postclypeus moderately inflated, width 2.1 times length, anterior margin nearly straight, posterior convex, evenly rounded ; antennae probably 15 segmented, II, IV, and V subequal, III shorter.

Pilosity of head dense, not sufficiently even to form a "pelt" or "mat", pronotum and abdominal pilosity similar, longer towards margins of sclerites.

Measurements (1 specimen) in millimetres.

Head width across eyes . . . . .	0.89
Greatest diameter of eye . . . . .	0.31
Ocellus . . . . .	0.09 × 0.13
Ocellus to eye . . . . .	0.03
Width of pronotum . . . . .	0.68
Length of pronotum . . . . .	0.46
Length of hind tibia . . . . .	1.20

*Soldier*. Head capsule pale yellow to yellow, nose orange-yellow to orange, rest of body cuticle pale yellow.

Head capsule in plan view weakly constricted behind antennae, posterior margin evenly rounded ; nose rather thick, conical. In profile almost straight or slightly convex, with slight depression behind base of nose and in front of evenly rounded posterior lobe ; antennae 13 segmented, II, III and V subequal, IV shorter.

Conspicuous setae of head consist of four to six in two or three pairs in line across base of nose in front of constriction, and one or two pairs similarly arranged on posterior lobe behind constriction.

Measurements (4 specimens from 1 locality) in millimetres.

	Range	Mean
Head length to tip of nose . . . . .	1·25-1·40 . . . . .	1·31
Head width . . . . .	0·59-0·66 . . . . .	0·62
Depth of head capsule . . . . .	0·33-0·41 . . . . .	0·38
Width of pronotum . . . . .	0·29-0·35 . . . . .	0·32
Length of pronotum . . . . .	0·11-0·14 . . . . .	0·12
Length of hind tibia . . . . .	0·61-0·74 . . . . .	0·68

*E. bipartitus* differs from its earliest congener *E. convergens* in the imago in having the ocelli closer to the eyes, and the eyes more distinctly set out from the sides of the head; the postclypeus is more inflated. The soldier of *E. bipartitus*, whilst similar in shape, appears to have fewer head setae. Differences from the new members of the genus, *E. abruptus*, *E. aquilinus*, and *E. undulans*, are discussed under those species.

Material. CONGO: Mukimbugu, 5° S., 14° E., 9.x.1904, Coll. No. 1158 (*K. E. Laman*), syntype male imago and soldiers from type colony, *E. bipartitus* (Sjöstedt); same locality, 19.x.1904, and 22.x.1904, 2 vials (*K. E. Laman*), the first of these containing further syntypes. All in A.M.N.H.

This species is only known from the original material, but it appears possible that it may be a savannah species south of the Congo forest, equivalent in its ecology to *E. aquilinus* in the north.

### *Eutermellus convergens* Silvestri

(Text-figs. 405, 406, 422-424, 485; Map 30)

*Eutermellus convergens* Silvestri, 1912: 245. Type locality: ISLAND OF FERNANDO POO, Basile.

*Eutermes* (*Eutermellus*) *convergens* (Silvestri) Holmgren, 1912: 64.

*Eutermellus convergens* Silvestri; Sjöstedt, 1926: 358. [States *convergens* syn. of *bipartitus* (Sjöstedt)].

*Eutermellus convergens* Silvestri; Snyder, 1949: 344. [States *convergens* not. syn. of *bipartitus* (Sjöstedt)].

*Imago*. Head capsule dark sepia brown, with paler markings on frons, postclypeus sepia brown, labrum and antennae brown. Pronotum sepia brown, meso- and metanota brown, other thoracic sclerites and legs yellow-brown to brown. Abdominal tergites sepia brown, sternites brown. Wing membrane translucent very pale brown, venation brown.

Posterior margin of head capsule behind eyes evenly rounded, less than semi-circular, turned slightly outwards at eye rim; fontanelle pale, slit-like and slightly bifurcate in front to Y-shaped with lateral arms dilated or branching terminally; eyes slightly set out from sides of head, oval, moderately prominent in proportion to own diameter and large or medium-sized relative to head width, W/E index 2·6-3·0; ocelli small, separated from eyes by three-quarters own least diameter; postclypeus moderately inflated, width 2·5 times length, anterior margin slightly convex or sinuate, posterior convex rounded, somewhat indistinct; antennae 15 segmented, II, IV and V subequal, III shorter.

Pilosity of head uneven, and dense not forming a "pelt" or "mat". Pronotum and abdominal pilosity similar, longer setae towards margins of tergites.

Measurements (3 specimens from 2 localities) in millimetres.

	Range
Head width across eyes . . . . .	0.88
Greatest diameter of eye . . . . .	0.29-0.33
Ocellus . . . . .	0.07-0.08 × 0.10-0.11
Ocellus to eye . . . . .	0.05-0.06
Width of pronotum . . . . .	0.69-0.70
Length of pronotum . . . . .	0.44-0.48
Length of hind tibia . . . . .	1.03-1.10

*Soldier.* Head capsule pale yellow to yellow, nose orange-yellow to orange, rest of body cuticle pale yellow.

Head capsule in plan view constricted behind antennae, posterior margin evenly rounded; nose rather thick, conical. In profile nearly straight, sometimes with slight depression in front of rounded posterior lobe; antennae, II, III and V subequal, IV shorter. Conspicuous setae of head consist of six to eight in three or four pairs approximately in line across base of nose in front of constriction, and a similar number on posterior lobe behind constriction.

Measurements (13 specimens from 5 localities) in millimetres.

	Range	Mean
Head length to tip of nose . . . . .	1.23-1.39	1.30
Head width . . . . .	0.55-0.68	0.61
Depth of head capsule . . . . .	0.38-0.40	0.39
Width of pronotum . . . . .	0.30-0.36	0.34
Length of pronotum . . . . .	0.11-0.15	0.13
Length of hind tibia . . . . .	0.57-0.72	0.66

*E. convergens* differs in the imago from *E. bipartitus* by the smaller ocelli, more distant from the eyes, slightly less inflated postclypeus, and shorter hind tibia. *E. abruptus* has a different fontanelle and more inflated postclypeus. The differences from *E. aquilinus* and *E. undulans* are discussed under those species. In the soldier, *E. aquilinus* and *E. bipartitus* have fewer head setae, and *E. abruptus* and *E. undulans* thinner noses.

**Material.** ISLAND OF FERNANDO POO: Basilè, date unknown (*L. Fea*), syntype imago and soldiers, type colony, *E. convergens* Silvestri, A.M.N.H.

GHANA: Aburi, 1912-13 (*F. Silvestri*), Silvestri Coll., Lab. Zool. Sc. Agr., Portici.

NIGERIA: Western Region; 63m. S. of Ilorin on Oyo Road, 4.xii.1957, and Ibadan, Agodi, 10.xii.1957 (*W. A. Sands*); Benin Province, Obanokoro, Sobo Plain, 7.i.1957 (*W. Wilkinson*).

CAMEROUN: Kumba, 19.x.1949 (*H. Oldroyd*).

Material in British Museum (Natural History) unless otherwise stated.

*E. convergens* appears to be a forest species, with only one record in riverain forest outside the main rain forest block of West Africa.

### *Eutermellus undulans* sp. n.

(Text-figs. 407, 408, 425-427, 486, 487; Map 30)

*Imago.* Head capsule sepia brown with paler markings on frons, postclypeus and antennae yellow-brown, labrum yellow. Pronotum, meso- and metanota brown, other thoracic sclerites and legs yellow. Abdominal tergites brown, sternites brown laterally, paler in mid-line. Wing membrane translucent very pale brown, venation brown, radius-sector outlined brown.

Posterior margin of head capsule behind eyes rounded, less than semi-circular, turned slightly outwards at eye rim; fontanelle almost obsolete, very indistinct, shape uncertain; eyes oval, scarcely set out from sides of head, moderately prominent in proportion to own diameter, large relative to head width, W/E index 2.6-2.7; ocelli medium-sized, oval, separated from eye by less than one-fifth own least diameter; postclypeus moderately inflated, width about twice length, anterior margin slightly convex, posterior convex, rounded, very indistinct; antennae 15 segmented, II, IV and V subequal, III shorter.

Pilosity of head rather even and dense, but not sufficiently so to form a "pelt" or "mat", pronotum and abdominal pilosity similar, longer towards margins of sclerites.

Measurements (2 specimens from 1 locality) in millimetres.

	Range
Head width across eyes . . . . .	0.85-0.88
Greatest diameter of eye . . . . .	0.33
Ocellus . . . . .	0.10 × 0.14
Ocellus to eye . . . . .	0.02
Width of pronotum . . . . .	0.69-0.71
Length of pronotum . . . . .	0.50
Length of hind tibia . . . . .	1.00-1.09
Length of fore wing . . . . .	6.80-7.20

*Soldier.* Head capsule pale yellow to yellow, nose orange-yellow to orange, rest of body cuticle pale yellow.

Head capsule in plan view distinctly constricted behind antennae, posterior margin evenly rounded; nose thin and cylindrical or slightly tapering. In profile undulating with distinct hump at base of nose, to nearly straight, with weak depression in front of evenly rounded posterior lobe; antennae, II, III and V subequal, IV shorter, antennal socket usually with small ridge over dorsal rim. Conspicuous setae of head consist of six to ten in three to five pairs approximately in line across base of nose in front of constriction, and three to five pairs similarly arranged on posterior lobe behind constriction, the latter being less regular in position.

Measurements (16 specimens from 4 localities) in millimetres.

	Range	Mean
Head length to tip of nose . . . . .	1.20-1.35	1.29
Head width . . . . .	0.58-0.64	0.62
Depth of head capsule . . . . .	0.38-0.43	0.41
Width of pronotum . . . . .	0.31-0.35	0.34
Length of pronotum . . . . .	0.11-0.13	0.12
Length of hind tibia . . . . .	0.68-0.75	0.69

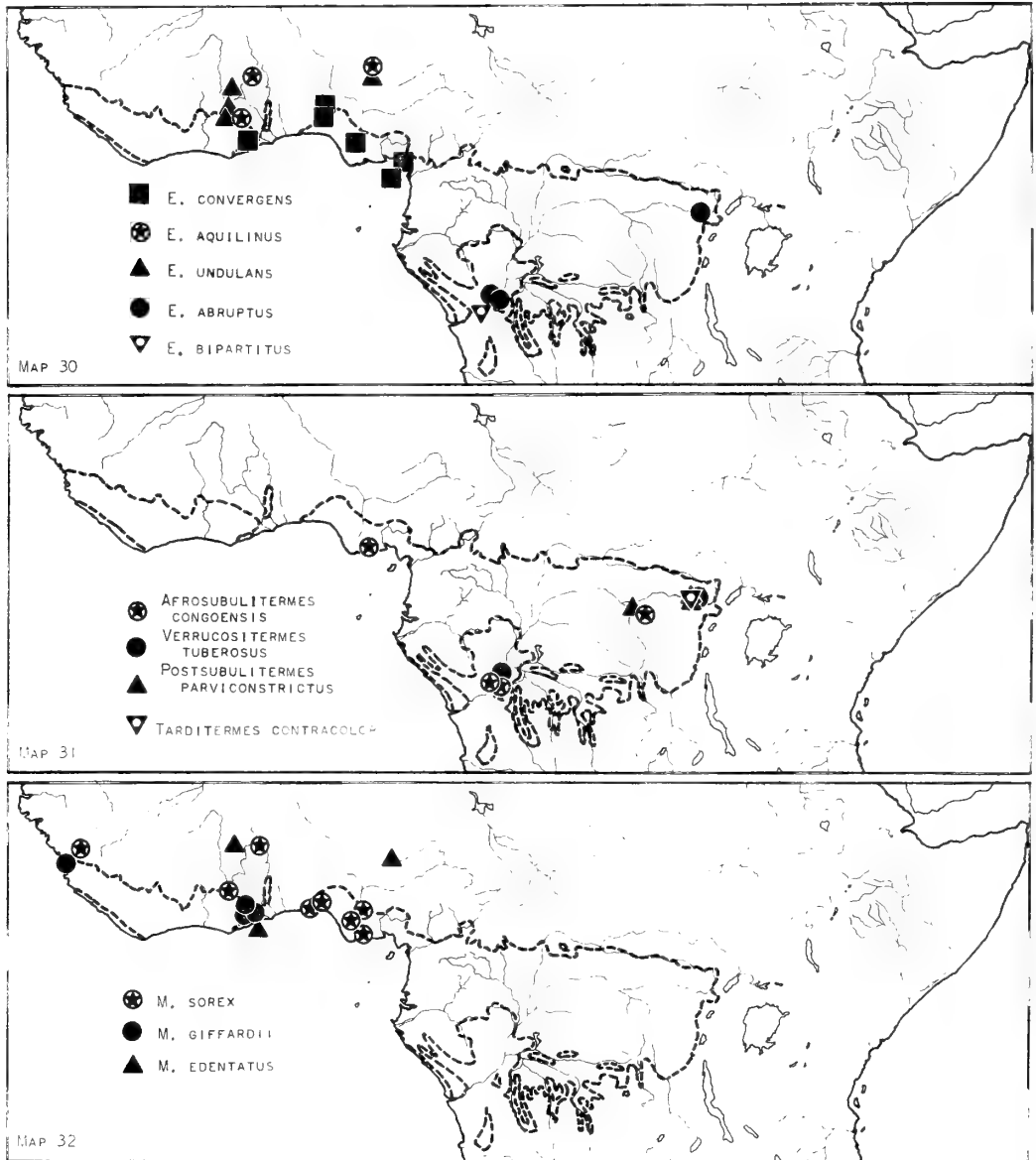
*E. undulans* differs in the imago from *E. bipartitus* in the almost obsolete fontanelle and shorter hind tibia. *E. convergens* has a conspicuous fontanelle and smaller ocelli more distant from the eyes, as is also the case with *E. abruptus*. The differences from *E. aquilinus* are discussed under that species. In the soldier, *E. abruptus* is closest, differing only slightly in the more abrupt depression behind the base of the nose. *E. convergens* has a thicker nose, and the other two species fewer head setae.

Holotype ♀ imago, allotype ♂, morphotype soldier, and paratypes from type colony. GHANA: 25m. north of Wenchi on Bamboi Road, 30.iii.1959 (*W. A. Sands* Coll. No. S.2680). In British Museum (Natural History).

Other paratype material. GHANA: 3m. from Larabanga on Bole Road, 22.iii.1959, and 12m. N. of Techiman on Wenchi Road, 29.iii.1959 (*W. A. Sands*), soldiers and workers.

NIGERIA : Northern Region ; 18m. from Kaduna on Zaria Road, 31.x.1957 (W. A. Sands), soldiers and workers. All in B.M.(N.H.).

This species has been recorded from the same vegetation zones as *E. aquilinus*, namely the Guinean savannah woodlands.



MAPS 30-32. (30), The genus *Eutermellus* ; (31), " *Paracornitermes* branch ", monotypic genera ; (32), The genus *Mimeutermes*.

***AFROSUBULITERMES* Emerson**

*Afrosubulitermes* Emerson, 1960 : 7. Type-species by original designation, *Afrosubulitermes congoensis* Emerson, 1960.

*Imago.* Left mandible with apical tooth distinctly longer than first marginal, but distance between them slightly shorter than that from first to third marginals (left mandible index .89-.94), cutting edge between the latter deeply indented in front of third marginal and slightly or not sinuate, anterior edge of third marginal longer than posterior, gap between this and molar prominence very narrow; right mandible, apical and first marginal as left, second marginal small but distinct, molar plate in surface view without basal indentation, asymmetrical, with large posterior rounded flange and smaller anterior, weakly ridged. Postclypeus scarcely inflated, following line of profile, width 2.3 times length. Fontanelle represented by elongate narrow ridge, visible only by side lighting on the highly polished head capsule, with pale oval spot in front. Eyes not set out from sides of head. Pilosity virtually absent from head, only prominent setae paired, on vertex, between ocelli, in middle of postclypeus and on its anterior margin. Pronotum, sides weakly convergent posteriorly, length three-quarters or more of width.

*Soldier.* Monomorphic. Nose thin, cylindrical, tapering to fine point. Vestigial mandibles without points, labrum with sinuate anterior margin. Head capsule weakly constricted behind antennae. Antennae 12 segmented. Head and nose with numerous fine short setae, and six longer setae, one pair on vertex and two pairs at base of nose. Abdominal tergites with scattered short setae and longer on posterior margins, sternites similar but all setae longer, in both cases, marginal setae approximately twice length of rest.

*Worker.* Mandibles as imago except apical tooth longer in proportion (left mandible index 1.36-1.39), cutting edge behind left first marginal more sinuate, and right molar plate with more pronounced flanges.

The discovery of the imago of *Afrosubulitermes* has clarified its relationships to a considerable extent. Its closest connection among Ethiopian genera is *Eutermellus*, and the generic separation of the two is not as distinct as would appear from the original description of *Afrosubulitermes*. New material of *Eutermellus* has shown a greater range of variation than was previously known, and the main distinctive features of *Afrosubulitermes* are its extremely small size and much reduced pilosity in the imago, and its proportionately shorter nose in the soldier. It also has features of resemblance to *Postsubulitermes* and appears to be intermediate between this genus and *Eutermellus*. *Afrosubulitermes* was considered by Emerson (1960) to be closely related to *Verrucositermes*, but I believe that the latter was more probably separately derived from an ancestral form close to *Eutermellus*.

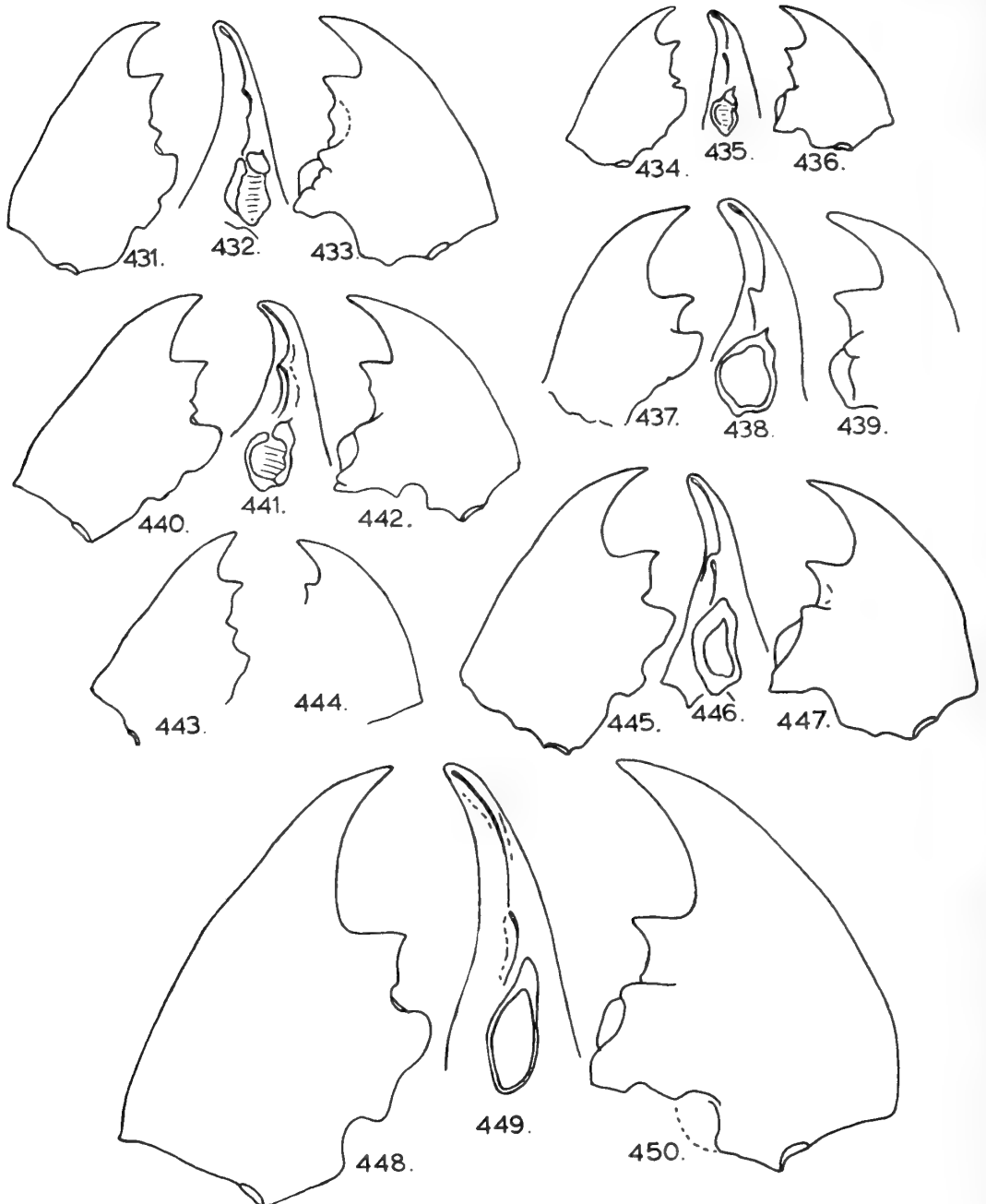
***Afrosubulitermes congoensis* Emerson**

(Text-figs. 409-411, 428-430, 434-436, 488; Map 31)

*Afrosubulitermes congoensis* Emerson, 1960 : 9. Type locality : CONGO, Stanleyville.

*Imago.* Previously undescribed. Head capsule sepia brown, paler patches in front of ocelli, antennae and postclypeus brown, labrum pale brown. Pronotum and abdominal sclerites brown, meso- and metanota, other thoracic sclerites and legs pale brown. Wing membrane translucent pale brown, radius sector sepia brown, rest of venation brown, only subcosta and radius sector distinct.

Posterior margin of head capsule behind eyes less than semi-circular, slightly sinuate immediately behind eyes; eyes large relative to head width W/E index 2.3-2.4, but not prominent in proportion to own diameter, slightly angular oval; ocelli medium-sized, oval, separated from



FIGS. 431-450: Imago mandibles of "Paracornitermes branch", showing details of right molar plate. 431-433, *Eutermellus abruptus*; 434-436, *Afrosbulitermes congoensis*; 437-439, *Postsubulitermes parviconstrictus* (late nymph); 440-442, *Verrucositermes tuberosus* (440-442, worker, 443, 444, unique morphotype king); 445-447, *Mimeutermes edentatus*; 448-450, *Tarditermes contricolor*.



eyes by about one-fifth own least diameter ; anterior margin of postclypeus straight, posterior convex, evenly rounded ; antennae 13 segmented, II and V subequal, IV slightly shorter, III shorter still and narrower.

Other characteristics given in generic diagnosis.

Measurements (10 specimens from 1 locality) in millimetres.

	Range	Mean
Head width across eyes . . . . .	0.54-0.56 . . . . .	0.55
Greatest diameter of eye . . . . .	0.23-0.24 . . . . .	0.24
Ocellus . . . . .	0.06 × 0.08-0.09 . . . . .	0.06 × 0.08
Ocellus to eye . . . . .	0.006-0.013 . . . . .	0.011
Width of pronotum . . . . .	0.39-0.43 . . . . .	0.41
Length of pronotum . . . . .	0.29-0.31 . . . . .	0.31
Length of hind tibia . . . . .	0.68-0.71 . . . . .	0.70
Length of fore wing . . . . .	4.40-4.60 . . . . .	4.48

Morphotype ♀ imago, NIGERIA : Eastern Region, 12m. from Aba on Ikot Ekpene Road, 12.ix.1957 (*W. Wilkinson* Coll. No. WW 830). In British Museum (Natural History).

*Soldier.* The additional material has slightly increased the range of variation in size.

Measurements (14 specimens from 4 localities) in millimetres.

	Range	Mean
Head length to tip of nose . . . . .	0.98-1.07 . . . . .	1.02
Head width . . . . .	0.37-0.41 . . . . .	0.38
Depth of head capsule . . . . .	0.28-0.29 . . . . .	0.28
Width of pronotum . . . . .	0.24-0.32 . . . . .	0.26
Length of pronotum . . . . .	0.09 . . . . .	
Length of hind tibia . . . . .	0.47-0.53 . . . . .	0.50

*Variation.* In the soldier caste the lack of any noticeable variation is significant, since the species has been recorded over a range of nearly 1,500 miles.

The relationships of this species are discussed under the generic heading.

Material (additional to morphotype colony). NIGERIA : Western Region, Ibadan, Agodi, 10.xii.1957 (*W. A. Sands*), one queen, B.M.(N.H.).

CONGO : Stanleyville, 26.v.1948, 1.vi.1948, paratype soldiers and workers, type and other colonies, Leopoldville, 5.vi.1948, paratype soldiers and workers (*A. E. Emerson*) ; Stanleyville, 19.iii.1948, paratype soldier (*N. A. Weber*), A.M.N.H.

REPUBLIC OF CONGO : 13km. W. of Brazzaville, 8.vi.1948, paratype soldiers and workers (*A. E. Emerson*), A.M.N.H. and B.M.(N.H.).

This species appears widely distributed throughout the Congo and lower Guinean forest block, where it has been recorded from galleries within the mounds of other species. It has not been found west of the Dahomey-Togoland gap in the Guinean forests.

### **POSTSUBULITERMES** Emerson

*Postsubulitermes* Emerson, 1960 : 10. Type-species by original designation, *Postsubulitermes parviconstrictus* Emerson, 1960.

*Imago.* The morphotype queen is unique and the mandibles have not been dissected. The worker mandibles are described below. Postclypeus moderately inflated, width twice length, anterior margin sinuate, convex in middle. Fontanelle elongate, Y-shaped. Eyes not set out

from sides of head. Pilosity very fine and sparse with very few more prominent setae, three over each eye, two pairs on vertex and one pair on postclypeus. Pronotum, sides converging posteriorly, length less than two-thirds width.

*Soldier*. Monomorphic. Nose thin, cylindrical, tapering to fine point. Vestigial mandibles without points, labrum with regular rounded anterior margin. Head capsule scarcely constricted behind antennae, weakly humped at base of nose. Antennae 12 segmented. Head setae confined to bilaterally placed pair on vertex, one or two pairs near base of nose, and few at nose tip. Abdominal tergites with scattered short setae one-third length of longer setae on posterior margins, sternites with scattered short setae longer than on tergites and half length of longer setae on posterior margins.

*Worker*. Left mandible with apical tooth much longer than first marginal, distance between them, nearly three times that from first to third marginals (left mandible index 2.63), cutting edge between the latter entire, concave, gap between third marginal and molar prominence very narrow; right mandible, apical and first marginal as left, second marginal absent, molar plate with weak basal indentation of outline, weak anterior and strong posterior rounded flanges, and no ridges.

Emerson (1960) considered this genus to have been derived from close to *Afrosubulitermes* and I agree with this, particularly since the recently discovered imago of the latter shows close similarities of shape and appearance to *Postsubulitermes*. The imago and worker mandibles of *Postsubulitermes* are more specialized, and the soldier has an evenly rounded labrum, which is a further reduction of the tri-lobed shape seen in the more primitive members of the group, such as *Eutermellus*. The other genera are distinguishable by many characters, and are unlikely to be confused with *Postsubulitermes*.

### ***Postsubulitermes parviconstrictus* Emerson**

(Text-figs. 4I2, 4I3, 437-439, 464-466, 489; Map 3I)

*Postsubulitermes parviconstrictus* Emerson, 1960 : 13. Type locality : CONGO, Yangambi.

**Material.** CONGO : Yangambi, 0° 47' N., 24° 23' E., 20.v.1948 (*A. E. Emerson*), holotype and paratype soldiers and morphotype queen; Camp Putnam, 1° 24' N., 28° 36' E., 13.v.1948, 4km. N. of Camp Putnam 19 and 20.v.1948 (*A. E. Emerson*), paratype soldiers, A.M.N.H. and B.M.(N.H.).

### **VERRUCOSITERMES Emerson**

*Verrucositermes* Emerson, 1960 : 3. Type-species by original designation, *Verrucositermes tuberosus* Emerson, 1960.

*Imago*. The morphotype king of *V. tuberosus* is unique and the mandibles have not been dissected. The worker mandibles in this group are particularly closely similar to the imago and are described below. Postclypeus moderately inflated, width 2.5 times length, anterior margin concave, sinuate. Fontanelle a pale streak, tapering and slightly depressed posteriorly. Eyes set slightly out from sides of head and undercut at rims. Pilosity of head fine and uniform with a few more prominent setae. Pronotum, sides converging posteriorly, length less than two-thirds width.

*Soldier*. Monomorphic. Nose thin, cylindrical, tapering to fine point. Vestigial mandibles without points but angular in outline, labrum with sinuate anterior margin. Head capsule

strongly inflated at base of nose and sharply constricted in middle, with numerous irregular small tubercle-like outgrowths of cuticle, denser on base of nose and anterior lobe of head. Antennae 12-13 segmented, III to IX or X with 3 tubercles each on inner side. Head and nose with numerous scattered small setae. Abdominal tergites with scattered short setae, longer on posterior margins, sternites with short setae more dense and longer than tergites, and longer on posterior margins.

*Worker.* Left mandible with apical tooth longer than first marginal, distance between them longer than that from first to third marginals (left mandible index 1.36), notch present in cutting edge in front of third marginal, gap between third marginal and molar prominence little wider than this notch, subsidiary tooth between them just visible; right mandible, apical and first marginal as left, second marginal almost absorbed in posterior edge of first, molar plate with weak basal indentation of outline, strong rounded posterior flange, "ridges" vestigial and embedded in smooth shining surface.

The curious eyes of the imago of *Verrucositermes* are a feature occurring to a less marked degree in some *Eutermellus* species and in *Mimeutermes*. The worker mandible illustrated by Emerson (1960) appears to be that of *Orthotermes depressifrons* (Termitinae), a common forest species frequently occurring in the nests of other genera. The paratype material deposited at the British Museum (Natural History) includes a worker of this species, and there is a notable resemblance in general appearance between this and the true paratype *Verrucositermes* worker in the same vial. The *Orthotermes* worker has a prominent comb of diverging bristle-like setae on the anterior coxae, and slight differences in the mandibles. Emerson notes in parenthesis that some workers of the type colony have the right second marginal tooth less conspicuous than that figured. This is characteristic of the true *Verrucositermes* worker, which also has a much narrower gap between left third marginal and molar prominence, and a more elongate right molar plate.

The very characteristic soldier caste is the chief distinctive feature of the genus, though the rugosity of the nose and its base in some *Eutermellus* and *Mimeutermes* indicates a similar tendency in these genera; indeed, the vertex and nose-base cuticle of *Mimeutermes giffardii* magnified  $\times 500$  shows very numerous outgrowths which are closely similar in appearance and may be homologous in spite of their much smaller size.

The phylogenetic position of *Verrucositermes* must remain in some doubt, but the most likely would appear to be derived from an ancestor of less specialized soldier caste, but otherwise similar, intermediate between the genera *Eutermellus* and *Mimeutermes*.

### *Verrucositermes tuberosus* Emerson

(Text-figs. 440-444, 451, 452, 467-469, 490; Map 31)

*Verrucositermes tuberosus* Emerson, 1960: 6. Type locality: CONGO, Leopoldville.

Material. CONGO: Leopoldville, Kalina Point, 4° 18' S., 15° 18' E., 5.vi.1948 (*A. E. Emerson*), holotype soldier, paratypes, and morphotype king, A.M.N.H.; Camp Putnam (1° 24' N., 28° 36' E.), 22.v.1948 (*A. E. Emerson*), paratype soldiers, A.M.N.H. and B.M.(N.H.).

**MIMEUTERMES** Silvestri

*Mimeutermes* Silvestri, 1914 : 47. Type-species by original designation, *Mimeutermes giffardii* Silvestri, 1914.

*Imago*. Left mandible with long apical tooth, cutting edge from first to third marginals short, slightly concave (left mandible index 2.00-2.23), gap between third marginal and molar plate less than half as wide as this cutting edge ; right mandible, apical and first marginal as left, second marginal obsolete, posterior cutting edge of first marginal concave, molar plate with pronounced anterior and posterior rounded flanges, and tapering distally, ridges absent. Post-clypeus weakly inflated, width twice length or slightly less. Fontanelle pale, slit-like, slightly bifurcate with pale patch in front, to almost obsolete, little paler than head. Eyes slightly set out from sides of head. Pilosity of head variable. Pronotum, rounded posteriorly, anterior margin concave.

*Soldier*. Monomorphic. Nose thickly conical, merging with taper of head capsule at base, fontanelle rather large. Vestigial mandibles with and without points, labrum with sinuate anterior margin. Head capsule in plan view not constricted, top-shaped including nose, with sides parallel or rounded towards back. Antennae 12 segmented. Head and nose with few conspicuous setae. Abdominal tergites with sparse scattered minute setae, longer on posterior margins and posterior 2-3 tergites ; sternites with sparse short setae and longer on posterior margins, approximately twice length of short.

*Worker*. Mandibles as imago except apical tooth longer in proportion (left mandible index 3.32-3.59), and right molar plate larger with more pronounced flanges.

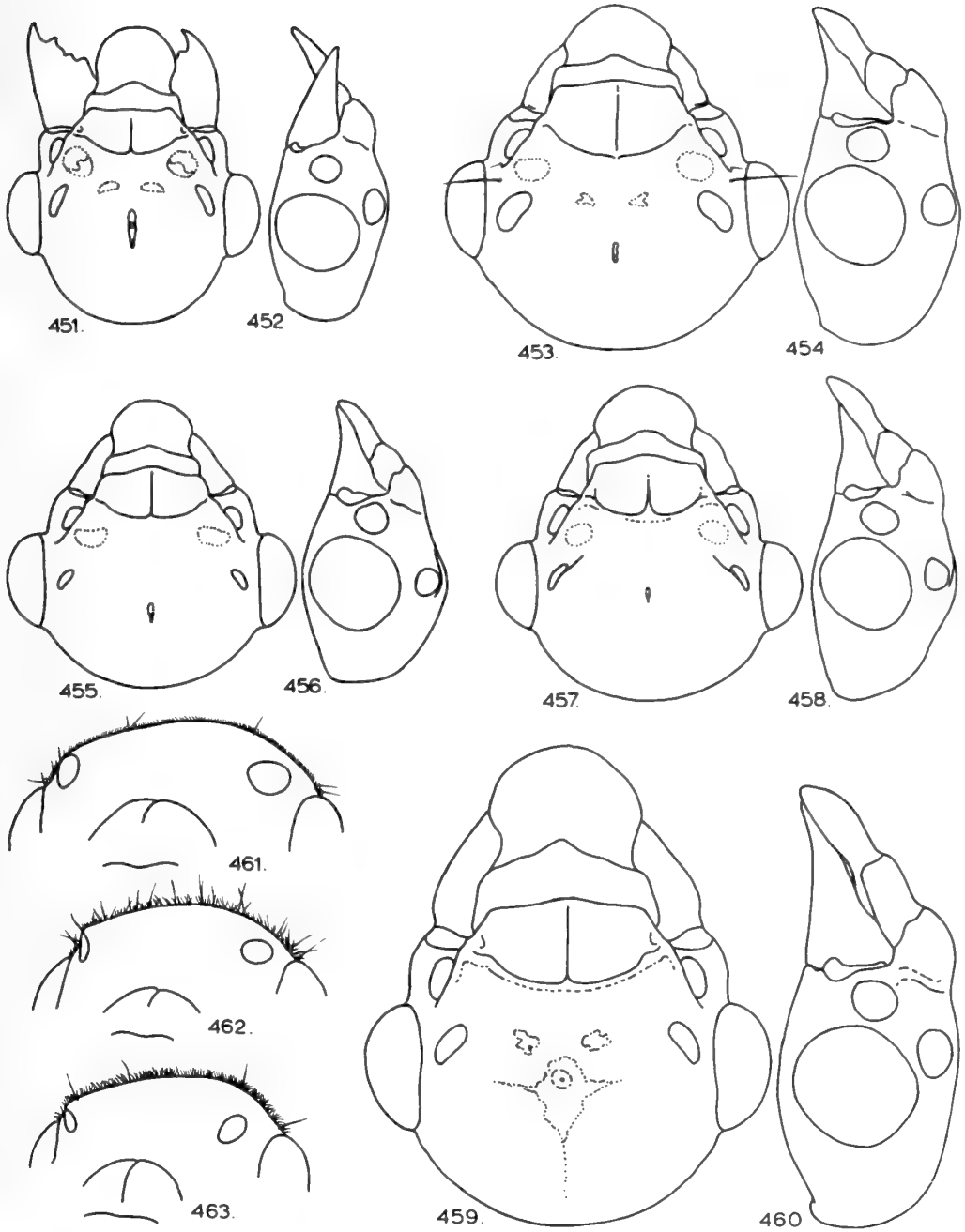
The genus *Mimeutermes*, like the other Ethiopian members of the "*Paracornitermes*-branch", is very distinctive in form, and detailed discussion is not required. Its relationships to *Tarditermes* and *Verrucositermes* are discussed under those genera. It is unlikely to be confused with any other genus except in the worker caste.

This is an unusual genus in that it appears to have evolved in the rain forest to the west of the Dahomey-Togoland gap. This forest limits the distribution of *M. giffardii*, the most primitive species, but the other two appear progressively more adapted to savannah conditions, and have spread back to Nigeria, though unknown further eastwards. It seems probable that this reflects the genuine distribution, rather than the failure of collectors, in view of the frequent records of related genera from similar habitats in other localities.

## KEYS TO SPECIES

## IMAGO

- |   |   |                           |
|---|---|---------------------------|
| 1 | Larger, W, 1.08-1.12 ; pronotum very large, wider than head width across eyes,<br>1.25-1.35 . . . . .   | <b>edentatus</b> (p. 160) |
| - | Smaller, W, 0.89-0.97 ; pronotum narrower than head width across eyes, 0.78-0.89  | 2                         |
| 2 | Eyes smaller, 0.29 ; T <sub>3</sub> longer, 1.02. Pilosity of head capsule and pronotum very even, forming a "pelt" with a few scattered longer setae (Text-fig. 463)                       | <b>sorex</b> (p. 163)     |
| - | Eyes larger, 0.31-0.33 ; T <sub>3</sub> shorter, 0.81-0.87. Pilosity of head capsule and pronotum uneven, not forming a "pelt", with many scattered longer setae, (Text-fig. 462) . . . . . | <b>giffardii</b> (p. 161) |



FIGS. 451-460 : Imago head capsule, front and side views. 461-463 : Vertex pilosity. 451, 452, *Verrucositermes tuberosus* ; 453, 454, 461, *Mimeuterms edentatus* ; 455, 456, 462, *M. giffardii* ; 457, 458, 463, *M. sorex* ; 459, 460, *Tarditermes contracolor*.

## SOLDIERS

- Vestigial mandibles with points . . . . . *giffardii* (p. 161)
- Vestigial mandibles without points . . . . . 2
- 2 Head capsule in plan view top-shaped, sides tapering more or less straight towards front . . . . . *sorex* (p. 163)
- Head capsule in plan view tear-drop-shaped, sides with concave curved taper towards front . . . . . *edentatus* (p. 160)

*Mimeuterme edentatus* Sands

(Text-figs. 445-447, 453, 454, 461, 470-473, 491 ; Map 32)

*Mimeuterme edentatus* Sands, 1956 : 83. Type locality : GHANA, Accra.

*Imago*. Previously undescribed. Head capsule dark sepia brown, postclypeus sepia brown, antennae and labrum yellow-brown. Pronotum, meso- and metanota sepia brown, pronotum with distinct large pale T-shaped mark in middle of anterior half, other thoracic sclerites brown, legs yellow-brown. Abdominal tergites sepia-brown, sternites brown, paler in mid-line. Wing membrane translucent pale brown, venation sepia brown, distinct.

Posterior margin of head capsule behind eyes widely rounded, slightly curved outwards at eye rim ; fontanelle a pale tapering slit ; eyes very slightly set out from sides of head, angularly short oval, moderately prominent in proportion to own diameter, and small to medium-sized relative to head width, W/E index 3.1-3.6 ; ocelli medium-sized, separated from eyes by half to four-fifths own least diameter ; anterior margin of postclypeus sinuate, convex in middle, posterior convex, rounded, width 1.8-1.9 times length ; antennae 15 segmented, IV and V nearly equal, II shorter and narrower, III much smaller. Pronotum very large, shield-like, wider than head across eyes.

Pilosity of vertex brown, very dense, short and even, forming a "pelt" or "mat", with a few longer emergent setae more or less symmetrically placed in pairs or groups, sometimes one very prominent seta between eye, ocellus and antennal socket on each side ; pronotum similar. Abdominal pilosity, tergites as pronotum, with few longer setae on posterior margins of last 6, more scattered and numerous on last 3 ; sternites with more longer setae, especially on posterior margins and last 4-5 segments.

Measurements (10 specimens from 1 locality) in millimetres.

	Range	Mean
Head width across eyes	1.08-1.12	1.10
Greatest diameter of eye	0.30-0.35	0.33
Ocellus . . . . .	0.10-0.12 × 0.13-0.15	0.11 × 0.14
Ocellus to eye . . . . .	0.06-0.08	0.07
Width of pronotum . . . . .	1.25-1.35	1.32
Length of pronotum . . . . .	1.04-1.15	1.10
Length of hind tibia . . . . .	1.00-1.06	1.04
Length of fore wing . . . . .	10.60-11.30	10.87

Morphotype ♀ imago. NIGERIA : Northern Region, 25m. from Jos on Kaduna Road, 5.iii.1957 (*W. A. Sands* Coll. No. S.1256). In British Museum (Natural History).

*Soldier*. The additional material has increased the known range of variation in size.

Measurements (15 specimens from 3 localities) in millimetres.

	Range	Mean
Head length to tip of nose . . . . .	1·22-1·61 . . . . .	1·43
Head width . . . . .	0·82-1·02 . . . . .	0·94
Depth of head capsule . . . . .	0·49-0·64 . . . . .	0·58
Width of pronotum . . . . .	0·43-0·51 . . . . .	0·47
Length of pronotum . . . . .	0·18-0·25 . . . . .	0·21
Length of hind tibia . . . . .	0·59-0·77 . . . . .	0·67

*M. edentatus* was described from a unique soldier, and additional material agrees well with the original description. The characteristics separating it from the other two species are discussed thereunder.

Material (other than holotype, Sands, 1956). GHANA : 30m. from Navrongo on Tumu Road, 13.iii.1959 (*W. A. Sands*).

*M. edentatus*, like its congeners, has been recorded from the mounds of other genera, but appears, unlike them, to be adapted to life in shaded habitats in the savannah zones, and has not been found in rain forest.

### *Mimeuterme giffardii* Silvestri

(Text-figs. 455, 456, 462, 476-478, 493, 494 ; Map 32)

*Mimeuterme giffardii* Silvestri, 1914 : 48. Type locality : GUINEA, Camayenne.

*Imago*. Head capsule very dark sepia brown, antennae and postclypeus sepia brown, labrum yellow. Pronotum, meso- and metanota sepia brown, other thoracic sclerites brown, femora yellow, tibiae and tarsi yellow-brown. Abdominal tergites brown, sternites brown laterally, yellow-white in mid-line. Wing membrane translucent pale brown, venation sepia brown, all distinct.

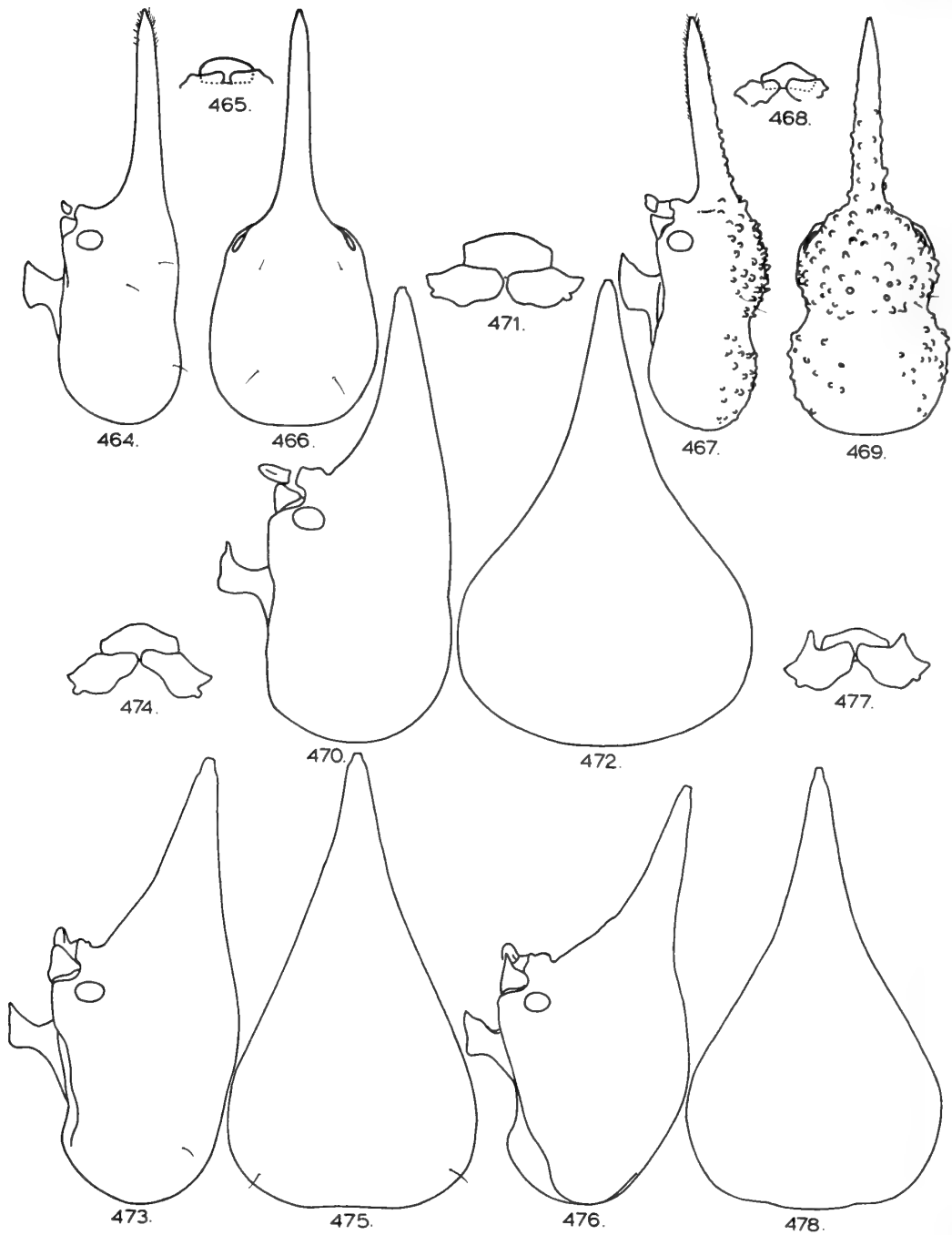
Posterior margin of head capsule behind eyes widely rounded, sharply curved outwards at eye rim ; fontanelle scarcely paler than head capsule, sometimes slightly bifurcate in front with paler spot ; eyes slightly but distinctly set out from sides of head, angularly short oval, prominent in proportion to own diameter and medium-sized relative to head width, W/E index 2·9-3·0 ; ocelli small, separated from eyes by half to three-quarters own least diameter ; anterior margin of postclypeus sinuate, convex in middle, posterior convex, rounded, width 2·2 times length ; antennae 15 segmented, IV and V nearly equal, II shorter and narrower, III much smaller. Pronotum narrower than head width across eyes.

Pilosity of vertex and pronotum yellow-brown, uneven in length with many scattered larger setae, not forming a "pelt" or "mat". Abdominal pilosity longer and denser on posterior segments, sternites more so than tergites.

Measurements (12 specimens from 3 localities) in millimetres.

	Range	Mean
Head width across eyes . . . . .	0·89-0·97 . . . . .	0·94
Greatest diameter of eye . . . . .	0·31-0·33 . . . . .	0·31
Ocellus . . . . .	0·08-0·09 × 0·09-0·11 . . . . .	0·09 × 0·10
Ocellus to eye . . . . .	0·04-0·07 . . . . .	0·06
Width of pronotum . . . . .	0·78-0·89 . . . . .	0·85
Length of pronotum . . . . .	0·61-0·71 . . . . .	0·66
Length of hind tibia . . . . .	0·82-0·87 . . . . .	0·84
Length of fore wing . . . . .	8·20-8·60 . . . . .	8·38

*Soldier*. Head capsule yellow to ferruginous orange, nose orange to ferruginous orange, rest of body cuticle yellow.



FIGS. 464-478 : Soldier head capsule, side and plan views, labrum, and mandibles. 464-466, *Postsubulitermes parviconstrictus* ; 467-469, *Verrucositermes tuberosus* ; 470-472, *Mimeuterme edentatus* ; 473-475, *M. sorex* ; 476-478, *M. giffardii*.



Head capsule in plan view top-shaped, sides parallel at back then sharply converging continuously with nose to about half nose length, rest of nose tapering less sharply. In profile strongly humped above antennal socket, which is distinctly behind middle of head, nose slightly upturned; vestigial mandibles with points; antennae, proportions of basal segments somewhat variable, usually II, IV and V subequal, longer up to twice III. Conspicuous head setae few, one bilaterally placed pair near back of head, and one pair near base of nose. Cuticle of vertex distinctly rastrate, at high magnifications ( $\times 500$ ) small papillae visible.

Measurements (14 specimens from 4 localities) in millimetres.

	Range	Mean
Head length to tip of nose . . . . .	1.25-1.48 . . . . .	1.39
Head width . . . . .	0.72-0.87 . . . . .	0.83
Depth of head capsule . . . . .	0.61-0.71 . . . . .	0.66
Width of pronotum . . . . .	0.43-0.46 . . . . .	0.44
Length of pronotum . . . . .	0.18-0.26 . . . . .	0.23
Length of hind tibia . . . . .	0.54-0.64 . . . . .	0.59

*M. giffardii* is easily distinguished from the other two species by the points on the soldier mandibles. Other features are the distinctly rastrate vertex and the differing profile in the soldier. In the imago, the coarser irregular vertex pilosity is distinctive; in addition the larger eyes and shorter hind tibia separate it from *M. sorex* and the generally smaller size from *M. edentatus*. *M. giffardii* is probably the most primitive of the three species in possessing these characteristics.

Material. GUINEA: Camayenne, 9° 25' N., 13° 40' W., 1912-13 (*F. Silvestri*), holotype ♀ imago, paratype soldiers and workers, *M. giffardii* Silvestri, Silvestri Coll., Lab. Zool. Sc. Agr., Portici.

GHANA: Aburi, 1912-13 (*F. Silvestri*), further paratype imago, soldiers, and workers, Silvestri Coll., as above; Kumasi, Kwadaso, 19.ii.1959, and 5½m. from Dunkwa on Obuasi Road, 4.iv.1959 (*W. A. Sands*), B.M.(N.H.).

This species appears to be one of the very few which are confined to the rain forest areas to the west of the Dahomey-Togoland gap, presumably having evolved in isolation from the main Congo forest block. It has been recorded from the mounds of other genera of termites.

### *Mimeuterмес sorex* Silvestri

(Text-figs. 457, 458, 463, 473-475, 495; Map 32)

*Mimeuterмес sorex* Silvestri, 1914: 50. Type locality: GUINEA, Mamou.

*Imago*. Previously undescribed. Head capsule dark sepia brown, antennae and postclypeus brown, labrum yellow. Pronotum, meso- and metanota brown, other thoracic sclerites and legs yellow-brown. Anterior abdominal tergites yellow-brown, posterior brown; sternites yellow-brown, brown around stigmata. Wings absent.

Posterior margin of head capsule behind eyes widely rounded, sharply curved outwards at eye rim; fontanelle a minute, pale, tapering slit with oval pale spot in front; eyes slightly set out from sides of head, angularly short oval, prominent in proportion to own diameter and medium-sized relative to head width, W/E index 3.4; ocelli small, separated from eyes by approximately three-quarters own least diameter; anterior margin of postclypeus sinuate, convex in middle, posterior convex, rounded, width 2.0 times length; antennae 15 segmented,

IV slightly larger than V, II smaller than these, III much smaller. Pronotum narrower than head width across eyes.

Pilosity of vertex and pronotum brown, of medium length, very dense and even, forming a "pelt" or "mat", with a few longer emergent setae more or less symmetrically placed in pairs or groups. Abdominal pilosity, first 3-4 tergites as pronotum, posterior tergites and sternites with longer setae of uneven length.

Measurements (Unique morphotype ♀) in millimetres.

Head width across eyes . . . . .	0.97
Greatest diameter of eye . . . . .	0.29
Ocellus . . . . .	0.09 × 0.10
Ocellus to eye . . . . .	0.06
Width of pronotum . . . . .	0.89
Length of pronotum . . . . .	0.66
Length of hind tibia . . . . .	1.02

Unique morphotype ♀ imago. NIGERIA : Eastern Region : Port Harcourt, I.iv.1957 (*W. Wilkinson*, Coll. No. WW.607). In British Museum (Natural History).

*Soldier*. Head capsule yellow to ferruginous, nose orange to chestnut brown, rest of body cuticle pale yellow to yellow.

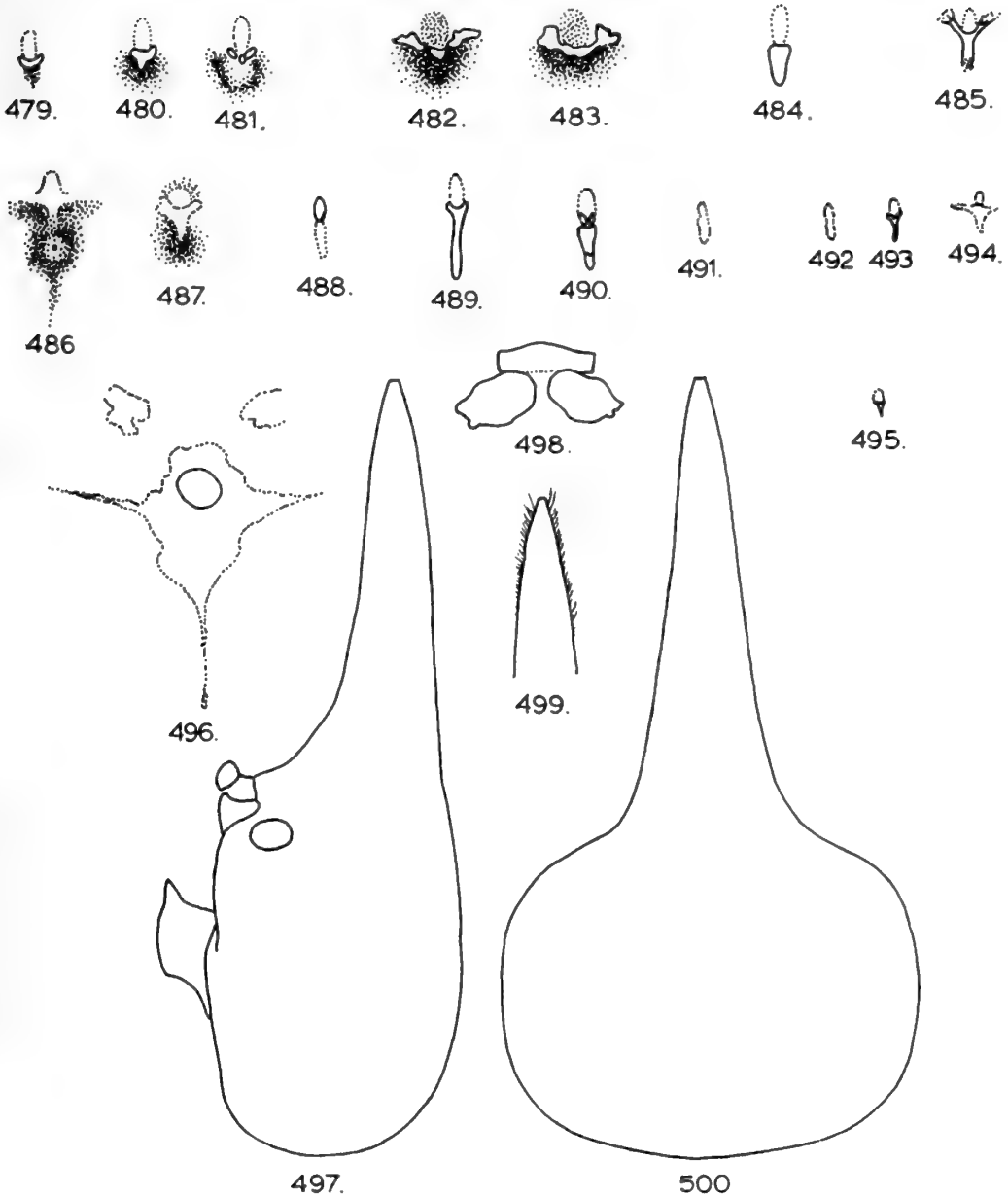
Head capsule in plan view top-shaped, posterior corners rounded, sides sharply converging to near tip of nose in continuous line. In profile strongly humped above antennal socket, which is behind middle of head, nose more or less parallel to long axis of head ; vestigial mandibles without points ; antennae, proportions of basal segments somewhat variable, usually II and V subequal, IV subequal or slightly larger, III smaller and narrower than these. Conspicuous head setae few, usually one bilaterally placed pair towards back of head. Cuticle of vertex not markedly rastrate.

Measurements (25 specimens from 8 localities) in millimetres.

	Range	Mean
Head length to tip of nose . . . . .	1.35-1.51	1.43
Head width . . . . .	0.75-0.89	0.82
Depth of head capsule . . . . .	0.61-0.69	0.63
Width of pronotum . . . . .	0.41-0.46	0.44
Length of pronotum . . . . .	0.18-0.22	0.19
Length of hind tibia . . . . .	0.64-0.71	0.66

*M. sorex* differs from *M. giffardii* in the shape of the soldier head capsule, particularly in profile, and the lack of points on the mandibles. *M. edentatus* is also different in shape. In the imago, the smaller eyes and very even dense head and pronotum pilosity separate *M. sorex* from *M. giffardii*. *M. edentatus* is larger, with a wider pronotum, and shorter but still dense and even pilosity.

The description above differs from that given by Silvestri in several respects, of which the most important is the lack of points on the soldier mandibles. The reason for this is that the syntypes of *M. sorex* include specimens of *M. giffardii*, presumably having been collected from a mound containing both species. This fact was not recognized by Silvestri, who described the general shape of *M. sorex*, clearly distinguishing it from the paratype soldiers of *M. giffardii*. The soldier mandibles he must have illustrated and described from a specimen of *M. giffardii* in which the points were slightly smaller than usual. The true *M. sorex* syntypes are without points, and no other specimen with points has been found. When the syntypes were examined in Portici in 1958, a lectotype was not selected, and this designation must await a further personal visit since the Silvestri collection is not accessible by



FIGS. 479-496 : Imago fontanelle. 497-500 : Soldier head capsule, nose tip, labrum and mandibles. 479, ♂, 480, 481, ♀, *Eutermellus abruptus* ; 482, ♂, 483, ♀, *E. aquilinus* ; 484, ♂, *E. bipartitus* ; 485, ♂, *E. convergens* ; 486, ♂, 487, ♀, *E. undulans* ; 488, ♂, ♀, *Afrosbulitermes congoensis* ; 489, ♀, *Postsubulitermes parviconstrictus* ; 490, ♂, *Verrucositermes tuberosus* ; 491, ♂, ♀, *Mimeuterme edentatus* ; 492, ♂, 493, 494, ♀, *M. giffardii* ; 495, ♀, *M. sorex* ; 496-500, *Tarditermes contricolor*.

post. However, there is no doubt as to the true identity of *M. sorex* and its genuine distinctness from *M. giffardii*.

Material. GUINEA : Mamou, 10° 20' N., 12° 15' W., 1912-13 (*F. Silvestri*), syntype soldiers and workers, *M. sorex* Silvestri, Silvestri Coll., Lab. Zool. Sc. Agr., Portici, and A.M.N.H.

GHANA : 17m. N.E. of Gambaga on Bawku Road, 6.iii.1959, and 12m. N. of Techiman on Wenchi Road, 29.iii.1959 (*W. A. Sands*).

NIGERIA : Western Region ; Ikeja, 10.ii.1955 (*W. V. Harris*) ; Benin Prov., Sobo Plain, Obanokoro, 7.iii.1957 (*W. Wilkinson*) ; between Shagamu and Ijebu-Ode, 14.xii.1957 (*W. A. Sands*). Eastern Region ; Port Harcourt, 18.iv. and 8.xi.1957, and Onitsha, 6.xi.1957 (*W. Wilkinson*).

Material in British Museum (Natural History) unless otherwise stated.

*M. sorex*, like its congeners, has been recorded from the mounds of other genera. It is more widely distributed than *M. giffardii*, having apparently become more tolerant of the marginal conditions of riverain and relict forest patches in the savannah zones, and has crossed the Dahomey-Togoland gap to the Nigerian rain forest. It has not however been recorded from the Congo forest block proper.

### TARDITERMES Emerson

*Tarditermes* Emerson, 1960 : 15. Type-species by original designation, *Tarditermes contricolor* Emerson, 1960.

*Imago*. Left mandible with apical tooth very long, distance from apical to first marginal over 3 times that from first to third marginals (left mandible index 3.17), cutting edge between the latter entire, slightly concave, gap between third marginal and molar prominence about half as wide as this cutting edge, small subsidiary tooth visible in gap in surface view ; right mandible, apical and first marginal as left, second marginal absent, molar plate with no marked irregularity of outline in surface view, and no ridges. Postclypeus, width 2.1 times length, moderately inflated, anterior margin convex, sinuate. Fontanelle a light round spot surrounded by an indefinite pale patch with lateral arms. Eyes very slightly set out from sides of head. Pilosity of head short and even with scattered longer setae. Pronotum almost semi-circular with rounded corners.

*Soldier*. Monomorphic. Nose long, thick, conical, tapering to large fontanelle. Vestigial mandibles without points, labrum with sinuate anterior margin. Head capsule not constricted, rounded rectangular in plan and wider than long to base of nose. Antennae 13 segmented. Head setae confined to nose tip apart from scattered microscopic hair-like setae on head and nose. Abdominal tergites with minute setae, longer towards posterior ; sternites with short setae and longer on posterior margins.

*Worker*. Mandibles as imago, except right molar plate weakly indented near base and with more pronounced anterior and posterior flanges (left mandible index 3.23).

According to Emerson (1960), the imago of *Tarditermes* is larger than all its nasute relatives except the neotropical *Angularitermes*. This is true but the recently discovered imago of *Mimeutermes edentatus* Sands to a large extent bridges the gap. Other features of the latter species appear to indicate a relationship with *Tarditermes*, including the characteristic slow movement of the neuter castes in life. The imago of *Tarditermes* most closely resembles *Mimeutermes* in the widely curved

posterior margin of the head capsule, the prominent eyes, the shape of the postclypeus, the rounded pronotum, and the imago mandibles. The soldier of *Tarditermes* is closely similar to *Mimeuterme*s except for the longer nose. The distinguishing features of the imago are its striking colour pattern, reduced pilosity, and larger size compared with *Mimeuterme*s. *Tarditermes* thus appears to be a more specialized genus, probably derived from an ancestor very close to *Mimeuterme*s.

***Tarditermes contricolor* Emerson**

(Text-figs. 448-450, 459, 460, 496-500 ; Map 31)

*Tarditermes contricolor* Emerson, 1960 : 18. Type locality : CONGO, near Camp Putnam, Epulu River.

Material, CONGO : 4km. N. of Camp Putnam, 1° 24' N., 28° 36' E., 19.v.1948, and Camp Putnam, 17.v.1948 (*A. E. Emerson*), holotype and paratype imagos, paratype soldiers and workers, A.M.N.H. and B.M.(N.H.).

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## INDEX TO SPECIES AND SUBSPECIES

(synonyms in italics, species of non-nasute genera in brackets).

- abassas*, 114  
*abruptus* sp. n., 145  
*aethiops*, 48  
*africanus*, 55  
*agricola*, 114  
*aquilinus* sp. n., 147  
*arabiae*, 82  
*arborum*, 20  
*auriceps*, 132  
*auriterrae*, 100  
  
*bequaerti*, 45  
*bettonianus*, 84  
*bipartitus*, 148  
 (bouvieri), 5  
*brunneus*, 61  
*brutus*, 114  
*bulbiceps*, 132  
  
*camerunensis*, 26  
*carbo*, 97  
*carbonarius*, 127  
*chapini*, 48  
*chrysopleura*, 27  
*coarctatus*, 72  
*coatoni* sp. n., 58  
*congoensis*, 153  
*contracolor*, 167  
*contractus*, 61  
*convergens*, 149  
*crassinus*, 84  
  
*diabolus*, 29  
*diplacodes*, 114  
*dispar*, 87  
*disparioides* ("form" = ssp.), 111  
*doriae*, 52  
*dubius*, 132  
*dulcis*, 48  
  
*ebenerianus*, 92  
*edentatus*, 160  
*ekunduensis*, 45  
*eldirensis*, 87  
*elegantulus*, 30  
*erythrae*, 87  
*expulsus*, 41  
  
*ferranti*, 32  
*fulleri*, 34  
  
*fuscus*, 132  
  
*gemellus*, 87  
*geminatus*, 92  
*giffardii*, 161  
*gratiosus*, 97  
*grootfonteinsis*, 87  
*grossus*, 92  
  
*hainesi*, 139  
*havilandi*, 132  
*hentschelianus*, 132  
*hilli*, 133  
*hirticeps* sp. n., 36  
*holmgreni*, 127  
  
*ibidanicus*, 92  
*impetus*, 45  
*incurvus*, 41  
*indoensis*, 41  
*infuscatus*, 37  
  
*kalaharicus*, 114  
*katangensis*, 87  
*kempae*, 39  
*kohli*, 30  
*konduensis*, 48  
*kulloensis*, 87  
*kurumanensis*, 132  
  
*latifrons*, 41  
*loubetsiensis*, 114  
*lujae*, 45  
*lutzi*, 100  
  
*macrophthalmus*, 30  
*maculiventris*, 20  
*mallyi*, 65  
*maudanicus*, 100  
*meringocephalus*, sp. n., 75  
*messor*, 132  
*minusculus*, 30  
*mobilis*, 105  
*muneris*, 114  
  
*nanus*, 45  
*nigeriensis*, 122  
  
*occidentalis*, 100  
*oconomus*, 105

*parviconstrictus*, 156  
*perfusca* ("var." = ssp.), 20  
*pius*, 41  
*posseleensis*, 127  
*pretoriensis*, 111  
 (profestus), 5  
*putidus*, 48  
  
*rapulum*, 110  
*rhodesiensis*, 114  
*roseni*, 114  
*ruficeps*, 84  
*rufonasalis*, 114  
  
*santschii*, 45  
*saudiensis* sp. n., 120  
*schoutedeni*, 48  
*schubotzianus*, 106  
*segelli*, 84  
*sjöstedti*, 41  
 (somalienensis), 5  
*sorex*, 163  
 (sudanicus), 5

*suffuscus*, 68  
*sulciceps* (ssp.), 100  
*suspensus*, 122  
  
*tchadensis*, 105  
*tenebricus*, 68  
*terrestris*, 122  
*terricola*, 122  
*thermarum*, 114  
*thomsoni* (ssp.), 132  
*togoensis*, 122  
*torquatus*, 29  
*trinerviiformis*, 132  
*trinervius*, 127  
*trinervoides*, 132  
*tuberosus*, 157  
  
*ueleensis*, 41  
*umzinduzii*, 87  
*undulans* sp. n., 150  
*usambarensis*, 37  
  
*zuluensis*, 111







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THE LEPTOCORISINAE  
(HETEROPTERA : ALYDIDAE)  
OF THE WORLD

I. AHMAD

BULLETIN OF  
THE BRITISH MUSEUM (NATURAL HISTORY)  
ENTOMOLOGY SUPPLEMENT 5  
LONDON: 1965



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(HETEROPTERA : ALYDIDAE)  
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BY

I. AHMAD *xref.*

Dept. of Zool. & Entom., Univ. of Connecticut, Storrs, U.S.A.

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# THE LEPTOCORISINAE (HETEROPTERA : ALYDIDAE) OF THE WORLD

By I. AHMAD

## CONTENTS

	<i>Page</i>
SYNOPSIS . . . . .	3
INTRODUCTION . . . . .	3
MATERIALS AND METHODS . . . . .	4
ABBREVIATIONS USED IN TEXT-FIGURES . . . . .	5
FAMILY <i>ALYDIDAE</i> . . . . .	6
KEY TO SUBFAMILIES . . . . .	6
<i>LEPTOCORISINAE</i> . . . . .	7
KEY TO GENERA . . . . .	9
ZOOGEOGRAPHY AND PHYLOGENY . . . . .	146
ACKNOWLEDGMENTS . . . . .	150
REFERENCES . . . . .	151
INDEX . . . . .	155

## SYNOPSIS

Prior to this revision, the subfamily Leptocorisinae Stål contained eight genera and thirty eight species, including major rice pests of the Far East. There was confusion over the identities of many species and since Stål (1873) no world-wide revisional work had been undertaken and in his work only fourteen species (including some synonyms) were covered.

During the present study, three new tribes, one new genus, two new subgenera, nineteen new species have been described and one species, because of its homonymy, has been renamed. *Stenocoris* Burmeister (1839) (subgenus sensu Stål, 1873) has been given generic rank and has been separated from *Leptocorisa* Latreille, 1829. *Rhabdocoris* Kolenati, 1845 (subgenus of *Leptocorisa* Latreille sensu Stål, 1873) has been synonymized with *Leptocorisa*. The undescribed mis-identified type-species of the subgenus *Erbula* has been renamed and described. Nine previously described species have been considered synonyms, whilst four species regarded as synonyms by earlier workers have been reinstated.

## INTRODUCTION

LEPTOCORISINAE Stål is a subfamily of the coreoid family Alydidae and contained, prior to the present revision, eight genera and thirty eight species, including a number of important rice pests of the Indochina, Malaya and Australian Sub-regions.

In the whole subfamily, there has been confusion and uncertainty over the identification of species. For example, China (1930), in "Insects of Samoa and other Samoan terrestrial Arthropoda", expressed his doubts on the specific identity of *Noliphus discopterus* Stål and stated that perhaps it was a local race of *N. insularis*

Stål. Villiers (1955), formulating keys for the species of French African *Stenocoris* Burmeister, then regarded as a subgenus of *Leptocoris* Latreille, suggested the synonymy of *S. (Erbula) distinguenda* (Blöte, 1937) with *S. (E.) elegans* (Blöte, 1937).

During the present work the forms of male and female genitalia (Ahmad & Southwood, 1964) have been found to be of great taxonomic value, clearly separating the species. The structure of female genitalia, and in particular the shape of spermatheca, have suggested that Oriental and Australian species of *Leptocoris* Latreille, 1829, (previously considered under the subgenus *Rhabdocoris* Kolenati, 1845) should be separated from Ethiopian, Nearctic and Neotropical species (previously considered under the subgenera *Stenocoris* Burmeister, 1839, *Erbula* Stål, 1873 and *Leptocoris* s. str. Stål, 1873). Other characters found to be of value are as follows:

- (a) The form of head, its colouration and its sutures.
- (b) Length and colour of antennal segments.
- (c) Size of rostrum and length of the components.
- (d) The comparison of the interocellar distance with the distance between an ocellus and an eye (in both cases including the diameter).
- (e) Length, breadth and the colour of pronotum.
- (f) The posterior margin of seventh abdominal tergum in ♂ and the seventh abdominal sternum in ♀.
- (g) In ♂, the shape of the pygophore, claspers, thecal appendages and the form of vesica when fully everted.
- (h) In ♀ the first gonocoxae, first gonopophyses, second gonopophyses and spermathecal shape.

Three of Bergroth's genera, *Dicrorymbus*, *Xenoceraea* (described within *Leptocorixaria* near *Mutusca* Stål, 1866 in 1918) and *Procamptus*, also described under *Leptocorixaria* in 1925, have been excluded from the subfamily Leptocorisinae and have been transferred to the tribes Dasytini Brown, 1955 and Procamptini trib. n. of the subfamily Coreinae (sensu Stål, 1873) (Ahmad, 1964).

#### MATERIAL AND METHODS

A large quantity of material (about 10,000 specimens) of the group was borrowed from major museums and personal collections from all over the world. (A complete list of these museums and of those who lent their personal collections is given under Acknowledgments.) Freshly prepared material (in 70% alcohol) was also obtained by the courtesy of Dr. J. W. Evans (Australian Museum, Sydney) and Dr. G. Rothschild (Sarawak Agricultural Institute).

Every effort was made to examine and dissect the genitalia of the holotypes of all species (including those believed to be synonyms). In the great majority of cases it has been possible to do this or obtain authoritative information about the loss or damage of the original holotype, so necessitating the designations of neotypes. Lectotypes have also been designated from syntypes in a few cases. A full account of the circumstances and action taken is given for each species.

♂ and ♀ genitalia were dissected after softening the terminalia in 10% potassium

hydroxide solution. It was found easiest to inflate the aedeagus in water just after it was softened. The form of the genitalia was considered to be a reliable character for distinguishing species, as little intergradation was found between its form in two allied species and within a species as many as twenty five examples from widely separated localities were dissected and found to have similar genitalia. Large structures were stained in 1% acid fuchsin in acetic acid and were examined in methyl benzoate, cedarwood oil or creosote. All the drawings were made by using a squared eyepiece under a binocular microscope, from the type specimen when available. Genital structures were preserved in glycerine in small tubes and were pinned with the insects.

All measurements were taken by using micromillimetre eyepiece graticules. When available, five specimens of each sex were measured and extreme ranges have been given. The length of the head was measured from the apex of the clypeus up to the anterior margin of the collar of the pronotum and the width was taken across the compound eyes including their diameter. Where very large numbers of specimens (e.g. *L. acuta*) were available it could be seen that the measurements of even the exceptional specimens did not lie far outside the ranges obtained by the above method. There is little variation within a species in the size of the parts measured.

The distributions given for each species are based largely on the material seen by the present author, since there has been so much confusion over the identification of the species in the past. In general, published records have been ignored except those given by the authors who originally described the species.

## ABBREVIATIONS USED IN TEXT-FIGURES

Ap	apodeme of the basal plate (pivot)	Ls	lateral stapes
At	attaching apodeme of pivot	Or	outer ramus
Atz	attachment of second gonocoxa	P	claspers (parameres)
Bp	basal plate	PaGp1	point of attachment of first gonapophysis
C	conjunctiva	PaR1	point of attachment of the first ramus
Ca	conjunctival membrane	Ph	phallosome (theca)
Cl	clypeus	Pr	process of 9th segment
Cm	connecting apodeme of the aedeagal strut	Ps	pronotal spine
Da	dorsal thecal appendage	Pt	paratergite
Dca	dorsal conjunctival appendage	R	ramus
Dla	dorso-lateral conjunctival appendage	Ra	right lateral conjunctival appendage
Ex	exosoma (theca)	Rb	rib of 9th segment
F	fold of the 9th segment	S	stapes
Fa	front conjunctival appendage	Sa	supporting appendage
Fs	femoral spine	Sl	spine-like appendage
G	genae	Sl2	second spine-like appendage
Gg	gonangulum	St	sternum
Gp	gonapophysis	Ta	terminal appendage
Gp2	second gonapophysis	Ts	"T" structure
Gx	gonocoxa	Tw	tubular way to genital chamber
Ivs	intervalvular sacs	V	vesica
Ju	paraclypeae (jugum)	Va	ventral thecal appendage
La	left lateral conjunctival appendage		

## ALYDIDAE Amyot et Serville

*Alydides* Amyot et Serville, 1843 : 221

*Alydidae* Dallas, 1852 : 467 ; Douglas and Scott, 1865 : 18

*Alydida* Stål, 1868 : 542

*Alydina* Stål, 1873 : 34, 84

*Alydinae* Distant, 1880 : 156

*Alydidae* Reuter, 1912 : 49

*Coriscidae* Stichel, 1925 : 45 ; Blatchley, 1926 : 256

*Alydidae* Southwood, 1952a : 80 ; Leston and Scudder, 1956 : 231 ; Leston, 1958 : 911 ;

Southwood and Leston, 1959 : 65 ; Scudder, 1959 : 418

*Alydinae* China and Miller, 1959 : 7, 40

*Alydidae* Wagner, 1961 : 141

Macropterous or at least brachypterous species, body length usually more than 10 mm. ; head proportionally much larger ; the part between the eyes wider than base of scutellum ; eyes usually very prominent ; ocelli usually large, usually narrowly separated ; apical segment of antennae as long as or usually longer than third ; bucculae short, not extending posteriorly beyond the insertion of antennae, sometimes entirely anterior to antenniferous tubercles ; metapleural scent gland ostioles usually distinct ; spiracles ventral in normal position, away from lateral margins ; fourth and fifth dorsal abdominal segments with basal margins lobately sinuate into preceding segments ; legs long, posterior femora usually thickened, in ♂ sometimes with spines ; first joint of tarsi usually more than twice as long as second and third together ; usually narrow, elongate or cylindrical, dark coloured species.

♂ genitalia usually very complicated and variable ; in ♀, second gonocoxae fused with each other and with second gonopophyses ; complicated sclerotized expansions present, supporting the genital chamber (Scudder, 1959). In eggs, pseudo-operculum absent (Southwood, 1956) ; usually four-lobed principal salivary glands present and accessory ducts with swelling midway along its length (Bugnion, 1910 and Southwood, 1952a) ; in larvae, tergum five usually medially with anterior and posterior margins deflected posteriorly and head pointed anteriorly, longer than broad (Leston and Scudder, 1956) ; chromosome number,  $2x = 13$  (x0) (Leston, 1958).

Alydidae can easily be separated from other related families by the presence of very short bucculae, not extending posteriorly beyond the insertion of antennae.

### KEY TO SUBFAMILIES

- 1 Pronotum at widest point only slightly wider and longer than head. (Aedeagus usually without ventral pair of thecal appendages) . . . . . 2
- Pronotum at widest point usually at least half as wide again as and distinctly longer than head. (Aedeagus always with a ventral pair of thecal appendages and usually very complex with a number of lateral, frontal and dorsal conjunctival appendages. In ♀, second gonopophyses usually rounded at apices ; spermatheca usually flask-shaped, sometimes with a median flange) . . . . . **LEPTOCORISINAE**
- 2 Second rostral segment usually distinctly longer than posterior two together ; fourth rostral segment about twice as long as third ; hind femora never with spines. (In ♂, pygophore with a median posterior spine and aedeagus with a dorsal pair of thecal appendages. In ♀, posterior margin of seventh abdominal sternum usually with a median split ; both pairs of rami fully developed ; spermatheca with a long coiled tube) . . . . . **MICRELYTRINAE**
- Second rostral segment usually distinctly shorter than posterior two together ; fourth never twice as long as third ; hind femora swollen, always with a series of ventroposterior spines. (In ♂, pygophore without a median posterior spine and aedeagus without thecal appendages. In ♀, posterior margin of seventh abdominal sternum emarginate without a median split, both pairs of rami very short and thin ; spermatheca with a short connecting tube) . . . . . **ALYDINAE**

**LEPTOCORISINAE Stål**

- Gerrida* Stål, 1868 : 543
- Gerrina* Stål, 1870 : 217
- Leptocorisaria* Stål, 1872 : 54, 1873 : 85 ; Uhler, 1886 : 13
- Leptocorisidae* Lethierry and Severin, 1894 : 102
- Myodochinae* Kirkaldy, 1902 : 306
- Leptocorisaria* Stål ; Distant, 1902 : 409 ; Oshanin, 1906 : 24
- Leptocorixaria* Bergroth, 1913 : 159
- Leptocorisini* Blatchley, 1926 : 257, 259
- Leptocorisinae* Tillyard, 1926 : 148

Head elongated ; epicranial suture (ecdysal cleavage line) usually present ; occipital suture usually complete ; ocelli minute to large, usually centrally placed behind the compound eyes. First rostral segment extending well beyond the compound eyes ; second rostral segment usually distinctly shorter than posterior two together, fourth usually almost equal to third. Pronotum at widest point usually at least half as wide again as and distinctly longer than head. Posterior angle of metasternum acutely produced. Posterior margin of second dorsal segment of abdomen truncate. Hamus (hook vein) of hind wing and vena decurrens not at all or little distant from base. Legs slender ; hind femora always without spines.

♂ genitalia, especially the aedeagus, highly specialized with a long coiled vesica and usually with a number of lateral, frontal and dorsal conjunctival appendages ; dorsal and ventral pairs of thecal appendages usually present (Text-fig. 1).

♀ genitalia highly specialized ; apices of second gonopophyses rounded ; gonangulum distinctly marked, with the first inner ramus attached ventrolaterally connecting first gonopophysis with it, outer ramus of gonopophysis usually marked ; second gonocoxae elongated, always with a long, curved and very distinct second ramus connecting second gonopophysis with it ; spermatheca usually balloon-shaped, with a coiled tube, sometimes with a median flange.

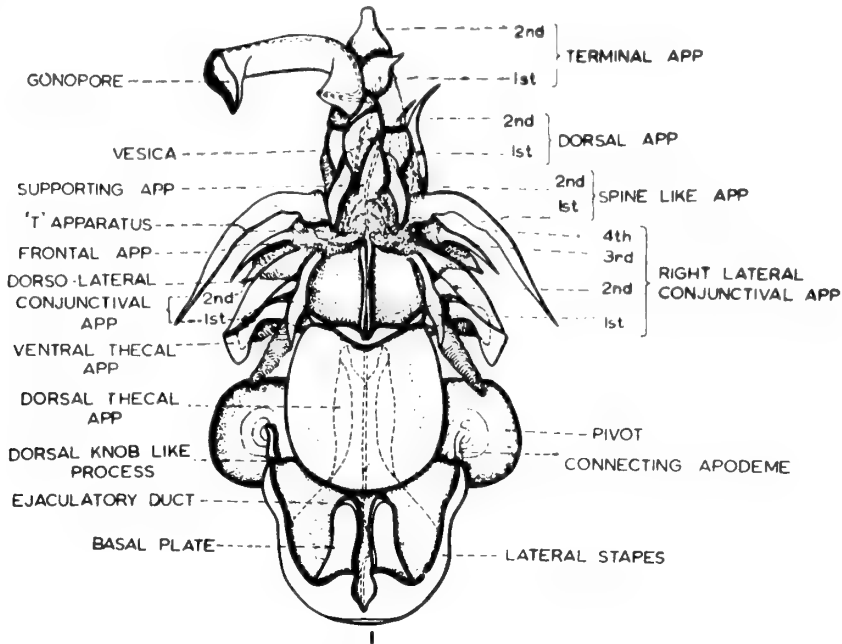
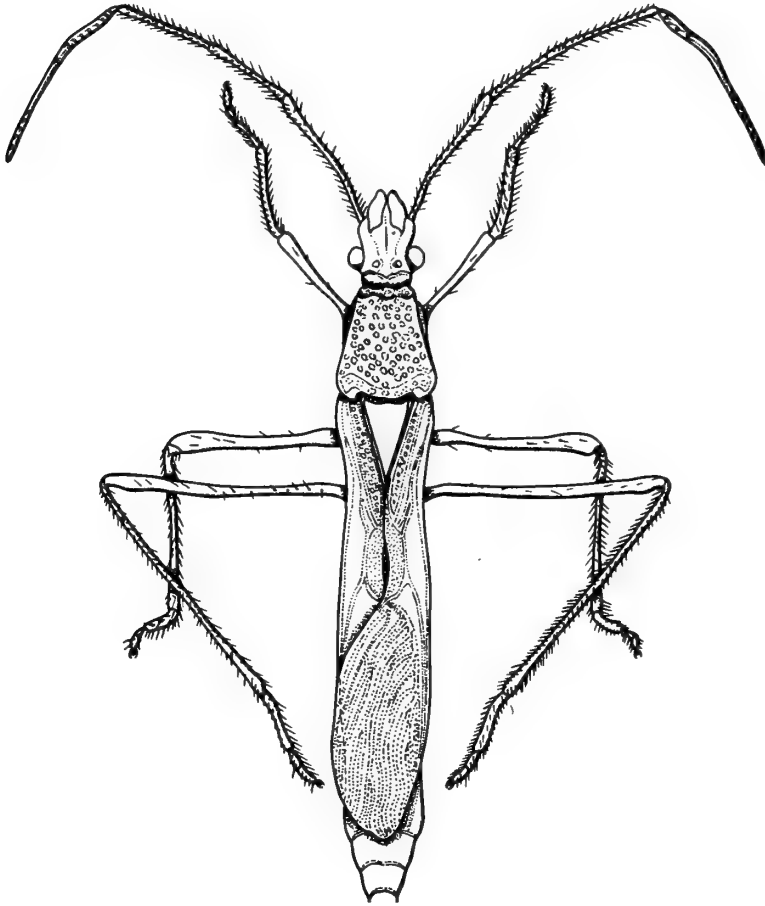


FIG. 1. Hypothetical ♂ aedeagus, fully everted.

This subfamily can be distinguished from *Micrellytrinae* by the length of second and fourth rostral segments. In the latter, the second rostral segment is usually distinctly longer than posterior two together and the fourth is always at least twice as long as the third. In *Alydinae* the hind femur is always armed whereas in this subfamily it is always without spines. Other distinctive characters are given under "Key to the subfamilies".



0.5 mm.

2

FIG. 2. *Stenocoris (Oryzocoris) filiformis*, ♀, dorsal view.

## KEY TO GENERA

- 1 Paraclypeae produced and meeting in front of clypeus (Text-fig. 3), dorsal surface of pronotum more or less flat (Leptocorisini trib. n.) . . . . . 2
- Paraclypeae shorter than clypeus and never enclosing its apex (Text-fig. 5) ; dorsal surface of pronotum usually convex and sloping down towards head (Text-figs. 4, 6 and 7) (Noliphini trib. n.) . . . . . 5
- 2 First antennal segment swollen throughout (Text-fig. 3), slender only at base ; in lateral view wider beyond middle. (In ♂, posterior margin of seventh abdominal tergum roundly produced in middle ; in ♀, posterior margin of seventh abdominal sternum with a median fold splitting it into two lobes) . . . . . *MUTUSCA* (p. 110)
- First antennal segment only swollen at apices ; in lateral view not wider beyond middle . . . . . 3
- 3 Genae inflexed, greatly produced in front of clypeus (Text-fig. 8). (In ♂, posterior margin of seventh abdominal tergum medially produced with a truncated apex, lobes of ninth segment greatly developed, usually produced like horn ; in ♀, posterior margin of seventh abdominal sternum usually conically produced in middle, sometimes with a short median split . . . . . *BLOETECORIS* (p. 115)
- Genae normal . . . . . 4
- 4 Claspers made up of two components, always crossed behind ; in ♀, posterior margin of seventh abdominal sternum never distinctly medially produced, never with a median fold, bilobed or with a median split ; spermatheca always with a median flange ; genus only represented in Oriento-Australian regions. . . . . *LEPTOCORISA* (p. 69)
- Claspers never made up of two components, never crossed behind ; in ♀, posterior margin of seventh abdominal sternum either medially produced, with a median fold, bilobed or with a median split ; genus represented in Ethiopian, Nearctic and Neotropical regions . . . . . *STENOCORIS* (p. 9)
- 5 Lateral angles of pronotum posteriorly armed with spines (Text-fig. 6). In ♂, pygophore normally more than half retracted within seventh ; in ♀, posterior margin of seventh abdominal sternum with a median fold . . . . . *NOLIPHUS* (p. 131)
- Lateral angles of pronotum posteriorly without spines . . . . . 6
- 6 Anterior femora on under surface below apex with a distinct spine (Text-fig. 9) ; ocelli very closely placed, almost touching each other ; disc of pronotum always black (Text-fig. 4) ; found in Oriento-Australian regions . . . . . *COSMOLEPTUS* (p. 126)
- Anterior femora without a spine, ocelli not at all touching each other ; disc of pronotum of pale colour (Text-fig. 7) ; found in Neotropical region . . . . . *LYRNESSUS* (p. 123)

**LEPTOCORISINI trib. n.**

Body linear. Head always longer than broad ; paraclypeae very well developed, always distinctly longer than and enclosing clypeus ; head behind the eyes not markedly narrower. Pronotum never broader than long, almost rectangular and flat. Aedeagus usually complicated. Spermatheca usually flask-shaped, never conical, sometimes with a median flange.

This tribe is distinguished from Noliphini by the characters of the anterior region of the head and pronotum.

***STENOCORIS* Burmeister.**

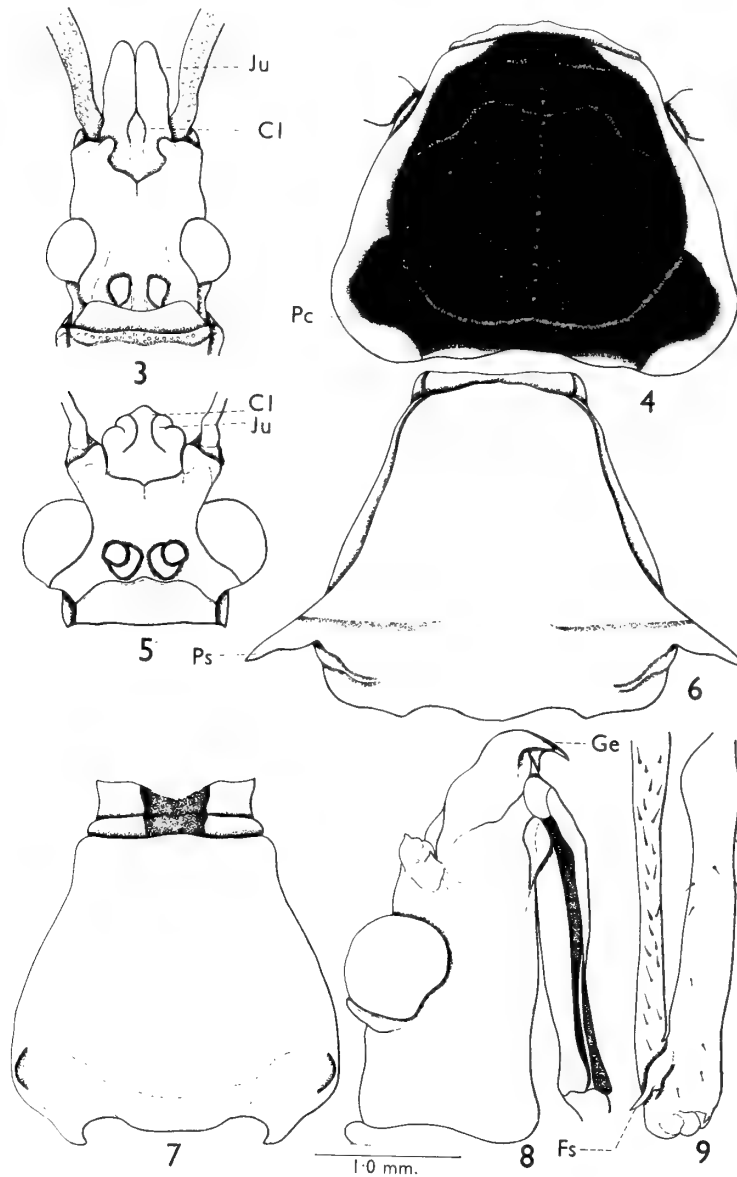
*Myodocha* Latreille, 1810 ; Burmeister, 1835 : 325

*Stenocoris* Burmeister, 1839 : 1010 ; Stål, 1873 : 87 [subgenus] ; Blöte, 1937 : 289 [subgenus] ; Villiers, 1955 : 1142 [subgenus] ; Villiers, 1963 : 232 [subgenus]

Type-species : *Cimex tipuloides* Degeer.

Body linear or comparatively robust. Head elongated. Antennae with apices of basal segments slightly swollen. Rostrum usually short, reaching second coxae.

In ♂, posterior margin of seventh abdominal tergum usually truncate; pygophore usually



FIGS. 3-9. 3, *Mutusca proluxa*, head, dorsal view; 4, *Cosmoleptus limbaticollis*, pronotum, dorsal view; 5, *Noliplus erythrocephalus*, head, dorsal view; 6, *Noliplus erythrocephalus*, pronotum, dorsal view; 7, *Lyrnessus geniculatus*, pronotum, dorsal view; 8, *Bloeteocoris inflexigena*, head, lateral view; 9, *Cosmoleptus limbaticollis*, portion of femur and tibia, inner view showing ventro-lateral fore femoral spine.



elongated ; claspers variable in form and position ; aedeagus usually with a ventral pair of thecal appendages ; frontal conjunctival appendages usually present, sclerotised ; membranous appendage short, usually without a terminal appendage but usually with a pair of dorsal appendages.

In ♀, posterior margin of seventh abdominal sternum either bilobed, medially produced, with a short median split or concave with a median fold ; first gonocoxae usually large, and triangular ; intervalvular sacs usually absent ; spermatheca usually flask-shaped, without a median flange and usually with a long coiled tube.

This genus shows some affinities with all the other genera in the tribe Leptocorisini and indeed to *Lyrnessus* and *Cosmoleptus sumatranus* in Noliphini. It could possibly be polyphyletic or have retained many of the characters of the more generalized ancestral form.

As *Myodocha* Burmeister nec Latreille was an erroneous identification as well as an emendation of *Myodocha* Latreille, it is not necessary that the replacement name *Stenocoris* Burmeister, 1839 should take the same type as that of *Myodocha* Latreille. The latter is *M. serripes* Olivier, 1811 (a Lygaeid) and has been so designated under the Plenary Powers by the International Commission on Zoological Nomenclature (1961, *Bull. zool. Nomencl.*, **18** : 287). *Stenocoris* is not a new name but is in fact a new generic name for the taxon wrongly identified by Burmeister (1835). The type-species of *Stenocoris* is one of the two species cited by Burmeister in 1835, i.e., *varicornis* Fabricius, 1803 and *tipuloides* Degeer, 1773. It has been fixed by Burmeister (1839) as *Cimex tipuloides* Degeer, 1773.

*Stenocoris* was reduced to subgeneric rank within *Leptocorisia* Latreille, 1829 by Stål. In fact Stål misidentified *Leptocorisia* Laporte nec Latreille for *Leptocorisia* Latreille. The most senior subgenus *Stenocoris* is therefore hereby proposed as the generic name for the taxon. An application with Dr. W. E. China has been made to the International Commission on Zoological Nomenclature for its recognition (1963).

KEY TO SUBGENERA

- 1 Claspers never crossed, when at rest parallel to one another (Text-fig. 19) ; posterior margin of ♀ seventh abdominal sternum always medially produced (Text-fig. 22), sometimes notched in the middle, never bilobed, concave or with a median split. **ERBULA** (p. 14)
- Claspers crossed (Text-fig. 75) ; posterior margin of ♀ seventh abdominal sternum either bilobed (Text-fig. 82), concave (Text-fig. 15) or with a short median split (Text-fig. 181) 2
- 2 Claspers curved like an "S", apex thick and truncated (Text-fig. 11) ; apical segment of antennae with at least basal half pale ; posterior margin of ♀ seventh abdominal sternum concave with a median fold **PSEUDOLEPTOCORISA** (p. 12)
- Claspers never curved like an "S", apex always acutely pointed (Text-fig. 76) ; apical segments of antennae with small pale area at base, never extending to half the length of the segment ; posterior margin of ♀ seventh abdominal sternum never concave with a median fold 3
- 3 Posterior angles of pygophore acutely pointed ; claspers crossed over pygophore (Text-fig. 178) ; posterior margin of ♀ seventh abdominal sternum always with a short median split **ORYZOCORIS** (p. 60)
- Posterior angles of pygophore not acutely pointed ; claspers crossed in a socket (Text-fig. 75) ; posterior margin of ♀ seventh abdominal sternum always medially bilobed, never with a split **STENOCORIS** (p. 30)

***STENOCORIS (PSEUDOLEPTOCORISA) subgen. n.***

Type-species : *Leptocorixa (Rhabdocoris) erratica* Blöte.

Body comparatively robust. Head only a third longer than broad ; paraclypeae long, about two-fifths the length of head, with pointed apices ; ocelli very close together, inter-ocellar distance only slightly less than half the distance between an ocellus and an eye. Antennae with at least basal halves of apical segments pale. Rostrum short, reaching second coxae. Lateral black line strongly represented, extending from base of antenniferous tubercles to posterior of propleuron. Pronotum distinctly sloping down towards head, with latero-posterior tips light brownish black. Abdomen dorsally pale blackish ; abdomen ventrally dull ochraceous. In ♂, posterior margin of seventh abdominal tergum produced, with a slight median notch ; pygophore round ; claspers extending behind pygophore, asymmetrically crossed, " S "-shaped with broad truncated apices ; aedeagus with dorsal and ventral pairs of thecal appendages ; frontal conjunctival appendage absent ; membranous appendage present but supporting and dorsal appendages wanting ; vesica with very small gonophore.

In ♀, posterior margin of seventh abdominal sternum concave with median fold ; first gonocoxae very large with lobe-like apices ; two pairs of intervalvular sacs ; spermatheca flask-shaped, medially thick with long curved neck, and very short tube.

This subgenus is isolated in *Stenocoris* but exhibits the characters of the genus in body shape, in lacking supporting appendages, in the form of membranous appendage of the aedeagus and in having curved " S "-shaped claspers composed of one component and a plain flask-shaped spermatheca without a median flange. However it is close to *Leptocorisa* in having a rounded pygophore, dorsal and ventral pairs of thecal appendages of the aedeagus and in the concave posterior margin of the female seventh abdominal sternum. It differs from both *Leptocorisa* and *Stenocoris* by the absence of frontal conjunctival appendages and in having only two pairs of intervalvular sacs. Pale basal halves of apical segments of antennae, lateral black line extending up to the posterior of propleuron, claspers with thick and truncated apices and the median fold on the posterior margin of the seventh abdominal sternum in the female are unique characters of this subgenus. This subgenus also shows some relations with *Lyrnessus geniculatus* (Guérin) and *Cosmoleptus sumatranus* Blöte of the tribe Noliophini in the characters of the hemielytra and apical antennal segment.

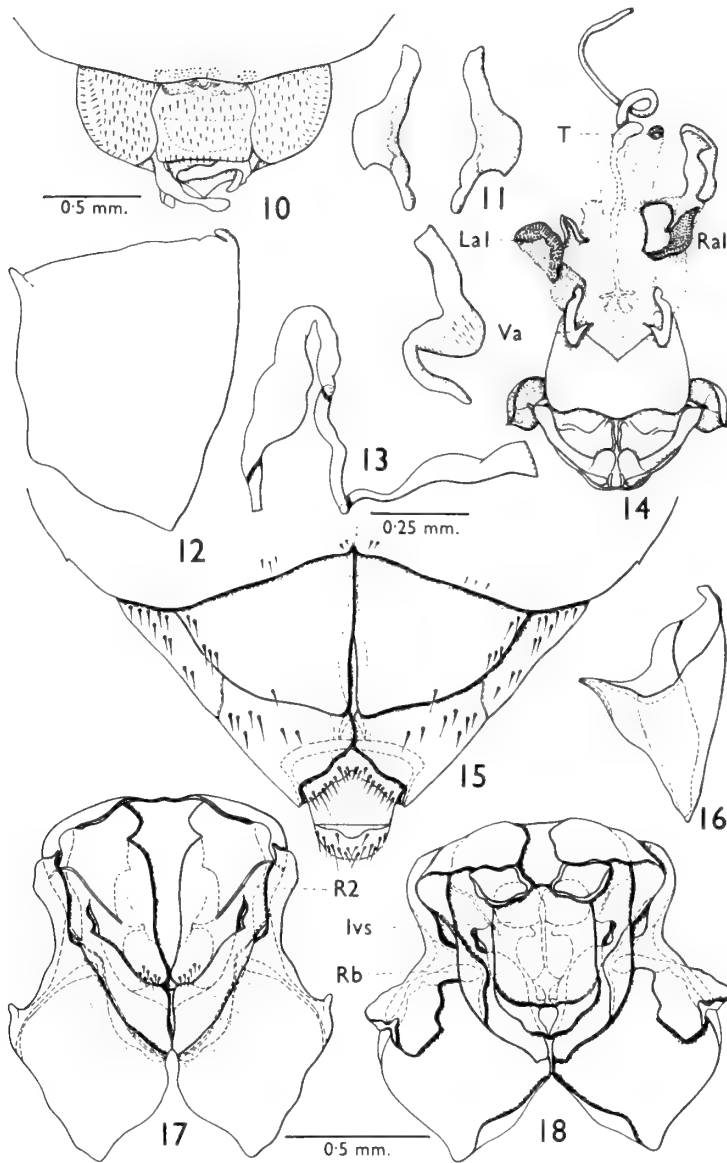
***Stenocoris (Pseudoleptocorisa) erratica* (Blöte) comb. n.**

(Text-figs. 10-18)

*Leptocorixa (Rhabdocoris) erratica* Blöte, 1937 : 286 ; Villiers, 1955 : 1143, 1963 : 234

Characterized by the pale basal half of the apical segment of antennae, by the round pygophore and by ♂ and ♀ genitalia.

♂. Body length, 13.0-14.0 mm., width, 2.0-2.2 mm. Head length, 1.7-1.8 mm., width, 1.3-1.4 mm., (only paraclypeae, 0.7 mm.) Antennae, segment I, 3.7-4.7 mm., II, 2.1-2.6 mm., III, 2.7-3.2 mm., IV, 4.2-4.9 mm. Rostrum, segment I, 1.2-1.3 mm., II, 1.3-1.4 mm., III, 0.7-0.8 mm., IV, 0.6-0.77 mm. Pronotum, length, 2.2-2.5 mm., width 2.0-2.2 mm. Hind femora, 5.6-6.4 mm. ; hind tibia, 6.1-7.2 mm. Distance between ocelli, 0.4-0.5 mm., distance between an ocellus and an eye, 0.66-0.7 mm.



FIGS. 10-18. *Stenocoris (Pseudoleptocoris) erratica*. 10, ♂ terminalia, dorsal view; 11, ♂ claspers, outer and inner views; 12, ♀, first gonocoxae, ventral view; 13, spermatheca; 14, ♂ aedeagus (inflated), ventral view; 15, ♀ terminalia, ventral view; 16, ♀, first gonopophysis, ventral view; 17, ovipositor, ventral view; 18, same, dorsal view.

Body comparatively robust, pale tinged black. Head only a third longer than broad with a pair of brownish black spots behind ocelli; occipital suture medially concave; paraclypeae thicker in middle and pointed at apices. Antennae dark brownish black with underside of first, articulations between first and second, second and third and about basal half of fourth pale. Rostrum short, hardly reaching second coxae. Lateral black line extending from antenniferous tubercles on to posterior of propleuron. Pronotal disc pale, posteriorly tinged black with two smooth black spots anteriorly on either side, black spots on latero-posterior tips absent. Legs pale with apices of femora, tibiae and tarsi tinged black. Hemelytra tinged brownish black with prominently pale veins. Posterior margin of seventh abdominal tergum slightly produced in middle; pygophore round, posterior margin medially acutely produced (Text-fig. 10).

♂ GENITALIA: Claspers extending behind pygophore, strongly curved in middle, more or less "S"-shaped, blunt at apices; both dorsal and ventral pairs of thecal appendages present, ventral, sac-like, 2 pairs of asymmetrical spiculed lateral appendages; membranous appendage short with a small round terminal appendage; frontal, dorsal and supporting conjunctival appendages wanting; vesica with a minute gonopore (Text-fig. 14).

♀ very similar to ♂ in colour, general appearance and measurement. Posterior margin of seventh abdominal sternum concave in middle with a small median fold (Text-fig. 15).

♀ GENITALIA: First gonocoxae almost conical when viewed externally, lobe-like at apices; two pairs of intervalvular sacs, anterior round and posterior pair oval, spermatheca flask-shaped, thicker in middle with a very short tube (Text-fig. 13).

Type material. Holotype ♀, UGANDA: Southern Toro, Mbarara, Fort Portal Road, 3,888-4,200 ft., 22-24.x. (*S. A. Neave*), B.M.(N.H.); allotype ♀ and paratypes, 4♂, 5♀, data as holotype, B.M.(N.H.); Tero Forest, 2♂, 2♀, vii.1912 (*C. C. Gowdey*), B.M.(N.H.).

Other material. UGANDA: 10♂, 13♀; CONGO: 26♀, 19♀; CAMEROONS: 16♂, 16♀.

This species seems to be very common in Congo and its range extends into Uganda in the east and Cameroons in the west. The adults have been collected in every month of the year except January, August and September.

This species is isolated in the genus *Stenocoris* with the characters of blunt "S"-shaped claspers, rounded pygophore, concave posterior margin of ♀ seventh abdominal sternum and pale basal half of apical antennal segment.

Blöte described this species under the subgenus *Rhabdocoris* Kolenati of *Leptocorixa* Berthold. During the present study *Rhabdocoris* is synonymized with *Leptocorixa* and the latter has been separated from other subgenera with Oriento-Australian species, previously considered under the subgenus *Rhabdocoris*. This species, being different from *Leptocorixa* in generic characters, is placed under the monotypic subgenus *Pseudoleptocorixa* as described here.

### ***STENOCORIS (ERBULA)* Stål.**

*Erbula* Stål, 1873: 86; Blöte, 1937: 282; Villiers, 1955: 1141, 1963: 229

Type-species: *Stenocoris (Erbula) southwoodi* sp. n.

Body comparatively short. Head usually only slightly longer than broad; paraclypeae short and rounded at apices; ocelli close together but distance between an ocellus and an eye about half again as long as interocellar distance. Antennae with apical segment pale only at

base ; second usually distinctly shorter than third. Rostrum short, never extending beyond second coxae. Lateral black line usually present but never extending beyond middle of propleuron. Pronotum slightly sloping down towards head with latero-posterior tips usually black. Abdomen usually pale dorsally, ventrally usually dull ochraceous.

In ♂, posterior margin of seventh abdominal tergum truncated ; pygophore usually rounded ; claspers short, curved medially with apices acutely pointed, never crossed ; aedeagus with dorsal and ventral pairs of thecal appendages ; dorsal pair united ; single frontal conjunctival appendage bifurcated at apices ; membranous appendage comparatively long with single dorsal appendage, terminal appendage wanting.

In ♀, posterior margin of seventh abdominal sternum medially produced, usually with a median notch ; first gonocoxae elongated ; intervalvular sacs absent ; spermatheca elongated with short tube coiling round neck.

Males of *Erbula* can be distinguished from those of other subgenera by examining the claspers which are never crossed and the females in having the posterior margin of the seventh abdominal sternum with a median process which is sometimes notched in the middle, but never indented, concave, or with a short median split and in having the spermatheca with a short tube coiled round its neck.

Mis-identification of *Stenocoris (Erbula) southwoodi* sp. n. for *Stenocoris apicalis* (Westwood, 1842), the type of the subgenus and the request for its recognition are the subjects of an application to the International Commission on Zoological Nomenclature (Ahmad, in press).

## KEY TO SPECIES

- |   |   |                             |
|---|---|-----------------------------|
| 1 | Lateral black line very faintly represented, usually in the form of a black dot on the lateral side of collar ; pygophore elongated ; in ♀, posterior margin of seventh abdominal sternum with a central median round projection, which has a distinct median notch . . . . . | <i>similis</i> (p. 23)      |
| - | Lateral black line usually strongly represented, extending at least on to collar ; pygophore usually rounded ; in ♀, posterior margin of seventh abdominal sternum either triangular, rounded or parallel-sided, if rounded never with a distinct notch . . . . .             | 2                           |
| 2 | Claspers short, nearly reaching apex of pygophore ; in ♀, median projection of seventh abdominal sternum round, faintly striated (Text-fig. 59) . . . . .   | <i>southwoodi</i> (p. 24)   |
| - | Claspers long, always reaching apex of pygophore ; in ♀, median projection of seventh abdominal sternum parallel-sided or triangular . . . . .  | 3                           |
| 3 | Apex of pygophore pointed ; lateral black line never extending forward on to genae ; rostrum usually short, reaching second coxae . . . . .   | 4                           |
| - | Apex of pygophore medially notched ; lateral black line usually extending forward on to genae ; rostrum usually extending at least slightly beyond second coxae . . . . .   | 5                           |
| 4 | Claspers broad in middle and knob-like at apices (Text-fig. 19) ; in ♀, median projection of seventh abdominal sternum parallel-sided, with a distinct median notch (Text-fig. 22) . . . . .  | <i>annulicornis</i> (p. 16) |
| - | Claspers narrow in middle and acutely pointed at apices (Text-figs. 29 and 30) ; in ♀, median projection of seventh abdominal sternum triangular (Text-fig. 31) . . . . .   | <i>distinguenda</i> (p. 18) |
| 5 | Claspers strongly outwardly curved (Text-figs. 37 and 38) ; in ♀, median projection of seventh abdominal sternum triangularly produced, with round apex (Text-fig. 41) . . . . .  | <i>elegans</i> (p. 20)      |
| - | Claspers only curved in middle (Text-figs. 65 and 66) ; in ♀, median projection of seventh abdominal sternum rectangular (Text-fig. 70) . . . . .   | <i>stali</i> (p. 28)        |

***Stenocoris (Erbula) annulicornis* (Signoret) comb. n.**

(Text-figs. 19-27)

*Leptocoris annulicornis* Signoret, 1860 : 941*Leptocorixa (Stenocoris) annulicornis* (Signoret) Blöte, 1937 : 289*Leptocorixa (Erbula) annulicornis* (Signoret); Villiers, 1963 : 230

Characterized by the claspers which are broad towards the base and knob-like at apices, by the parallel-sided median projection of the ♀ seventh abdominal sternum, with a distinct notch and by the form of ♂ and ♀ genitalia.

♂. Body length, 12.0-12.5 mm., width, 1.6-1.8 mm. Head length, 1.5-1.6 mm., width, 1.2-1.3 mm. Antennae, segment I, 3.0-3.3 mm., II, 1.7-2.0 mm., III, 2.0-2.3 mm., IV, 3.8-4.0 mm. Rostrum, segment I, 1.1-1.2 mm., II, 1.2-1.3 mm., III, 0.65-0.7 mm., IV, 0.6-0.7 mm. Pronotum, length, 1.9-2.0 mm., width, 1.6-1.8 mm. Hind femora, 4.8-5.0 mm. Hind tibia, 5.1-5.3 mm. Distance between ocelli, 0.4 mm., distance between an ocellus and an eye, 0.6 mm.

Body comparatively short, slim, tinged with brown. Head pale with area between the eyes and behind occipital suture brownish black; occipital suture medially concave with sides convex; paraclypeae short, thicker in middle and thinner at apices. Antennae brownish black, with underside of basal segment, median portion of second, articulation between first and second and that between second and third and basal portion of apical segment pale. Rostrum short, usually reaching base of second coxae. Lateral black line well represented on sides of antenniferous tubercles and extending to anterior of propleuron. Pronotal disc with brownish black punctures and black spots on posterior angles. Legs sometimes tinged with green. Hemelytra tinged with black. Abdomen with dorsum pale, tinged with brown, venter pale ochraceous, sometimes reddish anteriorly. Posterior margin of seventh abdominal tergum regularly curved, pygophore rounded with apex pointed.

♂ GENITALIA : Claspers broad towards base, external surface curved only in middle (Text-figs. 19 and 20); ventral thecal appendage as in Text-fig. 21; four left lateral conjunctival appendages as in Text-fig. 21; frontal appendage bifurcated in middle, sometimes left branch longer; four right lateral conjunctival appendages as in Text-fig. 21 with spine-like appendage, thicker at base and apex; dorsal appendage thick and curved at base as in Text-fig. 21.

♀. Body length, 13.0-14.0 mm., width, 2.0-2.2 mm. Head length, 1.6-1.73 mm., width, 1.3-1.35 mm. Antennae, segment I, 3.0-3.1 mm., II, 1.8-1.9 mm., III, 2.0-2.2 mm., IV, 3.8-4.0 mm. Rostrum, segment I, 1.33 mm., II, 1.33 mm., III, 0.7 mm., IV, 0.7 mm. Pronotum, length, 2.25-2.35 mm., width 2.0-2.13 mm. Hind femora, 5.3-5.6 mm.; hind tibia, 5.8-6.0 mm.; distance between ocelli 0.46 mm., distance between an ocellus and an eye, 0.7 mm.

Very similar in general appearance and colour but distinctly longer than ♂; seventh abdominal sternum with small median parallel-sided notched projection.

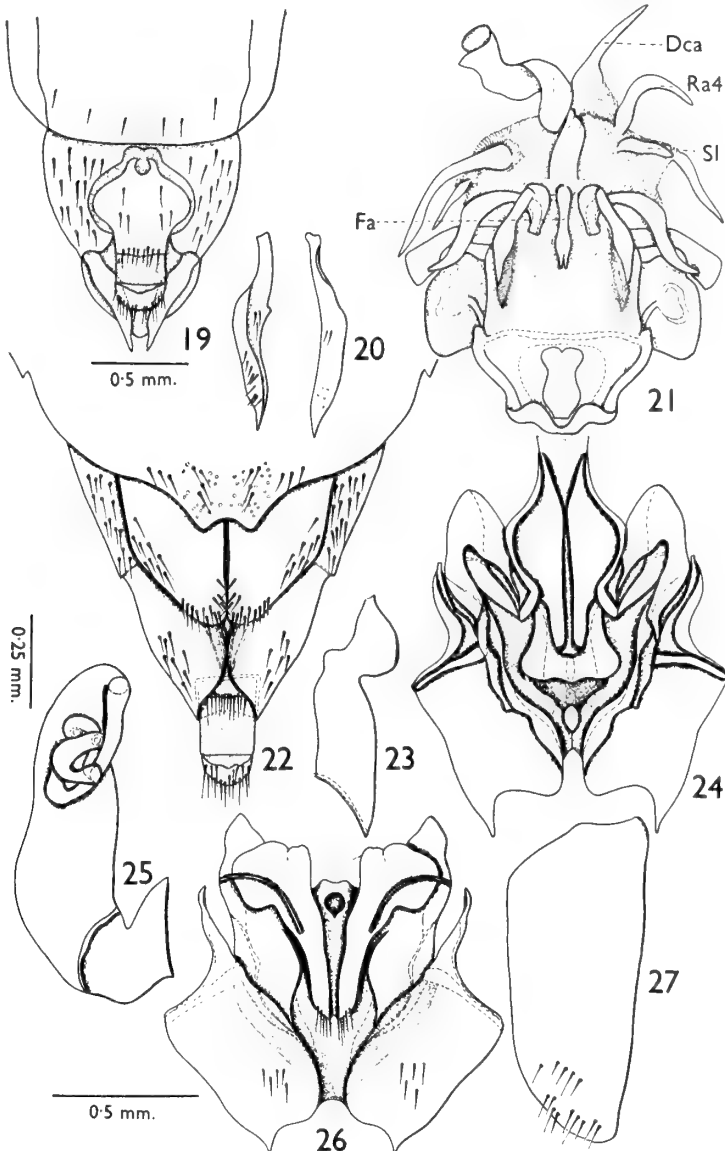
♀ GENITALIA : First gonocoxae thicker in middle and curved near apex with round apices; intervalvular sacs absent, spermatheca flask-shaped with long neck (Text-fig. 25).

Material studied. MAURITIUS : 1 ♂, 2 ♀; SEYCHELLES : 1 ♀; MADAGASCAR : 1 ♀; CONGO : 18 ♂, 11 ♀.

The range of this species extends in the west as far as the Congo (Ituri river) and in the east to Mauritius. It is also found in the Seychelles and Madagascar. It has mostly been collected during the early part of the year (from December until June), but it has also been taken in August.

This species is close to *distinguenda* (Blöte) in having similar type of paraclypeae, lateral black line and the similar shape of the pygophore, but can easily be separated

by examining the ♂ claspers, which are broad towards the bases and knob-like at apices in this species, whereas they are uniformly thin and acutely pointed in *distinguenda*. The small parallel-sided, medially notched projection of the ♀ seventh abdominal sternum separates it from all the species of this subgenus.



FIGS. 19-27. *Stenocoris (Erbula) annulicornis*. 19-21, ♂, 22-27, ♀. 19, terminalia, dorsal view; 20, claspers, inner and outer views; 21 aedeagus (inflated), ventral view; 22, terminalia, ventral view; 23, first gonopophysis, ventral view; 24, ovipositor, dorsal view; 25, spermatheca; 26, ovipositor, ventral view; 27, first gonocoxa, ventral view.

Stål (1873) synonymized this species with *L. (E.) apicalis* Westwood but in 1937 Blöte redescribed it from Mauritius and Seychelles, placing it in the subgenus *Stenocoris*. Signoret's type material is in the Naturhistorisches Museum, Vienna, but Prof. Max Beier informed the author that it was on loan to Dr. A. Villiers and thus it was not possible to examine it. However, Dr. Villiers (personal communication) has selected a lectotype and has published figures of the terminalia (♂, ♀). These agree with the concept of *annulicornis* in this study. Villiers has pointed out that *annulicornis* of Blöte was not the true *annulicornis* Signoret but another species, which he described as *Leptocorixa blotei*; however the ♂ of this species is clearly *S. phthisica* (Gerstäcker) (see page 70), but the ♀ represents the true *annulicornis* and Villiers' figures of the seventh abdominal sternum of the ♀ of *blotei* and *annulicornis* are almost identical.

***Stenocoris (Erbula) distinguenda* (Blöte) comb. n.**

(Text-figs. 28–36)

*Leptocorixa (Erbula) distinguenda* Blöte, 1937 : 286 ; Villiers, 1955 : 1142 [as synonym of *L. elegans*]

Characterized by the uniformly thin and smoothly tapering claspers, by the triangular median projection of the ♀ seventh abdominal sternum and by the form of ♂ and ♀ genitalia.

♂. Body length, 12.0–12.5 mm., width, 1.7–1.8 mm. Head length, 1.6–1.7 mm., width, 1.15–1.25 mm. Antennae, segment I, 2.9–3.0 mm., II, 1.7–1.75 mm., III, 1.9–2.1 mm., IV, 4.0–4.2 mm. Rostrum, segment I, 1.1–1.3 mm., II, 1.2–1.3 mm., III, 0.6–0.7 mm., IV, 0.6–0.65 mm. Pronotum, length, 2.0–2.1 mm., width, 1.7–1.8 mm. Hind femora, 4.7–4.9 mm.; hind tibia, 5.2–5.5 mm. Distance between ocelli, 0.4–0.43 mm., distance between an ocellus and an eye, 0.6–0.65 mm.

Body usually comparatively very short, pale, tinged with brownish black; occipital suture concave in middle with lateral arms curving outwards towards sides of head; paraclypeae short, thicker in middle, thinner and curved near apices. Antennae pale, with brownish black tinge, underside of basal segment, basal half of second, articulations of second and third and basal portion of apical segment pale. Rostrum short, approaching second coxae. Lateral black line well represented from sides of antenniferous tubercles to anterior of propleuron. Pronotal disc with brownish black punctures, posterior angles with black spots. Legs pale unicolourous, sometimes with apices of femora and bases of tibiae tinged with brown. Hemelytra with black punctures. Abdomen with dorsum except sides of connexiva yellowish red, venter pale ochraceous. Posterior margin of seventh abdominal tergum truncated, slightly convex in middle; pygophore with pointed apex.

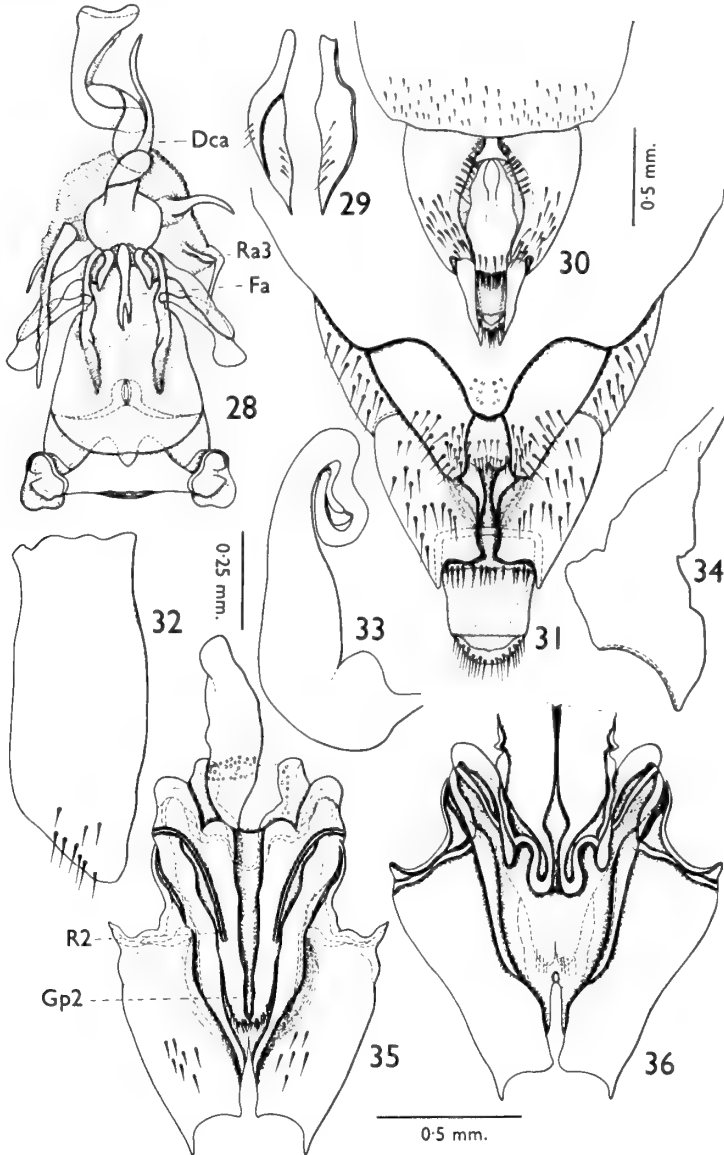
♂ GENITALIA : Claspers long, uniformly thin and distinctly reaching apex of pygophore, straight at apex; ventral thecal appendages as in Text-fig. 28; four lateral conjunctival appendages as in Text-fig. 28; frontal appendage long, thinner in middle and bifid at apex with almost equal branches, four right lateral conjunctival appendages as in Text-fig. 28 with spine-like appendage thin in middle, apex blunt; dorsal appendage convex at base, extending concavely towards apex.

♀. Body length, 14.5–15.6 mm., width, 2.0–2.1 mm. Head length, 1.65–2.0 mm., width, 1.3–1.4 mm. Antennae, segment I, 3.0–3.4 mm., II, 1.8–2.0 mm., III, 2.03–2.2 mm., IV, 4.0–4.3 mm. Rostrum, segment I, 1.3–1.33 mm., II, 1.3–1.33 mm., III, 0.7–0.8 mm., IV, 0.6–0.7 mm. Pronotum, length, 2.3–2.5 mm., width, 2.0–2.1 mm. Hind femora, 5.0–5.6 mm.



Hind tibia, 5.5-5.6 mm. Distance between ocelli, 0.4-0.5 mm., distance between an ocellus and an eye, 0.6-0.7 mm.

Very similar to ♂ in general appearance and colour, but distinctly longer and slightly darker ; posterior margin of seventh abdominal sternum with triangular median projection following deep curve on either side.



FIGS. 28-36. *Stenocoris (Erbula) distinguenda*. 28-30, ♂, 31-36, ♀. 28, aedeagus (inflated), ventral view ; 29, claspers, outer and inner views ; 30, terminalia, dorsal view ; 31, same, ventral view ; 32, first gonocoxa, ventral view ; 33, spermatheca ; 34, first gonopophysis, ventral view ; 35, ovipositor, ventral view ; 36, same, dorsal view.

♀ GENITALIA : First gonocoxae very narrow and curved at apices, outer margin regular ; intervalvular sacs absent ; spermatheca flask-shaped, with a short and curved neck as in Text-fig. 33.

Type material. Holotype ♂, NYASALAND (head and hind tibia missing), B.M. (N.H.) ; allotype ♀, with similar locality data (antennae missing), B.M.(N.H.).

Other material. CONGO : 15 ♂, 18 ♀.

This species seems to be represented in the south eastern region as far as Nyasaland. Adults are found in the early part of the year up to late May. No specimens were collected between July and October.

This species is close to *S. (E.) elegans* (Blöte) and *S. (E.) stali* sp. n. on one hand and *S. (E.) annulicornis* (Signoret) on the other. From the former pair it can be separated by the short rostrum, the triangular median projection of the ♀ seventh abdominal sternum and from the latter species by its uniformly thin and acutely pointed claspers.

Villiers doubted the validity of this species and suggested its synonymy with *S. (E.) elegans* (Blöte). He remarked that the shape of the ♀ seventh abdominal sternum was highly variable and this might have led Blöte to describe this species. The form of ♂ and ♀ genitalia clearly demarcates these two species and the shape of the ♀ seventh abdominal sternum has also been found to be fairly constant.

***Stenocoris (Erbula) elegans* (Blöte) comb. n.**

(Text-figs. 37-46)

*Leptocorixa (Erbula) elegans* Blöte, 1937 : 285 ; Villiers, 1955 : 1142, 1963 : 230

Characterized by the claspers which are regularly curved, by the triangular median projection of ♀ seventh abdominal sternum and by the form of ♂ and ♀ genitalia.

♂. Body length, 12.3-13.5 mm., width, 1.7-2.0 mm. Head length, 1.5-1.85 mm., width, 1.25-1.45 mm. Antennae, segment I, 3.0-3.4 mm., II, 2.0-2.2 mm., III, 2.3-2.6 mm., IV, 4.0-4.3 mm. Rostrum, segment I, 1.25-1.5 mm., II, 1.3-1.5 mm., III, 0.7-0.8 mm., IV, 0.65-0.7 mm. Pronotum, length, 2.0-2.5 mm., width, 1.7-2.0 mm. Hind femora, 5.5-5.9 mm. Hind tibia, 5.8-6.1 mm. Distance between ocelli, 0.4-0.5 mm., distance between an ocellus and an eye, 0.6-0.65 mm.

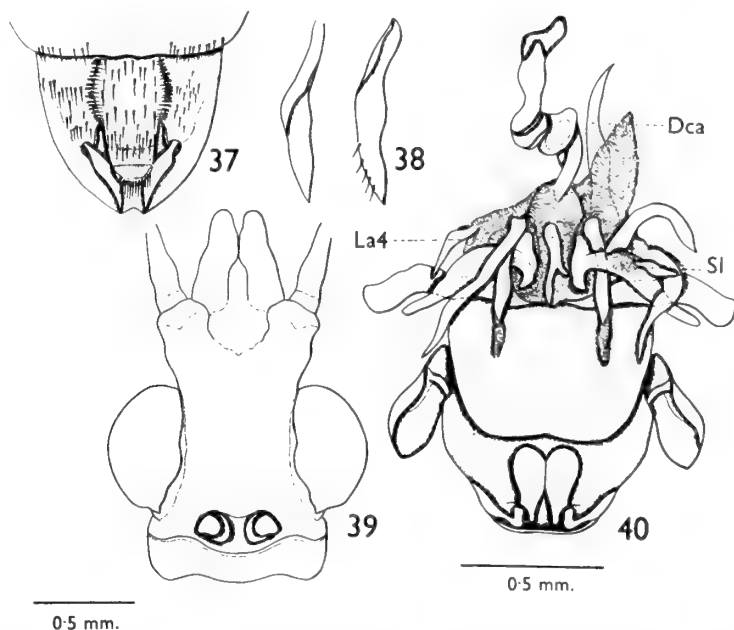
Body short, comparatively slim, pale, with brownish black tinge. Head pale, slightly brownish in middle ; occipital suture "U"-shaped in middle, side convex ; paraclypeae short, thick at bases, thin, rounded and divergent at apices. Antennae brownish black, sometimes with underside of first, middle of second, articulations between first and second and between second and third, and basal portion of apical segment pale. Rostrum usually comparatively long, extending at least slightly beyond second coxae. Lateral black line well represented, usually from genae to middle of propleuron sometimes faint to genae. Pronotal disc tinged brown, posterior angles with black dots. Legs pale, with apices of femora and bases of tibiae light brown, rarely with reddish tinge. Hemelytra with brownish black punctures. Abdomen with dorsum, except margins, red, venter pale ochraceous, sometimes tinged red. Posterior margin of seventh abdominal tergum usually at least slightly convex in middle ; pygophore with posterior margin medially notched.

♂ GENITALIA : Claspers long, reaching apex of pygophore, outer margin regularly curved and apices acutely pointed ; ventral thecal appendages as in Text-fig. 40 ; four left lateral con-

junctival appendages as in Text-fig. 40 ; frontal appendage bifurcated at apex, right branch shorter and thicker near apex ; four right lateral conjunctival appendages as in Text-fig. 40 with spine-like appendage thicker in middle, thinner and pointed at apex ; dorsal appendage thick in middle and curved near base and apex.

♀. Very similar to ♂ in general appearance and measurements, usually longer (13.5–15.0 mm.) with a triangular median projection of ♀ seventh abdominal sternum, this rounded at apex.

♀ GENITALIA : First gonocoxae with outer margin slightly sinuate, curved near apex ; intervalcular sacs absent ; spermatheca flask-shaped with thin and short neck as in Text-fig. 43.



FIGS. 37–40. *Stenocoris (Erbula) elegans*, ♂. 37, terminalia, dorsal view ; 38, claspers, outer and inner views ; 39, head, dorsal view ; 40, aedagus (inflated), ventral view.

Type material. Holotype ♂, SIERRA LEONE : II.X.1912 (*J. J. Simpson*), B.M. (N.H.) ; allotype ♀, data as holotype, B.M.(N.H.) ; paratypes, SIERRA LEONE : Jahama, 3 ♂, 2 ♀ (*J. J. Simpson*), B.M.(N.H.).

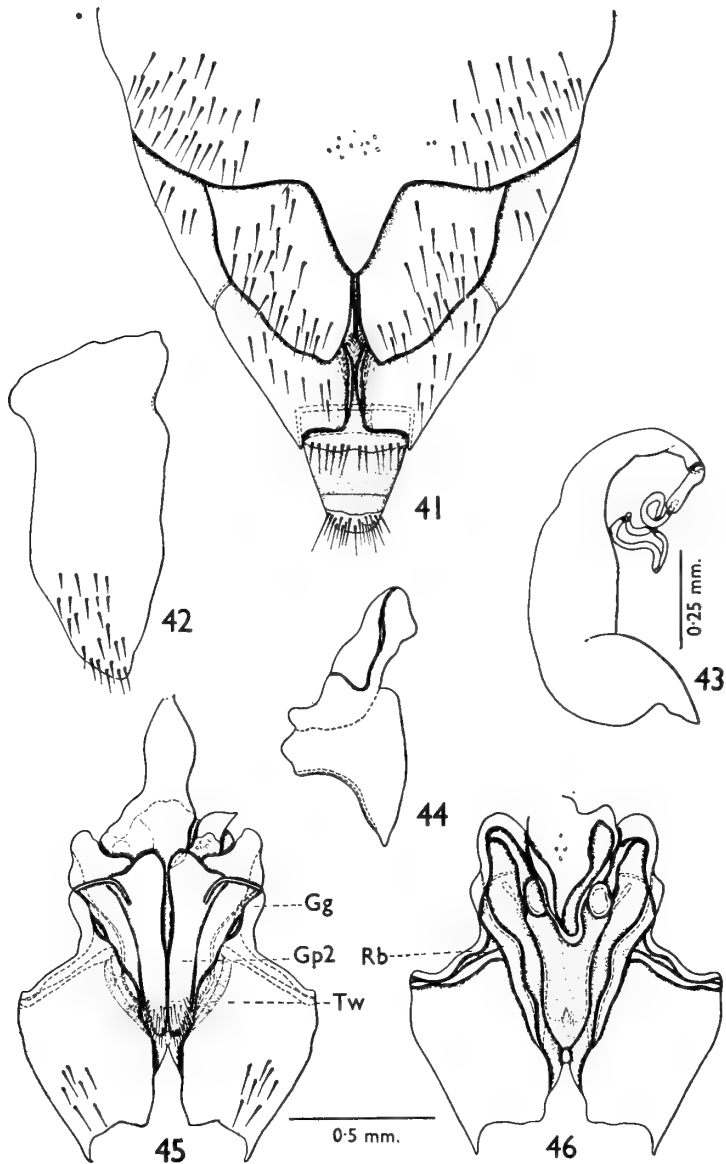
Other material. SENEGAL : 2 ♀, 2 ♀ ; NIGERIA : 5 ♀, 3 ♀ ; CONGO : 25 ♀, 15 ♀ ; TANGANYIKA : 3 ♀, 2 ♀.

1 ♀, 1 ♀ from SUMATRA, in Breddin's collection, labelled "Leptocorisa lepida Breddin det. Kiritshenko" (Dtsch. Entom. Inst. Berlin) were also examined. It is felt that there has been some mistake in the locality data.

The range of this species extends from Senegal in the west to Tanganyika in the east. This species is probably very common and adults have been collected throughout the year.

This species is close to *stali* sp. n. and *distinguenda* (Blöte). In *stali* the lateral

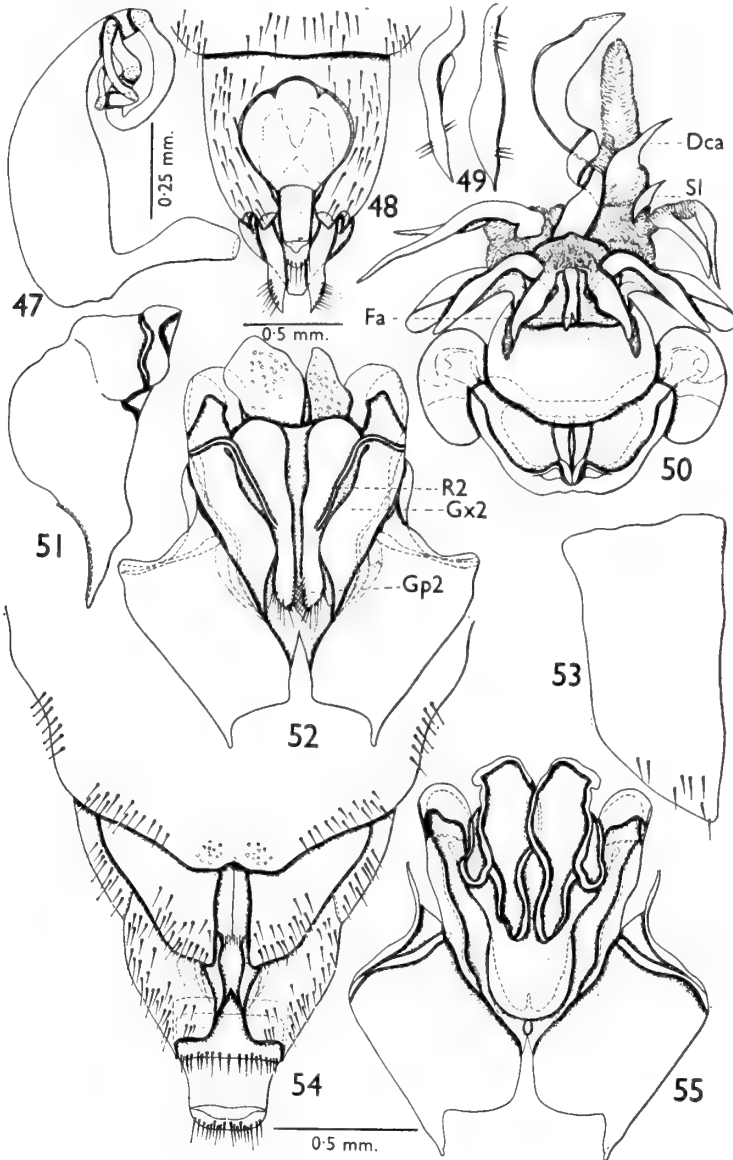
black line is faint, whereas in *distinguenda* (Blöte) the rostrum is short and does not extend beyond the second coxae. Its triangular median projection with the round apex of the ♀ seventh abdominal sternum and the claspers with regularly curved outer margins are its peculiarities.



FIGS. 41-46. *Stenocoris (Erbula) elegans*, ♀. 41, terminalia, ventral view; 42, first gonocoxae, ventral view; 43, spermatheca; 44, first gonopophysis, ventral view; 45, ovipositor, ventral view; 46, same, dorsal view.

*Stenocoris (Erbula) similis* (Blöte) comb. n.

(Text-figs. 47-55)

*Leptocorixa (Erbula) similis* Blöte, 1937 : 283

FIGS. 47-55. *Stenocoris (Erbula) similis*. 48-50, ♂, 47, 51-55, ♀. 47, spermatheca; 48, terminalia, dorsal view; 49, claspers, outer and inner views; 50, aedeagus; 51, first gonopophysis, ventral view; 52, ovipositor, ventral view; 53, first gonocoxae, ventral view; 54, terminalia, ventral view; 55, ovipositor, dorsal view.

Characterized by the faint lateral black line, which is usually represented by a lateral black dot on collar and by the form of ♂ and ♀ genitalia.

♂. Body length, 12.5–14.5 mm., width, 2.0–2.1 mm. Head length, 1.9–2.0 mm., width, 1.35–1.5 mm. Antennae, segment I, 3.4–3.5 mm., II, 2.3–2.4 mm., III, 2.5–2.7 mm., IV, 4.4–4.6 mm. Rostrum, segment I, 1.4–1.5 mm., II, 1.4–1.5 mm., III, 0.7–0.9 mm., IV, 0.6–0.7 mm. Pronotum, length, 2.5–2.6 mm., width, 2.0–2.1 mm. Hind femora, 5.4–5.6 mm. Hind tibia, 6.3–7.0 mm. ; distance between ocelli, 0.5 mm., distance between an ocellus and an eye, 0.7 mm.

Body short, slightly comparatively robust, pale with a blackish tinge. Head with brownish markings ; occipital suture "U"-shaped with arms curved backwards near sides of head ; paraclypeae short, thicker in middle. Antennae with brownish black tinge, apical segment red, pale at base. Rostrum short, approaching posterior limit of second coxae. Lateral black line very faintly represented, usually like a black dot on either side of collar. Pronotal disc with black latero-posterior spots. Legs pale, unicoloured, sometimes with blackish tinge. Hemelytra pale with black punctures on clavus, near membrane, on anal area and on cell. Abdomen pale, tinged red dorsally ; ventrally pale ochraceous. Posterior margin of seventh abdominal tergum truncated ; pygophore elongated, apex narrow and truncated.

♂ GENITALIA : Claspers long, distinctly reaching apex of pygophore, curved outwardly in middle and inwardly at apices ; ventral thecal appendages as in Text-fig. 50 ; four left lateral conjunctival appendages as in Text-fig. 50 ; frontal appendage bifid at apex, branches equal ; four right lateral conjunctival appendages with first spine-like appendage ; dorsal appendage thicker at base, inwardly curved and acutely pointed.

♀. Body length, 13.5–15.5 mm., width, 2.2–2.4 mm. Head length, 2.0–2.1 mm., width, 1.4–1.5 mm. Antennae, segment I, 3.3–3.5 mm., II, 2.1–2.3 mm., III, 2.4–2.6 mm., IV, 4.0–4.5 mm. Rostrum, segment I, 1.4–1.6 mm., II, 1.4–1.5 mm., III, 0.7–0.9 mm., IV, 0.6–0.8 mm. Pronotum, length, 2.7–2.8 mm., width, 2.2–2.4 mm. Hind femora, 5.4–5.6 mm. Hind tibia, 5.9–6.1 mm. Distance between ocelli, 0.5–0.7 mm. ; distance between an ocellus and an eye, 0.6–0.8 mm.

Usually longer than ♂ and slightly darker in colour, seventh abdominal sternum with a rounded median projection, which has a distinct median notch.

♀ GENITALIA : First gonocoxae triangular with rounded apices ; intervalvular sacs absent ; spermatheca thicker at base with a thin long and rounded neck as in Text-fig. 47.

Type material. Holotype ♂, ANGOLA : Quirimbo, v.1934 (*K. Jordan*), B.M. (N.H.) ; paratypes, 15 ♂, 10 ♀, with data as holotype, B.M.(N.H.).

Other material. CONGO : 34 ♂, 15 ♀ ; TANGANYIKA : 1 ♂.

This species is common in the Congo and its range extends south west into Angola. The adults have been collected from February until May and also in December.

This species is closest to *S. (E.) elegans* and *S. (E.) stali* sp. n., but can be separated from them by the character of the lateral black line, which is in this species commonly reduced to a black dot on either side of the collar. The rounded and medially notched median projection of the ♀ seventh abdominal sternum and the elongated pygophore with a truncated posterior margin are its peculiarities.

### *Stenocoris (Erbula) southwoodi* sp. n.

(Text-figs. 56–64)

*Leptocorisa apicalis* Westwood ; Stål, 1866 : 88, 1873 : 86

*Leptocorixa apicalis* Westwood ; Blöte, 1937 : 282 ; Villiers, 1955 : 1141, 1963 : 229

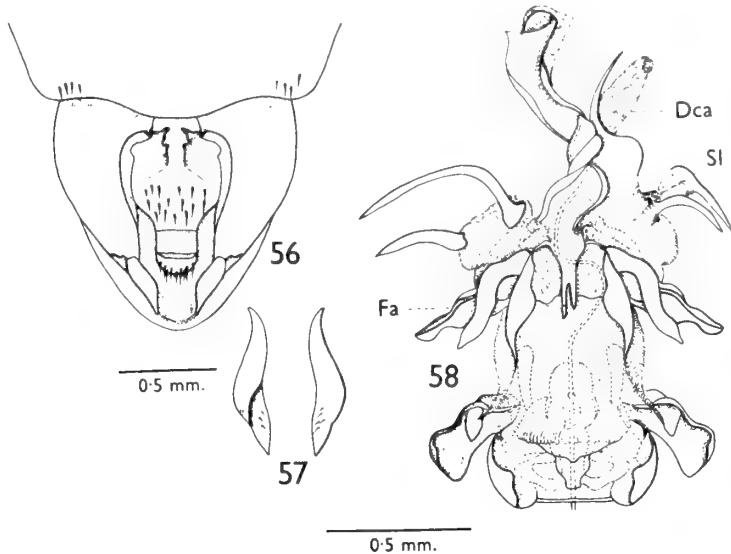
Characterized by very short claspers, which are thick and curved in the middle and do not reach the posterior margin of pygophore, by posterior median round projection of ♀ seventh abdominal sternum and by the form of ♂ and ♀ genitalia.

♂. Body length, 12.2–13.5 mm., width, 1.9–2.1 mm. Head length, 1.7–1.9 mm., width, 1.4–1.5 mm. Antennae, segment I, 3.2–3.6 mm., II, 2.0–2.2 mm., III, 2.4–2.6 mm., IV, 4.4–4.7 mm. Rostrum, segment I, 1.25–1.5 mm., II, 1.4–1.5 mm., III, 0.7–0.9 mm., IV, 0.5–0.7 mm. Pronotum, length 2.2–2.4 mm., width, 1.9–2.1 mm. Hind femora, 5.0–5.5 mm. Hind tibiae, 5.5–5.8 mm. Distance between ocelli, 0.5 mm., distance between an ocellus and an eye, 0.75 mm.

Body short, darker in colour. Head pale with blackish tinge; occipital suture "V"-shaped in middle with arms curving backwards towards side of head; paraclypeae short, slightly thicker in middle. Antennae brownish black, with underside of basal segment, articulations between first and second and between second and third and basal portion of apical segment, pale. Rostrum short, reaching apex of second coxae. Lateral black line extending from genae up to lateral side of collar. Pronotal disc pale with brownish black tinge, posterior angles brownish black. Legs pale, usually tinged black. Hemielytra, except costal margin and membrane, covered with black punctures. Abdomen with dorsum pale tinged red, venter pale ochraceous with reddish tinge anteriorly. Posterior margin of seventh abdominal tergum truncated, only slightly convex in middle; pygophore rounded with a pointed apex.

♂ GENITALIA: Claspers very short, never reaching posterior margin of pygophore, thicker and curved in middle; ventral thecal appendages as in Text-fig. 58, four left lateral conjunctival appendages as in Text-fig. 58, frontal appendage bifurcated from middle, branches equal; four right lateral conjunctival appendages as in Text-fig. 58, with spine-like appendage reduced to a very small bristle-like appendage; dorsal appendage thicker at base and strongly curved.

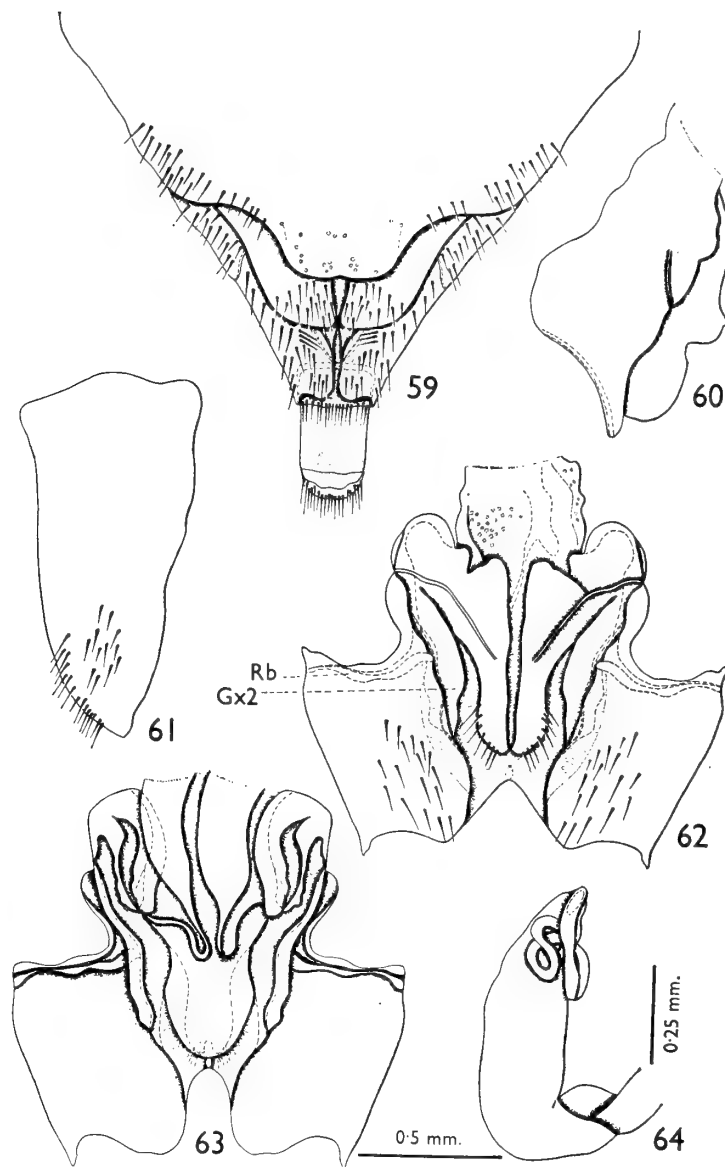
♀. Body length, 13.0–14.5 mm., width, 1.9–2.1 mm. Head length, 1.8–1.95 mm., width, 1.4–1.6 mm. Antennae, segment I, 3.0–3.6 mm., II, 2.0–2.3 mm., III, 2.4–2.6 mm., IV,



FIGS. 56–58. *Stenocoris (Erbula) southwoodi*, ♂. 56, terminalia, dorsal view; 57, claspers, outer and inner views; 58, aedeagus (inflated), ventral view.

4.5-4.7 mm. Rostrum, segment I, 1.4-1.6 mm., II, 1.4-1.6 mm., III, 0.7-0.9 mm., IV, 0.6-0.8 mm. Pronotum, length, 2.3-2.5 mm., width, 1.9-2.1 mm. Hind femora, 5.6-6.0 mm. Hind tibia, 6.0-6.1 mm. Distance between ocelli, 0.5 mm., distance between an ocellus and an eye, 0.75 mm.

Very similar to ♂ in general appearance, slightly darker and longer; posterior margin of seventh abdominal sternum with a round, median, faintly striated projection.



FIGS. 59-64. *Stenocoris (Erbula) southwoodi*, ♀. 59, terminalia, ventral view; 60, first gonopophysis, ventral view; 61, first gonocoxae, ventral view; 62, ovipositor, ventral view; 63, same, dorsal view; 64, spermatheca.



♀ GENITALIA : First gonocoxae elongated and narrow, apices rounded ; intervalvular sacs absent ; spermatheca ovate without a distinct neck, as in Text-fig. 64.

Holotype ♂, SIERRA LEONE : Sembehun, at light, 14.ii.1924 (*E. Hargreaves*), labelled "*Leptocorixa apicalis* Westwood, det. H. C. Blöte", B.M.(N.H.).

Paratypes. NIGERIA : Sapolar, 1 ♂, 10.v.1955 (*E. A. Duffy*), Lagos, 6 ♂ (*G. Strachan*), B.M.(N.H.) ; S. NIGERIA : 1 ♂, 1912 (*A. D. Peacock*), with label "*Leptocorixa apicalis* Westwood, det. H. C. Blöte", B.M.(N.H.) ; SIERRA LEONE : 1 ♀ (*Afzel*), Stål's collection, Riksmus. Stockholm ; GHANA : Ashanti Dist., 1 ♂, 1 ♀, 7.v.1913 (*A. E. Evans*), B.M.(N.H.) ; PRINCIPE ISLAND : 1 ♀, 1.i.1933 (*W. H. T. Tams*), B.M.(N.H.) ; SÃO THOMÉ ISLAND : 1 ♂, 1919-1921, B.M.(N.H.) ; CONGO : Ituru, 1 ♂ (*Gyld*), Riksmus. Stockholm, various localities, 250 ♂, 345 ♀, iii-vi. viii-xi. (various collectors), Mus. R. Afr. centr. ; SOMALIA : Basso Giulia Portrizi, 1 ♀, vii.1934, B.M.(N.H.) ; UGANDA : Kawanda, light trap in coffee plantation, 6-12.i, 4-7.ii, 8-11.xi.1959 (*J. Bowden*), Ahmad collection, Ruwenzori Range, Ibanda, 4,700 ft., 1 ♂, 4-6.vii.1952 (*D. S. Fletcher*), Bwamba Valley, 1 ♂, vii.1945 (*van Someren*), Kampala, Jinja Road, 4,000 ft., Mabira Forest, 3,500-3,800 ft., Chagwe, 1 ♀, 1 ♂, vii.1911 (*S. A. Neave*), Nymgasair Valley, 6,400 ft., between Mitiana and Entebbe, 3,800 ft., Tero Forest, 5 ♂, 5 ♀, ix.1911, 12.iv.1913, 2.vi.1930, xii.1934, i.1935 (various collectors), B.M.(N.H.) ; TANGANYIKA : Ilonga, nr. Kilosa, vii.1962 (*Robertson*), B.M.(N.H.) ; ZANZIBAR : 1 ♀, 1.ii.1925 (*H. J. Shell*), B.M.(N.H.) ; ?SUMATRA : 2 ♂, in series of *Leptocorixa lepida* Breddin, 1909, with label "*L. lepida* det. Kiritshenko" (probably an incorrect locality label), Dtsch. Entom. Inst., Berlin.

This is the most widely distributed species of *Erbula*. Leaving aside the doubtful record from Sumatra, its range extends from São Thomé Island and Principe Island in the west to Zanibar in the east and appears to comprise the whole of the African equatorial belt. The adults are very common in late May and early June, but they have been collected throughout the year.

This species is close to *S. (E.) annulicornis* (Signoret) in general appearance and colour but comparatively isolated and can be easily separated from all other species of the subgenus *Erbula* by having very short, medially thick and curved claspers in the ♂, which never reach the apex of the pygophore. In the ♀, the round median projection of the seventh abdominal sternum separates it from all other species of this group.

An examination of the material that was seen by Stål and Blöte (see above) has shown that Stål misidentified this species as *L. apicalis* Westwood, and Blöte correctly followed Stål's interpretation. However their specimens are not *Stenocoris apicalis* (Westwood) (see page 38) and thus the present species, which was the type of *Erbula* Stål, is hitherto undescribed. This species has also been recorded by Southwood (1961) in light trap catches at Kawanda, Uganda. I have pleasure in naming this species in honour of Dr. T. R. E. Southwood, who suggested the present problem and has supervised my studies on it.

*Stenocoris (Erbula) stali* sp. n.

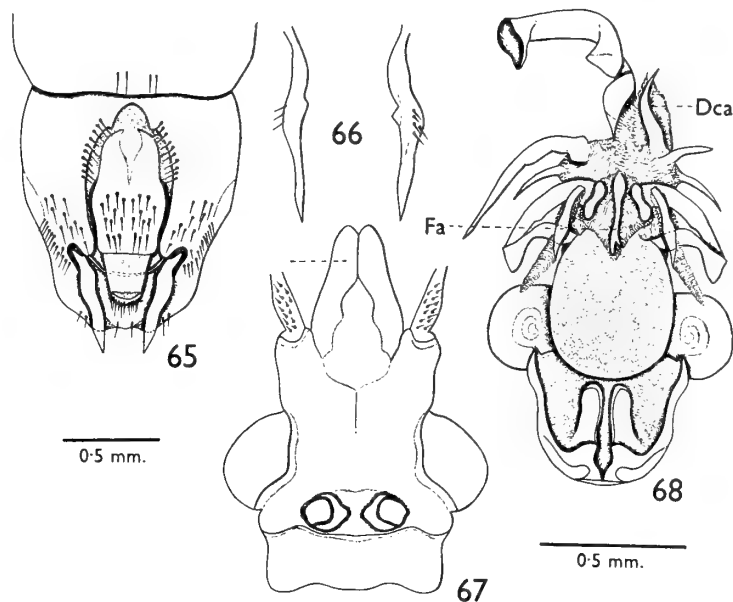
(Text-figs. 65-74)

Characterized by the shape of the claspers, by the median posterior margin of the ♀ seventh abdominal sternum and by the form of ♂ and ♀ genitalia.

♂. Body length, 12.4-14.0 mm., width, 1.66-2.26 mm. Head length, 1.6-1.86 mm., width, 1.2-1.25 mm. Antennae, segment I, 3.1-3.35 mm., II, 2.0-2.26 mm., III, 2.26-2.4 mm., IV, 4.0-4.13 mm. Rostrum, segment I, 1.2-1.3 mm., II, 1.2-1.33 mm., III, 0.65-0.7 mm., IV, 0.65-0.7 mm. Pronotum, length, 2.0-2.4 mm., width, 1.66-2.26 mm. Hind femora, 5.2-5.6 mm. Hind tibia, 5.5-6.0 mm. Distance between ocelli, 0.4-0.46 mm. Distance between an ocellus and an eye, 0.65-0.7 mm.

Body comparatively long, slim, pale, tinged with brown. Head medially and posteriorly brown; occipital suture medially concave with sides curved; paraclypeae short, usually flat, of uniform thickness. Antennae usually pale, tinged brown. Rostrum long, usually extending at least slightly beyond apices of second coxae. Lateral black line faint but extending from genae to anterior third of propleuron. Pronotal disc pale unicoloured with black spot on posterior angles. Legs pale, with apices of femora and bases of tibiae tinged with dark brown. Hemelytra with brown punctures on clavus and on anal area. Abdomen with dorsum, except connexiva, palish red, venter pale ochraceous. Posterior margin of seventh abdominal tergum truncated, pygophore elongated with bilobed apex.

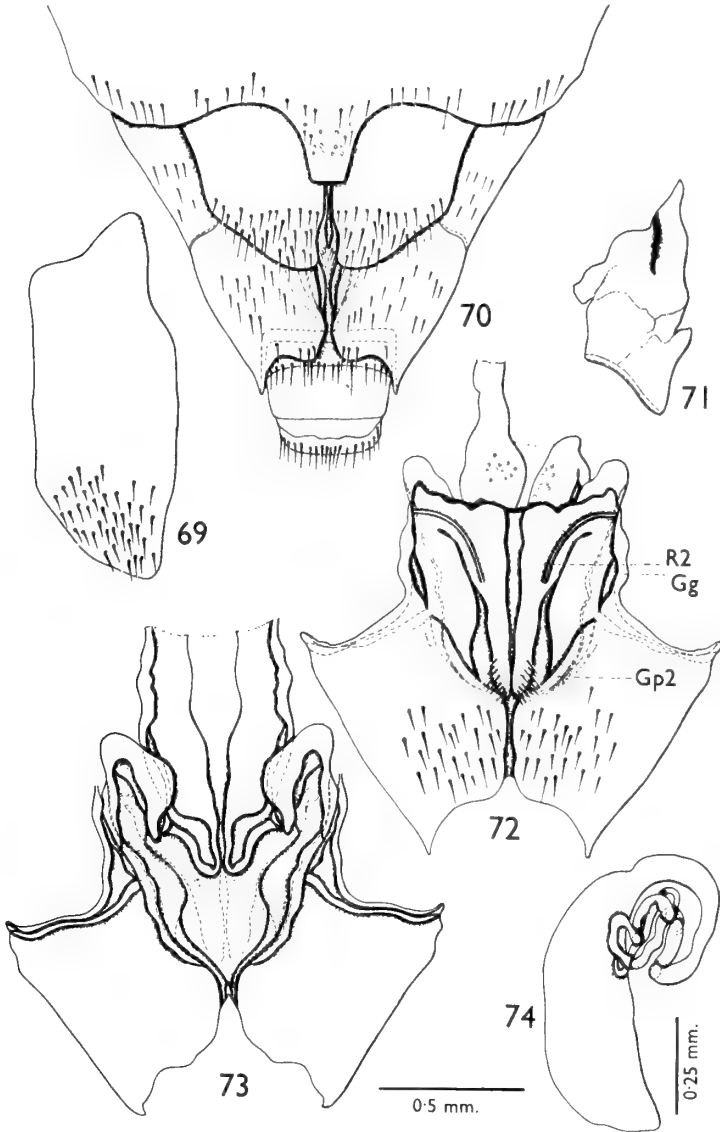
♂ GENITALIA: Claspers curved only in middle, narrow towards apices, acutely pointed; ventral thecal appendages as in Text-fig. 68; four left lateral conjunctival appendages as in Text-fig. 68; frontal appendage thinner in middle, bifid at apex, left branch longer and thicker; four right lateral conjunctival appendages as in Text-fig. 68; dorsal appendage strongly inwardly curved with pointed apex.



FIGS. 65-68. *Stenocoris (Erbula) stali*, ♂. 65, terminalia, dorsal view; 66, claspers, inner and outer views; 67, head, dorsal view; 68, aedeagus, ventral view.

♀. Body length, 15.0–15.8 mm., width, 2.0–2.1 mm. Head length, 1.8–1.9 mm., width, 1.2–1.4 mm. Antennae, segment I, 3.0–3.35 mm., II, 1.9–2.1 mm., III, 2.2–2.35 mm., IV, 4.0–4.2 mm. Rostrum, segment I, 1.33 mm., II, 1.33 mm., III, 0.7 mm., IV, 0.7 mm. Pronotum, length, 2.3–2.4 mm., width, 2.0–2.1 mm. Hind femora, 5.8 mm. Hind tibia, 6.0 mm. Distance between ocelli, 0.43 mm.; distance between an ocellus and an eye, 0.68 mm.

Very similar to ♂ in general appearance but usually distinctly longer; posterior margin of



FIGS. 69–74. *Stenocoris (Erbula) stali*, ♀. 69, first gonocoxa, ventral view; 70, terminalia, ventral view; 71, first gonophysis, ventral view; 72, ovipositor, ventral view; 73, same, dorsal view; 74, spermatheca.

seventh abdominal sternum with a median rectangular projection as in Text-fig. 70.

♀ GENITALIA : First gonocoxae broad, apex rounded ; intervalvular sacs absent ; spermatheca flask-shaped with a long curved neck as in Text-fig. 74.

Holotype ♂, CONGO : Congo da lemba, 1.ii.1913 (*R. Mayné*), Mus. R. Afr. centr.

Paratypes. 2 ♂, 2 ♀, with data as holotype, Mus. R. Afr. centr. ; CONGO : Katanga, Kando, 2 ♀, 25.iii.1931 (*G. F. de Witte*), Sokole, Eala, Sankuru, and Ubangi, 3 ♂, 2 ♀, 31.xii.1911, x.1923, 5.iv.1931, v.1937, 1952 (various collectors), Mobwasa, 1 ♀, 30.xi.1912 (*R. Mayné*), Mus. R. Afr. centr. ; SIERRA LEONE : Freetown, 1 ♂, 13.viii.1899 (*E. E. Austen*), B.M.(N.H.) ; NIGERIA ; Old Calabar, 1 ♂ (*Schouteden*), Mus. R. Afr. centr.

The range of this species extends in the west into Sierra Leone and in the east into Congo. Adults have been collected in the early part of the year until May, but they have not been collected in June or July.

This species is very close to *elegans* (Blöte) in general appearance but can easily be separated by the form of the claspers of the ♂. In ♀, the median projection of the seventh abdominal sternum separates it from all the species of this subgenus.

### **STENOCORIS (STENOCORIS) Burmeister**

Type-species : *Cimex tipuloides* Degeer.

Body robust. Head elongated, usually distinctly longer than broad ; paraclypeae usually short, straight and rounded at apices ; ocelli close together but distance between an ocellus and an eye about one-third as long again as interocellar distance. Antennae with apical segment pale only at base, second usually distinctly shorter than third. Rostrum long, usually reaching second coxae. Lateral black line usually present, never extending beyond middle of propleuron. Pronotum sloping down towards head with posterior angles usually brownish black. Abdomen with dorsum usually palish red ; venter usually pale unicoloured.

In ♂, posterior margin of seventh abdominal tergum usually truncate ; pygophore usually rounded ; claspers crossed in socket (Text-fig. 75), curved in middle with apices pointed ; aedeagus with only ventral pair of thecal appendages ; dorsal pair wanting ; frontal conjunctival appendages paired, elongated and sclerotized ; membranous appendage with usually paired dorsal appendages, terminal appendage absent.

In ♀, posterior margin of seventh abdominal sternum medially bilobed ; first gonocoxae large, often mainly hidden under seventh abdominal sternum ; intervalvular sacs absent ; spermatheca flask-shaped with a long coiled tube.

This subgenus can be distinguished from other subgenera in the ♂ by the character of claspers which are crossed in a socket and in the ♀ by the bilobed posterior margin of seventh abdominal sternum.

#### KEY TO SPECIES

- 1 Rostrum reaching anterior base of hind coxae ; apices of femora tinged with red (frontal conjunctival appendages in ♂ aedeagus very short (Text-fig. 167)) ; spermatheca cylindrical (Text-fig. 174) . . . . . *v-nigrum* (p. 57)
- Rostrum never reaching hind coxae ; apices of femora never tinged with red . . . . . 2
- 2 Posterior angles of pygophore produced backward (Text-fig. 148) ; in ♀, posterior margin of seventh abdominal sternum deeply indented in middle (Text-fig. 93) . . . . . 3

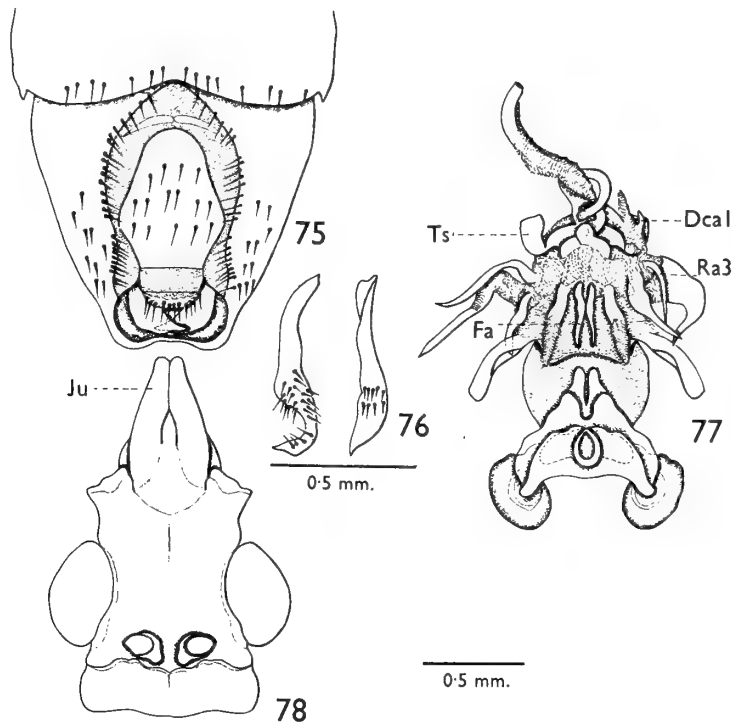
- Posterior angles never produced backward ; in ♀, posterior margin of seventh abdominal sternum only slightly indented (Text-fig. 124) or concave in form of a " V " . . . . . 7
- 3 Pygophore large with posterior margin usually more than half width of posterior margin of ♂ seventh abdominal tergum (Text-fig. 88) ; processes of posterior margin of ♀ seventh abdominal sternum large and very prominent, sometimes conical or " U " -shaped (Text-fig. 93) . . . . . 4
- Pygophore small, with narrow posterior margin, usually two-fifths width of posterior margin of seventh abdominal tergum (Text-fig. 107) ; processes of posterior margin of ♀ seventh abdominal sternum small, never triangular, usually posterior margin truncated (Text-fig. 111) . . . . . 5
- 4 Rostrum long, extending beyond second coxae ; lateral black line, prominent on genae to middle of propleuron ; (claspers narrow in middle (Text-figs. 148 and 149), second spine-like appendage in aedeagus absent ; spermatheca flat (Text-fig. 156)) . . . . . *sordida* (p. 52)
- Rostrum short, reaching second coxae, lateral black line faint, usually absent on genae ; (claspers broad in middle (Text-figs. 88 and 89) ; second spine-like appendage in aedeagus present ; spermatheca elongated (Text-fig. 95)) *apicalis* (p. 36)
- 5 Head elongated, about half again longer than broad (Text-fig. 78) with paraclypeae long and cylindrical, about 2/5 length of entire head ; lateral black line usually faint or absent on genae (aedeagus with first dorsal conjunctival appendage very small and curved ; spermatheca with smoothly curved neck (Text-fig. 80)) . . . . . *africana* (p. 32)
- Head broad, usually only slightly longer than broad ; paraclypeae short, usually one-quarter length of entire head ; lateral black line prominent on genae and extending to anterior of propleuron . . . . . 6
- 6 Rostrum long, extending well beyond apices of second coxae ; species comparatively robust, at least 14 mm. in length (dorsal thecal appendage present, rod-like in appearance (Text-fig. 112) ; right lateral conjunctival appendages three in number, fourth left lateral conjunctival appendage club-shaped ; in ♀, first gonocoxae with truncate posterior margin) . . . . . *claviformis* (p. 41)
- Rostrum short, only just extending beyond apices of second coxae ; species comparatively small, length about 13.5 mm. (dorsal thecal appendage absent ; right lateral conjunctival appendages four in number, fourth bifurcated at apex, fourth left lateral conjunctival appendage rod-like, elongate) . . . . . *ethiopsis* (p. 43)
- 7 Rostrum long, extending well beyond apices of second coxae ; pygophore rounded with posterior margin medially distinctly emarginate (Text-fig. 119) ; a large basal portion of first gonocoxae concealed (Text-fig. 124). (Frontal conjunctival appendages very long nearly reaching anterior base of basal plate ; spermatheca with a narrow and a smoothly curved neck) . . . . . *maculosa* (p. 44)
- Rostrum short, never extending well beyond apices of second coxae, usually reaching second coxae ; pygophore usually elongated (Text-fig. 128), rounded only in American species ; a very small basal portion of first gonocoxae concealed (Text-fig. 132) . . . . . 8
- 8 Pygophore elongated (Text-fig. 128) ; first gonocoxae comparatively narrow at base, so that only a small basal portion of eighth paratergite concealed externally. African species . . . . . 9
- Pygophore rounded (Text-fig. 98), first gonocoxae broad at base so that a large basal portion of eighth paratergite concealed externally (Text-fig. 102). American species . . . . . 10
- 9 Lateral black line usually represented extending from either side of antenniferous tubercles to anterior of collar ; black spots on posterior angles of pronotum usually present, paraclypeae comparatively long and thinner at apices (frontal conjunctival appendages short and thick ; spermatheca elongated, with smoothly

- curved neck) . . . . . *phthisica* (p. 49)
- Lateral black line usually represented by a black dot on either side of collar ; black spots on posterior angles of pronotum absent ; paraclypeae short and uniformly thick (frontal conjunctival appendages long and thin ; spermatheca almost pelican-shaped with a thick and coiled tube) . . . . . *pallida* (p. 46)
- 10 Pale unicoloured species with thin paraclypeae, spots on posterior angles of pronotum absent, spermatheca round . . . . . *braziliensis* (p. 48)
- Palish brown species with uniformly thick paraclypeae ; spots on posterior angles of pronotum always present ; spermatheca flask-shaped . . . . . II
- 11 Rostrum at least slightly extending beyond apices of second coxae ; lateral black line faintly represented ; in ♂, posterior margin of pygophore truncated (Text-fig. 85) . . . . . *americana* (p. 34)
- Rostrum reaching anterior margin of second coxae ; lateral black line strongly represented ; in ♂, posterior margin of pygophore medially emarginate (Text-fig. 158) . . . . . *tipuloides* (p. 55)

***Stenocoris (Stenocoris) africana* sp. n.**

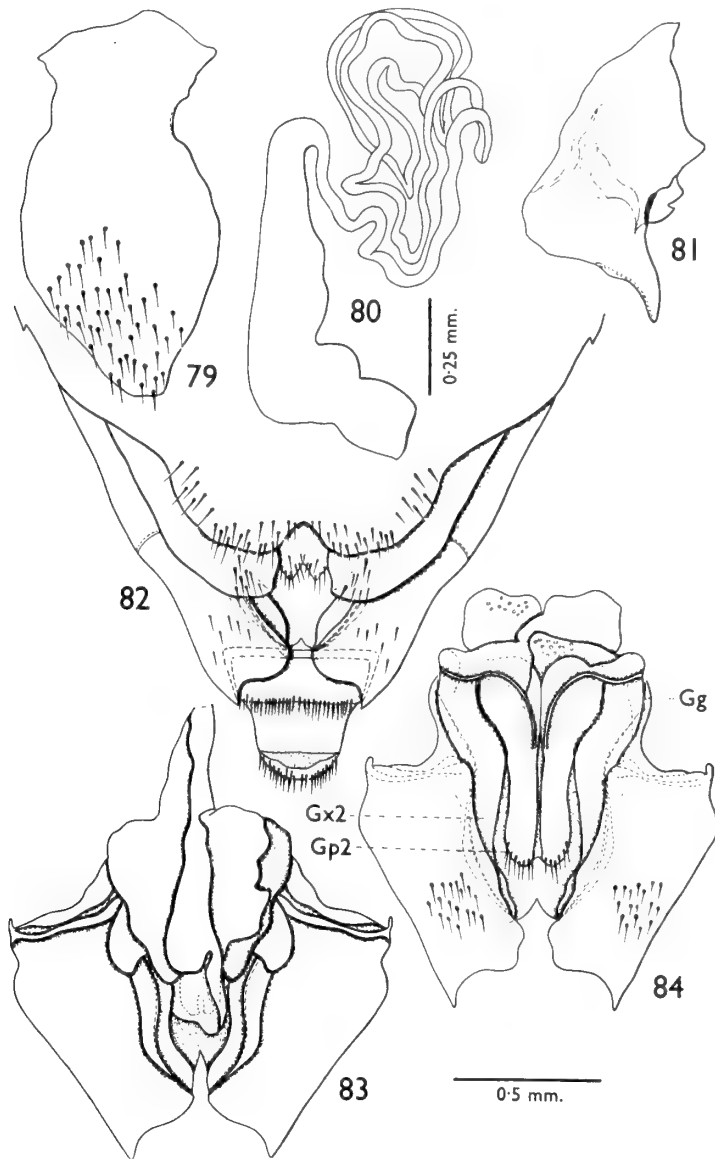
(Text-figs. 75-84)

Characterized by uniformly thin and long paraclypeae (Text-fig. 78), which are about two-fifths of entire head and by the form of ♂ and ♀ genitalia.



FIGS. 75-78. *Stenocoris africana*, ♂. 75, terminalia, dorsal view ; 76, claspers, inner and outer views ; 77, aedeagus (inflated), ventral view ; 78, head, dorsal view.

♂. Body length, 12.4–13.6 mm., width, 1.8–1.9 mm. Head length, 1.6–1.7 mm., width, 1.2–1.3 mm. Antennae, segment I, 3.2–3.7 mm., only paraclypeae 0.66 mm., II, 2.0–2.4 mm., III, 2.1–2.7 mm., IV, 3.6–4.1 mm. Rostrum, segment I, 1.2–1.3 mm., II, 1.3–1.4 mm., III,



FIGS. 79–84. *Stenocoris africana*, ♀. 79, first gonocoxa, ventral view; 80, spermatheca; 81, first gonopophysis, ventral view; 82, terminalia, ventral view; 83, ovipositor, ventral view; 84, same, dorsal view.

0.6–0.7 mm., IV, 0.7–0.8 mm. Pronotum length, 2.1–2.2 mm., width, 1.8–1.9 mm. Hind femora, 5.3–6.3 mm. Hind tibia, 5.6–6.5 mm. Distance between ocelli, 0.4 mm.; distance between an ocellus and an eye, 0.7 mm.

Body comparatively slim, palish brown. Head elongated, usually approximately half as long again as broad; occipital suture "U"-shaped in middle, sides convex; paraclypeae long, uniformly thin and round at apices, two-fifths of entire head. Antennae brownish black with underside of basal, usually basal halves of second and basal portions of apical segments pale. Rostrum short, usually reaching anterior margin of second coxae. Lateral black line well represented from lateral sides of antenniferous tubercles on to collars. Pronotal disc pale, posteriorly with brownish tinge, posterior angles with brownish black spots. Legs pale, with apices of femora and tibiae tinged with red. Costal and anal margins of hemielytra black, with black punctures on claval and anal areas. Abdomen dorsally, except connexival areas, tinged with red; venter pale ochraceous. Posterior margin of seventh abdominal tergum truncated, slightly medially concave; pygophore small with small posterior processes, posterior margin narrow, about one-third of seventh abdominal tergum.

♂ GENITALIA: Claspers small, medially thick and rounded at apices (Text-fig. 76); dorsal thecal appendages absent, ventral pair thin, medially curved and truncated at apices; four left lateral conjunctival appendages as in Text-fig. 77; frontal appendages paired, thin, short and medially curved; four right lateral conjunctival appendages as in Text-fig. 77, dorsal appendages as in Text-fig. 77.

♀. Body length, 15.0–15.5 mm., width, 2.2–2.4 mm. Head length, 1.7–1.9 mm., width, 1.3–1.4 mm. Antennae, segment I, 3.3–3.6 mm., (only paraclypeae 0.7–0.8 mm.), II, 2.3–2.4 mm., III, 2.4–2.5 mm., IV, 3.1–3.3 mm. Rostrum, segment I, 1.45–1.55 mm., II, 1.56–1.6 mm., III, 0.7–0.73 mm., IV, 0.8–0.83 mm. Pronotum, length, 2.4–2.6 mm., width, 2.2–2.4 mm. Hind femora, 6.0–6.4 mm. Hind tibia missing. Distance between ocelli, 0.4 mm., distance between an ocellus and an eye, 0.7 mm.

Very similar to ♂ in general appearance; posterior margin of seventh abdominal sternum indented in middle, forming broad and truncated lobes on either side (Text-fig. 82).

♀ GENITALIA: First gonocoxae largely concealed by seventh abdominal sternum, outer margin irregular with apices truncated; intervalvular sacs absent; spermatheca elongated, tapering towards apex with smoothly curved neck and thick coiled tube.

Holotype ♂, CONGO: Kivu, Terr. Mwenna Kitutu, 650 m., (lumière), vi.1958 (*N. Leleup*), Mus. R. Afr. centr.

Paratypes. CONGO: Uelé, Gangalena Bodio, 1 ♂, 14.v.1936 (*L. Lippens*), Nyangwe, 15am, 2 ♂, 30.iii, iv.1918 (*R. Mayné*), Kivu-mulungo, Tshibinda, 1 ♂, 2 ♀, 5.iv.1937, 22.iv.1938 (*Hendrickx*), Elizabethville, Kasongo, Kibambo, 4 ♂, vi.1930, iii.1932, viii.1959 (various collectors), Mus. R. Afr. centr.; SIERRA LEONE: Freetown, 13.vii.1899 (*E. E. Austen*), B.M.(N.H.); ABYSSINIA: Mulatos, Haxor, 1 ♂, 22–25. x.1920, A.M.N.H.

This species is very close to *S. phthisica* (Gerstäcker) and *S. maculosa* (Blöte), but can easily be separated from the latter by short rostrum and from the former by short lateral black line, never extending beyond the collar.

### *Stenocoris (Stenocoris) americana* sp. n.

(Text-figs. 85–87)

Characterized by pale body, long rostrum, reaching beyond the second coxae and by the form of ♂ and ♀ genitalia.



♂. Body length, 13.0–14.0 mm., width, 2.0–2.1 mm. Head length, 1.8–1.9 mm., width, 1.3–1.4 mm. Antennae, segment I, 3.0–3.1 mm., II, 2.2–2.3 mm., III, 2.3 mm., IV, 3.3 mm. Rostrum, segment I, 1.3 mm., II, 1.4 mm., III, 0.7 mm., IV, 0.8 mm. Pronotum, length, 2.2–2.4 mm., width, 2.0–2.1 mm. Hind femora, 5.9–6.0 mm. Hind tibia, 6.1–6.3 mm. Distance between ocelli, 0.4 mm., distance between an ocellus and an eye, 0.66 mm.

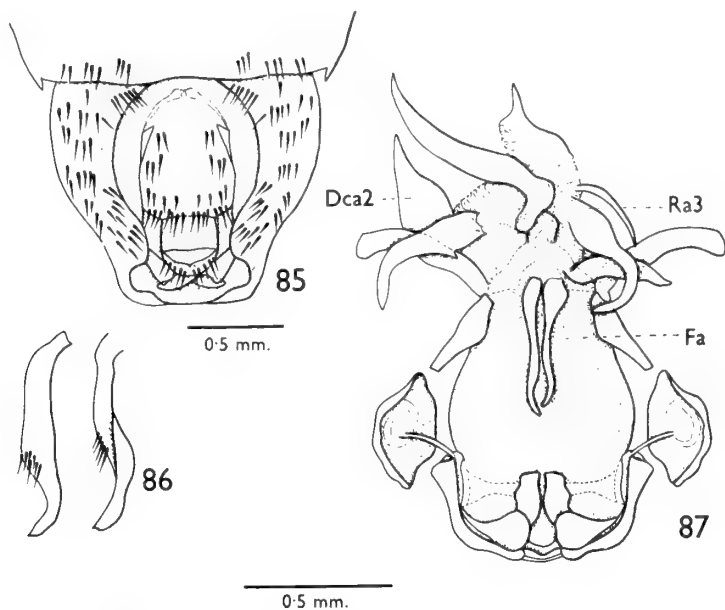
Body pale, comparatively slim. Head slightly tapering behind occipital suture, at least a third as long again as broad, pale with a brownish tinge; occipital suture medially concave, arms bending forward; paraclypeae short, about one-third of head; uniformly thin and pointed at apices. Antennae with underside of basal segment, three-quarters of second and third and basal portions of apical segments pale. Rostrum comparatively long, at least extending slightly beyond apices of second coxae. Lateral black line faint, extending from genae on to anterior third of propleuron. Pronotal disc pale, tinged with light brown, black spots on posterior angles faint. Legs pale, apices of femur and tibia tinged with light brown. Hemielytra brownish black. Abdomen with dorsum, excluding connexiva, red, venter pale ochraceous. Posterior margin of seventh abdominal tergum truncate; pygophore rounded with sides curved near apex, posterior margin truncate.

♂ GENITALIA: Claspers strongly curved in middle and at apices, acutely pointed; dorsal thecal appendages absent, ventral pair long thicker in middle and truncated at apices; four left lateral conjunctival appendages as in Text-fig. 87; frontal appendages paired, longest of all, strongly inwardly curved and acutely pointed at apices, four right lateral conjunctival appendages as in Text-fig. 87; dorsal appendages as in Text-fig. 87.

No ♀ available for study.

Holotype ♂, ECUADOR: Puna, Riksmus. Stockholm.

Paratypes, 1 ♂, with same data as holotype. Riksmus. Stockholm; VENEZUELA: Dapure San Fernada de Apure, Mayeul, 1 ♂, 1923, Mus. Hist. nat. Paris.



FIGS. 85–87. *Stenocoris americana*, ♂. 85, terminalia, dorsal view; 86, claspers, inner and outer views; 87, aedeagus (inflated), ventral view.

This species is very close to *S. tipuloides* (Degeer) and *S. braziliensis* sp. n. but can be separated by its comparatively long rostrum, which extends beyond apices of second coxae and by faint brownish black spots on the posterior angles of pronotum.

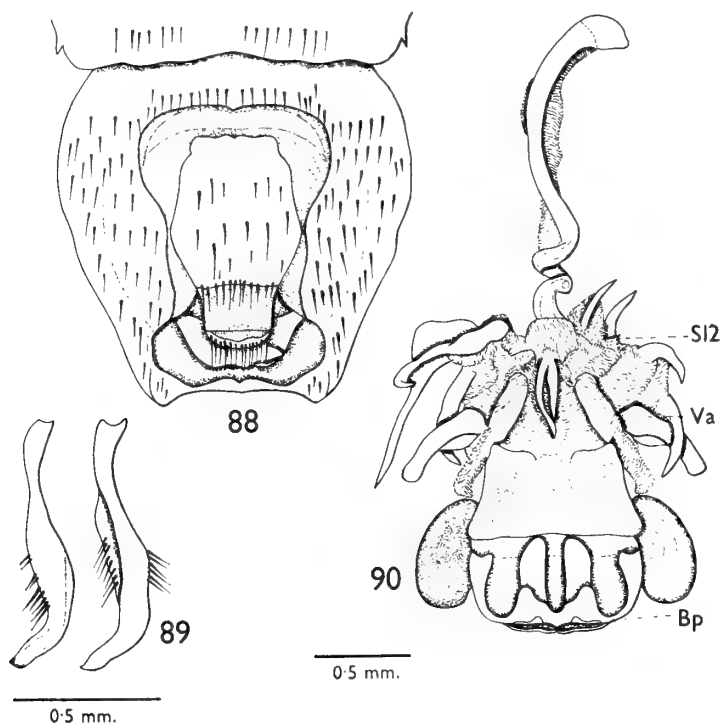
***Stenocoris (Stenocoris) apicalis* (Westwood) comb. n.**

(Text-figs. 88-96)

*Leptocorisa apicalis* Westwood, 1842 : 18

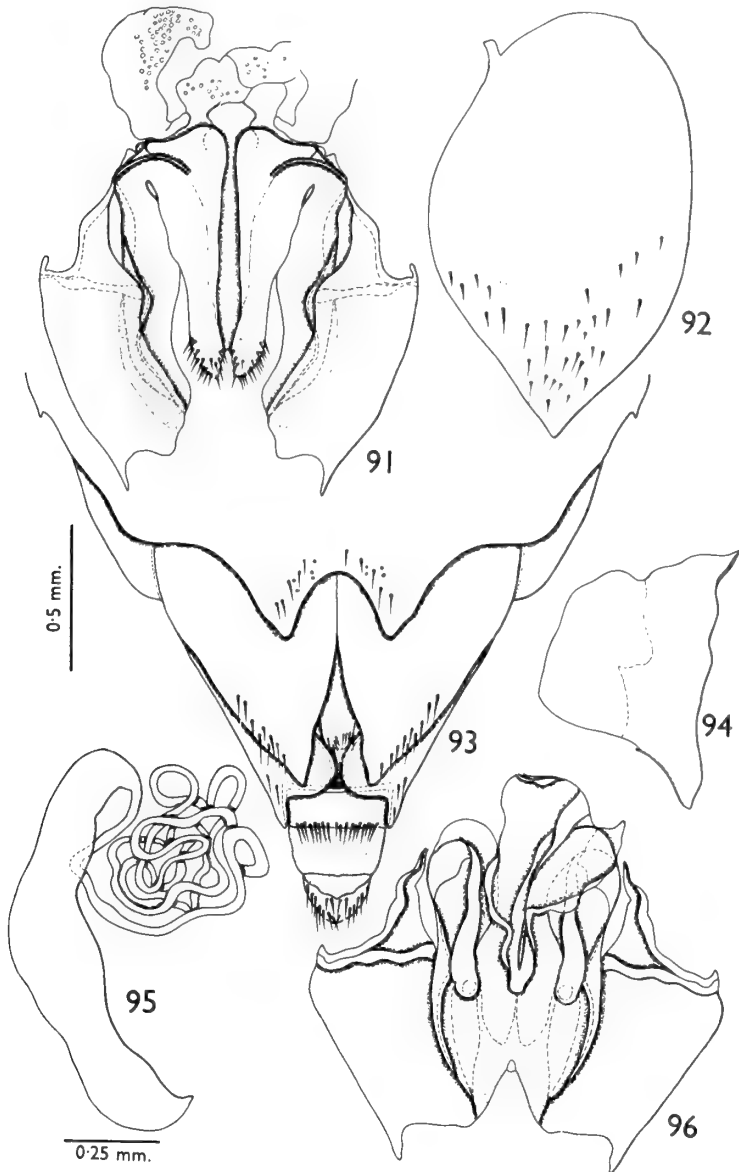
Characterized by medially strongly indented ♀ seventh abdominal sternum, giving triangular processes on either side, by large pygophore with strong posterior processes and by ♂ and ♀ genitalia.

♂. Body length, 12.8-13.5 mm., width, 2.1-2.3 mm. Head length, 1.6-1.9 mm., width, 1.3-1.46 mm. Antennae, segment I, 3.6-3.86 mm., II, 2.3-2.6 mm., III, 2.35-2.7 mm., IV, 4.0-4.2 mm. Rostrum, segment I, 1.4-1.5 mm., II, 1.4-1.5 mm., III, 0.7-0.73 mm., IV, 0.7-0.73 mm. Pronotum, length, 2.3-2.5 mm., width, 2.1-2.3 mm. Hind femora, 5.6-6.0 mm. Hind tibia, 6.0-6.4 mm. Distance between ocelli, 0.4-0.5 mm., distance between an ocellus and an eye, 0.7-0.75 mm.



FIGS. 88-90. *Stenocoris apicalis*, ♂. 88, terminalia, dorsal view ; 89, claspers, outer and inner views ; 90, aedeagus, ventral view.

Body comparatively robust, pale, tinged with black. Head slightly longer than broad; occipital suture medially "V"-shaped, following convexly towards sides; paraclypeae short, uniformly thick and rounded at apices. Antennae with underside of basal segment and basal portion of apical segments pale. Rostrum comparatively long, distinctly extending beyond



FIGS. 91-96. *Stenocoris apicalis*, ♀. 91, ovipositor, ventral view; 92, first gonocoxa, ventral view; 93, terminalia, ventral view; 94, first gonopophysis, ventral view; 95, spermatheca; 96, ovipositor, dorsal view.

apices of second coxae. Lateral black line faint, extending from genae on to anterior of propleuron. Pronotal disc pale, brownish black spots on posterior angles present. Legs pale, tibiae and tarsi tinged with black. Anal margins and *M-Cu* cell of hemielytra black. Abdomen with dorsum, excluding connexiva, red, venter pale ochraceous. Posterior margin of seventh abdominal tergum truncated, pygophore large, posterior processes prominent, acute; posterior margin broad, more than half the width of posterior margin of seventh abdominal tergum.

♂ GENITALIA: Claspers broad in middle, not strongly curved at apices; dorsal thecal appendages absent, ventral pair thicker at base with round apices; four left lateral conjunctival appendages as in Text-fig. 90; frontal conjunctival appendages paired, left long, thin and curved; four right lateral conjunctival appendages as in Text-fig. 90; dorsal appendages as in Text-fig. 90, with second spine-like appendage at base.

♀. Body length, 13.3–14.6 mm., width, 2.2–2.3 mm. Head length, 1.6–1.9 mm., width, 1.4–1.5 mm. Antennae, segment I, 3.3–3.6 mm., II, 2.0–2.3 mm., III, 2.3–2.5 mm., IV, 3.9–4.1 mm. Rostrum, segment I, 1.4–1.5 mm., II, 1.4–1.5 mm., III, 0.7–0.8 mm., IV, 0.7–0.8 mm. Pronotum, length, 2.3–2.4 mm., width, 2.2–2.3 mm. Hind femora, 5.2–6.0 mm. Hind tibia, 5.9–6.3 mm.; distance between ocelli, 0.4–0.5 mm.; distance between an ocellus and an eye, 0.7–0.8 mm.

Very similar to ♂ in general appearance; posterior margin of seventh abdominal sternum strongly indented medially, giving triangular processes on either side.

♀ GENITALIA: First gonocoxae large, concealing a large portion of ninth paratergite, broader at base and acutely pointed at apices; intervalvular sacs absent; spermatheca of thick crescent shape with a long and coiled tube.

Type material. Holotype ♀, without data but with type labels, Hope Dept., Univ. Mus. Oxford.

Other material. CONGO: 21 ♂, 30 ♀; GHANA: 2 ♂; CAMEROON: 15 ♂, 13 ♀.

This species seems to be restricted to the West African region. Adults have been collected from February until October.

This species is the closest to *S. sordida* (Blöte) but can be separated by triangular processes of ♀ seventh abdominal sternum and by broad posterior margin of the pygophore, which is always more than half the width of seventh abdominal tergum.

Stål, by misidentifying a hitherto unnamed species (now described as *S. (Erbula) southwoodi* sp. n.) as *Stenocoris apicalis* Westwood, established a subgenus (*Erbula*) to contain it.

The holotype ♀ (see above) is a typical *Stenocoris* s. str. in having bilobed posterior margin of seventh abdominal sternum and in lacking short tube of spermatheca, which is curled round its neck in *Erbula*.

### *Stenocoris (Stenocoris) braziliensis* sp. n.

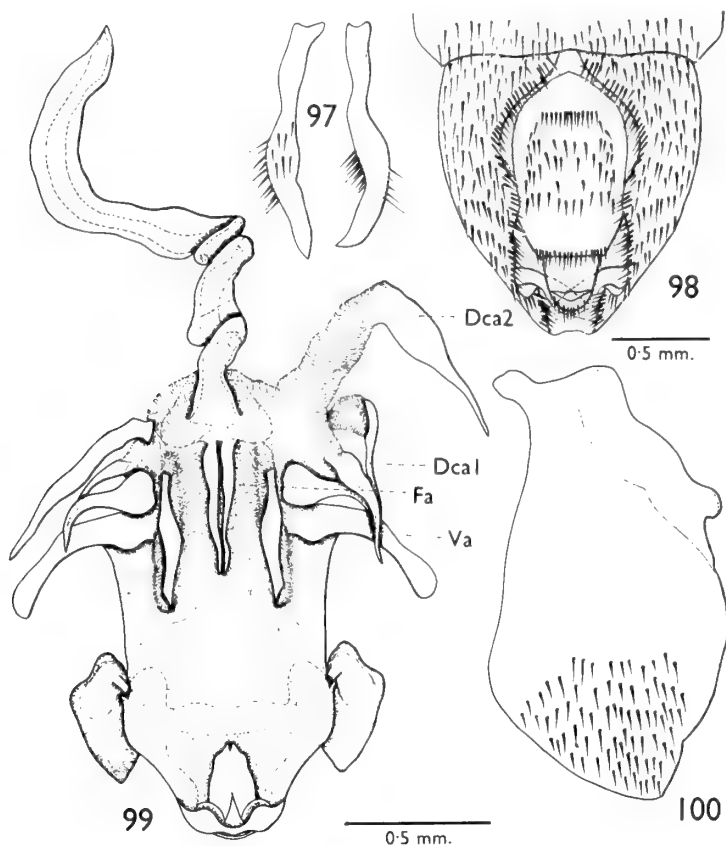
(Text-figs. 97–105)

Characterized by parallel-sided head, pale unicoloured body and by the form of ♂ and ♀ genitalia.

♂. Body length, 14.0–15.2 mm., width, 2.0–2.3 mm. Head length, 1.8–1.9 mm., width, 1.3–1.4 mm. Antennae, segment I, 3.0–3.6 mm., (only paraclypeae, 0.66–0.7 mm.), II, 2.1–2.3 mm., III, 2.3–2.5 mm., IV, 3.9–3.1 mm. Rostrum, segment I, 1.2–1.4 mm., II, 1.2–1.4 mm., III, 0.7–0.75 mm., IV, 0.8–0.85 mm. Pronotum, length, 2.4–2.5 mm., width, 2.0–2.3 mm. Hind femora, 5.6–6.0 mm. Hind tibia, 6.0–6.5 mm. Distance between ocelli, 0.5 mm., distance between an ocellus and an eye, 0.6 mm.

Body comparatively robust, pale unicoloured. Head parallel-sided, long, at least a third again longer than broad; occipital suture "V"-shaped with arms curving outwards towards sides of head; paraclypeae long, more than a third of head-length, uniformly thin and rounded at apices. Antennae pale, tinged black, with underside of basal segment, middle of second and third and basal portions of apical segments pale. Rostrum short, hardly reaching apices of second coxae. Lateral black line usually very faint, extending from sides of antenniferous tubercles on to anterior of propleuron. Pronotal disc, posteriorly with greenish tinge, posterior angles without black spots. Legs with bases of femora tinged with green and apices brownish. Anal margin and *M-Cu* cell of hemielytra brownish black. Abdomen with dorsum pale, unicoloured, venter pale, sometimes brownish. Posterior margin of seventh abdominal tergum truncated; pygophore rounded, tapering posteriorly with narrow, medially concave posterior margin.

♂ GENITALIA: Claspers comparatively long, thicker in middle, curved and pointed at apices; dorsal thecal appendages absent, ventral pair long, thicker at bases and rounded at apices; four left lateral conjunctival appendages as in Text-fig. 99; frontal conjunctival appendages paired, of equal sizes, long, thick at bases and acutely pointed at apices; four right lateral conjunctival appendages as in Text-fig. 99; dorsal appendages as in Text-fig. 99.



FIGS. 97-100. *Stenocoris braziliensis*. 97-99, ♂, 100, ♀. 97, claspers, inner and outer views; 98, terminalia, dorsal view; 99, aedeagus (inflated), ventral view; 100, first gonocoxa, ventral view.

♀. Body length, 14.5–15.5 mm., width, 2.2–2.3 mm. Head length, 1.9–2.0 mm., width, 1.3–1.4 mm. Antennae, segment I, 3.3–3.7 mm., (only paraclypeae 0.7–0.8 mm.), II, 2.3–2.5 mm., III, 2.4–2.6 mm., IV, missing. Rostrum, segment I, 1.3–1.5 mm., II, 1.4–1.5 mm., III, 0.7–0.8 mm., IV, 0.8–0.85 mm. Pronotum, length, 2.50–2.66 mm., width, 2.2–2.3 mm. Hind femora, 5.7–6.4 mm. Hind tibia, 6.1–6.7 mm. Distance between ocelli, 0.5–0.6 mm., distance between an ocellus and an eye, 0.6–0.7 mm.

Very similar to ♂ in general appearance and colour ; posterior margin of seventh abdominal sternum with a "U"-shaped median indentation.

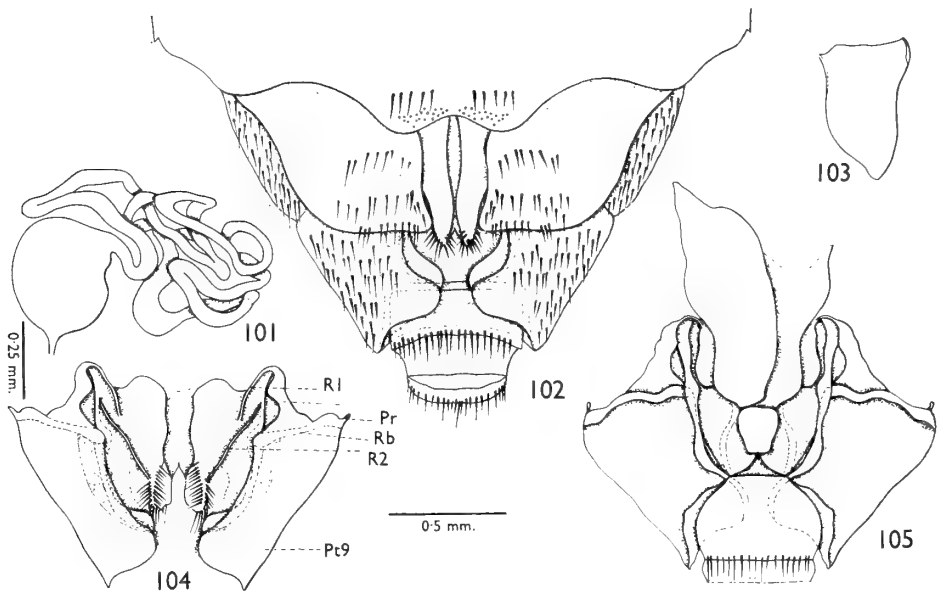
♀ GENITALIA : First gonocoxae almost triangular in form, apices rounded ; intervalvular sacs absent ; spermatheca round, bladder-shaped with a long and thick coiled tube (Text-fig. 101).

Holotype ♂, BRAZIL : State of Amazonas, Rio Cairy Uaapes, 1906 (Schmidt), A.M.N.H.

Paratypes. 1 ♂, 1 ♀, with data as holotype, A.M.N.H. ; MEXICO : Tapanatepec, 3 miles north Oaxaca, 2 ♂, 1 ♀, 22.xii.1955 (J. C. Schaffner), Ahmad Coll. ; 1 ♂ with some data as above, in Coll. J. C. Schaffner ; PANAMA CANAL ZONE : Darien, 2 ♀ (F. Geay), Mus. Hist. nat. Paris.

This species seems to be distributed as far as Oaxaca (Mexico) in the northern part of Neotropical region.

This species is close to *S. tipuloides* (Degeer) and *S. americana* sp. n. but can be separated by parallel-sided head, by uniformly thin, straight and long paraclypeae, which are rounded at the apices and by the lack of black spots on the posterior angles of pronotum.



FIGS. 101–105. *Stenocoris braziliensis*, ♀. 101, spermatheca ; 102, terminalia, ventral view ; 103, first gonopophysis, ventral view ; 104, ovipositor, ventral view ; 105, same, dorsal view.

*Stenocoris (Stenocoris) claviformis* sp. n.

(Text-figs. 106-115)

Characterized by club-shaped appendage in the aedeagus, by truncated processes of ♀ seventh abdominal sternum and by ♂ and ♀ genitalia.

♂. Body length, 13.5-14.2 mm., width, 2.0-2.15 mm. Head length, 1.6-1.7 mm., width, 1.4-1.6 mm. Antennae, segment I, 3.3-3.6 mm., II, 2.1-2.3 mm., III, 2.3-2.6 mm., IV, 3.6-4.0 mm. Rostrum, segment I, 1.5-1.6 mm., II, 1.5-1.6 mm., III, 0.8-0.83 mm., IV, 0.8-0.85 mm. Pronotum, length, 2.3-2.4 mm., width, 2.0-2.15 mm. Hind femora, 5.5-5.6 mm. Hind tibia, 6.0-6.1 mm. Distance between ocelli, 0.4-0.45 mm., distance between an ocellus and an eye, 0.7-0.73 mm.

Body robust, pale, tinged with black. Head comparatively short, slightly longer than broad; occipital suture medially concave, sides curving outwards; paraclypeae comparatively short, thinner at base and rounded at apices. Antennae brownish black, with underside of basal segments, bases and middle of second and bases of apical segments pale. Rostrum comparatively long, extending well beyond apices of second coxae. Lateral black line well represented, extending from genae on to anterior propleuron. Pronotal disc with blackish punctures, black spots on posterior angles present. Legs with apices of femora, tibiae and tarsi tinged with dark brown. Hemelytra with black punctures. Abdomen with dorsum, excluding connexiva, red, venter pale ochraceous. Posterior margin of seventh abdominal tergum truncated, usually slightly produced in middle; pygophore broader at base, tapering posteriorly; posterior margin about two fifths of width of posterior margin of seventh abdominal tergum.

♂ GENITALIA: Claspers uniformly thin, strongly curved and acutely pointed at apices; very small, fused, rod-like dorsal thecal appendages present, ventral appendages paired, thick at bases and very thin and curved near apices; four left lateral conjunctival appendages as in Text-fig. 113; frontal appendages longest of all, left thick, longer and curved; dorsal conjunctival appendages as in Text-fig. 113.

♀. Body length, 14.4-15.0 mm., width, 2.2-2.3 mm. Head length, 1.7-1.8 mm., width, 1.4-1.6 mm. Antennae, segment I, 3.2-4.1 mm., II, 2.0-2.7 mm., III, 2.2-2.5 mm., IV, 3.8-4.2 mm. Rostrum, segment I, 1.5-1.6 mm., II, 1.5-1.6 mm., III, 0.7-0.8 mm., IV, 0.8-0.9 mm. Pronotum, length, 2.3-2.5 mm., width, 2.2-2.3 mm. Hind femora, 5.3-5.6 mm. Hind tibia, 5.6-6.1 mm. Distance between ocelli, 0.4-0.46 mm., distance between an ocellus and an eye, 0.7-0.8 mm.

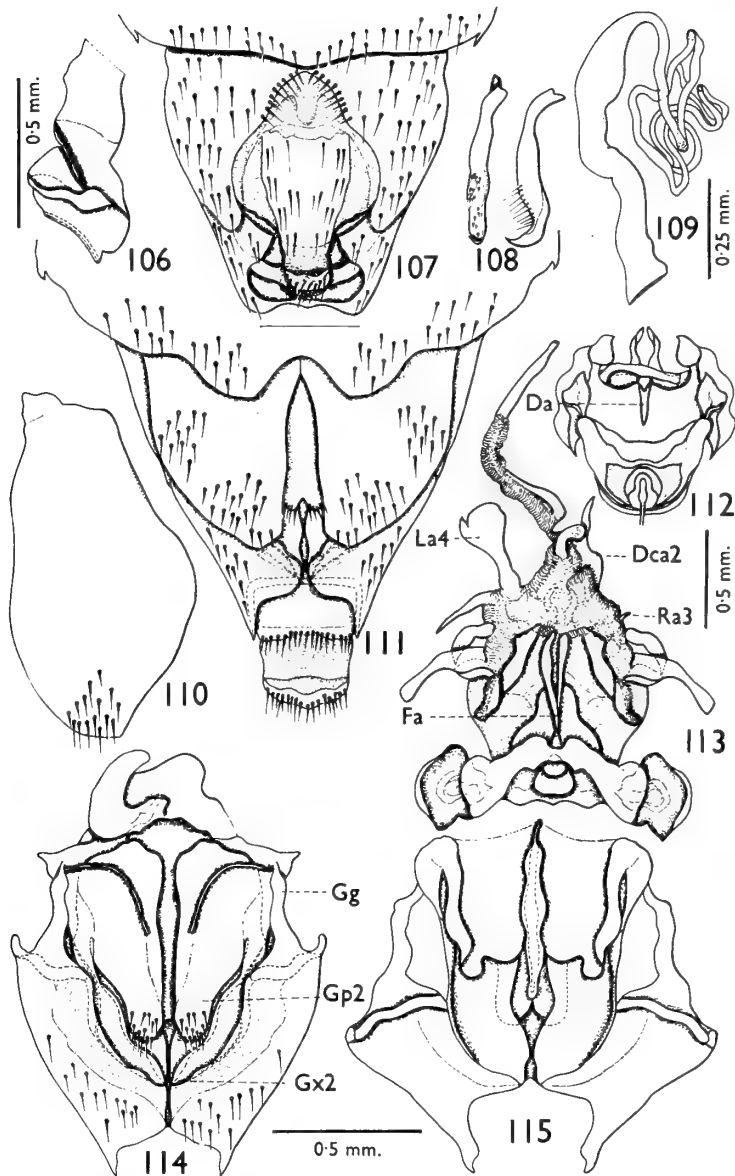
Very similar to ♂ but slightly longer, posterior margin of seventh abdominal venter medially indented, giving two truncated processes (Text-fig. 111).

♀ GENITALIA: First gonocoxae comparatively small, apices truncated (Text-fig. 110); intervalvular sacs absent; spermatheca tubular, slightly thicker in middle with a long coiled tube as in Text-fig. 109.

Holotype ♂, CONGO: Kasongo, ix.1959 (*P. L. G. Benoit*), Mus. R. Afr. centr.

Paratypes. 1 ♂ with same data as holotype, Mus. R. Afr. centr.; Uelé, Gangalano Bodio, Lulua, Capsanga, Bongo da lemba, 5 ♂, 7 ♀, 15.v.1936, ix.1952, i.1933, ii.1913 (various collectors), Mus. R. Afr. centr.; CAMEROON: Lolodorf, 8 ♂, 3 ♀ (*A. I. Good*), Carnegie Mus.

This species is closest to *S. africana* sp. n. in having small posterior processes of pygophore and truncated processes of ♀ seventh abdominal sternum. However it can easily be separated from *S. africana* by long rostrum, extending well beyond the apices of second coxae.



FIGS. 106–115. *Stenocoris claviformis*. 107, 108, 112–113, ♂, 106, 109–111, 114–115, ♀. 106, first gonopophysis, ventral view; 107, terminalia, dorsal view; 108, claspers, inner and outer views; 109, spermatheca; 110, first gonocoxa, ventral view; 111, terminalia, ventral view; 112, theca, dorsal view; 113, aedeagus (inflated), ventral view; 114, ovipositor, ventral view; 115, same, dorsal view.

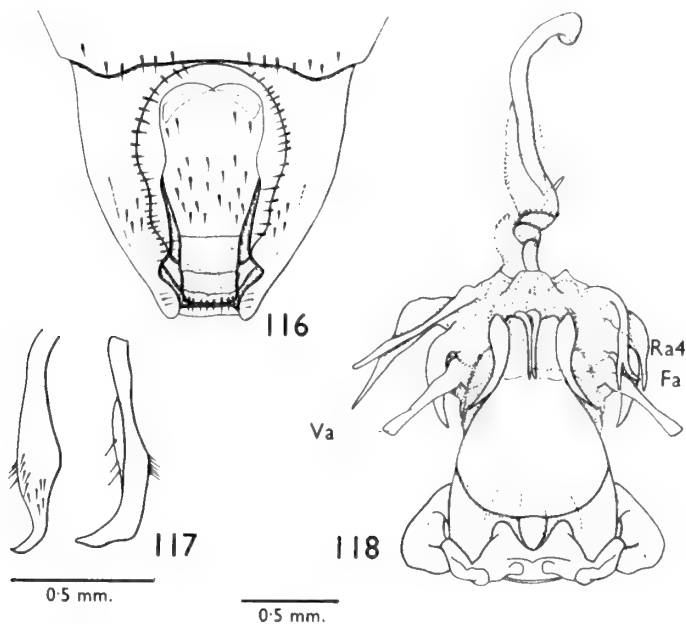


*Stenocoris (Stenocoris) ethiopsis* sp. n.

(Text-figs. 116-118)

Characterized by small size of the body, divergent paraclypeae and by the form of the ♂ and ♀ genitalia.

♂. Body length, 12.0 mm., width, 1.8 mm. Head length, 1.6 mm., (only paraclypeae 0.6 mm.), width, 1.3 mm. Antennae, segment I, 3.2 mm., II, 2.0 mm., III, 2.3 mm., IV, 4.1 mm. Rostrum, segment I, 1.3 mm., II, 1.3 mm., III, 0.65 mm., IV, 0.7 mm. Pronotum, length, 2.2 mm., width, 1.8 mm. Hind femora, 5.1 mm. Hind tibia, 5.6 mm. Distance between ocelli, 0.4 mm., distance between an ocellus and an eye, 0.7 mm.



FIGS. 116-118. *Stenocoris ethiopsis*, ♂. 116, terminalia, dorsal view; 117, claspers, inner and outer views; 118, aedeagus (inflated), ventral view.

Body comparatively very short and slim, pale, tinged with black. Head only about a quarter as long again as broad; occipital suture medially concave, arms curving outwards; paraclypeae about one-third of head, thicker in middle, very thin and divergent at apices. Antennae with underside of basal segments, articulations of first and second, second and third, middle of second and basal portions of apical segments, pale. Rostrum extending at least slightly beyond apices of second coxae. Lateral black line faint, extending from genae on to anterior of propleuron. Pronotal disc pale with black punctures, with smooth black spots on posterior angles. Legs with apices of femora slightly brownish. Hemelytra with black punctures on anal and claval areas. Abdomen with dorsum pale, unicolourous, venter pale ochraceous. Posterior margin of seventh abdominal tergum truncated, slightly laterally produced on either side; pygophore with small and rounded posterior processes, posterior margin a third of width of posterior margin of seventh abdominal tergum.

♂ GENITALIA : Claspers thicker in middle, strongly curved and pointed at apices ; dorsal thecal appendages absent, ventral paired, very thin, elongated and truncate at apices, four left lateral conjunctival appendages as in Text-fig. 118 ; frontal appendages paired, long, thin and curved at bases ; four right lateral conjunctival appendages with fourth bifurcated at apex (Text-fig. 118) ; dorsal appendages as in Text-fig. 118.

No ♀ available for study.

Holotype ♂, GHANA : Tafo, 24.iii-20.iv.1959 (*R. Smith*) (recorded by Southwood, 1961, on light trap), B.M.(N.H.).

Paratypes. 2 ♂, same data as holotype, but without terminalia, B.M.(N.H.).

This seems to be a rare species and is probably confined to West Africa.

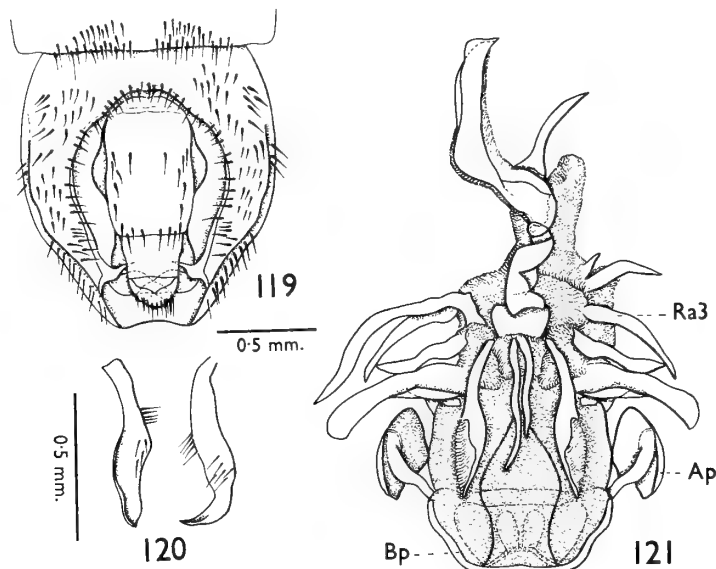
This species is close to *S. claviformis* sp. n. and *S. africana* sp. n. but can be separated from them in having medium sized rostrum only slightly extending beyond apices of second coxae (extending well beyond the apices of second coxae in *claviformis* and in *africana* never extending beyond second coxae). Its bifurcated fourth right lateral conjunctival appendage is its peculiarity.

***Stenocoris (Stenocoris) maculosa* (Blöte) comb. n.**

(Text-figs. 119-127)

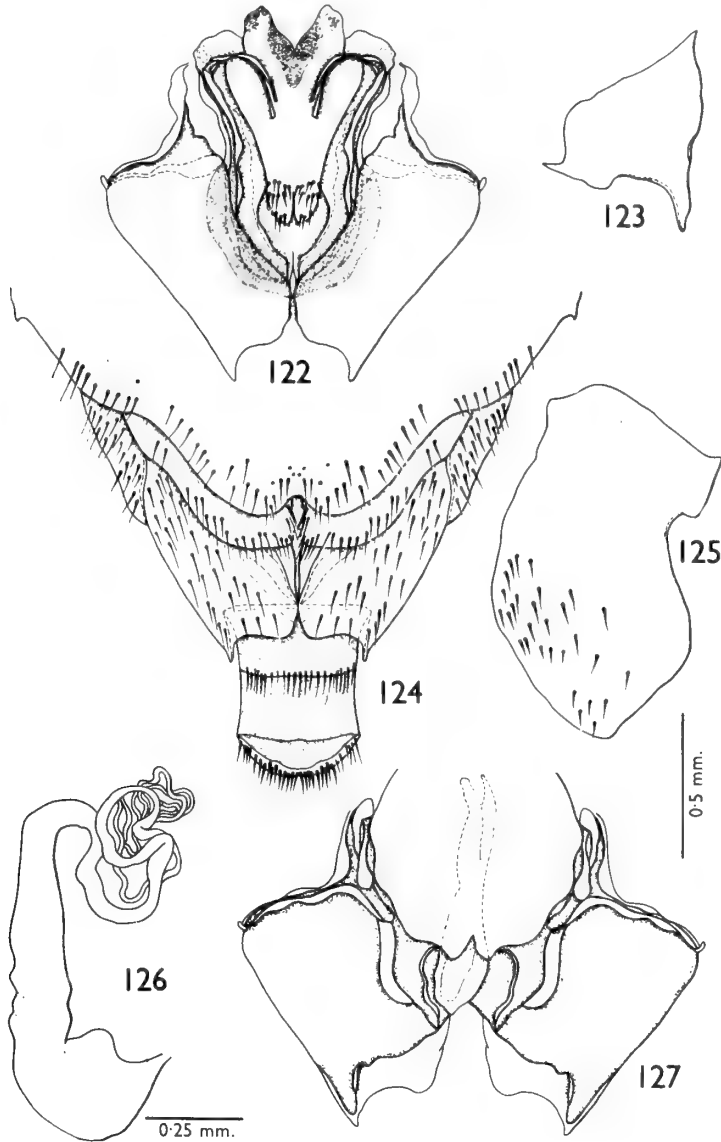
*Leptocorixa (Stenocoris) maculosa* Blöte, 1937 : 290 ; Villiers, 1963 : 232

Characterized by long rostrum extending well beyond the apices of second coxae and by the form of the ♂ and ♀ genitalia.



FIGS. 119-121. *Stenocoris maculosa*, ♂. 119, terminalia, dorsal view ; 120, claspers, inner and outer views ; 121, aedeagus (inflated), ventral view.

♂. Body length, 13.0–15.5 mm., width, 1.9–2.1 mm. Head length, 1.7–1.9 mm., width, 1.2–1.3 mm. (only paraclypeae 0.6 mm.). Antennae, segment I, 3.2–3.5 mm., II, 2.1–2.4 mm., III, 2.3–2.5 mm., IV, 3.5–3.7 mm. Rostrum, segment I, 1.3–1.4 mm., II, 1.3–1.4 mm., III, 0.7–0.73 mm., IV, 0.75–0.85 mm. Pronotum, length, 2.2–2.4 mm., width, 1.9–2.1 mm. Hind femora, 5.1–6.0 mm. Hind tibia, 5.3–6.5 mm. Distance between ocelli, 0.4 mm.; distance between an ocellus and an eye, 0.75 mm.



FIGS. 122–127. *Stenocoris maculosa*, ♀. 122, ovipositor, ventral view; 123, first gonopophys, ventral view; 124, terminalia, ventral view; 125, first gonocoxa, ventral view; 126, spermatheca; 127, ovipositor, dorsal view.

Body linear, pale, tinged with black. Head at least a third as long again as broad; occipital suture medially concave, arms curving outwards towards sides; paraclypeae long, uniformly thin and rounded at apices. Antennae with underside of basal segment, middle of second and third and bases of fourth, pale. Rostrum long, extending well beyond apices of second coxae. Lateral black line usually represented by two black dots on sides of antenniferous tubercles and collar. Pronotal disc tinged with light brown, posterior angles with brownish black spots. Legs with apices of femora tinged with red. Hemielytra blackish, anal and claval areas with black punctures. Abdomen with dorsum, excluding connexiva, red, venter pale ochraceous. Posterior margin of seventh abdominal tergum truncate; pygophore small, rounded, with emarginate posterior margin.

♂ GENITALIA: Claspers thicker in middle with a long thin neck, apices pointed; dorsal thecal appendages absent, ventral pair curved in middle and rounded at apices; four left lateral conjunctival appendages as in Text-fig. 121; frontal appendages paired, very long, uniformly thin and curved near bases and apices; four right lateral conjunctival appendages as in Text-fig. 121; dorsal appendages as in Text-fig. 121.

♀. Body length, 14.5–16.0 mm., width, 2.1–2.4 mm. Head length, 1.8–2.0 mm., width, 1.4–1.5 mm. Antennae, segment I, 3.1–3.2 mm., II, 2.2–2.4 mm., III, 2.3–2.5 mm., IV, 3.0–3.6 mm. Rostrum, segment I, 1.5–1.6 mm., II, 1.5–1.6 mm., III, 0.7–0.75 mm., IV, 0.75–0.85 mm. Pronotum, length, 2.4–2.8 mm., width, 2.1–2.4 mm. Hind femora, 5.9–6.2 mm. Hind tibia, 6.3–6.5 mm. Distance between ocelli, 0.4–0.5 mm., distance between an ocellus and an eye, 0.7–0.85 mm.

Very similar to ♂ in general appearance and colour, slightly larger; posterior margin of seventh abdominal sternum almost inverted "V"-shaped in middle as in Text-fig. 124.

♀ GENITALIA: First gonocoxae largely concealed by seventh abdominal sternum, apices rounded; intervalvular sacs absent, spermatheca tapering anteriorly with lateral margins irregular and a small, thick and coiled tube (Text-fig. 126).

Type material. Holotype ♂, SOUTH AFRICA: Pondoland, Port St. John, x.1923 (R. E. Turner), B.M.(N.H.); allotype ♀, data as holotype, B.M.(N.H.); paratypes, SOUTH AFRICA: Zululand, Natal, Durban, 4 ♂, 3 ♀, 20–21.ii.1925 (C. N. Barker), B.M.(N.H.); Umkomaas River, 1 ♂, 1847, B.M.(N.H.); UGANDA: Siroko R., near foot of Mt. Elgon, 3,600 ft., 1 ♂, 1–14.viii.1911 (S. A. Neave), B.M.(N.H.).

Other material. CONGO: 30 ♀, 36 ♀; UGANDA: 1 ♂, 2 ♀; ANGOLA: 2 ♂; TANGANYIKA: 14 ♂, 5 ♀; CAMEROONS: 1 ♂; RHODESIA (N. and S.): 2 ♂.

The range of this species seems to extend in the west into Cameroons and in the east into Tanganyika, but it is particularly common in southern Africa, Rhodesia and Angola. The adults have been collected from May until November.

This species is close to *S. phthisica* (Gerstäcker), *S. pallida* (Blöte) and *S. africana* sp. n. in general appearance but can easily be separated from them by the long rostrum, which extends well beyond the apices of second coxae.

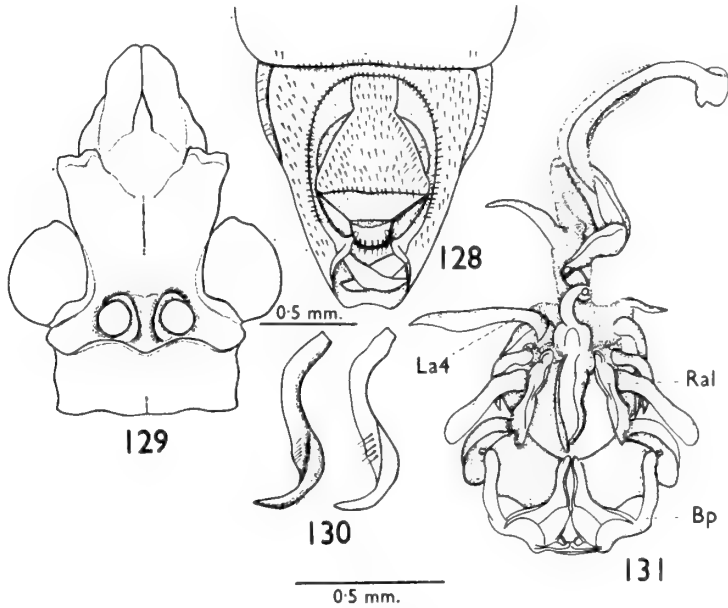
### *Stenocoris (Stenocoris) pallida* (Blöte) comb. n.

(Text-figs. 128–137)

*Leptocorixa (Stenocoris) pallida* Blöte, 1937: 295

Characterized by the pale unicolourous disc of pronotum, which is without black spots on posterior angles, by a black dot on sides of collar and by the form of ♂ and ♀ genitalia.

♂. Body length, 13.5–14.5 mm., width, 1.9–2.1 mm. Head length, 1.8–2.0 mm., width, 1.3–1.4 mm. (only paraclypeae 0.6–0.7 mm.). Antennae, segment I, 3.6–3.8 mm., II, 2.4–2.6 mm., III, 2.5–2.7 mm., IV, 3.8–4.1 mm. Rostrum, segment I, 1.3–1.5 mm., II, 1.3–1.5 mm., III, 0.65–0.75 mm., IV, 0.75–0.85 mm. Pronotum, segment I, 2.3–2.6 mm., width, 1.9–2.1 mm. Hind femora, 6.0–6.4 mm. Hind tibia, 6.5–6.8 mm. Distance between ocelli, 0.4–0.45 mm., distance between an ocellus and an eye, 0.6–0.67 mm.



FIGS. 128–131. *Stenocoris pallida*, ♂. 128, terminalia, dorsal view; 129, head, dorsal view; 130, claspers, inner and outer views; 131, aedeagus (inflated), ventral view.

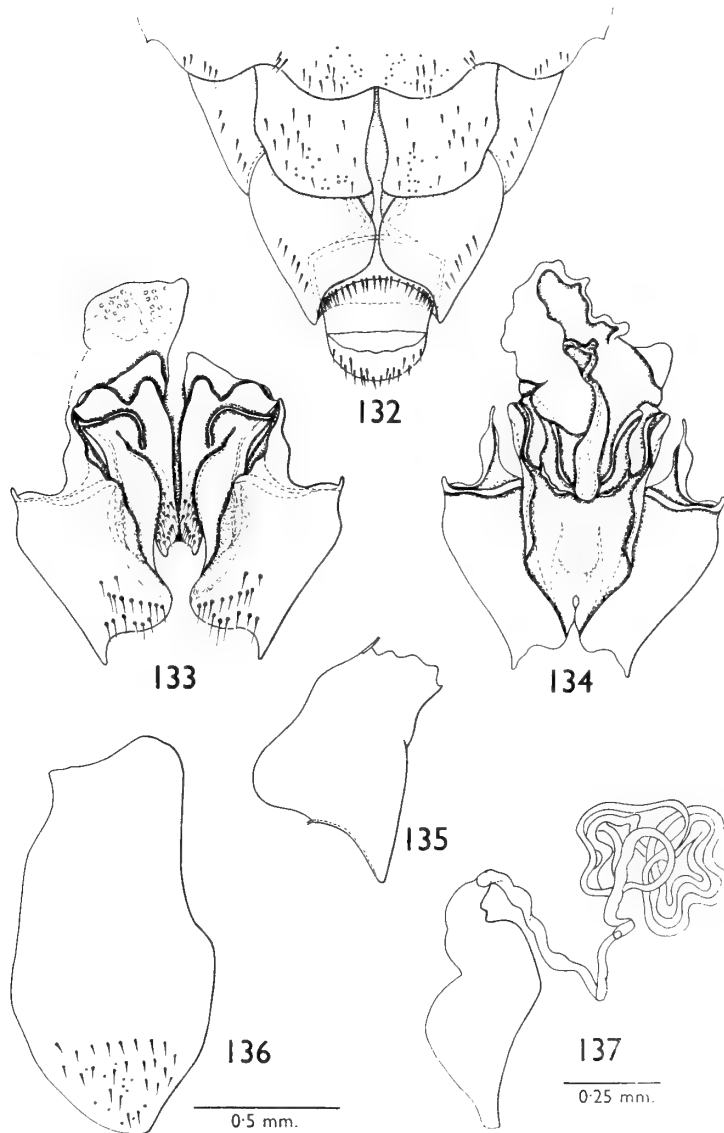
Body comparatively robust, pale, unicoloured. Head long, more than a third as long again as broad; occipital suture medially "V"-shaped, arms curving outwards towards sides; paraclypeae long, more than a third as long as head, thicker at bases and rounded at apices. Antennae pale, with apices of second, third and apical three-quarters of fourth segments brownish black. Rostrum short, hardly reaching apices of second coxae. Lateral black line usually represented by a black dot on sides of collar. Pronotal disc pale unicoloured, black spots on posterior angles absent. Legs with apices of femora usually tinged with red. Hemelytra usually brownish black. Abdomen with dorsum, excluding connexiva, red; venter pale ochraceous. Posterior margin of seventh abdominal tergum truncate; pygophore elongate, thicker at base and tapering posteriorly.

♂ GENITALIA: Claspers strongly curved in middle, strongly curved and pointed at apices; dorsal thecal appendages absent; ventral pair long, almost straight and rounded at apices; four left lateral conjunctival appendages as in Text-fig. 131; frontal conjunctival appendages paired, long, at least as long as or longer than first lateral conjunctival appendages; four right lateral conjunctival appendages as in Text-fig. 131; a single dorsal appendage as in Text-fig. 131.

♀. Body length, 14.5–16.0 mm., width, 2.0–2.1 mm. Head length, 1.8–2.0 mm., width, 1.3–1.5 mm. (only paraclypeae 0.6–0.7 mm.). Antennae, segment I, 3.1–3.8 mm., II, 2.3–2.5 mm., III, 2.4–2.7 mm., IV, 3.9–4.2 mm. Rostrum, segment I, 1.3–1.4 mm., II, 1.3–1.4 mm., III,

0.7-0.75 mm., IV, 0.75-0.85 mm. Disc of pronotum 2.3-2.6 mm., width, 2.0-2.1 mm. Hind femora, 6.0-6.2 mm. Hind tibia, 6.5-6.7 mm. Distance between ocelli, 0.4-0.45 mm., distance between an ocellus and an eye, 0.6-0.7 mm.

Very similar but usually larger than ♂; posterior margin of seventh abdominal sternum almost an inverted "V"-shape in middle as in Text-fig. 132, large basal portion of ninth paratergite visible.



FIGS. 132-137. *Stenocoris pallida*, ♀. 132, terminalia, ventral view; 133, ovipositor, ventral view; 134, same, dorsal view; 135, first gonopophysis, ventral view; 136, first gonocoxa, ventral view; 137, spermatheca.

♀ GENITALIA : First gonocoxae largely concealed by seventh abdominal sternum, outer margin irregular ; intervalvular sacs absent ; spermatheca irregular, pelican-shaped with a long, thick and coiled tube.

Type material. Holotype ♂, UGANDA : between Mitiana and Entebbe, 3,800 ft., 9-11.i. (S. A. Neave), B.M.(N.H.) ; allotype ♀, and paratypes, 4 ♂, 1 ♀, with same data as holotype, B.M.(N.H.) ; KENYA : Shimba, 4 ♂, 3 ♀, vii.1912 (A. D. Milne), B.M.(N.H.) ; NYASALAND : Zomba, Mlanje, Mimosa, 3 ♂, 3 ♀, iv.1962, 7.xi.1913, 10.v.1919, B.N.(M.H.) ; Zomba, Mlanje, 2,300 ft., lower Shire valley, near Chikawa, 600 ft., 15.viii., 5.ix., 7.xi.1913, 16.iv.1910, 13.vi., vii.1912 (various collectors), B.M.(N.H.) ; ZANZIBAR : 1 ♂, 1.ii.1925 (H. J. Shell), B.M.(N.H.) ; KENYA : Mazimosa, Tayari, 1 ♂, 9.ii. (B. Elbon), B.M.(N.H.) ; UGANDA : S. E. Shore of L. Kiaja, 2,400 ft., Entebbe, 3 ♂, 2 ♀, 11.viii.1911, 14-25.v.1912 (S. A. Neave, C. C. Gowdey), B.M.(N.H.).

Other material. KENYA : 3 ♂, 4 ♀ ; TANGANYIKA : 10 ♂, 13 ♀ ; UGANDA : 4 ♂, 2 ♀.

This is an East African species. Its range extends in the south into Nyasaland and in the north into Kenya. It has not been reported from central or western Africa. The adults have been collected mainly between April and November, but 2 ♂ were collected from Zanzibar and Kenya in February.

This species is closest to *S. phthisica* (Gerstäcker) but can be separated from it by the paraclypeae, which are thicker at base and thinner and rounded at apices in this species (Text-fig. 129), whilst they are thicker in the middle in *phthisica* (Text-fig 140). The lateral black line in the form of a black dot on either side of collar and lack of black spots on the posterior angles of pronotum separate it from all the other species of the subgenus *Stenocoris*.

### *Stenocoris (Stenocoris) phthisica* (Gerstäcker) comb. n.

(Text-figs. 138-147)

*Leptocorisa phthisica* Gerstäcker, 1873 : 406

*Leptocorixa (Stenocoris) annulicornis* Signoret ; Blöte, 1937 : 289 **syn. n.**

*Leptocorixa (Stenocoris) blotei* Villiers, 1963 : 232 **syn. n.**

Characterized by long paraclypeae, which are thicker only in the middle and are rounded at apices (Text-fig. 140) and by the form of ♂ and ♀ genitalia.

♂. Body length, 13.5-15.0 mm., width, 1.8-2.0 mm. Head length, 1.7-1.9 mm., (head exposed 2.0-2.1 mm.), width, 1.2-1.3 mm. (only paraclypeae 0.66-0.7 mm.). Antennae, segment I, 3.6-3.9 mm., II, 2.6-2.7 mm., III, 2.7-2.75 mm., IV, 4.0-4.1 mm. Rostrum, segment I, 1.1-1.4 mm., II, 1.1-1.4 mm., III, 0.6-0.7 mm., IV, 0.7-0.75 mm. Pronotum, length, 2.1-2.4 mm., width, 1.8-2.0 mm. Hind femora, 5.9-6.7 mm. Hind tibia, 6.3-6.9 mm. Distance between ocelli, 0.4-0.5 mm., distance between an ocellus and an eye, 0.66-0.7 mm.

Body linear, pale unicolourous. Head long, about half as long again as broad ; occipital suture medially concave, arms following straight towards sides ; paraclypeae long, about two-fifths of entire head, thicker in middle and thinner at bases and apices, apices rounded (Text-fig. 140). Antennae brownish black with underside of basal segment, middle of second and third and bases of apical segments pale. Rostrum short, reaching second coxae. Lateral black line faint, usually extending from sides of antenniferous tubercles on to anterior of propleuron.

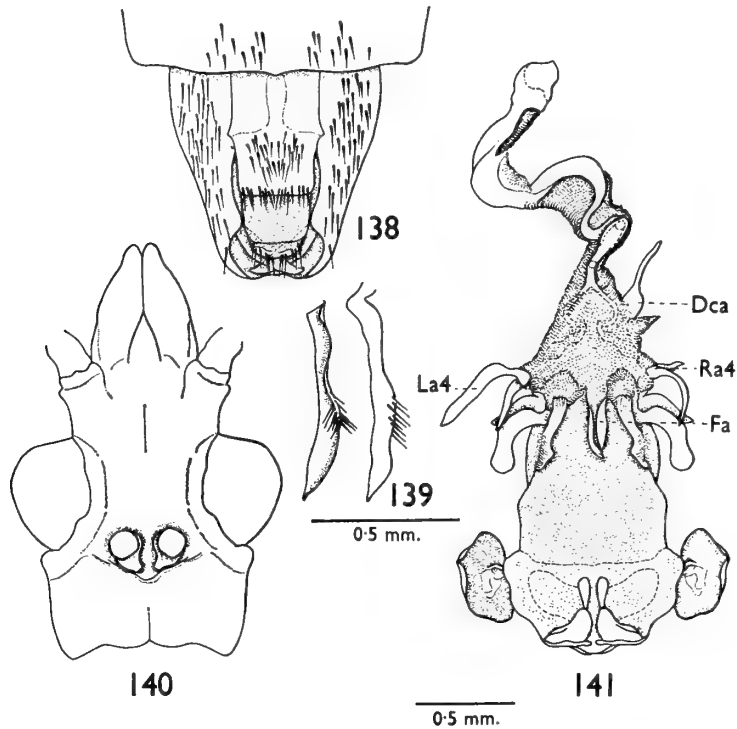
Pronotal disc pale unicoloured, black spots on posterior angles sometimes present. Legs with apices of femora and bases of tibiae tinged with red. Hemelytra tinged brownish black. Abdomen with dorsum tinged with light brown, venter pale ochraceous. Posterior margin of seventh abdominal tergum truncate, pygophore elongated, thinner in middle, posterior margin emarginate (Text-fig. 138).

♂ GENITALIA : Claspers long, uniformly thin and rounded at apices (Text-fig. 139) ; dorsal thecal appendages absent ; ventral pair thinner at bases, thick and rounded at apices ; four left lateral conjunctival appendages as in Text-fig. 141 ; frontal conjunctival appendages paired, comparatively short and thick, left uniformly thin and curved ; four right lateral conjunctival appendages as in Text-fig. 141 ; dorsal appendage as in Text-fig. 141.

♀. Body length, 15.5–16.0 mm., width, 2.1–2.2 mm. Head length, 1.8–2.0 mm., width, 1.3–1.35 mm. Antennae, segment I, 3.5–3.6 mm., II, 2.3–2.4 mm., III, 2.4–2.5 mm., IV, 3.9–4.1 mm. Rostrum, segment I, 1.3–1.4 mm., II, 1.4–1.5 mm., III, 0.7–0.8 mm., IV, 0.75–0.8 mm. Pronotum, length, 2.3–2.6 mm., width, 2.1–2.2 mm. Hind femora, 6.0–6.3 mm. Hind tibia, 6.3–6.6 mm. Distance between ocelli, 0.4–0.5 mm., distance between an ocellus and an eye, 0.66–0.7 mm.

Very similar to ♂ in general appearance and colour but usually larger ; posterior margin of seventh abdominal sternum with "U"-shaped indentation in the middle and curved towards extremities as in Text-fig. 142.

♀ GENITALIA : First gonocoxae with outer margin irregular, apices rounded (Text-fig. 146), almost triangular in external view ; intervalvular sacs absent ; spermatheca irregular, thicker in middle, with a long and coiled tube of varying thickness (Text-fig. 147).

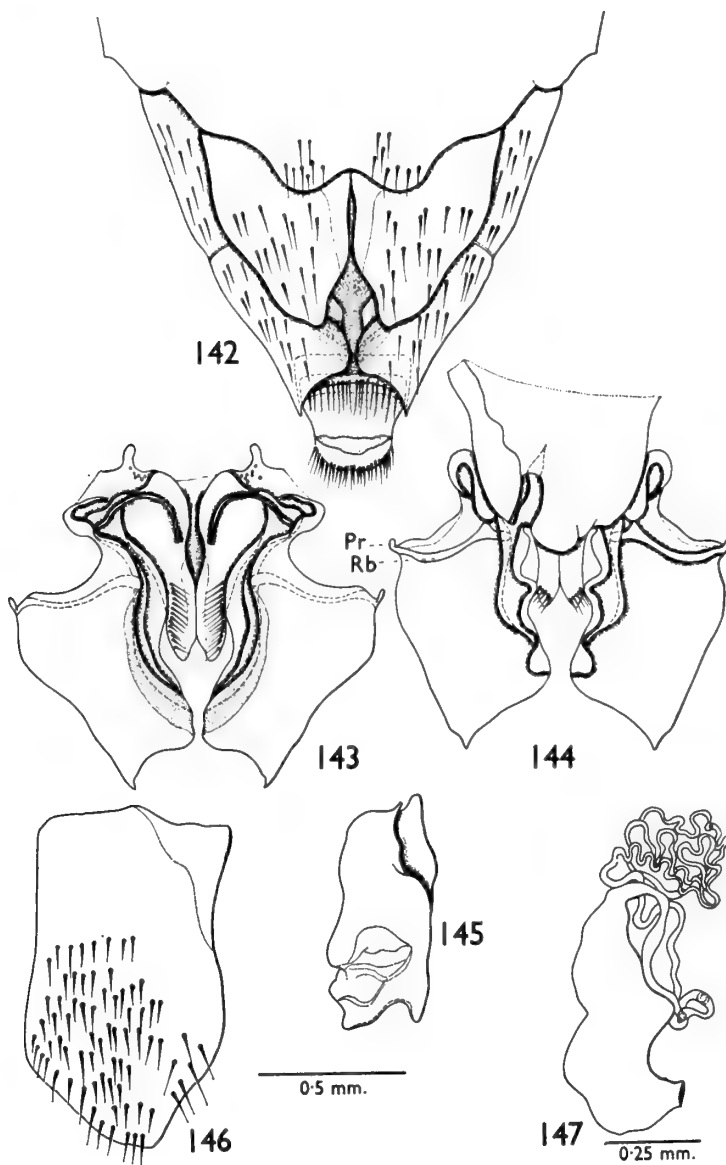


FIGS. 138–141. *Stenocoris phthisica*, ♂. 138, terminalia, dorsal view ; 139, claspers, inner and outer views ; 140, head, dorsal view ; 141, aedeagus (inflated), ventral view.



Type material. Holotype ♂, EAST AFRICA : Mbaramu (*V. I. Deck*), Humboldt. Univers. Berlin ; cotype ♂, without data, Humboldt. Univers. Berlin.

Other material. CONGO : 12 ♂, 8 ♀ ; TANGANYIKA : 6 ♂, 3 ♀ ; KENYA : 6 ♂, 6 ♀ ; SEYCHELLES : 1 ♂ ; MAURITIUS : 1 ♂.



FIGS. 142-147. *Stenocoris phthisica*, ♀. 142, terminalia, ventral view ; 143, ovipositor, ventral view ; 144, same, dorsal view ; 145, first gonopophysis, ventral view ; 146, first gonocoxa, ventral view ; 147, spermatheca.

This species is distributed in eastern and central Africa. Its range extends in the east into Mauritius and Seychelles and in the west into Congo, Central Africa. Adults have been collected during March to August.

This species is close to *S. maculosa* (Blöte), *S. pallida* (Blöte), and *S. africana* sp. n. but can easily be separated from them by paraclypeae which are long, thicker in the middle, and very thin and rounded at apices.

Blöte redescribed *Leptocorisa annulicornis* Signoret, 1860 (now *Stenocoris* (*Erbula*) *annulicornis*) and placed it under the subgenus *Stenocoris*. Villiers showed that Blöte had misidentified Signoret's species and suggested that *annulicornis* Blöte nec Signoret from Seychelles was a new species and named it *blotei*. It has not been possible to borrow types of *L. (S.) blotei* for the present study, but ♂ specimens (with Blöte's det. label) from Mauritius and Seychelles in the B.M.(N.H.) have been examined. The structure of the aedeagus shows that *L. blotei* is a synonym of *S. phthisica* (Gerstäcker). However ♀ specimens from Seychelles : Mahe, 5.12.1905, leg. J. S. Gardiner (B.M.(N.H.)) also seen by Blöte are in fact true *annulicornis* and this would appear to apply also to the supposed ♀ of *L. (S.) blotei* figured by Villiers (1963 : 232). The posterior margin of seventh abdominal sternum is produced in the middle and the posterior margin of this projection is slightly concave in the middle, which is characteristic of the subgenus *Erbula*.

### *Stenocoris (Stenocoris) sordida* (Blöte) comb. n.

(Text-figs. 148-156)

*Leptocorixa (Stenocoris) sordida* Blöte, 1937 : 292 ; Villiers, 1955 : 1143, 1144, 1963 : 232

Characterized by prominent, pointed posterior processes of pygophore, rounded processes of posterior margin of ♀ seventh abdominal sternum and by the form of ♂ and ♀ genitalia.

♂. Body length, 12.5-15.0 mm., width, 2.1-2.5 mm. Head length, 1.6-2.1 mm., width, 1.3-1.5 mm. Antennae, segment I, 3.5-3.8 mm., II, 2.3-2.5 mm., III, 2.31-2.5 mm., IV, 4.0-4.2 mm. Rostrum, segment I, 1.4-1.6 mm., II, 1.4-1.6 mm., III, 0.7-0.9 mm., IV, 0.7-0.9 mm. Pronotum, length, 2.3-2.7 mm., width, 2.1-2.5 mm. Hind femora, 5.8-6.0 mm. Hind tibia, 6.0-6.5 mm. Distance between ocelli, 0.4-0.5 mm. ; distance between an ocellus and an eye, 0.65-0.8 mm.

Body comparatively robust, pale, tinged with black. Head usually slightly longer than broad ; occipital suture medially concave, curving outwards towards sides ; paraclypeae comparatively short, thinner at base and rounded at apices. Antennae dark brown, with underside of basal segment and bases of the apical segments pale. Rostrum long, usually reaching halfway between apices of second and bases of third coxae. Lateral black line well represented from genae on to anterior of propleuron. Pronotal disc pale, posteriorly with black punctures, posterior angles with smooth black spots. Legs with apices of femora brown, tibiae and tarsi tinged with brownish black. Hemelytra with black punctures. Abdomen with dorsum, excluding connexiva, brown, venter pale ochraceous. Posterior margin of seventh abdominal tergum truncate ; pygophore large (Text-fig. 148), posterior processes prominent, acutely pointed, posterior margin less than half of posterior margin of seventh abdominal tergum.

♂ GENITALIA : Claspers strongly curved and acutely pointed at apices ; dorsal thecal

appendages absent ; ventral pair thicker at base and very thin and rounded at apices ; four left conjunctival appendages as in Text-fig. 150 ; frontal conjunctival appendages paired, left slightly longer and straighter ; four right lateral conjunctival appendages as in Text-fig. 150 ; a pair of dorsal conjunctival appendages as in Text-fig. 150 without second spine-like appendage.

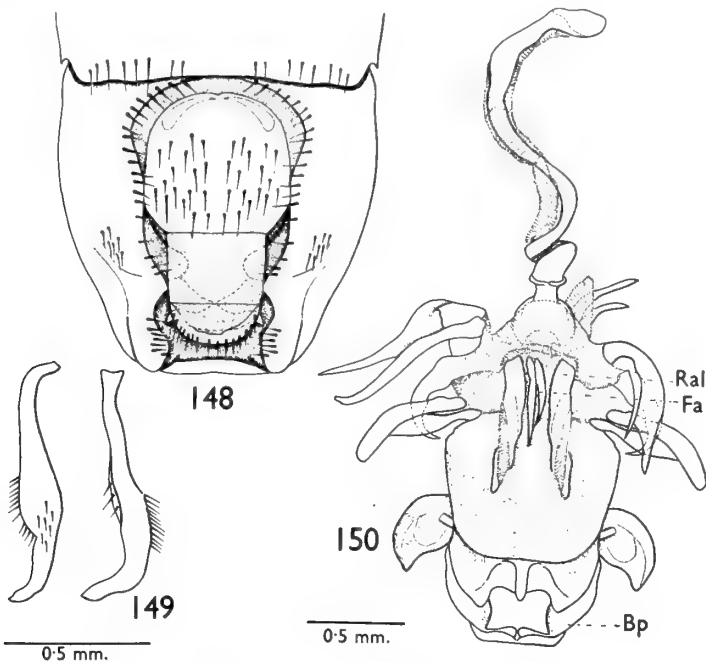
♀. Very similar to ♂ in general appearance, colour and measurements ; posterior margin of seventh abdominal sternum medially strongly indented, forming rounded processes on either side (Text-fig. 151).

♀ GENITALIA : First gonocoxae not concealing a large portion of ninth paratergite, rounded at apices ; intervalvular sacs absent ; spermatheca broad, curved, with a short coiled tube.

Type material. Holotype ♂, UGANDA : Entebbe, xii.1912 (C. C. Gowdey), B.M.(N.H.) ; allotype ♀ and paratypes, 1 ♂, 2 ♀, with same data as holotype, B.M.(N.H.) ; shores of L. Isolt or Wanala, 3,800 ft., 1 ♀, 7-8.i.1912 (S. A. Neave), B.M.(N.H.) ; Bugma Forest, Ruwenzori Range, 6,500 ft., Kimbe, Tero Forest, Semliki Plain, near south shore of L. Albert, 2,200 ft., 4 ♂, 4 ♀, ii, vii, ix, xii.1912, i.1913 (various collectors), B.M.(N.H.).

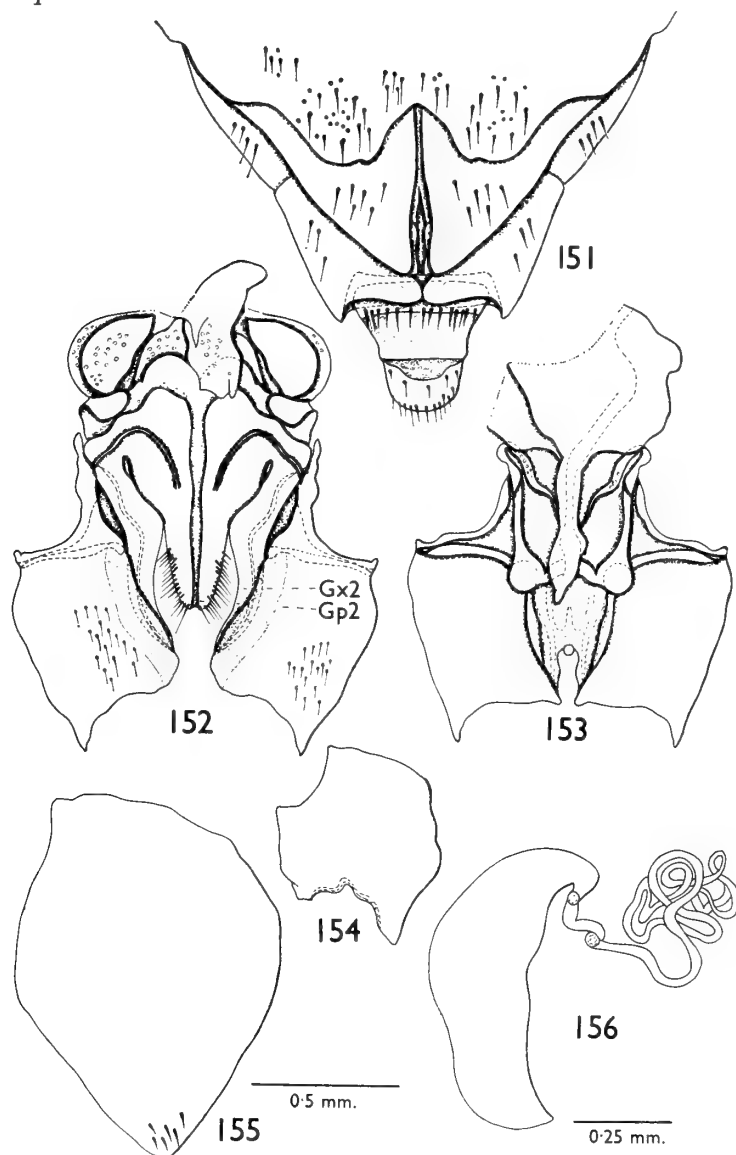
Other material. SIERRA LEONE : 4 ♂, 1 ♀ ; GHANA : 4 ♂, 1 ♀ ; NIGERIA : 1 ♀ ; CAMEROONS : 1 ♂ ; CONGO : 155 ♂, 141 ♀ ; UGANDA : 2 ♂, 1 ♀.

This is a West African species. Its range extends in the east into central Africa, Congo and East Africa, Uganda and in the west into Sierra Leone. Adults have been collected in every month of the year but it seems that it is abundant in the months of April and May.



FIGS. 148-150. *Stenocoris sordida*, ♂. 148, terminalia, dorsal view ; 149, claspers, inner and outer views ; 150, aedeagus (inflated), ventral view.

*S. (S.) apicalis* (Westwood) is its closest ally, from which it can be separated by the lateral black line, which is well represented on genae and extends beyond sides of collar, whereas in *S. apicalis* this line is faint on genae. The posterior margin of the pygophore is comparatively narrow and the processes formed by median indentation of ♀ seventh abdominal sternum are rounded in this species, whereas they are triangular in *S. apicalis*.



FIGS. 151-156. *Stenocoris sordida*, ♀. 151, terminalia, ventral view; 152, ovipositor, ventral view; 153, same, dorsal view; 154, first gonopophysis, ventral view; 155, first gonocoxa, ventral view; 156, spermatheca.

***Stenocoris (Stenocoris) tipuloides* (Degeer) comb. n.**

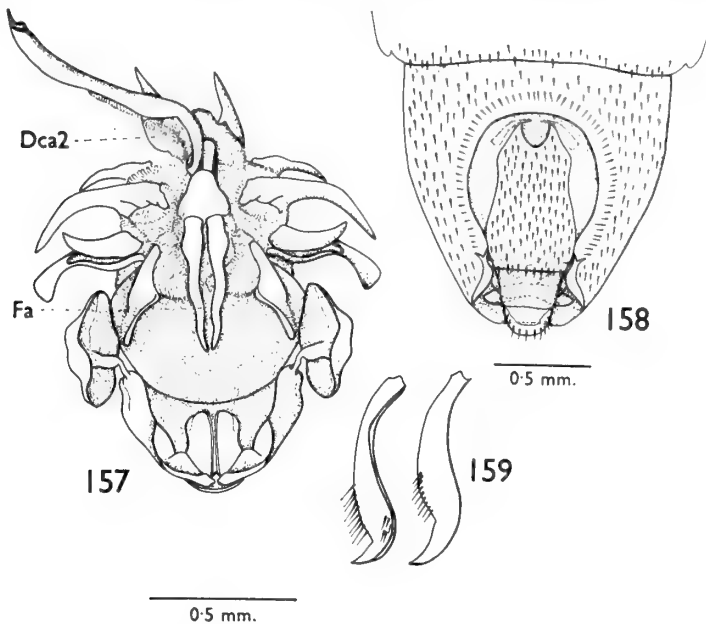
(Text-figs. 157-165)

*Cimex tipuloides* Degeer, 1773 : 354, 1778 : 272 ; Gmelin, 1788 : 2194*Myodocha tipuloides* (Degeer) Latreille, 1807 : 126 ; Olivier, 1811 : 106 ; Burmeister, 1835 : 325*Stenocoris tipuloides* (Degeer) Burmeister, 1839 : 1010*Leptocoris tipuloides* (Degeer) Amyot et Serville, 1843 : 229*Gerris tipuloides* (Degeer) Stål, 1870 : 218*Leptocorixa tipuloides* (Degeer) Hussey, 1951 : 152*Leptocoris crudelis* Westwood, 1842 : 18

Characterized by the round pygophore, the posterior margin of which is medially emarginate and by the form of ♂ and ♀ genitalia.

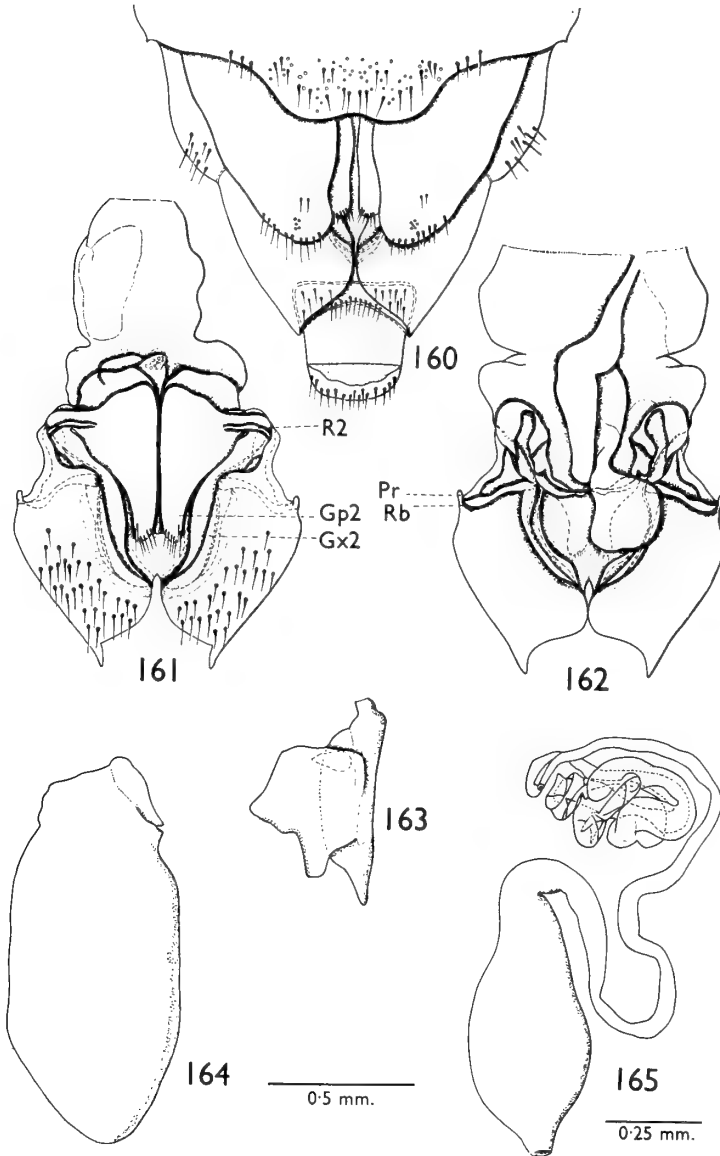
♂. Body length, 14.0-15.5 mm., width, 2.1-2.2 mm. Head length, 1.9-2.0 mm., width, 1.3-1.4 mm. (length of paraclypeae 0.70 mm.). Antennae, segment I, 3.3-3.7 mm., II, 2.3-2.6 mm., III, 2.4-2.7 mm., IV, 4.0-4.2 mm. Rostrum, segment I, 1.3-1.5 mm., II, 1.4-1.5 mm., III, 0.7-0.8 mm., IV, 0.75-0.8 mm. Pronotum, length, 2.4-2.7 mm., width, 2.1-2.2 mm. Hind femora, 6.0-6.7 mm. Hind tibia, 6.4-6.9 mm. Distance between ocelli, 0.5-0.6 mm., distance between an ocellus and an eye, 0.66-0.7 mm.

Body comparatively robust, pale, tinged with light brown. Head slightly tapering behind occipital suture, about half as long again as broad ; occipital suture medially "U"-shaped, with arms bending outwards towards margins of head ; paraclypeae long, more than one-third length of head, uniformly thin and rounded at apices. Antennae pale, usually tinged with pink. Rostrum short, never extending beyond apices of second coxae. Lateral black line



FIGS. 157-159. *Stenocoris tipuloides*, ♂. 157, aedeagus (inflated), ventral view ; 158, terminalia, dorsal view ; 159, claspers, inner and outer views.

usually faintly represented, extending from sides of antenniferous tubercles on to collar. Pronotal disc uniformly pale, black spots on posterior angles absent. Legs usually with apices of femora and bases of tibiae pink. Hemelytra tinged brownish black. Abdomen with dorsum, excluding connexiva, pink; venter pale ochraceous. Posterior margin of seventh abdominal tergum truncate; pygophore rounded, smoothly tapering posteriorly, posterior margin medially emarginate (Text-fig. 158).



FIGS. 160-165. *Stenocoris tipuloides*, ♀. 160, terminalia, ventral view; 161, ovipositor, ventral view; 162, same, dorsal view; 163, first gonopophysis, ventral view; 164, first gonocoxa, ventral view; 165, spermatheca.

♂ GENITALIA : Claspers thicker at bases, strongly curved in middle (Text-fig. 159) ; dorsal thecal appendages absent ; ventral pair long, thicker at bases, very thin and truncated at apices ; four pairs of lateral conjunctival appendages as in Text-fig. 157 ; frontal conjunctival appendages, paired, long, curved in middle, not at all curved at apices, dorsal appendages as in Text-fig. 157.

♀. Body length, 15.0-16.0 mm., width, 2.2-2.3 mm. Head length, 1.9-2.0 mm., width, 1.3-1.4 mm. (only paraclypeae 0.70 mm.). Antennae, segment I, 3.0-3.1 mm., II, 2.1-2.3 mm., III, 2.3-2.4 mm., IV, 3.6-3.9 mm. Rostrum, segment I, 1.3-1.5 mm., II, 1.4-1.5 mm., III, 0.7-0.8 mm., IV, 0.75-0.85 mm. Pronotum, length, 2.6-2.7 mm., width, 2.2-2.3 mm. Hind femora, 5.9-6.3 mm. Hind tibia, 6.1-6.4 mm. Distance between ocelli, 0.5-0.56 mm., distance between an ocellus and an eye, 0.66-0.7 mm.

Slightly larger than ♂ ; posterior margin of seventh abdominal sternum slightly notched in middle, forming rounded lobes, large basal portion of eighth paratergite concealed (Text-fig. 160).

♀ GENITALIA : First gonocoxae comparatively small, outer margins sinuate and apices rounded (Text-fig. 164) ; intervalvular sacs absent ; spermatheca flask-shaped with a curved long neck and uniformly thick coiled tube (Text-fig. 165).

Type material. Holotype without data, Riksmus. Stockholm. Holotype ♀, of *Leptocoris crudelis* Westwood, without data, Hope Dept., Univ. Mus., Oxford.

Other material. U.S.A. : 2 ♀ ; BRAZIL : 5 ♂, 5 ♀ ; COLOMBIA : 2 ♂ ; MEXICO : 3 ♂, 5 ♀ ; BRITISH GUIANA : 1 ♂ ; PANAMA : 8 ♂, 5 ♀ ; ECUADOR : 2 ♂, 2 ♀ ; CUBA : 1 ♀ ; PARAGUAY : 1 ♂, 1 ♀.

This species is very common in the northern Neotropical region, its range extending in the north into Texas and Florida, and in the south into Brazil. Adults have been collected throughout the year but it seems to be more common in April, May, and June.

This species is closest to *S. americana* sp. n., from which it can be separated by a short rostrum, which never extends beyond apices of second coxae and by the frontal conjunctival appendages of the aedeagus.

### ***Stenocoris (Stenocoris) v-nigrum* (Blöte) comb. n.**

(Text-figs. 166-174)

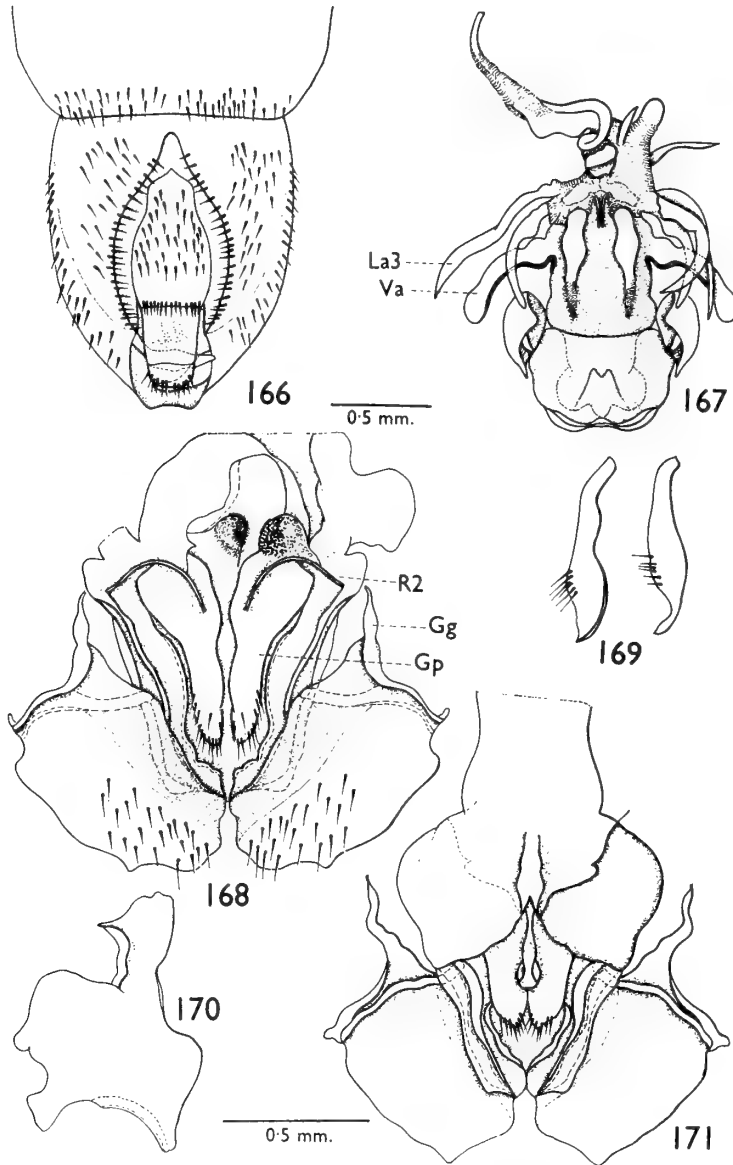
*Leptocorixa (Stenocoris) v-nigrum* Blöte, 1937 : 293 ; Villiers, 1955 : 1142, 1144, 1963 : 232

Characterized by long rostrum, which approaches third coxae and by the form of ♂ and ♀ genitalia.

♂. Body length, 14.0-15.5 mm., width, 2.1-2.25 mm. Head length, 1.9-2.25 mm., width, 1.5-1.6 mm. (only paraclypeae 0.6-0.7 mm.). Antennae, segment I, 3.7-3.8 mm., II, 2.7-2.9 mm., III, 2.8-3.0 mm., IV, 3.7-3.9 mm. Rostrum, segment I, 1.65-1.75 mm., II, 1.7-2.0 mm., III, 0.8-0.9 mm., IV, 0.8-1.0 mm. Pronotum length, 2.3-2.5 mm., width, 2.1-2.25 mm. Hind femora, 5.0-6.0 mm. Hind tibia, 6.4-6.6 mm. Distance between ocelli, 0.4-0.5 mm., distance between an ocellus and an eye, 0.7-0.8 mm.

Body comparatively robust, pale, tinged with black. Head about a third as long again as broad ; occipital suture "V"-shaped in middle, arms continuing straight towards sides ; paraclypeae about one-third of head length, uniformly thick and rounded at apices. Antennae brownish black, tinged with red, underside of basal segment, articulation between first and second segment, middle of second and at least basal third of apical segment pale. Rostrum long, usually reaching anterior margin of third coxae. Lateral black line well represented on

genae, extending on to collar. Pronotal disc pale, posteriorly with brownish black punctures, black spots on posterior angles present. Legs pale, with apices of femora, tibiae and tarsi brownish. Hemelytra tinged with black. Abdomen with dorsum, excluding connexiva, red, venter pale unicolourous. Posterior margin of seventh abdominal tergum truncate; pygophore large, tapering posteriorly, posterior margin truncate (Text-fig. 166).



FIGS. 166-171. *Stenocoris v-nigrum*, 166, ♂ terminalia, dorsal view; 167, aedeagus (inflated), ventral view; 168, ovipositor, ventral view; 169, ♂ claspers, inner and outer views; 170, ♀ first gonopophysis, ventral view; 171, ovipositor, dorsal view.



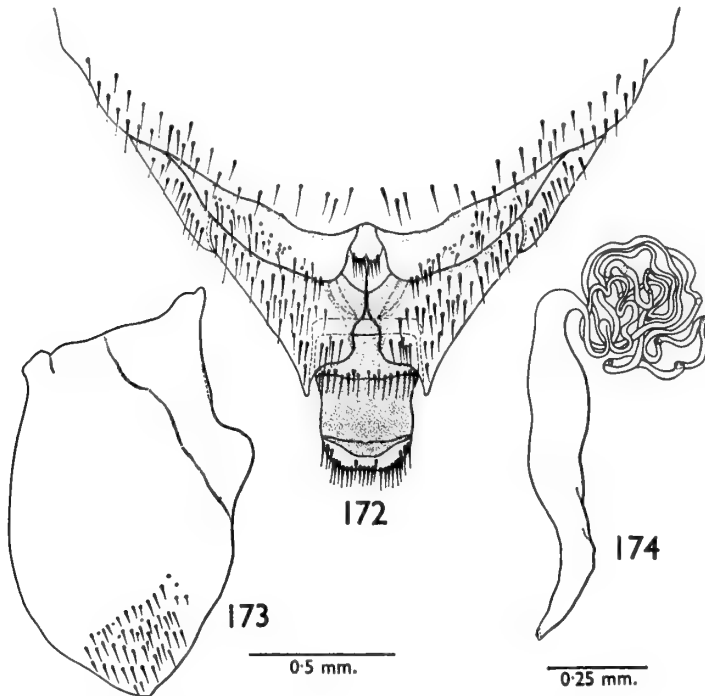
♂ GENITALIA : Claspers thicker in middle with thin and curved apices (Text-fig. 169) ; dorsal thecal appendages absent ; ventral pair long, uniformly thick, slightly curved in middle and rounded at apices ; four left lateral conjunctival appendages as in Text-fig. 167 ; frontal conjunctival appendages paired, minute, reduced to spines, four right lateral conjunctival appendages as in Text-fig. 167 ; dorsal appendages as in Text-fig. 167.

♀. Body length, 15.2–16.6 mm., width, 2.2–2.6 mm. Head length, 2.0–2.4 mm., width, 1.5–1.6 mm. (only paraclypeae 0.7–0.8 mm.). Antennae, segment I, 3.7–3.8 mm., II, 2.7–2.9 mm., III, 2.75–3.0 mm., IV, 3.9–4.1 mm. Rostrum, segment I, 1.6–1.8 mm., II, 1.7–1.9 mm., III, 0.9–1.0 mm., IV, 0.9–1.1 mm. Pronotum, length, 2.4–2.8 mm., width, 2.2–2.6 mm. Hind femora, 5.6–6.1 mm. Hind tibia, 6.0–6.6 mm. Distance between ocelli, 0.4–0.45 mm., distance between an ocellus and an eye, 0.7–0.75 mm.

Distinctly longer than ♂ ; posterior margin of seventh abdominal sternum almost of inverted "V"-shape in middle, forming small rounded lobes (Text-fig. 172).

♀ GENITALIA : A large portion of first gonocoxae covered by seventh abdominal sternum, apices rounded ; intervalvular sacs absent, spermatheca tubular with a thick, curved and short neck (Text-fig. 174).

Type material. Holotype ♂, UGANDA : Southern Toro, Mbarara, Fort Portal Road, 3,800–4,200 ft., 22–24.x.1911 (S. A. Neave), B.M.(N.H.) ; allotype ♀, 1 paratype ♂, same data as holotype, B.M.(N.H.) ; paratypes, Toro or Doro Forest, 4,000–4,500 ft., 1 ♂, 25–29.x.1911 (S. A. Neave), B.M.(N.H.) ; Western Ankola, 4,500–5,000 ft., 1 ♀, 10–14.x.1911 (S. A. Neave), B.M.(N.H.).



FIGS. 172–174. *Stenocoris v-nigrum*, ♀. 172, terminalia, ventral view ; 173, first gonocoxa, ventral view ; 174, spermatheca.

Other material. CONGO : 10 ♂, 9 ♀ ; GHANA : 2 ♂, 1 ♀ ; TANGANYIKA : 10 ♂, 12 ♀.

The range of this species extends in the west into Ghana and in the east into Tanganyika, but this seems to be more common in eastern Africa. Adults have been collected mainly in April and May.

This species is isolated in the subgenus *Stenocoris* s. str. by the characters of long rostrum, which approaches third coxae, greatly reduced frontal conjunctival appendages in the aedeagus and by tubular spermatheca.

### ***STENOCORIS (ORYZOCORIS) subgen. n.***

*Leptocorisa* Latreille 1829 ; Laporte, 1833 : 25 ; Stål, 1873 : 87

*Leptocorixa* Laporte ; Hussey, 1951 : 152

Type-species : *Cimex filiformis* Fabricius by monotypy.

Body linear. Head elongated, almost half as long again as broad ; paraclypeae short, straight and rounded at apices ; ocelli wide apart, interocellar distance only slightly shorter than distance between an ocellus and an eye (in both cases including the diameter of both). Antennae with apical segment pale only at base, second subequal to third. Rostrum very short, hardly approaching second coxae. Lateral black line usually entirely absent, sides of head and thorax pale. Pronotum flat with latero-posterior tips usually pale but sometimes brownish black. Abdomen dorsally yellowish red, abdomen ventrally usually pale unicoloured.

In ♂, posterior margin of seventh abdominal tergum truncated ; pygophore elongated, laterally posterior tips acutely pointed ; claspers asymmetrically crossed over pygophore, curved in the middle and strongly pointed at apices ; aedeagus with only ventral pair of thecal appendages, dorsal pair wanting ; frontal conjunctival appendages paired, very small ; membranous appendage rounded with paired dorsal appendages, terminal appendage absent. In ♀, posterior margin of seventh abdominal sternum with short median split ; first gonocoxae small, almost truncated at apices ; intervalvular sacs absent ; spermatheca very large oval, with a short coiled tube of varying thicknesses.

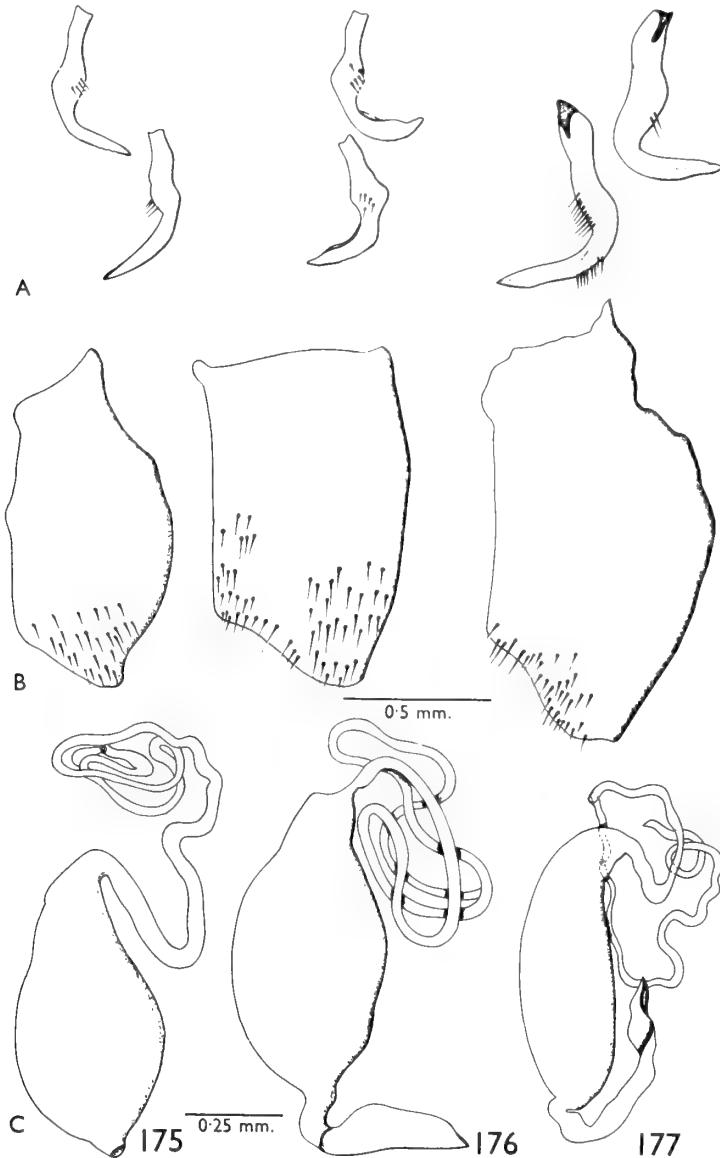
This subgenus can be separated from other subgenera, in the ♂ by the claspers which, at rest, are always crossed over the pygophore and are not in a socket (Text-fig. 178) and in the ♀ by the posterior margin of seventh abdominal sternum, which is always with a short median split (Text-fig. 181).

Laporte described *Leptocorisa* and included *linearis* (Nearctic and Neotropical) (= *filiformis* Fabricius) but in 1830 Guérin had already described his *flavida* (Oriental) (= *acuta* Thunberg **syn. n.**) under *Leptocorisa* Latreille. This was the first redescription of *Leptocorisa* Latreille, 1829 and *flavida*, the first and only species ever included in the genus, became the type-species of *Leptocorisa* Latreille by monotypy. Stål divided *Leptocorisa* into four subgenera as follows : (1) *Rhabdocoris* Kolenati, 1845 ; (2) *Stenocoris* Burmeister, 1839 ; (3) *Erbula* Stål, 1873 ; (4) *Leptocorisa* Laporte s. str. During the present study *Rhabdocoris* Kolenati (type-species *arcuata* Kolenati, 1845) has been synonymized with *Leptocorisa* Latreille and all the Oriento-Australian species (previously described under subgenus *Rhabdocoris*) have been separated from other Ethiopian, Nearctic and Neotropical species. *Stenocoris* being the senior subgenus has been given generic rank and *Leptocorisa* Laporte (a hitherto undescribed subgenus) has been described here as *Oryzocoris*.

## KEY TO SPECIES

- 1 Median longitudinal red line on ventral abdominal segments present, sometimes faint ; pygophore with posterior processes rounded and pointing posteriorly (Text-fig. 195) ; basal portions of eighth paratergites largely visible (Text-fig. 192)

*furcifera* (p. 67)



FIGS. 175-177. *Stenocoris* (*Oryzocoris*) spp. 175, *filiformis*; 176, *furcifera*; 177, *fabricii*. A, claspers, outer and inner views; B, first gonacoxa, ventral view; C, spermatheca.

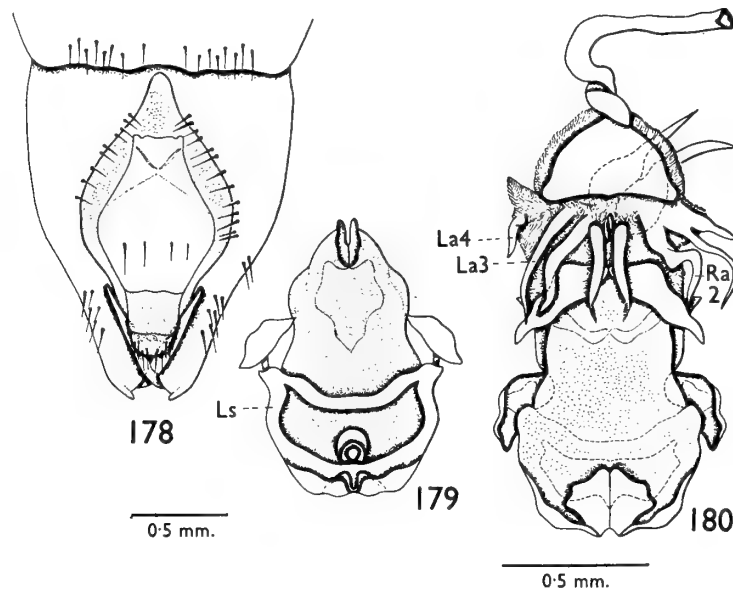
- Median longitudinal red line absent ; pygophore with posterior processes pointed and facing each other (Text-fig. 185) ; basal portions of eighth paratergites largely concealed by first pair of gonocoxae (Text-fig. 181) . . . . . 2
- 2 Pygophore greatly elongated, posterior margin very narrow, about one-sixth of posterior margin of seventh abdominal tergum (Text-fig. 178) ; lobes of ♀ seventh abdominal sternum with posterior margin medially concave (Text-fig. 181). (Second right lateral conjunctival appendage of aedeagus sickle-shaped (Text-fig. 180))
- fabricii* (p. 62)
- Pygophore almost rectangular, posterior margin broad, more than half of posterior margin of seventh abdominal tergum (Text-fig. 185) ; lobes of ♀ seventh abdominal sternum with convex posterior margin (Text-fig. 187). (Second right lateral conjunctival appendage of aedeagus almost straight (Text-fig. 186)). *filiformis* (p. 64)

***Stenocoris (Oryzocoris) fabricii* sp. n.**

(Text-figs. 177–184)

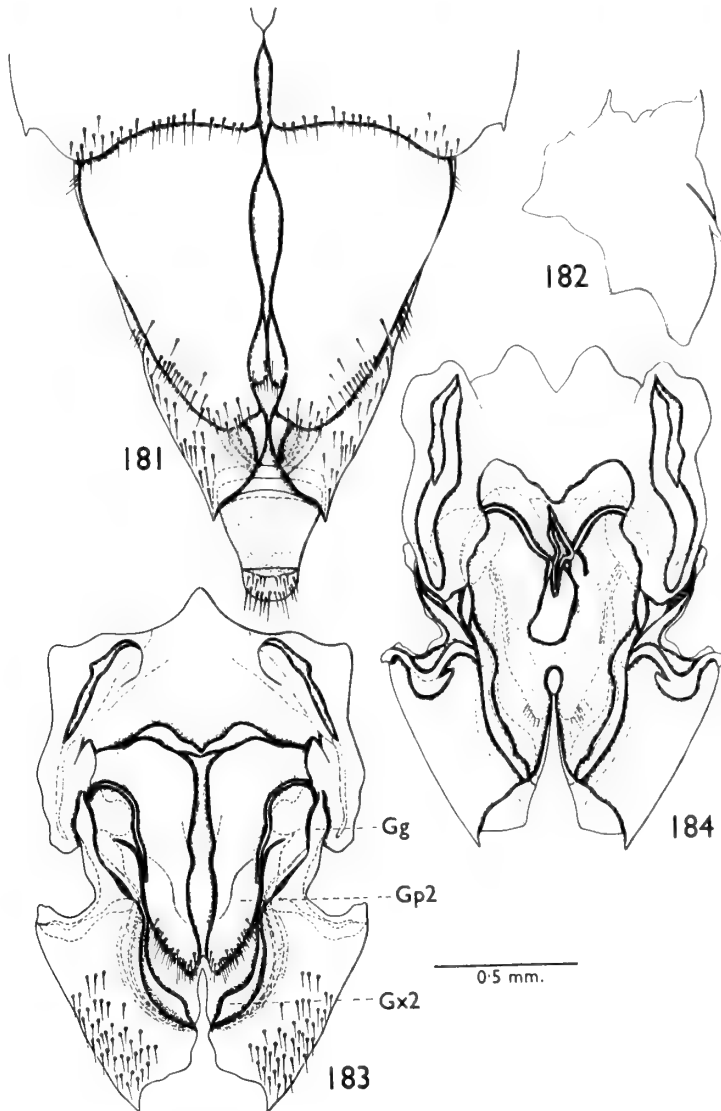
Characterized by extremely narrow posterior margin of pygophore, by the triangular form of first gonocoxae and by other ♂ and ♀ genital characters.

♂. Body length, 14.5–15.06 mm., width, 2.0–2.1 mm. Head length, 1.8–1.9 mm. (paraclypeae only, 0.5–0.55 mm.), width, 1.4 mm. Antennae, segment I, 3.6–3.73 mm., II, 2.0–2.26 mm., III, 2.1–2.4 mm., IV, 4.0–4.4 mm. Rostrum, segment I, 1.33 mm., II, 1.33 mm., III, 0.66 mm., IV, 0.66 mm. Pronotum, length, 2.4–2.5 mm., width, 2.0–2.1 mm. Hind femora, 5.46–5.6 mm. Hind tibia, 5.73–6.0 mm. Distance between ocelli, 0.46 mm., distance between an ocellus and an eye, 0.7 mm.



FIGS. 178–180. *Stenocoris (Oryzocoris) fabricii*, ♂. 178, terminalia, dorsal view ; 179, theca, dorsal view ; 180, aedeagus (inflated), ventral view.

Body comparatively robust, pale. Head never half as long again as broad; occipital suture medially concave, arms bending inwards towards sides; paraclypeae short, about one-third of head, straight and of uniform thickness. Antennae with underside of basal segment pale, above black; second and third grey, second slightly shorter than third, fourth tinged with red, pale only at base. Rostrum comparatively long, reaching apices of second coxae. Lateral black line faint, extending from sides of antenniferous tubercles on to collar. Pronotal disc pale, posteriorly with greenish tinge, black spots on posterior angles absent. Legs pale, with



FIGS. 181-184. *Stenocoris (Oryzocoris) fabricii*, ♀. 181, terminalia, ventral view; 182, first gonopophysis, ventral view; 183, ovipositor, ventral view; 184, same, dorsal view.

femora greenish, tibiae and tarsi tinged with black. Hemelytra with anal and medial veins brownish black. Abdomen with dorsum, excluding connexiva, red, venter pale, tinged with red; median longitudinal red line absent. Posterior margin of seventh abdominal tergum sinuate, medially concave; pygophore greatly elongated, tapering posteriorly, posterior margin narrow, about one-sixth of width of posterior margin of seventh abdominal tergum; posterior processes pointed, facing each other (Text-fig. 178).

♂ GENITALIA: Claspers strongly curved in middle, acutely pointed and curved at apices (Text-fig. 177, A); dorsal thecal appendages absent; ventral pair as in Text-fig. 180; four left lateral conjunctival appendages as in Text-fig. 180; frontal conjunctival appendages paired, minute, right slightly longer; four right lateral conjunctival appendages with second sickle-shaped as in Text-fig. 180; dorsal appendages as in Text-fig. 180.

♀. Body length, 15.2–15.6 mm., width, 1.9–2.0 mm. Head length, 1.77–1.9 mm. (only paraclypeae 0.53–0.55 mm.), width, 1.33 mm. Antennae, segment I, 2.93–3.1 mm., II, 1.8–1.96 mm., III, 1.8–2.0 mm., IV, 4.0–4.2 mm. Rostrum, segment I, 1.33 mm., II, 1.33 mm., III, 0.66 mm., IV, 0.6 mm. Pronotum, length, 2.36–2.4 mm., width, 1.9–2.0 mm. Hind femora, 5.2–5.34 mm. Hind tibia, 5.32–5.6 mm. Distance between ocelli, 0.46 mm., distance between an ocellus and an eye, 0.7 mm.

Very similar to ♂ in general appearance; seventh abdominal sternum with a short median split, forming a lobe on either side; lobes with concave posterior margins (Text-fig. 181).

♀ GENITALIA: First gonocoxae large, concealing eighth paratergites, triangular, apices facing each other (Text-fig. 181); intervalvular sacs absent; spermatheca oval, with a smoothly curved neck and a short coiled tube (Text-fig. 177, C).

Holotype ♂, PERU: Tingo Maria, Huan, 2,200 ft., II.X.1946 (*J. C. Pallister*), A.M.N.H.

Paratypes. 1 ♂, 1 ♀, with same data as holotype, A.M.N.H., 1 ♂, without any data, from a series of *filiformis* Fabricius in coll. Fabricius, Zool. Mus. Copenhagen; VENEZUELA: Estate of Guasualito (Guarico), Camagua, 1 ♂, 1923, (*S. Mayeul Crisol*), Mus. Hist. nat. Paris; ARGENTINA: Misiones, Erv. de San Ignacio Villa, Lutecia, 1 ♂, 1910 (*E. R. Wagner*), Chaco de Santa Fe las Garzas, near Figlas Garzas, 20 km. to Docampo, 1 ♂, 1903 (*E. R. Wagner*), Mus. Hist. nat. Paris; BRAZIL: 1 ♀, 1898 (*Noualhier*), Pernambuco, Pery, 1 ♂, 1898 (*Noualhier*), Mus. Hist. nat. Paris; BRITISH GUIANA: Georgetown, 1 ♀, 6.vii.1911, A.M.N.H.; HONDURAS: Tegucigalpa, 28.iii.1917 (*F. J. Dyer*), A.M.N.H.

This species is found at high altitudes and seems to be common in Peru. Its range extends in the north into Venezuela. Adults have been collected in April and October.

This species is close to *S. (O.) furcifera* (Westwood) in general appearance but can easily be separated by the absence of red median longitudinal line on venter of abdomen.

### *Stenocoris (Oryzocoris) filiformis* (Fabricius) comb. n.

(Text-figs. 175, 185–190)

*Cimex filiformis* Fabricius, 1775 : 727, 1781 : 375, 1787 : 308; Gmelin, 1789 : 2191

*Gerris filiformis* (Fabricius) Fabricius, 1794 : 191, 1803 : 260; Stål, 1866 : 66

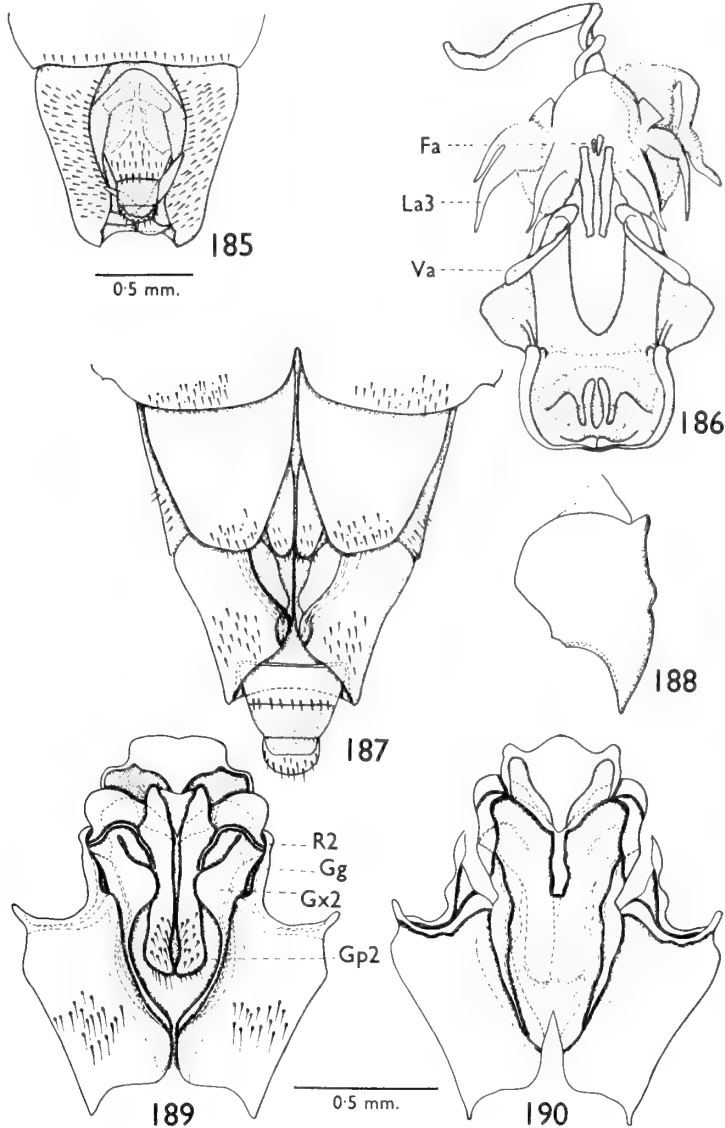
*Leptocorisa* (s. str.) *filiformis* (Fabricius) Stål, 1873 : 87

*Leptocorisa linearis* Laporte, 1833 : 26

*Leptocorisa tipuloides* Dallas, 1852 : 484

Characterized by the long cylindrical paraclypeae, by almost rectangular pygophore, by convex posterior margin of the lobes of the ♀ seventh abdominal sternum and by the form of ♂ and ♀ genitalia.

♂. Body length, 14.0–15.0 mm., width, 1.8–1.9 mm. Head length, 1.9–1.8 mm. (only paraclypeae, 0.66 mm.), width, 1.3–1.4 mm. Antennae, segment I, 3.0–3.26 mm., II, 1.8–



FIGS. 185–190. *Stenocoris (Oryzocoris) filiformis*. 185–186, ♂, 187–190, ♀. 185, terminalia, dorsal view; 186, aedeagus (inflated), ventral view; 187, terminalia, ventral view; 188, first gonopophysis, ventral view; 189, ovipositor, ventral view; 190, same, dorsal view.

2.0 mm., III, 2.2-2.26 mm., IV, 3.7-4.0 mm. Rostrum, segment I, 1.2-1.3 mm., II, 1.2-1.3 mm., III, 0.6-0.66 mm., IV, 0.6-0.66 mm. Pronotum, length, 2.3-2.4 mm., width, 1.8-1.9 mm. Hind femora, 5.5-5.9 mm. Hind tibia, 5.9-6.0 mm. Distance between ocelli, 0.5-0.53 mm., distance between an ocellus and an eye, 0.66-0.7 mm.

Body medium sized, linear, usually yellowish with greenish or sometimes reddish tinge. Head comparatively broad, breadth usually less than two-thirds of length; occipital suture "V"-shaped in middle; paraclypeae long and cylindrical, more than one-third of head. Antennae usually palish brown, sometimes tinged red, second distinctly shorter than third. Rostrum, only reaching anterior margins of second coxae. Lateral black line well represented extending from sides of antenniferous tubercles on to collar. Pronotal disc pale, tinged with green, black spots on posterior angles absent. Legs with apices of femora sometimes reddish. Hemelytra with anal vein usually more prominently black than medial. Abdomen with dorsum pale unicoloured, sometimes with reddish tinge, venter pale ochraceous, red median longitudinal line absent. Posterior margin of seventh abdominal tergum truncate, pygophore curved near apex, posterior processes acutely pointed and facing each other, posterior margin broad, more than half of width of seventh abdominal tergum (Text-fig. 185).

♂ GENITALIA: Claspers irregularly crossed over pygophore, curved near apex (Text-fig. 175, A); dorsal thecal appendages absent; ventral pair as in Text-fig. 186; four left lateral conjunctival appendages as in Text-fig. 186; frontal conjunctival appendages paired, minute, right slightly thicker and longer; four right lateral conjunctival appendages, with second almost straight as in Text-fig. 186; dorsal appendages as in Text-fig. 186.

♀. Body length, 15.0-16.5 mm., width, 1.9-2.0 mm. Head length, 1.8-1.9 mm., width, 1.3-1.4 mm., (length of only paraclypeae, 0.66-0.7 mm.). Antennae, segment I, 2.56-3.1 mm., II, 1.86-2.06 mm., III, 2.2-2.26 mm., IV, 3.7-4.0 mm. Rostrum, I, 1.16-1.2 mm., II, 1.16-2.0 mm., III, 0.6-0.63 mm., IV, 0.6-0.63 mm. Pronotum, length 2.3-2.4 mm., width, 1.9-2.0 mm. Hind femora, 5.2-5.3 mm. Hind tibia, 5.6-5.8 mm. Distance between ocelli, 0.5-0.56 mm., distance between an ocellus and an eye, 0.6-0.63 mm.

Distinctly longer than ♂, posterior margin of seventh abdominal sternum with a short median split, forming convex lobe on either side.

♀ GENITALIA: First gonocoxae broad, concealing a large basal portion of eighth paratergite (Text-fig. 187); outer margin regular, apices rounded; intervalvular sacs absent; spermatheca flask-shaped with a distinct, smoothly curved neck as in Text-fig. 175C.

Type material. Lectotype ♂, without data ("filiformis" Fabricius' handwriting), Zool. Mus. Copenhagen; syntypes, 1 ♂, 1 ♀, with no data, Zool. Mus. Copenhagen.

Other material. MEXICO: 1 ♀; U.S.A.: 6 ♂, 10 ♀; CUBA: 1 ♂; COLOMBIA: 2 ♂, 1 ♀; BRITISH GUIANA: 2 ♂, 2 ♀; LEEWARD ISLANDS: 2 ♂, 2 ♀; BRAZIL: 21 ♂, 14 ♀.

The range of this species extends in the east into the Leeward Islands and in the west into Mexico and Gorgona Island, Colombia. It is the commonest Central American species and in the north is found in Texas and Leesburg, Florida. Adults seem to be very common in August.

This is close to *S. (O.) furcifera* (Westwood) and can be separated from it by the absence of red median longitudinal line on abdominal venter.

Four syntypes from Fabricius' collection have been examined; all except one ♂ represent the present concept of *S. (O.) filiformis* (Fabricius). One ♂ with Fabricius' own label "*filiformis*" has been designated lectotype of *Stenocoris (Oryzocoris) filiformis* (Fabricius) and has been given a lectotype label. The exceptional ♂ represents *S. (O.) fabricii* sp. n.



*Stenocoris (Oryzocoris) furcifera* (Westwood) comb. n.

(Text-figs. 176, 191-196)

*Leptocorisa furcifera* Westwood, 1842 : 18*Gerris nigricornis* Stål, 1870 : 218 syn. n.*Leptocorisa nigricornis* (Stål) Stål, 1873 : 87

Characterized by red median longitudinal line on abdominal venter and by the form of ♂ and ♀ genitalia.

♂. Body length, 14.0-16.12 mm., width, 1.8-2.0 mm. Head length, 1.9-2.0 mm., (length of paraclypeae 0.5-0.56 mm.), width, 1.3-1.4 mm. Antennae, segment I, 3.3-3.6 mm., II, 2.20-2.26 mm., III, 2.20-2.26 mm., IV, 3.7-4.0 mm. Rostrum, segment I, 1.3-1.33 mm., II, 1.3-1.33 mm., III, 0.6-0.63 mm., IV, 0.6-0.63 mm. Pronotum, length, 2.4-2.6 mm., width, 1.8-2.0 mm. Hind femora, 5.73-6.0 mm. Hind tibia, 6.5-7.1 mm. Distance between ocelli, 0.46-0.5 mm., distance between an ocellus and an eye, 0.6-0.66 mm.

Body usually greatly elongated, linear and usually pale unicolourous. Head about half as long again as broad; occipital suture medially concave, arms curving outwards towards sides; paraclypeae short, about one-third length of head, thicker at bases and thinner at apices. Antennae pale, with apices of each segment (except fourth) black, fourth light red, second and third usually subequal. Rostrum very short, usually not reaching second coxae. Lateral black line faint, extending from sides of antenniferous tubercles on to collar. Pronotal disc usually pale unicolourous, sometimes with greenish tinge posteriorly; posterior angles without black spots, although sometimes trace of brownish spot present. Legs pale unicolourous. Hemielytra with both anal and medial veins prominently black. Abdomen with dorsum, excluding connexiva, red, venter palish red with a median longitudinal red line, this line sometimes faint. Posterior margin of seventh abdominal tergum slightly medially concave; pygophore smoothly tapering posteriorly; posterior processes rounded, directed backward (Text-fig. 195).

♂ GENITALIA: Claspers crossed regularly over pygophore, not curved at apices (Text-fig. 176, A); dorsal thecal appendages absent, ventral pair as in Text-fig. 191; four left lateral conjunctival appendages as in Text-fig. 191; frontal conjunctival appendages paired, minute, almost of equal length; four right lateral conjunctival appendages, with second almost straight as in Text-fig. 191; dorsal appendages as in Text-fig. 191.

♀. Body length, 17.66-18.66 mm., width, 2.0-2.26 mm. Head length, 1.86-2.0 mm., width, 1.4-1.5 mm. Antennae, segment I, 3.3-3.73 mm., II, 2.2-2.26 mm., III, 2.2-2.26 mm., IV, 3.3-3.8 mm. Rostrum, segment I, 1.3-1.33 mm., II, 1.3-1.33 mm., III, 0.63-0.7 mm., IV, 0.63-0.7 mm. Pronotum length, 2.5-2.66 mm., width, 2.0-2.26 mm. Hind femora, 5.33-5.7 mm. Hind tibia, 6.0-6.1 mm. Distance between ocelli, 0.46-0.5 mm., distance between an ocellus and an eye, 0.66-0.7 mm.

Distinctly longer than ♂; posterior margin of seventh abdominal sternum with a median split, forming concave lobe on either side (Text-fig. 192).

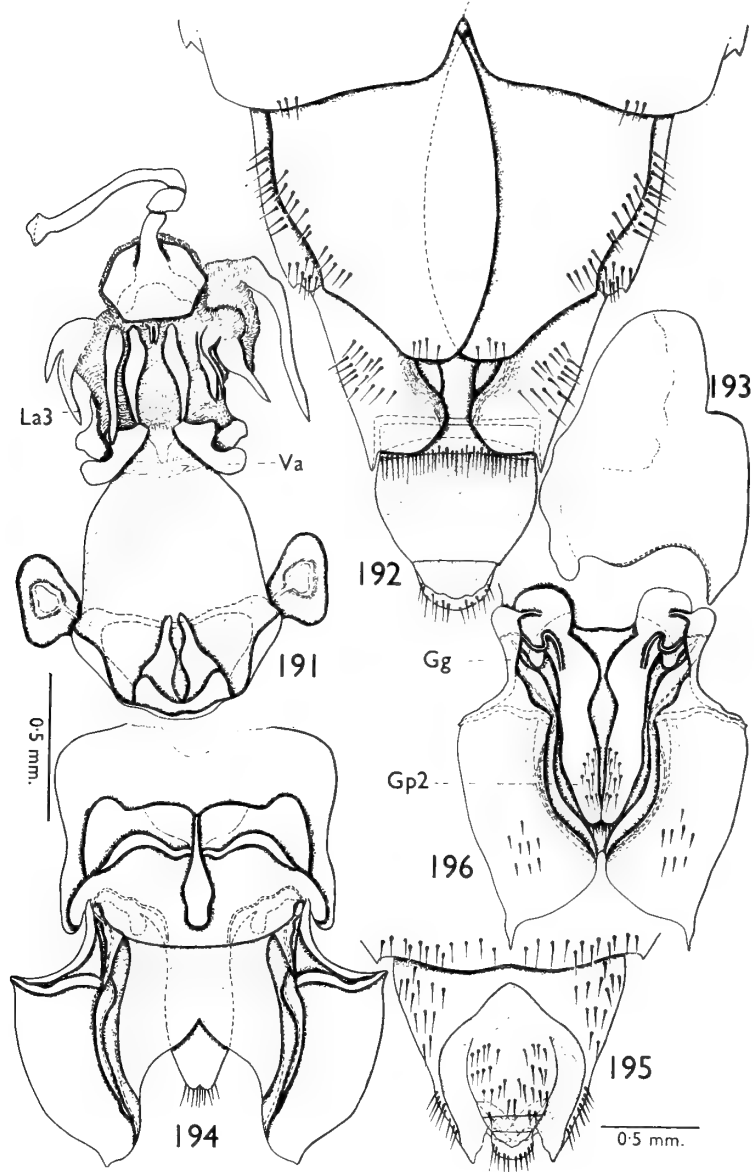
♀ GENITALIA: First gonocoxae comparatively narrow, leaving a portion of eighth paratergite unconcealed, outer margin irregular, apices truncated; intervalvular sacs absent; spermatheca large, bladder-shaped, without a distinct neck.

Type material. Holotype ♀, without data but with a label "Br/c" and other type labels, Hope Dept., Univ. Mus. Oxford; holotype ♀ of *Leptocorisa nigricornis* Stål, BRAZIL: Minas, Riksmus. Stockholm.

Other material. BRAZIL: 21 ♂, 16 ♀; BRITISH GUIANA: 1 ♂; VENEZUELA: 1 ♀; MEXICO: 2 ♂, 2 ♀; PANAMA (CANAL ZONE): 1 ♀; U.S.A., Florida: 1 ♂.

This species seems to be very common in Brazil. Adults have been collected throughout the year. Its range extends in the north into Florida.

This species is very close to *S. (O.) filiformis* (Fabricius) but can be separated by



FIGS. 191-196. *Stenocoris furcifera*. 191, 195, ♂, 192-194, 196, ♀. 191, aedeagus (inflated), ventral view; 192, terminalia, ventral view; 193, first gonopophysis, ventral view; 194, ovipositor, dorsal view; 195, terminalia, dorsal view; 196, ovipositor, ventral view.

the median longitudinal red line which runs on the ventral side of abdominal segments (but is sometimes only faintly represented) by the black anal and medial vein of hemielytra and by the short paraclypeae, which are thicker at base and thinner at apices.

### LEPTOCORISA Latreille

*Leptocorise* Latreille, 1825 : 421

*Leptocorisa* Latreille, 1829 : 197 ; Guérin, 1830 : 178 ; Westwood, 1842 : 18 ; Dallas, 1852 : 481 ; Costa, 1863 : 260 ; Montrouzier, 1865 : 227 ; Walker, 1871 : 172 ; Stål, 1872 : 54, 1873 : 86 ; Lethierry and Severin, 1894 : 102 ; Distant, 1901 : 335, 1902 : 409 ; Breddin, 1909 : 293 ; Oshanin, 1912 : 24 ; Breddin, 1912 : 104 ; Van Duzee, 1914 : 378 ; China, 1924 : 237 ; Tillyard, 1926 : 148 ; Miller, 1956 : 55 ; Southwood and Leston, 1959 : 65

*Leptocorixa* Berthold, 1827 : 418 ; Kirkaldy, 1908 : 123 ; Reuter, 1913 : 78 ; Bergroth, 1913 : 12, 1913a : 159

*Rhabdocoris* Kolenati, 1845 : 67 **syn. n.**

Type-species : *Cimex acutus* Thunberg, 1783.

Body robust. Head elongated but shorter than pronotum, ocelli placed close together. Antennae with apices of basal segment slightly thicker. Rostrum usually short, touching second coxae.

In ♂, posterior margin of seventh abdominal tergum truncated ; pygophore rounded, claspers crossed behind, made up of two components, shaft (or main stem) and blade (or bent portion) ; aedeagus with both (dorsal and ventral) pairs of thecal appendages ; frontal conjunctival appendage membranous with usually two or three sclerotized pieces ; membranous appendage large, usually with a terminal and a dorsal appendage.

In ♀, posterior margin of seventh abdominal sternum emarginate, entire, without a fold or split ; first gonocoxae large, conical in form ; intervalvular sacs at least four pairs ; spermatheca usually irregular, always with a median flange.

This genus is close to *Stenocoris* Burmeister but can readily be distinguished by the form of the claspers, which in *Stenocoris* consist of a single component and by emarginate posterior margin of seventh abdominal sternum (which in *Stenocoris* is usually with a median projection, indentation or split). These genera can also be separated by the structure of aedeagus, for in *Stenocoris* the frontal conjunctival appendage is usually sclerotized and supporting and terminal appendages are wanting. The median flange of spermatheca of *Leptocorisa* is unique. The ranges of *Leptocorisa* and *Stenocoris* are distinct, for *Leptocorisa* is confined to Oriento-Australian region and *Stenocoris* is found in Ethiopian, Nearctic and Neotropical regions. From *Bloeteocoris* this genus can be separated by its normal genae and by other characters in the genitalia (see page 115).

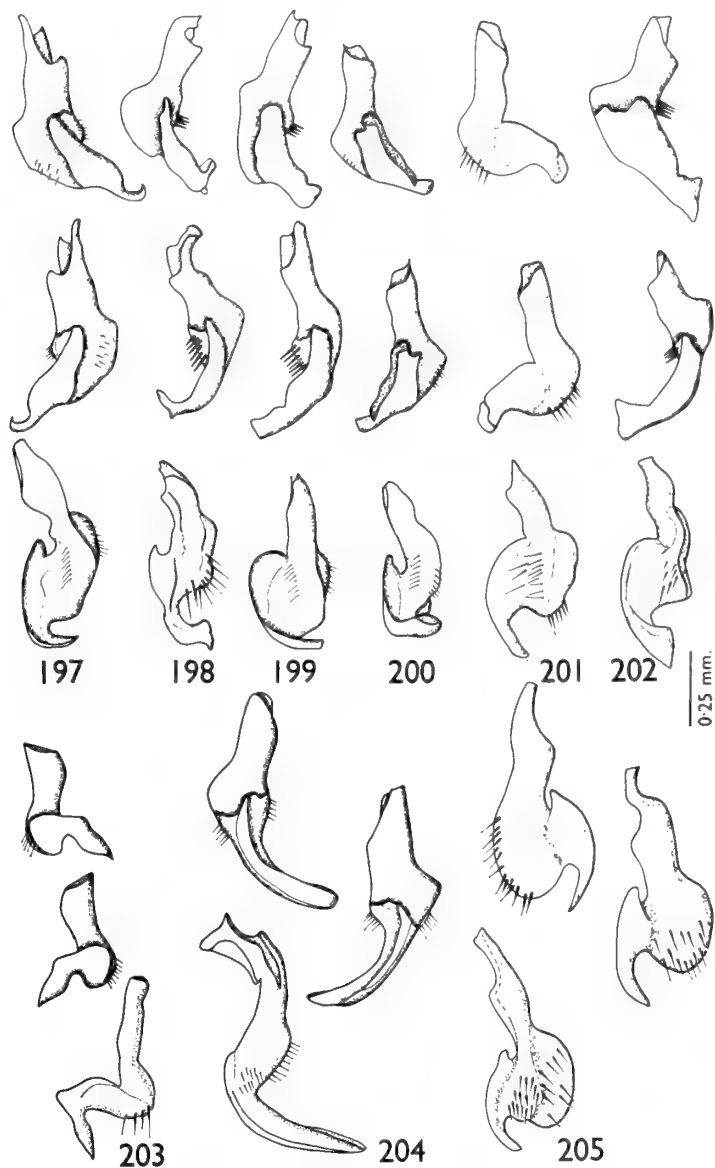
The preservation of the name *Leptocorisa* Latreille and the suppression of *Leptocorixa* Berthold are the subjects of an application to the International Commission on Zoological Nomenclature (China and Ahmad, 1963).

#### KEY TO SPECIES

- |   |  |   |
|---|--|---|
| 1 | Rostrum long, always extending beyond the apices of second coxae, sometimes reaching third coxae . . . . . | 2 |
| - | Rostrum short, never extending beyond second coxae. . . . .  | 5 |

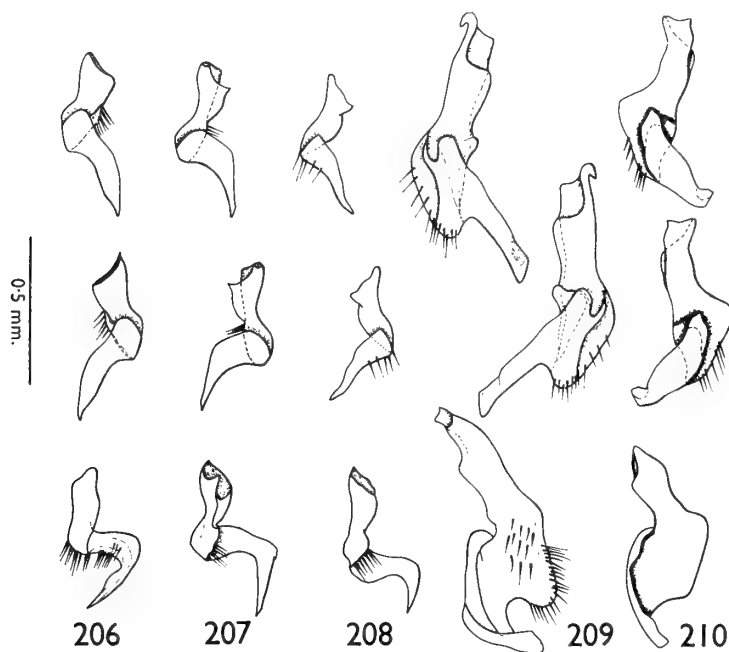
- 2 Lateral black line very prominent, extending from the bases of the antenniferous tubercles for at least three-quarters of the length of the propleuron ; posterior of disc of pronotum with black punctures . . . . . 3
- Lateral black line faint, never extending beyond the pronotal collar ; disc of pronotum never with black punctures, sometimes with greenish tinge . . . . . 4
- 3 Central black line on venter of abdomen present, extending from the first to sixth segments ; rostrum usually extending halfway between second and third coxae, never touching third, basal quarters of apical segments of antennae never pale (pygophore almost of square shape with thin lobes of ninth segment (Text-fig. 342), blades of the claspers long (Text-fig. 345), ventral thecal appendages asymmetrical (Text-fig. 344) ; first gonocoxae large with truncated broad apices (Text-fig. 251) ; spermatheca large, fusiform with a rounded smooth neck and a short tube (Text-fig. 237)) . . . . . *solomonensis* (p. 104)
- Central black line on venter of abdomen absent, rostrum usually reaching third coxae ; basal quarters of apical segments of antennae pale. (Pygophore rounded, with thick and rounded lobes of ninth segments (Text-fig. 291) ; blades of claspers short (Text-fig. 200) ; ventral thecal appendages symmetrical (Text-fig. 293) ; first gonocoxae small, with rounded lobe-like apices (Text-fig. 242) ; spermatheca elongated and thin, with a long curved neck, giving a small knob near its apex (Text-fig. 228)) . . . . . *discoidalis* (p. 87)
- 4 Paraclypeae remarkably elongated, cylindrical and pointed (Text-fig. 322) ; lateral black line only faintly represented by two brownish black dots, one on sides of antenniferous tubercles and the other on collar. (Ventral thecal appendages symmetrical (Text-fig. 325) ; right lateral conjunctival appendages three in number (Text-fig. 324) ; dorsal membranous appendage with a pointed hooked terminal and a short curved dorsal appendage (Text-fig. 324) ; spermatheca with a broad median flange and a tube which is twisted at the base (Text-fig. 229)) . . . . . *palawanensis* (p. 98)
- Paraclypeae short, thick at base ; lateral black line represented on sides of antenniferous tubercles, extending back to the sides of collar. (Ventral thecal appendages asymmetrical (Text-fig. 337) ; right lateral conjunctival appendages two in number (Text-fig. 338) dorsal membranous appendage with a bulb-like terminal and a bilobed dorsal appendage (Text-fig. 338) ; spermatheca short, flask-shaped with a transverse neck (Text-fig. 238)) . . . . . *sakdapolrakae* (p. 102)
- 5 Posterior third of dorsum of abdomen black, apical segments of antennae pale both at bases and apices ; paraclypeae acutely pointed, claspers narrow at base, strongly and abliquely truncate (Text-fig. 203). Ventral thecal appendages spiny (Text-fig. 287) ; spermatheca short, twisted at apex (Text-fig. 231) *costalis* (p. 85)
- Dorsum of abdomen uniformly pale, brown or ochraceous ; apical antennal segments never pale at both bases and apices ; paraclypeae never acutely pointed 6
- 6 Hemielytra, except costal margins above the membrane, dark black, claspers extending well beyond pygophore, with broad truncated apices (Text-fig. 273). (Second right lateral conjunctival appendage bifurcated (Text-fig. 216,F) ; spermatheca linear and thin (Text-fig. 230)) . . . . . *biguttata* (p. 80)
- Hemielytra usually unicolourous, pale or ochraceous, never dark black as above, claspers never extending beyond pygophore, apex never broadly truncated as above 7
- 7 Body short, length not exceeding 12 mm. . . . . 8
- Body long, length exceeding 14 mm. . . . . 10
- 8 Paraclypeae long, somewhat pointed, smoothly regular (Text-fig. 296) ; claspers usually extending slightly beyond pygophore, apices pointed. (Second right lateral conjunctival appendage short, thicker in middle and pointed at apex (Text-fig. 220) ; spermatheca below flange elongated and pointed (Text-fig. 234)) . . . . . *lepida* (p. 88)

- Paraclypeae short, usually blunt, either thicker at base or in middle (Text-fig. 309 or 329) ; claspers never extending posterior margin of pygophore, curved and rounded
- 9 Paraclypeae thin at base and thicker in middle (Text-fig. 309) ; in ♂, posterior margin of seventh abdominal tergum with a slight truncated median projection,

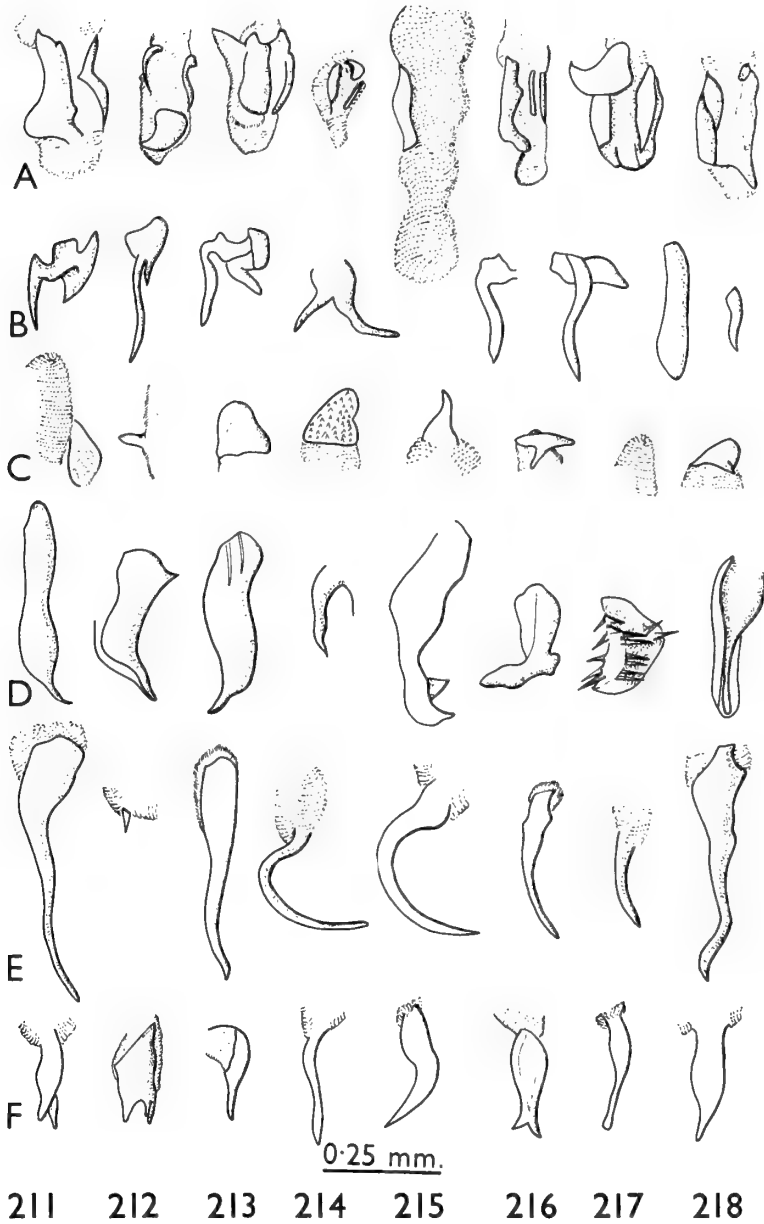


FIGS. 197-205. *Leptocorisa* spp., claspers, outer and inner views. 197, *oratorius* ; 198, *acuta* ; 199, *chinensis* ; 200, *discoidalis* ; 201, *palawanensis* ; 202, *biguttata* ; 203, *costalis* ; 204, *tagalica* ; 205, *luzonensis*.

- pygophore rounded (Text-fig. 308). (Dorsal membranous appendage of aedeagus with a flat pointed (first terminal appendage) appendage at base of terminal appendage (Text-fig. 311) ; first gonocoxae elongated and almost pointed (Text-fig. 250)) . . . . . *luzonica* (p. 92)
- Paraclypeae thicker at base and thinner in middle ; in ♂, posterior margin of seventh abdominal tergum truncated, not produced as above ; pygophore elongated (Text-fig. 332) ; (dorsal membranous appendage with an unsclerotized triangular appendage (first terminal appendage) at the base of terminal appendage (Text-fig. 331) ; first gonocoxae broad with rounded apices (Text-fig. 249)) . . . . . *pseudolepida* (p. 100)
- 10 Apices of femora and bases of tibiae black, two black spots behind ocelli . . . . . 11
- Legs usually pale unicolourous, sometimes with blackish tinge but specially apices of femora and bases of tibiae never black ; no black spots behind ocelli . . . . . 12
- 11 Body pale ochraceous ; claspers with very long cylindrical and pointed blades (Text-fig. 204). (Right lateral conjunctival appendages three in number (Text-fig. 350) ; terminal appendage flat (Text-fig. 350) ; in ♀, lateral posterior margin of seventh abdominal sternum giving tiny backward projections (Text-fig. 351) ; spermatheca elongated and pointed (Text-fig. 232)) . . . . . *tagalica* (p. 106)
- Body light brown, claspers with a short and pointed blade (Text-fig. 205) (only one bilobed right lateral conjunctival appendage (Text-fig. 305) ; terminal appendage triangular (Text-fig. 305) ; in ♀, lateral posterior margin of seventh abdominal sternum without tiny backward projections (Text-fig. 306) ; spermatheca balloon-shaped, blunt, with a tube of irregular thickness (Text-fig. 233)) . . . . . *luzonensis* (p. 90)
- 12 Body robust, usually with brownish black ventro-lateral spots on abdomen ; claspers wide at base with extremities curved and tapering to a point (Text-fig.



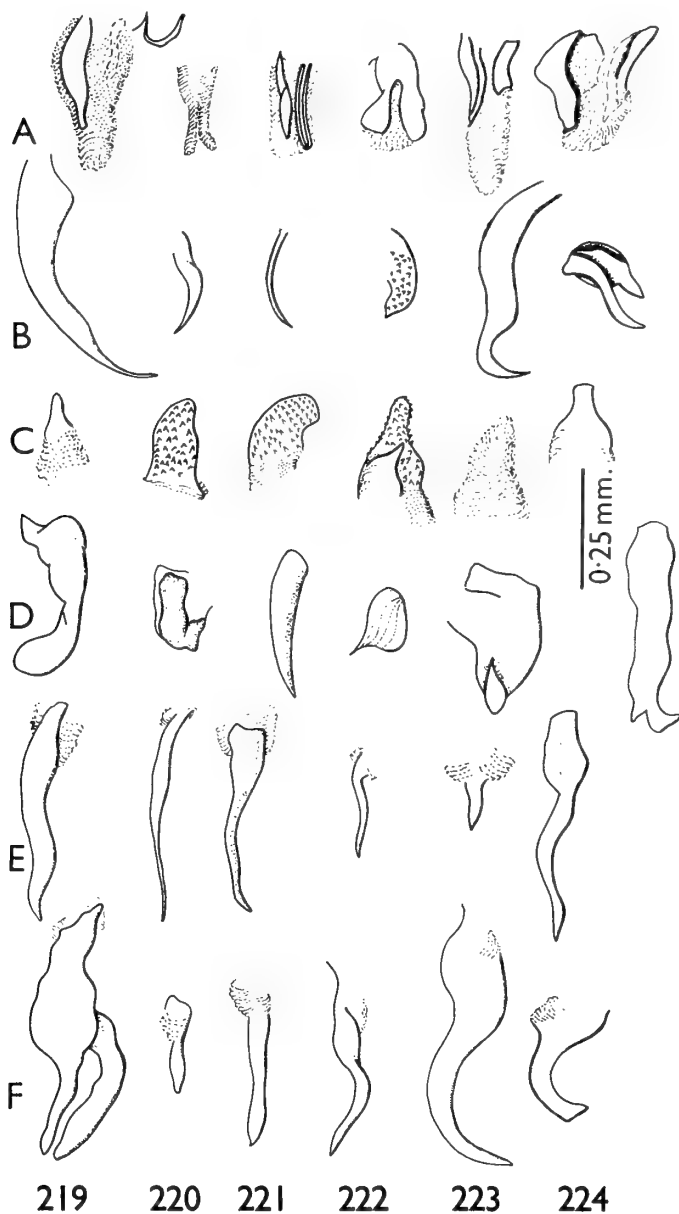
FIGS. 206-210. *Leptocorisa* spp., claspers, outer and inner views. 206, *lepida* ; 207, *pseudolepida* ; 208, *luzonica* ; 209, *solomonensis* ; 210, *sakdapolvakae*.



FIGS. 211-218. *Leptocorisa* spp., aedeagal appendages, outer view ; A, frontal appendage ; B, dorsal conjunctival appendage ; C, terminal appendage ; D, ventral thecal appendage ; E, left lateral conjunctival appendage ; F, second right lateral conjunctival appendage. 211, *oratorius* ; 212, *acuta* ; 213, *chinensis* ; 214, *discoidalis* ; 215, *palawanensis* ; 216, *biguttata* ; 217, *costalis* ; 218, *tagalica*.

197). (Second right lateral conjunctival appendage bilobed (Text-fig. 211, F) ; in ♀, posterior margin of seventh abdominal sternum deeply emarginate (Text-fig. 315), first gonocoxae elongated, giving a tiny lobe at apices (Text-fig. 239))

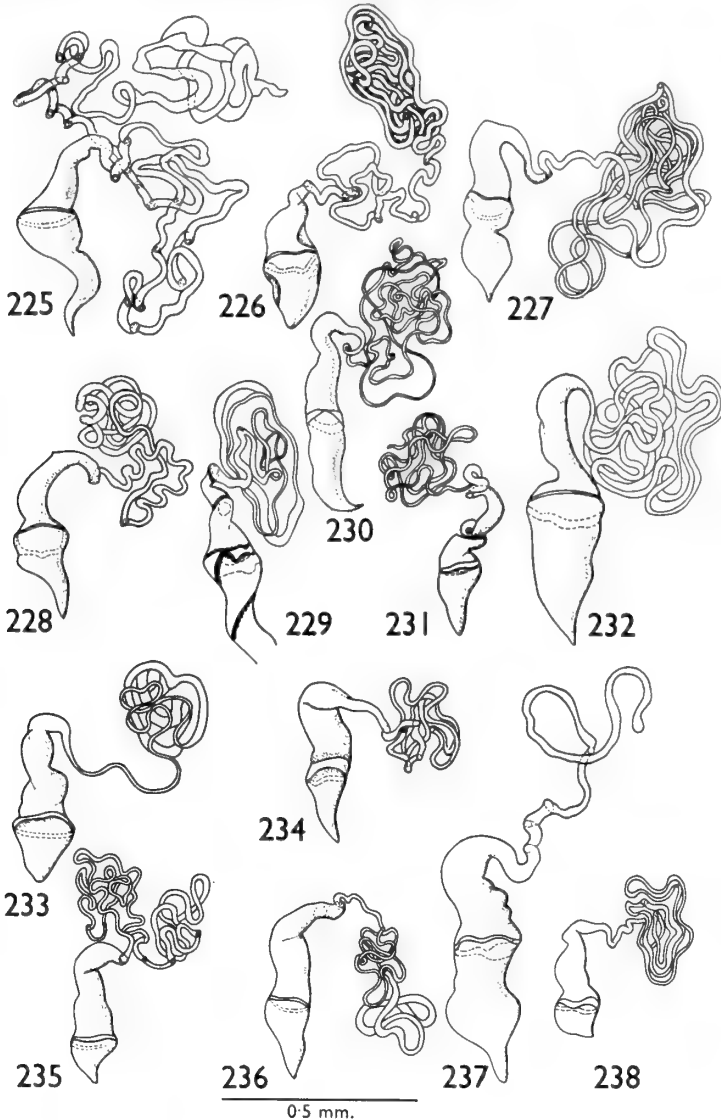
*oratorius* (p. 94)



FIGS. 219-224. *Leptocorisa* spp., aedeagal appendages, lettering as in figs. 211-218. 219, *luzonensis*; 220, *lepida*; 221, *pseudolepida*; 222, *luzonica*; 223, *solomonensis*; 224, *sakdapolvaka*.

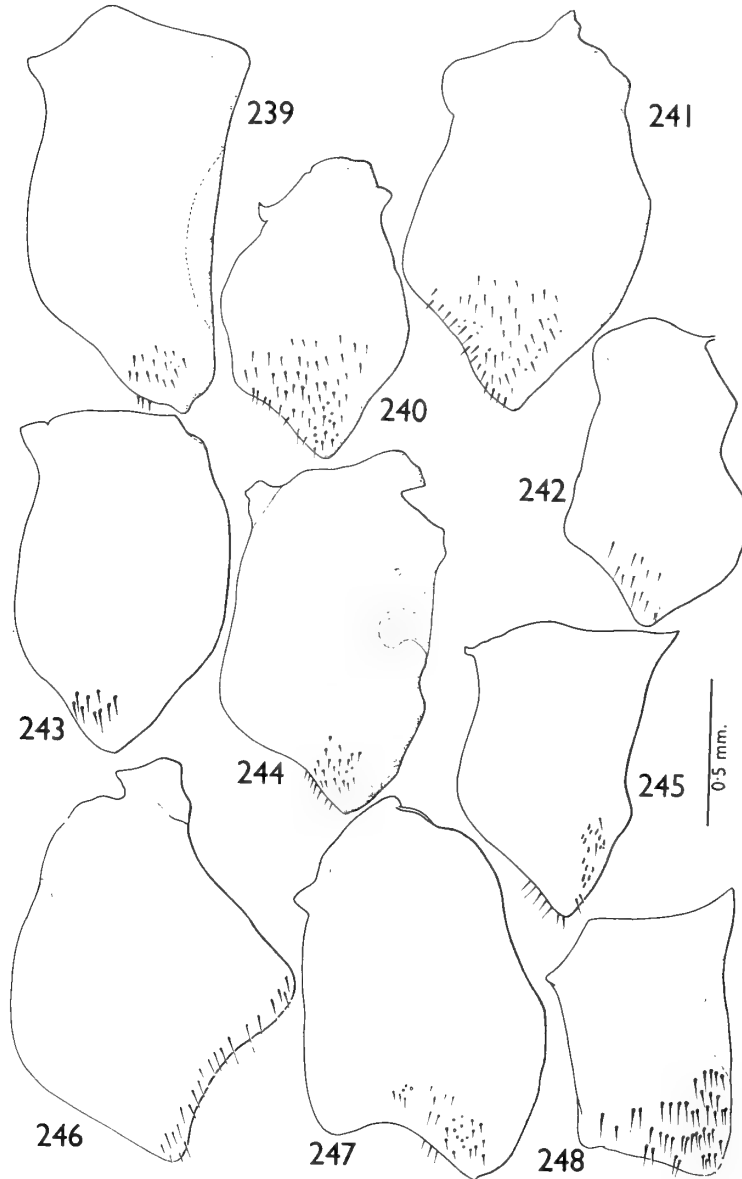


- Body more cylindrical, without ventro-lateral spots on abdomen ; claspers never pointed ; second right lateral conjunctival appendage never bilobed. . . . . 13
- 13 Basal joint of antennae usually pale unicoloured, lateral black line represented by only a black dot on the sides of collar ; claspers bifid at apices (Text-fig. 198). (Second right lateral conjunctival appendage trilobed (Text-fig. 212, F) ; in ♀, posterior margin of seventh abdominal sternum with a pointed median projection (Text-fig. 269) ; spermatheca irregular (Text-fig. 226)) . . . . . **acuta** (p. 78)

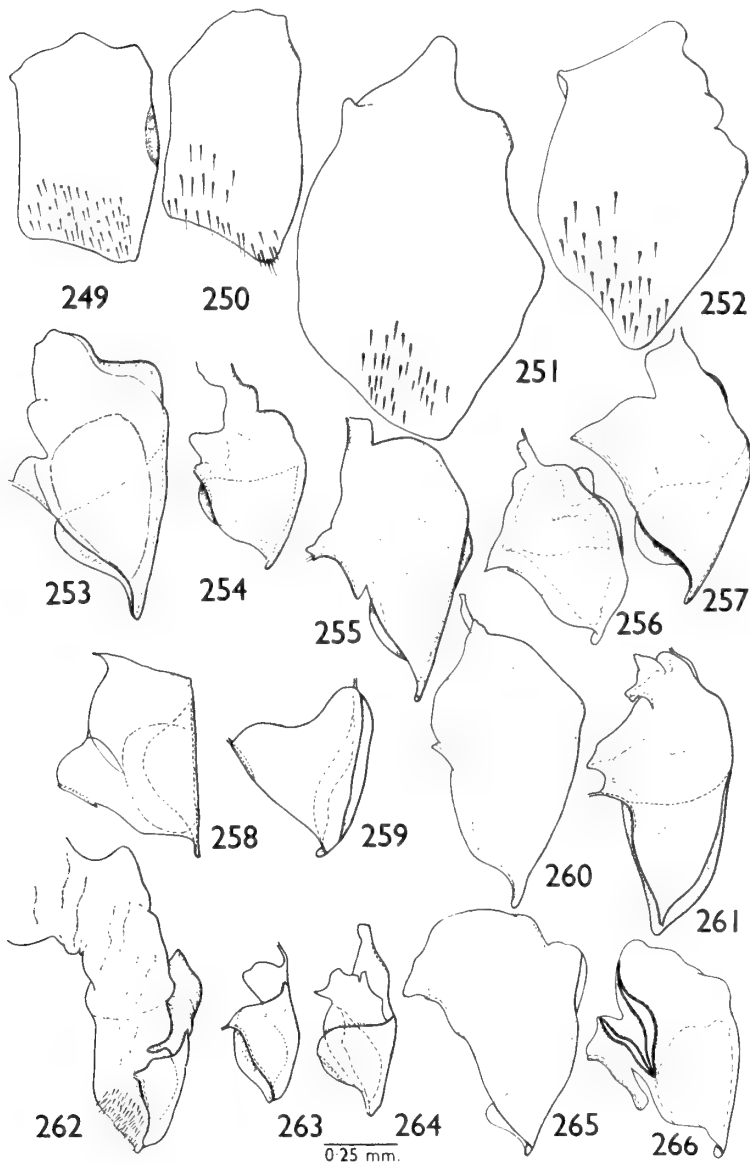


FIGS. 225-238. *Leptocoris* spp., spermatheca, ventral view. 225, *oratorius* ; 226, *acuta* ; 227, *chinensis* ; 228, *discoidalis* ; 229, *palawanensis* ; 230, *biguttata* ; 231, *costalis* ; 232, *tagalica* ; 233, *luzonensis* ; 234, *lepida* ; 235, *pseudolepida* ; 236, *luzonica* ; 237, *solomonensis* ; 238, *sakdapolrakae*.

- Basal joint of antennae dark brown or black ; lateral black line extending from bases of antenniferous tubercles to sides of collar, apices of claspers truncated (Text-fig. 199). (Second right lateral conjunctival appendage with a single lobe (Text-fig. 213, F) ; in ♀, posterior margin of seventh abdominal sternum with a rounded median projection (Text-fig. 280) ; spermatheca thinner in middle, almost divided into two compartments (Text-fig. 227)) . . . *chinensis* (p. 82)



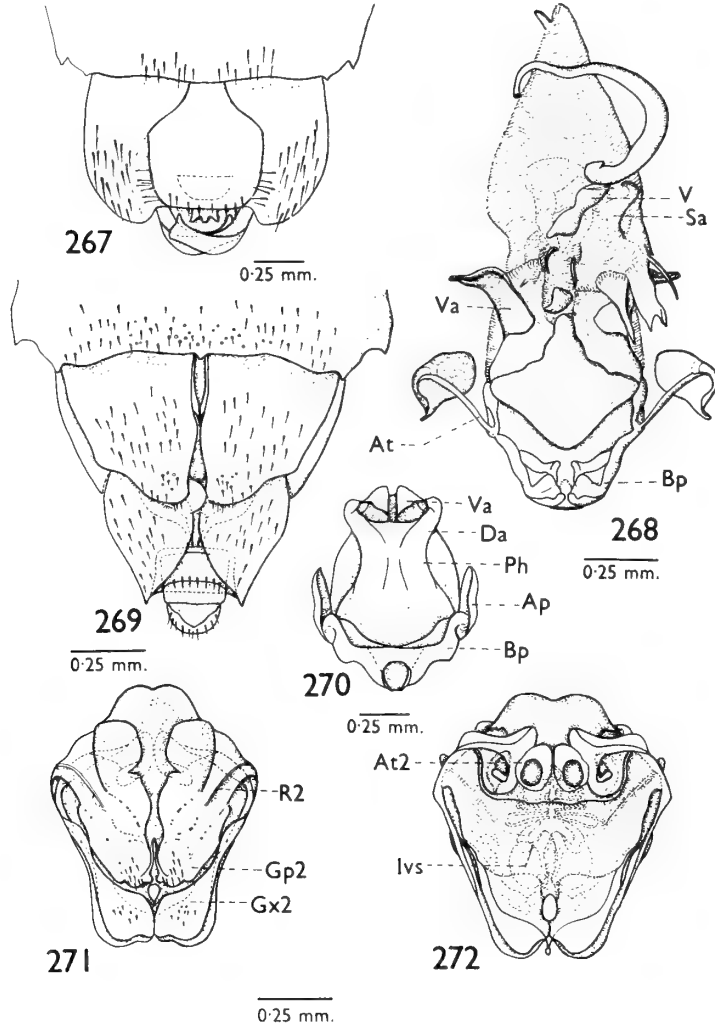
FIGS. 239-248. *Leptocorisa* spp., first gonocoxa, ventral view. 239, *oratorius* ; 240, *acuta* ; 241, *chinensis* ; 242, *discoidalis* ; 243, *palawanensis* ; 244, *biguttata* ; 245, *costalis* ; 246, *tagalica* ; 247, *luzonensis* ; 248, *lepida*.



FIGS. 249-266. *Leptocoris* spp., 249-252, first gonocoxa, ventral view; 253-266, first gonopophysis, ventral view. 249, *pseudolepida*; 250, *luzonica*; 251, *solomonensis*; 252, *sakdapolrakae*; 253, *oratorius*; 254, *acuta*; 255, *chinensis*; 256, *discoidalis*; 257, *palawanensis*; 258, *biguttata*; 259, *costalis*; 260, *tagalica*; 261, *luzonensis*; 262, *lepida*; 263, *pseudolepida*; 264, *luzonica*; 265, *solomonensis*; 266, *sakdapolrakae*.

*Leptocoris acuta* (Thunberg)

(Text-figs. 198, 212, 226, 240, 254, 267-272)

*Cimex acutus* Thunberg, 1783 : 34*Leptocoris (Rhabdocoris) acuta* (Thunberg) Stål, 1873 : 86*Cimex angustata* Fabricius, 1787 : 308*Cimex angustus* Fabricius ; Gmelin, 1789 : 2193*Gerris angustata* (Fabricius) Fabricius, 1803 : 262*Gerris varicornis* Fabricius, 1803 : 260 **syn. n.***Leptocoris flavida* Guérin, 1830 : 178 **syn. n.**

FIGS. 267-272. *Leptocoris acuta*, 267, 268, 270, ♂, 269, 271, 272 ♀. 267, terminalia, dorsal view ; 268, aedeagus (inflated), ventral view ; 269, terminalia, ventral view ; 270, theca, dorsal view ; 271, ovipositor, ventral view ; 272, same, dorsal view.

*Coreus varicornis* (Fabricius) Burmeister, 1834 : 298

*Myodocha varicornis* (Fabricius) Burmeister, 1835 : 325

*Leptocorisa varicornis* (Fabricius) Dallas, 1852 : 484

*Leptocorisa* (*Rhabdocoris*) *varicornis* (Fabricius) Stål, 1873 : 86 ; China, 1924 : 237

Characterized by claspers which are bifurcated at their apices and by the form of the ♂ and ♀ genitalia.

♂. Body length, 15.0–16.0 mm., width, 2.3–2.4 mm. Head length, 1.8–2.0 mm., width, 1.4–1.5 mm. Antennae, segment I, 4.0–5.0 mm., II, 2.7–2.8 mm., III, 3.0–3.4 mm., IV, 5.7–5.9 mm. Rostrum, segment I, 1.4–1.6 mm., II, 1.4–1.6 mm., III, 0.7–0.9 mm., IV, 0.7–0.9 mm. Pronotum, length, 2.4–2.5 mm., width, 2.3–2.4 mm. Hind femora, 6.0–6.2 mm. Hind tibia, 6.8–7.0 mm. Distance between ocelli, 0.45–0.5 mm., distance between an ocellus and an eye, 0.7–0.75 mm.

Body cylindrical, palish brown. Head elongated, pale ; occipital suture medially deeply concave ; paraclypeae long and pointed. Antennae uniformly pale, sometimes tinged with brownish black. Rostrum short, hardly reaching apices of second coxae. Lateral black line represented by only a black dot on either side of collar. Pronotal disc with whitish margins, with black spots on posterior angles. Legs uniformly pale, sometimes slightly darker. Posterior margin of seventh abdominal tergum truncate ; pygophore rounded and small (Text-fig. 267).

♂ GENITALIA : Claspers bifid at apices (Text-fig. 198) ; dorsal and ventral pairs of thecal appendages present ; ventral thecal appendages symmetrical as in Text-fig. 268 ; left lateral conjunctival appendage reduced, spine-like ; frontal conjunctival appendage with a distinct posterior sclerite ; two right lateral conjunctival appendages as in Text-fig. 268, second trilobed ; dorsal membranous appendage with a pointed terminal and bilobed dorsal conjunctival appendages as in Text-fig. 268.

♀. Very similar to ♂ in colour and measurements ; seventh abdominal sternum emarginate, with a very small median triangular projection (Text-fig. 269).

♀ GENITALIA : First gonocoxae small, outer margins sinuate, apices rounded (Text-fig. 240) ; six pairs of intervalvular sacs (Text-fig. 272) ; spermatheca irregular, with a median flange and a long coiled tube (Text-fig. 226).

Type material. Holotype of *Cimex acutus* Thunberg, without any data (abdomen and antennal segments missing), Zool. Inst., Uppsala ; neotype ♂, MALAYA : “ *Cimex acutus* Thunb. ” “ with Stål’s label ” “ sec. Mus. Thunb. ”, Riksmus. Stockholm ; holotype ♂ of *Gerris varicornis* Fabricius, without any data (Jrassquebana, Dalldorff. Mus. Jondlund), Zool. Mus. Copenhagen ; holotype ♂ of *Gerris angustata* Fabricius, without data, labelled “ *angustata* ”, Zool. Mus. Copenhagen.

Other material. INDIA : 41 ♂, 23 ♀ ; PAKISTAN : 2 ♂, 1 ♀ ; BURMA : 3 ♂, 2 ♀ ; BHUTAN : 21 ♂, 15 ♀ ; VIETNAM : 113 ♂, 114 ♀ ; FORMOSA : 1 ♀ ; HONGKONG : 1 ♂, 1 ♀ ; THAILAND : 317 ♂, 119 ♀ ; MALAYA : 12 ♂, 8 ♀ ; SUMATRA : 1 ♂ ; SARAWAK : 17 ♂, 11 ♀ ; NORTH BORNEO : 187 ♂, 207 ♀ ; PHILIPPINE ISLANDS : 4 ♂, 4 ♀ ; NEW GUINEA : 218 ♂, 110 ♀ ; NEW BRITAIN : 1 ♂ ; NEW IRELAND : 18 ♂, 15 ♀ ; AUSTRALIA : 55 ♂, 56 ♀ ; SOLOMON ISLANDS : 54 ♂, 25 ♀ ; NEW CALEDONIA : 2 ♂, 2 ♀ ; NEW HEBRIDES : 4 ♂, 3 ♀ ; FIJI ISLANDS : 118 ♂, 137 ♀ ; SAMOAN ISLANDS : 194 ♂, 115 ♀.

This species is a major pest of paddy crops and is found in all rice growing regions of the Far East countries. It is very common in India (U.P.) (and here it is known as “ Gandhi bug ”), Sarawak, and New Guinea. Its range extends in the west into

India and in the east right into Samoa, New Caledonia and the Fiji Islands and is found throughout the year. No specimens have been recorded from Java and Ceylon. Its biology and life history have been studied in India by Lefroy (1908) and Akbar (1958) under the name of *Leptocoris* *varicornis* (Fabricius).

This species, with *L. oratorius* (Fabricius) and *L. chinensis* Dallas, forms a group of widely distributed pests of paddy crops in the Far East, but it can easily be separated from them and in fact from all other species of *Leptocoris* in the ♂ by the claspers, which are bifurcated at apices and in the ♀ by a very small median triangular projection of the seventh abdominal sternum.

Stål redescribed *acutus* Thunberg and *varicornis* Fabricius as distinct species. During the present study the types of both the species have been examined, and were found to represent the same species. In view of the damaged condition of the supposed type of *acutus* Thunberg in the Zoological Institute, Uppsala, and with the agreement of Dr. Kullenberg (Mr. Hedstrom), a male specimen in the Riksmus., Stockholm from the type locality (Malacca) and bearing Stål's label "*Cimex acutus* Thunb. Mus. Thunb." has been designated neotype and has been given a neotype label.

### *Leptocoris biguttata* Walker

(Text-figs. 202, 216, 230, 244, 258 and 273-277)

*Leptocoris biguttata* Walker, 1871 : 174

*Leptocoris biguttata* Walker; Distant, 1901 : 372 [as synonym of *L. costalis* Herrich Schäffer]

Characterized by hemielytra which, excluding the costal margins, are black, by lateral black line extending from sides of antenniferous tubercles on to pronotal collar, by short paraclypeae, which are thick at bases and pointed at apices, and by the form of ♂ and ♀ genitalia.

♂. Body length, 16.0-17.0 mm., width, 2.2-2.4 mm. Head length, 2.2-2.3 mm., width, 1.7-1.8 mm. Antennae, segment I, 4.8-4.9 mm., rest missing. Rostrum, segment I, 1.6-1.7 mm., II, 1.7-1.8 mm., III, 0.9-1.0 mm., IV, 0.8 mm. Pronotum, length, 2.7-2.8 mm., width, 2.2-2.4 mm. Hind femora, 7.0 mm. Hind tibia, 7.0-7.2 mm. Distance between ocelli, 0.5-0.55 mm., distance between an ocellus and an eye, 0.95 mm.

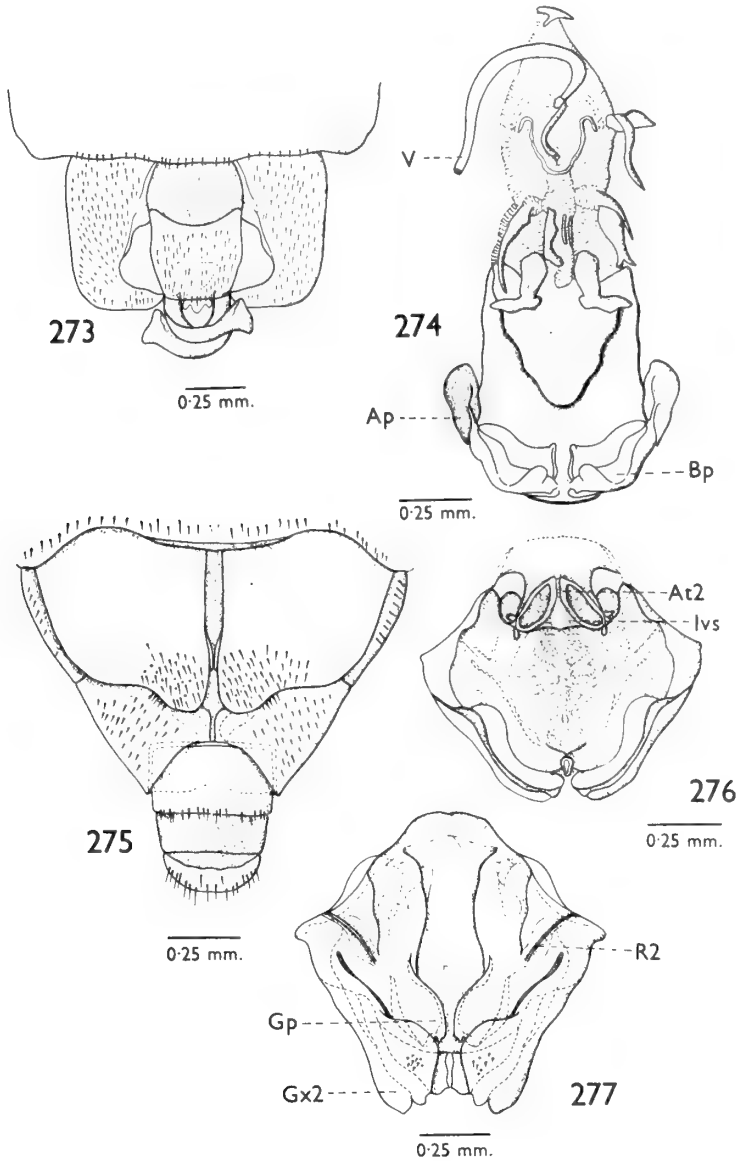
Body elongated, robust and brownish black. Head elongated, yellowish brown with occipital suture medially smoothly concave; paraclypeae short, very thick at bases and pointed at apices. Rostrum short, reaching apices of second coxae. Lateral black line extending from sides of antenniferous tubercles on to collar. Pronotal disc yellowish brown, posterior angle with black spots. Hemielytra, excluding costal margin, dark black. Legs brownish black, hind femora darker. Posterior margin of seventh abdominal tergum truncated, medially very slightly convex; pygophore almost rectangular (Text-fig. 273).

♂ GENITALIA : Claspers extending well beyond the posterior margin of pygophore, apices broadly truncated (Text-fig. 202); both dorsal and ventral thecal appendages present as in Text-fig. 274, symmetrical; left lateral conjunctival appendage short, pointed and curved like an arch; frontal conjunctival appendages with three sclerotized pieces as in Text-fig. 274; two right lateral conjunctival appendages, second thick at base and bifurcated at apex (Text-fig. 216, F); dorsal membranous appendage with a laterally pointed terminal, and a bilobed dorsal appendage (Text-fig. 274).

♀. Body length, 17.5-17.8 mm., width, 2.4-2.5 mm. Head length, 2.2-2.4 mm., width, 1.8-1.9 mm. Antennae, segment I, 5.0 mm., II, 3.0 mm., III, 3.3 mm., IV, missing. Rostrum,

segment I, 1.5–1.6 mm., II, 1.7–1.8 mm., III, 0.8–0.9 mm., IV, 0.7–0.8 mm. Pronotum, length, 2.8–2.9 mm., width, 2.4–2.5 mm. Hind femora, 6.9–7.0 mm. Hind tibia, 7.0–7.1 mm. Distance between ocelli, 0.5 mm., distance between an ocellus and an eye, 0.9 mm.

Slightly longer than ♂ with usually less dark hemelytra, posterior margin of seventh abdominal sternum emarginate, with a very small rounded projection in the middle (Text-fig. 275).



FIGS. 273–277. *Leptocoris biguttata*, 273, 274, ♂, 275–277, ♀. 273, terminalia, dorsal view; 274, aedeagus (inflated), ventral view; 275, terminalia, ventral view; 276, ovipositor, dorsal view; 277, same, ventral view.

♀ GENITALIA : First gonocoxae broad at bases, apices pointed (Text-fig. 244) ; fifteen pairs of intervalvular sacs (Text-fig. 276) ; spermatheca elongated and thin, with a coiled tube and a median flange as in Text-fig. 230.

Type material. Holotype ♀, CELEBES : Gilolo (Wallace Coll.), B.M.(N.H.).

Other material. MALAYA : 13 ♂, 14 ♀ ; PHILIPPINE ISLANDS : 4 ♂, 2 ♀ ; SARAWAK : 25 ♂, 10 ♀ ; CELEBES : 6 ♂, 6 ♀ ; HALMAHERA ISLAND : 2 ♂, 1 ♀.

The range of this species extends in the west into Malaya and in the east as far as Halmahera Island east of the Celebes. This species has also been reported on paddy and on grasses, *Panicum barbatum*. It seems to be very common in the early part of the year, December, January and February.

This species is the closest ally of *L. costalis* (Herrich Schäffer) but can easily be separated from this species by the apical antennal segments, which are pale only at bases (pale both at bases and at apices in *costalis*), by the dorsum of abdomen which is yellowish brown, unicolourous (posterior one-third black in *costalis*) and by the short paraclypeae, which are thicker at bases and pointed at apices (cylindrical, pointed and knob-like at apices in *costalis*). Its broadly truncated claspers extending well beyond the posterior margin of pygophore and linear spermatheca are its peculiarities.

Distant synonymized this species with *L. costalis* (Herrich Schäffer) and consequently this species was not included by China (1924) in his key for the Oriental species of *Leptocoris* ; but the apical antennal segments, abdominal colour and ♂ and ♀ genitalia show it to be distinct (see above).

### *Leptocoris chinensis* Dallas

(Text-figs. 199, 213, 227, 241, 255 and 278-283)

*Leptocoris chinensis* Dallas, 1852 : 483

*Leptocoris chinensis* Dallas ; Stål, 1873 : 86 [as synonym of *Leptocoris (Rhabdocoris) varicornis* Fabricius]

*Leptocoris nitidula* Breddin, 1912 : 107 **syn. n.**

*Leptocoris corbetti* China, 1924 : 237 **syn. n.**

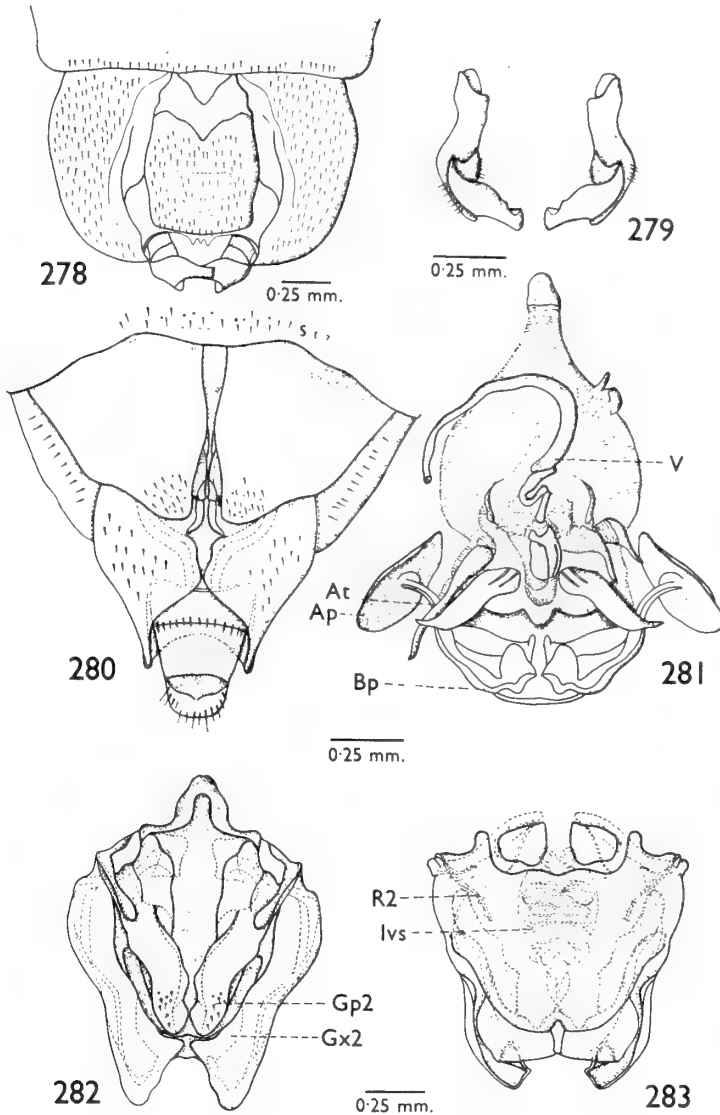
Characterized by the lateral black line, which is represented by two dots on the posterior sides of head and on the pronotal collar, by the basal antennal segments which are black at apices and by the form of ♂ and ♀ genitalia.

♂. Body length, 17.3-17.8 mm., width, 2.7-2.9 mm. Head length, 2.3 mm., width, 1.6 mm. Antennae, segment I, 4.2-4.3 mm., II, 2.8-2.9 mm., III, 3.0-3.3 mm., IV, 4.4-4.6 mm. Rostrum, segment I, 1.6-1.8 mm., II, 1.7-1.8 mm., III, 1.0-1.1 mm., IV, 1.0-1.1 mm. Pronotum, length, 3.0-3.2 mm., width, 2.7-2.9 mm. Hind femora, 6.6-6.9 mm. Hind tibia, 7.0-7.1 mm. Distance between ocelli, 0.6 mm., distance between an ocellus and an eye, 0.8 mm.

Body robust, pale. Head elongated, occipital suture medially concave ; paraclypeae elongated, and rounded at apices. Antennae pale, tinged with black. Rostrum short, reaching apices of second coxae. Lateral black line usually represented by two black dots on posterior sides of head and on pronotal collar. Pronotal disc pale unicolourous, black spots on posterior angles absent or faint. Legs pale, sometimes tinged with black. Posterior margin of seventh abdominal tergum truncated, pygophore large, rounded, (Text-fig. 278).



♂ GENITALIA : Claspers truncated at apices (Text-fig. 199) ; both dorsal and ventral thecal appendages present, symmetrical (Text-fig. 281) ; left lateral conjunctival appendage elongated, pointed and curved in middle ; frontal conjunctival appendage with two sclerotized pieces (Text-fig. 281) ; two right lateral conjunctival appendages, second with one lobe (Text-fig. 213,F) ; dorsal membranous appendage with a cap-shaped terminal appendage and a dorsal appendage as in Text-fig. 281.



FIGS. 278-283. *Leptocoris chinensis*, 278, 279, 281, ♂, 280, 282, 283, ♀. 278, terminalia, dorsal view ; 279, claspers, outer and inner view ; 280, terminalia, ventral view ; 281, aedeagus (inflated), ventral view ; 282, ovipositor, ventral view ; 283, same, dorsal view.

♀. Body length, 16.8–18.1 mm., width, 2.7–2.9 mm. Head length, 2.7 mm., width, 1.7 mm. Antennae, segment I, 4.1–4.8 mm., II, 2.7–2.9 mm., III, 3.1–3.7 mm., IV, 4.3–4.5 mm. Rostrum, segment I, 1.7–1.8 mm., II, 1.5–1.9 mm., III, 0.8–1.0 mm., IV, 0.7–1.0 mm. Pronotum, length, 2.9–3.1 mm., width, 2.7–2.9 mm. Hind femora, 6.7–6.8 mm. Hind tibia, 7.0–7.1 mm. Distance between ocelli, 0.5–0.6 mm., distance between an ocellus and an eye, 0.8–0.9 mm.

Very similar to ♂ in general appearance; posterior margin of seventh abdominal sternum with a minute median rounded projection (Text-fig. 280).

♀ GENITALIA: First gonocoxae large, rounded at apices (Text-fig. 241); seven pairs of intervalvular sacs (Text-fig. 283); spermatheca elongated, almost divided in middle, with a median flange (Text-fig. 227).

Type material. Neotype ♂, CHINA: Foochow (Fuchou), 10–14.vii.1936 (*M. S. Yang*), B.M.(N.H.); holotype ♀ of *Leptocorisa nitidula* Breddin, CHINA: Pingh' siang, near Kwangsi (Coll. Breddin, labelled "*Leptocorisa nitidula* Bredd."), Dtsch. Entom. Inst., Berlin; holotype ♂ of *Leptocorisa corbeti* China, MALAYA: Kuala Lumpur, 1933 (*G. H. Corbett*), B.M.(N.H.); paratypes, 1 ♂, 1 ♀, of *L. nitidula*, with data as holotype, Dtsch. Entom. Inst., Berlin; paratypes, 1 ♂, 6 ♀, of *L. corbeti*, with data as holotype, B.M.(N.H.).

Other material. CHINA: 24 ♂, 23 ♀; BONIN ISLAND: 1 ♂; FORMOSA: 1 ♂; THAILAND: 2 ♂; VIETNAM: 1 ♂; PHILIPPINE ISLANDS: 10 ♂, 6 ♀; BHUTAN: 40 ♂, 35 ♀; MALAYA: 10 ♂, 10 ♀; SUMATRA: 5 ♂, 2 ♀; PALAU ISLAND: 1 ♀.

The range of this species extends in the north into Bhutan and China, in the south into Sumatra and in the east into Malaya. This species has not been recorded from Australian region. The adults have been collected throughout the year; this species has also been recorded on grasses and four specimens were found in maize fields.

This species is very close to *L. oratorius* (Fabricius) and *L. acuta* (Thunberg) but can easily be separated from them by the lateral black line, which is represented by two brownish black dots on the sides of the head and pronotal collar. The outer side of basal antennal segment is usually black and the claspers are truncated at apices, whereas in *acuta* the lateral black line is represented by a black dot on the sides of collar and in *oratorius* lateral black line is absent. In *oratorius* claspers taper to a point posteriorly and in *acuta* these are bifurcated at apices.

In the original description, Dallas (1852) mentions "Head impunctate with a black line on each side. Antennae, with the basal joint fulvous black externally at the apex, legs pale fulvous, tibia sometimes black at the base and apex, tarsi black at the apex". The two specimens recorded by Dallas and presented by G. T. Lay can not now be found in the British Museum (Natural History) and are presumably lost. This species was consequently unknown to Dr. W. E. China and was not discussed in his 1924 revision. A number of specimens agreeing with Dallas's description have been found in the unnamed accessions in the British Museum. It is proposed to designate one of these (♂ B.M. 1948–548) from the type locality as neotype and this has been given a neotype label.

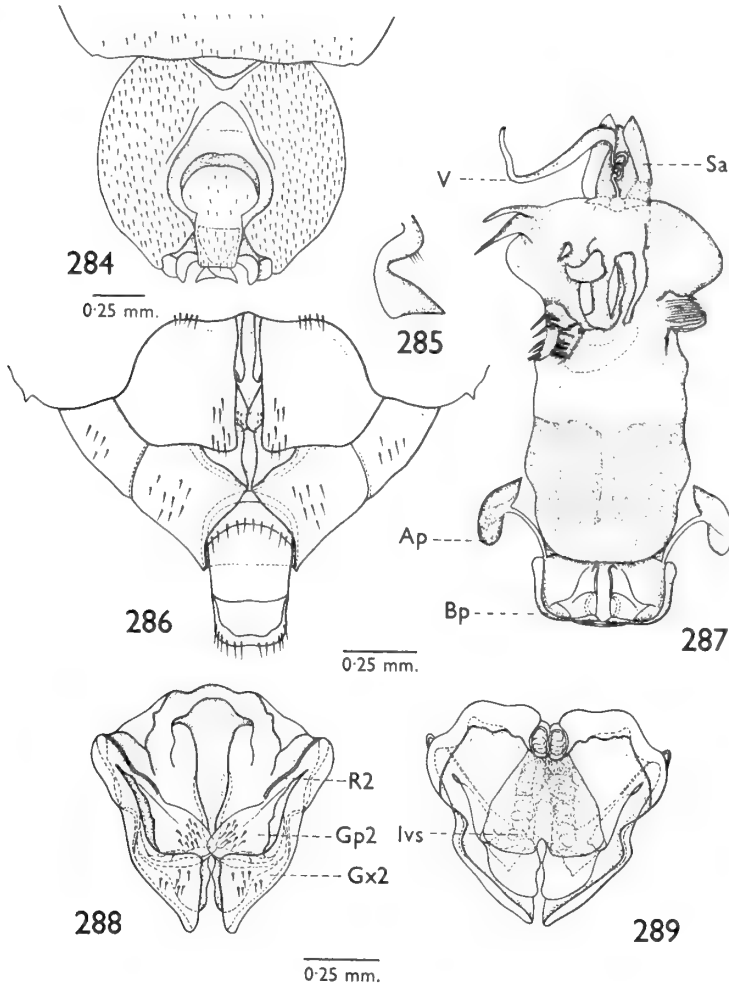
Stål (1873) synonymized this species with *varicornis* Fabricius. The synonymy has been found incorrect, the two species being easily separable (see above).

*Leptocoris costalis* (Herrich Schäffer)

(Text-figs. 203, 217, 231, 245, 259 and 284-289)

*Myodochus costalis* Herrich Schäffer, 1848 : 96*Leptocoris (Rhabdocoris) costalis* (Herrich Schäffer) Stål, 1873 : 86 ; China, 1924 : 238

Characterized by the apical segments of antennae, which are pale, both at bases and apices, by the basal third of the dorsum of the abdomen, which is black, by the paraclypeae which are cylindrical, and pointed, knob-like at apices, and by ♂ and ♀ genitalia.



FIGS. 284-289. *Leptocoris costalis*, 284, 285, 287, ♂, 286, 288, 289, ♀. 284, terminalia, dorsal view; 285, claspers, inner view; 286, terminalia, ventral view; 287, aedeagus (inflated), ventral view; 288, ovipositor, ventral view; 289, same, dorsal view.

♂. Body length, 14.7–15.2 mm., width, 2.1–2.6 mm. Head length, 2.0–2.3 mm., (length of paraclypeae 0.7–0.8 mm.), width, 1.5–1.7 mm. Antennae, segment I, 4.0–4.7 mm., II, 2.5–2.7 mm., III, 2.8–2.9 mm., IV, 5.0–5.4 mm. Rostrum, segment I, 1.2–1.4 mm., II, 1.2–1.4 mm., III, 0.7–0.9 mm., IV, 0.7–0.8 mm. Pronotum, length, 2.4–2.7 mm., width, 2.1–2.6 mm. Hind femora, 6.0–6.4 mm. Hind tibia, 6.4–6.7 mm. Distance between ocelli, 0.4–0.5 mm., distance between an ocellus and an eye, 0.7–0.8 mm.

Body cylindrical, light brown, tinged with black. Head elongated, occipital suture almost straight, paraclypeae remarkably elongated and pointed knob-like at apices. Antennae brownish black, with apical segment pale, both at bases and at apices. Rostrum short, usually reaching apices of second coxae. Lateral black line prominent, extending from sides of antenniferous tubercles to anterior third of propleuron. Pronotal disc palish brown, sometimes anteriorly blackish, posterior angles with black spots. Legs brownish black, with basal half of femora pale. Hemielytra, excluding costal margins, black. Posterior margin of seventh abdominal tergum almost truncated, slightly sinuate; pygophore rounded (Text-fig. 284).

♂ GENITALIA: Claspers curved and acutely pointed, blades obliquely truncated (Text-fig. 203); both dorsal and ventral pairs of thecal appendages present, with ventral appendages, asymmetrical, spiny and sac-like (Text-fig. 287); three left lateral conjunctival appendages as in Text-fig. 287; frontal conjunctival appendages with three sclerotized pieces (Text-fig. 217,A); only one thin, curved and blunt right lateral conjunctival appendage present, (Text-fig. 217,F), membranous appendage without a terminal or a dorsal appendage (Text-fig. 287).

♀. Body length, 15.0–16.0 mm., width, 2.2–2.4 mm. Head length, 2.1–2.5 mm., width, 1.6–1.8 mm. Antennal segment I, 4.5–4.7 mm., II, 2.4–2.6 mm., III, 2.7–2.8 mm., IV, 5.2–5.4 mm. Rostrum, segment I, 1.5–1.6 mm., II, 1.4–1.6 mm., III, 0.7–0.9 mm., IV, 0.7–0.8 mm. Pronotum, length, 2.5–2.8 mm., width, 2.4–2.7 mm. Hind femora, 6.26–6.4 mm. Hind tibia, 6.4–6.6 mm. Distance between ocelli, 0.5 mm., distance between an ocellus and an eye, 0.8–0.85 mm.

Very similar to ♂ in general appearance; posterior margin of seventh abdominal sternum sinuately emarginate (Text-fig. 286).

♀ GENITALIA: First gonocoxae triangular, apices pointed (Text-fig. 245); sixteen pairs of intervalvular sacs (Text-fig. 289); spermatheca twisted at apices, with a median flange and a long coiled tube of variable thickness.

Type material. Neotype ♂, JAVA: Carnegie Mus.

Other material. VIETNAM: 13 ♂, 17 ♀; SINGAPORE: 2 ♂, 1 ♀; THAILAND: 2 ♂; MALAYA: 10 ♂, 8 ♀; JAVA: 2 ♂; SUMATRA: 10 ♂, 12 ♀; SARAWAK: 26 ♂, 16 ♀; NORTH BORNEO: 18 ♂, 20 ♀; BORNEO: 1 ♂; PHILIPPINE ISLANDS: 2 ♂.

The range of this species extends in the west into Sumatra, Thailand and Malaya and in the east into Borneo and the Philippine Islands. It seems to be very common in Borneo. Adults have been collected almost throughout the year.

It is a completely isolated species in the genus on the basis of the aedeagus. However it is close to *L. biguttata* Walker in colouration of the hemielytra, but the two can easily be separated from each other by the characters of apical antennal segment, colouration of abdomen and shape of claspers (see above).

In the original description Herrich Schäffer (1848) stated " *M. virescens* antennis (articulo 4 basi albo) linea lateralis capitis, angulis posticis thoracis, scutello et elytris intus nigris, tibiis tarsisque fuscis (Fig. 864)". Dr. W. Forster (Zoologische Sammlung des Bayerischen Staates) has kindly informed the author that in 1944 the type of *Myodochnus costalis* Herrich Schäffer was destroyed as the result of an air raid, but a number of specimens agreeing with Herrich Schäffer's description and

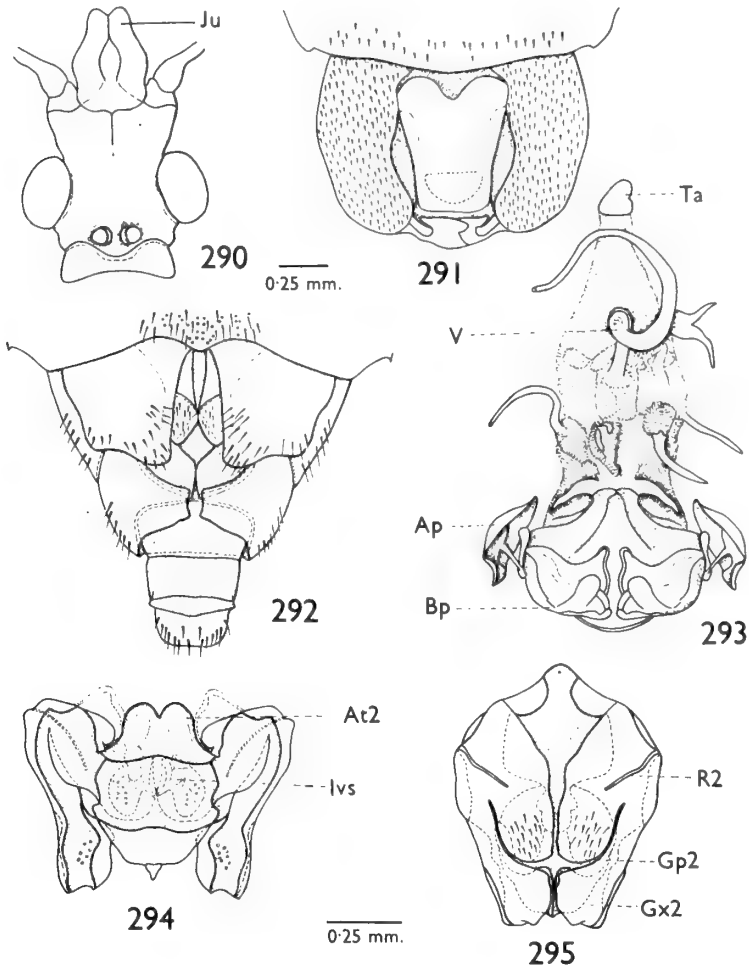
figure were identified. A male specimen from Java (the type locality) from the Carnegie Museum (No. 8147) has been designated neotype of *Leptocoris costalis* (Herrich Schäffer) and has been given a neotype label.

***Leptocoris discoidalis* Walker**

(Text-figs. 200, 214, 228, 242, 256 and 290–295)

*Leptocoris discoidalis* Walker, 1871 : 173

*Leptocoris (Rhabdocoris) discoidalis* (Walker) China, 1924 : 239



FIGS. 290–295. *Leptocoris discoidalis*, 290, 291, 293, ♂, 292, 294, 295, ♀. 290, head, dorsal view; 291, terminalia, dorsal view; 292, terminalia, ventral view; 293, aedeagus (inflated), ventral view; 294, ovipositor, dorsal view; 295, same, ventral view.

Characterized by long rostrum, which reaches third coxae and by the form of ♂ and ♀ genitalia.

♂. Body length, 15.5–16.5 mm., width, 2.2–3.0 mm. Head length, 1.7–1.9 mm., width, 1.5–1.7 mm. Antennae, segment I, 4.2–4.3 mm., II, 2.9–3.0 mm., III, 3.5–3.6 mm., IV, 5.2–5.3 mm. Rostrum, segment I, 1.9 mm., II, 1.9 mm., III, 0.9 mm., IV, 1.0 mm. Pronotum, length, 2.4–2.5 mm., width, 2.2–2.3 mm. Hind femora, 6.5–6.7 mm. Hind tibia, 6.8–6.9 mm. Distance between ocelli, 0.44–0.45 mm., distance between an ocellus and an eye, 0.7–0.75 mm.

Body elongate, testaceous, head short and broad (Text-fig. 290); occipital suture deeply concave in middle; paraclypeae short, medially thick and rounded at apices. Antennae, basal segment with inner side pale outer side and bases of second and third black, apical segment with at least basal quarter pale. Rostrum long, usually reaching apices of third coxae. Lateral black line extending from sides of antenniferous tubercles on to anterior three-quarters of propleuron. Pronotal disc pale, posteriorly with black punctures, black spots on posterior angles present. Legs yellowish, with apices of femora, tibiae and tarsi blackish. Hemelytra, clavus with black punctures. Posterior margin of seventh abdominal tergum medially slightly convex; lobes of ninth segment comparatively larger (Text-fig. 291).

♂ GENITALIA: Claspers very thick and truncated at apices (Text-fig. 200); dorsal and ventral thecal appendages present, with symmetrical ventral appendages (Text-fig. 293); lateral conjunctival appendage strongly inwardly curved (Text-fig. 214, E); frontal conjunctival appendage with two small sclerotized pieces (Text-fig. 214, A); two right lateral conjunctival appendages, with second short, thick and pointed at apex (Text-fig. 214, F); membranous appendage with a sclerotized cap-like terminal and a bilobed dorsal appendage (Text-fig. 293).

♀. Very similar to ♂ in colour and measurements, posterior margin of seventh abdominal sternum emarginate with a small convex median projection and tiny backward projections at sides (Text-fig. 292).

♀ GENITALIA: First gonocoxae small, outer margin convex, apices rounded (Text-fig. 292); only four pairs of intervalvular sacs present (Text-fig. 294); spermatheca having a knob at apex, with a median flange and a long coiled tube (Text-fig. 228).

Type material. Holotype ♀, NEW GUINEA: B.M.(N.H.).

Other material. CERAM ISLAND: 1 ♂; HALMAHERA ISLAND: 1 ♂; NEW GUINEA: 114 ♂, 65 ♀; NEW IRELAND: 15 ♂, 13 ♀; PHILIPPINE ISLANDS: 1 ♀; SOLOMON ISLANDS: 3 ♂, 1 ♀; NEW HEBRIDES: 6 ♂, 3 ♀.

The range of this species extends in the west into Indonesia (north of Ceram Island) and in the east into New Hebrides. It is very common in New Guinea and New Hebrides. The adults have been collected throughout the year.

This species is closest to *L. solomonensis* sp. n. but can easily be separated by rostrum which reaches third coxae, but not in *solomonensis*. In the aedeagus of *solomonensis* the ventral thecal appendages are asymmetrical and the terminal appendage is missing.

### *Leptocoris lepida* Breddin

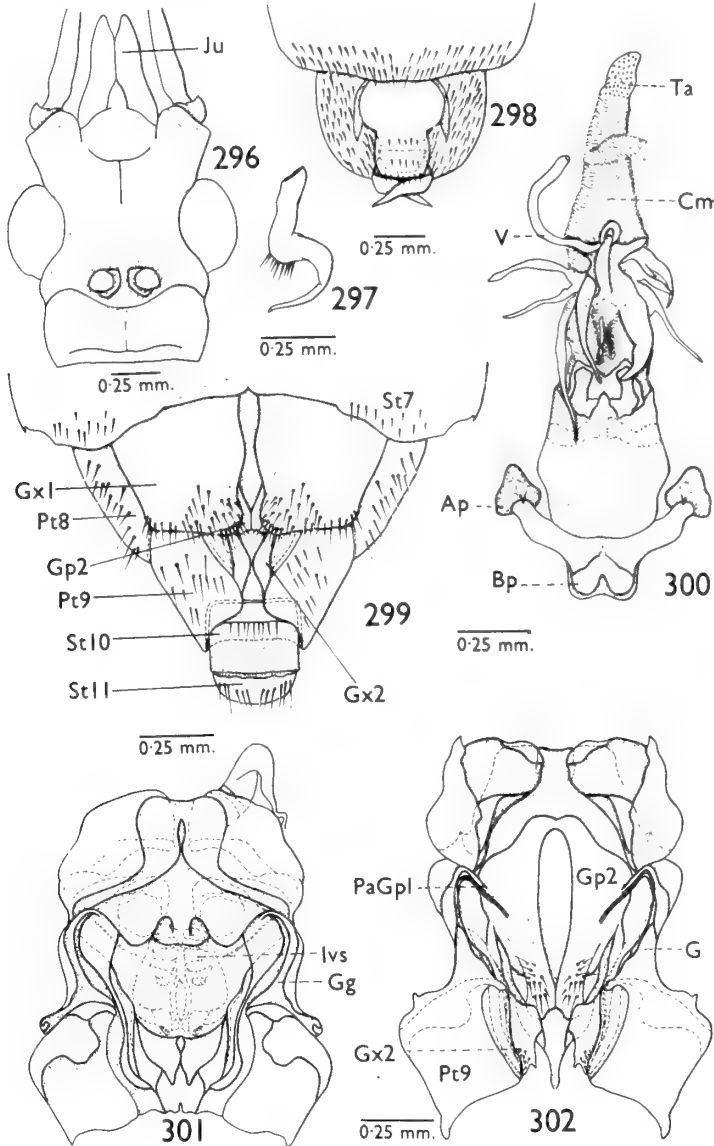
(Text-figs. 206, 220, 234, 248, 262, and 296–302)

*Leptocoris lepida* Breddin, 1909: 293

*Leptocoris (Rhabdocoris) lepida* (Breddin) China, 1924: 238

Characterized by very short and slim body, by long, cylindrical and pointed paraclypeae and by the form of ♂ and ♀ genitalia.

♂. Body length, 11.5–11.8 mm., width, 1.6–1.8 mm. Head length, 1.6–1.7 mm., width, 1.1–1.2 mm. Antennae, segment I, 3.5–3.7 mm., II, 2.0–2.2 mm., III, 2.5–2.6 mm., IV, missing. Rostrum, segment I, 1.0 mm., II, 1.0 mm., III, 0.6 mm., IV, 0.6 mm. Pronotum, length, 1.7–1.9 mm., width, 1.6–1.8 mm. Hind femora, 6.0 mm. Hind tibia, 6.0 mm. Distance between ocelli, 0.33–0.35 mm., distance between an ocellus and an eye, 0.56–0.6 mm.



FIGS. 296–302. *Leptocoris lepida*, 296–298, 300, ♂, 299, 301, 302, ♀. 296, head, dorsal view; 297, claspers, inner and outer views; 298, terminalia, dorsal view; 299, terminalia, ventral view; 300, aedeagus (inflated), ventral view; 301, ovipositor, ventral view; 302, same, dorsal view.

Body short and slim, pale unicolourous. Head elongate (Text-fig. 296); occipital suture complete; paraclypeae elongated and cylindrical with pointed apices. Antennae pale, tinged with black, underside of basal segments and bases of each segment pale. Rostrum short, reaching apices of second coxae. Lateral black line faint on sides of antenniferous tubercles, extending on to collar like a black dot. Pronotal disc punctate, pale, sometimes tinged with green; brownish black spots on posterior angles present. Legs uniformly pale, with articulations between femora, tibiae and tarsi black. Hemelytra pale unicolourous. Posterior margin of seventh abdominal tergum with a very small rounded projection; pygophore round (Text-fig. 298).

♂ GENITALIA: Claspers with long blades and with curved and pointed apices (Text-fig. 206); both dorsal and ventral pairs of thecal appendages present, with symmetrical sac-like, broad ventral appendages (Text-fig. 220); four lateral conjunctival appendages as in Text-fig. 300; frontal conjunctival appendage without any sclerotized piece (Text-fig. 220,A); three right lateral conjunctival appendages, with second short, straight and thick only in middle (Text-fig. 220,F); membranous appendage with a spiculed, cap-shaped terminal and a short, curved and acutely pointed dorsal appendage.

♀. Very similar to ♂ in general appearance and measurements; posterior margin of seventh abdominal sternum sinuately emarginate (Text-fig. 299).

♀ GENITALIA: First gonocoxae short, broad, rounded at apices (Text-fig. 299); six pairs of intervalvular sacs (Text-fig. 302); spermatheca short, pointed at apex, with a median flange and a short coiled tube (Text-fig. 234).

Type material. Holotype ♂, without data, labelled "*Leptocorisa lepida* Bredd.", "Type!", Coll. Breddin, Dtsch. Entom. Inst., Berlin.

Other material. INDIA: 2 ♂, 2 ♀; BHUTAN: 45 ♂, 35 ♀; BURMA: 1 ♂; THAILAND: 2 ♂, 2 ♀.

This species is common in India (U.P.) and its range extends in the east as far as Thailand. The adults have been collected in April, September and December.

This species is very close to *L. pseudolepida* sp. n. and *L. luzonica* sp. n. and shares with them the character of small size of the body (less than 12 mm. in length). It can be separated from them by the long and cylindrical paraclypeae, which are pointed at their apices and by other genital characters (see above).

### *Leptocorisa luzonensis* sp. n.

(Text-figs. 205, 219, 233, 247, 261 and 303-307)

Characterized by apical antennal segments, which are equal to or longer than second and third segments together and by the form of ♂ and ♀ genitalia.

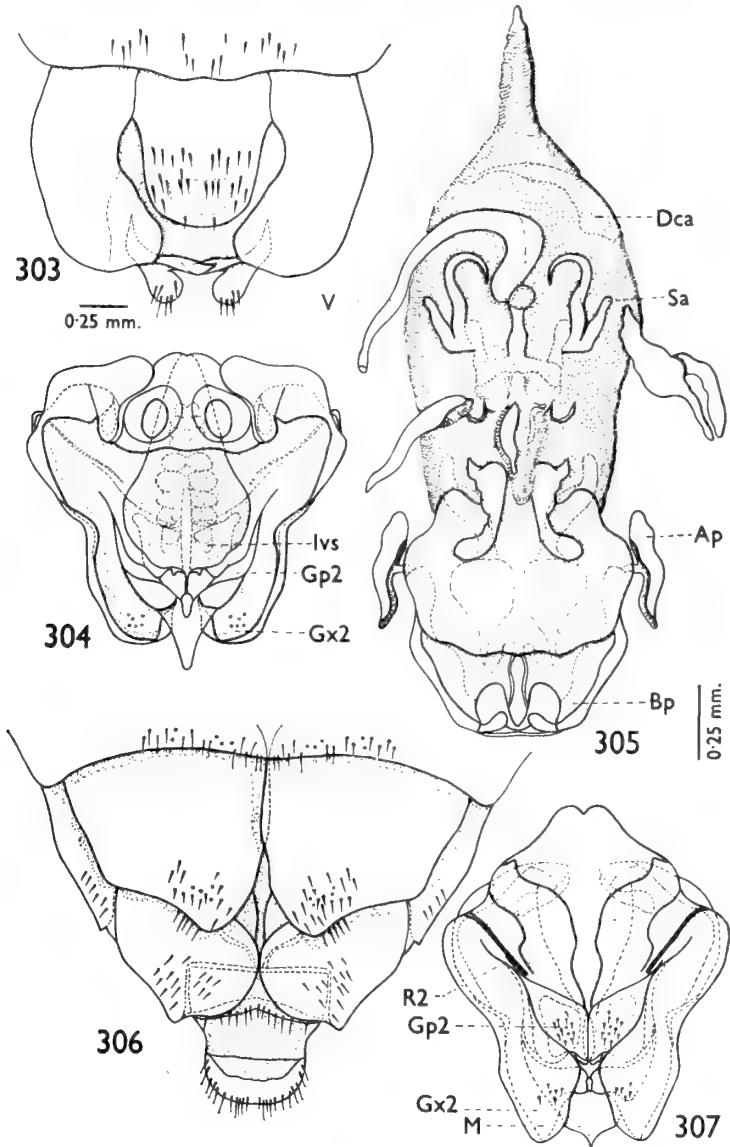
♂. Body length, 17.0-17.5 mm., width, 2.6-2.8 mm. Head length, 1.9-2.0 mm., width, 1.6-1.8 mm. Antennae, segment I, 4.8-5.1 mm., II, 2.8-3.0 mm., III, 3.5-3.7 mm., IV, 6.5-6.7 mm. Rostrum, segment I, 1.5-1.7 mm., II, 1.5-1.7 mm., III, 0.8-0.9 mm., IV, 0.7-0.75 mm. Pronotum, length, 2.6-2.8 mm., width, 2.6-2.7 mm. Hind femora, 7.0-7.2 mm. Hind tibia, 7.5-7.6 mm. Distance between the ocelli, 0.5 mm., distance between an ocellus and an eye, 0.7-0.75 mm.

Species robust, yellowish brown. Head elongated, with two brownish black spots behind ocelli; occipital suture medially concave; paraclypeae short, with rounded apices. Antennae brownish black, with basal three-quarters of first segments, apices of second and third and bases of apical segments, pale. Rostrum short, reaching apices of second coxae. Lateral black



line extending from sides of antenniferous tubercles on to collar. Pronotal disc pale, with black spots on posterior angles. Legs pale, with apices of femora and bases of tibiae and tarsi black. Hemielytra pale unicolourous. Posterior margin of seventh abdominal tergum medially convex, pygophore large with thin lobes of ninth segment (Text-fig. 303).

♂ GENITALIA : Claspers with very short blades, apices pointed (Text-fig. 205) ; both dorsal and ventral pairs of thecal appendages present, ventral pair symmetrical as in Text-fig. 305 ;



FIGS. 303-307. *Leptocoris luzonensis*, 303, 305, ♂, 304, 306-307, ♀. 303, terminalia, dorsal view ; 304, ovipositor, dorsal view ; 305, aedeagus (inflated), ventral view ; 306, terminalia, ventral view ; 307, ovipositor, ventral view.

left lateral conjunctival appendage curved near apex (Text-fig. 219, E) ; frontal conjunctival appendage with two sclerotized pieces (Text-fig. 219, A) ; the only right lateral conjunctival appendage bilobed with a very thick main stem (Text-fig. 219, F) ; membranous appendage long, with a short triangular terminal and a bow-shaped, pointed dorsal appendage (Text-fig. 305).

♀. Body length, 17.5–18.0 mm., width, 2.65–2.8 mm. Head length, 2.0–2.2 mm., width, 1.8–1.9 mm. Antennae, segment I, 4.8–5.0 mm., II, 2.8–3.0 mm., III, 3.5–3.7 mm., IV, 6.5–6.7 mm. Rostrum, segment I, 1.6–1.8 mm., II, 1.6–1.8 mm., III, 0.9–1.0 mm., IV, 0.7–0.8 mm. Pronotum, length, 2.6–2.8 mm., width, 2.65–2.80 mm. Hind femora, 7.2–7.4 mm. Hind tibia, 7.8–8.0 mm. Distance between ocelli, 0.45–0.55 mm., distance between an ocellus and an eye, 0.75–0.85 mm.

Usually slightly more robust than ♂ ; posterior margin of seventh abdominal sternum emarginate, with a very small median projection (Text-fig. 306).

♀ GENITALIA : First gonocoxae broad, outer margin sinuate (Text-fig. 247) ; eleven pairs of intervalvular sacs (Text-fig. 304) ; spermatheca elongated with a median flange and a short coiled tube of different thicknesses (Text-fig. 233).

Holotype ♂, PHILIPPINE ISLANDS : North Luzon, Los Baños, 21.i.1914 (*G. Bottcher*) B.M.(N.H.).

Paratypes. 1 ♂, 4 ♀, with some data as holotype, B.M.(N.H.), North Luzon, Los Baños, 1 ♂, (*P. I. Baker*), Mus. Hels., 1 ♂, without any date, Riksmus. Stockholm, Luzon, Mt. Maquilang, Elev. 50 m., 3.ix.1949 (*Boscós*), Moravian Mus., Berne.

This species is probably localized in Philippine Islands and has not been found in any other part of Oriental regions. Adults have been collected in the months of January and September.

This species is closely allied to another, slightly more widely distributed species, *L. tagalica*, and shares the characters of black apices of femora, and bases of tibiae and tarsi ; however the ♂ can easily be separated by very short and pointed blades of claspers (very long and cylindrical in *tagalica*) and the ♀ by small, convex median projection of seventh abdominal sternum (a large median projection in *tagalica*) and by first gonocoxae curved near apices. This species can be separated from all other species of this genus by long apical antennal segments, which are at least as long as or longer than second and third together.

### *Leptocorisa luzonica* sp. n.

(Text-figs. 208, 222, 236, 250, 264 and 308–314)

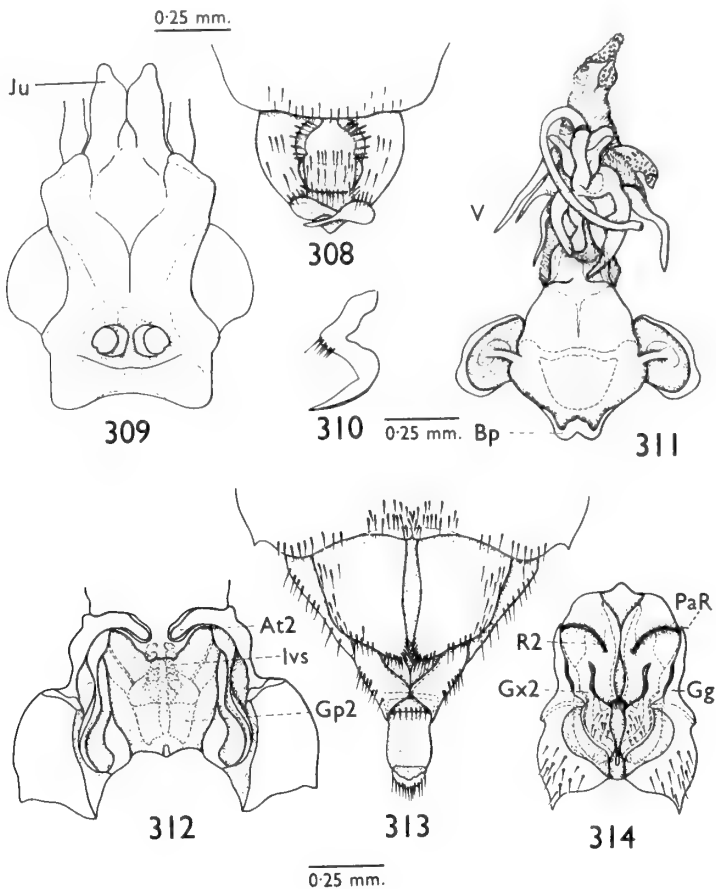
Characterized by small body, straight and blunt paraclypeae and by the form of ♂ and ♀ genitalia.

♂. Body length, 11.3–11.5 mm., width, 1.5–1.6 mm. Head length, 1.5–1.7 mm., width, 0.8–1.0 mm. Antennae, segment I, 2.9–3.0 mm., II, 1.7–1.8 mm., III, 2.0–2.4 mm., IV, 4.0–4.2 mm. Rostrum, segment I, 1.0–1.1 mm., II, 1.0–1.1 mm., III, 0.5–0.6 mm., IV, 0.6–0.7 mm. Pronotum, length, 1.7–1.8 mm., width, 1.5–1.6 mm. Hind femora, 5.0–5.2 mm. Hind tibia, 5.2–5.3 mm. Distance between ocelli, 0.4 mm., distance between an ocellus and an eye, 0.7 mm.

Species of small size, pale, unicolourous. Head comparatively short, occipital suture rather invisible at sides (Text-fig. 309) ; paraclypeae straight, thick at base, with rounded apices.

Antennae sometimes with brownish tinge, apices of second segments and apical segments brownish only pale at bases. Rostrum short, hardly reaching apices of second coxae. Lateral black line usually faint at sides of antenniferous tubercles and like a black dot on sides of collar. Pronotal disc pale, unicolourous, black spots on posterior angles rather faint, legs pale, unicolourous. Hemielytra pale. Posterior margin of seventh abdominal tergum truncated, very slightly medially produced; pygophore rounded with pointed apices (Text-fig. 308).

♂ GENITALIA: Claspers laterally with short blades and curved sharp apices (Text-fig. 208); both dorsal and ventral pairs of thecal appendages present, ventral appendages symmetrical, sac-like with sclerotized linings (Text-fig. 222, D); four left lateral conjunctival appendages as in Text-fig. 311; frontal conjunctival appendage with two sclerotized pieces (Text-fig. 222, A); only two right lateral conjunctival appendages, second long and strongly curved in middle (Text-fig. 222, F); membranous appendage with two terminal appendages and a flat dorsal conjunctival appendage as in Text-fig. 311.



FIGS. 308-314. *Leptocoris luzonica*, 308-311, ♂, 312-314, ♀. 308, terminalia, dorsal view; 309, head, dorsal view; 310, claspers, inner view; 311, aedeagus (inflated), ventral view; 312, ovipositor, dorsal view; 313, terminalia, ventral view; 314, ovipositor, ventral view.

♀. Body length, 11.5–12.0 mm., width, 1.7–1.9 mm. Head, length, 1.7 mm., width, 1.2 mm. Antennae, segment I, 3.5–3.7 mm., II, 2.0–2.2 mm., III, 2.6–2.8 mm., IV, missing. Rostrum, segment I, 1.0 mm., II, 1.0 mm., III, 0.6 mm., IV, 0.6 mm. Pronotum, length, 1.7–2.0 mm., width, 1.7–1.9 mm. Hind femora, 6.0 mm. Hind tibia, 6.0 mm. Distance between ocelli, 0.3–0.4 mm., distance between an ocellus and an eye, 0.5–0.7 mm.

Slightly robust, posterior margin of seventh abdominal sternum deeply emarginate medially, slightly convex (Text-fig. 313).

♀ GENITALIA : First gonocoxae elongated, curved in middle (Text-fig. 250) ; seven pairs of intervalvular sacs (Text-fig. 312) ; spermatheca long and cylindrical, thinner in middle with a long coiled tube (Text-fig. 236).

Holotype ♂, PHILIPPINE ISLANDS : Luzon, Manginin, 17.ix (G. Bottcher), B.M. (N.H.).

Paratypes. PHILIPPINE ISLANDS : 3 ♂, 2 ♀, same data as holotype, B.M.(N.H.), Mindanao, Sulu, near base of Mt. Dahao Jolo 1, 150 m., 11 ♂, 12 ♀, 2.ix.1958 (Milliron), Bern. Bishop Mus. ; VIETNAM : Tonkin, Choganh, Hoa-Binh, 5 ♂, 1 ♀, 1919 (J. De Cooman, L. Duporte, R. Oberthur) Mus. Hist. nat Paris ; SARAWAK : Kuching, Santubong, 797–1,500 m., 41 ♂, 45 ♀, 18–30.vi.1958 (T. C. Maa), Bern. P. Bishop Mus., K. S. Road, 19½ miles, Tarat Station, 10th mile Bau Rd., 18th mile K. S. Rd. on grasses near wet paddy, 105 ♂, 95 ♀, 13.iii.1963 (S. K. Hueh, R. Lav), Dept. Agric., Sarawak.

This species is found in Vietnam in the west, Philippine Islands in the east and Borneo in the south. The adults have been collected in March, June and September but it seems to be most abundant in March and September. This species has also been reported feeding on grasses near paddy fields, but probably does not commonly feed on paddy or this would have been recorded.

This species is close to *L. lepida* Breddin and *L. pseudolepida* sp. n., its allopatric allies, in having small size of the body (less than 12 mm.) but can easily be separated from them by the shape of the paraclypeae, which are straight, thicker in the middle and rounded at the apices. The conjunctival appendages of the aedeagus, the first pair of gonocoxae in ♀ and the shape of the spermatheca confirm its identity.

### *Leptocoris oratorius* (Fabricius)

(Text-figs. 197, 211, 225, 239, 253 and 315–320)

*Gerris oratorius* Fabricius, 1794 : 191, 1803 : 261

*Leptocoris bengalensis* Westwood, 1842 : 18

*Rhabdocoris arcuata* Kolenati, 1845 : 67

*Myodochus trinotata* Herrich Schäffer, 1848 : 95

*Leptocoris maculiventris* Dallas, 1852 : 484

*Leptocoris* (*Rhabdiocoris*) *acuta* (Thunberg) ; Distant, 1902 : 410, China, 1924 : 237 [Mis-identifications]

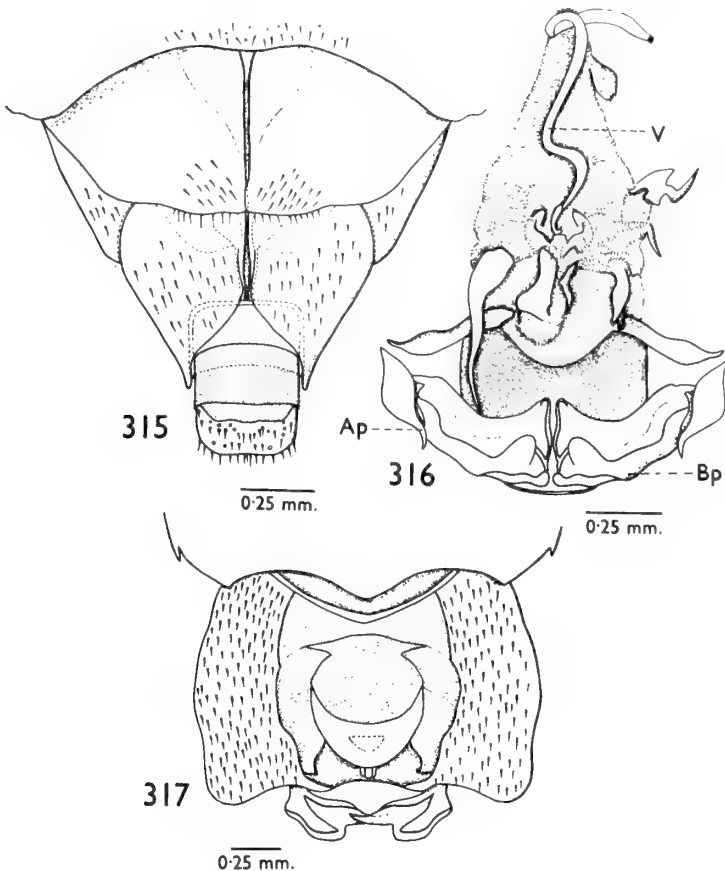
Characterized by the robust body, series of brownish black dots on the ventrolateral side of abdomen and by the form of ♂ and ♀ genitalia.

♂. Body length, 18.0–18.5 mm., width, 2.9–3.0 mm. Head length, 2.4–2.6 mm., width, 1.8–2.0 mm. Antennae, segment I, 5.0–5.2 mm., II, 3.4–3.5 mm., III, 3.9–4.0 mm., IV, 5.6–6.0 mm. Rostrum, segment I, 1.9 mm., II, 1.9 mm., III, 1.0 mm., IV, 0.9 mm. Pronotum,

length, 3.1–3.5 mm., width, 2.9–3.0 mm. Hind femora, 6.7 mm. Hind tibia, 7.6 mm. Distance between ocelli, 0.6–0.7 mm., distance between ocellus and outer margin of eye, 0.8 mm.

Body robust, pale unicolourous. Head elongated; occipital suture medially concave; paraclypeae short and pointed. Antennae usually pale, unicoloured, rarely with brownish black tinge. Rostrum short, reaching only the apices of second coxae. Lateral black line on the sides of head and propleuron absent. Pronotal disc pale unicolourous, posterior angles without black spots. Legs usually pale unicoloured, rarely tinged with black. Hemielytra pale. A series of ventro-lateral brownish black spots on abdomen usually prominently present, rarely faint. Posterior margin of seventh abdominal tergum medially convex; pygophore very large and almost rectangular in form (Text-fig. 317).

♂ GENITALIA: Claspers curved and tapering to a point at apices (Text-fig. 197); both dorsal and ventral pairs of thecal appendages present, ventral pair symmetrical as in Text-fig. 316; left lateral conjunctival appendage elongated, curved at base and apex (Text-fig. 211, E); frontal conjunctival appendage with two sclerotized pieces as in Text-fig. 211, A; two right lateral conjunctival appendages, second bifid at apex (Text-fig. 211, F); membranous appendage usually with a bulbous or pointed terminal appendage and a hooked bilobed dorsal conjunctival appendage (Text-fig. 316).

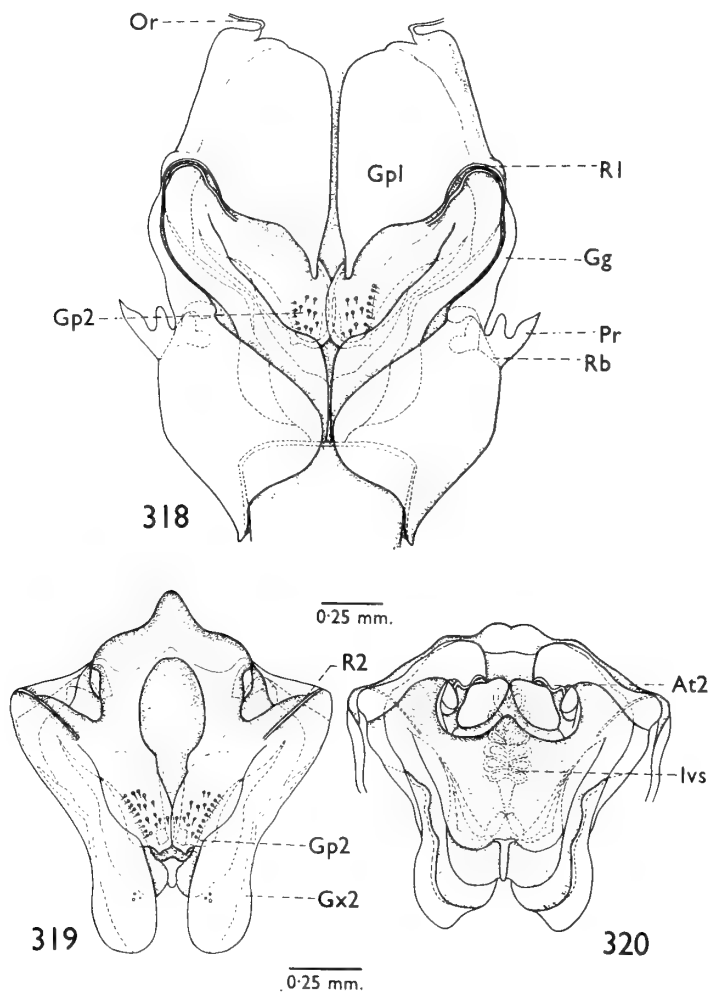


FIGS. 315–317. *Leptocoris oratorius*. 315, ♀ terminalia, ventral view; 316, aedeagus (inflated), ventral view; 317, ♂ terminalia, dorsal view.

♀. Very similar to ♂ in general appearance and measurements ; posterior margin of seventh abdominal sternum emarginate, very slightly convex in middle (Text-fig. 315).

♀ GENITALIA : First gonocoxae elongated, about three times as long as broad, apices pointed (Text-fig. 239) ; six pairs of intervalvular sacs (Text-fig. 320) ; spermatheca thick in middle with a median flange, round and coiled tube (Text-fig. 225).

Type material. Holotype ♂ of *Gerris oratorius* Fabricius, SUMATRA : (Daldorff), with label "Mus. de Johstedt", "*Gerris oratorius* Fabricius, s. : *G. varicornis* Fabr." "Teste Stal", Zool. Mus. Copenhagen ; cotype ♀ of *G. angustata* Fabricius 1787, without data, Zool. Mus. Copenhagen ; holotype ♂ of *Leptocorisa bengalensis* Westwood, 1842, INDIA : Bengal, Hope Dept., Univ. Mus., Oxford ; holotype ♂,



FIGS. 318-320. *Leptocorisa oratorius*, ♀. 318, ovipositor, with 9th paratergite, ventral view ; 320, same, dorsal view.

*Rhabdocoris arcuata* Kolenati, 1845, without data (R. A. Kywakeeuya), with label "*Rhabdocoris arcuatus* Klti", "Mel II, 67", Zool. Mus. Leningrad; 1 ♂, CHINA: Komai (Sanganchu) in Tibet, with label "trinotatus" "Herrich Schäffer, fig. 863", Riksmus. Stockholm.

Other material. CEYLON: 5 ♂, 1 ♀; INDIA: 23 ♂, 18 ♀; NICOBAR ISLAND: 4 ♂; PAKISTAN: 1 ♂, 2 ♀; BHUTAN: 40 ♂, 25 ♀; BURMA: 1 ♀; THAILAND: 19 ♂, 13 ♀; VIETNAM: 32 ♂, 28 ♀; MALAYA: 5 ♂, 3 ♀; SINGAPORE: 1 ♂; SUMATRA: 1 ♂; JAVA: 38 ♂, 18 ♀; SARAWAK: 40 ♂, 37 ♀; CELEBES: 2 ♂, 2 ♀; PHILIPPINE ISLANDS: 157 ♂, 128 ♀; AUSTRALIA: 4 ♂, 4 ♀; SOLOMON ISLANDS: 2 ♀.

The range of this species extends in the west into Ceylon, in the north to Malabar, Sylhet (East Pakistan), Bhutan, China (Komai in Tibet) in the south into North Queensland (Australia) and in the east as far as Solomon Islands.

Uichanco (1921) has stated that its common name in India, China and Java is "Waleng sangeet", but in the Philippines, it is called by various common names such as Tagalog, Bicol, Visayun, Pangasinan, Panpanga, Ilacano and Moro. It is a serious rice pest in the Far East countries and, to quote Uichanco, "of the insect enemies of rice there is probably none that is so well known among the Filippino planters as the rice bug *Leptocorisa acuta* Thunberg". The figure he gives of the pygophore makes it clear that he was referring to this species and not *L. acuta* s. str. He has estimated that in abundance, it destroys at times over one-half of the season's crop. It causes the greatest damage in the months of November and December, when the rainy season rice is in the milk stage. Its life history has also been studied by Koningsberger (1903) and Zehntner under the name of *Leptocorisa acuta* (Thunberg). It has also been collected at light in Java.

This species is close to *L. acuta* (Thunberg) and *L. chinensis* Dallas but can easily be separated by a series of ventro-lateral black dots on abdomen. In ♂ the claspers which posteriorly taper into a point and in the ♀ the first pair of elongated and pointed gonocoxae are its peculiarities.

Stål (1873) synonymized the following species:

*Cimex acuta* Thunberg, *Cimex angustata* Fabricius 1787, *Gerris oratorius* Fabricius 1794, *Leptocorisa bengalensis* Westwood 1842, *Rhabdocoris arcuata* Kolenati 1845, *Myodochus trinotata* Herrich Schäffer 1848 and *Leptocorisa maculiventris* Dallas 1852. During the present study the holotype of *acuta* Thunberg has been examined and because of its damaged abdomen, another male specimen (from type locality) and with Stål's label "*Cimex acutus* Thunb. ! Mus. Thunb." has been designated neotype of *C. acuta* Thunberg (see page 80). The type of *C. angustata* Fabricius has been found to be identical with *C. acuta* Thunberg. The types of *Gerris oratorius* Fabricius, *Leptocorisa bengalensis* Westwood and *Rhabdocoris arcuata* Kolenati all differ from the type of *acuta* (*J. S. varicornis*) and represent the modern concept of *L. acuta* China nec Thunberg 1783. This *acuta* auctt., which is now without a name, should take the name of the most senior synonym, i.e. *Gerris oratorius* Fabricius 1794. The types of *M. trinotata* Herrich Schäffer 1848 and *L. maculiventris* Dallas could not

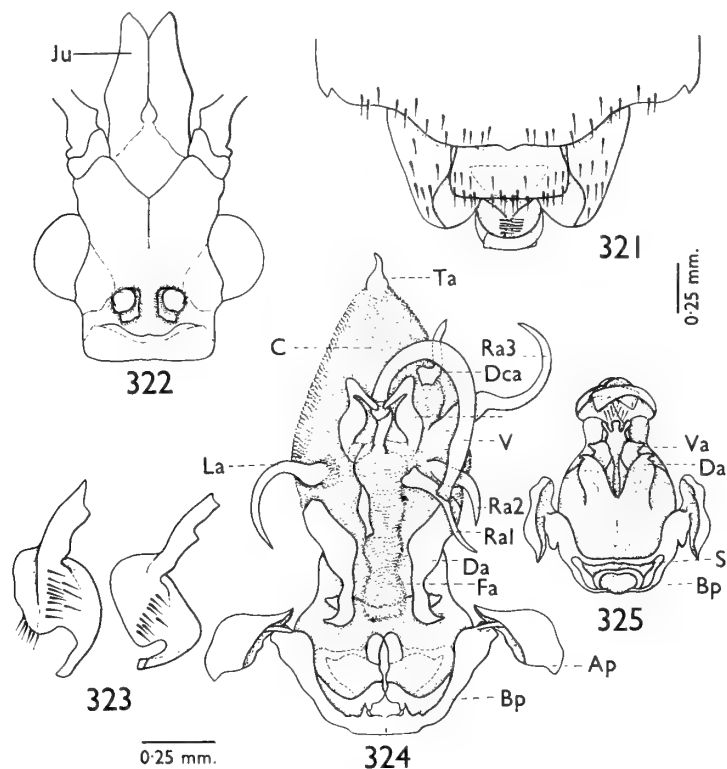
be examined. Dr. Forster (Zoologische Sammlung des Bayerischen Staates) has informed me that the type of *M. trinotata* Herrich Schäffer was destroyed during an air raid in 1944, and Dr. W. E. China (British Museum) has told me that the type of *L. maculiventris* Dallas must be presumed lost. However the original description and diagram (Fig. 863) of Herrich Schäffer for *trinotata* and the original description of *L. maculiventris* Dallas agree with the holotype of *Gerris oratorius* Fabricius.

***Leptocorisa palawanensis* sp. n.**

(Text-figs. 201, 215, 229, 243, 257 and 321-328)

Characterized by very long and pointed paraclypeae which are only very slightly less than half of entire head length, by rostrum, which extends beyond the apices of second coxae and by the form of genitalia.

♂. Body length, 14.9 mm., width, 2.30 mm. Head length, 2.2 mm. (only paraclypeae 0.83 mm.), width, 1.5 mm. Antennae, segment I, 4.7 mm., II, 3.0 mm., III, 3.3 mm., IV, 5.7 mm. Rostrum, segment I, 1.7 mm., II, 1.5 mm., III, 0.8 mm., IV, 0.8 mm. Pronotum, length, 2.6 mm., width, 2.3 mm. Hind femora, 6.9 mm. Hind tibia, 7.3 mm. Distance between ocelli, 0.5 mm., distance between an ocellus and an eye, 0.8 mm.



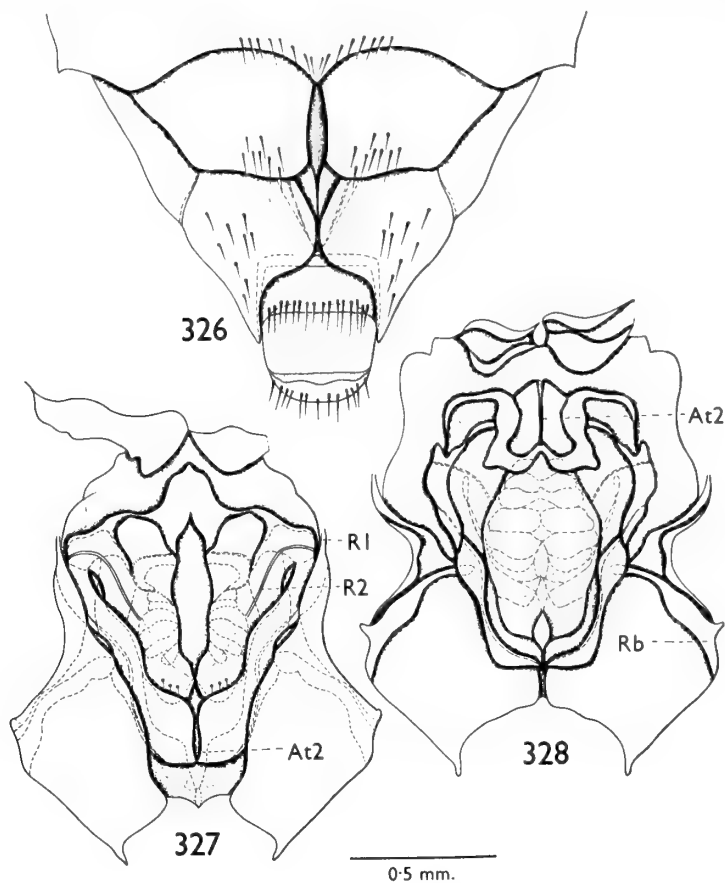
FIGS. 321-325. *Leptocorisa palawanensis*, ♂. 321, terminalia, dorsal view; 322, head, dorsal view; 323, claspers, inner and outer views; 324, aedeagus (inflated), ventral view; 325, theca, dorsal view.



Body cylindrical, pale. Head elongate; occipital suture smoothly medially concave; paraclypeae very long, cylindrical and pointed. Antennae with basal segments pale, only black at apices, second, third and fourth segments black, only pale at bases. Rostrum long, extending beyond apices of second coxae. Lateral black line faint on the sides of head, represented only by a black dot on either side of collar. Pronotal disc light brown, sometimes with greenish tinge; brownish black spots on posterior angles present. Legs pale, with usually apices of femora, tibiae and tarsi black. Hemielytra pale. Posterior margin of seventh abdominal tergum sinuate, with a very small pointed median projection; pygophore round (Text-fig. 321).

♂ GENITALIA: Claspers truncated and thick at apices with very short blades (Text-fig. 201); both dorsal and ventral pairs of thecal appendages present, ventral appendages bilobed and symmetrical (Text-fig. 325); left lateral conjunctival appendage strongly curved and pointed (Text-fig. 215, E); frontal conjunctival appendage with only one sclerotized piece (Text-fig. 215, A); three right lateral conjunctival appendages as in Text-fig. 324, second smaller, curved in middle and pointed (Text-fig. 215, F); membranous appendage short, with a hooked terminal and a curved dorsal conjunctival appendage (Text-fig. 324).

♀. Very similar to ♂ in general appearance and measurements, posterior margin of seventh abdominal sternum emarginate with a small pointed median projection (Text-fig. 326).



FIGS. 326-328. *Leptocoris palawanensis*, ♀. 326, terminalia, ventral view; 327, ovipositor, ventral view; 328, same, dorsal view.

♀ GENITALIA : First gonocoxae small, outer margin convex, apices rounded (Text-fig. 243) ; seven pairs of intervalvular sacs (Text-fig. 328) ; spermatheca with a long coiled tube and a median fringe (Text-fig. 229).

Holotype ♂, PHILIPPINE ISLANDS : N. Palawan, Binaluan, xi-xii.1913 (*G. Roettcher*), B.M.(N.H.).

Paratypes. PHILIPPINE ISLANDS : 1 ♂ (*Semper*), Riksmus. Stockholm, Mindanao, Iligan, 1 ♂ (*Baker*), Mus. Hels., Mindanao, Misamis, Sulu, Palawan, 3.2 km. south of Tarumpitao, 2.vi., 20.vii., 7.ix., 19-20.x.1958 (various collectors), Bern. P. Bishop Mus. ; NEW GUINEA : Papua, West District Orimo, Govt. Sta., 26-28.x.1960 (*J. L. Gressitt*), Bern. P. Bishop Mus. ; AUSTRALIA : Queensland, 1 ♂ (*Mjöberg*), Riksmus. Stockholm.

The range of this species extends in the north west into Philippine Islands and in the south east into northern Australia (Queensland). The adults have been collected in the late part of the year from June to December.

This species is very close to *L. acuta* (Thunberg) and *L. discoidalis* Walker but can easily be separated from them by very long (about half the length of the head), cylindrical and pointed paraclypeae. In the aedeagus, the bilobed symmetrical ventral thecal appendages and in the spermatheca the tube, which is twisted at its base, are its peculiarities.

### *Leptocorisa pseudolepida* sp. n.

(Text-figs. 207, 221, 235, 249, 263 and 329-335)

Characterized by very small size of the body, by short, thick and pointed paraclypeae and by the form of ♂ and ♀ genitalia.

♂. Body length, 11.5-12.0 mm., width, 1.6-1.9 mm. Head length, 1.5-1.7 mm., width, 1.2-1.3 mm. Antennae, segment I, 3.6-4.0 mm., II, 2.2-2.4 mm., III, 2.4-2.8 mm., IV, 4.0-4.2 mm. Rostrum, segment I, 1.0-1.1 mm., II, 1.1-1.2 mm., III, 0.6-0.7 mm., IV, 0.6-0.7 mm. Pronotum, length, 1.7-2.0 mm., width, 1.7-1.9 mm. Hind femora, 5.0-6.2 mm. (specimen from Malacca or Borneo with smaller hind femora (5.0-5.2 mm.) from Selangor, Kuala Lumpur (6.2 mm.)). Hind tibia, 5.6-6.5 mm. (specimens from Borneo or Malacca 5.6-5.8 mm. and from Kuala Lumpur 6.5 mm.). Distance between ocelli, 0.3-0.4 mm., distance between an ocellus and an eye, 0.5-0.6 mm.

Body short, pale, tinged with black. Head short, occipital suture complete (Text-fig. 329) ; paraclypeae short, thick at base, curved near apices and pointed. Antennae usually brownish black, with basal segments pale, only black at apices, second, third and fourth segments brownish black, only pale at their bases. Rostrum short, reaching apices of second coxae. Lateral black line faint on sides of head, only represented on sides of head by a black dot. Pronotal disc pale, unicoloured, sometimes with brownish tinge. Legs usually black, only femora pale. Hemielytra pale. Abdomen dorsally palish brown, connexiva and venter pale, ochraceous. Posterior margin of seventh abdominal tergum truncated, pygophore rounded, apex pointed (Text-fig. 332).

♂ GENITALIA : Claspers never extending beyond posterior margin of pygophore, dorsally rounded (Text-fig. 332), apices truncated (Text-fig. 207) ; both dorsal and ventral thecal appendages present as in Text-fig. 331, ventral, symmetrical ; four lateral conjunctival appendages as in Text-fig. 331 ; frontal conjunctival appendage with two elongated sclerotized pieces (Text-fig. 221, A) ; three right lateral conjunctival appendages (Text-fig. 331) ; second straight,

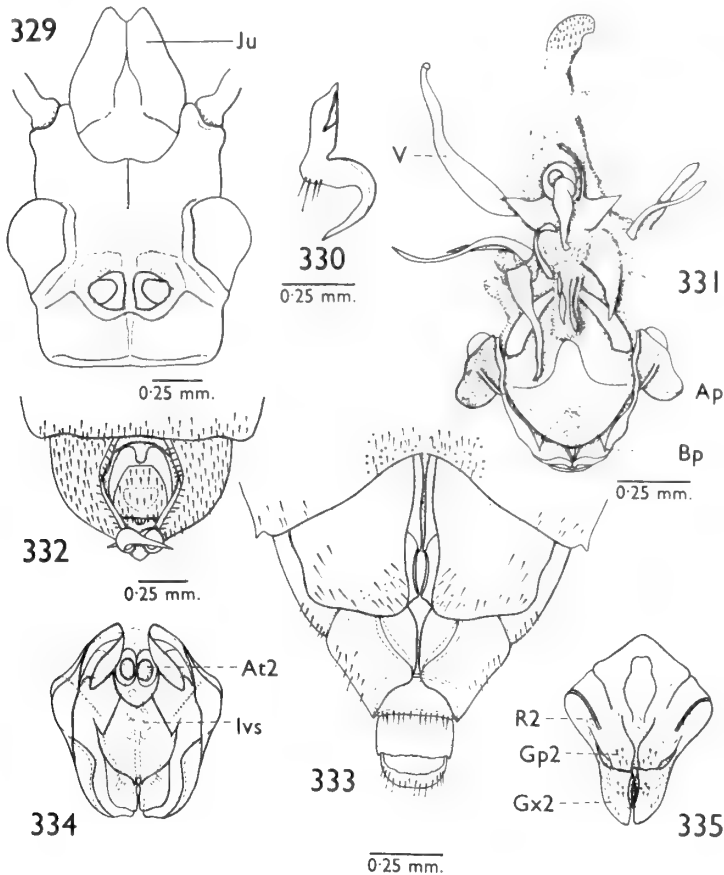
thick at base and pointed at apex (Text-fig. 221, F) ; membranous appendage with a cap-like terminal and a thin curved dorsal appendage (Text-fig. 331).

♀. Very similar to ♂ in general appearance and measurements ; posterior margin of seventh abdominal sternum deeply emarginate (Text-fig. 333).

♀ GENITALIA : First gonocoxae small and with outer margin sinuate (Text-fig. 249) ; five pairs of intervalvular sacs (Text-fig. 334) ; spermatheca broad at apex, with a median flange and a long coiled tube.

Holotype ♂, MALAYA : Selangor, Kuala Lumpur, 17th mile Chesar Rd., at light, 17.i.1924 (*E. Seimond*), B.M.(N.H.).

Paratypes. CEYLON : 2 ♂, 1 ♀, B.M.(N.H.) ; MALAYA : Malacca (*Keranton*), with labels "*Leptocorisa lepida* Bredd.", "Coll. Breddin", Dtsch. Entom. Inst., Berlin ; INDIA : S. Malabar, 4 ♂, 3 ♀ (various collectors), B.M.(N.H.) ; BORNEO : (south east), 1 ♂, 1 ♀, 1895 (*Atkinson coll.*), Hope Dept., Univ. Mus., Oxford.



FIGS. 329-335. *Leptocorisa pseudolepida*, 329-332, ♂, 333-335, ♀. 329, head, dorsal view ; 330, claspers, inner and outer views ; 331, aedeagus (inflated), ventral view ; 332, terminalia, dorsal view ; 333, terminalia, ventral view ; 334, ovipositor, dorsal view ; 335, same, ventral view.

The range of this, possibly rather rare, species extends in the west into Ceylon and in the east into south east Borneo. The adults have been collected in January. This species has also been collected at light in Malaya (Selangor State).

This species is close to *L. lepida* Breddin and *L. luzonica* sp. n., but can easily be separated from them by its short, thick, curved and pointed paraclypeae (Text-fig. 329). In aedeagus, its elongated, ventral thecal appendages (Text-fig. 221, D), long and straight second right lateral conjunctival appendage (Text-fig. 221, F) and in the ♀ the deep emarginate posterior margin of seventh abdominal sternum (Text-fig. 333) are its peculiarities.

***Leptocorisa sakdapolrae* sp. n.**

(Text-figs. 210, 224, 238, 252, 266 and 336-341)

Characterized by short but cylindrical and pointed paraclypeae, long rostrum, which extends well beyond the apices of second coxae and by the form of the ♂ and ♀ genitalia.

♂. Body length, 13.06-15.2 mm., width, 1.8-2.1 mm. Head length, 1.73-2.0 mm., width, 1.3-1.6 mm. Antennae, segment I, 3.6-4.26 mm., II, 2.0-2.8 mm., III, 2.5-3.2 mm., IV, 5.2-5.73 mm. Rostrum, segment I, 1.3-1.6 mm., II, 1.3-1.6 mm., III, 0.6-0.8 mm., IV, 0.6-0.8 mm. Pronotum, length, 2.1-2.3 mm., width, 1.8-2.1 mm. Hind femora, 5.3-6.5 mm. Hind tibia, 6.0-7.3 mm. Distance between ocelli, 0.4-0.46 mm., distance between an ocellus and an eye, 0.73-0.8 mm.

Body slim, light brown, tinged with black. Head short; occipital suture "V"-shaped in middle; paraclypeae short, cylindrical, thicker at base and pointed at apices. Antennae brownish black with basal segments palish brown, apices black, second, third and fourth segments only pale at their bases. Rostrum long, extending well beyond apices of second coxae. Lateral black line, extending from sides of antenniferous tubercles on to collar. Pronotal disc pale, sometimes with greenish tinge posteriorly. Legs usually black, pale near articulations. Hemelytra pale, slightly dark. Posterior margin of seventh abdominal tergum medially convex, pygophore elongated, with thin lobes of ninth segments (Text-fig. 336).

♂ GENITALIA: Claspers in dorsal view, extending beyond posterior margin of pygophore (Text-fig. 336); apices truncated (Text-fig. 210); both dorsal and ventral pairs of conjunctival appendages present, ventral asymmetrical (Text-fig. 337); left lateral conjunctival appendage strongly curved in middle and acutely pointed at apex (Text-fig. 224, E); frontal conjunctival appendage with two sclerotized pieces (Text-fig. 224, A); two right lateral conjunctival appendages as in Text-fig. 338; second long, strongly curved in middle and acutely pointed (Text-fig. 224, F); membranous appendage with a trinagular terminal and a bilobed dorsal appendage (Text-fig. 338).

♀. Very similar to ♂ in general appearance and measurements, highly variable in size; posterior margin of seventh abdominal sternum emarginate, with a small convex median projection (Text-fig. 339).

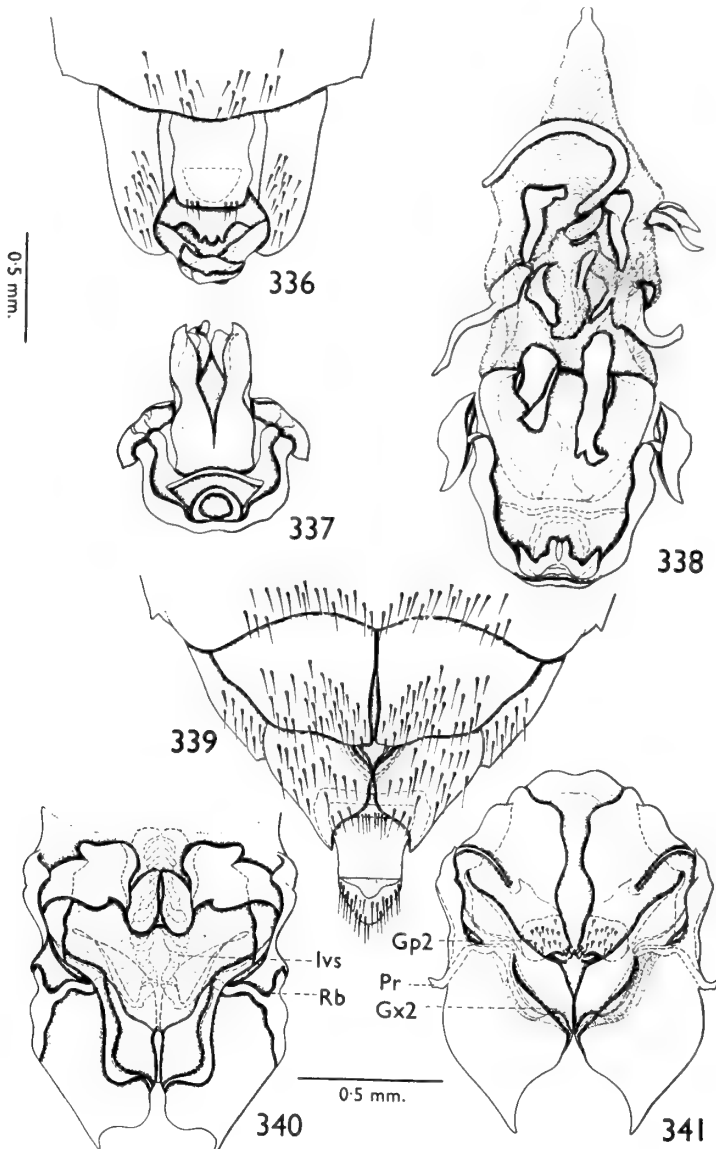
♀ GENITALIA: First gonocoxae elongated, outer margin sinuate, apices rounded (Text-fig. 252); fourteen pairs of intervalvular sacs (Text-fig. 340); spermatheca comparatively very short, elongated with a transverse neck, a median flange and a long coiled tube (Text-fig. 238).

Holotype ♂, JAVA: Carnegie Mus.

Paratypes. JAVA: Sindanglava, 1 ♂, 27.xi.1920, A.M.N.H.; THAILAND: Kaochong, Trang, 1 ♂, 1 ♀, 18.iv.1960 (*Sakdapolrak*), 1 ♂, 1 ♀, with same data as above, "terminalia missing", Coll. Sakdapolrak; MALAYA: Phang, Kuala

Terenggan, 220 m., 25 ♂, 18 ♀, 15.xii.1958 (*J. L. Gressitt*), Bern. P. Bishop Mus. ;  
 SUMATRA : Labuan, Bilik, 48 ♂, 42 ♀ (*Palm*), Mus. Hels.

The range of this species extends in the north west into Thailand and in the south east into Java. Adults are probably in greatest abundance in the late part of the year, November and December.



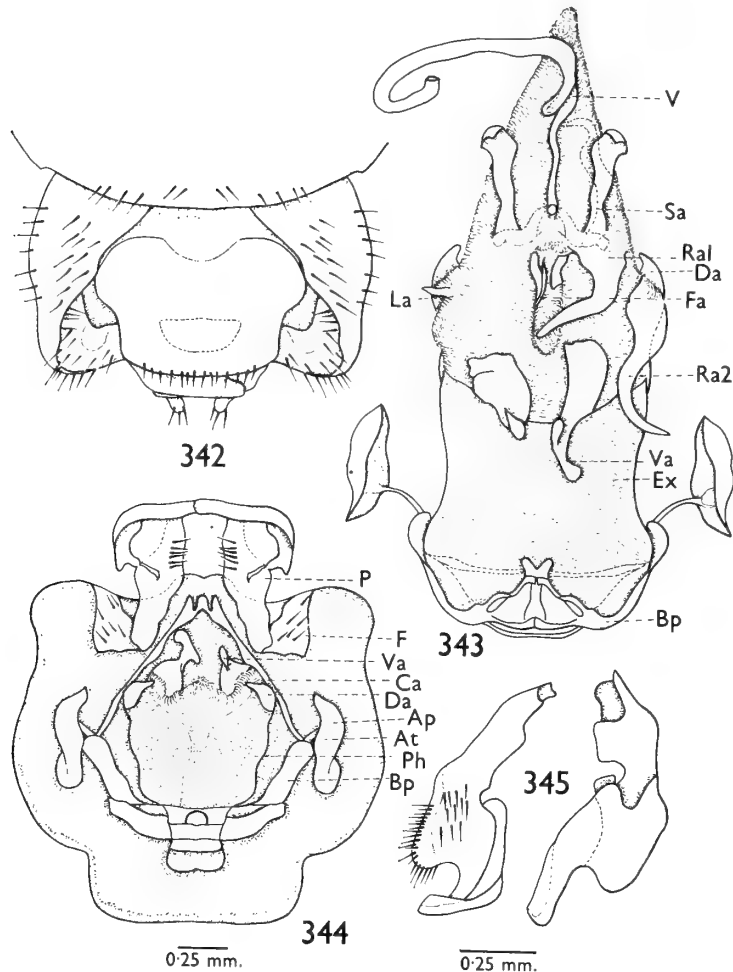
FIGS. 336-341. *Leptocoris sakdapolvaka*, 336-338, ♂, 339-341, ♀. 336, terminalia, dorsal view ; 337, theca, dorsal view ; 338, aedeagus (inflated), ventral view ; 339, terminalia, ventral view ; 340, ovipositor, dorsal view ; 341, same, ventral view.

This species is close to *L. discoidalis* Walker and *L. acuta* (Thunberg). From the former species it can be very easily separated by rostrum, which does not reach third coxae and from both by the lateral black line, which never extends beyond pronotal collar. Its asymmetrical ventral conjunctival appendages in the aedeagus show its relationship with *L. solomonensis* sp. n. and its very short spermatheca is its peculiarity.

This species is named after Miss N. Sakdapolrak, who discovered it independently and generously made her material available to me.

***Leptocoris solomonensis* sp. n.**

(Text-figs. 209, 223, 237, 251, 265 and 342-345)

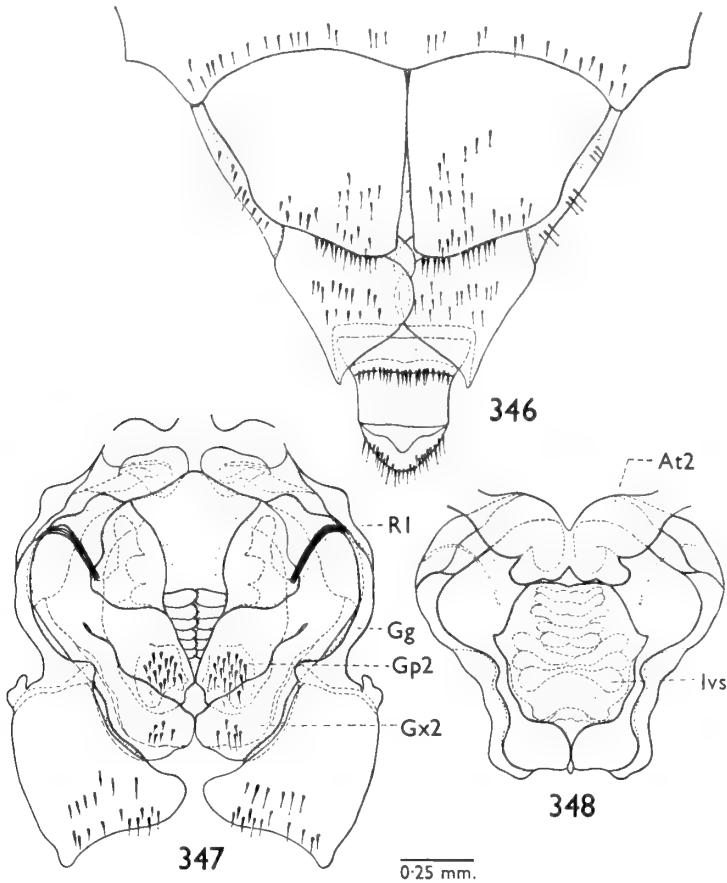


FIGS. 342-345. *Leptocoris solomonensis*, ♂. 342, terminalia, dorsal view ; 343, aedeagus (inflated), ventral view ; 344, theca, dorsal view ; 345, claspers, inner and outer views.

Characterized by the dark black line which extends from the sides of the antenniferous tubercles on to posterior of propleuron, by ventral black median longitudinal line which extends from first to sixth abdominal segment and by the form of the ♂ and ♀ genitalia.

♂. Body length, 16.0–16.5 mm., width, 2.5–2.7 mm. Head length, 2.0–2.4 mm., width, 1.6–1.7 mm. Antennae, segment I, 5.2–5.3 mm., II, 2.5–3.3 mm., III, 3.8–4.0 mm., IV, 5.0–5.2 mm. Rostrum, segment I, 1.7 mm., II, 1.7 mm., III, 1.0 mm., IV, 0.9 mm. Pronotum, length, 2.6–2.9 mm., width, 2.5–2.7 mm. Hind femora, 7.0–7.3 mm. Hind tibia, 8.0–8.2 mm. Distance between ocelli, 0.5 mm., distance between an ocellus and an eye, 0.8 mm.

Species of medium size, brownish black. Head short, occipital suture medially deeply concave, a black spot visible behind it ; paraclypeae short, thick at base and pointed at apices. Antennae brownish black, only bases of each segment pale. Rostrum long, extending well beyond apices of second coxae but never reaching third coxae. Lateral black line extending



FIGS. 346–348. *Leptocoris solomonensis*, ♀. 346, terminalia, ventral view ; 347, ovipositor, ventral view ; 348, same, dorsal view.

from sides of antenniferous tubercles on to posterior of propleuron. Pronotal disc pale, posterior three-quarters with black punctures, black spots on posterior angles present. Legs light brown, tinged black. Hemelytra pale, tinged with black. Abdomen with dorsum and venter red, a median longitudinal black line extending from first to sixth abdominal venter. Posterior margin of seventh abdominal tergum medially convex; pygophore large, rectangular, with very thin lobes of ninth segment (Text-fig. 342).

♂ GENITALIA: Claspers usually extending beyond posterior margin of pygophore (Text-fig. 342); blades very long with truncated apices (Text-fig. 209); both dorsal and ventral pairs of thecal appendages present, ventral pair asymmetrical (Text-fig. 344); left lateral conjunctival appendage reduced to a spine-like appendage (Text-fig. 223, E); frontal conjunctival appendage with two flat sclerotized pieces (Text-fig. 223, A); two right lateral conjunctival appendages (Text-fig. 343), second curved in middle like an arch (Text-fig. 223, F); membranous appendage with a curved and pointed dorsal appendage, but terminal appendage absent (Text-fig. 343).

♀. Very similar to ♂ in general appearance and measurement; posterior margin of seventh abdominal sternum emarginate, with a small triangular projection in middle (Text-fig. 346).

♀ GENITALIA: First gonocoxae with convex outer margin (Text-fig. 251); intervalvular sacs eight in number, three anterior pairs larger (Text-fig. 348); spermatheca large, flask-shaped with a thick, smoothly curved neck, median flange and a small coiled tube.

Holotype ♂, SOLOMON ISLANDS: Buin, 21.vii.1922 (*E. A. Armytage*), B.M.(N.H.).

Paratypes. SOLOMON ISLANDS: Guadalanal, Lavoro, 2 ♂, 1 ♀, 18.ii.1934 (*H. T. Pagden*), Isles of Savu, 1 ♂, 28.iv.1922 (*E. A. Armytage*), B.M.(N.H.); Bougainville, 1 ♀, (*A. A. Voyce*), labelled "*Leptocoris discoidalis* Walker", det. N. C. E. Miller, S. A. Mus.; NEW GUINEA: Papua, Port Moresby, Bisia tabu, Mt. Lamington, 1,300-1,500 ft., 6 ♂, 5 ♀, 1954 (*W. N. Lock*), S. A. Mus.; Brown River, 5 m., c. District of Otama Plant'n, 1 m. E. of Moresby, 5 ♂, 13 ♀, x.1959, 23.x, 2.xi.1960 (various collectors), Bern. P. Bishop Mus.; NEW IRELAND: Schleinitz Lelet Plateau, 5 ♂, Bern. P. Bishop Mus.

The range of this species seems very restricted to eastern New Guinea (Papua) and the adjacent Solomon Islands. The adults have been collected at most times of the year.

This species is closest to *L. discoidalis* Walker but can be easily separated by black median longitudinal line on the first to the sixth abdominal venter, the rostrum never reaches the third coxae and the pygophore (in the ♂) is comparatively very large and rectangular. Its asymmetrical ventral thecal appendages, the small spine-like second lateral conjunctival appendage, loss of terminal appendage and the elongated large flask-shaped spermatheca are other diagnostic features.

### *Leptocoris tagalica* nom. n.

(Text-figs. 204, 218, 232, 246, 260 and 349-353)

*Leptocoris (Rhabdocoris) geniculata* China, 1924: 238

Characterized by pale body, very long cylindrical and pointed claspers and other ♂ and ♀ genital characters.

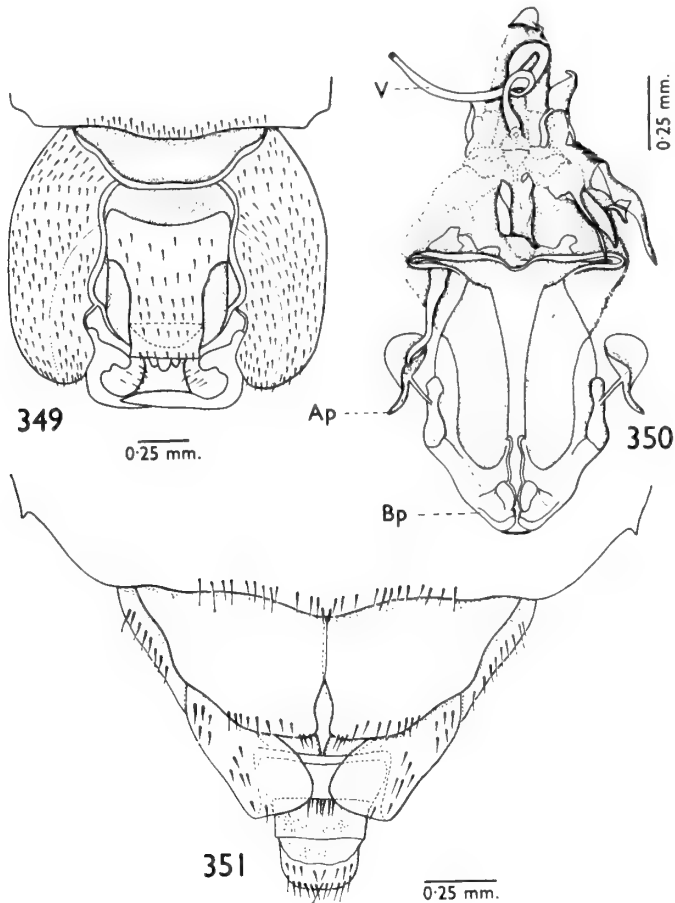
♂. Body, length, 17.0-17.5 mm., width, 2.5-2.8 mm. Head length, 2.0-2.2 mm., width, 1.6-1.8 mm. Antennae, segment I, 5.2-5.4 mm., II, 3.4-3.6 mm., III, 3.8-3.9 mm., IV, 6.0-6.3 mm. Rostrum, segment I, 1.3-1.4 mm., II, 1.3-1.4 mm., III, 0.7-0.9 mm., IV,



0.7–0.8 mm. Pronotal length, 2.6–2.9 mm., width, 2.5–2.8 mm. Hind femora, 7.0–7.7 mm. Hind tibia, 8.0–8.5 mm. Distance between ocelli, 0.5 mm., distance between an ocellus and an eye, 0.8–0.9 mm.

Body robust, pale ochraceous, tinged with green. Head elongated, occipital suture medially concave, usually two brownish black spots behind it; paraclypeae short, rounded at apices. Antennae with basal segments pale, black only at bases and apices, second, third and fourth black, only pale at bases. Rostrum short, reaching second coxae. Lateral black line extending from sides of antenniferous tubercles on to pronotal collar. Pronotal disc pale, densely punctate, with brownish black spots on posterior angles. Legs pale, with apices of femora and bases of tibiae prominently black. Hemielytra pale ochraceous. Abdomen with venter of dusty grey colour. Posterior margin of seventh abdominal tergum with a small convex median projection; pygophore large, lobes of ninth segment thick (Text-fig. 349).

♂ GENITALIA: Claspers with short main stems and very long, cylindrical and pointed blades, (Text-fig. 204); both dorsal and ventral pairs of thecal appendages present (Text-fig. 350);



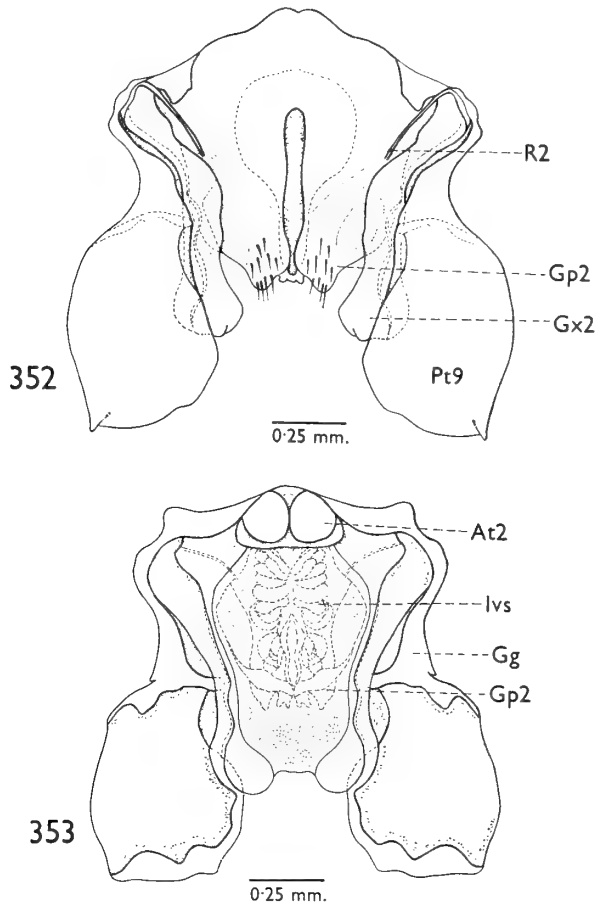
FIGS. 349–351. *Leptocorisa tagalica*. 349, ♂ terminalia, dorsal view; 350, aedeagus (inflated), ventral view; 351, ♀ terminalia, ventral view.

ventral pair symmetrical ; left lateral conjunctival appendage curved near apex, pointed (Text-fig. 218, E) ; frontal conjunctival appendage with two sclerotized pieces (Text-fig. 218, A) ; three right lateral conjunctival appendages as in Text-fig. 350, second short and thick (Text-fig. 218, F) ; membranous appendage with a sclerotized cap-like and a dorsal appendage (Text-fig. 350).

♀. Very similar to ♂ in general appearance and measurement ; posterior margin of seventh abdominal sternum sinuately emarginate, with a small median rounded projection (Text-fig. 351).

♀ GENITALIA : First gonocoxae broad, outer margin posteriorly concave (Text-fig. 246) ; thirteen pairs of intervalvular sacs (Text-fig. 353) ; spermatheca flask-shaped with a median flange and a long coiled tube (Text-fig. 232).

Type material. Holotype ♂, *Leptocorisa geniculata* China, PHILIPPINE ISLANDS : (J. J. P. Mounsey), B.M.(N.H.) ; paratypes, 5 ♂, 3 ♀ of *L. geniculata* China, data as holotype, B.N.(M.H.).



FIGS. 352-353. *Leptocorisa tagalica*. ♀. 352, ovipositor, ventral view ; 353, same, dorsal view.

Other material. SARAWAK : 1 ♂, 1 ♀ ; HALMAHERA ISLAND : 1 ♀ ; PHILIPPINE ISLANDS : 13 ♀, 10 ♀.

The range of this species extends in the north into Philippine Islands and in the south into Indonesia (Halmahera Islands). This species has also been found on paddy in Sarawak. The adults have been collected from March to November.

This species is very close to *L. luzonensis* sp. n. and shares the characters of the black colour of the apices of femora and bases of tibiae and the two brownish black spots behind ocelli ; but can easily be separated from this species by pale ochraceous colour of the body, dusty grey colour of the venter of abdomen and short apical antennal segments. The long and cylindrical blades of claspers and other aedeagal appendages are of value in confirming identification.

*Leptocorisa geniculata* China, 1924 is a primary homonym of *Leptocorisa geniculata* Guérin, 1857. In spite of the fact that Guérin's species had been transferred to *Lyrnessus* by Stål (1866) before China described his species, China's species must be renamed. Dr. W. E. China has kindly suggested that *tagalica* would be an appropriate name, representing its Philippine origin.

### *Leptocorisa bipunctata* Costa

*Leptocorisa bipunctata* Costa, 1863 : 260 ; Stål, 1873 : 87

Original description : " Luteo—testacea, antennis brunneis, articulis 1z et 2z basi dilutioribus quarto basi pallido ; capitis linea utrinque laterali, pronoti punctis duobis humera-libus, elytrorum que cario margine laterali expecti fusco nigris, femoribus apice, tibiis tarsisque fuscis ♂ long. mill 14, lat. mill 2 1/3 long, antenn. mill. 17. Patria ? ".

Every effort was made to find the type of this species but without success. Approaches to the University Museum, Naples were unsuccessful. None of the specimens examined had been labelled as *Leptocorisa bipunctata* Costa by earlier workers. The original description is so vague that it might apply to almost any member of the subfamily and without any knowledge of the type locality, its identity cannot be guessed.

### *Leptocorisa burmeisteri* Montrousier

*Leptocorisa burmeisteri* Montrousier, 1865 : 277 ; Stål, 1873 : 87

Original description (translated from French) : " (length including antennae, 0.030 m.). Animal dark green above and yellowish below. Legs green, antennae brown. The upper surface of the head is light yellow, beneath it is yellowish green with the anterior portion apple green. The antennae which are as long as the body are brown with the extremity of the first segment dark green and the base of the fourth light green. The eyes are black, ocelli red. The rostrum, which is green, does not extend past the insertion of the middle legs. The prothorax is shagreened with gibbosity at its posterior angles, green marks on the rest of the border, green shades being paler at the sides, yellow below with a black spot at each side under the anterior angles. Scutellum finely punctate and almost metallic green. The elytra have the coriaceous part punctate, pink at the base and brown at the corners and bright green at the margins, especially the exterior, the membranous part obscurely smoky. Sternum is yellow and pale green in front of the insertion of the front legs. The abdomen is yellow, a little reddish on the sides with the tip green. Femora are green, the hairy tibiae are brownish and so are the tarsi. It is found at Kanala in the fields, on grasses and in vegetation."

The type of this species could not be examined. According to Horn (1926-28), the Montrousier collection is supposed to be present in Montpellier Museum (Herauld) France. M. Jean Claparede, the curator of this museum, wrote saying that there was no insect collection there and he would convey my request to the University of Montpellier, but no further information has been received.

However two specimens labelled "*Leptocorisa burmeisteri* Montrousier" from New Caledonia and New Hebrides in the collection of the Paris Museum were examined. These represented *Leptocorisa acuta* (Thunberg). As the title of Montrousier's paper shows, Kanala is in New Caledonia, from where a number of specimens have been identified as *Leptocorisa acuta*. In the light of original description and type locality it becomes certain that this species is a synonym of *L. acuta* (Thunberg).

### MUTUSCA Stål

*Mutusca* Stål, 1866 : 160, 1873 : 86

Type-species : *Leptocorisa prolixa* Stål by monotypy.

Body linear. Head elongated. Antennae with basal segments swollen throughout their length, in side view wider beyond middle. Rostrum short, nearly reaching second coxae. Pronotum at least twice as long as broad.

In ♂, posterior margin of seventh abdominal tergum produced into a medium rounded process (Text-fig. 355) ; pygophore rounded, claspers curved at apices, curved portion triangular (Text-fig. 357) ; aedeagus with both (dorsal and ventral) pairs of thecal appendages, with a pair of lateral conjunctival appendages, a dorsal membranous with a terminal appendage (Text-fig. 356) and a pair of dorso-lateral conjunctival appendages. Frontal or dorsal conjunctival appendages wanting.

In ♀, posterior margin of seventh abdominal sternum emarginate, with a short median split and a fold (Text-fig. 368) ; intervalvular sacs absent ; spermatheca rounded, with a small twisted tube but without a median flange (Text-fig. 370).

This genus can easily be separated from other genera of the tribe by the basal antennal segments, which are swollen throughout their length.

#### KEY TO SPECIES

1 Basal antennal segment long, at least a third as long again as third segment ; second at least slightly longer than third ; paraclypeae thin and straight (Text-fig. 3) ; usually a faint black median longitudinal line present on abdominal venter. (In ♂, pygophore with a concave median posterior margin (Text-fig. 364) ; aedeagus with second left lateral conjunctival appendage represented by scattered spines and first lateral appendage asymmetrical (Text-fig. 366). In ♀, ninth paratergite narrow and elongated, at least three times as long as broad (Text-fig. 368))

*prolixa* (p. 113)

- Basal antennal segment comparatively short, only slightly longer than third ; second at least slightly shorter than third ; paraclypeae thick, medially curved and converging at apices (Text-fig. 354) ; faint black line on abdominal venter usually absent. (In ♂, pygophore with a pointed apex (Text-fig. 355) ; aedeagus with second left lateral conjunctival appendages represented by a bunch of spines, all fused together and first lateral appendage symmetrical (Text-fig. 356) ; in ♀, ninth paratergite broad and comparatively short, about twice as long as broad))

*brevicornis* (p. 111)

*Mutusca brevicornis* (Dallas)

(Text-figs. 354-363)

*Leptocorisa brevicornis* Dallas, 1852 : 483*Mutusca brevicornis* (Dallas) Stål, 1866 : 160, 1873 : 86

Characterized by curved, thick and converging paraclypeae, by short basal antennal segment, which is only slightly longer than third and by the form of ♂ and ♀ genitalia.

♂. Body length, 14.7-15.2 mm., width, 1.5-1.6 mm. Head length, 2.0-2.1 mm., width, 1.3-1.33 mm. Antennae, segment I, 2.8-3.1 mm., II, 2.3-2.4 mm., III, 2.4-2.45 mm., IV, 2.3-2.4 mm. Rostrum, segment I, 1.3-1.35 mm., II, 1.3-1.35 mm., III, 0.4-0.5 mm., IV, 0.7 mm. Pronotum, length, 2.4-2.5 mm., width, 1.3-1.5 mm. Hind femora, 4.7-4.8 mm. Hind tibia, 4.8-5.2 mm. Distance between ocelli, 0.4-0.5 mm., distance between an ocellus and an eye, 0.6-0.7 mm.

Body linear, comparatively more robust, usually pale unicolourous. Head with paraclypeae thick and medially curved, converging at apices (Text-fig. 354). Antennae with short basal segments, at most a quarter as long again as third segment, second always shorter than third. Rostrum comparatively short, nearly approaching anterior margins of second coxae. Pronotal disc with posterior angles brownish black. Legs pale, with basal half of femora usually tinged with green. Hemelytra at base of membrane brownish. Abdomen with dorsum, excluding connexiva, brownish black with three black lines; venter pale, usually with two lateral black lines, median longitudinal black line usually absent. Posterior margin of seventh abdominal tergum with a median round projection, less punctate and with transverse lines; pygophore rounded with pointed apex (Text-fig. 355).

♂ GENITALIA : Claspers comparatively with a long neck and a small median process (Text-fig. 357); both dorsal and ventral pairs of thecal appendages present; second left as a bunch of spines, all fused together, first symmetrical; membranous appendage with a smaller terminal appendage (Text-fig. 356), and a pair of dorso-lateral membranous appendages.

♀. Body length, 15.0-16.5 mm., width, 1.5-1.7 mm. Head length, 2.1-2.2 mm., (only paraclypeae 0.8 mm.), width, 1.3-1.5 mm. Antennae, segment I, 3.0-3.2 mm., II, 2.4-2.5 mm., III, 2.43-2.6 mm., IV, 2.5-2.6 mm. Rostrum, segment I, 1.33 mm., II, 1.33 mm., III, 0.5 mm., IV, 0.7 mm. Pronotum, length, 2.6-2.7 mm., width, 1.5-1.7 mm. Hind femora, 4.7-4.8 mm. Hind tibia, 4.9-5.2 mm. Distance between ocelli, 0.4-0.5 mm., distance between an ocellus and an eye, 0.6-0.7 mm.

Longer than ♂, otherwise similar, posterior margin of seventh abdominal sternum emarginate, with a long median split and a median fold; ninth paratergites comparatively broad, about twice as long as broad (Text-fig. 360).

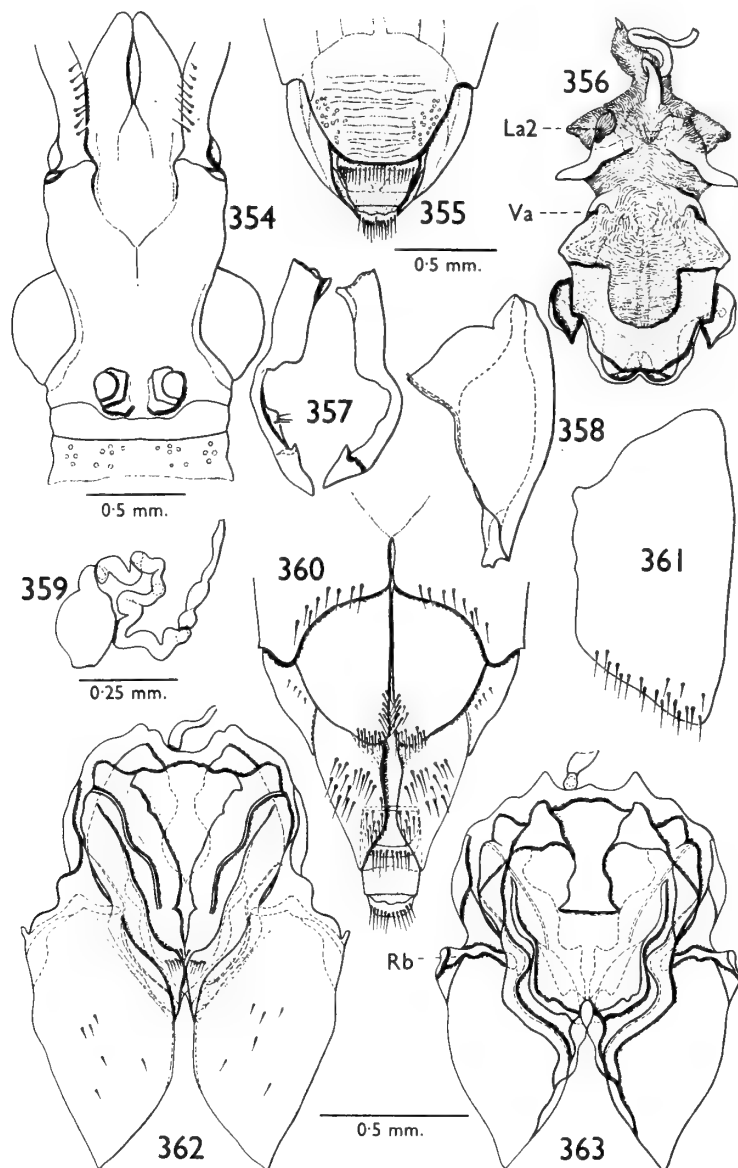
♀ GENITALIA : First gonocoxae comparatively broad, breadth less than half of length, apices rounded (Text-fig. 360); intervalvular sacs absent; spermatheca oval, with a short twisted tube.

Type material. Lectotype ♂, AUSTRALIA : "New Holland" (*J. Byrne*), B.M. (N.H.); paratype, 1 ♀, AUSTRALIA : "New Holland", Swan River (*Richardson*), B.M.(N.H.).

Other material. AUSTRALIA : 83 ♂, 53 ♀; SOLOMON IS. : 1 ♂.

The range of this species extends from the type localities in Western Australia to Melville Islands in the north, to New South Wales and Tasmania in the south and

Solomon Islands in the east. The adults have been found on *Daviesia*, an Australian leguminous plant and they have also been collected at light. Adults have been taken at most times of the year, but they seem to be in abundance during the summer months of November to February. No specimen has been collected in July or August.



FIGS. 354-363. *Mutusca brevicornis*, 354-357, ♂, 358-363, ♀. 354, head, dorsal view; 355, terminalia, dorsal view; 356, aedeagus (inflated), ventral view; 357, claspers, inner and outer views; 358, first gonopophysis, ventral view; 359, spermatheca; 360, terminalia, ventral view; 361, first gonocoxa, ventral view; 362, ovipositor, ventral view; 363, same, dorsal view.

This species can easily be separated from *M. prolixa* (Stål) by examining the median posterior margin of pygophore in ♂, which is pointed in this species and concave in *prolixa*. In ♀, the ninth paratergite is comparatively short and broad, breadth about half of the length in this species, whereas in *prolixa* it is elongate and breadth is one-third of length.

Of the three specimens recorded by Dallas only two remain in the British Museum Collection. One is a ♂ (Brit. Mus. 1844-4) collected by Surgeon J. Byrne, R.N. during the voyage of H.M.S. Beagle in North West Australian waters and presented to the British Museum by Haslar Naval Hospital in 1844. The other is a ♀ collected on the Swan River, North West Australia and presented by Sir John Richardson to the British Museum in 1843 (Brit. Mus. 1843-14). Both are labelled New Holland.

The ♂ syntype is here selected as lectotype of this species and has been given a blue museum lectotype label and labelled lectotype of *Leptocorisa brevicornis* Dallas.

### *Mutusca prolixa* (Stål)

(Text-figs. 364-372)

*Leptocorisa prolixa* Stål, 1859 : 235

*Mutusca prolixa* (Stål) Stål, 1873 : 86

Characterized by thin and straight paraclypeae, by long basal antennal segments, which are about a third longer than third segment and by the form of ♂ and ♀ genitalia.

♂. Body length, 14.5-16.0 mm., width, 1.4-1.6 mm. Head length, 1.9-2.2 mm., (only paraclypeae 0.8-0.9 mm.), width, 1.2-1.3 mm. Antennae, segment I, 3.4-3.7 mm., II, 2.4-2.8 mm., III, 2.3-2.7 mm., IV, 2.5-2.7 mm. Rostrum, segment I, 1.1-1.2 mm., II, 1.1-1.2 mm., III, 0.5-0.6 mm., IV, 0.7-0.8 mm. Pronotum, length, 2.3-2.6 mm., width, 1.4-1.6 mm. Hind femora, 4.7-5.2 mm. Hind tibia, 5.2-5.3 mm. Distance between ocelli, 0.4-0.43 mm., distance between an ocellus and an eye, 0.55-0.66 mm.

Body linear, usually pale, tinged light brown. Head with paraclypeae uniformly thin, straight and diverging at apices (Text-fig. 3). Antennae, usually tinged with pink, with long basal segment, at least a third as long again as third segment; second at least slightly longer than third. Rostrum usually reaching anterior margin of second coxae. Pronotal disc usually without brownish black spots on posterior angles. Legs pale, with femora tinged light green. Hemelytra with red subcostal and radial veins. Abdomen, with dorsum brownish black, venter pale with a black median longitudinal line. Posterior margin of seventh abdominal tergum with a median rounded projection, projection densely punctate; pygophore rounded with median posterior margin concave (Text-fig. 364).

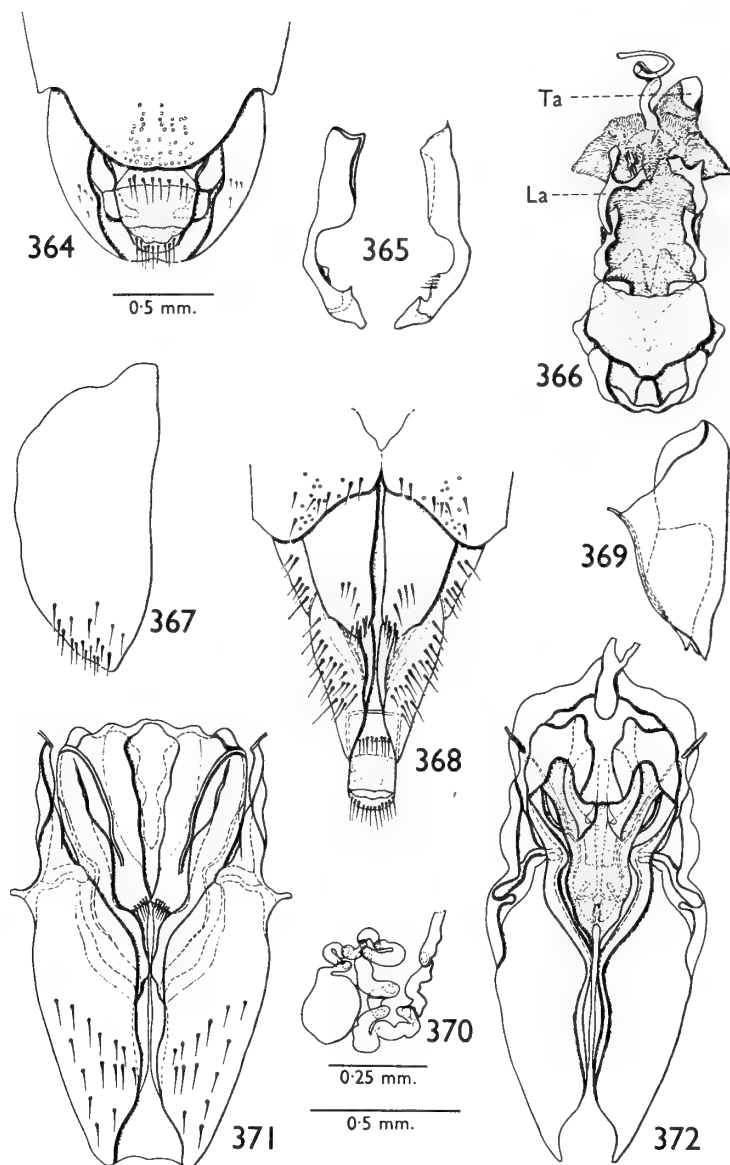
♂ GENITALIA: Claspers comparatively with a short neck and greatly developed median process (Text-fig. 365); both (dorsal and ventral) pairs of thecal appendages present; second left lateral conjunctival appendage, represented by scattered spines, first lateral asymmetrical; membranous appendage with a large terminal appendage (Text-fig. 366) and a pair of dorso-lateral membranous appendages.

♀. Body length, 17.0-18.1 mm., width, 1.6-1.7 mm. Head length, 2.0-2.2 mm., (only paraclypeae 0.7-0.9 mm.), width, 1.3-1.33 mm. Antennae, segment I, 3.4-4.0 mm., II, 2.4-2.8 mm., III, 2.3-2.7 mm., IV, 2.5-2.7 mm. Rostrum, segment I, 1.2-1.3 mm., II, 1.2-1.4 mm., III, 0.5-0.55 mm., IV, 0.7-0.8 mm. Pronotum, length, 2.5-2.9 mm., width, 1.6-1.7 mm. Hind femora, 4.6-5.6 mm. Hind tibia, 4.9-6.0 mm. Distance between ocelli, 0.4-0.43 mm., distance between an ocellus and an eye, 0.6-0.66 mm.

Very similar to ♂ in general appearance but usually longer, posterior margin of seventh

abdominal sternum emarginate, with a short median split and fold (Text-fig. 368); ninth paratergite elongated, breadth only a third of length.

♀ GENITALIA: First gonocoxae narrow, at least twice as long as broad, with rounded apices (Text-fig. 367); intervalvular sacs absent (Text-fig. 372); spermatheca bladder-shaped, with a long twisted tube.



FIGS. 364-372. *Mutusca prolixa*, 364-366, ♂, 367-372, ♀. 364, terminalia, dorsal view; 365, claspers, inner and outer views; 366, aedeagus (inflated), ventral view; 367, first gonocoxa, ventral view; 368, terminalia, ventral view; 369, first gonopophysis, ventral view; 370, spermatheca; 371, ovipositor, ventral view; 372, same, dorsal view.



Type material. Holotype, CHINA : (*Kinb*), labelled "typus", "*prolixus*", abdomen missing, Riksmus. Stockholm.

Other material. INDIA : 1 ♂ ; JAVA : 1 ♀ ; MALAYA : 1 ♂ ; AUSTRALIA : 4 ♂, 6 ♀ ; NEW CALEDONIA : 1 ♂.

The range of this species is wide, extending in the west into India, in the south into Australia, in the north into China and in the east into New Caledonia. It has been collected on grasses, but not many individuals seem to have been found.

### **BLOETEOCORIS gen. n.**

Type-species : *Leptocorixa* (*Rhabdocoris*) *inflexigena* Blöte 1934.

Body robust. Head elongated ; genae remarkably developed, with pointed and inflexed tips (Text-fig. 8) ; ocelli usually placed very close together ; interocellar distance usually about half the distance between an ocellus and an eye (in both the cases including the diameter of both). Antennae with apices of basal segments slightly thicker. Rostrum long, reaching hind coxae.

In ♂, posterior margin of seventh abdominal tergum produced into a median truncated process (Text-fig. 376) ; pygophore rounded, lobes of ninth segments prominently developed, usually produced into horn-like processes ; median posterior margin pointed ; claspers branched at apices into a rectangular and a conical leaf-like portion (Text-fig. 374, A) ; aedeagus with both (dorsal and ventral) pairs of thecal appendages and two pairs of dorso-lateral conjunctival appendages ; supporting appendages always present but frontal and membranous conjunctival appendages absent (Text-fig. 377).

In ♀, posterior margin of seventh abdominal sternum usually with medially pointed apex, very small portion of first gonocoxae visible externally (Text-fig. 378) ; intervalvular sacs absent ; spermatheca usually flask-shaped, with a long coiled tube but without a median flange.

This genus resembles *Stenocoris* and *Leptocorisa* but can easily be separated from them by the pointed and inflexed genae, developed processes of the lobes of the ninth segments in the ♂ and in the ♀ by very small externally visible first gonocoxae.

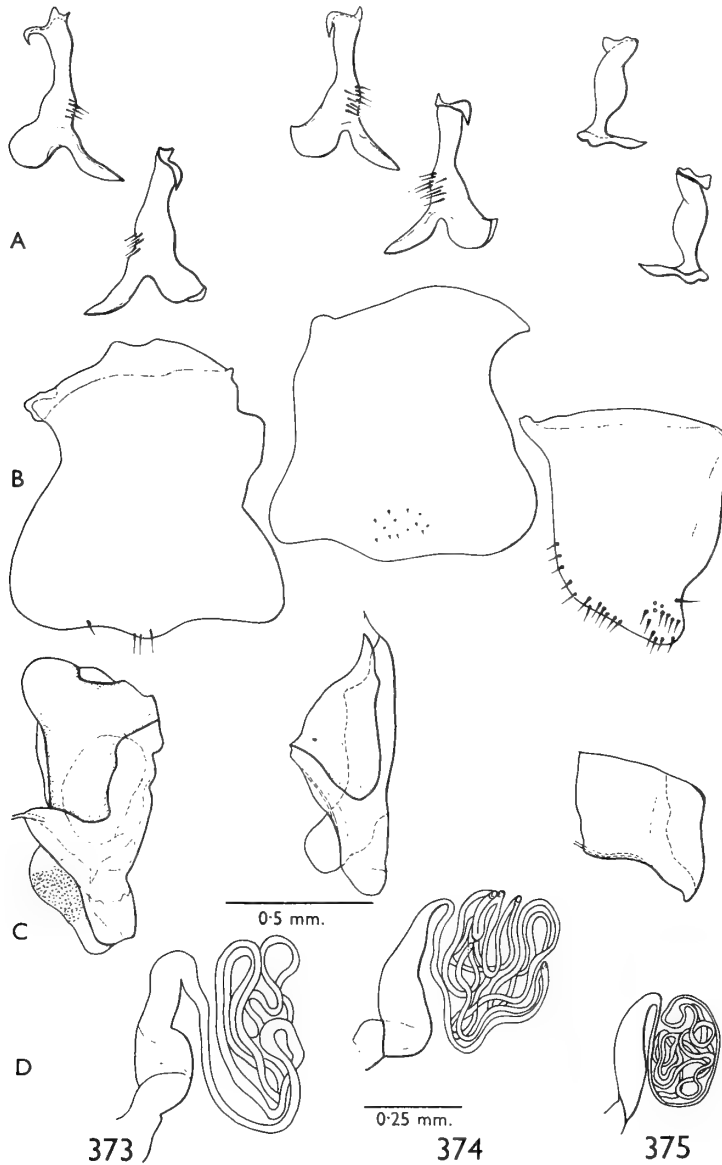
It is named in honour of Dr. H. C. Blöte.

Hsiao (1963) has described a monotypic new genus, *Grypocephalus* for *pallipectus* new species. His generic description is based on the character of remarkably developed juga, which he has shown inflexed and pointed in his diagram of *pallipectus*. It is suspected that he has erred in recognizing the developed structure as "juga" rather than genae. If this is so, my new genus *Bloeteocoris* will fall into synonymy of *Grypocephalus* Hsiao. Until the type specimen of *G. pallipectus* is studied, this cannot be ascertained.

#### KEY TO SPECIES

- 1 Larger species, body length exceeding 14 mm., head dorsally without a black mark or spot ; in ♂, lobes of ninth segments produced into horn-like processes (Text-fig. 382) ; in ♀, posterior margin of seventh abdominal sternum medially with a small projection, without split (Text-fig. 378) . . . . . 2
- Smaller species, body length in ♂ 11-11.5 mm., and in ♀, 12-13.2 mm. ; a pair of symmetrical trifurcate marks present on the dorsum of the head ; in ♂, lobes of ninth segments rounded (Text-fig. 386) ; in ♀, posterior margin of seventh abdominal sternum with a median split (Text-fig. 388) . . . . . *minutus* (p. 121)

- 2 Ocelli larger, interocellar distance always greater than half the distance between an ocellus and an eye ; second antennal segments distinctly longer than third ; in ♂, processes of the lobes of the ninth segments greatly developed, inwardly curved and pointed (Text-fig. 376) ; in ♀, distal margin of first gonocoxae regular (Text-fig. 378 . . . . . *inflexigena* (p. 117)



Figs. 373-375. *Bloeteocoris* spp. A, claspers, inner and outer views ; B, first gonocoxae, ventral view ; C, first gonopophysis, ventral view ; D, spermatheca. 373, *inflexigena* ; 374, *meridianus* ; 375, *minutus*.

- Ocelli minute, interocellar distance distinctly less than half the distance between an ocellus and an eye ; second antennal segments subequal to third ; in ♂, the processes of the lobes of ninth segment not greatly developed, straight, and rounded at apices (Text-fig. 381) ; in ♀, distal margin of first gonocoxae irregular (Text-fig. 383) . . . . . *meridianus* (p. 119)

***Bloeteocoris inflexigena* (Blöte) comb. n.**

(Text-figs. 373, 376-380)

*Leptocorixa (Rhabdocoris) inflexigena* Blöte, 1934 : 283

Characterized by acutely pointed and curved processes of the lobes of the ninth segments in the ♂ and in the ♀ by pointed median posterior margin of the seventh abdominal sternum and by the forms of ♂ and ♀ genitalia.

♂. Body length, 16.0 mm., width, 2.4 mm. Head length, 2.2 mm., width, 1.8 mm. Antennae, segment I, 5.3 mm., II, 3.8 mm., III, 3.3 mm., IV, 4.9 mm. Rostrum, segment I, 2.0 mm., II, 2.1 mm., III, 1.1 mm., IV, 1.6 mm. Pronotum, length, 2.8 mm., width, 2.4 mm. Hind femora, 6.4 mm. Hind tibia, 7.6 mm. Distance between ocelli, 0.5 mm., distance between an ocellus and an eye, 0.86 mm.

Body robust, brown with a greenish tinge. Head large, slightly longer than broad, brownish green ; occipital suture medially concave, arms curving outwards towards sides ; paraclypeae converging at apices, genae with strongly developed tips. Antennae reddish black, with the bases of the apical segments pale. Rostrum long, reaching hind coxae. Disc of pronotum brownish green, behind the collar dorsally convex, a fork-shaped brownish black mark present anteriorly in the middle ; posterior angles with brownish black spots. Legs brownish black, femora tinged with green. The subcostal and radial veins of hemielytra brownish black. Abdomen dorsally pale, tinged with brown, a portion of seventh segment and pygophore black, venter pale unicolourous. Posterior margin of seventh abdominal tergum produced in middle, posterior margin of this projection medially concave ; lobes of ninth segments horn-shaped, inwardly curved and acutely pointed at apices (Text-fig. 376).

♂ GENITALIA : Claspers with leaf-like portions narrow and elongated (Text-fig. 373, A) ; both dorsal and ventral pairs of thecal appendages present, ventral triangular (Text-fig. 377) ; a pair of symmetrical and small lateral appendages (Text-fig. 377) ; vesica, long coiled tube with " T " structures and a pair of supporting appendages (Text-fig. 377).

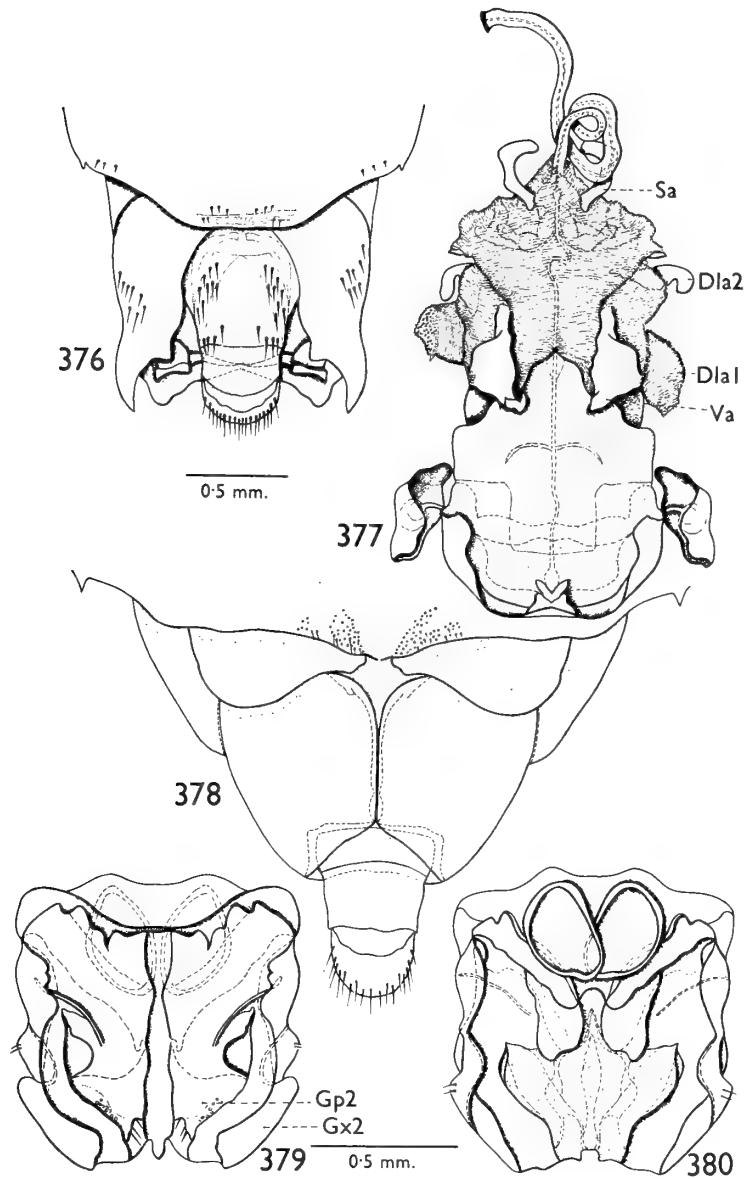
♀. Very similar to ♂ in general appearance, colour and measurements, only slightly larger ; posterior margin of seventh abdominal sternum medially produced with a pointed apex (Text-fig. 378).

♀ GENITALIA : First gonocoxae largely covered externally by seventh abdominal sternum, slightly longer than broad, posterior margin broader than anterior margin, outer margin smooth, convex in middle (Text-fig. 373, B) ; intervalvular sacs absent (Text-fig. 380) ; spermatheca with an uniformly thick and smoothly curve neck (Text-fig. 373, D).

Type material. Holotype ♂, BURMA : Moulmein, 12.v.1929, Mus. Leiden ; allotype ♀, data as holotype, Mus. Leiden.

This species seems to be comparatively rare.

The ♂ can be separated from the closely allied species *meridianus* by curved and pointed processes of the lobes of ninth segments and the ♀ by pointed median posterior margin of seventh abdominal sternum.



FIGS. 376-380. *Bloeteocoris inflexigena*, 376-377, ♂, 378-380, ♀. 376, terminalia, dorsal view; 377, aedeagus (inflated), ventral view; 378, terminalia, ventral view; 379, ovipositor, ventral view; 380, same, dorsal view.

***Bloeteocoris meridianus* sp. n.**

(Text-figs. 374, 381-385)

♂ characterized by the straight processes of the lobes of the ninth segment and ♀ by the small and rounded projection of the seventh abdominal sternum and by the form of genitalia.

♂. Body length, 15.0 mm., width, 2.3 mm. Head length, 2.0 mm., width, 1.7 mm. Antennae, segment I, 5.2 mm., II, 3.5 mm., III, 3.46 mm., IV, 4.3 mm. Rostrum, segment I, 1.9 mm., II, 1.9 mm., III, 1.0 mm., IV, 1.45 mm. Pronotum, length, 2.9 mm., width, 2.3 mm. Hind femora, 6.0 mm. Hind tibia, 7.6 mm. Distance between ocelli, 0.4 mm., distance between an ocellus and an eye 0.9 mm.

Body robust, pale with a brownish tinge. Head large, slightly longer than broad; occipital suture medially concave, slightly "V"-shaped behind ocelli, arms curving outwards towards sides, paraclypeae diverging at apices; genae with inflexed tips. Antennae reddish brown, with second and third segments tinged black and the bases of the apical segments pale. Rostrum long, reaching hind coxae. Pronotal disc palish brown, not remarkably convex behind collar, fork-shaped, brownish black mark absent; posterior angles with brownish black spots. Legs palish brown, with tibiae and tarsi darker. Subcostal and radial veins of hemielytra brownish black. Abdomen with dorsum pale, tinged with brown; venter pale unicolourous; a portion of seventh segment and pygophore black. Posterior margin of seventh abdominal tergum medially produced, projection with a truncated margin; pygophore with lobes of the ninth segments produced into straight processes, rounded at apices (Text-fig. 381).

♂ GENITALIA: Claspers with leaf-like portion broad and short (Text-fig. 374, A); both (dorsal and ventral) pairs of thecal appendages present, ventral elongated (Text-fig. 382); a pair of symmetrical lateral larger conjunctival appendages (Text-fig. 382); two pairs of dorso-lateral conjunctival appendages as in Text-fig. 382; vesica thin, long coiled tube with "T" structures and a pair of supporting appendages (Text-fig. 382).

♀. Body length, 16.5 mm., width, 2.5-2.6 mm. Head, length, 2.1-2.2 mm., width, 1.8 mm. Antennae, segment I, 5.1 mm., II, 3.5 mm., III, missing, IV, missing. Rostrum, segment I, 2.0 mm., II, 2.0 mm., III, 1.0 mm., IV, 1.5 mm. Pronotum, length, 3.0-3.1 mm., width, 2.5-2.6 mm. Hind femora, 6.4 mm. Hind tibia, 7.7 mm. Distance between ocelli, 0.4 mm., distance between an ocellus and an eye, 0.9 mm.

Slightly larger than ♂, otherwise very similar; posterior margin of seventh abdominal sternum with a rounded median projection (Text-fig. 383).

♀ GENITALIA: First gonocoxae externally almost entirely covered by seventh sternum, about as long as broad, posterior margin broader than anterior margin, outer margin sinuate (Text-fig. 374, B); intervalvular sacs absent (Text-fig. 384); spermatheca with a thin tapering neck (Text-fig. 374, D).

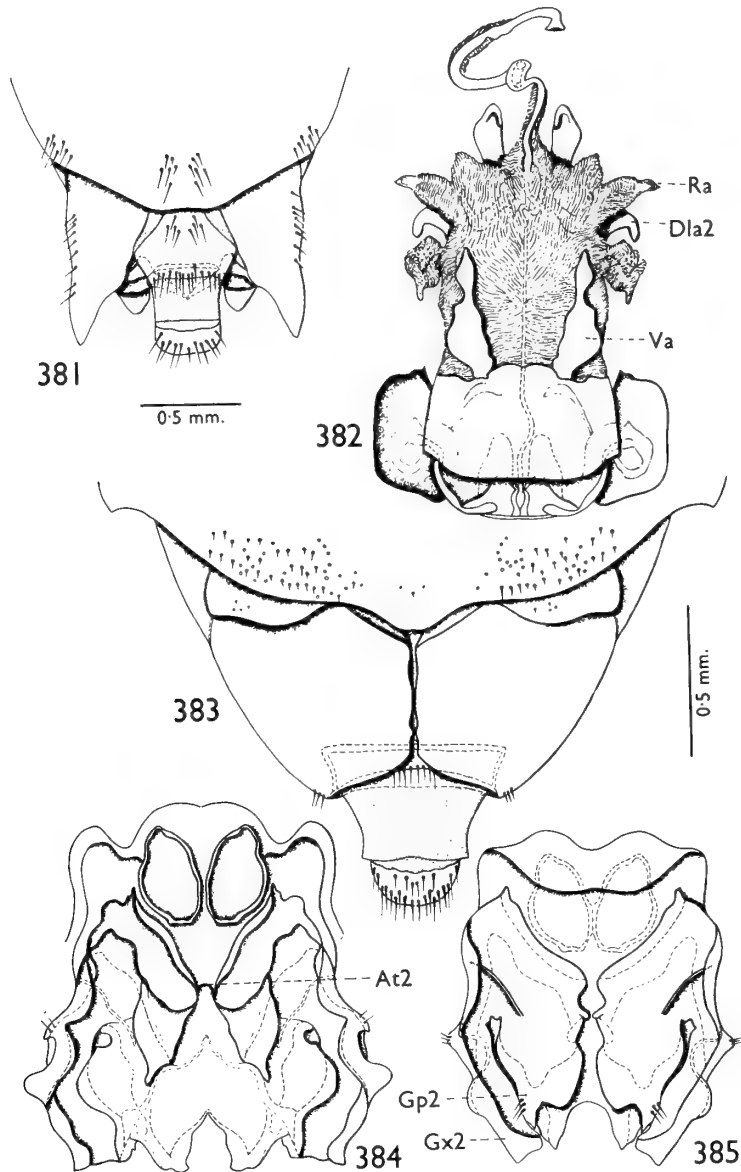
Holotype ♂, THAILAND: Trang. Banchong "at light", 26.iv.1924 (*I. H. Evans*), "Ex F. M. S. Museum", B.M.(N.H.).

Paratypes. MALAYA: Perak, Gunong Kledang, 2 ♂ xi.1916, "Ex F. M. S. Museum", B.M.(N.H.).

This species has most southernly range in the genus *Bloeteocoris*. All three *Bloeteocoris* species would appear to be allopatric. *B. minutus* in south China, north India and north east Burma, *B. inflexigena* in south Burma and *B. meridianus* in Thailand and Malaya.

This species is very close to *inflexigena*, but can easily be separated by smaller

interocellar distance (less than half of the distance between an ocellus and an eye), and by the straight processes of the lobes of the ninth segment.



FIGS. 381-385. *Bloeteocoris meridianus*, 381-382, ♂, 383-385, ♀. 381, terminalia, dorsal view; 382, aedeagus (inflated), ventral view; 383, terminalia, ventral view; 384, ovipositor, dorsal view; 385, same, ventral view.

***Bloeteocoris minutus* sp. n.**

(Text-figs. 375, 386-390)

Characterized by small size of the body, by a pair of trifurcate dorsal black marks on the middle of head and by the form of ♂ and ♀ genitalia.

♂. Body length, 11.0-11.5 mm., width, 1.7-1.9 mm. Head, length, 1.5-1.6 mm., width, 1.3-1.4 mm. Antennae, segment I, 2.6-2.7 mm., II, 1.9-2.1 mm., III, 1.9-2.1 mm., IV, 2.4-2.8 mm. Rostrum, segment I, 1.4-1.6 mm., II, 1.4-1.6 mm., III, 0.7-0.9 mm., IV, 1.0-1.2 mm. Pronotum, length, 1.9-2.1 mm., width, 1.7-1.9 mm. Hind femora, 3.5-3.7 mm. Hind tibia, 4.3-4.6 mm. Distance between ocelli, 0.3-0.4 mm., distance between an ocellus and an eye, 0.6-0.7 mm.

Body short, pale, tinged black. Head large, slightly longer than broad, with a pair of symmetrical trifurcate dorsal black marks between compound eyes; postoccipital region black; occipital suture concave in middle, arms curving outwards towards sides; paraclypeae converging at apices; genae with inflexed tips. Antennae brownish black, unicolourous. Rostrum very long, extending beyond the apices of third coxae. Pronotal disc with brownish black punctures, margins and an oval portion in middle pale; posterior angles with brownish black spots. Legs pale unicolourous, tarsi slightly darker. *R-M* vein of the hemielytra brownish black. Abdomen with dorsum pale, tinged with red, venter palish brown. Posterior margin of seventh abdominal tergum with a median rounded projection; pygophore with lobes of ninth segments rounded (Text-fig. 386).

♂ GENITALIA: Apices of claspers slightly concave in middle with small leaf-like portion (Text-fig. 375, A); both dorsal and ventral pairs of thecal appendages present, ventral pair triangular (Text-fig. 387); a pair of symmetrical lateral conjunctival and two asymmetrical pairs of dorso-lateral appendages present (Text-fig. 388); vesica thin and coiled tube with "T" structures and a pair of supporting appendages.

♀. Body length, 12.0-13.2 mm., width, 2.0-2.2 mm. Head length, 1.7-1.9 mm., width, 1.4-1.5 mm. Antennae, segment I, 2.9-3.2 mm., II, 2.3-2.4 mm., III, 2.2-2.3 mm., IV, 2.6-2.8 mm. Rostrum, segment I, 1.7-1.8 mm., II, 1.7-1.9 mm., III, 0.7-1.0 mm., IV, 1.2-1.3 mm. Pronotum, length, 2.2-2.7 mm., width, 2.0-2.2 mm. Hind femora, 4.3-4.7 mm. Hind tibia, 4.8-5.6 mm. Distance between ocelli, 0.4 mm., distance between an ocellus and an eye, 0.7-0.8 mm.

Very similar to ♂ in general appearance but distinctly larger; posterior margin of seventh abdominal sternum with a short median split and a conspicuous median fold (Text-fig. 388).

♀ GENITALIA: First gonocoxae largely covered by seventh abdominal sternum, triangular with rounded apices (Text-fig. 375, B); intervalvular sacs absent (Text-fig. 390); spermatheca kidney-shaped (Text-fig. 375, D).

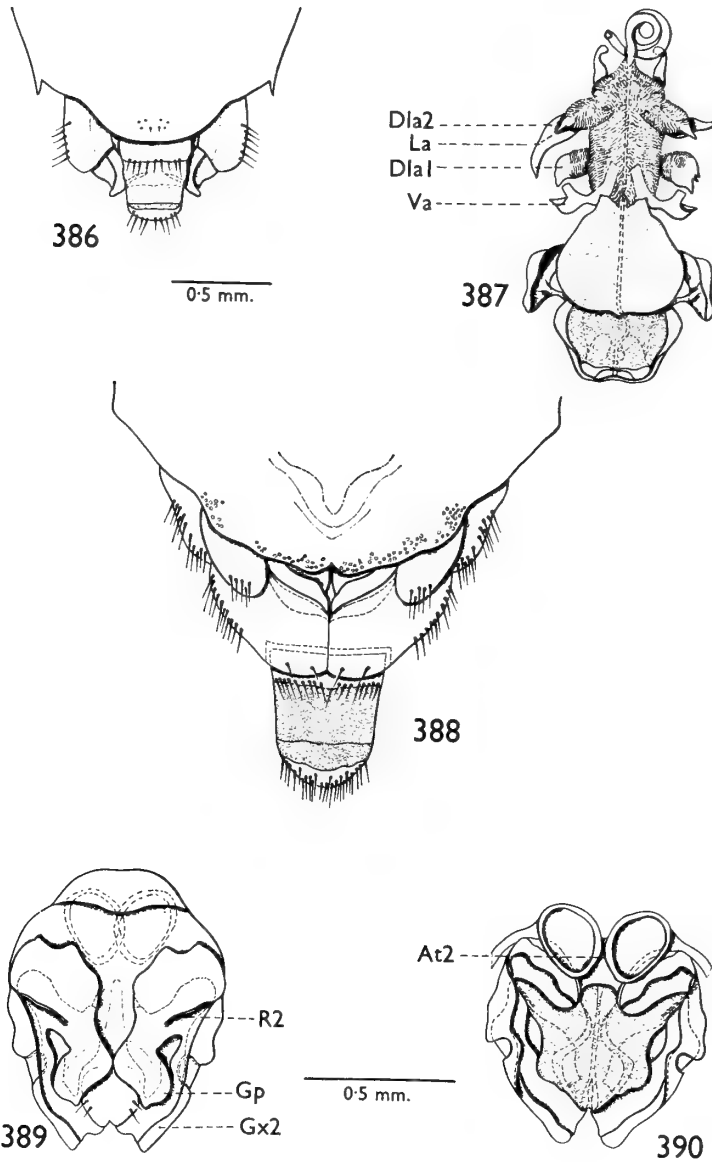
Holotype ♂, N.E. BURMA: Kambaiti, 7,000 ft., 12.iv.1934 (*R. Malaise*), labelled "*Leptocoris costalis* H. S., det. Kiritshenko", Riksmus. Stockholm.

Paratypes. 4 ♂, 4 ♀, locality as holotype, iv-v.1934, Riksmus. Stockholm; CHINA: Kunming, Yunnan, 1 ♂ 24.vii.1945 (*Cazier*), A.M.N.H.; INDIA: Darjiling, 1 ♂, Mus. Hist. nat. Paris, 2 ♂, 1 ♀, B.M.(N.H.).

The range of this species extends from N.E. India in the west into southern China (Kunming, Yunnan) and N.E. Burma. Specimens have been collected in April, May and July.

This is an isolated species in the genus and can easily be separated by its small size and characters of genitalia (see above).

The diagram of the lateral side of the head of *G. pallipectus* Hsiao (1963) resembles *B. minutus* and if he has erred in diagnosing *juga* for *genae*, *B. minutus* will fall as a synonym of *G. pallipectus*. I have written to Dr. Hsiao for the loan of his type material but so far have had no reply.



FIGS. 386-390. *Bloeteocoris minutus*, 386-387, ♂, 388-390, ♀. 386, terminalia, dorsal view; 387, aedeagus (inflated), ventral view; 388, terminalia, ventral view; 389, ovipositor, ventral view; 390, same, dorsal view.



**NOLIPHINI trib. n.**

Body large and robust. Head broader than long, paraclypeae poorly developed, distinctly shorter than and never enclosing clypeus; head behind the eyes very strongly narrowed and turned up towards pronotum. Pronotum broader than long, trapeziform and convex. Aedeagus with both dorsal and ventral pairs of thecal appendages, simple. Spermatheca usually tubular, sometimes triangular, never with a median flange.

The characters of the anterior region of the head and the form of the pronotum clearly separate this tribe from Leptocorisini.

**LYRNESSUS Stål**

*Lyrnessus* Stål, 1862 : 59, 1865 : 185, 1866 : 159, 1868 : 54, 1873 : 86

*Coristenia* Costa, 1863 : 261

Type-species : *Lyrnessus geniculatus* (Guérin, 1857) by monotypy.

Body robust. Head triangular. Antennae with apices of basal segments slightly thicker. Rostrum long, reaching third coxae. Pronotal disc trapeziform, without latero-posterior spines (Text-fig. 7) and without black sculpturation. Hemielytra brownish black with costal margins and veins prominently pale.

In ♂, posterior margin of seventh abdominal tergum truncated, medially only slightly concave (Text-fig. 392); claspers strongly curved, apically acutely pointed, with a median spine (Text-fig. 393); aedeagus with both (dorsal and ventral) pairs of thecal appendages, asymmetrical pair of lateral conjunctival appendages and a pair of fused supporting appendages (Text-fig. 393).

In ♀, posterior margin of seventh abdominal sternum emarginate, with a median fold (Text-fig. 394); first gonocoxae large with round apices (Text-fig. 399); three pairs of intervalvular sacs, spermatheca tubular, curved in middle, with a long coiled tube.

The only species of this genus, *L. geniculatus* (Guérin), is found in Neotropical region, whereas all the other species of the tribe Noliphini are confined to Oriento-Australian region, thus it is not surprising that it shows isolation in many characters. It lacks the fore femoral spines of *Cosmoleptus* and latero-posterior spines on pronotum of *Noliphus*. It also resembles *Stenocoris* (*Pseudoleptocorisa*) *erratica* Blöte in the characters of the colour of the hemielytra.

***Lyrnessus geniculatus* (Guérin)**

(Text-figs. 391-399)

*Leptocorisa geniculata* Guérin, 1857 : 392

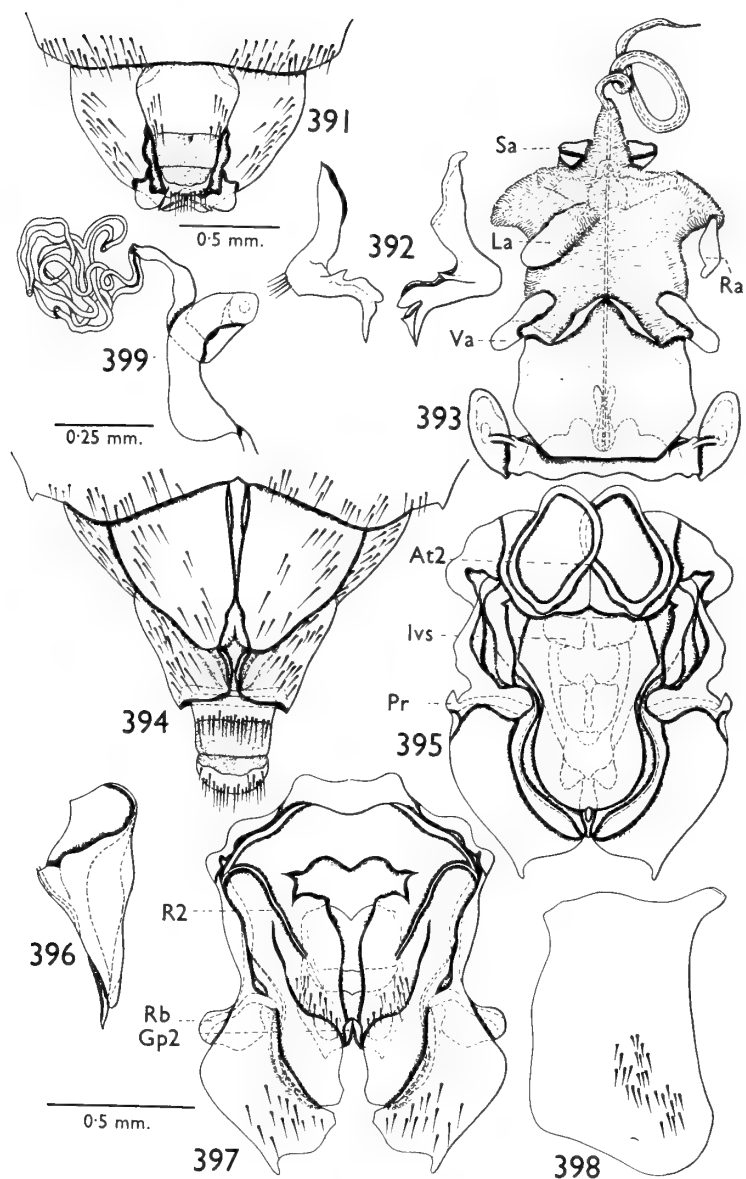
*Lyrnessus geniculatus* (Guérin) Stål, 1866 : 159

*Paryphes tibialis* Stål, 1860 : 31

*Coristenia flavicosta*, Costa, 1863 : 261

Characterized by pale basal quarter of apical antennal segments, by dark brownish black apices of femora, entire tibia and tarsi and by the form of ♂ and ♀ genitalia.

♂. Body length, 12.6-14.6 mm., width, 2.2-2.7 mm. Head length, 1.3-1.4 mm., width, 1.4-1.7 mm. Antennae, segment I, 3.0-3.7 mm., II, 2.1-2.8 mm., III, 2.4-3.0 mm., IV, 3.9-4.1 mm. Rostrum, segment I, 1.4-1.6 mm., II, 1.4-1.7 mm., III, 0.6-0.7 mm., IV, 0.9-1.1 mm. Pronotum, length, 2.1-2.6 mm., width, 2.2-2.7 mm. Hind femora, 4.2-5.5 mm.



FIGS. 391-399. *Lyrnessus geniculatus*, 391-392, ♂, 394-399, ♀. 391, terminalia, dorsal view; 392, claspers, inner and outer views; 393, aedeagus (inflated), ventral view; 394, terminalia, ventral view; 395, ovipositor, dorsal view; 396, first gonopophysis, ventral view; 397, ovipositor, ventral view; 398, first gonocoxa, ventral view; 399, spermatheca.

Hind tibiae, 4.9-6.6 mm., interocellar distance, 0.4-0.5 mm., distance between an ocellus and an eye, 0.7-0.9 mm.

Body robust. Head pale, with a black spot behind ocelli and one on clypeus at labral base; distinctly broader than long; ocelli large, interocellar distance slightly more than half the distance between an ocellus and an eye. Antennae brownish black, with bases of second, third and at least a quarter basal portions of apical segments pale. Rostrum long, reaching hind coxae with third segment shortest. Lateral black line extending from sides of antenniferous tubercle on to anterior one-fourth of propleuron. Pronotal disc posteriorly tinged green, sometimes pale unicoloured, with backward triangular processes on either side, brownish black spots on posterior angles present (Text-fig. 7). Legs with femora pale, tinged with green, apices of femora, entire tibiae and tarsi brownish black. Hemelytra brownish black with pale veins. Abdomen with dorsum yellowish brown, venter pale, unicoloured. Posterior margin of seventh abdominal tergum truncated (Text-fig. 391), medially slightly concave; pygophore round, with narrow emarginated posterior margin.

♂ GENITALIA: Claspers strongly curved in middle, apically acutely pointed, with a smaller spine near apices and a larger in middle (Text-fig. 392); aedeagus with both (dorsal and ventral) pairs of thecal appendages as in Text-fig. 393; lateral appendages asymmetrical (Text-fig. 393); vesica with a pair of fused supporting appendages.

♀. Very similar to ♂ in general appearance and measurements; posterior margin of seventh abdominal sternum emarginate, with a median fold (Text-fig. 394).

♀ GENITALIA: First gonocoxae large, round at apices with regular external margin (Text-fig. 398); three pairs of intervalvular sacs (Text-fig. 395); spermatheca tubular (Text-fig. 399).

Type material. Holotype ♀ of *Paryphus tibialis* Stål, BRAZIL: (*F. Schlb*), Riksmuseum. Stockholm; MEXICO: Oaxaca, 1 ♂ (*Sallé*), with a label "*Leptocorisica geniculata* Guérin (M. M. Type)", Riksmuseum. Stockholm.

Other material. CUBA: 2 ♂, 2 ♀; BRAZIL: 3 ♂, 7 ♀; PERU: 3 ♂, 1 ♀; PANAMA: 1 ♂, 1 ♀; PARAGUAY: 1 ♀.

The range of this species extends in the north into Mexico and in the south into Paraguay. The adults have been collected in March, September, October and November.

In spite of enquiries at various Italian museums, it has not been possible to trace the type of *Leptocorisica geniculata* Guérin or *Coristenia flavicosta* Costa. It is possible that the specimens from the Riksmuseum, Stockholm with labels "Typ" and "*Leptocorisica geniculata* Guerin" could have been the type. However, although Guérin's original description was based entirely on colour characters, this and the figure make it obvious that the present concept of the species (which is also Stål's) is correct. This view is strengthened by the identification of a few specimens from the type locality (Cuba) as this species. In 1868 Stål synonymized *Coristenia* Costa, 1863 with *Lyrnessus* Stål, 1860. Costa in his original description states "Luteo testacea, punctata, antennis nigris articulis 2 et 3 summa basi, 4 annulo latiore prope basi un albidis. Capitis vitta utrinque laterali, maculaque pone ocellos nigris; pronote disc postico virescente, punctis, humeralibus nigris, elytrorum corio fusco virescenti venis discoidalibus fulvis, vena juxta marginata conspicua flava; tibiis tarsisque fuscis, illis annulo minuto basi pallido, long. mill. 13; lat. mill. 2½. Patria?". This description agrees in all details with that of *L. geniculata* and as neither the type specimen nor the type locality is known, it is proposed to accept Stål's synonymy.

**COSMOLEPTUS** Stål

*Cosmoleptus* Stål, 1873 : 86-87

Type-species : *Lyrnessus limbaticollis* Stål by monotypy.

Body usually robust. Head triangular. Antennae with apices of basal segments slightly thicker. Rostrum long, approaching hind coxae. Pronotal disc trapeziform with black sculpturation, lateral and anterior margins pale, impunctate (Text-fig. 4). Posterior angles without spines. Legs with fore femora armed with ventro-posterior spines (Text-fig. 9). Hemelytra, cuneus with a white spot.

In ♂, posterior margin of seventh abdominal tergum truncated, medially slightly concave (Text-fig. 403) ; pygophore rounded ; claspers with pointed apices (Text-fig. 405) ; aedeagus with dorsal and ventral pairs of thecal appendages, a pair of fused supporting appendages and membranous appendage with usually a terminal appendage (Text-fig. 406) ; frontal conjunctival and dorsal appendages wanting.

In ♀, posterior margin of seventh abdominal sternum emarginate, with a median fold (Text-fig. 408) ; first gonocoxae large, usually two pairs of intervalvular sacs present (Text-fig. 411). Spermatheca tubular (Text-fig. 407).

This genus is close to *Noliphus* but can be separated by the absence of spines on posterior angles of pronotum. Its fore femoral spines are unique.

## KEY TO SPECIES

- 1 Abdomen ventrally pale, unicoloured, with a series of brownish black spots on either side ; disc of pronotum dark brown with smooth brownish black dots posteriorly on either side ; hemelytra brownish black with prominently pale veins, fore femoral spines pale, only brownish at apices ; hind femora pale unicoloured *sumatranus* (p. 129)
- Abdomen ventrally reddish brown, brownish black spots absent ; disc of pronotum dark brownish black, without distinct brownish black dots ; hemelytra palish brown, unicoloured ; entire fore femoral spines brownish black ; hind femora usually brownish black at apices . . . . . 2
- 2 Smaller species (13.7-14.0 mm.) ; pronotum short, about two-thirds of basal antennal segments, with anterior quarter pale ; in ♂, posterior margin of seventh abdominal tergum truncate (Text-fig. 400) . . . . . *bakeri* (p. 126)
- Larger and robust species (16.2-17.2 mm.) ; pronotum long, about three-quarters of basal antennal segments, with entire disc behind collar except sides dark brownish black ; in ♂, posterior margin of seventh abdominal tergum emarginate (Text-fig. 403) . . . . . *limbaticollis* (p. 128)

***Cosmoleptus bakeri* sp. n.**

(Text-figs. 400-402)

Characterized by small size, short pronotum, about two-thirds of basal antennal segment, with anterior fourth pale and by ♂ genitalia.

♂. Body length, 13.7-14.0 mm., width, 2.7-2.9 mm. Head length, 1.45-1.55 mm., width, 1.7-1.8 mm. Antennae, segment I, 3.6-3.9 mm., II, 2.9-3.1 mm., III, 2.9-3.0 mm., IV, missing. Rostrum, segment I, 1.8-1.85 mm., II, 1.8-1.85 mm., III, 0.6-0.7 mm., IV, 1.0-1.05 mm. Pronotum, length, 2.4-2.5 mm., width, 2.7-2.9 mm. Hind femora, 6.0-6.2 mm. Hind tibia, 6.9-7.0 mm. Distance between ocelli, 0.45-0.5 mm., distance between an ocellus and an eye, 0.8-0.85 mm.

Body short. Head with ocelli pale, tinged pink at base ; distance between an ocellus and an eye usually only slightly less than twice the distance between two ocelli. Antennae brownish black, with basal portions of first segments pale. Rostrum approaching hind coxae. Lateral black line extending from collar of propleuron up to metapleuron. Disc of pronotum brownish black, with about anterior quarter pale, brownish black dots on posterior angles indistinct. Legs with fore femoral spines entirely black, all femora pale, but usually brownish black at apices, tibiae and tarsi dark brown. Hemielytra palish brown, with veins of similar colour, with pale spots pointing posteriorly. Abdomen ventrally palish brown, ventro-lateral spots absent. Posterior margin of seventh abdominal tergum truncate ; posterior margin of pygophore truncate (Text-fig. 400).

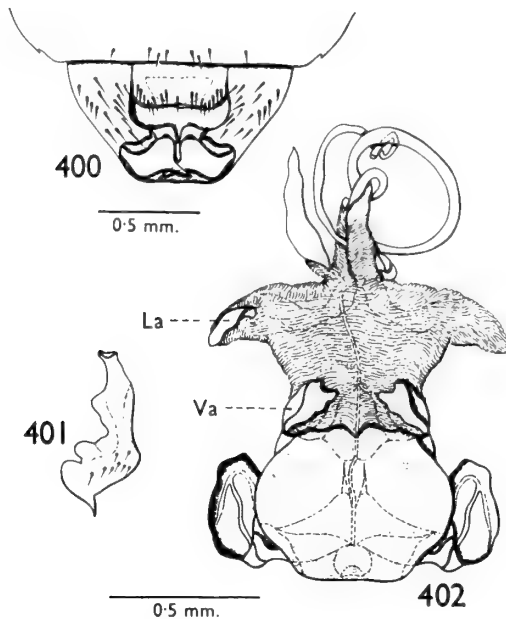
♂ GENITALIA : Claspers pointed at apices, points sharp, smoothly tapering (Text-fig. 401). Aedeagus with both dorsal and ventral pairs of thecal appendages ; a single left lateral conjunctival appendage long and thin (Text-fig. 402) ; a pair of asymmetrical supporting appendages, left longer and thinner ; a dorsal membranous appendage with a very small rounded terminal appendage.

No ♀ available for study.

Holotype ♂, PHILIPPINE ISLANDS : Mindanao-Davao (*Baker*), Mus. Hels.

Paratype, 1 ♂, same data as holotype, B.M.(N.H.).

This species can easily be separated from *limbaticollis* (Stål) and *sumatranus* Blöte by its small size and short pronotum.



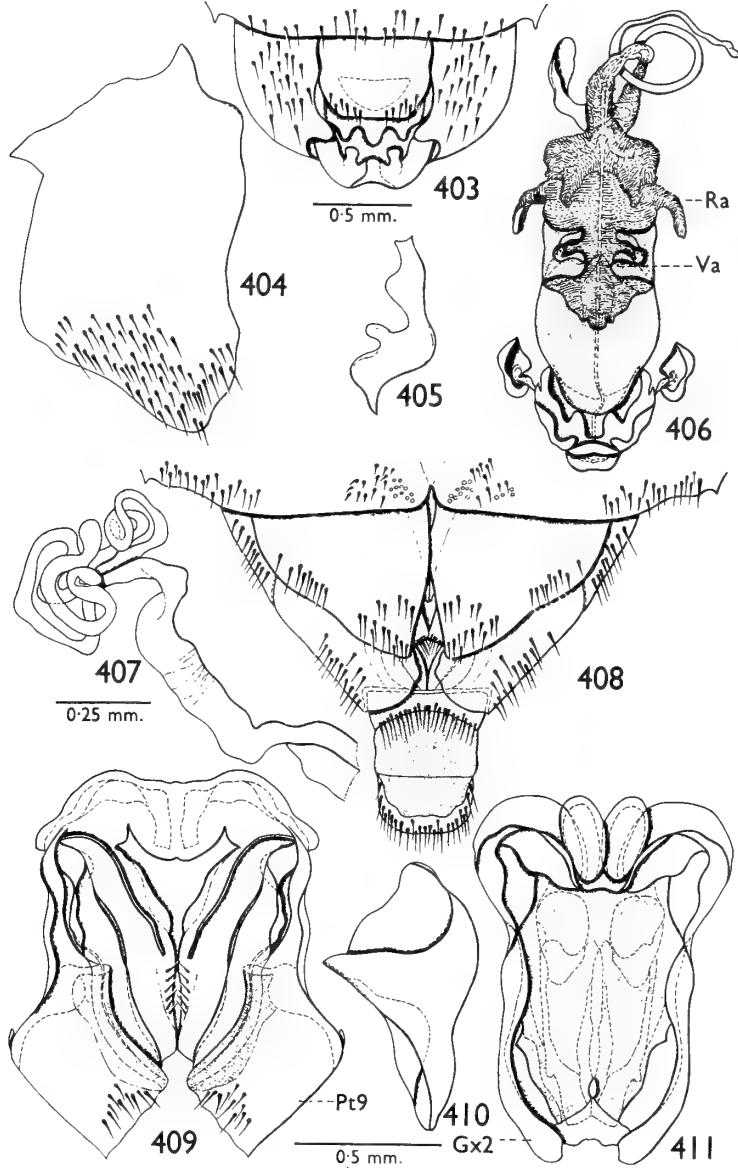
FIGS. 400-402. *Cosmoleptus bakeri*, ♂. 400, terminalia, dorsal view ; 401, claspers, outer view ; 402, aedeagus (inflated), ventral view.

***Cosmoleptus limbaticollis* (Stål)**

(Text-figs. 403-411)

*Lyrnessus limbaticollis* Stål, 1865 : 185*Cosmoleptus limbaticollis* (Stål) Stål, 1873 : 87

Characterized by large and robust body, long pronotum, about three-fourths of basal antennal segments, with entire disc behind collar except the sides brownish black and by ♂ and ♀ genitalia.



♂. Body length, 16.2-17.2 mm., width, 3.1-3.3 mm. Head length, 1.9-2.0 mm., width, 2.0-2.1 mm. Antennae, segment I, 3.8-4.2 mm., II, 2.9-3.2 mm., III, 2.9-3.1 mm., IV, 5.4-6.2 mm., (pale portion, 2.5-3.0 mm.). Rostrum, segment I, 1.9-2.0 mm., II, 1.9-2.1 mm., III, 0.8-0.9 mm., IV, 1.1-1.2 mm. Pronotum, length, 3.0-3.2 mm., width, 3.1-3.3 mm. Hind femora, 6.7-7.2 mm. Hind tibiae, 7.8-8.2 mm. Distance between ocelli, 0.5-0.55 mm., distance between an ocellus and an eye, 1.0-1.1 mm.

Body large and robust. Head with ocelli usually pink with brownish black rim, distance between an ocellus and an eye about twice the distance between two ocelli. Antennae dark brown, with inner sides of basal segments and at least three-sevenths of basal portion of apical segments pale. Rostrum hardly approaching hind coxae. Entire pro-, meso-, and metapleuron and sternum, except coxae, dark brownish black. Entire disc of pronotum behind collar, except sides, dark brownish black, posterior angles without brownish black dots. Legs with fore femoral spines entirely dark brown, all femora pale, with brownish black apices, tibiae and tarsi palish brown. Hemelytra dark brown with palish veins, pale spots at base of membrane almost quadrilateral. Abdomen ventrally palish brown, brownish black ventrolateral spots absent. Posterior margin of seventh abdominal tergum medially emarginate and laterally convex, posterior margin of pygophore truncated (Text-fig. 403).

♂ GENITALIA : Claspers pointed at apices, points uniformly thick (Text-fig. 405). Aedeagus with both (dorsal and ventral) pairs of thecal appendages ; a single left lateral conjunctival appendage present, small and thin (Text-fig. 406) ; a pair of asymmetrical supporting appendages, left large, curved and cup-shaped and a dorsal membranous appendage, terminal appendage wanting (Text-fig. 406).

♀. Very similar to ♂ but usually slightly smaller in size. Posterior margin of seventh abdominal sternum truncated, with a median fold (Text-fig. 408).

♀ GENITALIA : First gonocoxae pointed at apices, broad, covering a larger portion of eighth paratergite (Text-fig. 409) ; three pairs of intervalvular sacs (Text-fig. 411) ; spermatheca like an elongated tube with a small, uniformly thick, coiled tube (Text-fig. 407).

Type material. Holotype ♂, NEW GUINEA : " Stål ", "*limbaticois*", Riksmus. Stockholm, allotype ♀, data as holotype, Riksmus. Stockholm ; paratypes, NEW GUINEA : Ins. Aru, 1 ♂, Mysol (*Stevens*), Riksmus. Stockholm.

Other material. NEW GUINEA : 3 ♂, 4 ♀.

This species is restricted to New Guinea. Its range is the most easterly in the genus. The two other allopatric species are similarly restricted, *sumatranus* to Sumatra and *bakeri* to the Philippine Islands.

### *Cosmoleptus sumatranus* Blöte

(Text-figs. 412-420)

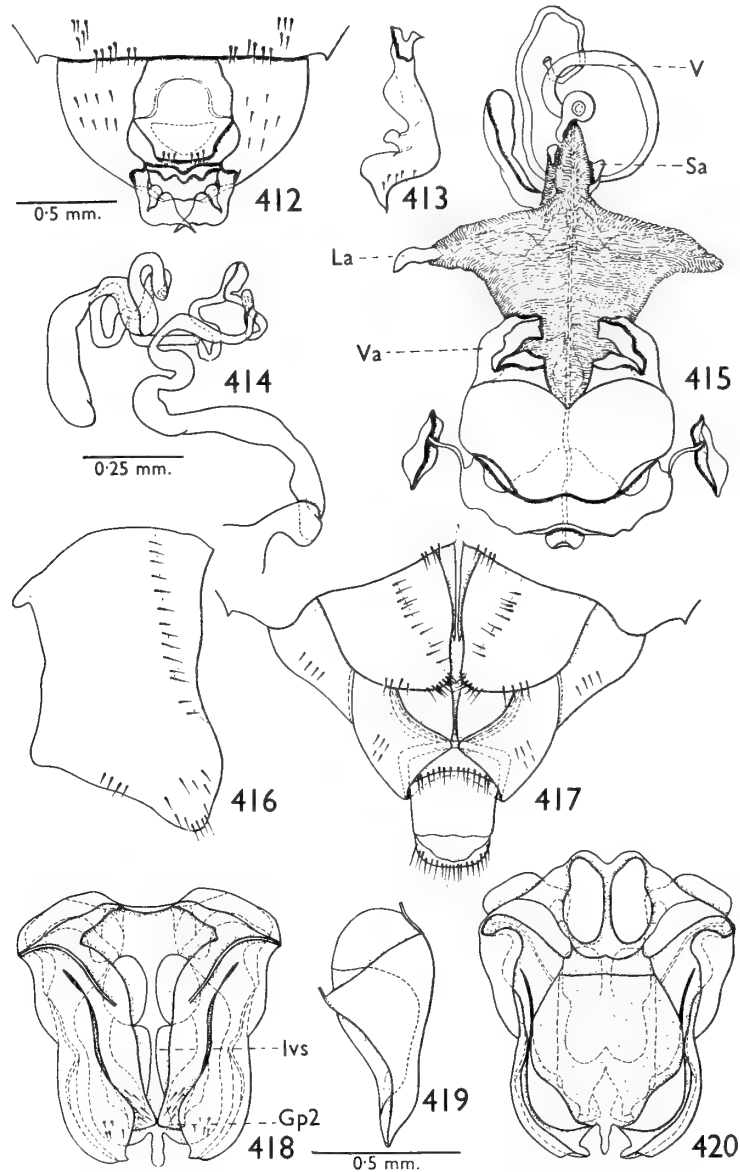
*Cosmoleptus sumatranus* Blöte, 1934 : 285

Characterized by uniformly pale venter of abdomen with a series of brownish black spots on either side, by the latero-posterior smooth brownish black dots on pronotum and by ♂ and ♀ genitalia.

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FIGS. 403-411. *Cosmoleptus limbaticollis*, 403, 405-406, ♂, 404, 407-411, ♀. 403, terminalia, dorsal view ; 404, first gonocoxa, ventral view ; 405, claspers, outer view ; 406, aedeagus (inflated), ventral view ; 407, spermatheca ; 408, terminalia, ventral view ; 409, ovipositor, ventral view ; 410, first gonopophysis, ventral view ; 411, ovipositor, dorsal view.

♂. Body length, 15.7 mm., width, 3.2 mm. Head length, 1.7 mm., width, 1.9 mm. Antennae, segment I, 4.0 mm., II, 3.3 mm., III, 3.2 mm., IV, 4.9 mm. (pale, 2.0 mm.). Rostrum, segment I, 1.7 mm., II, 1.8 mm., III, 0.8 mm., IV, 1.1 mm. Pronotum, length, 3.0 mm.,



FIGS. 412-420. *Cosmoleptus sumatranus*, 412, 413, 415, ♂, 414, 416-420, ♀. 412, terminalia, dorsal view; 413, claspers, inner and outer views; 414, spermatheca; 415, aedeagus (inflated), ventral view; 416, first gonocoxa, ventral view; 417, terminalia, ventral view; 418, ovipositor, ventral view; 419, first gonopophysis, ventral view; 420, ovipositor, dorsal view.



width, 3.2 mm. Hind femora, 6.4 mm. Hind tibia, 7.4 mm. Distance between ocelli, 0.5 mm distance between an ocellus and an eye, 0.9 mm.

Body linear. Head with ocelli pale with reddish rim, distance between an ocellus and an eye usually less than twice the distance between two ocelli. Antennae dark brown, with basal portions of first and about two-fifths of apical segment pale. Rostrum approaching hind coxae. Lateral black line extending from posterior margin of eyes up to metapleuron. Disc of pronotum dark brown, with about anterior third pale, smooth brownish black dots on posterior angles present. Legs with fore femoral spines pale, only brownish black at apices, all femora pale, tibiae and tarsi brown. Hemielytra brownish black with prominently pale veins, pale spots at base of membrane pointing anteriorly. Abdomen ventrally pale, unicolourous, with a series of brownish black spots on either side. Posterior margin of seventh abdominal tergum truncate; posterior margin of pygophore emarginate (Text-fig. 412).

♂ GENITALIA: Claspers pointed at apices, points knob-like, thicker at base (Text-fig. 413); aedeagus with both (dorsal and ventral) pairs of thecal appendages, a single left lateral conjunctival appendage flat; a pair of asymmetrical supporting appendages, left larger and broader, and a dorsal membranous appendage with a terminal pyramid-shaped appendage (Text-fig. 415).

♀. Very similar to male in general appearance and measurements. Posterior margin of seventh abdominal sternum sinuately emarginate (Text-fig. 417).

♀ GENITALIA: First gonocoxae round at apices, narrow, not covering entire eighth paratergite (Text-fig. 417); two pairs of intervalvular sacs (Text-fig. 420); spermatheca more or less tubular, with a very long tube of variable thickness (Text-fig. 414).

Type material. Holotype ♂, SUMATRA: Tandjong, Morawa, Serdang (*B. Hagen*), labelled "*Cosmoleptus sumatranus* det Blöte", Mus. Leiden; allotype ♀, data as holotype, Mus. Leiden.

This species can easily be separated from *limbaticollis* (Stål) and *bakeri* sp. n. by the characters of latero-posterior smooth brownish black dots on pronotum and by a series of ventro-lateral brownish black spots on uniformly pale venter of abdomen. This species also resembles *Lyrnessus geniculatus* (Guérin) and *Stenocoris (Pseudo-leptocoris) erratica* (Blöte) in having brownish black hemielytra with prominently pale veins.

### NOLIPHUS Stål

*Noliphus* Stål, 1858: 440, 1873: 86-87

Type-species: *Noliphus erythrocephalus* Stål by monotypy.

Body usually robust. Head triangular. Antennae with apices of basal segments slightly thicker. Rostrum long, reaching hind coxae. Pronotal disc trapeziform, posterior angles with strong and curved spines (Text-fig. 6).

In ♂, posterior margin of seventh abdominal tergum truncated, sometimes slightly medially produced (Text-fig. 439), always concealing most of pygophore; claspers with pointed apices; aedeagus with both (dorsal and ventral) pairs of thecal appendages, membranous appendage with a long and curved dorsal appendage and usually two pairs of lateral conjunctival appendages (Text-fig. 441); frontal conjunctival and terminal appendages wanting.

In ♀, posterior margin of seventh abdominal sternum emarginate, with a median fold (Text-fig. 444); first gonocoxae usually large; intervalvular sacs absent; spermatheca conical, with a short tube (Text-fig. 443).

This genus can be separated from other genera of the tribe Noliphini by the strong and curved spines on the posterior angles of the pronotum.

## KEY TO SPECIES

- 1 Entire propleuron and pronotum shining black ; apical antennal segments long, usually half as long again as third . . . . . 2
- Propleuron and pronotum light brown, sometimes tinged with black ; apical antennal segments short, never half as long again as third . . . . . 5
- 2 Venter of abdomen pale brown, unicolourous ; ocelli pale brown, unicoloured, minute, interocellar distance less than half the distance between an ocellus and an eye. (Posterior margin of seventh abdominal tergum truncated, slightly medially produced (Text-fig. 448) ; in aedeagus, second right lateral conjunctival appendage partly membranous (Text-fig. 450)) . . . . . *insularis* (p. 138)
- Venter of abdomen always with black spots or markings ; ocelli with conspicuous brownish black margins, large interocellar distance, usually more than half the distance between an ocellus and an eye . . . . . 3
- 3 Large and robust species (♂ 13.5–15.2 mm., ♀ 15.2–16.0 mm.) ; venter of abdomen with four black transverse lines ; usually basal halves of apical antennal segments pale. (Posterior margin of seventh abdominal tergum truncate (Text-fig. 451) ; in aedeagus, frontal conjunctiva with bunches of spines (Text-fig. 452) ; in the ♀ first gonocoxae triangular, with rounded apices (Text-fig. 457)) . . . . . *papuensis* (p. 140)
- Small species (♂ 12.4–13.2 mm., ♀ 12.8–13.6 mm.) ; black transverse lines on venter of abdomen absent ; only small basal portions of apical antennal segments pale . . . . . 4
- 4 A pair of black dots present anteriorly on venter of abdomen ; basal antennal segments slightly shorter than third ; ocelli comparatively distant from each other, interocellar distance about two-thirds of the distance between an ocellus and an eye. (Claspers symmetrically placed (Text-fig. 461) ; in the aedeagus, second right lateral conjunctival appendage only slightly notched near apex (Text-fig. 466) ; spermatheca elongated, with smooth curved neck (Text-fig. 465)) . . . . . *spinosus* (p. 142)
- Round black dots absent, but two black marks present on either side, being a continuation of the connexival colour on to venter of abdomen ; basal antennal segments slightly longer than third ; ocelli comparatively close together, interocellar distance about half the distance between an ocellus and an eye. (Claspers asymmetrically placed (Text-fig. 440) ; second right lateral conjunctival appendage distinctly bifid at apex (Text-fig. 441) ; spermatheca curved, with a transverse neck (Text-fig. 443)) . . . . . *erythrocephalus* (p. 137)
- 5 Species of very small size (8.4–10 mm. in length) ; basal antennal segments very short, subequal to second ; third rostral segment comparatively longer, more than half of second. (In ♂, backward lateral projections of seventh abdominal tergum inconspicuous ; aedeagus with long and curved dorsal appendage, rounded at apex ; in ♀, spermatheca almost tube-shaped, with thumb-like base (Text-fig. 434)) . . . . . *discopterus* (p. 135)
- Species larger (12.0–13.5 mm.) ; basal antennal segments distinctly longer than second ; third rostral segment comparatively short, distinctly half the length of the second . . . . . 6
- 6 A pair of black dots present anteriorly on each side of venter of abdomen ; hemielytra usually pale, unicolourous. (Posterior margin of ♂ seventh abdominal tergum with backward spine-like projections on either side (Text-fig. 421) ; in aedeagus, frontal conjunctiva with usually two or three spines (Text-fig. 425) ; posterior margin of ♀ seventh abdominal sternum deeply emarginate (Text-fig. 427)) . . . . . *annulipes* (p. 133)
- Without black dots on venter of abdomen ; hemielytra tinged with black. (Backward spine-like processes of the posterior margin of the ♂ seventh abdominal tergum absent (Text-fig. 469) ; in the aedeagus, frontal conjunctiva with a bunch of spines (Text-fig. 472)) . . . . . *timoris* (p. 144)

*Noliphus annulipes* Walker

(Text-figs. 421-429)

*Noliphus annulipes* Walker, 1871 : 176

Characterized by the light brown pronotum and propleuron with two smooth black dots (in linear order) anteriorly on either side of the venter of abdomen and by the form of the ♂ and the ♀ genitalia.

♂. Body length, 12.0-13.2 mm., width, 2.3-2.5 mm. Head length, 1.4-1.5 mm., width, 1.6-1.7 mm. Antennae, segment I, 2.3-2.5 mm., II, 2.0-2.2 mm., III, 2.3-2.4 mm., IV, 3.1-3.2 mm. Rostrum, segment I, 1.4-1.5 mm., II, 1.4-1.6 mm., III, 0.7-0.75 mm., IV, 1.0-1.2 mm. Pronotum, length, 2.2-2.4 mm., width, 2.3-2.5 mm. Hind femora, 5.6-6.0 mm. Hind tibia, 6.0-6.4 mm. Distance between ocelli, 0.4-0.5 mm., distance between an ocellus and an eye, 0.85-0.9 mm.

Body of medium size, light brown. Head, underside pale. Antennae pale, with apices of first, second and third segments black and apical segments brownish black, only pale at bases. Rostrum comparatively short, reaching anterior margin of third coxae. Propleuron pale, sometimes tinged brown, usually with a brownish black line extending from sides of posterior margin of eyes on to anterior third of propleuron. Pronotal disc light brown, posteriorly with brownish black tinge; spines on posterior angles thicker in middle, apices pointed. Legs usually pale, with apices of femora, bases of tibiae and tarsi brownish black. Hemelytra pale, with brownish black tinge and punctures. Abdomen, dorsum palish brown, third, fourth, fifth and sixth connexiva on either side with black spots, venter pale, sometimes tinged brown, with black triangular marks pointing posteriorly in middle of fifth and sixth segments, seventh medially black. Posterior margin of seventh abdominal tergum medially convex, laterally on either side with spine-like backward projections, concealing about half of pygophore; pygophore with emarginate posterior margin (Text-fig. 421).

♂ GENITALIA: Claspers asymmetrically placed, (Text-fig. 421); both (dorsal and ventral) pairs of thecal appendages present; two pairs of left lateral conjunctival appendages as in Text-fig. 425; two pairs of lateral conjunctival appendages, second right, bifid at apex as in Text-fig. 425; dorsal conjunctival appendage thicker at base and curved near apex (Text-fig. 425); frontal conjunctiva usually with two or three spines.

♀. Body length, 12.8-13.6 mm., width, 2.5-2.7 mm. Head length, 1.4-1.6 mm., width, 1.7-1.8 mm. Antennae, segment I, 2.2-2.6 mm., II, 2.0-2.3 mm., III, 2.2-2.5 mm., IV, 3.0-3.3 mm. Rostrum, segment I, 1.5-1.6 mm., II, 1.56-1.65 mm., III, 0.75-0.85 mm., IV, 1.2-1.3 mm. Pronotum, length, 2.3-2.5 mm., width, 2.5-2.7 mm. Hind femora, 5.6-6.2 mm. Hind tibia, 6.0-6.6 mm. Distance between ocellum 0.5 mm., distance between an ocellus and an eye, 0.9 mm.

Very similar to ♂ but slightly larger, with external genitalia usually pale unicolourous; posterior margin of seventh abdominal sternum greatly emarginate, with a short median split and a fold and backward spine-like projections on either side (Text-fig. 427).

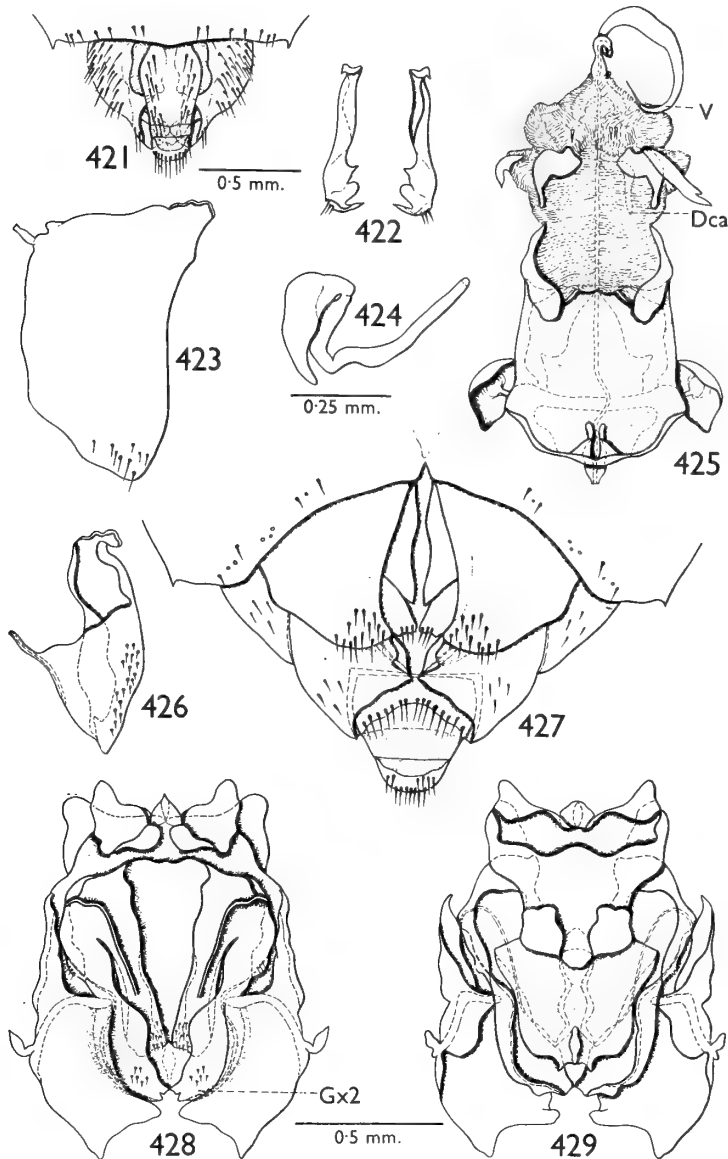
♀ GENITALIA: First gonocoxae large, seen from above externally broader than long, with irregular outer margin and round apices (Text-fig. 423); intervalvular sacs absent (Text-fig. 429); spermatheca with a broad neck (Text-fig. 424).

Type material. Holotype ♂, CELEBES: presented by Saunders (pygophore missing), B.M.(N.H.).

Other material. CELEBES: 1 ♀; AMBOINA ISLANDS: 3 ♂, 1 ♀; AUSTRALIA: 7 ♂, 9 ♀.

The range of this species extends in the west into Java and in the south east into the Northern Territory and Queensland (Australia).

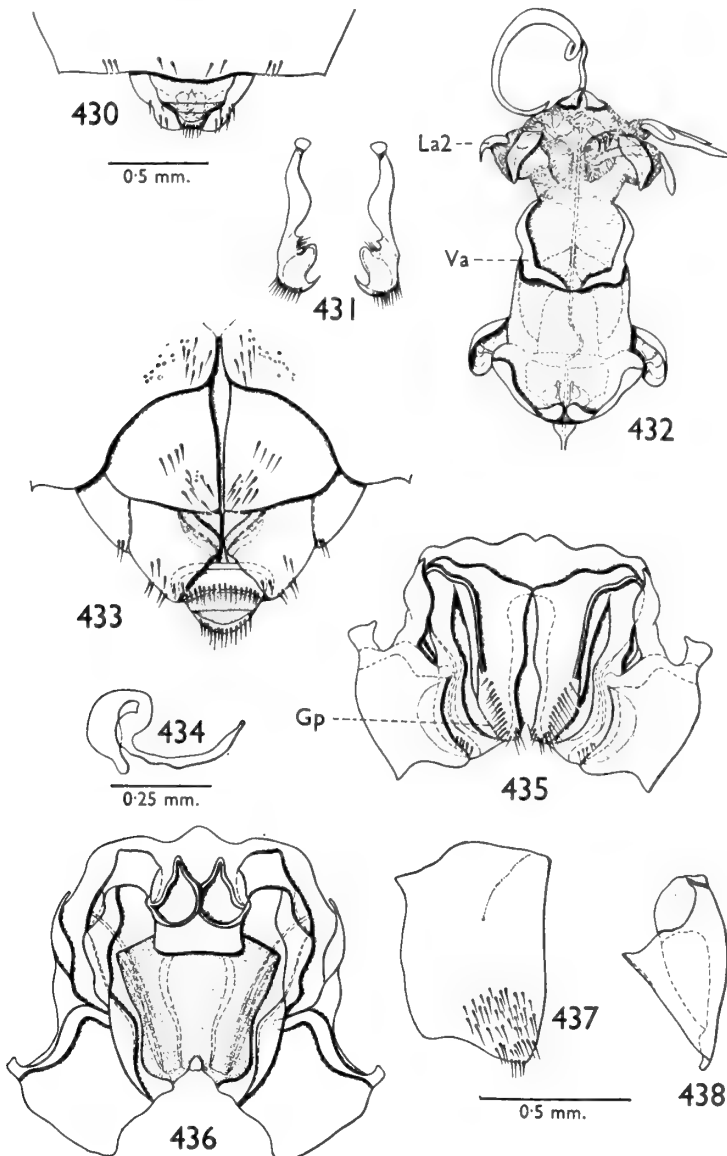
This species is very close to *discopterus* Stål, from which it can easily be separated by the larger size of the body (12.0–13.6 mm.) (*discopterus* being smaller—8.4–10.5 mm.).



FIGS. 421–429. *Noliphus annulipes*, 421, 422, 425, ♂, 423, 424, 426–429, ♀. 421, terminalia, dorsal view; 422, claspers, inner and outer views; 423, first gonocoxa, ventral view; 424, spermatheca; 425, aedeagus (inflated), ventral view; 426, first gonopophysis, ventral view; 427, terminalia, ventral view; 428, ovipositor, ventral view; 429, same, dorsal view.

*Noliphus discopterus* Stål

(Text-figs. 430-438)

*Noliphus discopterus* Stål, 1873 : 87

FIGS. 430-438. *Noliphus discopterus*, 430-432, ♂, 433-438, ♀. 430, terminalia, dorsal view; 431, claspers, inner and outer views; 432, aedeagus (inflated), ventral view; 433, terminalia, ventral view; 434, spermatheca; 435, ovipositor, ventral view; 436, same, dorsal view; 437, first gonocoxa, ventral view; 438, first gonopophysis, ventral view.

Characterized by small body ranging from 8.4–10.5 mm. ; by the short basal antennal segment, which is subequal to the second and by the form of the ♂ and ♀ genitalia.

♂. Body length, 8.4–10.5 mm., width, 1.7–2.0 mm. Head length, 1.3–1.5 mm., width, 1.5–1.6 mm. Antennae, segment I, 2.0–2.1 mm., II, 1.9–2.0 mm., III, 2.0–2.2 mm., IV, 2.7–2.9 mm. Rostrum, segment I, 1.3–1.4 mm., II, 1.3–1.4 mm., III, 0.66–0.76 mm., IV, 1.0–1.2 mm. Pronotum, length, 1.7–2.0 mm., width, 1.7–2.0 mm. Hind femora, 4.8–5.2 mm. Hind tibia, 5.3–5.6 mm. Distance between ocelli, 0.4–0.5 mm., distance between an ocellus and an eye, 0.7–0.8 mm.

Body of small size, usually pale, tinged brownish black. Head behind ocelli brownish black, underside, except brownish black bucculae and rostrum, pale unicoloured. Antennae with apices of first, second and third segments brownish black, apical segments brownish black with small basal portions pale. Rostrum comparatively long, extending beyond third coxae. Propleuron pale, sometimes tinged with brown, with a black lateral line extending from posterior margin of eye on to posterior of propleuron. Pronotal disc pale, tinged with light brown with brownish black punctures, spines on posterior angles slanting posteriorly, acutely pointed. Legs pale, with apices of femora, tibiae and tarsi brownish black. Hemelytra pale, with dark brownish black costal margins, densely punctate. Abdomen, dorsum pale, with black marks on third, fourth, fifth and sixth connexiva, seventh black, venter yellowish brown, third, fourth and fifth with black marks in continuation with connexival marks on margins, round black dots on third and fourth venter present on either side, median portion of seventh, visible portion of eighth and pygophore brownish black. Posterior margin of seventh abdominal tergum sinuate (without backward spine-like projections), medially convex, pygophore curved near apex, posterior margin truncate (Text-fig. 430).

♂ GENITALIA : Claspers asymmetrically placed (Text-fig. 430) ; both (dorsal and ventral) pairs of thecal appendages present, two pairs of lateral conjunctival appendages as in Text-fig. 432 ; second right bifurcated from the middle ; dorsal conjunctival appendage bow-shaped (Text-fig. 432) ; frontal conjunctiva usually with three spines, close together.

♀. Very similar to ♂ in general appearance and measurements, seventh abdominal venter and genital structures pale ; posterior margin of seventh abdominal sternum greatly emarginate, with a large median split and a fold ; backward spine-like projections on either side present (Text-fig. 433).

♀ GENITALIA : First gonocoxae of medium size, externally as long as broad (Text-fig. 433) ; triangular in form and rounded at apices (Text-fig. 438) ; intervalvular sacs absent (Text-fig. 436) ; spermatheca almost tubular, thicker in middle and thumb-like at apices (Text-fig. 434).

Type material. Holotype ♂, SAMOAN ISLANDS : (*Schmeltz*), labelled “*discopterus*”, Riksmus. Stockholm.

Other material. SAMOAN ISLANDS : 2 ♂, 1 ♀ ; NEW HEBRIDES : 1 ♂, 1 ♀.

The range of this species extends in the west into New Hebrides and in the east into Samoa Islands. Adults have been found in November and December.

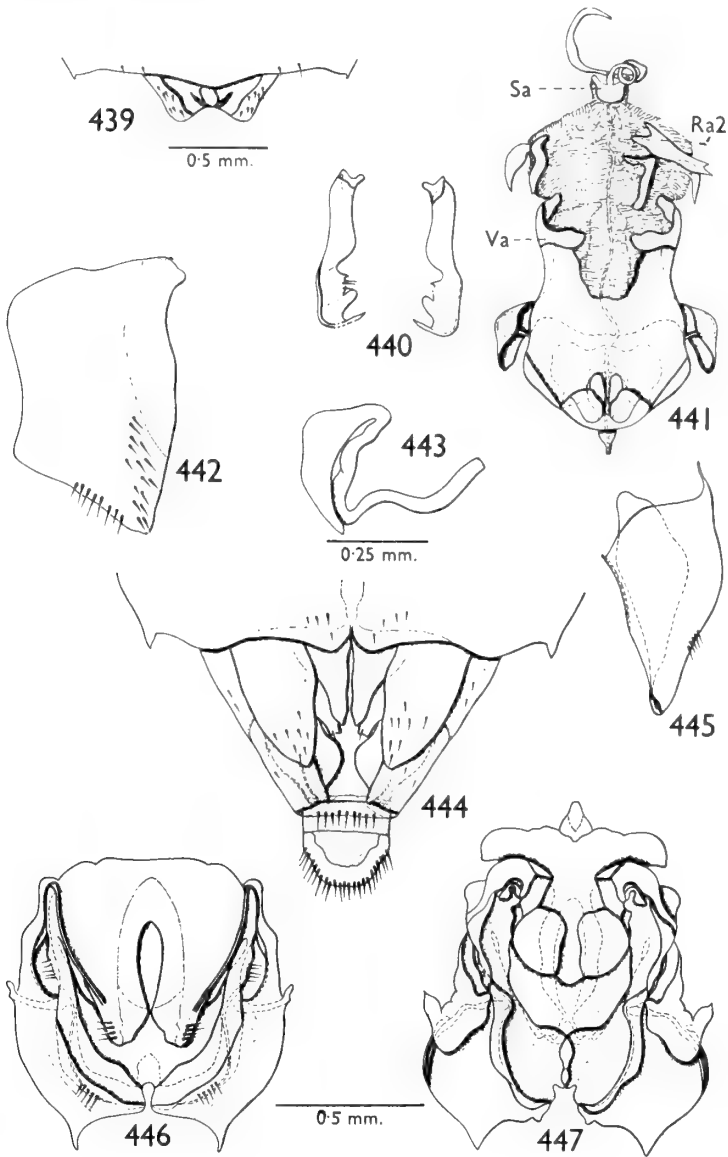
### *Noliphus erythrocephalus* Stål

(Text-figs. 439–447)

*Noliphus erythrocephalus* Stål, 1858 : 440, 1873 : 87

Characterized by dark black pronotum, propleuron and underside of the head, by two black marks on the ventro-lateral of abdomen and by the form of the ♂ and ♀ genitalia.

♂. Body length, 12.4–12.8 mm., width, 2.3–2.5 mm. Head length, 1.5–1.6 mm., width, 1.6–1.8 mm. Antennae, segment I, 2.5–2.6 mm., II, 2.2–2.4 mm., III, 2.4–2.5 mm., IV, 3.8–4.0 mm. Rostrum, segment I, 1.4–1.6 mm., II, 1.6–1.75 mm., III, 0.7–0.9 mm., IV, 1.2–1.3 mm. Pronotum, length, 2.3–2.5 mm., width, 2.3–2.5 mm. Hind femora, 5.6–6.0 mm.



FIGS. 439–447. *Noliphus erythrocephalus*, 439–441, ♂, 442–447, ♀. 439, terminalia, dorsal view; 440, claspers, inner and outer views; 441, aedeagus (inflated), ventral view; 442, first gonocoxa, ventral view; 443, spermatheca; 444, terminalia, ventral view; 445, first gonopophysis, ventral view; 446, ovipositor, ventral view; 447, same, dorsal view.

Hind tibia, 6.4–6.7 mm. Distance between ocelli, 0.5 mm., distance between an ocellus and an eye, 0.9 mm.

Body of medium size, brownish black. Head yellowish brown, post-occipital region black, underside including apex of clypeus, bucculae and rostrum shining black. Antennae with apices of first, second and third brownish black, apical segment brownish black, pale only at base. Rostrum long, usually extending beyond posterior margin of third coxae. Propleuron shiny black. Pronotal disc usually shining black, densely punctate. Spines on posterior angles, thicker and curved at bases, tapering smoothly towards apices, pointed. Legs brownish black, with bases of femora, tibiae and tarsi pale. Hemelytra palish brown, with costal margins and parts of corium dark black. Abdomen, dorsum yellowish brown, seventh black; third to sixth connexiva with black marks continuous on sides of venter. Venter, palish brown with black triangular mark pointing posteriorly in middle of fifth and sixth segments, seventh, visible portions of eighth and pygophore dark black. Posterior margin of seventh abdominal tergum sinuate and medially convex, on either side with spine-like backward projections, concealing about three-quarters of pygophore; pygophore tapering posteriorly with emarginate posterior margin (Text-fig. 439).

♂ GENITALIA: Claspers asymmetrically placed (Text-fig. 439); both dorsal and ventral pairs of thecal appendages present, two pairs of lateral appendages, second right bifurcated at apex, with distinct branches; dorsal appendage usually "L"-shaped; frontal conjunctiva usually without spines (Text-fig. 441).

♀. Body length, 13.0–13.6 mm., width, 2.4–2.7 mm. Head length, 1.5–1.65 mm., width, 1.8–1.9 mm. Antennae, segment I, 2.5–2.6 mm., II, 2.3–2.4 mm., III, 2.5–2.6 mm., IV, missing. Rostrum, segment I, 1.6–1.7 mm., II, 1.6–1.66 mm., III, 0.8–0.9 mm., IV, 1.3–1.35 mm. Pronotum, length, 2.4–2.6 mm., width, 2.4–2.7 mm. Hind femora, 6.0–6.5 mm. Hind tibia, 6.9–7.2 mm. Distance between ocelli, 0.5 mm., distance between an ocellus and an eye, 0.9 mm.

Very similar to ♂ in general appearance but usually distinctly larger; seventh venter of abdomen and genitalia externally black; posterior margin of seventh abdominal sternum sinuately emarginate, with a short median split and a median fold; spine-like backward projections on either side present (Text-fig. 444).

♀ GENITALIA: First gonocoxae small, externally longer than broad, outer margin regular, apices pointed and inner margin irregular (Text-fig. 442); intervalvular sacs absent (Text-fig. 447); spermatheca with a hump-shaped neck (Text-fig. 443).

Type material. Lectotype ♂, AUSTRALIA: Queensland, Cape York (*Jhorey*), Riksmus. Stockholm; allotype ♀, data as holotype, Riksmus. Stockholm.

Other material. AUSTRALIA: 5 ♂, 4 ♀.

This species has restricted range in north east Australia (Queensland).

This species is close to *spinusus* sp. n. but can be separated by the absence of ventro-lateral smooth black dots on anterior of abdominal venter.

Six specimens (3 ♂, 3 ♀) were obtained from the Riksmuseum, Stockholm. None was clearly labelled as the type and in a personal communication Dr. Kjellander informed me that Stål often failed to fix a definite type-specimen. Therefore one ♂ specimen from Cape York (Queensland) has been selected as the lectotype and has been given a lectotype label.

### *Noliphus insularis* Stål

(Text-figs. 448–450)

*Noliphus insularis* Stål, 1865: 185, 1873: 87



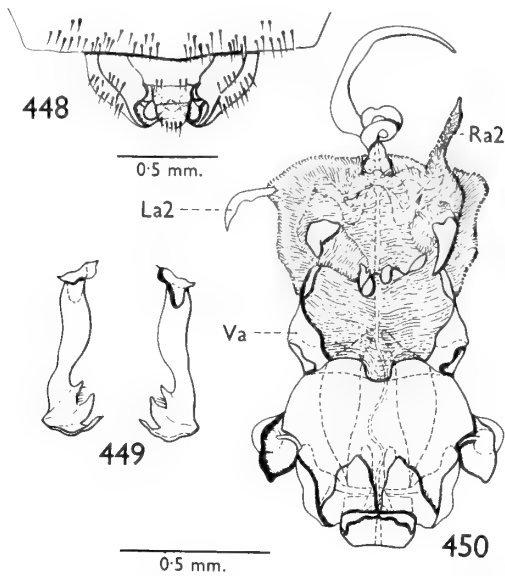
Characterized by yellowish brown unicoloured abdominal venter, palish brown unicoloured minute ocelli, about a third of basal portion of apical antennal segment pale and by the form of the ♂ and ♀ genitalia.

♂. Body length, 13.5–15.2 mm., width, 2.1–2.4 mm. Head length, 1.5–1.7 mm., width, 1.7–1.85. Antennae, segment I, 3.1–3.6 mm., II, 2.7–3.1 mm., III, 2.8–3.2 mm., IV, 5.1 mm. Rostrum, segment I, 1.66–1.7 mm., II, 1.7–1.8 mm., III, 0.8–0.96 mm., IV, 1.3–1.4 mm. Pronotum, length, 2.1–2.4 mm., width, 2.1–2.4 mm. Hind femora, 5.9–6.4 mm. Hind tibia, 6.8–8.0 mm. Distance between ocelli, 0.4 mm., distance between an ocellus and an eye, 0.86–0.96 mm.

Body elongated and slim, tinged brown. Head pale, unicolourous, dorsal and ventral; antennae brownish black, at least a third basal portion of apical segment pale. Rostrum long, extending well beyond third coxae. Propleuron including procoxae, mesopleuron and underside of collar brownish black. Pronotal disc brownish black with at least anterior quarter pale; latero-posterior spines long, thin, curved near apices and acutely pointed. Legs brownish black, with at least basal half of femora pale. Entire hemielytra, except pale costal margin, brownish black, densely punctate. Abdomen, dorsum including connexiva pale, unicoloured; abdomen ventrally pale unicolourous, including seventh venter and visible portion of eighth segment and pygophore. Posterior margin of seventh abdominal tergum truncated, slightly medially convex, with backward spine-like projection on either side, concealing two-thirds of pygophore; pygophore curved and tapering at apex, posterior margin concave (Text-fig. 448).

♂ GENITALIA: Claspers symmetrically placed (Text-fig. 448); both (dorsal and ventral) pairs of thecal appendages present, two pairs of lateral conjunctival appendages (Text-fig. 450), second right partly sclerotized (Text-fig. 451); frontal conjunctiva with two sclerotized rounded pieces in middle of basicconjunctiva and a spiny appendage on right, top of first right lateral conjunctival appendage; membranous appendage with a bow-shaped dorsal appendage, strongly curved in middle (Text-fig. 450).

No ♀ available for study.



FIGS. 448–450. *Noliphus insularis*, ♂. 448, terminalia, dorsal view; 449, claspers, inner and outer views; 450, aedeagus (inflated), ventral view.

Type material. Holotype ♂, INS. FIJI (Fidschi) (*Jhorey*), Riksmus. Stockholm.

Other material. NEW HEBRIDES : 2 ♂.

This species is close to *papuensis* Stål but can easily be separated by examining pale uncoloured abdomen.

### *Noliphus papuensis* Stål

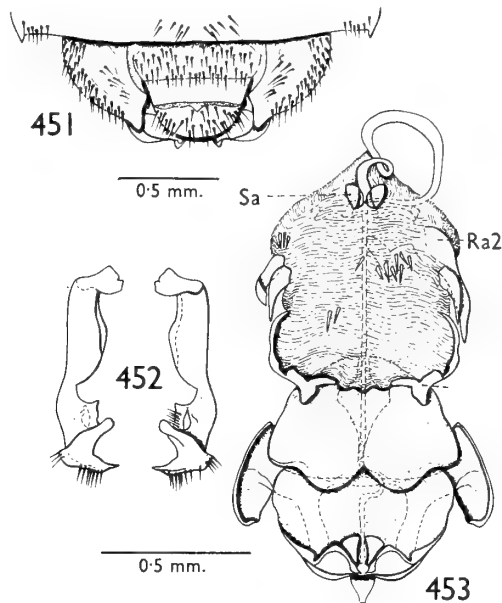
(Text-figs. 451-459)

*Noliphus papuensis* Stål, 1865 : 185, 1873 : 87

Characterized by its large size, by at least basal half of apical segments of antennae being pale, by the four black transverse lines on the underside of abdomen and by the structure of the ♂ and ♀ genitalia.

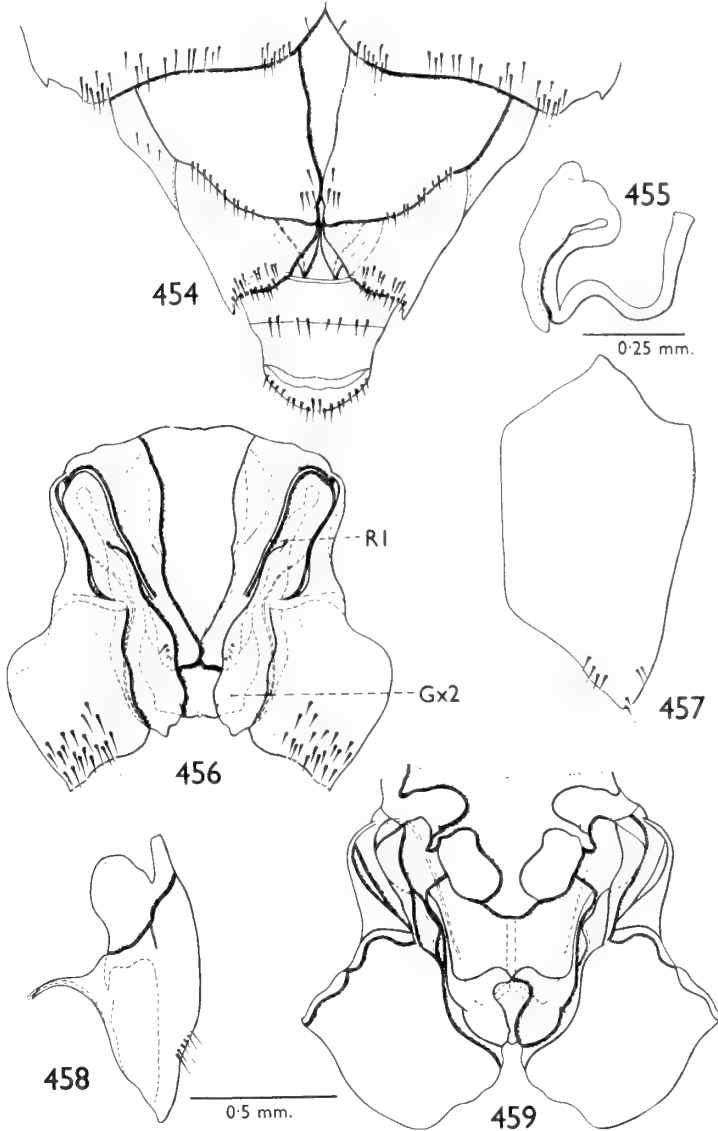
♂. Body length, 13.5-15.2 mm., width, 2.3-2.6 mm. Head length, 1.66-1.8 mm., width, 1.8-2.0 mm. Antennae, segment I, 3.5-4.4 mm., II, 3.2-3.3 mm., III, 3.3-3.6 mm., IV, 4.8-5.0 mm. (2.4-2.6 mm. pale). Rostrum, segment I, 1.7-2.0 mm., II, 1.7-2.1 mm., III, 0.9-1.0 mm., IV, 1.4-1.6 mm. Pronotum, length, 2.3-2.7 mm., width, 2.3-2.6 mm. Hind femora, 6.5-8.0 mm. Hind tibia, 7.7-9.1 mm. Distance between ocelli, 0.5 mm., distance between an ocellus and an eye, 0.9 mm.

Large and robust body, shining black. Head pale unicolourous. Antennae brownish black, with bases of first, second, third and at least basal half of apical segment pale. Rostrum long, usually extending well beyond third coxae. Propleuron shining brownish black. Pronotal disc shining brownish black, collar dorsally pale with small punctures, spines on posterior angles short, curved near base and smoothly tapering apically. Legs yellowish brown, with apices of



FIGS. 451-453. *Noliphus papuensis*, ♂. 451, terminalia, dorsal view ; 452, claspers, inner and outer views ; 453, aedeagus (inflated), ventral view.

femora, bases of tibiae, tarsi brownish black. Entire hemielytra brownish black, clavus and corium densely punctate. Abdomen, dorsum including connexival areas and pygophore brownish black; abdomen venter, except two anterior brownish black segments, pale with four brownish black transverse lines, lateral margins brownish black, including visible portions of eighth and ninth (pygophore) segments. Posterior margin of seventh abdominal tergum



FIGS. 454-459. *Noliphus papuensis*, ♀. 454, terminalia, ventral view; 455, spermatheca; 456, ovipositor, ventral view; 457, first gonocoxa, ventral view; 458, first gonopophysis, ventral view; 459, ovipositor, dorsal view.

slightly convex, with a backward spiny process on either side on lateral extremities, concealing about two-thirds of pygophore ; pygophore rounded, curved near apex, posterior margin slightly concave (Text-fig. 451).

♂ GENITALIA : Claspers symmetrically placed (Text-fig. 451), dorsal and ventral thecal appendages present ; two pairs of lateral conjunctival appendages (Text-fig. 453) asymmetrical ; frontal conjunctiva with bunches of spines, usually about fifteen, second right lateral conjunctival appendage thicker at base and near apex, curved in middle and pointed at apex ; membranous appendage with an elongated irregular dorsal appendage (Text-fig. 453).

♀. Body length, 15.2–16.0 mm., width, 2.67–2.7 mm. Head length, 1.7–1.9 mm., width, 1.9–2.0 mm. Antennae, segment I, 3.6–3.9 mm., II, 2.9–3.4 mm., III, 3.3–3.6 mm., IV, 5.2–5.33 mm. Rostrum, segment I, 1.8–2.2 mm., II, 2.0–2.2 mm., III, 1.0–1.1 mm., IV, 1.5–1.6 mm. Pronotum, length, 2.6–2.7 mm., width, 2.6–2.7 mm. Hind femora, 7.5–7.6 mm. Hind tibia, 8.5–8.7 mm. Distance between ocelli, 0.5–0.6 mm., distance between an ocellus and an eye, 0.85–0.95 mm.

Very similar to ♂ in general appearance but distinctly larger ; seventh abdominal sternum and genital structures usually pale, tinged brownish black. Posterior margin of seventh abdominal sternum emarginate, with a median split and a large median fold making two smaller lobes, one on each side at extremities, with a backward spiny process on each side (Text-fig. 454).

♀ GENITALIA : First gonocoxae large, seen from outside, broader than long, almost conical in form, with lobe-like apices and medially curved and concave external margin (Text-fig. 458). Intervalvular sacs absent (Text-fig. 459) ; spermatheca elongated, flat and hump-shaped near apex (Text-fig. 455).

Type material. Holotype ♂, NEW GUINEA : “ Stål ”, “ *papuensis* ”, Riksmus. Stockholm.

Other material. NEW GUINEA : 21 ♂, 8 ♀ ; MISOOL ISLANDS : 1 ♂ ; CERAM ISLANDS : 1 ♂.

This species is completely isolated in the genus and can be easily separated from other species by its entirely brownish black hemielytra, by brownish black dorsum of abdomen, black transverse lines on the ventral side of abdomen, long rostrum extending well beyond hind coxae and by pale colouration of basal half of apical segment of antennae. This species shows some relationship with *Cosmoleptus limbaticollis* (Stål) in having similar shape and colouration of pronotum and almost similar form of the apical antennal segment.

### *Noliphus spinosus* sp. n.

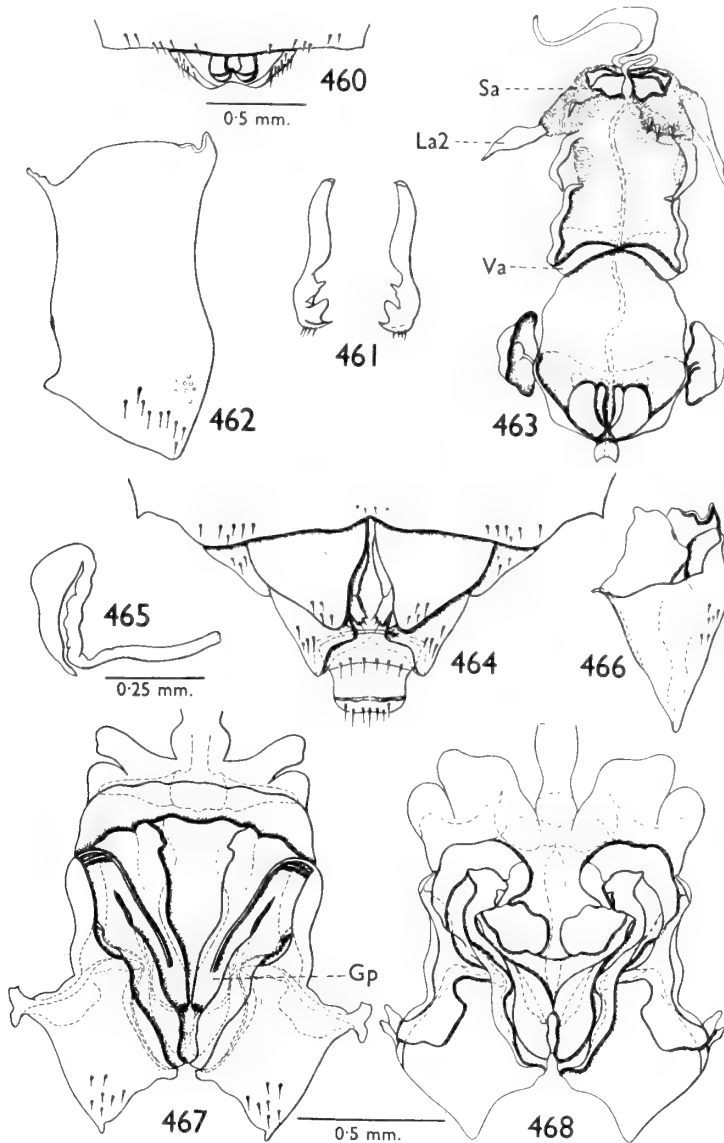
(Text-figs. 460–468)

Characterized by the black propleuron, pronotum and usually black underside of head and two round and smooth black dots in succession on either side of venter of abdomen, by the short basal segment of antennae, and by the form of ♂ and ♀ genitalia.

♂. Body length, 12.5–13.2 mm., width, 2.3–2.4 mm. Head length, 1.4–1.5 mm., width, 1.6–1.7 mm. Antennae, segment I, 2.3–2.5 mm., II, 2.2–2.4 mm., III, 2.4–2.6 mm., IV, missing. Rostrum, segment I, 1.4–1.7 mm., II, 1.6–1.7 mm., III, 0.75–0.8 mm., IV, 1.2–1.3 mm. Pronotum, length, 2.3–2.4 mm., width, 2.3–2.4 mm. Hind femora, 6.0 mm. Hind tibia, 7.2 mm. Distance between ocelli, 0.5–0.6 mm., distance between an ocellus and an eye, 0.83–0.85 mm.

Body of medium size, brownish black. Head usually yellowish brown, median post-occipital

region brownish black, underside of head, including apex of clypeus, bucculae and second, third and fourth segment of rostrum black, but underside of head sometimes yellowish brown. Antennae pale, with apices of first, second and third segments black, apical segment brownish black with a small basal portion pale. Rostrum usually long, extending slightly beyond third



FIGS. 460-468. *Noliphus spinosus*, 460, 461, 463, ♂, 462, 464-468, ♀. 460, terminalia, dorsal view; 461, claspers, inner and outer views; 462, first gonocoxa, ventral view; 463, aedeagus (inflated), ventral view; 464, terminalia, ventral view; 465, spermatheca; 466, first gonopophysis, ventral view; 467, ovipositor, ventral view; 468, same, dorsal view.

coxae. Propleuron shining brownish black. Pronotal disc usually shining brownish black, densely punctate posteriorly, spines on posterior angles comparatively short, thicker in middle and acutely pointed at apices. Legs usually brownish black, with basal half of femora entire, middle of tibiae and bases of tarsi pale. Hemelytra brownish black, with clavus and a portion of corium yellowish brown, with brownish black punctures. Abdomen, dorsum yellowish brown, seventh segment black, third, fourth, fifth and sixth connexiva with black spots; abdomen venter yellowish brown, with black semicircular spots on fifth and sixth venter, visible portion of eighth and (pygophore) ninth usually black. Posterior margin of seventh abdominal tergum truncated, only slightly convex medially, concealing about three-quarters of pygophore, with very small backward spiny processes on either side; pygophore round, tapering posteriorly with emarginate posterior margin (Text-fig. 460).

♂ GENITALIA: Claspers symmetrically placed (Text-fig. 460), both (dorsal and ventral) pairs of thecal appendages present; two pairs of lateral conjunctival appendages, right thicker at base and bifid at apex, frontal conjunctiva usually with four spiny appendages (three on one side and one on the other) (Text-fig. 463); membranous appendage with a "V"-shaped dorsal appendage, thicker at base and curved near base and apex (Text-fig. 463).

♀. Body length, 12.8–13.5 mm., width, 2.5–2.6 mm. Head length, 1.45–1.7 mm., width, 1.7–1.8 mm. Antennae, segment I, 2.4–2.6 mm., II, 2.2–2.5 mm., III, 2.4–2.7 mm., IV, 3.6–3.7 mm. Rostrum, segment I, 1.5–1.7 mm., II, 1.6–1.7 mm., III, 0.7–0.9 mm., IV, 1.1–1.3 mm. Pronotum, length, 2.2–2.6 mm., width, 2.1–2.5 mm. Hind femora, 5.6–6.4 mm. Hind tibia, 6.7–7.2 mm. Distance between ocelli, 0.5–0.6 mm., distance between an ocellus and an eye, 0.8–0.9 mm.

Very similar to ♂ in general shape and colour but usually longer, seventh abdominal sternum and genital structures seen from outside usually brownish black, sometimes palish brown. Posterior margin of seventh abdominal sternum sinuately emarginate, with a very short median split and a short median fold, large lateral lobes on either side with a backward spiny process on either side (Text-fig. 464).

♀ GENITALIA: First gonocoxae large, seen from above broader than long, outer margin regular with lobe-like but truncated apices; inner margin regular, convex in middle (Text-fig. 462); intervalvular sacs absent (Text-fig. 468); spermatheca elongated, curved in middle and thicker at apex (Text-fig. 465).

Type material. Holotype ♂, PHILIPPINE ISLANDS: with a label "*Noliphus erythrocephalus* Stål", Riksmus. Stockholm; paratypes, PHILIPPINE ISLANDS: 2 ♀ (*Semper*), Riksmus. Stockholm.

Other material. PHILIPPINE ISLANDS: 1 ♀; CELEBES: 1 ♂; KEY ISLAND: 1 ♂; SOLOMON ISLANDS: 1 ♀; JAVA: 1 ♂, 2 ♀.

This species is very close to *annulipes* Walker and *erythrocephalus* Stål but can easily be separated from the former by the dark black pronotum and propleuron (in *annulipes* these are paler) and from the latter by the two pairs of black dots on the underside of the abdomen (in *erythrocephalus* the black marks are continuous with the connexiva).

### *Noliphus timoris* sp. n.

(Text-figs. 469–471)

Characterized by pale, tinged brownish black pronotum and propleuron with antero-ventrolateral of abdomen without black marks or dots and by the form of ♂ and ♀ genitalia.

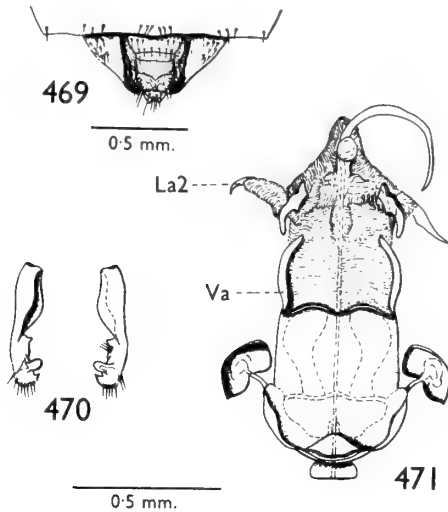
♂. Body length, 13.3 mm., width, 2.8 mm. Head length, 1.6 mm., width, 1.8 mm. Antennae, segment I, 2.7 mm., II, 2.4 mm., III and IV missing. Rostrum, segment I, 1.6 mm., II, 1.7 mm., III, 0.8 mm., IV, 1.3 mm. Pronotum, length, 2.6 mm., width, 2.8 mm. Hind femora and tibiae missing. Distance between ocelli, 0.5 mm., distance between an ocellus and an eye, 0.9 mm.

Body of medium size, brownish black. Head yellowish brown, tinged black, underside yellowish brown, only clypeus, labrum and rostral segments brownish black. Antennae pale, tinged brownish black. Rostrum long, extending slightly beyond third coxae. Propleuron pale, tinged brown, a black line extending from collar on to anterior third of propleuron. Pronotal disc pale, tinged brown, with anterior part behind collar and posterior part from latero-posterior spines brownish black; spines on posterior angles long and sharply pointed at apices. Legs pale, with apices of femora, apices of tibiae and bases of tibiae and tarsi brownish black. Entire hemelytra brownish black, densely punctate. Scutellum brownish black. Abdomen, dorsum pale, tinged brown, third, fourth, fifth and sixth connexiva with brownish black marks; seventh abdominal segment brownish black, abdomen ventrally pale, tinged brown, fifth and sixth venter with median black triangular marks pointing posteriorly, seventh venter, visible portion of eighth segment and pygophore brownish black; no black dot or mark on ventrolateral margins of third and fourth abdominal venter. Posterior margin of seventh abdominal tergum sinuately truncated, without a spine-like backward process on either side of lateral extremities, concealing about two-thirds of pygophore; pygophore rounded, curved and tapering at apex, posterior margin slightly concave. (Text-fig. 469).

♂ GENITALIA: Claspers symmetrically placed (Text-fig. 469); both (dorsal and ventral) thecal appendages present; two pairs of lateral conjunctival paired appendages, second right curved and bifid at apex (Text-fig. 471); frontal conjunctiva with a bunch of spines (about 11 usually) at base of first right conjunctival appendage; aedeagus with "L" shaped dorsal appendage (Text-fig. 471).

No ♀ available for study.

Holotype ♂, TIMOR: Riksmus. Stockholm.



FIGS. 469-471. *Noliphus timoris*, ♂. 469, terminalia, dorsal view; 470, claspers, inner and outer views; 471, aedeagus (inflated), ventral view.

This species can be separated from all the species of this genus except *insularis* by absence of black dots or marks on ventro-lateral of third and fourth abdominal segments. From *insularis* Stål it can be separated by the presence of black triangular marks on the underside of the abdomen in the middle of fifth and sixth segments.

#### ZOOGEOGRAPHY AND PHYLOGENY

The subfamily Leptocorisinae is represented in all zoogeographical regions, but in the Nearctic and Palearctic it is only found in the extreme southern areas and it is not recorded from New Zealand.

An exact phylogeny of this group cannot be attempted, for there is no fossil material, little knowledge of the biology of many members of the group and none of the biochemistry. Further more the phylogeny and even the classification of the family Alydidae, indeed of the whole Coreoidea is uncertain (Stys, 1961 ; Scudder, 1963). However, a study of the zoogeography and the comparative morphology of the group throw at least some light on the relationships and a very tentative phylogenetic scheme is shown on Text-fig. 472.

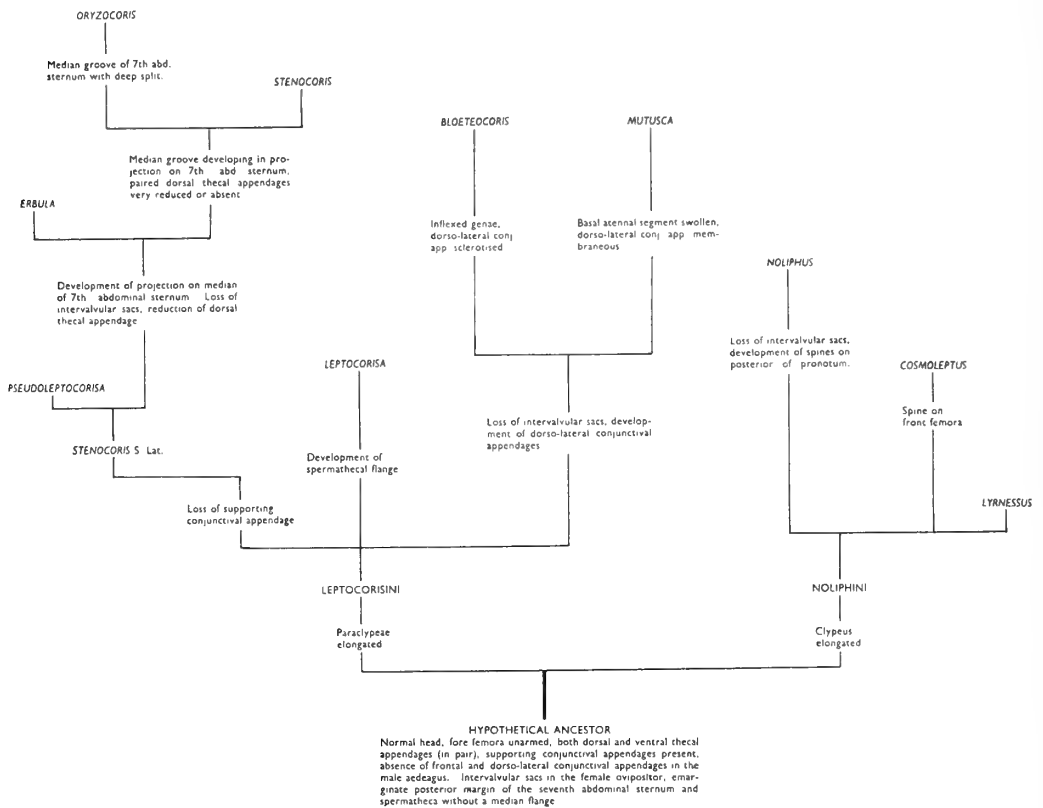


FIG. 472. Phylogenetic tree of the Leptocorisinae.



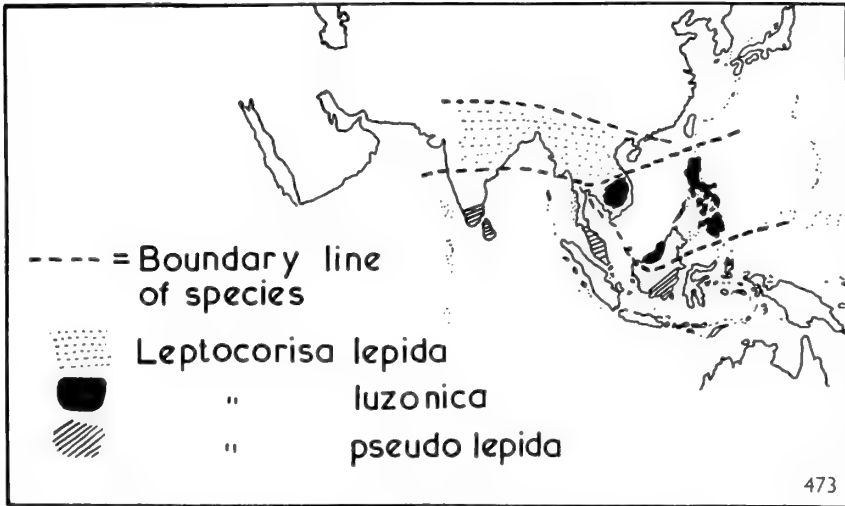


FIG. 473. Distribution map of *Leptocorisisa* spp.

The two tribes Leptocorisini and Noliphini are clearly distinct on the form of head and pronotum, whereas in the Noliphini there are distinctions in the shape and form of the body in the different genera, the body form in the Leptocorisini is remarkably uniform and the taxonomic distinctions are mainly based on characters of the genitalia. It may be that evolutionary pressures due to the habitat (various Gramineae) of the Leptocorisini has restricted the modification of the form of the body; the other large groups of Heteroptera that share this habitat, Stenodemini (Miridae) and Blissinae (Lygaeidae), are also both relatively uniform in body form. The habits of the Noliphini are unknown. Alternatively it may be that the Leptocorisini are more recently evolved and so less differentiated than the Noliphini.

The Noliphini have an interesting distribution, similar to, but rather more extensive than that of the Marsupials: Neotropical region (*Lyrnessus*) and Australian region and Malayan and Philippine sub-regions of the Oriental region (*Cosmoleptus* and *Noliphus*). The centre of evolution of the tribe was clearly in the Australian region, perhaps in the Papuan sub-region; the farthest west that the tribe has spread is north east Sumatra (*C. sumatranus*) but it does not seem to have crossed the Strait of Malacca or the South China Sea. *C. bakeri* is found in the Philippine Islands. *Noliphus spinosus* has the widest distribution of any member of that genus; Java, Philippine Islands, Solomon Islands and north Australia, but the remaining species are, so far as present records show, restricted to the Australian region (i.e. east of Wallace's Line).

In contrast the Leptocorisini are almost world-wide and some of the species have very wide ranges, e.g. *Leptocorisisa acuta*, the "Gandhi rice bug", is found throughout the Oriental and Australian regions (except New Zealand). It is considered that *Stenocoris* (*Pseudoleptocorisisa*) *erratica* retains more primitive characters than any

other species of the tribe and this, together with zoogeographical evidence, leads to the tentative suggestion that in contrast to Noliphini, the centre of evolution of this tribe was in the Ethiopian-Oriental regions. The subgenera of *Stenocoris* show a series of changes in the form of the posterior margin of the ♀ seventh abdominal sternum running parallel with which is the reduction of the dorsal thecal appendages in the aedeagus. The dorsal thecal appendages are paired in *Pseudoleptocoris*, they are fused in *Erbula* and very small and reduced in *Stenocoris claviformis* and absent in all the other species of *Stenocoris* and in all the species of *Oryzocoris*. The subgenus *Erbula* is entirely Ethiopian, *Stenocoris* is distributed in Ethiopian, southern Nearctic and Neotropical regions and *Oryzocoris* is limited to the southern Nearctic and Neotropical (occurring as far north as Florida and Texas). The Neotropical species of *Stenocoris* stand apart from the rest of the subgenus, more especially in the broad bases of the first gonocoxae that extend to conceal most of the eighth paratergite proximally.

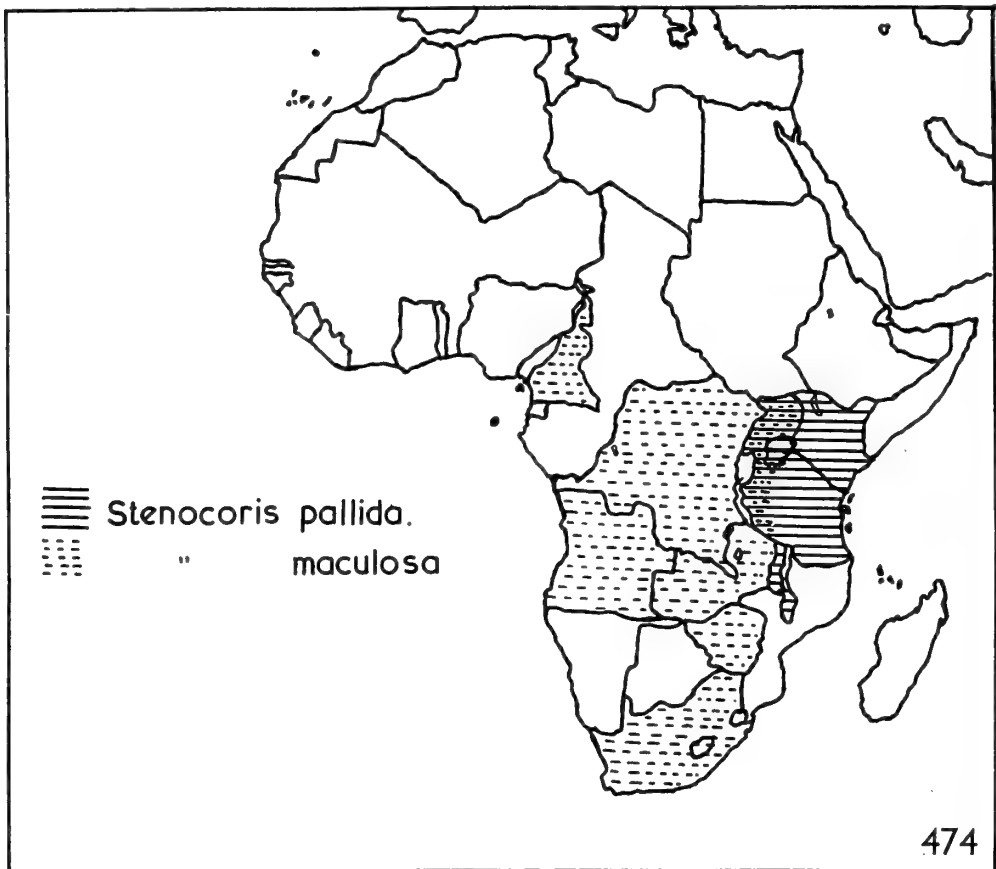


FIG. 474. Distribution map of *Stenocoris* spp.

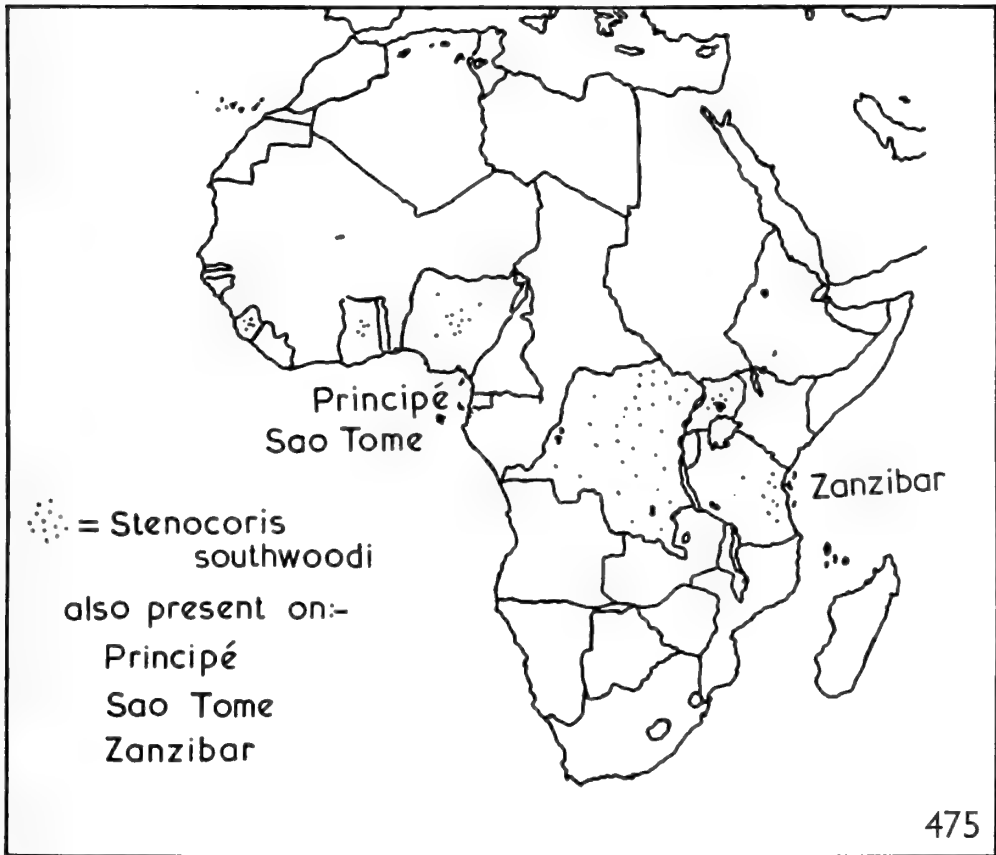


FIG. 475. Distribution map of *Stenocoris (Erbula) southwoodi*.

The remaining genera of the Leptocorisini, *Leptocorisa*, *Bloeteocoris* and *Mutusca*, have Oriental and Australian distributions but *Leptocorisa* is closer to *Stenocoris* than are the other two. *Mutusca* and *Bloeteocoris* might be considered more specialized in having lost the ancestral intervalvular sacs in the ovipositor and developed dorso-lateral conjunctival appendages in the aedeagus. In *Mutusca* one pair of these appendages are present and are membranous in form; running parallel with this character is the entirely swollen basal antennal segment, whereas in *Bloeteocoris* there are two sclerotized pairs of dorso-lateral conjunctival appendages in the aedeagus and this genus also shows remarkable development of genae, the tips of which are acutely pointed and inflexed.

The species of *Leptocorisa* fall into a number of groups :

*L. costalis* (range Indo-China, Philippines and East Indies) is in many ways the more generalized, showing more characters in common with *Stenocoris erratica*, especially the small membranous appendage in the male aedeagus, whilst *L. biguttata* (Indo-China, Sarawak, Celebes and East Indies) and *L. palawanensis*

(Philippine Islands and New Guinea) occupy a central position in the genus, around which are the four main species groups:

1. *luzonensis* (restricted to Philippine Islands) and *tagalica* extending from the Philippine Islands to Sarawak, Halmahera Island, with two black dots behind the ocelli and brownish black tips to hind femora.

2. *sakdapolrakae* (Thailand, Java, and Sumatra), *discoidalis* (Thailand, New Guinea, Australia, Solomon Islands and New Hebrides) and *solomonensis* (New Guinea and Solomon Islands) with a large rostrum extending beyond second coxae and the black line on the side of the head and prothorax lengthening in the order given above (which also, perhaps coincidentally, corresponds with successive progression of the ranges towards east).

3. *lepida* (North and Central India, Bhutan, Burma and Thailand), *pseudolepida* (South India, Ceylon and Malaya) and *luzonica* (Philippine Islands, Sarawak and Vietnam) (Text-fig. 473) which are smaller than the other species and possess the second right lateral conjunctival appendage, which is short in *lepida*, elongated in *pseudolepida* and elongated and curved in *luzonica*; these appear to form a group of allopatric species, the range of *lepida* being north of that of *pseudolepida* and of *luzonica* north east of that of *lepida*.

4. *chinensis*, *acuta* and *oratorius*, the most widely distributed species of all in the Oriental and Australian regions and major rice pests, show progressive reduction of the lateral black line (extending from antenniferous tubercles up to the lateral side of collar, sometimes like two dots in *chinensis*, represented by one dot at collar in *acuta* and completely absent in *oratorius*) and parallel with this a trend for the apex of the claspers to become united, for whereas they are truncated in *chinensis*, one lobe is produced in *acuta* and finally in *oratorius*, this lobe is enlarged and acutely pointed and the other lobe is lost.

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5. Carnegie Museum, Pennsylvania, U.S.A. (Dr. G. Wallace).

6. American Museum of Natural History, New York (Dr. P. Wygodzinsky).
7. Bernice P. Bishop Museum, Honolulu, Hawaii (Dr. J. L. Gressitt and Miss S. Nakata).
8. Museum do Dundo, Dundo, Lunda, Angola (Dr. A. de Barros Machado).
9. Museum National d'Histoire naturelle, Paris, France (Dr. A. Villiers).
10. Musée Royale de l'Afrique centrale, Tervuren, Belgium (Dr. P. Basilewsky).
11. Riksmuseum, Stockholm (Dr. E. Kjellander).
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## INDEX TO GENERA AND SPECIES

(Synonyms in italics)

- acuta* Thunberg, 78  
*acuta* Distant, 94  
*africana* sp. n., 32  
*americana* sp. n., 34  
*angustata*, 78  
*annulicornis* Blöte, 49  
*annulicornis* Signoret, 16  
*annulipes*, 133  
*apicalis* Stål, 24  
*apicalis* Westwood, 36  
*arcuata*, 94
- bakeri* sp. n., 126  
*bengalensis*, 94  
*biguttata*, 80  
*bipunctata*, 109  
 BLOETEOCORIS gen. n., 115  
*blotei*, 49  
*braziliensis* sp. n., 38  
*brevicornis*, 111  
*burmeisteri*, 109
- chinensis*, 82  
*claviformis* sp. n., 41  
*corbetti*, 82  
 CORISTENIA, 123  
 COSMOLEPTUS, 126  
*costalis*, 85  
*crudelis*, 55
- DICRORYMBUS, 4  
*discoidalis*, 87  
*discopterus*, 135  
*distinguenda*, 18  
*elegans*, 20  
 ERBULA, 14  
*erratica*, 12
- erythrocephalus*, 137  
*ethiopsis* sp. n., 43
- fabricii*, sp. n., 62  
*filiformis*, 64  
*flavicosta*, 123  
*flavida*, 78  
*furcifera*, 67
- geniculata* China, 106  
*geniculata* Guérin, 123  
 GRYPOCEPHALUS, 115
- inflexigena*, 117  
*insularis*, 138
- lepida*, 88  
 LEPTOCORISA Laporte, 60  
 LEPTOCORISA Latr., 69  
 LEPTOCORIXA, 69  
*limbaticollis*, 128  
*linearis*, 64  
*luzonensis* sp. n., 90  
*luzonica* sp. n., 92  
 LYRNESSUS, 123
- maculiventris*, 94  
*maculosa*, 44  
*meridianus* sp. n., 119  
*minutus* sp. n., 121  
 MUTUSCA, 110  
 MYODOCHA, 9
- nigricornis*, 68  
*nitidula*, 82  
 NOLIPHUS, 131

oratorius, 94  
 ORYZOCORIS, 60

palawanensis sp. n., 98  
 pallida, 46  
 papuensis, 140  
 phthisica, 49  
 PROCAMPTUS, 4  
 proluxa, 113  
 pseudolepida sp. n., 100  
 PSEUDOLEPTOCORISA, 12

*RHABDOCORIS*, 69

sakdapolrakae sp. n., 102  
 similis, 23  
 solomonensis sp. n., 104

sordida, 52  
 southwoodi sp. n., 24  
 spinosus sp. n., 142  
 stali sp. n., 28  
 STENOCORIS, 9, 30  
 sumatranus, 129

tagalica n. n., 106  
*tibialis*, 123  
 timoris sp. n., 144  
*tipuloides* Dallas, 64  
*tipuloides* De Geer, 55  
*trinotata*, 94

*varicornis*, 78  
 v-nigrum, 57

XENOCERAEA, 4











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# DIPTERA FROM NEPAL

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## CRYPTOCHAETIDAE, DIASTATIDAE & DROSOPHILIDAE

T. OKADA

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ENTOMOLOGY Supplement 6  
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BY

T. OKADA

Dept. of Biology, Faculty of Science  
Tokyo Metropolitan University

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## CRYPTOCHAETIDAE, DIASTATIDAE & DROSOPHILIDAE

By T. OKADA

### CONTENTS

	<i>Page</i>
SYNOPSIS . . . . .	3
INTRODUCTION . . . . .	4
ABBREVIATIONS USED IN THE TEXT-FIGURES . . . . .	5
ACKNOWLEDGEMENTS . . . . .	6
Family CRYPTOCHAETIDAE . . . . .	6
Family DIASTATIDAE . . . . .	8
Family DROSOPHILIDAE . . . . .	14
Subfamily STEGANINAE . . . . .	15
Subfamily DROSOPHILINAE . . . . .	37
GEOGRAPHICAL DISTRIBUTION . . . . .	112
ECOLOGICAL DISTRIBUTION . . . . .	117
NOTES ON SOME SPECIAL SYSTEMATIC CHARACTERS . . . . .	119
A. Archestinic characters . . . . .	119
B. Homeotic expression of the hooked scaly bristles . . . . .	120
C. Homology in the components of phallic organs and the systematic analysis of phallic formulae . . . . .	121
REFERENCES . . . . .	124
INDEX . . . . .	127

### SYNOPSIS

The Cryptochaetidae, Diastatidae and Drosophilidae collected by Mr. Ralph L. Coe, British Museum (Natural History), during the British Museum East Nepal Expedition, 1961-1962 amounted to twelve hundred and eighty-seven well-preserved dried flies and a puparial case. They represent seventy-six species belonging to fifteen genera, including *Lissodrosophila* gen. n. and thirty-seven new species. In addition to describing new forms, insufficiently known species have been re-described according to current taxonomy. Brief notes of the geographical and ecological distributions of the genera and species concerned are given, and some systematically important problems concerning the occurrence of "archestinic" characters in a taxon, the homeotic and compensatory expression of characters, and homology in the components of phallic organs are analysed and discussed.

## INTRODUCTION

THROUGH the recommendation of Dr. E. B. Basden, Institute of Animal Genetics, Edinburgh, the author was enabled to examine a large collection of Cryptochaetidae, Diastatidae and Drosophilidae from East Nepal, collected by Mr. R. L. Coe while a member of the British Museum East Nepal Expedition, Sept. 1961–Febr. 1962. The collection is made up of the following fifteen genera : *Cryptochaetum* (1 sp.) of Cryptochaetidae, *Diastata* (2), *Campichoeta* (1) and *Apsinota* (2) of Diastatidae, and *Stegana* (1), *Leucophenga* (16), *Microdrosophila* (6), *Lissodrosophila* (1), *Hypselothyrea* (1), *Liodrosophila* (4), *Paramycodrosophila* (1), *Chaetodrosophilella* (1), *Scaptomyza* (4), *Diathoneura* (1) and *Drosophila* (34) of Drosophilidae.

The genus *Lissodrosophila* and thirty-seven species belonging to ten genera are described as new : *Diastata* (1 sp. n.), *Apsinota* (1), *Leucophenga* (4), *Microdrosophila* (5), *Lissodrosophila* (1), *Liodrosophila* (3), *Chaetodrosophilella* (1), *Scaptomyza* (3), *Diathoneura* (1) and *Drosophila* (17).

These genera have apparently not been recorded from Nepal, apart from *Drosophila*, of which the following six species were recorded earlier by the present author (Okada, 1955) : *D. bipectinata* Duda, *D. kikkawai* Burla, *D. melanogaster* Meigen, *D. takahashii* Sturtevant, *D. nepalensis* Okada and *D. immigrans* Sturtevant. Of these, *D. bipectinata* alone is not recorded in the present collection, which has brought the number of Nepalese species of the three families involved to seventy-seven.

The drosophilid fauna of Nepal is most interesting biogeographically and ecologically, as it comprises Palaearctic and Oriental elements ranging from low, subtropical lands to the highest mountains in the world. In this respect, it closely resembles the pattern of the Japanese fauna, which is, though essentially Palaearctic, rich in Oriental elements, as for example with the mosquitoes (Edwards, 1921 : 264). In addition to describing new forms, some of the poorly-known species are re-described in the light of current taxonomic knowledge.

Some taxonomic characters are explained below.

*Width of front at its posterior margin* : measured across the ocellar triangle.

*Width of cheek* : the greatest distance from eye margin measured vertically to the tangent drawn upon eye margin.

*Wing indices* : C-index (costal index), a ratio in length of the second and the third costal sections ; 4V-index (4th vein index), a ratio in length of the distal and the proximal sections of the vein *M* (media) ; 4C-index, a ratio in length of the third costal section and the proximal section of *M* ; 5x-index, a ratio in length of the distal section of the vein *Cu* (cubitus) and the posterior crossvein ; Ac-index (acrocostal index, Burla, 1956 : 193), a ratio in length of the third and fourth costal sections.

*C1-bristles* : strong bristles at the end of the first costal section.

*C3-fringe* : the portion of the third costal section bearing the strong costal fringe (Wheeler and Takada, 1964 : 168).

*Sterno-index* : a ratio in length of the anterior and the ventral (posterior, Kikkawa

and Peng, 1938) sterno-pleurals (Kikkawa and Peng, 1938 : 552).

*Mesonotum* : prescutum and scutum of the morphological mesonotum (Sturtevant, 1921 : 28).

*Abdominal tergite* : sometimes abbreviated as T, e.g., 1T means the first abdominal tergite.

The terminology of the male and female genitalia is chiefly based on Hsu (1949), Nater (1953), and Okada (1954, 1956). The *phallic formula* (p.f.) is a series of alphabetical signs indicating various characters of the phallic organs of each species according to the following rules.

- (A) Aedeagus apparently bifid, or (a) fused.
- (B) Aedeagus non-pectinated, or (b) pectinated.
- (C) Aedeagus bare, or (c) pubescent.
- (D) Anterior parameres large, or (d) minute.
- (E) Anterior parameres articulated to the aedeagus, or (e) non-articulated.
- (F) Anterior parameres with sensilla mesad to or scattered evenly on the parameres, or (f) distal, or absent ( $f_0$ ).
- (G) Posterior parameres (penis mantle sheath, Nater, 1953) non-contiguous, or (g) contiguous to each other to compose a "distal bow" (Fota-Pessoa, 1954), or ( $g_0$ ) absent.
- (H) Posterior parameres non-branched or (h) branched.
- (I) Novasternum with paired submedian spines (hyandrial bristles, Nater, 1953) on its caudal margin, or (i) without such spines.
- (K) Novasternum without or (k) with a median notch on its caudal margin.
- (L) Aedeagus vertically or (l) horizontally flattened.
- (M) Aedeagus without or (m) with a prominent basal vertical rod or ventral recurved process.
- (N) Basal apodeme of aedeagus as long as or longer than aedeagus, or (n) less than half the length of aedeagus.

A small alphabetical letter with attached dash (') indicates a feature intermediate between those of the corresponding large and small letters.

*Phallosomal index* (PI) : a ratio in length of aedeagus and its apodeme.

#### ABBREVIATIONS USED IN THE TEXT-FIGURES

- a. anterior paramere or anterior gonapophysis (phallic organs).
- d. decasternum or bridge connecting claspers (periphalllic organs).
- e. aedeagus or penis (phallic organs).
- g. genital arch or novatergum (periphalllic organs).
- h. subterminal hair (egg-guide).
- i. basal isthmus (egg-guide).
- k. clasper (periphalllic organs).
- l. lobe (egg-guide).
- n. novasternum or hyandrial plate (phallic organs).
- o. basal apodeme of aedeagus (phallic organs).
- p. posterior paramere or posterior gonapophysis (periphalllic organs).

- r. vertical rod of aedeagus (phallic organs).
- s. submedian spine of hypandrium (phallic organs).
- t. anal plate or cercus (periphallic organs).
- u. ventral recurved process of aedeagus (phallic organs).
- v. ventral fragma of novasternum (phallic organs).

The scales of the text-figures 1-327 : solid line, 0.1 mm. ; broken line, 1.0 mm.

#### ACKNOWLEDGEMENTS

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### Family CRYPTOCHAETIDAE

#### **CRYPTOCHAETUM** Rondani

*Cryptochaetum* Rondani, 1875 : 167.

Type-species : *Cryptochaetum grandicorne* Rondani, 1875 : 167 (Europe).

#### ***Cryptochaetum nipponense*** (Tokunaga)

(Text-figs. 1-5)

*Hippelates nipponensis* Tokunaga, 1943 : 1075 (Japan).

*Cryptochaetum nipponense* (Tokunaga) Foote and Arnaud, 1958 : 241 (Japan).

*Cryptochaetum grandicorne* Rondani ; Coquillett, 1898 : 340 (Japan) ; Kuwana, 1922 1 : 28 ; 2 : 37 (Japan) ; Okada, 1956 : 9 (Japan). [Mis-identification.]

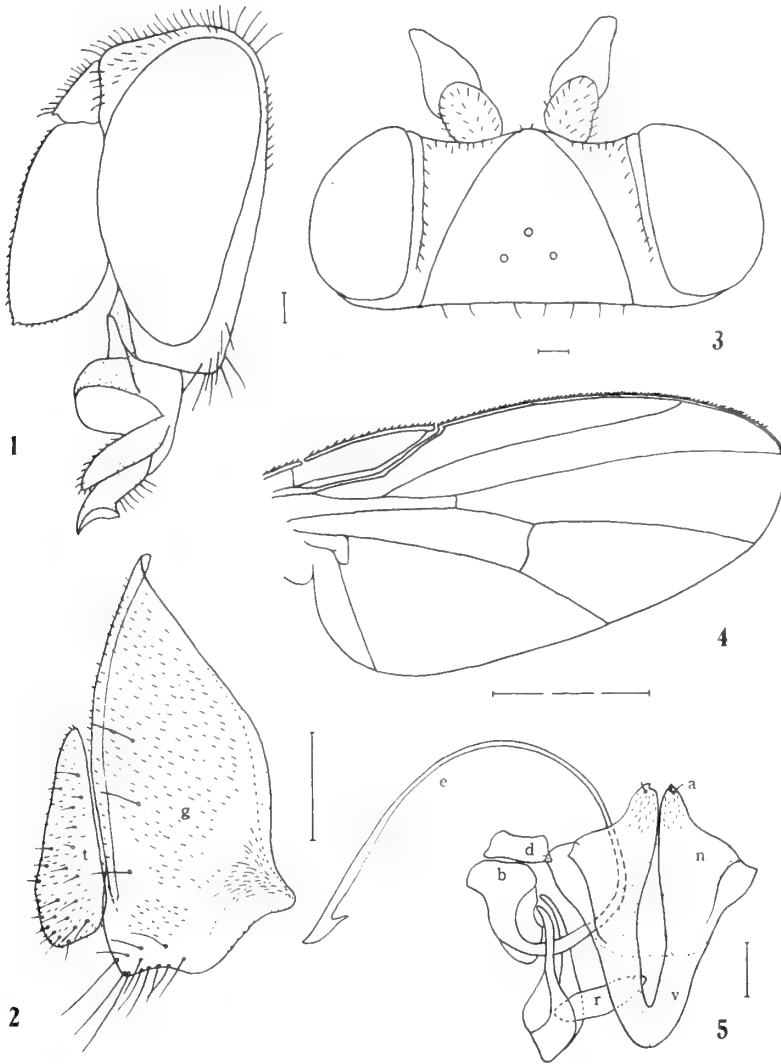
♂. Body about 3 mm. Front large, frontal triangle not sharply pointed anteriorly. Antennae slightly shorter than face, apically angular, ending in a minute tubercle. Fore tarsi normal, not dilated. Posterior crossvein sinuate, anterior crossvein level with the second costal break.  $R_1$  angulate at middle. *Costa* extending slightly beyond the end of  $R_{4+5}$ .

Taplejung District, damp evergreen oak forest above Sangu, c. 9,200', 2-26.xi.1961, 12 ♂ (2 ♂ hovering in front of eyes) (*R.L.C.*) ; below Sangu, by stream in shady ravine, c. 6,000', 1 ♂, 30.x.1961 (*R.L.C.*).

Distribution : Nepal (new locality), Japan.



All the features mentioned above and the detailed structures of male genitalia (Text-figs. 2, 5) fully agree with those of the Japanese form examined by the author (1956) and confirmed and re-described by Foote and Arnaud (1958).



FIGS. 1-5. *Cryptochaetum nipponense* (Tokunaga), ♂. 1, head, lateral aspect; 2, periphallallic organs, lateral aspect; 3, head, dorsal aspect; 4, wing; 5, phallic organs, ventral aspect.

Family **DIASTATIDAE**

## KEY TO GENERA

- 1 Mesopleura with bristles. Orbitals above the middle of front . . . . . 2  
 - Mesopleura bare. Orbitals at the middle of front. Arista pubescent. Anterior reclinate orbitals slender. *Subcosta* short, not reaching *costa*  
**CAMPICHOETA** Macquart (p. 10)
- 2 Three orbitals present, anterior reclinate orbitals strong, posterior reclinate orbitals slender. Arista with short branches. *Subcosta* short, not reaching *costa*  
**DIASTATA** Meigen (p. 8)
- Only one orbital present, strong and reclinate. Arista with long branches both dorsally and ventrally. *Subcosta* complete, reaching *costa*  
**APSINOTA** van der Wulp (p. 11)

**DIASTATA** Meigen

*Diastata* Meigen, 1830 : 94.

Type-species : *Diastata vagans* Loew, 1864 : 362 (Europe).

## KEY TO SPECIES

- 1 Wing with two large transverse black bands surrounding crossveins. C-index about 3.2 . . . . . **ussurica** (p. 8)  
 - Wing black only at its base and along posterior crossvein, fuscous along *costa*. C-index about 6.0 . . . . . **basdeni** (p. 8)

**Diastata ussurica** Duda

*Diastata ussurica* Duda, 1934 : 8 (Ussuri) ; Okada, 1956 : 13 (Japan) ; Okada, 1960b : 165 (Japan).

♂. Wing patterns somewhat intermediate between those of Ussurian (Duda, 1934) and Japanese (Okada, 1956) forms, the black patch covering posterior crossvein distinctly narrowing below *M* as in the Ussurian form, but extending outside posterior crossvein as in the Japanese.

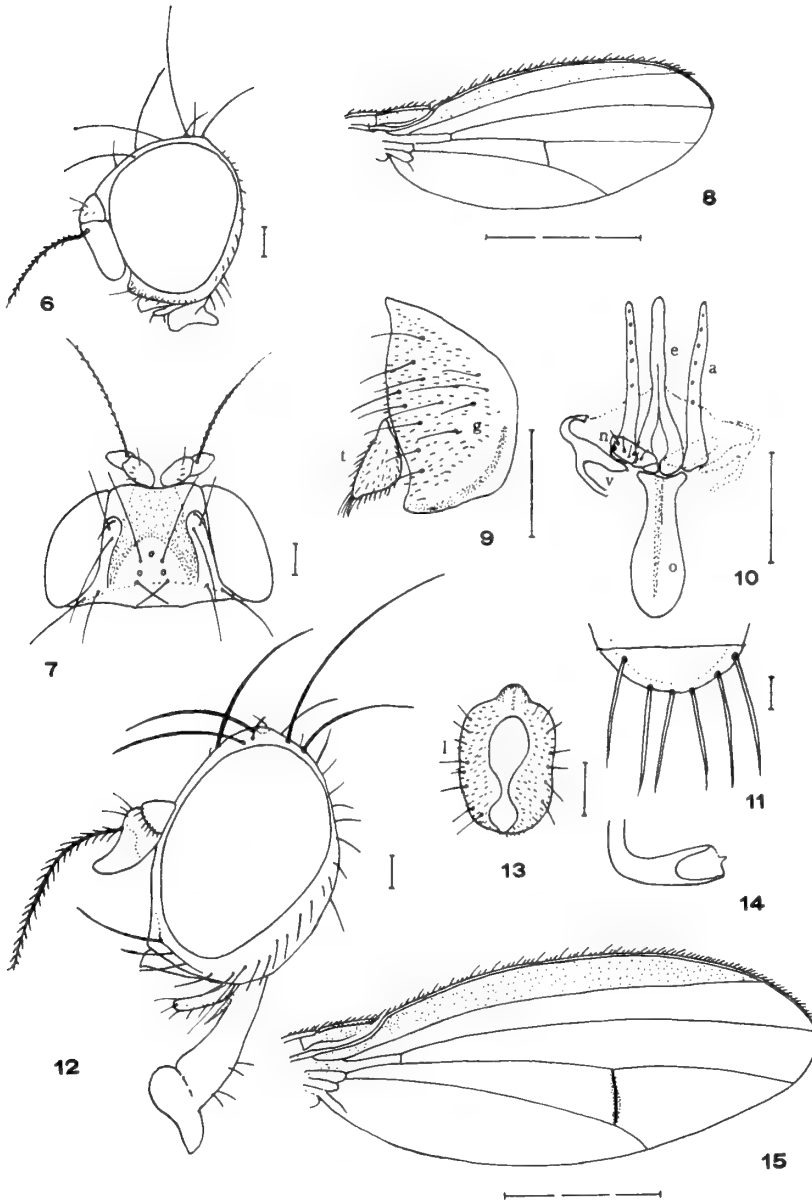
Taplejung District, below Sangu, mixed vegetation on sheltered slopes above river, c. 4,000', 3.i.1962, 1 ♂ (*R.L.C.*).

Distribution : Nepal (new locality), Japan, Ussuri.

**Diastata basdeni** sp. n.

(Text-figs. 12-15)

♀. Body about 3.5 mm., black, slender. Head much broader than thorax. Eyes dark purplish red, bare. Antennae orange-yellow ; third segment broad, slightly more than twice as long as broad, apical half fuscous, anteroventrally narrowing. Arista black, shortly plumose on both sides. Palpus slender, curved, yellow, basally brown, with about three black setae near apex below. Ocellar triangle fuscous. Periorbit fuscous, strongly curved inward anteriorly, ending before middle of front. Front pale yellow, anterior margin concave, anteriorly slightly broader than length down middle, posteriorly half as broad as head width. Face pale yellow, shining silvery white in dorsal view. Carina undeveloped, represented by a weak median ridge. Cheeks yellowish grey, about two-ninths the greatest diameter of eye. Postgena black. Clypeus reddish brown. Occiput black, concave, grey pollinose. Anterior reclinate orbital longer than



FIGS. 6-15. 6-11, *Campichoeta obscuripennis* (Meigen), ♂. 6, head, lateral aspect; 7, head, dorsal aspect; 8, wing; 9, periphallic organs, lateral aspect; 10, phallic organs, ventral aspect; 11, sixth abdominal tergite. 12-15, *Diastata basdeni* sp. n., ♀. 12, head, lateral aspect; 13, egg-guides, ventral aspect; 14, ventral receptacle; 15, wing.

proclinate, before and inside proclinate ; proclinate half as long as inner vertical ; posterior reclinate minute, behind anterior reclinate ; a minute seta before anterior reclinate. Only one strong oral, second oral about one-third length of vibrissa, third as long as second.

Mesonotum, scutellum, and thoracic pleura black, bluish grey pollinose. One long humeral. Prescutellars long, somewhat divergent. Acrostichal hairs in about ten irregular rows. Anterior dorsocentrals about six-sevenths as long as posteriors ; distance between anterior and posterior dorsocentrals about four-fifths of distance between anterior pair. Anterior scutellars long, parallel ; posterior scutellars three-fifths as long as anteriors, upright and crossed. Sterno-index about 0.6. Legs yellowish brown or dark brown, femora especially dark. All metatarsi as long as next three segments together ; fore femur with a few stout but short setae inside near apex. Wing fuscous along *costa*, black at base below first costal section. Posterior crossveins narrowly clouded.  $R_{2+3}$  straight where it reaches *costa*.  $R_{4+5}$  and *M* slightly divergent distally. C-index about 6.0 ; 4V-index about 1.2 ; 4C-index about 0.3 ; 5x-index about 0.7 ; Ac-index about 1.1. C1-bristle one, long ; C3-fringe on basal two-thirds. Halteres white. Abdominal tergites black, somewhat shining blue.

Egg-guide lobes pale brown, horizontally flattened, fused to each other, setigerous and pubescent, apically narrowing and curved inward. Ventral receptacle large, dark brown, proximally narrowing and curved rectangularly, apically with a U-shaped invagination.

Holotype ♀. EAST NEPAL : Taplejung District, above Sangu, damp evergreen oak forest, c. 9,200', 2-26.xi.1961 (*R.L.C.*), BMNH.

Paratypes : 2 ♀, collected together with the holotype (*R.L.C.*), BMNH and Tokyo Metropolitan University.

Allied to *D. vagans* Loew, 1864 (Europe), in having wings basally black and anteriorly fuscous, but differs in the less distinct dark cloud on posterior crossvein and in the shape of egg-guide (distally not narrowing in *vagans*, Okada, 1960b) and ventral receptacle (apical invagination shallow triangular in *vagans*, Okada, 1960b).

### **CAMPICHOETA** Macquart

*Campichoeta* Macquart, 1833 : 547.

Type-species : *Diastata obscuripennis* Meigen, 1830 : 97 (Europe).

### ***Campichoeta obscuripennis*** (Meigen)

(Text-figs. 6-11)

*Diastata obscuripennis* Meigen, 1830 : 97 (Europe).

*Campichoeta obscuripennis* (Meigen) Duda, 1934 : 14 (Europe).

*Campichoeta obscuripennis* (Meigen) ; Basden and Collin, 1958 : 139 (Europe).

♂. Body about 2.5 mm., matt black. Head as broad as thorax. Eyes dark red, large, bare. Antennae matt velvety black, second segment somewhat grey pollinose, third elongate and more than twice as long as broad, apically blunt. Palpus black, curved, apically rounded, with about two strong black ventral setae. Ocellar triangle matt black, grey pollinose. Periorbit black, grey pollinose, anteriorly rounded, about two-thirds as long as front, posteriorly narrowing. Front matt black, grey pollinose, anteriorly nearly as broad as median length, posteriorly about half as broad as the head width. Face black, marginally yellowish white. Carina flat, broad, black. Cheeks narrow, yellowish white, marginally black, about one-twelfth as broad as the greatest diameter of eye. Anterior reclinate orbital much before and inside proclinate, about one-fourth as long as posterior reclinate ; proclinate shortly before and outside posterior reclinate, about two-thirds as long as posterior reclinate. Vibrissae short, other orals fine.

Mesonotum matt black, somewhat bluish grey pollinose. Scutellum matt black, unicolorous. Thoracic pleura black, bluish grey pollinose. Only one prominent humeral. Prescutellars long. Acrostichal hairs in eight rows. Anterior dorsocentrals three-fourths length of posteriors, distance between anterior and posterior dorsocentrals slightly shorter than distance between anterior pair. Anterior scutellars divergent; posterior scutellars three-fifths length of anteriors. Sterno-index about 0.7; median sternopleural slender. Legs yellowish brown; femora darker; fore femur with a row of about ten short black stout setae anteroventrally on distal two-thirds, ventrally with a stout seta near apex. Preapicals well developed on all legs; apicals prominent on mid leg. Wings narrow, deeply fuscous especially along *costa*. *Costa* with sparse long black setae besides the usual strong fringe. C-index about 4.5; 4V-index about 1.5; 4C-index about 0.6; 5x-index about 2.7; Ac-index about 1.5. C1-bristles two, well developed; C3-fringe on basal one-fifth. Halteres yellowish white. Abdomen black, slender; caudal tergite with about three pairs of long stout black bristles.

Periphallalic organs: Genital arch black, broad, much narrowing above, with microtrichia and scattered macrotrichia, toe broad and triangular. Clasper absent. Cercus fusiform, brownish black, with thick microtrichia, which are especially long at lower apex. Phallic organs: Aedeagus orange-brown, rod-like, straight, apically curved ventrally, basally swollen laterally; apodeme thick, straight. PI about 1.3. Anterior paramere slender, straight, tapering, orange-brown, with a few sensilla in a longitudinal row on distal half. Posterior parameres fused to form a broad triangular medially pointed black lobe. Ventral fragma short. p.f.=ABCDEFgHikLMN. Hypandrial plate setigerous.

Taplejung District, between Sangu and Tamrang, mixed shrubs in deep gorge, c. 5,200', 10.xi.1961, 1 ♂, 1 ex. (R.L.C.).

Distribution: Nepal (new locality), Europe.

The ♂ genitalia agree with those figured by Basden and Collin (1958: Text-fig. 5) for the European form.

### *APSINOTA* van der Wulp

*Apsinota* van der Wulp, 1887: 178.

Type-species: *Apsinota pictiventris* van der Wulp, 1887: 178 (Java).

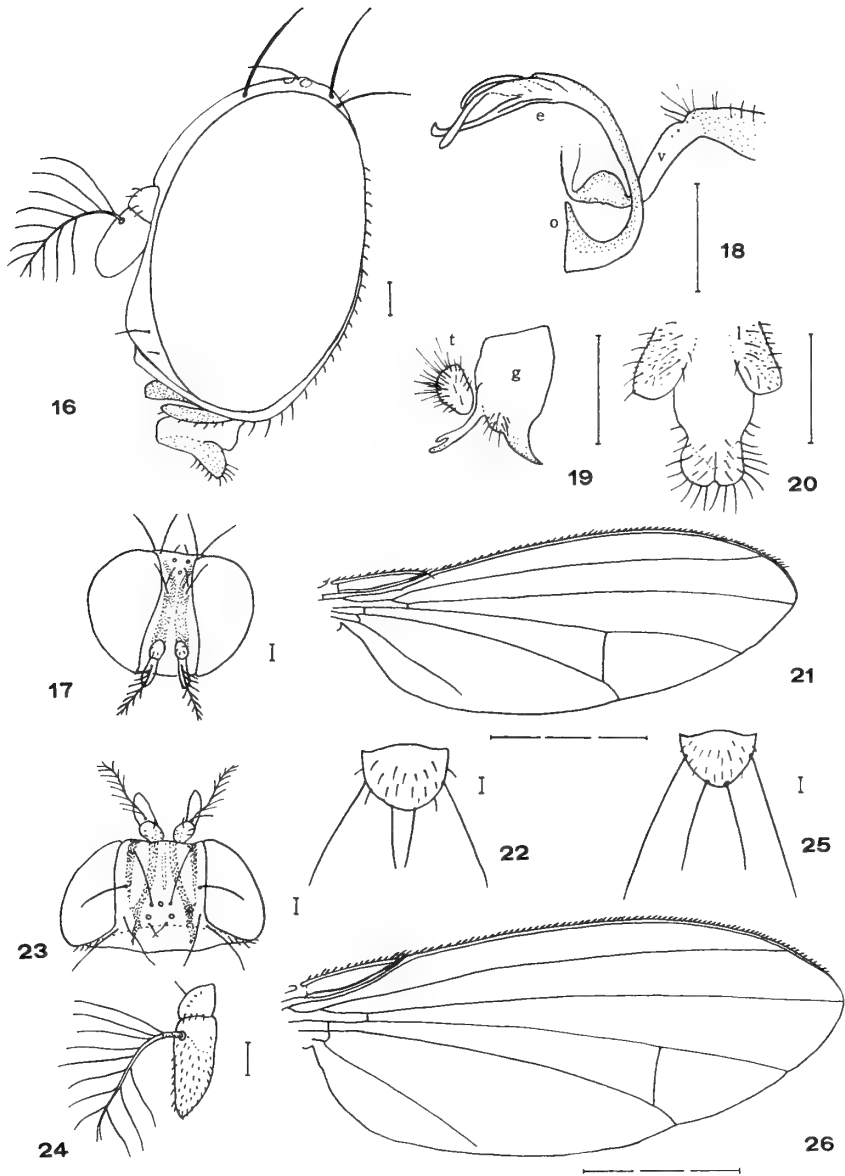
#### KEY TO SPECIES

- 1 Front with a pair of dark longitudinal stripes. Mesonotum uniformly greyish white, somewhat bluish pollinose. Acrostichal hairs in about four rows. Anterior scutellar about twice as long as the posteriors. Legs entirely yellow; mid tibia with row of long setae anteriorly . . . . . ***rufipes*** (p. 11)
- Body larger and darker. Front with two pairs of dark longitudinal stripes. Mesonotum dark greyish black, with two pairs of bluish white longitudinal stripes. Acrostichal hairs in six rows. Anterior scutellar about one and a half times the length of posteriors. Legs yellow; tarsi fuscous; mid tibia without a row of long setae anteriorly . . . . . ***pictiventris*** (p. 13)

### *Apsinota rufipes* sp. n.

(Text-figs. 16-22)

♂, ♀. Body about 2.7 mm., greyish white, blue pollinose. Head round, slightly broader than thorax. Eyes large, dark purplish red, bare. Antennae with second segment orange-grey, shortly setose; third elliptical, bright orange-grey, pubescent. Arista with about seven dorsal and three ventral long branches and a small terminal fork. Palpus black, elongate, with short setae below. Ocellar triangle greyish white. Periorbit short, narrow, one-third as long as front. Male front narrow; anteriorly wider, two-ninths as broad as head width, greyish white, pollin-



FIGS. 16-26. 16-22, *Apsinota rufipes* sp. n. 16, ♂ head, lateral aspect; 17, ♂ head, dorso-anterior aspect; 18, phallic organs, lateral aspect; 19, peripheral organs, lateral aspect; 20, ♀ egg-guides and cerci; 21, ♂ wing; 22, ♂ scutellum. 23-26, *Apsinota pictiventris* van der Wulp, ♀. 23, head, dorsal aspect; 24, antenna; 25, scutellum; 26, wing.

ose, darker above; with a pair of greyish brown submedian longitudinal stripes, which are broadened anteriorly. Female front wider than in ♂. Face greyish white, pollinose. Clypeus black. Carina low. Mouth-parts black. Occiput greyish white, pollinose. Cheek very narrow, about one-fiftieth as broad as the greatest diameter of eye. Only one long reclinate orbital bristle, situated at one-third distance from the vertex to anterior margin of front. Vibrissae small, second oral minute.

Mesonotum strongly convex, black, bluish white pollinose. Scutellum greyish white pollinose, apically rounded and slightly yellowish grey, with about twelve discal and four marginal setae besides the scutellars. Thoracic pleura with two stout mesopleurals. Two subequal humerals. Prescutellars longer than anterior dorsocentrals. Acrostichal hairs in four irregular rows. Posterior dorsocentrals about two and a half times as long as anteriors; distance between anterior pair of dorsocentrals slightly more than twice distance between anterior and posterior pairs. Anterior scutellars divergent, long, about twice the length of scutellum; posterior scutellars convergent, closely approximated, as long as scutellum. Only one prominent sternopleural (posteroventral), the anterior one minute. Legs yellowish grey, slender; fore femur with a row of about ten short thick black bristles anteroventrally on distal half. Preapicals on all legs, apicals prominent on mid leg. Wings hyaline, slender, iridescent;  $R_{2+3}$  straight; *costa* reaching  $M$ ;  $R_{4+5}$  ending at wing tip;  $R_{4+5}$  and  $M$  apically divergent. C-index about 5.9; 4V-index about 0.7; 4C-index about 0.4; 5x-index about 0.4; Ac-index about 0.8. C<sub>1</sub>-bristles two, C<sub>3</sub>-fringe on basal one-third. Halteres yellowish white. Abdominal tergites black, bluish grey pollinose, slender. In ♀ each abdominal tergite with an anteromedian small longitudinal, and a lateral triangular apically broadened, dark spot.

Periphallic organs: Genital arch black, broad, narrowing below, lower distal margin with short setae. Anal plate conical, black, hairy, separated from genital arch. Clasper (?) elongate, black, apically bifurcated, without teeth. Phallic organs: Aedeagus brown, elongate, large, C-shaped in lateral aspect, apically somewhat swollen and forked. Basal apodeme recurved and pointed at tip, short. PI about 6.0. Ventral fragma pale brown, quadrate, proximally semicircular, distally closely fused to the tip of genital arch. Anterior paramere apparently fused to the lateral arm of ventral fragma, with a few long sensilla. Posterior paramere absent. p.f.=aBCdefg<sub>0</sub>HiklMN.

Holotype ♂. EAST NEPAL: Arun Valley, below Tumlingtar, River Sabhaya, west shore, evergreen shrubs on sandy shore, c. 1,800', 9-17.xii.1961 (R.L.C.), BMNH.

Allotype ♀. Same data as holotype male. BMNH.

Paratypes: 4 ♂, 4 ♀, same data as holotype; 1 ♀, Tumlingtar, bare rocky slope above River Sabhaya, west bank, c. 1,900', 8-24.xii.1961 (R.L.C.), BMNH. 1 ♂, 1 ♀, same data as holotype, deposited at the Tokyo Metropolitan University.

Resembles *A. obscuripes* de Meijere, 1911, (Java and Formosa) in wing venation, but differs from it in its pale hind tibia and tarsi and unicolorous mesonotum.

### *Apsinota pictiventris* van der Wulp

(Text-figs. 23-26)

*Apsinota pictiventris* van der Wulp, 1887: 178 (Java); de Meijere, 1908: 149 (Java); Duda, 1924a: 177; 1924b: 224 (Java); Duda, 1929: 415 (Moluccas, New Guinea, Sumatra).

♀. Body about 3.7 mm. Head slightly broader than thorax. Eyes reddish brown, bare, large. Antennae with second segment reddish brown; third thrice as long as broad, somewhat pointed apically, greyish brown, basally reddish brown. Arista with about nine dorsal and three ventral branches and a moderate terminal fork. Palpus black, slender, without long setae. Ocellar triangle greyish brown. Periorbit greyish brown, short, about one-third length of front.

Clypeus velvety black. Front anteriorly somewhat swollen above, parallel-sided, matt greyish brown, with two pairs of deep brownish black longitudinal stripes, lateral pair on anterior half of front, median pair posteriorly divergent and reaching occiput; eye margin narrowly white. Occiput black, grey pollinose. Face black, silvery grey pollinose. Carina large but low. Cheeks very narrow, white. Vibrissae fine, no succeeding orals.

Mesonotum dark greyish black, with two pairs of bluish white posteriorly narrowing longitudinal stripes, median pair occupying anterior half of mesonotum. Scutellum greyish brown, setigerous. Thoracic pleura with two long bristles and about ten minute hairs. Two long humerals, upper slightly longer. Prescutellars well developed, two-thirds length of posterior dorsocentrals. Acrostichal hairs in six rows. Anterior dorsocentrals about one-third length of posteriors, distance between anterior pair of dorsocentrals about one and a half times distance between anterior and posterior pairs. Anterior scutellars long, divergent; posteriors divergent, two-thirds length of anteriors. Only one long sternopleural. Legs yellow, tarsi and apices of femora and tibiae somewhat fuscous. Fore femur with a row of about ten black hooklets anteroventrally on distal half. Coxa greyish white. All metatarsi as long as two succeeding tarsal segments. Mid tibia without long setae anteriorly. Preapicals on all tibiae; apicals prominent on mid leg. Wing hyaline, *costa* reaching *M*;  $R_{2+3}$  gently upcurved, straight where it meets *costa*. C-index about 5.0; 4V-index about 0.6; 4C-index about 0.3; 5x-index about 0.5; Ac-index about 0.9. C1-bristles two; C3-fringe on basal three-fifths. Halteres white, basally yellow. Abdominal tergites greyish black, laterally paler; 1-2T white, with yellowish grey laterally broadened anterior cross bands; 3-6T with a pair of bluish grey triangular spots on anterior borders. Cercus elongate.

Arun Valley, east shore of River Arun below Tumlingtar, evergreen shrubs, bordering dry stream-beds, c. 1,800', 14-23.xii.1961, 1 ♀ (*R.L.C.*).

Distribution: Nepal (new locality), Java, Sumatra, Moluccas, New Guinea.

Slightly different from the original form as re-described by de Meijere (1908), in having median pair of pale mesonotal stripes anteriorly almost equally distant from each other and from lateral pair (nearer to each other than to lateral pair in the original form).

## Family DROSOPHILIDAE

### KEY TO GENERA

- 1 Posterior reclinate orbital nearer to inner vertical than to proclinate. Anterior reclinate orbital nearly as long as proclinate. Discal and second basal cells usually separated (if confluent, *costa* with several thorn-like warts on the lower surface of the third section). Prescutellars present . . . . . (**STEGANINAE**) 2
- Posterior reclinate orbital nearer to proclinate than to inner vertical. Anterior reclinate orbital usually shorter than proclinate. Discal and second basal cells confluent. *Costa* without thorn-like warts on the third section. Prescutellars usually absent . . . . . (**DROSOPHILINAE**) 3
- 2 Discal and second basal cells separated. Mid tibia with a row of long stout bristles dorsally.  $R_{4+5}$  and *M* strongly convergent distally. . . . . **STEGANA** (p. 15)
- Discal and second basal cells confluent. Mid tibia without a row of long stout bristles dorsally.  $R_{4+5}$  and *M* not strongly convergent distally . . . . . **LEUCOPHENG**A (p. 17)
- 3 Face flat, without true carina. Postverticals minute. Anal vein abbreviated . . . . . **DIATHONEURA** (p. 65)
- Face with carina . . . . . 4
- 4 Periorbit much broadened anteriorly. Anterior reclinate orbital fine. Anterior dorsocentrals situated near suture . . . . . **MICRODROSOPHILA** (p. 37)



- Periorbit not greatly broadened anteriorly. Anterior dorsocentrals situated much behind suture . . . . . 5
- 5 Front broad, glossy, and flat. Postverticals minute or absent. Anal vein and cell abbreviated . . . . . 6
- Front not exceedingly broad, nor glossy, nor flat. Postverticals usually long. Anal vein and cell usually well developed . . . . . 8
- 6 Orbitals two, both proclinate, no reclinate. Antenna exceedingly large. Fore femur without a row of anteroventral spinules . . . . . **LISODROSOPHILA** (p. 45)
- Reclinate orbital present. Antenna normal. Fore femur with a row of anteroventral spinules . . . . . 7
- 7 Postvertical and anterior reclinate orbital absent. Only one sternopleural . . . . . **HYPSELOTHYREA** (p. 47)
- Postvertical and anterior reclinate orbital present, though minute. Two sternopleurals . . . . . **LIODROSOPHILA** (p. 48)
- 8 Postvertical minute. Anterior reclinate orbital large, as long as proclinate. Second costal section somewhat swollen at tip, with deep incision . . . . . **PARAMYCODROSOPHILA** (p. 55)
- Postverticals usually not minute. Anterior reclinate orbital shorter than proclinate. Second costal section not swollen apically, with incision shallow . . . . . 9
- 9 More than two pairs of dorsocentrals present . . . . . **CHAETODROSOPHILELLA** (p. 57)
- Dorsocentrals in two pairs . . . . . 10
- 10 Acrostichal hairs in two or four rows. Body and wing slender . . . . . **SCAPTOMYZA** (p. 58)
- Acrostichal hairs usually in six or more rows. Body and wings usually not slender . . . . . **DROSOPHILA** (p. 66)

Subfamily **STEGANINAE****STEGANA** Meigen

*Stegana* Meigen, 1830 : 79.

Type-species : *Drosophila curvipennis* Fallén, 1823 : 1 (Europe). [teste Westwood, 1843 ; according to Wheeler, 1960].

Subgenus **Steganina** Wheeler

*Steganina* Wheeler, 1960 : 110.

Type-species: *Musca coleoptrata* Scopoli, 1763 : 338 (Europe).

**Stegana (Steganina) nigrifrons** de Meijere

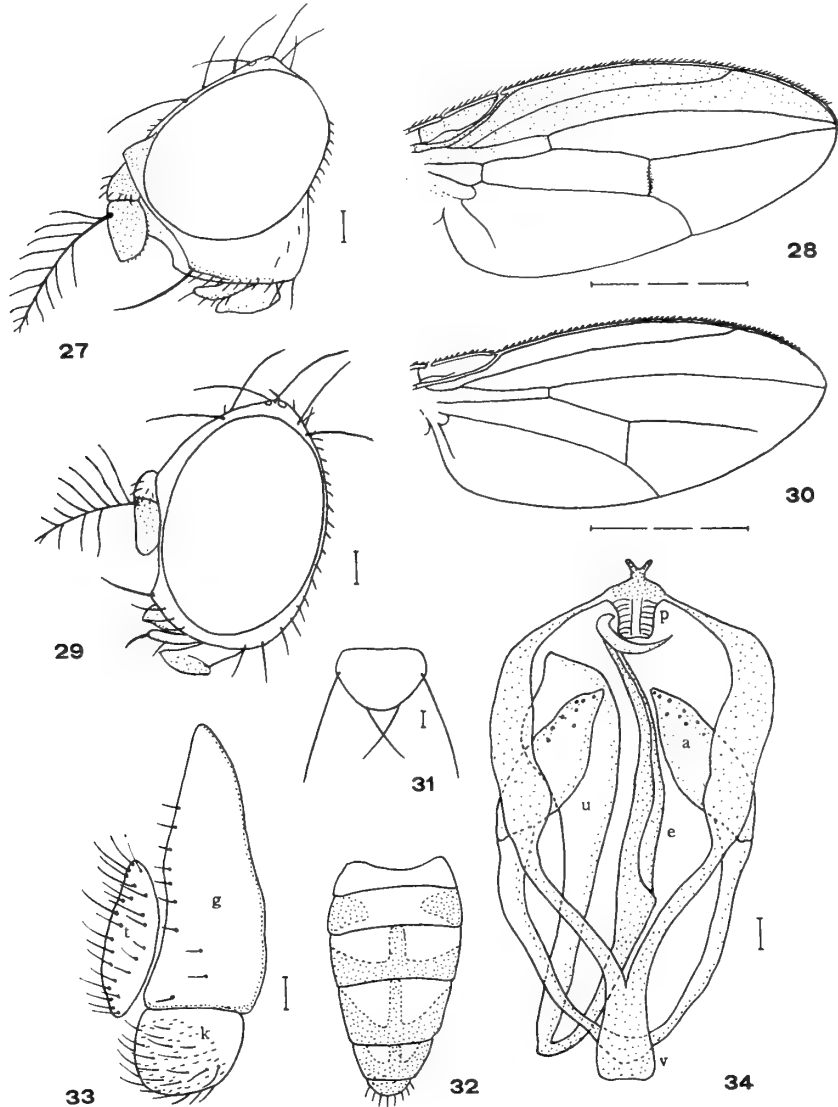
(Text-figs. 27-28)

*Stegana nigrifrons* de Meijere, 1911 : 418 (Java) ; Duda, 1923 : 37 (Formosa) ; Duda, 1924a : 182 (Java) ; Duda, 1926 : 45 (Sumatra) ; Duda, 1939 : 13 (S. Africa).

*Stegana (Steganina) nigrifrons* de Meijere ; Wheeler, 1960 : 110.

♀. Body about 2.2 mm. Head slightly narrower than thorax. Eye dark purplish red, bare. Antenna with second segment yellowish orange, anteriorly brown ; third velvety black, pubescent, anteroventral corner rectangular, posterior margin rounded, basally orange-yellow. Palpus slender, pale yellowish grey, with about three black ventral setae. Ocellar triangle black. Periorbit pale yellowish grey, half as long as front, straight, posteriorly somewhat broadened. Front deep glossy brown, concave, anterior width nearly two-thirds as broad as length down middle, posteriorly two-fifths as broad as head width. Clypeus yellowish grey. Face brownish black, lower margin broadly white. Carina short, half as long as face, high,

narrow. Cheek white, glossy, black above, about one-fourth as broad as the greatest diameter of eye. Occiput brownish black, concave. Orbitals equally distant from eye margin; anterior reclinate orbital two-thirds length of proclinate, twice as distant from posterior reclinate as from proclinate. Proclinate slightly longer than posterior reclinate. Vibrissae stout and long, succeeding orals fine.



FIGS. 27-34. 27-28, *Stegana (Steganina) nigrifrons* de Meijere, ♀. 27, head, lateral aspect; 28, wing. 29-34, *Leucophenga abbreviata* Duda, ♂. 29, head, lateral aspect; 30, wing; 31, scutellum; 32, abdominal tergites; 33, periphallallic organs, lateral aspect; 34, phallic organs, ventral aspect.

Mesonotum and scutellum dark brownish black, somewhat glossy. Scutellum triangular, somewhat pollinose. Thoracic pleura white, with a broad black longitudinal stripe above. One prominent humeral. Humeral callus somewhat pale. Acrostichal hairs in about ten irregular rows. Anterior dorsocentrals apparently absent. Anterior scutellars long, divergent; posteriors half as long as anteriors, much nearer to each other than to anteriors. Sterno-index about 0.8. Legs greyish white; knees dark brown; fore and hind femora brown apically, mid femur dark on distal half; mid and hind tibiae proximally dark. Front metatarsus as long as three succeeding tarsal segments together, subequal to the rest of tarsal joints in mid and hind legs. Wing brown, anteriorly darker.  $R_{2+3}$  strongly convex;  $R_{4+5}$  and  $M$  strongly convergent apically. Crossveins clouded, posterior crossvein somewhat sinuated.  $Cu$  distally curved downward. C-index about 1.8; 4V-index about 1.9; 4C-index about 1.3; 5x-index about 1.8; Ac-index about 20.0. C1-bristle one, short; C3-fringe on basal five-sixths. Abdominal tergites dark brownish black, darker than mesonotum.

Taplejung District, between Sangu and Tamrang, mixed plants by damp cliff in deep river gorge, c. 5,200', 22.xi.1961, 1♀ (*R.L.C.*).

Distribution: Nepal (new locality), Java, Sumatra, Formosa, S. Africa.

### LEUCOPHENGA Mik

*Leucophenga* Mik, 1886: 317.

Type-species: *Drosophila maculata* Dufour, 1839: 50 (Europe).

In homologizing components of the phallic organs of this genus, the author (1956) made some wrong interpretations, which are now amended. The main part of aedeagus (misidentified as the main part of posterior paramere) is elongate, usually partially bifurcated longitudinally, and distally with a hooked piece, which is contiguous with the posterior parameres, and proximally with a stout ventral recurved process (u, misidentified as the main part of aedeagus) (cf. pp. 121-122).

#### KEY TO SPECIES

1	$M$ distally abbreviated, not reaching wing margin . . . . .	<i>abbreviata</i> (p. 18)
-	$M$ distally not abbreviated, reaching wing margin . . . . .	2
2	Wing with more or less distinct dark markings . . . . .	3
-	Wing clear, without distinct dark markings . . . . .	6
3	Wing markings distinctly demarcated . . . . .	4
-	Wing markings diffuse . . . . .	5
4	Wing markings along <i>costa</i> and interrupted near middle . . . . .	<i>interrupta</i> (p. 21)
-	Wing markings along <i>costa</i> and on the crossveins . . . . .	<i>ornata</i> (p. 21)
5	Wing markings along <i>costa</i> and below $R_1$ . . . . .	<i>costata</i> (p. 19)
-	Wing markings only below $R_1$ . . . . .	<i>subpollinosa</i> (p. 21)
6	Third abdominal tergite very short . . . . .	7
-	Third abdominal tergite normal . . . . .	8
7	Scutellum laterally black, apically white . . . . .	<i>leucozona</i> (♂) (p. 21)
-	Scutellum dark brown, unicolorous . . . . .	<i>albifascia</i> (♂) (p. 22)
8	Halteres with black knob . . . . .	9
-	Halteres yellow or white . . . . .	11
9	Mesonotum and scutellum white, silver pollinose . . . . .	<i>argentata</i> (p. 24)
-	Mesonotum yellowish brown, scutellum dark brownish black and apically white . . . . .	10
10	Thoracic pleura without black patches . . . . .	<i>halteropunctata</i> (p. 25)
-	Thoracic pleura with black longitudinal stripe . . . . .	<i>leucozona</i> (♀) (p. 21)
11	Thoracic pleura yellow, without dark patches or stripes . . . . .	12

-	Thoracic pleura dark brownish black or with dark longitudinal stripes . . . . .	16
12	Palpus black or dark brown . . . . .	13
-	Palpus yellow or orange-yellow or at least apically yellow . . . . .	15
13	Scutellum laterally black, apically pale yellow . . . . .	<i>salatigae</i> (p. 27)
-	Scutellum yellowish grey, basally somewhat fuscous . . . . .	14
14	Palpus slender, with long setae . . . . .	<i>nigripalpis</i> (p. 28)
-	Palpus large, without setae . . . . .	<i>guttiventris</i> (p. 30)
15	Palpus apically black. Abdominal tergites banded, not spotted . . . . .	<i>nigriceps</i> (p. 31)
-	Palpus pale yellowish white. Abdominal tergites spotted . . . . .	<i>rectinervis</i> (p. 33)
16	Palpus pale brown. Abdominal tergites mostly black, 1T yellow . . . . .	<i>nigroscutellata</i> (p. 34)
-	Palpus pale yellow. Abdominal tergites spotted . . . . .	<i>albiceps</i> (p. 36)

### *Leucophenga abbreviata* (de Meijere)

(Text-figs. 29-34)

*Drosophila abbreviata* de Meijere, 1911 : 400 (Java).

*Drosomyiella abbreviata* (de Meijere) Hendel, 1914 : 114 (Java, Formosa).

*Leucophenga abbreviata* (de Meijere) Duda, 1924a : 185 (Java).

♂, ♀. Body about 2.2-3.0 mm. Head as broad as thorax. Eyes dark red, bare; ocelli bright red. Antennae with second segment yellowish brown; third greyish brown, oblong, apically rounded. Arista with about seven dorsal and three ventral branches and a small terminal fork. Palpus yellowish orange, slender, with only one prominent apical seta, ventrally with a long fine hair. Ocellar triangle black, pollinose. Periorbit greyish brown, short, medially constricted. Front somewhat glossy dirty yellow, darker in caudal aspect, parallel-sided, anterior width three-fourths as broad as length down middle, posteriorly two-fifths as broad as head width. Clypeus pale yellowish orange, somewhat protruded. Face yellowish grey, ventral margin somewhat convex. Postverticals small. Cheeks narrow, about one-thirteenth as broad as the greatest diameter of eye. Occiput dark brown, pale above. Posterior reclinate orbital slightly longer than others; anterior reclinate thrice as distant from posterior reclinate as from proclinate. Second oral fine, half as long as vibrissa, succeeding orals shorter.

Mesonotum yellowish brown, matt without prominent patches. Scutellum yellowish brown, grey pollinose, tip whitish. Thoracic pleura pale yellowish white, unicolorous. Humeral two, strong, upper the longer. Prescutellar longer than anterior dorsocentral, almost equally distant from each other and from dorsocentral. Acrostichal hairs in about ten irregular rows. Anterior dorsocentrals about one-third as long as posteriors; distance between anterior and posterior dorsocentrals about one-fourth distance between anterior pair. Anterior scutellars divergent, long, one and a half times as long as posteriors, which are nearer to each other than to anteriors. Sterno-index about 0.5. Legs yellowish white; last tarsal segment orange; front metatarsi subequal to the remaining segments together, mid metatarsi twice next two segments together, and hind metatarsi subequal to next three segments together. Preapicals on mid and hind legs; apicals on mid and hind legs. Knees somewhat fuscous. Wings hyaline, somewhat fuscous; veins yellowish brown, crossveins not clouded.  $R_{2+3}$  slightly curved to *costa* at tip;  $R_{4+5}$  slightly convex anteriorly; *M* apically abbreviated. C-index about 2.3; 4V-index about 2.0; 4C-index about 1.3; 5x-index about 1.0; Ac-index about 1.7. C1-bristles two, C3-fringe on basal two-thirds. Halteres yellow, apically black. Abdominal tergites yellowish or reddish brown; 2T medially and laterally with black spots; 3-5T with caudal black bands projected forward at middle; 6T mostly black, often with an obscure caudal band.

Periphallalic organs brownish black. Genital arch narrow above, truncate below, without microtrichia, posterior margin with several long setae; toe somewhat projected posteriorly; heel low, rectangular. Anal plate vertically elongate, fusiform, setigerous. Clasper nearly quadrate, pubescent, and setigerous. Phallic organs: Aedeagus black, basally pale, elongate, bifurcated on distal half, basally with a distally broadening apically pointed pale yellowish

brown recurved process ; hooked piece yellowish orange. Anterior paramere fusiform, with long stalk, subapically with several sensilla. Ventral fragma anteriorly pointed, lateromedially somewhat swollen.  $PI = \infty$ . p.f. = ABCDeFgHikLmN.

Taplejung District, Sangu mixed vegetation by stream in gully, c. 6,200', 9.xi.1961, 3 ♀ ; below Sangu, by stream in shady ravine, c. 6,000', 30.x.1961, 1 ♂ ; Arun Valley : east shore of River Arun below Tumlingtar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961, 24 ♂, 26 ♀ (R.L.C.).

Distribution : Nepal (new locality), Java, Formosa.

### *Leucophenga costata* sp. n.

(Text-figs. 35-37)

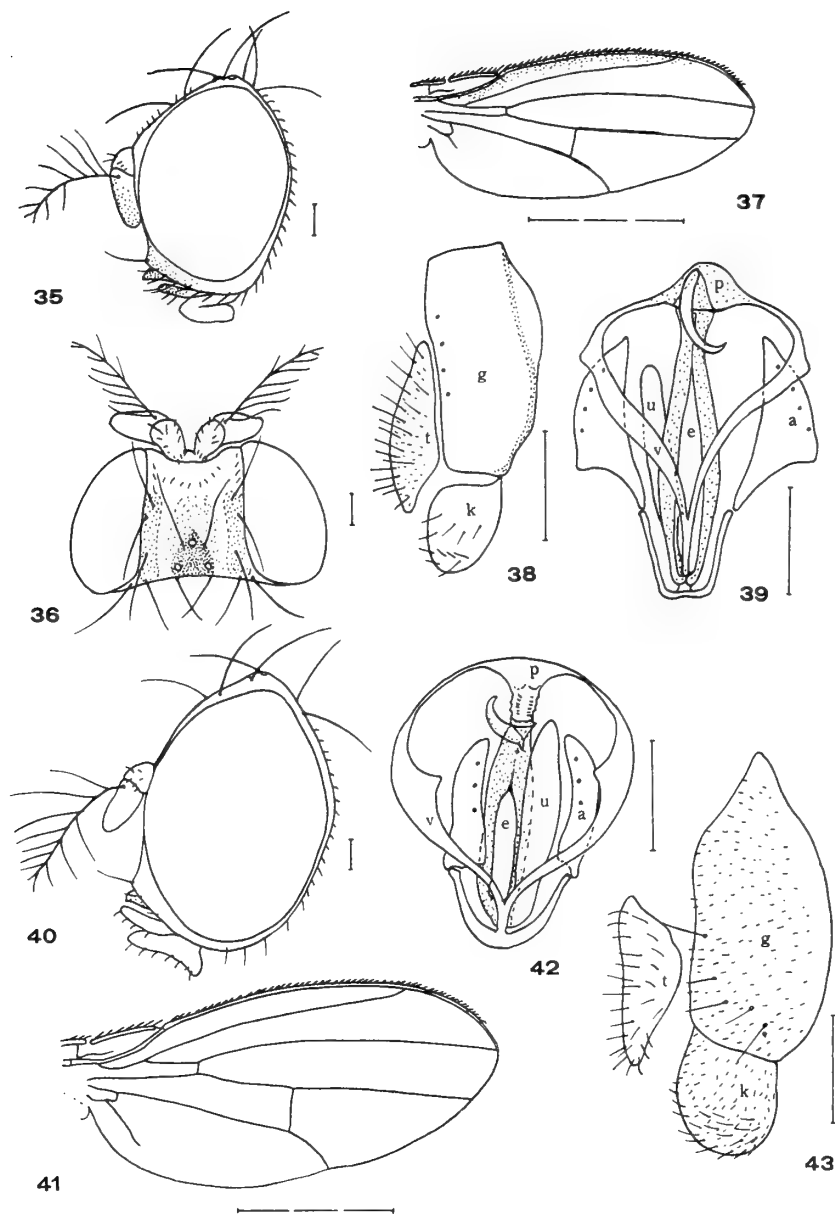
♀. Body about 2.3 mm. Head as broad as thorax. Eyes dark red, bare. Antennae with second segment yellowish grey ; third grey, basally white, apically dark orange. Palpus comparatively large, yellowish brown, apically rounded, with a subapical and a ventral black setae. Ocellar triangle black, grey pollinose. Periorbit black, grey pollinose, broad, two-thirds as long as front. Front yellowish grey, somewhat glossy, whitish and anterior width about seven-eighths as broad as length down middle, posteriorly one-third as broad as head width. Clypeus yellowish grey. Face greyish white, matt, concave. Carina low. Cheeks white, narrow, about one-twelfth as broad as the greatest diameter of eye. Occiput dark brown. Posterior reclinate orbital slightly longer than others ; anterior reclinate thrice as far from posteriors as from proclinate. One prominent oral ; second fine, one-third length of vibrissa. Postvertical rather long.

Mesonotum dark yellowish brown, black behind, grey pollinose ; humeral callus grey pollinose, dorsally bordered by a somewhat fuscous patch. Scutellum dark brownish black, grey pollinose. Thoracic pleura dark yellowish orange, with two black broad longitudinal stripes, upper one extending to postnotum ; lower short, limited to sternepisternum. One long humeral, a few shorter below it. Prescutellar longer than anterior dorsocentral. Acrostichal hairs in about eight irregular rows. Anterior dorsocentrals one-third length of posteriors ; distance between anterior and posterior dorsocentrals about one-third distance between anterior pair. Anterior scutellars divergent, longer than posteriors ; posterior scutellars four-fifths as long as anteriors, nearer to each other than to anteriors. Sterno-index about 0.7. Legs yellowish white, knees of mid and hind legs black ; all metatarsi much longer than remaining tarsal segments together. Wings hyaline, fuscous on and below *costa* ; *costa* reaching  $R_{4+5}$ . Crossveins clear.  $R_{2+3}$  weakly curved to *costa* at apex ;  $R_{4+5}$  and *M* nearly parallel. C-index about 1.9 ; 4V-index about 2.4 ; 4C-index about 1.4 ; 5x-index about 1.5 ; Ac-index about 2.0. Cr-1-bristles two, subequal ; C3-fringe on basal five-sevenths. Halteres yellowish white. Abdominal tergites glossy black ; 2T posteriorly silvery white pollinose, ultimate T white, 3-5T latero-anteriorly with white patches.

Holotype ♀. EAST NEPAL : Arun Valley, east shore of River Arun below Tumlingtar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961 (R.L.C.), BMNH.

Paratypes : 2 ♀, same data as holotype ; 1 ♀, Taplejung District, between Sangu and Tamrang, mixed shrubs in deep gorge, c. 5,200', 10.xi.1961. (R.L.C.), BMNH and at Tokyo Metropolitan University (1 ♀ from Arun Valley).

Similar to *L. nigroscutellata* Duda, 1924, (Formosa) in having black palpus, striped thoracic pleura, yellow halteres, black *costa*, and clear crossveins, but differs in having entirely black scutellum (apically yellow in *nigroscutellata*) and palpus with only a moderately strong apical seta.



FIGS. 35-43. 35-37, *Leucophenga costata* sp. n., ♂. 35, head, lateral aspect; 36, head, dorsal aspect; 37, wing. 38-39, *Leucophenga subpollinosa* de Meijere, ♂. 38, peripheral genitalia, lateral aspect; 39, phallic organs, ventral aspect. 40-43, *Leucophenga leucoxona* Duda, ♂. 40, head, lateral aspect; 41, wing; 42, phallic organs, ventral aspect; 43, peripheral genitalia, lateral aspect.

***Leucophenga subpollinosa* de Meijere**

(Text-figs. 38-39)

*Leucophenga subpollinosa* de Meijere, 1914 : 263 (Java) ; Duda, 1923 : 27 (Formosa) ; Duda, 1924a : 186 (Java, Annam, Formosa) ; 1924b : 237 (Formosa) ; Duda, 1926 : 52 (Sumatra) ; Duda, 1939 : 42 (Africa) ; Okada, 1956 : 30 (Japan) ; Wheeler and Takada, 1964 : 229 (Palau).

Periphallalic organs : Genital arch black, broadly truncate below, heel and toe rectangular. Anal plate black, elongate, fusiform. Clasper oval, setigerous tip, rounded. Decasternum laterally oblong, yellowish brown. Phallic organs : Aedeagus slender, distal half black and bifid, basally with pale brown, rod-shaped, ventral recurved process. Anterior paramere elongate, triangular, medially with a few sensilla. Ventral fragma narrow, proximal half rod-shaped. Posterior parameres triangular.  $PI = \infty$ . p.f. = ABCDeFgHikLmN.

Taplejung District, river banks below Tamrang Bridge, c. 5,500', x-xi.1961, 1 ♂ ; below Sangu, mixed vegetation on sheltered slopes above river, c. 4,000', 3.i.1962, 1 ♂ ; Dobhan, small pockets of plants on arid slopes above River Maewa, c. 3,500', 2.i.1962, 12 ♂, 15 ♀ ; ibid., shady places on shrubby slope above River Tamur, c. 3,500', 21-27.i.1962, 9 ♂, 9 ♀ ; Arun Valley, east shore of River Arun below Tumlingtar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961, 1 ♂, 10 ♀ (R.L.C.).

Distribution : Nepal (new locality), Java, Sumatra, Viet-Nam, Formosa, Japan, Africa, Micronesia.

Slightly different from the Japanese form (Okada, 1956) in ♂ genital organs ; clasper apically rounded (pointed and clawed in Japanese form).

***Leucophenga ornata* Wheeler**

*Leucophenga ornata* Wheeler, 1959 : 184 ; Okada, 1964a : 105 (Japan : Amami).

*Drosophila ornatipennis* Williston ; de Meijere, 1914 : 256 (Java).

*Leucophenga ornatipennis* (Williston) ; Duda, 1924a : 186 (Java) ; Okada, 1956 : 37 (Japan) ; Paik, 1958 : 211 (Korea).

Arun Valley, east shore of River Arun below Tumlingtar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961, 1 ♀ (R.L.C.).

Distribution : Nepal (new locality), Java, Japan, Korea.

***Leucophenga interrupta* Duda**

*Leucophenga interrupta* Duda, 1924a : 187 ; 1924b : 237 (Formosa) ; Okada, 1956 : 36 (Japan) ; Okada, 1964a : 106 (Amami : Japan).

Arun Valley : above River Sabhaya, east shore, swept from dwarf bamboos in deep ravine, c. 2,000', 12.xii.1961, 1 ♂ (R.L.C.).

Distribution : Nepal (new locality), Formosa, Japan.

***Leucophenga leucozona* Duda**

(Text-figs. 40-43, 96)

*Leucophenga leucozona* Duda, 1924a : 188 (New Guinea).

♂, ♀. Body about 2.2-2.8 mm. Head as broad as thorax. Eyes deep red, large, bare. Antennae with second segment yellow ; third grey, oblong, twice as long as broad. Arista with

five to eight dorsal and two or three ventral branches besides a small fork. Palpus yellowish orange, with short black stout setae below. Ocellar triangle black. Periorbit yellowish grey, medially narrowing, two-thirds as long as front. Front yellowish grey, parallel-sided, anterior width two-thirds or three-fourths as broad as length down middle, posteriorly two-fifths as broad as head width, medially slightly fuscous. Face greyish white, laterally concave. Carina flat. Cheeks yellow, very narrow, about one-fourteenth as broad as the greatest diameter of eye. Orbitals equal sized; anterior reclinate four times as distant from posterior reclinate as from proclinate. Only one prominent oral. Postverticals rather long.

Mesonotum deep yellowish orange, unicolorous. Scutellum deep yellowish orange, laterally black, apically yellowish white. Thoracic pleura yellow, with a black longitudinal obscurely defined stripe. Prescutellar long, as long as anterior dorsocentral. Acrostichal hairs in about ten rows. Anterior dorsocentrals two-thirds length of posteriors; distance between anterior and posterior dorsocentrals about two-sevenths distance between anterior pair. Anterior scutellars divergent, slightly longer than scutellum; posteriors slightly shorter than anteriors. Sterno-index about 0.8. Legs yellow, thick; mid and hind knees slightly fuscous. Mid metatarsi sub-equal in length to the other segments together, fore and hind metatarsi slightly longer than the other segments together. Preapicals on all legs; those on mid leg large. Wing hyaline, crossveins clear.  $R_{2+3}$  gently curved to *costa* at tip;  $R_{4+5}$  and  $M$  somewhat divergent apically. C-index about 2.2; 4V-index about 2.0; 4C-index about 1.1; 5x-index about 1.4; Ac-index about 2.0. C1-bristles two; C3-fringe on basal seven-tenths. Halteres yellow, slightly black at tip. Abdominal tergites: In ♂, 1T yellow; 2T anteriorly black, posterior half silvery white; 3T very short, silvery white, without macrotrichia; 5-6T black, dorsolaterally with small yellowish spots; anal cerci yellow. In ♀, 2T with lateral black spot; 3T not short; 3-5T black, lateroanteriorly yellow; 6T yellow; anal cercus yellow.

Periphallalic organs: Genital arch white, narrow above, broadly truncate below, heel and toe nearly rectangular, with evenly distributed microtrichia and several setae on posterior and ventral margins. Anal cercus white, small, fusiform, setigerous, anteriorly convex. Clasper white, oval, pubescent, setigerous on lower half. Phallic organs: Aedeagus black, entirely bifurcated, apically with an orange-yellow hooked piece, basally with a pale rod-shaped recurved process. Anterior paramere pale, elongate, fusiform, distally with a few sensilla. Posterior parameres triangular, orange-brown. Ventral fragma proximally pointed, laterally somewhat dilated.  $PI = \infty$ . p.f. = ABCDEFgHikLmN.

Taplejung District, between Sangu and Tamrang, mixed shrubs in deep gorge, c. 5,200', x-xi.1961, 1 ♂; Arun Valley, east shore of River Arun below Tumlingtar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961, 15 ♂, 5 ♀ (R.L.C.).

Distribution: Nepal (new locality), New Guinea.

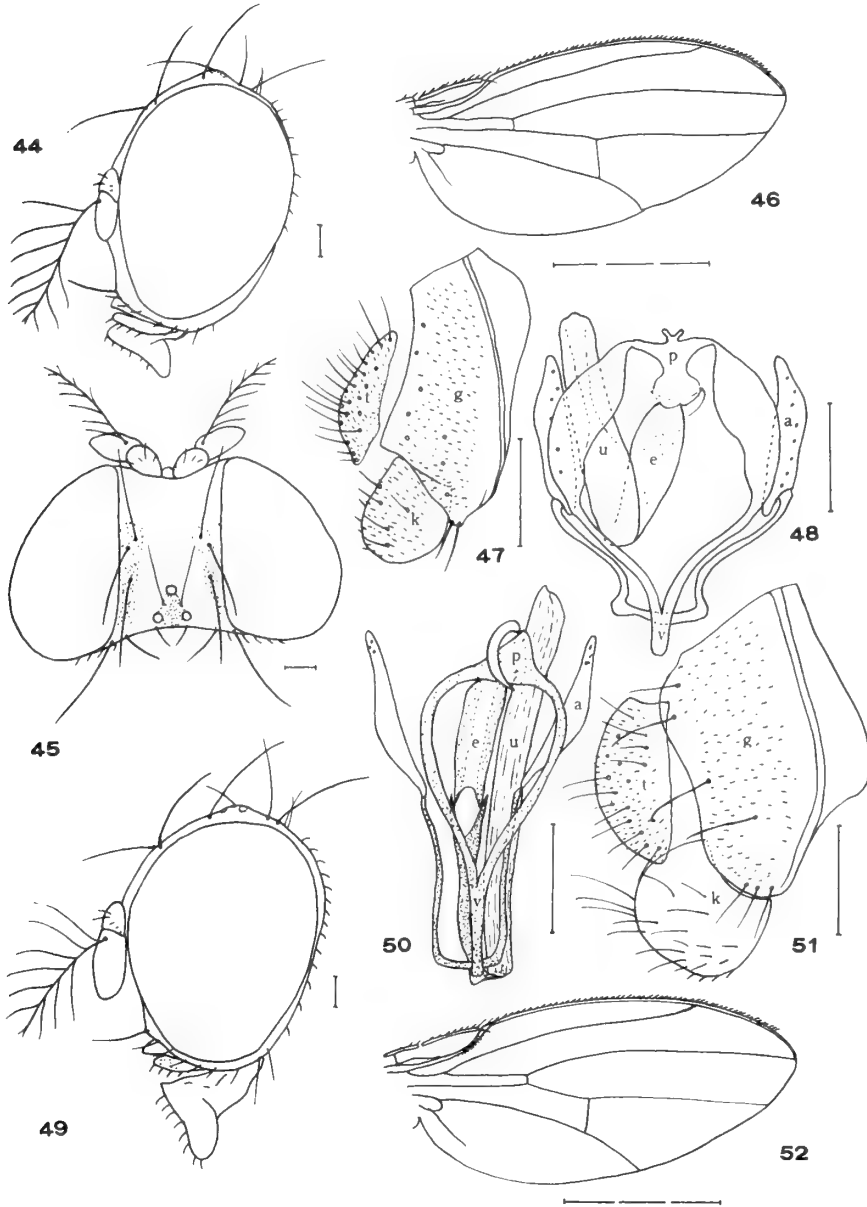
Agrees with the original form (New Guinea, Duda, 1924a) in having yellow palpus, yellow and apically black halteres, and striped thoracic pleura, but differs in having no prominent macrotrichia on ♂ 3T.

### *Leucophenga albifascia* sp. n.

(Text-figs. 44-48, 95)

♂. Body about 2.5 mm. Head slightly broader than thorax. Eyes dark red, large, bare. Ocelli bright deep red. Antennae with second segment yellow, third grey. Arista with about six dorsal and three ventral branches and a small terminal fork. Palpus orange-yellow, slender, ventrally with a few strong black setae. Ocellar triangle black, grey pollinose. Periorbit brown, obscurely demarcated from front, anteriorly broadened, two-thirds as long as front. Front narrow, nearly parallel-sided, dark yellowish grey, anteriorly paler, anterior width as





FIGS. 44-52. 44-48, *Leucophenga albifascia* sp. n., ♂. 44, head, lateral aspect; 45, head, dorsal aspect; 46, wing; 47, peripheral phallic organs, lateral aspect; 48, phallic organs, ventral aspect. 49-52, *Leucophenga argentata* de Meijere, ♂. 49, head, lateral aspect; 50, phallic organs, ventral aspect; 51, peripheral phallic organs, lateral aspect; 52, wing.

broad as length down middle, posteriorly about two-sevenths as broad as the head width. Face greyish white, flat, laterally concave. Carina undeveloped. Cheeks white, very narrow, about one-twentieth as broad as the greatest diameter of eye. Occiput brownish black. Anterior reclinate orbital thrice as distant from posterior reclinate as from proclinate. Postverticals slender. Inner vertical much shorter than outer vertical. Vibrissae long, succeeding orals about one-third as long as vibrissa.

Mesonotum dark orange-brown, silver pollinose, mediocaudally and laterally more fuscous. Scutellum dark brown, grey pollinose. Thoracic pleura pale yellow, orange below, with an anteriorly narrowing dark brownish black median longitudinal stripe. Humerals two, upper longer. Prescutellar as long as anterior dorsocentral. Anterior dorsocentrals about half length of posteriors; distance between anterior and posterior dorsocentrals about two-thirds distance between anterior pair. Anterior scutellars divergent, slightly longer than posteriors, which are nearer to each other than to anteriors. Sterno-index about 0.9. Legs yellow; knees of hind leg somewhat fuscous; last tarsal segment brownish. Front and mid metatarsi slightly longer than the other segments together, hind metatarsi as long as the other segments together. Preapicals on mid and hind legs; apicals prominent on mid leg. Wings hyaline, crossveins clear.  $R_{2+3}$  nearly straight, gently curved to *costa* apically;  $R_{2+3}$  and  $M$  nearly parallel. C-index about 2.2; 4V-index about 2.1; 4C-index about 2.2; 5x-index about 1.3; Ac-index about 2.5. C1-bristles two; C3-fringe on basal two-thirds. Halteres yellow, tip glossy black. Abdominal tergites black, matt; 1T yellow; 2T medioanteriorly yellow, caudal margin narrowly white; 3T very short, white, without setae. Cerci black.

Periphallallic organs: Genital arch black, pubescent, broad; heel low, triangularly pointed, with a few stout long setae; toe nearly rectangular; caudal margin with several long setae. Anal plate rather small, fusiform, setigerous, pubescent, ventral tip pointed. Clasper oval, pubescent and setigerous, proximally somewhat narrowing, distally rounded. Decasternum a narrow transverse bar. Phallic organs: Aedeagus black, flat, oblong; ventral recurved process pale yellow, rod-shaped, parallel-sided, twice as long as aedeagus. Anterior paramere oblong, pale, with a row of several sensilla on nearly entire length. Ventral fragma appearing pointed proximally, laterally pale, fusiformly dilated.  $PI = \infty$ . p.f. = ABCDeFgHikLmN.

Holotype ♂. EAST NEPAL: Arun Valley, west shore of River Arun, below Tumlingtar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961 (R.L.C.), BMNH.

Closely resembles *L. leucozona* Duda in having very narrow white 3T in ♂, halteres with black knob, striped thoracic pleura, and yellowish orange palpus, but differs from it in having unicolorously dark brownish black scutellum, 2T only yellow anteriorly and cercus black.

### *Leucophenga argentata* (de Meijere)

(Text-figs. 49-52, 73)

*Drosophila argentata* de Meijere: 258 (Java).

*Leucophenga argentata* (de Meijere) Duda, 1924a: 188; 1924b: 238 (Java, Formosa); Sturtevant, 1927: 364 (Philippine); Wheeler and Takada, 1964: 226 (Palau).

♂, ♀. Body about 2.5 mm. Head slightly broader than thorax. Eyes reddish brown, large, bare. Antennae milky white; third segment twice as long as broad, tip somewhat angular anteroventrally. Arista with about seven dorsal and three ventral branches and a small terminal fork. Palpus pale brown, darker in female, small, apically fuscous, ventrally with a few long black setae. Ocellar triangle black, grey pollinose. Periorbit milky white, obscurely demarcated from front. Front milky white, flat, parallel-sided, anterior width four-sevenths as

broad as length down middle, posteriorly two-sevenths as broad as head width. Clypeus greyish white, medially white. Face white, narrow. Carina undeveloped. Cheeks white, narrow, about one-twentieth as broad as head width. Occiput dark brownish black, white above. Anterior reclinate orbital four times as distant from posterior reclinate as from proclinate, which is slightly shorter than reclinates; posterior reclinate slightly nearer to proclinate than to inner vertical. Inner vertical one-third as long as outer vertical. Postverticals short, half as long as inner verticals. Only one prominent oral.

Male mesonotum white, densely silver pollinose; scutellum silver pollinose, unicolorous. Female mesonotum yellowish white; scutellum yellowish white, apically white. Thoracic pleura white, matt, unicolorous. Only one long median humeral. Prescutellar as long as anterior dorsocentral. Acrostichal hairs in about eight rows. Anterior dorsocentrals two-thirds length of posteriors; distance between anterior and posterior dorsocentrals about two-thirds distance between anterior pair. Anterior scutellars divergent, posteriors slightly nearer to each other than to anteriors. Sterno-index about 0.8. Legs white; all metatarsi subequal in length to the other segments together. Preapicals on mid and hind legs; apicals prominent on mid leg. Wings hyaline, slightly pointed at tip; crossveins clear; *costa* ending at the tip of  $R_{4+5}$ ;  $R_1$  and  $R_{2+3}$  apically black;  $R_{2+3}$  gently curved to *costa* apically;  $R_{4+5}$  and  $M$  nearly parallel. C-index about 1.8; 4V-index about 2.9; 4C-index about 1.9; 5x-index about 1.9; Ac-index about 2.4. C<sub>1</sub>-bristles two; C<sub>3</sub>-fringe on basal five-sevenths. Halteres white, knob black. Abdominal tergites yellowish white. In male, 2T laterally with a small black spot; 4-5T medially with a long black stripe, laterally with two large black spots. In female, 2T laterally with a large black spot; 3-4T with five black spots; 5T with seven black spots; 6T with two black spots.

Periphalllic organs yellowish white. Genital arch broad, gently narrowing below, pubescent, with a few setae on upper caudal margin, lower tip, and at middle; heel rectangular; toe rounded. Anal plate semicircular, setigerous and pubescent. Clasper nearly quadrate, broader than long, with long setae on caudal margin and inferior surface. Phallic organs: Aedeagus black, elongate, distal half bifurcated, basally with a pale yellowish brown elongate ventral recurved process, which is longer than aedeagus and apically slightly pointed. Anterior paramere long, narrow, slightly swollen medially, apically with a few sensilla. Posterior paramere brown, attached to a dark brown hooked piece of aedeagus. Ventral fragma black, proximally pointed. PI =  $\infty$ . p.f. = ABCDefgHikLmN.

Taplejung District, Dobhan, evergreen trees overhanging stream in deep gully, c. 3,500', 30.i.1962, 1 ♂; Arun Valley, east shore of River Arun below Tumlingtar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961, 6 ♂, 5 ♀; above River Sabhaya, east shore, swept from dwarf bamboos in deep ravine, c. 2,000', 12.xii.1961, 1 ♂ (*R.L.C.*).

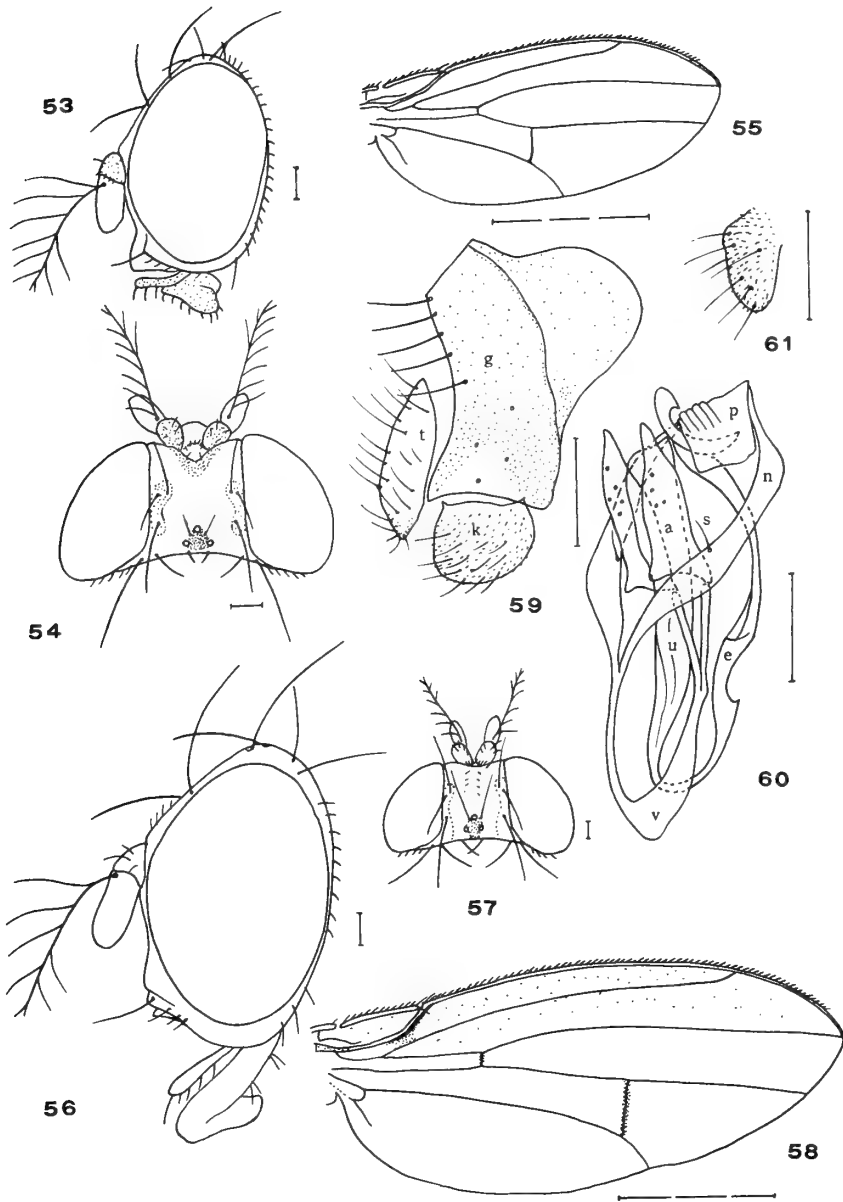
Distribution: Nepal (new locality), Java, Formosa, Philippines, Palau.

### *Leucophenga halteropunctata* Duda

(Text-figs. 53-55, 71)

*Leucophenga halteropunctata* Duda, 1923: 28 (Formosa) [nom. nud.]; Duda, 1924a: 188; 1924b: 239 (Formosa); Sturtevant, 1927: 364 (Philippine); Burla, 1954: 29 (Africa); Wheeler and Takada, 1964: 228 (Palau).

♀. Body about 2 mm. Head as broad as thorax. Eyes dark red, bare. Antennae with second segment orange-brown; third greyish yellow. Arista with about five dorsal and two or three ventral branches and a moderate terminal fork. Palpus dark brownish black, slender, with an apical and two ventral long setae. Ocellar triangle black, grey pollinose, Periorbit greyish yellow, not sharply demarcated. Front yellowish grey, parallel-sided, somewhat glossy,



FIGS. 53-61. 53-55, *Leucophenga halteropunctata* Duda, ♀. 53, head, lateral aspect; 54, head, dorsal aspect; 55, wing. 56-61, *Leucophenga salatigae* de Meijere. 56, ♂ head, lateral aspect; 57, ♂ head, dorsal aspect; 58, ♂ wing; 59, periphallallic organs, lateral aspect; 60, phallic organs, lateral aspect; 61, ♀ egg-guide.

anterior width three-fourths as broad as length down middle, posteriorly slightly less than one-third as broad as head width. Carina flat, grey. Buccal margin somewhat convex. Cheek narrow, yellowish white, about one-twentieth as broad as the greatest diameter of eye. Occiput dark brown, paler above. Proclinate orbital slightly shorter than others; anterior reclinate just outside proclinate. Inner vertical much shorter than outer vertical. Postvertical minute. One prominent oral.

Mesonotum orange-yellow, anterolaterally and caudomedially yellowish brown; neck region brownish black above. Scutellum dark brown, laterally with a black patch at the insertion of anterior scutellar. Thoracic pleura white, without dark patches. Only one humeral. Prescutellar slightly longer than anterior dorsocentral. Acrostichal hairs in about nine irregular rows. Anterior dorsocentrals about half length of posteriors; distance between anterior and posterior dorsocentrals slightly longer than one-third distance between anterior pair. Anterior scutellars divergent; posteriors as long as anteriors, equally distant from each other and from anteriors. Sterno-index about 0.8. Legs yellowish white; femora white; tibiae fuscous apically and tarsi slightly so. Preapicals on mid and hind legs; apicals on mid leg. Wing hyaline; veins yellowish brown; crossveins not clouded, posterior crossveins somewhat sinuated.  $R_{2+3}$  nearly straight, apically curved to *costa*;  $R_{4+5}$  and  $M$  nearly parallel, considerably convergent basally. C-index about 1.7; 4V-index about 3.1; 4C-index about 1.9; 5x-index about 1.3; Ac-index about 2.8. C<sub>1</sub>-bristles two; C<sub>3</sub>-fringe on basal three-sevenths. Halteres yellow, base orange, knob glossy black. Abdominal tergites yellowish brown, with black spots as follows: two small ones on 1T (usually absent), four outer larger, on 2T, three on 3T, median one large, five large ones on 4T, five small ones on 5T, and two small ones on 6T.

Arun Valley, east shore of River Arun below Tumlingtar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961, 10 ♀ (*R.L.C.*).

Distribution: Nepal (new locality), Formosa, Philippines, Palau, Africa.

### *Leucophenga salatigae* de Meijere

(Text-figs. 56-61, 72)

*Leucophenga salatigae* de Meijere, 1914: 260 (Java).

*Leucophenga albicincta* de Meijere var. *Salatigae* de Meijere; Duda, 1939: 47 (Africa).

♂, ♀. Body about 3 mm. Head as broad as thorax. Eyes dark red, large, bare. Antennae with second segment yellowish grey; third grey, twice as long as broad, pale at base of arista, which has about six dorsal and two ventral branches and a small terminal fork. Palpus yellowish orange, slender, curved upward, apical half dark brown, with short setae below. Ocellar triangle black. Periorbit yellowish grey, not reaching anterior extremity of front. Front yellowish grey, matt, anteriorly pale, anterior width narrower than length down middle, posteriorly about two-fifths as broad as head width. Clypeus yellowish grey. Face yellowish white. Carina flat. Cheek very narrow, about one-twelfth as broad as the greatest diameter of eye. Occiput black. Postverticals moderate in size. Posterior reclinate orbital nearly twice as long as others; anterior reclinate slightly behind proclinate and thrice as distant from posterior reclinate as from proclinate. Only one prominent oral, others slender.

Mesonotum orange-brown, convex, unicolorous. Scutellum yellowish orange, apically pale yellow, laterally black. Thoracic pleura yellow, with a broad black longitudinal stripe for entire length. Humeral callus yellow. Humerals three, uppermost longest, lowermost shortest. Acrostichal hairs in about eight rows. Prescutellar nearly as long as anterior dorsocentral. Posterior dorsocentrals nearly twice as long as anteriors; distance between anterior and posterior dorsocentrals about one-third distance between anterior pair. Anterior scutellars long, divergent; posteriors two-thirds length of anteriors and as long as scutellum. Sterno-index about

0.6. Legs yellow ; knees not absolutely black ; front metatarsi slightly longer than the other segments together, mid and hind metatarsi much longer than the other segments together. Preapicals on mid and hind legs, apicals prominent on mid leg. Wing slightly fuscous especially on anterior half, with black patch below  $R_1$  ; crossveins slightly clouded. C-index about 2.4 ; 4V-index about 1.2 ; 4C-index about 0.9 ; 5x-index about 1.6 ; Ac-index about 2.1. C1-bristles two ; C3-fringe on basal three-fourths. Halteres whitish yellow, not fuscous. Abdominal tergites black ; 1T yellow, 2T anteromedially yellow, 3T yellow on anterolateral margin. Abdominal sternites pale yellow.

Periphallalic organs : Genital arch black, broad, ventrally broader and truncate, pubescent and caudally with setae ; toe triangularly pointed caudally ; heel low, rectangular. Clasper oval pale brown, darker anteriorly, setigerous and pubescent. Anal plate fusiform, pale brown, setigerous but without microtrichia, ventral tip black. Phallic organs : Aedeagus pale brown, slender, bifid on distal two-thirds ; ventral recurved process slender, nearly as long as aedeagus ; apical hooked piece yellowish orange. Anterior paramere elongate, blade-like, pale yellowish brown, medially with a few sensilla. Posterior parameres dark brown, fused to be a quadrate lobe. Ventral fragma with distinct submedian spines. PI =  $\infty$ . p.f. = ABCDeFgHIkLmN.

Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', ix-x.1961, 1 ♀ ; between Sangu and Tamrang, shrubs by path, c. 5,800', 6.xi.1961, 3 ♂ ; ibid., mixed shrubs in deep gorge, c. 5,200', x-xi.1961, 19 ♂, 3 ♀ ; ibid., mixed plants by damp cliff in deep river gorge, c. 5,200', 22.xi.1961, 3 ♂, 1 ♀. Arun Valley, below Tumlingtar, River Sabhaya, west shore, evergreen shrubs on sandy shore, c. 1,800', 9-17.xii.1961, 1 ♂, 1 ♀. (R.L.C.).

Distribution : Nepal (new locality), Java, Africa.

Differs from the original form (Java, de Meijere, 1914) in having pale yellow halteres (fuscous in original form) and much smaller 4V-index (2.3 in original form). Occurrence of submedian spines on ventral fragma of phallic organ seems to be unique among the genus *Leucophenga*, although it is prevalent in the subfamily Drosophilinae.

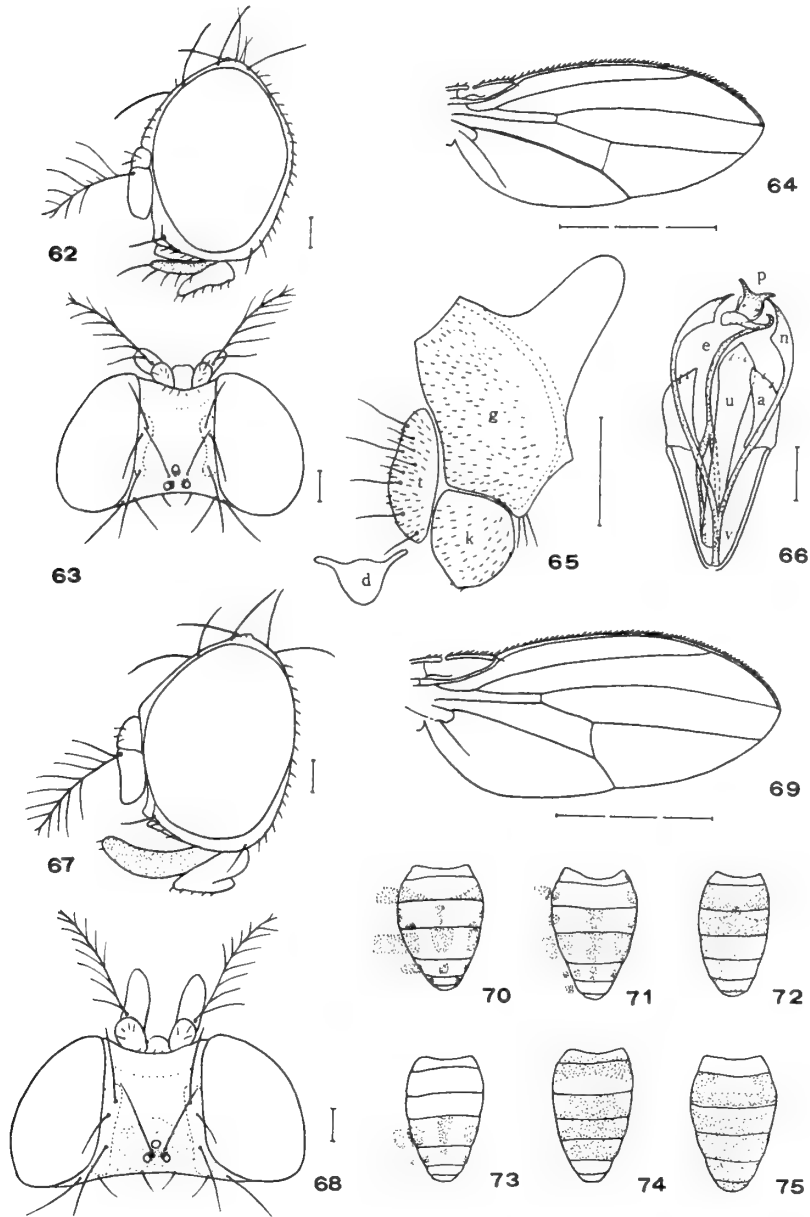
### *Leucophenga nigripalpis* Duda

(Text-figs. 62-66)

*Leucophenga nigripalpis* Duda, 1924a : 188 (Formosa).

♂. Body about 2 mm. Head as broad as thorax. Eyes reddish brown, large, bare. Antennae with second segment pale yellowish brown, third greyish yellow. Arista with about five to six dorsal and two to three ventral branches and a moderate terminal fork. Palpus black, slender, with an apical and a few ventral long black setae. Ocellar triangle black within the bright red ocelli. Periorbit greyish yellow, short, medially constricted. Front pale yellowish grey, somewhat glossy, flat, parallel-sided, anteriorly yellowish white and two-thirds as broad as length down middle, posteriorly slightly narrower than one-third head width. Face flat, yellowish white ; buccal margin slightly convex. Cheek white, narrow, about one-fifteenth as broad as the greatest diameter of eye. Orbitals subequal in size ; anterior reclinate orbital just outside and behind proclinate, four times as distant from posterior reclinate as from proclinate. Postverticals small. Vibrissae rather short, second oral much shorter than vibrissa. Clypeus pale brown.

Mesonotum pale yellowish orange, laterally and caudally fuscous. Scutellum yellowish brown, anterolaterally fuscous. Thoracic pleura pale yellowish orange, without dark patches. Two humerals. Prescutellar longer than anterior dorsocentral. Acrostichal hairs in about ten irregular rows. Anterior dorsocentrals short, about two thirds length of posteriors ; distance



FIGS. 62-75. 62-66, *Leucophenga nigripalpis* Duda, ♂. 62, head, lateral aspect ; 63, head, dorsal aspect ; 64, wing ; 65, periphallallic organs, lateral aspect ; 66, phallic organs, ventral aspect. 67-70, *Leucophenga guttiventris* Duda, ♀. 67, head, lateral aspect ; 68, head, dorsal aspect ; 69, wing ; 70, abdominal tergites. 71-75, abdominal tergites of 71, *Leucophenga halteropunctata* Duda, ♀ ; 72, *L. salaticgae* de Meijere, ♂ ; 73, *L. argentata* de Meijere, ♂ ; 74, *L. nigroscutellata* Duda, ♀ ; 75, *L. albiceps* de Meijere ♂.

between anterior and posterior dorsocentrals about two-sevenths distance between anterior pair. Anterior scutellars divergent, slightly longer than posteriors, which are a little nearer to each other than to anteriors. Sterno-index about 0.7. Legs yellowish white; mid and hind knees somewhat fuscous. All metatarsi longer than the other segments together. Preapicals on all legs; apicals prominent on mid leg. Wings hyaline, slightly pointed at tip; crossveins clear.  $R_{2+3}$  nearly straight;  $R_{4+5}$  and  $M$  somewhat convergent distally;  $Cu$  black, other veins pale. C-index about 2.0; 4V-index about 2.2; 4C-index about 1.4; 5x-index about 1.1; Ac-index about 2.6. C1-bristles two; C3-fringe on basal about three-fifths. Halteres yellowish orange, stalk paler. Abdominal tergites mostly black; 1T and 2T except posterior margin yellowish brown.

Periphallalic organs: Genital arch brownish black, broad, pubescent; anterior fragma extremely protruded forward; heel lower than toe, with a few long hairs. Anal plate oblong, brown, hairy and pubescent. Clasper brownish black, roughly pentagonal, lower tip somewhat pointed, without teeth, pubescent on surface. Phallic organs: Aedeagus black, slender, basal half bifurcated; ventral recurved process dark orange, elongate, distally much swollen, apically curved ventrally and pointed, nearly as long as aedeagus. Anterior paramere pale, broad, subapically with a few sensilla. Posterior paramere brown. Ventral fragma proximally pointed, distally narrowing. PI =  $\infty$ . p.f. = ABCDefgHikLMN.

Arun Valley, east shore of River Arun, Tumlingtar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961, 3 ♂ (*R.L.C.*).

Distribution: Nepal (new locality), Formosa.

Differs from the original form (Formosa) in having 3-5T largely black, without diffuse black lateral spots.

### *Leucophenga guttiventris* (de Meijere)

(Text-figs. 67-70)

*Drosophila guttiventris* de Meijere, 1911: 414 (Java).

*Leucophenga guttiventris* (de Meijere) Sturtevant, 1921: 131 (Java); Duda, 1924a: 187, 188; 1924b: 239 (Java, Formosa); Duda, 1923: 28 (Java, Formosa); Bezzi, 1928: 155 (Fiji); Duda, 1939: 32; 51 (Africa); Okada, 1956: 27 (Japan).

*Leucophenga guttiventris* var. *curvipila* Duda, 1939: 32 (Africa).

*Leucophenga guttiventris* var. *fuscipennis* Duda, 1939: 32 (Formosa).

*Leucophenga fuscipennis* Duda, 1923: 28 (Formosa).

*Drosophila maculiventris* van der Wulp; de Meijere, 1908: 155 (Java).

♀. Body about 2.5 mm. Head as broad as thorax. Eyes pale reddish brown, large, bare. Antennae with second segment pale yellowish brown; third greyish white, elongate. Arista with about six dorsal and four ventral branches and a small terminal fork. Palpus large, dark brownish black, basally paler, curved upward, subapically with a fine short seta. Ocellar triangle black, pollinose. Periorbit greyish white, short, flat, not well demarcated from front. Front white, somewhat glossy, posteriorly slightly yellowish brown, anteriorly about five-sevenths as broad as length down middle, posteriorly about two-fifths as broad as head width. Clypeus pale brown, narrow. Face white, flat. Carina undeveloped. Cheeks white, narrow, about one-twentieth as broad as the greatest diameter of eye. Occiput black, upper margin yellow. Anterior reclinate orbital slightly shorter than other orbitals, outside proclinate, thrice as distant from posterior reclinate as from proclinate. Only one prominent rather short oral.

Mesonotum orange-yellow, caudomedially somewhat brownish, posteriorly slightly silver pollinose; humeral callus pale. Scutellum orange-yellow, slightly glossy, laterally somewhat fuscous, pale at tip. Thoracic pleura pale yellowish white, without dark markings. Humerals two. Prescutellar as long as anterior dorsocentral. Acrostichal hairs in about eight rows. Anterior dorsocentrals about five-eighths as long as posteriors; distance between anterior and



posterior dorsocentrals about one-fourth distance between anterior pair. Anterior scutellars long, divergent; posteriors shorter, nearly equally distant from each other as from anteriors. Sterno-index about 0.7. Legs yellowish white; knees of mid and hind legs narrowly black; all metatarsi nearly as long as the other segments together. Preapicals on all legs; apicals on fore and mid legs. Wing hyaline, veins dark yellow, crossveins clear.  $R_{2+3}$  somewhat convex anteriorly at middle, curved to *costa* at tip;  $R_{4+5}$  strongly convex anteriorly before middle. *Costa* reaching tip of  $R_{4+5}$ . C-index about 2.3; 4V-index about 3.3; 4C-index about 1.7; 5x-index about 1.0; Ac-index about 2.7. C1-bristles two; C3-fringe on basal five-eighths. Halteres yellow, stalk paler. Abdominal tergites orange-yellow; 1T entirely yellow; 2-6T with black spots as follows: two on 2T, 3 small on 3T, three large on 4T, three small on 5T, two small on 6T.

Arun Valley, east shore of River Arun below Tumlingtar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961, 5 ♀. Taplejung District, Dobhan, mixed vegetation in dry gully on wooded slope, c. 3,500', 29.i.1962, 1 ♀ (R.L.C.).

Distribution: Nepal (new locality), Java, Formosa, Japan, Fiji, Africa.

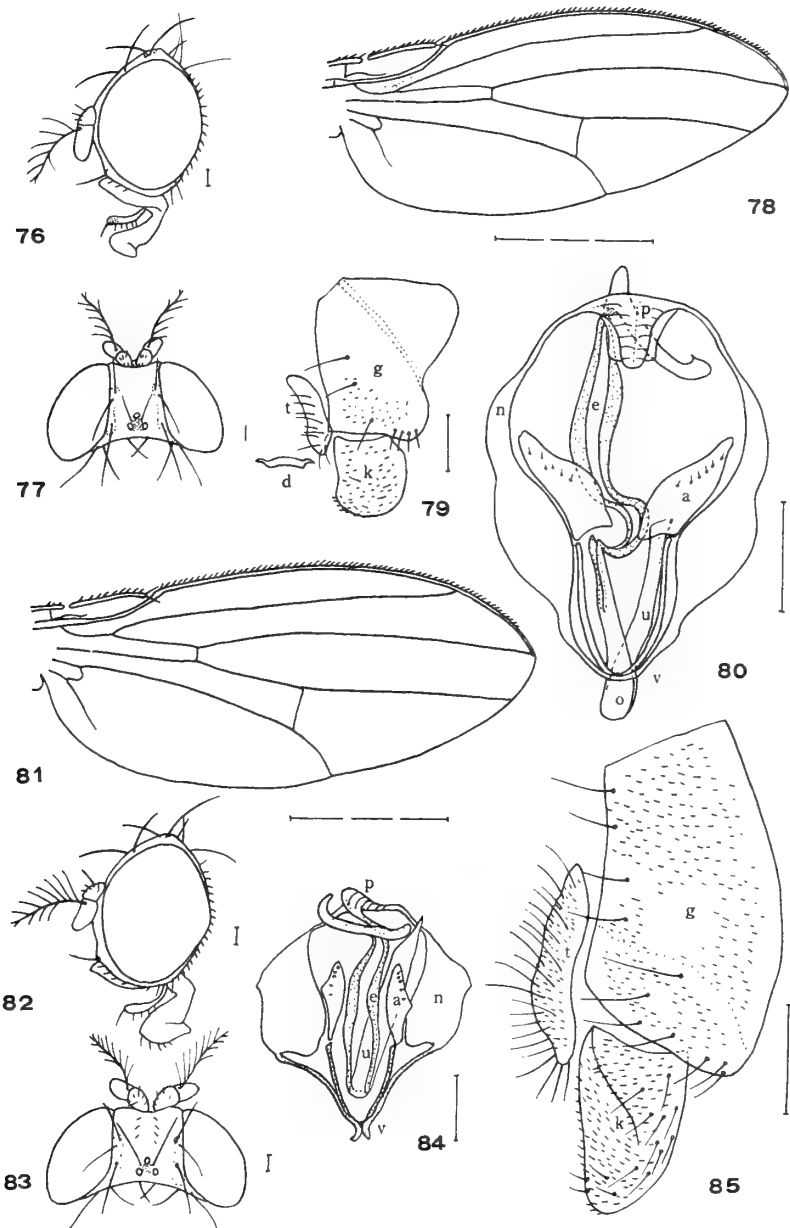
### *Leucophenga nigriceps* sp. n.

(Text-figs. 76-80)

♂. ♀. Body about 3 mm. Head slightly broader than thorax. Eyes dark red, bare, large. Antennae with second segment yellow; third yellowish grey, oblong, twice as long as broad, pale at the base of arista. Arista with about five dorsal and one ventral branches and a small terminal fork, branches rather short. Palpus slender, curved, yellow, apically black. Ocellar triangle black. Periorbit slightly paler than front, short, a little more than half as long as front. Front flat, narrow, parallel-sided, pale yellowish grey, matt, anteriorly five-sevenths as broad as length down middle, posteriorly one-third as broad as head width. Clypeus pale yellowish brown. Face yellowish white, concave. Carina undeveloped. Cheeks yellow. Very narrow, about one-sixteenth as broad as the greatest diameter of eye. Occiput black. Orbitals subequal in size; anterior reclinate orbital close to and outside proclinate, more than four times as distant from posterior reclinate as from proclinate. Only one prominent oral.

Mesonotum dark orange-brown, medioanteriorly paler, medioposteriorly fuscous. Scutellum black, apically pale. Thoracic pleura yellowish brown, with irregular longitudinal patches; sternepisternum largely black. Humerals two, lower longer. Acrostichal hairs in about eight irregular rows. Anterior dorsocentrals two-thirds as long as posteriors; distance between anterior and posterior pair nearly one-third distance between anterior pair. Anterior scutellars long, divergent; posteriors half as long as anteriors. Sterno-index about 0.6. Legs yellow; mid and hind knees dark; front and hind metatarsi subequal to next three segments together, mid metatarsi longer than the other segments together. Preapicals on mid and hind legs; apicals prominent on mid leg. Wing hyaline, veins black, crossveins clear. *M* apically pale;  $R_{2+3}$  gently curved to *costa* at tip. C-index about 2.5; 4V-index about 1.8; 4C-index about 1.1; 5x-index about 1.3; Ac-index about 1.9. C1-bristles two; C3-fringe on basal three-fifths. Halteres entirely pale yellow. Abdominal tergites: 1T yellow, 2T black, medioanteriorly and laterally yellow, 3T shining silvery blue especially in male, 4T to caudal end largely black.

Periphallallic organs: Genital arch broad, black, paler below, much narrowed above, broadly truncate below, caudal margin with a few setae, anteroventral corner with a few shorter setae; heel low, rounded. Anal plate small, oblong, pale. Clasper large, quadrate, pubescent inferiorly, setigerous exteriorly, pale yellowish brown. Decasternum in shape of narrow cross bar. Phallic organs: Aedeagus black, bifid, sinuate in lateral aspect, with short basal apodeme; ventral recurved process short, rod-like, pale, apically pointed. Anterior paramere fusiform, pale, with a longitudinal row of a few sensilla at middle. Posterior parameres yellow. PI = 12.0. p.f. = ABCDeFgHikLmN.



FIGS. 76-85. 76-80, *Leucophenga nigriceps* sp. n., ♂. 76, head, lateral aspect; 77, head, dorsal aspect; 78, wing; 79, peripheral organs, lateral aspect; 80, phallic organs, ventral aspect. 81-85, *Leucophenga rectinervis* sp. n., ♂. 81, wing; 82, head, lateral aspect; 83, head, dorsal aspect; 84, phallic organs, ventral aspect; 85, peripheral organs, lateral aspect.

Holotype ♂. EAST NEPAL : Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', ix-x.1961 (R.L.C.), BMNH.

Paratypes : 4 ♂, same data as holotype ; 9 ♂, 2 ♀, Taplejung District, between Sangu and Tamrang, mixed shrubs in deep gorge, c. 5,200', x-xi.1961 ; 1 ♂, Sangu, mixed vegetation by stream in gully, c. 6,200', ix.1961-i.1962 ; 1 ♂, north of Sangu, dry grass above river bank, c. 5,000', 5.i.1962 ; 1 ♂, Dobhan, evergreen trees overhanging stream in deep gully, c. 3,500', 30.i.1962 ; 2 ♀, between Sangu and Tamrang, mixed plants by damp cliff in deep river gorge, c. 5,200', i-ii.1962 ; 1 ♂, *ibid.*, mossy ground under bushes by hill stream, c. 5,500', 20.x.1961 (R.L.C.), BMNH, 1 ♂ from between Sangu and Tamrang, at the Tokyo Metropolitan University.

Allied to *L. albiceps* de Meijere, 1914, (Java and Formosa) but differs in having palpus black apically, 4-5T unspotted, and 3T silvery shining.

### *Leucophenga rectinervis* sp. n.

(Text-figs. 81-85, 94)

♂, ♀. Body about 3 mm. Head slightly broader than thorax. Eyes bright reddish brown ; ocelli bright red. Antennae pale yellowish white, third segment relatively slender. Arista with about seven dorsal and three ventral long branches and a small terminal fork. Palpus pale yellowish white, slender, gently curved upward, rounded at tip, with a strong apical and a few weaker ventral setae. Ocellar triangle black. Periorbit pale yellowish white, slightly glossy, obscurely demarcated from front. Front flat, pale yellowish white, matt, parallel-sided, anteriorly somewhat narrower than length down middle, posteriorly about one-third as broad as head width. Face white, laterally concave. Clypeus pale yellowish white. Cheeks pale, narrow, about one-twentieth as broad as the greatest diameter of eye. Occiput black. Proclinate orbital slightly shorter than other orbitals ; anterior reclinate outside and just posterior to proclinate. Only one prominent oral.

Mesonotum yellowish brown, silver pollinose. Scutellum dark yellowish brown, matt, apically white. Thoracic pleura pale yellowish grey, with an obscurely demarcated dark cloud on pteropleuron. Humeral callus pale, with two humerals, lower shorter. Prescutellars long, parallel with each other, slightly longer than anterior dorsocentral. Acrostichal hairs in about ten irregular rows. Anterior dorsocentrals shorter than posteriors ; distance between anterior and posterior dorsocentrals about one-third distance between anterior pair. Anterior scutellars divergent ; posterior scutellars longer than anteriors and nearer to each other than to anteriors. Sterno-index about 0.6. Legs yellowish white ; all metatarsi much longer than the other segments together. Preapicals on all legs ; apicals prominent on mid leg. Wing hyaline, veins brown ; crossveins clear.  $R_{2+3}$  nearly straight, not curved to *costa* at tip ; *costa* weak beyond  $R_{4+5}$  ;  $R_{4+5}$  and  $M$  nearly parallel. Wing tip slightly pointed. C-index about 3.0 ; 4V-index about 2.0 ; 4C-index about 1.0 ; 5x-index about 1.3 ; Ac-index about 2.0. C1-bristles two ; C3-fringe on basal two-thirds. Halteres white. Abdominal tergites yellowish white, with black spots as follows : two small on 2T, three large on 4T, five large on 5T (median one small and longitudinal), two on 6T. 3T largely black. Caudal sternites black.

Periphallic organs : Genital arch black, broad, not narrowing above, pubescent and setigerous, ventrocaudally obliquely truncate, heel low. Anal plate narrow, pale yellow, pubescent and setigerous. Clasper large, black, oval, pubescent and with short setae. Phallic organs : Aedeagus entirely bifid, black, medially somewhat broadened ; ventral recurved process pale brown, long, blade-like, apically pointed. Anterior paramere pale, fusiform, with a longitudinal row of a few sensilla on distal half. Posterior paramere pale yellow, contiguous with orange hooked piece of aedeagus. PI = ∞. p.f. = ABCDeFgHikLmN.

Holotype ♂. EAST NEPAL : Arun Valley, east shore of River Arun, below Tumlingtar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961 (R.L.C.), BMNH.

Allotype ♀. Taplejung District, between Sangu and Tamrang, dense vegetation in tree shade by hill stream, c. 5,500', 23.x.1961 (R.L.C.), BMNH.

Paratypes : 1 ♂, same data as holotype ; 1 ♂, below Sangu, mixed vegetation on sheltered slopes above river, c. 4,000', 3.i.1962 ; 1 ♀, below Sangu, edge of small mixed wood, c. 6,000', 4.xi.1961 ; 1 ♀, between Sangu and Tamrang, mixed shrubs in deep gorge, c. 5,200', x-xi.1961 ; 1 ♀, old mixed forest above Sangu, c. 6,200', 25-28.x.1961 (R.L.C.), BMNH ; 1 ♂, below Sangu, deposited at the Tokyo Metropolitan University.

Resembles *L. flavipalpis* Duda, 1939, (Uganda, Africa) in having pale palpus, clear wings, pale halteres, spotted abdominal tergites, and silvery pollinose mesonotum, but differs from it in having nearly straight  $R_{2+3}$  (hence the specific name) and larger C-index (2.5 in *flavipalpis*).

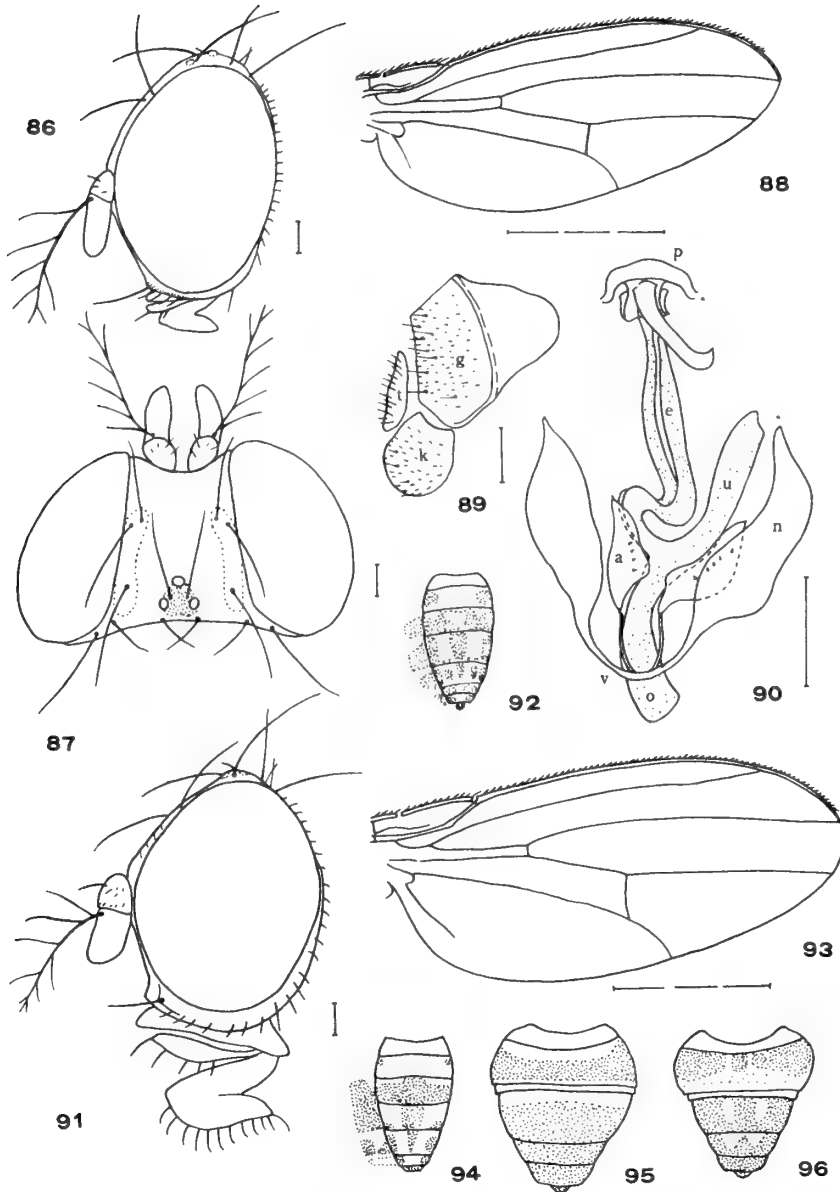
### *Leucophenga nigroscutellata* Duda

(Text-figs. 74, 86-90)

*Leucophenga nigroscutellata* Duda, 1924a : 186 ; 1924b : 237 (Formosa).

♂, ♀. Body about 3 mm. Head slightly broader than thorax. Eyes reddish brown, bare. Antennae with second segment orange-yellow ; third greyish brown, oblong. Arista with about five dorsal and one ventral sparsely arranged branches and a large terminal fork. Palpus yellowish brown, oblong, with an apical and a few ventral setae. Ocellar triangle black, grey pollinose. Periorbit pale greyish brown, somewhat glossy, short, half as long as front, not constricted medially. Front yellowish white, parallel-sided, anteriorly paler and two-thirds as broad as length down middle ; posteriorly about one-third as broad as head width. Face whitish grey, somewhat concave. Clypeus brown. Cheeks yellowish white, narrow, about one-twentieth as broad as the greatest diameter of eye. Occiput dark brownish black. Anterior reclinate orbital four times as distant from posterior reclinate as from proclinate. Postverticals short. One prominent oral, others fine.

Mesonotum dark brown, slightly glossy, not distinctly pollinose ; humeral callus pale. Scutellum brownish black, matt, apically pale. Thoracic pleura mostly dark brown. Three long humerals, median one longest, ventral one shortest. Acrostichal hairs in about eight irregular rows. Anterior dorsocentrals one-third as long as posteriors ; distance between anterior and posterior dorsocentrals about one-third distance between anterior pair. Anterior scutellars divergent ; posterior scutellars about two-fifths as long as anteriors, nearer to each other than to anteriors. Sterno-index about 0.6. Legs yellowish white ; mid and hind knees brown ; front metatarsi as long as next three segments together, mid metatarsi subequal to the succeeding segments, hind metatarsi longer than the succeeding segments. Preapicals on mid and hind legs ; apicals on mid leg. Wing hyaline, veins pale.  $R_{2+3}$  nearly straight, not curved to *costa* at tip ;  $R_{4+5}$  and *M* nearly parallel. C-index about 2.6 ; 4V-index about 1.8 ; 4C-index about 1.1 ; 5x-index about 1.9 ; Ac-index about 2.3. C1-bristles two ; C3-fringe on basal about two-thirds. Halteres yellowish white. Abdominal tergites mostly black, somewhat glossy ; 1T yellow, often laterally fuscous ; 2T medially with a yellow caudally narrowing patch ; ultimate T white.



FIGS. 86-96. 86-90, *Leucophenga nigroscutellata* Duda, ♂. 86, head, lateral aspect; 87, head, dorsal aspect; 88, wing; 89, periphallallic organs, lateral aspect; 90, phallic organs, ventral aspect. 91-93, *Leucophenga albiceps* de Meijere, ♀. 91, head, lateral aspect; 92, abdominal tergites; 93, wing. 94-96, abdominal tergites of 94, *Leucophenga rectinervis* sp. n., ♂; 95, *L. albifascia* sp. n., ♂; 96, *L. leucozona* Duda, ♂.

Periphallalic organs : Genital arch broad, ventrally somewhat narrowing, brownish black, setigerous and pubescent ; heel low, rectangular. Anal plate pale yellowish brown, oblong, thickly setigerous. Clasper ovoid, distally rounded, brownish black, pubescent and with short, setae. Phallic organs : Aedeagus black, entirely bifid, sub-basally strongly sinuate ; ventral recurved process rod-shaped, orange ; apodeme unusually developed, long, and stout. Anterior paramere pale, short, fusiform, medially with a row of a few sensilla. Posterior parameres orange. Ventral fragma laterally pale yellow, broad, fusiform. PI = 5.0. p.f. = ABCDeFgHikLmN.

Taplejung District, between Sangu and Tamrang, mixed shrubs in deep gorge, c. 5,200', x-xi.1961, 1 ♂, 1 ♀ ; above Sangu, evergreen scrub, c. 6,500', 5-13.x.1961, 1 ♀. Arun Valley, east shore of River Arun below Tumlingtar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961, 1 ♀ (*R.L.C.*).

Distribution : Nepal (new locality), Formosa.

Differs slightly from the original form (Formosa, Duda, 1924) in having larger body and sometimes entirely yellow palpus.

### *Leucophenga albiceps* de Meijere

(Text-figs. 75, 91-93)

*Leucophenga albiceps* de Meijere, 1914 : 258 (Java) ; Duda, 1924a : 190 (Java, Formosa).

*Leucophenga albiceps* var. *meijereae* Duda, 1924a : 190 (Formosa).

*Leucophenga meijerei* Duda, 1924b : 240 [in citation].

♀. Body about 3.2 mm. Head as broad as thorax. Eyes dark red, bare. Antennae with second segment yellow ; third yellowish white, quadrate, broad, apically truncate. Arista with about four dorsal and two ventral branches and a moderate terminal fork. Palpus yellowish white, large, medially broadened, with a few prominent ventral setae. Ocellar triangle black, bluish grey pollinose. Periorbit short, greyish white, well demarcated, apically curved inward. Front pale yellowish grey, parallel-sided, anteriorly slightly broader than median length down middle. Clypeus pale yellowish grey, protruded. Postverticals short. Face greyish white, flat, laterally depressed, lower margin somewhat protruded. Cheeks narrow, whitish, about one-twelfth as broad as the greatest diameter of an eye. Posterior reclinate orbital longer than other orbitals ; anterior reclinate orbital outside and posterior to proclinate, four times as distant from posterior reclinate as from proclinate. Only one prominent oral.

Mesonotum dark yellowish brown, somewhat silver pollinose ; neck region brown above. Scutellum dark yellowish brown, silver grey pollinose, apically white and broadly rounded. Thoracic pleura pale yellowish grey, somewhat fuscous below, with dark patches on pteropleuron. Humeral two, long, stout. Prescutellar longer than anterior dorsocentral. Acrostichal hairs in about eight rows. Anterior dorsocentrals half as long as posteriors ; distance between anterior and posterior dorsocentrals about one-fourth distance between anterior pair. Anterior scutellars divergent, longer than posteriors, which are nearer to each other than to anteriors. Sterno-index about 0.9. Legs yellowish white, knees pale. Front metatarsi slightly shorter than the succeeding segments, mid and hind metatarsi slightly longer than the succeeding segments. Preapicals on mid and hind legs ; apicals on all legs. Wings hyaline, veins yellowish brown.  $R_{2+3}$  nearly straight, apically not curved to *costa* ;  $R_{4+5}$  and *M* parallel ;  $R_{4+5}$  only weakly convex near base. Posterior crossveins weakly curved inward. C-index about 2.3 ; 4V-index about 1.8 ; 4C-index about 0.9 ; 5x-index about 1.2 ; Ac-index about 1.6. C1-bristle two ; C3-fringe on basal five-sevenths. Halteres yellow. Abdominal tergites pale yellow, with black spots as follows : two small on 2T ; three large somewhat confluent on 3T ; three large on 4T ; five on 5T ; two on 6-7T. Anal cercus elongate, pale yellow, setigerous.

Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', ix-x.1961, 1 ♀; old mixed forest above Sangu, c. 6,200', 25-28.x.1961, 3 ♀; below Sangu, edge of small mixed wood, c. 6,000', 4.xi.1961, 1 ♀; below Sangu, mixed vegetation on sheltered slopes above river, c. 4,000', 2.i.1962, 1 ♀ (R.L.C.).

Distribution : Nepal (new locality), Java, Formosa.

Differs slightly from the original form in having less distinct dark band on the thoracic pleura and lower 4V-index.

### Subfamily DROSOPHILINAE

#### *MICRODROSOPHILA* Malloch

*Microdrosophila* Malloch, 1921 : 312.

Type-species : *Drosophila quadrata* Sturtevant, 1916 : 341 (N. America).

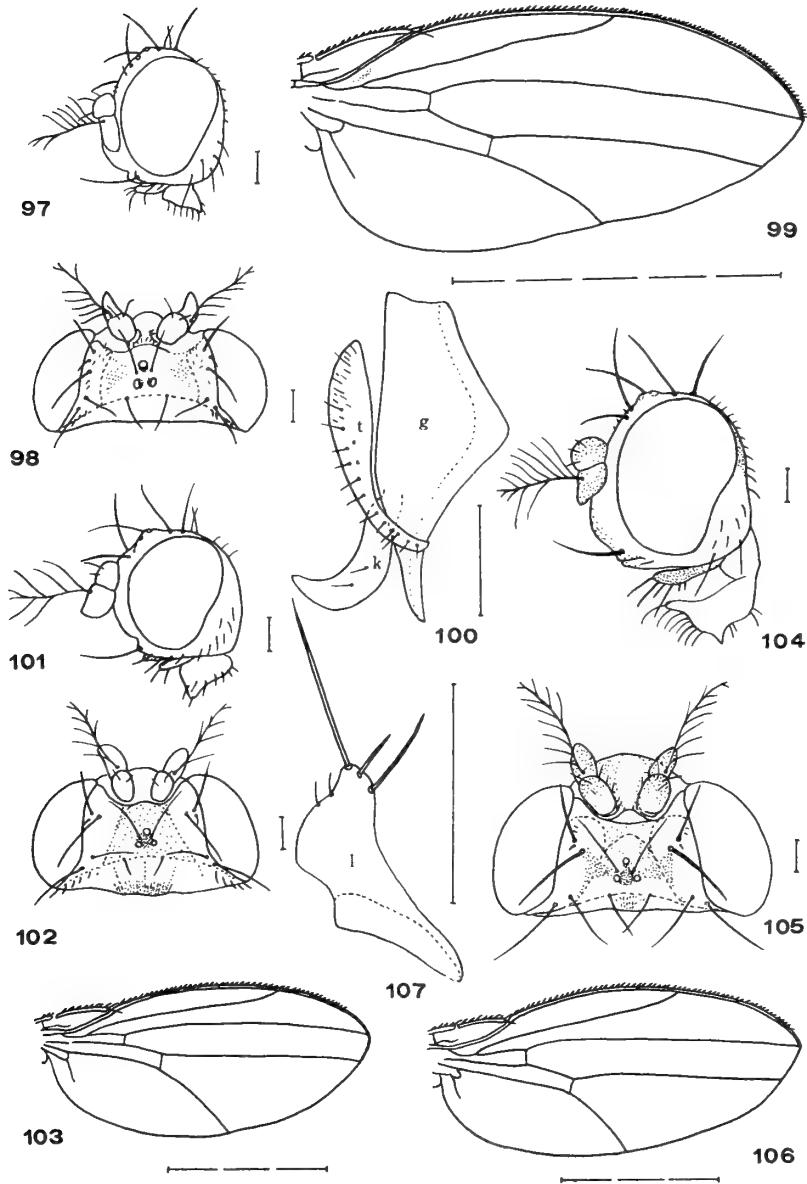
#### KEY TO SPECIES

- |   |   |                                      |
|---|---|--------------------------------------|
| 1 | Third costal section with strong bristles on almost entire length. Second costal break deep, more than one-fourth as deep as the length of first costal section between two breaks. Wing somewhat pointed at tip . . . . .      | <b><i>pectinata</i></b> (p. 37)      |
| - | Third costal section with strong bristles ending well before the apex . . . . .   | 2                                    |
| 2 | Second costal break more than one-fourth as deep as the length of first costal section between two breaks. First costal section apically much swollen and black . . . . .   | sp. (p. 39)                          |
| - | Second costal break less than one-fifth as deep as the length of first costal section between two breaks. First costal section apically not much swollen and not black . . . . .  | 3                                    |
| 3 | Third costal section with strong bristles on its basal two-thirds. Arista with only three dorsal and two ventral branches beside terminal fork. Thoracic pleura dark only on humeral callus . . . . .                           | <b><i>pauciramosa</i></b> (p. 40)    |
| - | Third costal section with strong bristles on its basal five-sixths or more. Arista with about six dorsal and three ventral branches beside fork. Thoracic pleura with more or less distinct black longitudinal stripe . . . . . | 4                                    |
| 4 | Palpus orange-yellow. Thoracic pleura with diffuse dark brown longitudinal stripe. Halteres yellow . . . . .  | <b><i>marginata</i></b> (p. 42)      |
| - | Palpus black. Thoracic pleura with a well demarcated black longitudinal stripe. Halteres black or brownish black . . . . .  | 5                                    |
| 5 | Mesonotum with three distinct black longitudinal stripes. Ocellar triangle black . . . . .  | <b><i>nigripalpis</i></b> (p. 41)    |
| - | Mesonotum with three diffuse black stripes or uniformly dark brown. Ocellar triangle yellow . . . . .   | <b><i>nigrohalterata</i></b> (p. 41) |

#### *Microdrosophila pectinata* sp. n.

(Text-figs. 97-100)

♂. Body about 1.5 mm. Head slightly broader than thorax. Eyes dark red, pilose. Antennae with second segment dark yellowish brown, large, conical; third narrower, yellowish brown, with long pubescence. Arista with about five dorsal and one ventral branches and a moderate terminal fork. Palpus pale yellowish brown, with a few stout black apical setae. Ocellar triangle pale yellowish grey, black within ocelli. Periorbit rather narrow, somewhat convex, anteriorly broadened, extending near anterior margin of front. Front pale yellowish grey, slightly glossy, mediolaterally fuscous, anteriorly two and a half times as broad as length down middle, posteriorly about three-fifths as broad as head width. Clypeus yellowish white.



FIGS. 97-107. 97-100, *Microdrosophila pectinata* sp. n., ♂. 97, head, lateral aspect; 98, head, dorsal aspect; 99, wing; 100, periphallallic organs, lateral aspect. 101-103, *Microdrosophila pauciramosa* sp. n., ♀. 101, head, lateral aspect; 102, head, dorsal aspect; 103, wing. 104-107, *Microdrosophila nigripalpis* sp. n., ♀. 104, head, lateral aspect; 105, head, dorsal aspect; 106, wing; 107, egg-guide, lateral aspect.



Face pale yellowish white, somewhat narrowing below. Carina high, long, yellowish white, reaching buccal margin. Cheeks pale yellowish white, slightly less than one-fourth as broad as the greatest diameter of an eye. Occiput pale yellowish grey. Proclinate orbital slightly inside posterior reclinate; anterior reclinate minute, not distinguishable from adjacent microtrichia, outside other orbitals, almost equally distant from proclinate and posterior reclinate. Vibrissae strong, second oral slender.

Mesonotum yellowish brown, matt. Scutellum pale yellowish grey, matt, slightly pollinose. Thoracic pleura pale yellowish white, somewhat fuscous above. Only one humeral. Acrostichal hairs in about six rows. Distance between anterior and posterior dorsocentrals about five-sevenths distance between anterior pair. Anterior scutellars divergent, small, one-third length of posteriors, which are somewhat divergent and nearly equidistant from each other and from anteriors. Posterior sternopleural long, others missing. Legs yellow, anterior femur with a few long hairs below; claws long; all metatarsi subequal to the next three segments together; last tarsal segment large. Preapicals on all legs; apicals prominent on mid legs. Wing hyaline, second costal incision very deep; tip pointed.  $R_{2+3}$  apically curved to costa;  $R_{4+5}$  and  $M$  medially somewhat convergent. C-index about 1.1; 4V-index about 3.6; 4C-index about 3.3; 5x-index about 5.7; Ac-index about 3.6. C1-bristles two; C3-fringe on nearly entire length. Halteres yellowish brown. Abdominal tergites matt black; 1T pale yellowish grey, with dark patches; 2T yellowish white laterally. Abdominal sternites pale.

Periphallalic organs: Pregenital lobe long, club-shaped, pale orange. Genital arch pale yellowish brown, nearly bare, ventrally pointed; heel very high. Clasper apparently fused to genital arch, crescentic, pale brown. Anal plate pale brown, setigerous, narrow but long, ventrally curved anteriorly. Phallic organs not examined.

Holotype ♂. EAST NEPAL: Taplejung District, Dobhan, east bank of River Tamur, mixed vegetation by stream in deep gully, c. 3,500', i-ii.1962 (R.L.C.), BMNH.

Resembling *M. tectifrons* (de Meijere, 1914) (Java) in having pointed wings and only one ventral branch of arista, but differs in the paler body,  $R_{2+3}$  not straight, and carina well developed. Belonging to the subgenus *Oxystyloptera* Duda, 1924.

### *Microdrosophila* sp.

♂ ex. Head much broader than thorax. Eyes green-black, thickly grey pilose. Antennae with second segment globular, yellowish brown, paler below; third dark brown, oval, paler caudally. Arista with four dorsal and three ventral branches and a large terminal fork. Palpus yellowish brown, subapically with two strong black setae. Ocellar triangle glossy black, convex. Periorbit glossy grey, broad, medially somewhat constricted, anteriorly truncate, four-fifths as long as front. Front greyish yellow, anteriorly paler, black inside periorbits, with a pair of large triangular anteriorly pointed black patches. Clypeus pale brown, medially with a dark narrow cross stripe. Face yellow, very broad, parallel-sided. Carina large, high, pale. Cheek greyish white, three-eighths as broad as the greatest diameter of eye. Occiput yellowish grey. Anterior reclinate orbital minute, just outside proclinate, nearer to proclinate than to posterior reclinate, which is longer than anterior reclinate. Second oral two-thirds as long as vibrissa, succeeding orals slender.

Mesonotum greyish yellow, matt, with five narrow dark brown longitudinal stripes, median one broadest. Scutellum greyish yellow, with a pair of broad dark longitudinal stripes. Thoracic pleura pale yellowish grey, with two dark longitudinal stripes. One long humeral. Acrostichal hairs in six rows. Distance between anterior pair of dorsocentrals equal to distance between anterior and posterior pairs. Anterior dorsocentrals two-thirds as long as posteriors. Anterior scutellars divergent, as long as posteriors, which are nearer to each other than to anteriors. Sterno-index about 0.8. Legs yellow, fore and hind metatarsi subequal to next

three segments together, mid metatarsi subequal to the following segments together. Pre-apicals on all legs; apicals prominent on mid leg. Wing hyaline, 2.1 mm. in length; first costal section apically much swollen and black; second costal break deep.  $R_{2+3}$  straight. Wing-tip somewhat pointed.  $R_{4+5}$  and  $M$  parallel. C-index about 1.8; 4V-index about 1.9; 4C-index about 1.3; 5x-index about 2.0; Ac-index about 3.3. C1-bristles two; C3-fringe on basal half. Halteres missing. Abdomen missing.

Taplejung District, between Sangu and Tamrang, mixed shrubs in deep gorge, c. 5,200', x-xi.1961, 1 ex (R.L.C.).

Characters intermediate between *Styloptera* Duda, 1924 and *Microdrosophila* Malloch; first costal section apically swollen and black as in *Styloptera*, acrostichal hairs in six rows as in *Microdrosophila*. A deep incision at the second costal break suggests that this species belongs to the subgenus *Oxystyloptera* Duda.

### *Microdrosophila pauciramosa* sp. n.

(Text-figs. 101-103)

♀. Body about 1.5 mm., yellowish brown. Head broader than thorax. Eyes deep purple-red, oval, pilose, with caudal margin straight. Antennae dark yellowish brown, third segment quadrate, slightly longer than broad. Arista with only three dorsal and two ventral sparsely arranged branches and a large terminal fork. Palpus pale yellow, broad, with two stout bristles below near apex. Ocellar triangle black; ocelli pale. Periorbit large, somewhat convex, pale yellowish brown, anteriorly broadened and reaching anterior margin of front. Front pale yellowish grey, medio-anteriorly orange, anteriorly twice as broad as length down middle, posteriorly somewhat wider and about five-ninths as broad as head width. Clypeus dark brown. Face yellowish white, slightly narrowing below, buccal margin white. Carina high, long, reaching near buccal margin. Cheek pale yellowish white, darker above, about one-third as broad as the greatest diameter of eye. Occiput pale yellow, darker below. Proclinate orbital slightly shorter than posterior reclinate, close to and outside posterior reclinate; anterior reclinate minute, just outside posterior reclinate.

Mesonotum dirty yellowish brown, slightly glossy, with three indistinct longitudinal dark patches. Scutellum dirty yellowish brown. Thoracic pleura pale yellow, darker above. Humeral callus dark brown. Only one humeral. Acrostichal hairs in about eight rows. Distance between anterior pair of dorsocentrals about one and a half times distance between anterior and posterior pairs. Anterior scutellars slightly shorter than posteriors, divergent; posterior scutellars as long as posterior dorsocentrals. Sterno-index about 0.4. Legs pale yellowish brown; front metatarsi subequal in length to next three segments together, mid and hind metatarsi subequal to the rest of segments. Fore femur and mid coxa with long hairs below. Preapicals on all legs; apicals prominent on mid leg. Wings hyaline; crossveins clear; first costal section distally curved posteriorly and swollen; *costa* reaching  $M$ ;  $R_{2+3}$  subapically gently curved to *costa*;  $R_{4+5}$  and  $M$  parallel. C-index about 1.9; 4V-index about 5.2; 4C-index about 2.7; 5x-index about 7.5; Ac-index about 4.3. C1-bristles two; C3-fringe on basal two-thirds. Halteres greyish brown. Abdominal tergites dirty yellowish brown, laterally darker, with irregular dark brown clouds, posterior margin narrowly grey. Abdominal sternites pale. Cerci broader than long.

Holotype ♀. EAST NEPAL: Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', xi.1961 - i.1962 (R.L.C.), BMNH.

Somewhat resembles *M. cristata* Okada, 1960 in having obscurely demarcated mesopleural dark stripe, gently curved  $R_{2+3}$ , and orbitals close to each other, but differs from it in having fewer arisal branches, posterior reclinate orbital not inside proclinate and lesser range of C3-fringe.

***Microdrosophila nigripalpis* sp. n.**

(Text-figs. 104-107)

♀. Body about 2 mm., dark yellowish brown. Head slightly broader than thorax. Eyes deep purplish black, thickly pilose. Antennae dark greyish brown; second segment large, oval; third triangular, short, with long pubescence. Arista with seven dorsal and three ventral long branches and a moderate terminal fork. Palpus black, slender, apically rounded, with a few stout black setae below near apex. Ocellar triangle black; ocelli pale yellow. Periorbits quite large, anteriorly broadened, pale yellowish white, convex, reaching anterior margin of front. Front short, anteriorly nearly four times as broad as length down middle, posteriorly more than half as broad as head width, dark orange-brown, caudally black. Clypeus pale yellow. Face pale, laterally concave. Carina pale yellow, large, long, evenly convex, extending near buccal margin. Cheeks yellowish white, black above, about one-fourth as broad as the greatest diameter of eye, narrow below. Occiput pale yellow, black below. Three orbitals close to each other; proclinate orbital about half as long as posterior reclinate, just before and outside posterior reclinate; anterior reclinate minute, slightly outside proclinate. Only one stout oral.

Mesonotum yellowish brown, with three broad black longitudinal stripes; median stripe diffuse, reaching apex of scutellum; lateral stripes well demarcated, not extending in front of suture. Scutellum laterally yellowish brown, medially dark. Thoracic pleura pale yellow below, with broad black longitudinal stripe above. One humeral. Acrostichal hairs in about eight rows. Distance between anterior and posterior dorsocentrals about three-fourths distance between anterior pair; anterior dorsocentrals slightly shorter than posteriors, situated near the suture. Anterior scutellars missing; posteriors slightly divergent, twice length of scutellum. Sterno-index about 0.3. Legs yellowish grey; mid and hind pairs with distal half of femur and proximal part of tibia brownish black; all metatarsi nearly as long as the other segments together. Preapicals on all legs; apicals prominent on mid leg. Wings hyaline, tip pointed; veins brown, crossveins clear; *costa* reaching *M*; second costal break deep.  $R_{2+3}$  nearly straight, weakly sinuated;  $R_{4+5}$  and *M* parallel. C-index about 1.3; 4V-index about 4.1; 4C-index about 2.7; 5x-index about 6.0; Ac-index about 4.0. C1-bristles two; C3-fringe on basal six-sevenths. Halteres greyish black. Abdominal tergites matt black, posterior margins narrowly pale; 1T laterally pale. Abdominal sternites pale yellow. Egg-guide triangular, dark brown, apically with a very long and two shorter setae.

Holotype ♀. EAST NEPAL; Taplejung District, old mixed forest above Sangu, c. 6,200', 25-28.x.1961 (R.L.C.), BMNH.

Allied to *M. purpurata* Okada, 1956, (Japan) in having black mesonotal and mesopleural longitudinal stripes and triangular egg-guides, but differs from it principally in having palpus and halteres black and pointed wings.

***Microdrosophila nigrohalterata* sp. n.**

(Text-figs. 114-118)

♂, ♀. Body about 2.5 mm., dark yellowish brown. Head broader than thorax. Eyes dark purplish red, somewhat quadrate, weakly sinuous at inner margin, pilose. Antennae thick, second segment dark yellowish brown, with two long stout setae; third rounded at tip, greyish brown, with long pubescence. Arista with about five dorsal and three ventral long branches and a moderate terminal fork. Palpus dark brown or black, slender, with a few stout spical setae. Ocellar triangle highly convex, pale yellowish brown; mouth-parts yellowish white. Periorbit large, highly convex, glossy greyish brown, anteriorly broadened, reaching near the anterior margin of front. Clypeus yellowish white. Front glossy greyish brown, highly convex,

anteriorly and laterally orange-brown; anteriorly two and a half times as broad as length down middle; posteriorly about half as broad as head width. Face pale yellowish white, laterally depressed. Carina high, slender, two-thirds as long as face. Occiput yellowish grey, black below. Cheek pale yellowish black near neck region, about one-third as broad as the greatest diameter of eye, narrow below. Proclinate orbital two-thirds length of posterior reclinate, outside and slightly anterior to posterior reclinate; anterior reclinate minute, just outside posteriors, twice as distant from proclinate as from posterior reclinate. Only one very stout and long oral.

Mesonotum glossy yellowish brown, mediocaudally and laterally dark brown, or uniformly dark brown. Scutellum dark yellowish brown, glossy, often medially and marginally pale. Thoracic pleura yellowish white, with broad black longitudinal stripe above. Humerals two, very long, stout, subequal in length. Acrostichal hairs in six rows. Anterior dorsocentrals near the level of suture; distance between anterior and posterior dorsocentrals subequal to distance between anterior pair. Anterior scutellars short; posteriors long, divergent, thrice as long as anteriors. Sterno-index about 0.5. Legs fuscous yellow, femora pale on proximal half. Preapicals on all legs; apicals prominent on mid leg. Wings hyaline, crossveins clear, tip slightly pointed, *costa* reaching *M*.  $R_{2+3}$  apically curved to *costa*;  $R_{4+5}$  and *M* parallel. C-index about 1.3; 4V-index about 3.6; 4C-index about 2.2; 5x-index about 5.0; Ac-index about 4.4. C<sub>1</sub>-bristles two, long; C<sub>3</sub>-fringe on basal ten-elevenths. Halteres greyish black. Abdominal tergites mostly black, glossy; abdominal sternites yellowish white.

Periphallallic organs: Genital arch yellow, broad, narrowing below, pubescent, setigerous on upper caudal margin, ventral apex pointed anteriorly, caudal lower margin orange, rounded. Clasper and anal plate obscure. Decasternum triangular, yellowish white. Phallic organs: Aedeagus robust, orange, with several complicated triangular processes, basally narrowing and with a stout recurved dark orange ventral process, which is slightly shorter than aedeagus (cf. Text-fig. 117). Apodeme of aedeagus thick but short, about one-third as long as aedeagus. PI = 3.0. Anterior paramere seemingly fused to hypandrium and with about two sensilla. Posterior paramere elongate, connecting hypandrium and subbasal part of aedeagus (cf. Text-fig. 117). Ventral fragma triangularly pointed proximally; hypandrial plate large, blade-like. p.f. = abCdeFgHiKlmn. Egg-guide yellow, oval, distally fuscous and with four stout brownish setae and a small hair.

Holotype ♂. EAST NEPAL: Taplejung District, between Sangu and Tamrang, mixed plants by damp cliff in deep river gorge, c. 5,200', i-ii.1962 (R.L.C.), BMNH.

Allotype ♀. Taplejung District, above Sangu, mixed vegetation in dried-up ravine, c. 6,800', 17.ii.1962 (R.L.C.) BMNH.

Paratypes: Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', xi.1961-i.1962, 1 ♀ (R.L.C.), BMNH. Arun Valley, east shore of River Arun below Tumlingtar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961, 1 ♀ (R.L.C.), deposited at the Tokyo Metropolitan University.

Closely resembles *M. nigripalpis* Okada, in having distinct broad black mesopleural longitudinal stripe, black palpus, and black halteres, but differs from its allies in having less distinct mesonotal black stripes, pale ocellar triangle, and oval egg-guide.

### *Microdrosophila marginata* sp. n.

(Text-figs. 108-113)

♂, ♀. Body about 1.3 mm., pale yellowish brown. Head very large, much broader than thorax. Eyes deep purplish red, large, thickly pilose. Antennae with second segment dark

yellowish brown, large, globular ; third as long as second, much narrower and paler. Arista with about seven dorsal and three ventral very long branches and a small terminal fork. Palpus orange-yellow, small, apically rounded and with a stout black and a few thinner ventral setae. Ocellar triangle medially black. Frontal triangle large, convex. Periorbit large, convex, anteriorly much broadened, pale yellowish grey, somewhat glossy, reaching anterior margin of front. Front pale yellowish grey, somewhat glossy, anteriorly two-thirds as broad as length down middle, posteriorly slightly more than half as broad as head width. Face pale yellow, laterally concave. Carina high, long, pale yellowish white, wider below, reaching near buccal margin. Clypeus pale yellow. Cheeks narrow below, yellowish white, about one-fifth as broad as the greatest diameter of eye. Occiput pale yellow. Anterior reclinate orbital minute, just behind proclinate ; proclinate about two-thirds as long as posterior reclinate, before and outside posterior reclinate. Only one long stout oral, others fine.

Mesonotum yellowish brown, caudomedially and caudolaterally with indistinct dark brown patches. Scutellum yellowish brown, slightly darker medially. Thoracic pleura pale yellowish white, diffuse dark brown above. Only one stout humeral. Acrostichal hairs in six somewhat irregular rows. Anterior dorsocentrals at the level of suture ; distance between anterior pair of dorsocentrals about four-fifths distance between anterior and posterior pairs. Anterior scutellars small, parallel, less than half as long as posteriors, which are divergent. Sterno-index about 0.5. Legs yellowish grey ; all metatarsi subequal to the next three segments together. Preapicals on all legs ; apicals prominent on mid leg. Wings hyaline, pointed at tip (slightly below end of  $R_{4+5}$ ) ; crossveins clear.  $R_{2+3}$  gently curved to *costa* at tip ;  $R_{4+5}$  and  $M$  slightly divergent. C-index about 1.7 ; 4V-index about 5.0 ; 4C-index about 3.0 ; 5x-index about 5.3 ; Ac-index about 3.0. C1-bristles two ; C3-fringe on basal five-sixths. Halteres yellow. Abdominal tergites yellowish grey, laterally and caudally dark brown. Abdominal sternites pale.

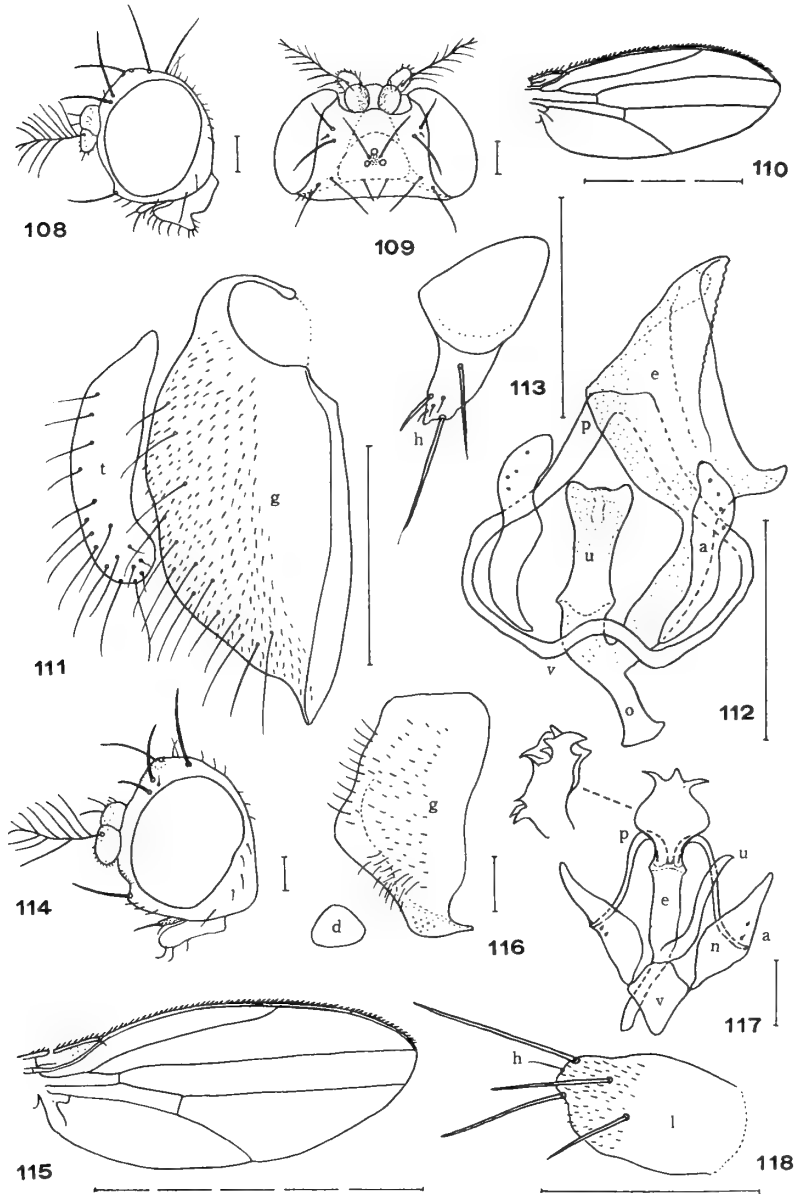
Periphallic organs : Genital arch pale yellow, broad, fusiform, pubescent, abruptly narrowing above, ventroanteriorly pointed downward, caudoventral margin setigerous. Anal plate pale yellow, oblong, setigerous, lower tip rounded. Clasper apparently absent. Phallic organs : Aedeagus large, pale orange-brown, fusiform in lateral view, with a narrow anterior projection subbasally, basal half rod-shaped, contiguous with a large distally truncate ventral recurved process, which is nearly half as long as aedeagus. Apodeme of aedeagus short, rod-like. PI = 6.0. Anterior paramere elongate, pale yellow, proximally narrowing, subapically with a row of a few sensilla. Posterior parameres fused to each other and to ventral fragma. Ventral fragma like a narrow bow. p.f. = aBCdeFgHikLmn. Egg-guide pale yellowish brown, short, triangular, apically pointed, with a long apical and two shorter submedian stout setae and a fine subapical hair.

Holotype ♂. EAST NEPAL : Taplejung District, Dobhan, small pockets of plants on arid slopes above River Maewa, c. 3,500', 2.i.1962 (*R.L.C.*), BMNH.

Allotype ♀. Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', xi.1961-i.1962 (*R.L.C.*), BMNH.

Paratype : 1 ♂, same data as allotype, BMNH.

Resembles *M. maculata* Okada, 1960, (Japan) in having dark second antennal segment, yellowish abdomen laterally dark, pale palpus, and large fusiform aedeagus, but differs from it in having pointed wings, entirely black ocellar triangle, entirely yellow halteres (knob darker in *maculata*), and triangular egg-guide (quadrate in *maculata*).



FIGS. 108-118. 108-113, *Microdrosophila marginata* sp. n. 108, ♂ head, lateral aspect ; 109, ♂ head, dorsal aspect ; 110, ♂ wing ; 111, peripheral organs, lateral aspect ; 112, phallic organs, ventral aspect ; 113, ♀ egg-guide, lateral aspect. 114-118, *Microdrosophila nigrohalterata* sp. n. 114, ♂ head, lateral aspect ; 115, ♂ wing ; 116, peripheral organs, lateral aspect ; 117, phallic organs, ventral aspect ; left upper figure, tip of aedeagus, lateral aspect ; 118, ♀ egg-guide, lateral aspect.

***LISSODROSOPHILA* gen. n.**

Type-species, *Lissodrosophila longicornis* sp.n. (Nepal).

Eyes vertical. Arista without ventral branches below fork, dorsal branches long. Front broad, glossy, smooth. Periorbit very broad, reaching anterior margin of front. Orbitals two, both proclinate, without reclinate orbitals. Postverticals minute. Mesonotum very convex, glossy. Scutellum matt, short. Two long sternopleurals, one humeral, one supra-alar. Acrostichal hairs in two rows. Only one pair of dorsocentrals. No prescutellars. Alula and anal vein abbreviated.

Related to the genus *Lissocephala* Malloch, 1929, in having a smooth, glossy, and flat front, small postverticals, shining convex mesonotum, dull scutellum, no anal vein, and no row of spinules on fore femur. Differs from *Lissocephala* in having no reclinate orbitals, no ventral branches of arista, only one pair of supra-alars, two rows of acrostichal hairs, and only one pair of dorsocentrals.

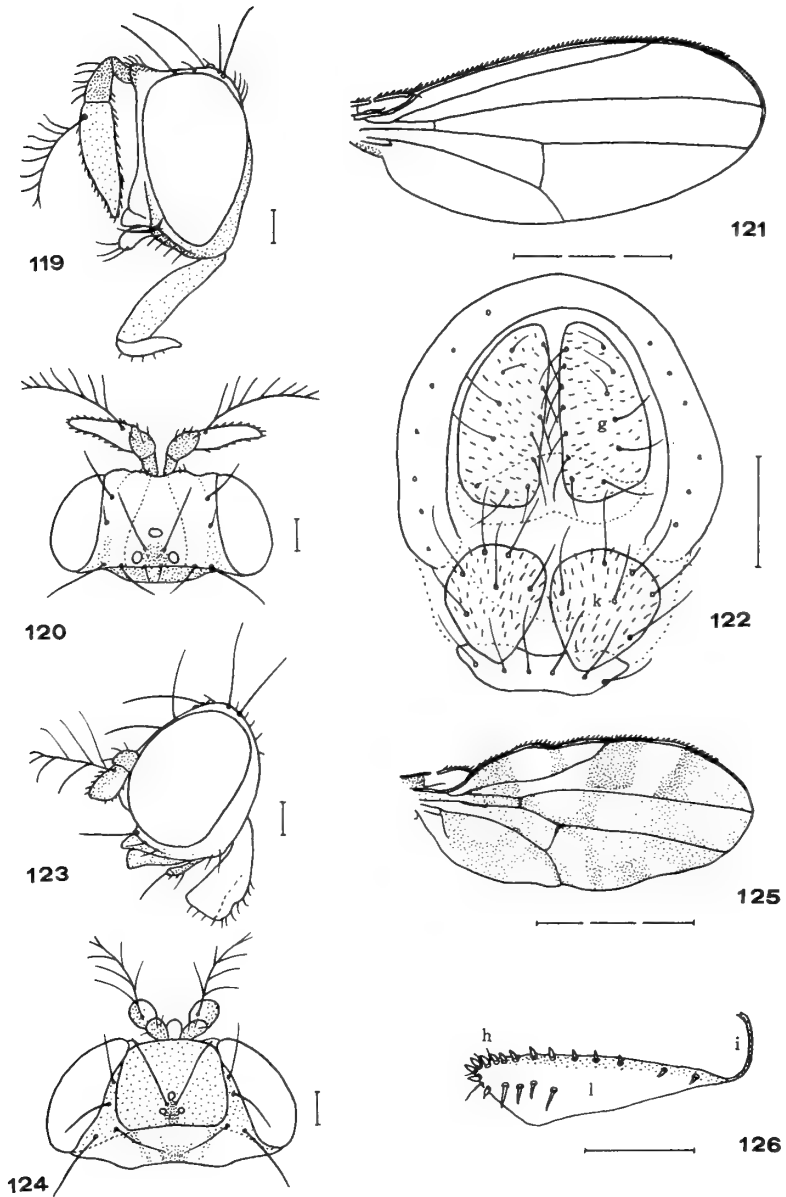
***Lissodrosophila longicornis* sp. n.**

(Text-figs. 119-122)

♂. Body about 1.5 mm. Head dorsoventrally elongated, much broader than thorax, anteriorly protruded at antennal base. Eyes vertically elongate, ventrally narrowing, deep purplish brown, bare. Antennae very large and long; first segment black, longer than broad; second black, distally broadened, rectangularly articulated to the first; third matt black, with grey pubescence, about four times as long as broad, distally tapering. Arista with about seven dorsal long branches and a small terminal fork. Palpus club-shaped, yellow, subapically with a few black setae. Ocellar triangle dark brown, glossy. Periorbit very broad, reaching anterior margin of front, glossy deep brown. Postverticals minute. Front glossy deep brown, smooth, anteriorly one-third broader than length down middle, posteriorly more than half as broad as head width. A few frontal hairs present. Clypeus dark brown. Face narrow, deep glossy brown, buccal margin pale and much protruded upward. Carina absent. Cheeks narrow, yellowish brown, pale at eye margin, about one-ninth as broad as the greatest diameter of eye, black above. Occiput deep brownish black. Mouth-parts deep brown, robust and long. Anterior proclinate orbital long and upright, posteriors minute. A few short orals; vibrissa somewhat longer than other orals.

Mesonotum black, shining blue-green, convex, with thick grey pubescence. Scutellum velvety black, much shorter than broad, posteriorly grey pollinose. Thoracic pleura dark brownish black, glossy, somewhat blue-green. Dorsocentrals near the caudal end of scutum. Anterior scutellars divergent, about two-thirds as long as posteriors; posteriors longer than dorsocentral, parallel, twice as far from each other as from anteriors. A small marginal hair between anterior and posterior scutellars. Sterno-index about 0.7. Legs mostly brownish black; femora darker; all metatarsi much longer than the other segments together. Preapicals on all legs; apicals prominent on mid leg. Wings hyaline, tip rounded, veins yellow. Alula black, small, without fringe.  $R_{2+3}$  strongly curved to *costa* at tip;  $R_{2+3}$  and  $M$  parallel; posterior crossvein curved outward; anal vein absent. C-index about 1.8; 4V-index about 2.0; 4C-index about 1.3; 5x-index about 1.2; Ac-index about 3.1. C1-bristles two; C3-fringe on basal half, sparse. Halteres white, stalk black. Abdominal tergites glossy black, shining metallic green, broader and shorter than thorax. Genital arch narrow, setigerous; clasper oval, setigerous and pubescent; anal plate elliptical, setigerous and pubescent. Phallic organs not examined.

Holotype ♂. EAST NEPAL: Taplejung District, below Sangu, by stream in shady ravine, c. 6,000', 30.X.1961 (R.L.C.), BMNH.



FIGS. 119-126. 119-122, *Lissodrosophila longicornis* gen. & sp. n., ♀. 119, head, lateral aspect; 120, head, dorsal aspect; 121, wing; 122, abdomen, caudal aspect. 123-126, *Hypselothyrea guttata* Duda, ♀. 123, head, lateral aspect; 124, head, dorsal aspect; 125, wing; 126, egg-guide.



**HYPSELOTHYREA** de Meijere

*Hypselothyrea* de Meijere, 1906 : 193.

Type-species : *H. dimidiata* de Meijere, 1906 : 193 (New Guinea).

***Hypselothyrea guttata*** Duda

(Text-figs. 123-126)

*Hypselothyrea guttata* Duda, 1926 : 56 (Sumatra) ; Duda, 1928 : 86 (Formosa).

♀. Body about 1.6 mm., glossy purplish brown, with ornamented wing. Head somewhat broader than thorax. Eyes dark red, widely separated, with fine pilosity. Antennae with second segment dark brown, conical ; third broader, tip rounded, yellowish brown and anteriorly black. Palpus black, slender, basally narrowing, with about two stout apical and subapical setae. Ocellar triangle black. Periorbit glossy dark brown, anteriorly narrowing, posteriorly much broadened, two-thirds as long as front. Postverticals absent. Front brownish black, glossy, somewhat purplish, quadrate, as broad as long. Clypeus black or dark brown. Face yellowish brown, highly convex below. Carina yellowish orange or dark brown, high, short, less than half as long as face. Cheeks dark brown, paler above, about two-ninths as broad as the greatest diameter of eye, narrow below. Two long orbitals, no posterior reclinate ; proclinate orbital slightly shorter than reclinate ; both orbitals equidistant from eye margin. Vibrissae thin, long ; succeeding orals short.

Mesonotum convex, yellowish or dark reddish brown, glossy, posteriorly darker. Scutellum triangular, tip protruded dorsoposteriorly, black, marginally white. Thoracic pleura pale yellowish grey, with a black longitudinal stripe above. One humeral. Acrostichal hairs in six rows. Posterior dorsocentrals slightly longer than anteriors ; distance between anterior and posterior dorsocentrals four-sevenths distance between anterior pair. Anterior scutellars parallel, half as long as posteriors, which are twice as distant from anteriors as from each other. Only one stenopleural. Legs pale yellowish grey ; fore femur basally black ; fore and mid coxae black ; hind coxa white ; mid and hind femora subapically black. Fore femur with anteroventrally a row of about ten small black teeth. Front metatarsi somewhat shorter than next three segments together, mid and hind metatarsi as long as the rest of segments together. Preapicals on all legs ; apicals prominent on mid leg. Wings broad, with scattered large black patches roughly in six transverse rows. Costa irregularly sinuous, alternately white and black.  $R_{2+3}$  gently curved to costa apically ;  $R_{4+5}$  and  $M$  slightly divergent distally ; posterior cross-vein curved outward. C-index about 1.3 ; 4V-index about 4.0 ; 4C-index about 4.1 ; 5x-index about 1.3 ; Ac-index about 3.8. C1-bristles one, small ; C3-fringe on basal two-thirds. Halteres black. Abdomen narrowing anteriorly ; abdominal tergites mostly glossy black, mediolongitudinally yellowish brown ; abdominal sternites reddish brown.

Egg-guide lobe slender, pale yellow, basally brownish, tip gently narrowing, with about fifteen marginal thick yellow teeth and four discal longer but thinner yellow teeth. Basal isthmus narrow, brown.

Taplejung District, Sangu, rotting fruits of Bhor tree on ground, c. 6,200', 7-31.x.1961, 1 ♀ ; below Sangu, by stream in shady ravine, c. 6,000', 30.x.1961, 1 ♀ (R.L.C.).

This species has some features characteristic of the genus *Liodrosophila* Duda : an anteroventral row of small bristles on fore femur, smooth glossy front, and narrow triangular egg-guide. It has, however, no postverticals, no anterior reclinate orbital, and only one sternopleural, characteristics of the genus *Hypselothyrea*.

Distribution : Nepal (new locality), Sumatra, Formosa.

**LIODROSOPHILA** Duda*Liodrosophila* Duda, 1922 : 153.Type-species : *Camilla coeruleifrons* de Meijere, 1911 : 421 (Java).

## KEY TO SPECIES

- 1 Wings with black markings. Front and mesonotum granulose, moderately shining black. Legs yellow, fore tarsi black . . . . . ***bimaculata*** (p. 48)
- Wings without black markings. Front and mesonotum smooth, glossy, not granulose. Fore tarsi yellow or yellowish grey, not black . . . . . 2
- 2 Acrostichal hairs in two rows. Mesonotum somewhat shining blue, punctured . . . . . ***onchopyga*** (p. 50)
- Acrostichal hairs in six rows. Mesonotum glossy, not punctured . . . . . 3
- 3 Mesonotum usually brownish black. Clasper with a concave row of marginal teeth. Wings somewhat fuscous. Periorbit relatively broad, not narrowing anteriorly . . . . . ***fuscipennis*** (p. 51)
- Mesonotum enamel-blue-black. Clasper with a convex row of marginal teeth. Wings hyaline. Periorbit much narrowing anteriorly . . . . . ***nitida*** (p. 54)

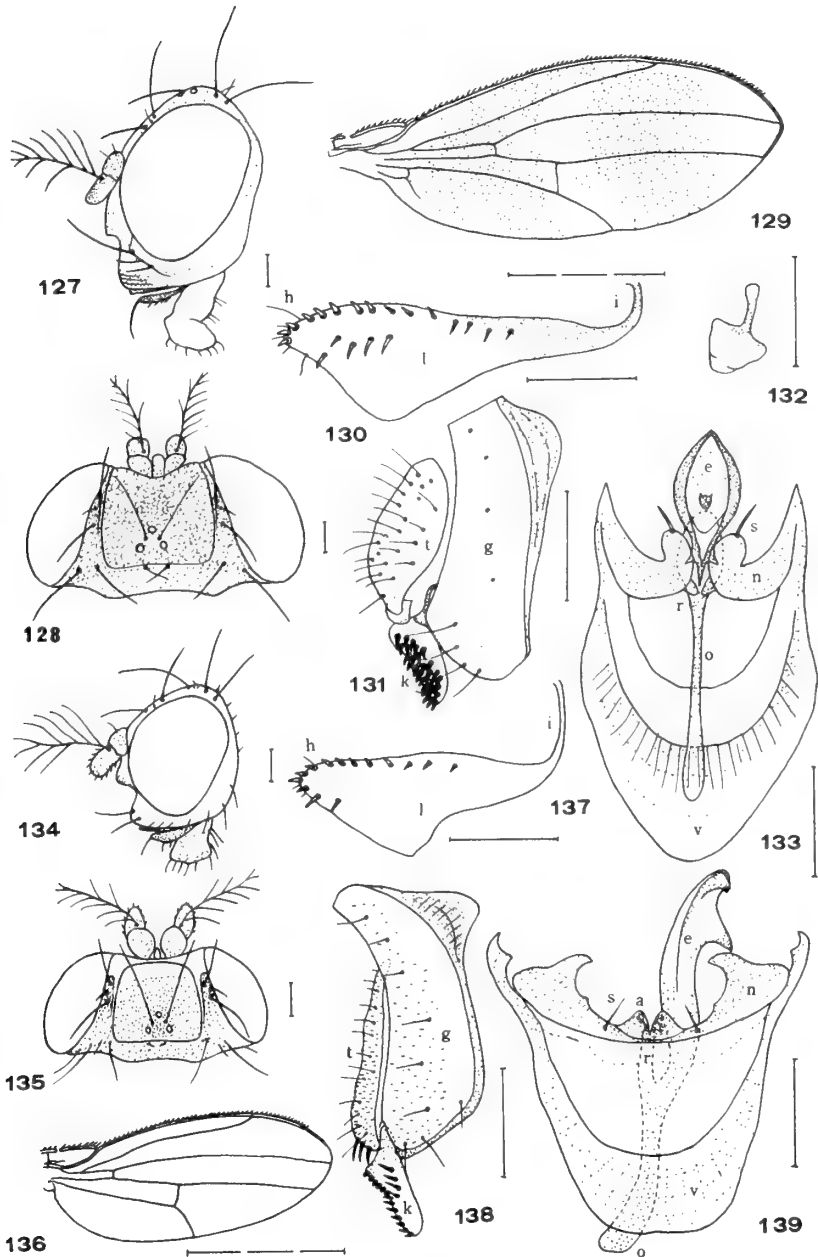
***Liodrosophila bimaculata* sp. n.**

(Text-figs. 127–133)

♂, ♀. Body about 2.5 mm. Head slightly broader than thorax. Eyes dark reddish brown with thick long grey pilosity. Antennae with second segment black ; third orange-brown, twice as long as broad. Arista with about six dorsal and two ventral long branches and a small terminal fork. Palpus black, slender, with a very long apical black seta and a few shorter ventral setae. Ocellar triangle bluish black, flat, not sharply demarcated. Mouth-parts black, thick. Periorbit bluish black, moderately shining, granulose, somewhat convex, three-fourths as long as front. Front moderately shining black, slightly bluish, flat, quadrate, granulose. Face moderately shining black, slightly bluish, not depressed ; buccal margin with a few transverse fine linear grooves. Carina high, black, broader below, ventrally reaching three-fifths length of face, flat above. Cheek moderately shining black, one-fifth as broad as the greatest diameter of eye. Occiput black. Postverticals slender. Anterior reclinate orbital minute, outside and behind proclinate, thrice as distant from posterior reclinate as from proclinate ; proclinate two-thirds as long as posterior reclinate. Vibrissae long, stout, succeeding orals short.

Mesonotum moderately shining black, granulose. Scutellum velvety black, somewhat pollinose at anterolateral corners. Thoracic pleura moderately shining black, slightly bluish. Two long humerals, lower longer. Acrostichal hairs in six sparse and somewhat irregular rows. Anterior dorsocentrals about three-fourths as long as posteriors ; distance between anterior and posterior dorsocentrals four-sevenths distance between anterior pair. Anterior scutellars divergent, four-ninths as long as posteriors, which are nearly parallel and subequally distant from each other and from anteriors. Sterno-index about 0.3. Legs yellow, fore tarsi and basal half of fore femur black ; tips of mid and hind femora somewhat dark. Fore femur with a row of spinules anteroventrally on distal half and a row of long hairs ventrally on distal half. Front metatarsi as long as next three segments together, mid and hind metatarsi subequal to the other segments together. Preapicals on all legs ; apicals on mid leg. Wings with two large black spots, one triangular, basal to posterior crossvein, and the other round, large, outside posterior crossvein ; wing tip slightly pointed.  $R_{2+3}$  weakly curved to *costa* at tip ;  $R_{4+5}$  and  $M$  nearly parallel. C-index about 1.8 ; 4V-index about 3.3 ; 4C-index about 2.3 ; 5x-index about 2.1 ; Ac-index about 3.8. C1-bristle one ; C3-fringe on basal five-sevenths. Halteres greyish brown, basally white, outer margin black. Abdominal tergites elongate, glossy black, somewhat purplish, slightly grey pollinose.

Periphallic organs dark brownish black. Genital arch slightly broader below, ventrally truncate obliquely, sparsely setigerous ; heel low, rounded. Anal plate fusiform, setigerous,



FIGS. 127-139. 127-133, *Liodrosophila bimaculata* sp. n. 127, ♂ head, lateral aspect; 128, ♂ head, dorsal aspect; 129, wing; 130, ♀ egg-guide; 131, peripheral organs, lateral aspect; 132, ejaculatory apodeme; 133, phallic organs, ventral aspect. 134-139, *Liodrosophila onchopyga* sp. n. 134, ♂ head, lateral aspect; 135, ♂ head, dorsal aspect; 136, ♂ wing; 137, ♀ egg-guide; 138, peripheral organs, lateral aspect; 139, phallic organs, ventral aspect.

caudal tip somewhat elongated below. Clasper elliptical, with about three rows of black teeth along outer margin. Decasternum orange, small, oval. Phallic organs: Aedeagus black, medially paler, rhombic in ventral aspect, basally with a pair of short triangular vertical rods; apodeme slender, black, nearly twice as long as aedeagus. Anterior paramere fused to hypandrium, without prominent sensilla. Hypandrial plate crescentic, brown, inferiorly with a stout short submedian spine. Ventral fragma large, ovoid, dark brown. Ejaculatory apodeme with black stalk and dark brown triangular plate.  $PI = 0.8$ .  $p.f. = aBCdef_0g_0HIklmN$ . Egg-guide lobe pale orange, triangularly pointed apically, basally tapering and black, with about eighteen marginal and five discal orange teeth, subapically with a rather stout yellow hair above and below. Basal isthmus short, black.

Holotype ♂. EAST NEPAL: Taplejung District, below Sangu, by stream in shady ravine, c. 6,000', 30.x.1961 (R.L.C.), BMNH.

Allotype ♀. Same data as holotype (R.L.C.), BMNH.

Paratypes: 2 ♀, same data as holotype; 1 ♀, Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', xi.1961-i.1962 (R.L.C.), BMNH (2 ♀), and the Tokyo Metropolitan University (1 ♀, from Sangu).

Easily distinguished from other members of the genus *Liodrosophila* in having two large black markings on wings, front and mesonotum granulose.

### *Liodrosophila onchopyga* sp. n.

(Text-figs. 134-139)

♂, ♀. Body about 1.0-1.5 mm., glossy black. Head broader than thorax. Eyes dark red, very sparsely pubescent. Antennae with second segment dark orange, third narrower, dark yellow, anteriorly and apically black. Arista with about four dorsal and two ventral long branches and a large terminal fork. Palpus black, with a fine long terminal seta and a few short ventral setae. Ocellar triangle glossy brownish black, convex. Periorbit glossy brownish black, convex, anteriorly narrowing, four-fifths as long as front. Front flat, glossy brownish black, shining blue, anterior one-fourth sometimes orange-brown, anteriorly one-third broader than length down middle; posteriorly two-thirds as broad as head width. Face yellowish grey, concave. Carina high, narrow, yellowish grey, half as long as face. Clypeus black. Cheek yellowish grey, anterior corner black, one-sixth as broad as the greatest diameter of eye. Occiput black. Postverticals minute, upright. Anterior reclinate orbital minute, outside and slightly behind proclinate, a little nearer to posterior reclinate than to proclinate; proclinate slightly shorter than posterior reclinate. Two well developed orals, second a little shorter than vibrissa.

Mesonotum black, glossy, slightly bluish, with fine punctures, without pubescence. Scutellum velvety black, tip grey pollinose. Thoracic pleura greyish brown, glossy. Three long humerals, uppermost one somewhat shorter than others. Acrostichal hairs in two rows. Anterior dorsocentrals about half as long as posteriors; distance between anterior and posterior dorsocentrals half distance between anterior pair. Anterior scutellars nearly parallel, less than half as long as posteriors; posteriors longer than scutellum, slightly more distant from each other than from anteriors. Legs yellow; mid and hind metatarsi longer than next three segments together, front metatarsi slightly shorter than next three segments together. Preapicals prominent on hind leg; apicals on mid leg. Wing hyaline, crossveins clear;  $R_{2+3}$  gently curved to *costa* apically;  $R_{4+5}$  and  $M$  somewhat convergent apically. C-index about 1.6; 4V-index about 2.0; 4C-index about 1.5; 5x-index about 1.7; Ac-index about 3.2. Cr-bristle one, short;

C<sub>3</sub>-fringe on basal half. Halteres yellowish orange. Abdominal tergites glossy dark brown, slightly shining purple.

Periphallallic organs : Genital arch brownish black, pubescent, dorsally narrowing, ventrally triangularly pointed ; heel high, rounded. Anal plate very narrow, ventrally broadened, pale yellowish brown, pubescent and setigerous. Clasper yellowish brown, elongate below, broader and darker basally, distally with a concave row of about fourteen marginal black teeth, discally with about three long stout black spines. Phallic organs : Aedeagus robust, brown, rod-shaped, subapically with a large dorsal triangular black projection (thus the specific name), gently sinuous in S-form in lateral aspect, basally with a black narrow vertical rod and a long apically broadened black apodeme. PI = 1.5. Anterior paramere brown, minute, triangular, with a few sensilla, attached to vertical rod of aedeagus. Posterior parameres apparently absent. Hypandrial plate triangular, brown, apically with a large black hooked process. Ventral fragma quadrate, large, caudally with a pair of small black triangular submedian processes. p.f. = ab'CdEfg<sub>0</sub>HIKLmn. Egg-guide lobe brownish black, basally darker, broad, apically rounded, projecting mediodorsally, with about thirteen brown marginal teeth and a discal dorsal one. Basal isthmus rather long, dark brown.

Holotype ♂. EAST NEPAL : Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', ix-x.1961 (R.L.C.), BMNH.

Allotype ♀. Same data as holotype, BMNH.

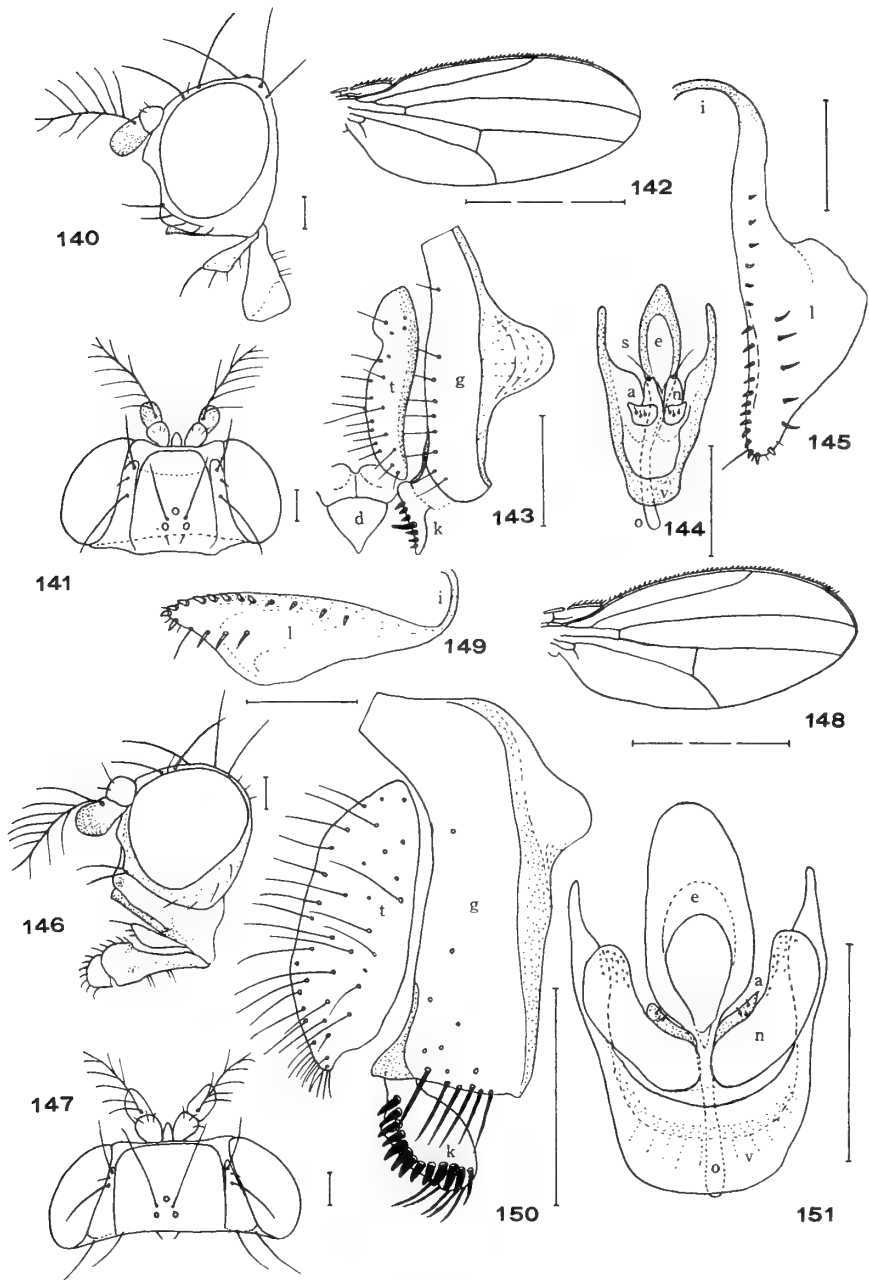
Paratypes : Taplejung District, 6 ♂, same data as holotype ; 2 ♂, 1 ♀, Sangu, rotting fruits of Bhor tree on ground, c. 6,000', 7-31.xi.1961 ; 3 ♂, 1 ♀, below Sangu, by stream in shady ravine, c. 6,000', 30.x.1961 ; 1 ♂, 1 ♀, between Sangu and Tamrang, mixed shrubs in deep gorge, c. 5,200', x-xi.1961. Arun Valley, 1 ♀, evergreen shrubs on sandy shore, below Tumlingtar, River Sabhaya, west shore, c. 1,800'. 9-17.xii.1961 ; 4 ♂, 7 ♀, above River Sabhaya, east shore, swept from dwarf bamboos in deep ravine, c. 2,000', 12.xii.1961 ; 13 ♀, east shore of River Arun, below Tumlingtar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961 ; 2 ♂, 4 ♀, below Tumlingtar, west shore, fermented millet seeds on shore, c. 1,800', 24.xii.1961 (R.L.C.), BMNH : 1 ♂, from rotting fruits, Sangu, deposited in the Tokyo Metropolitan University.

Similar to *L. rugulosa* (de Meijere, 1915) (Java) in having brownish black finely punctured mesonotum, velvety black scutellum, and dark anterior corners of face, but differs from it in having only two rows of acrostichal hairs (six in *rugulosa*), yellow halteres (black in *r.*), and yellow fore and mid femora (black in *r.*).

### *Liodrosophila fuscipennis* sp. n.

(Text-figs. 140-145)

♂, ♀. Body about 1.7-2.2 mm. Head broader than thorax. Eyes dark red, bare. Antennae with second segment conical, orange-brown ; third mainly black, as broad as long. Arista with about five dorsal and two ventral long branches and a large terminal fork. Palpus distally broadened, with a slender apical and two shorter ventral setae. Ocellar triangle somewhat convex, shining black. Periorbit black, anteriorly narrowing, three-fifths as long as front. Front shining brownish black, anteriorly broader than length down middle ; posteriorly about two-thirds as broad as head width. Clypeus black. Postverticals minute, upright. Face glossy brownish black, greyish white along eye margin. Carina high, brownish black, narrow, short,



FIGS. 140-151. 140-145, *Liodrosophila fuscipennis* sp. n. 140, ♂ head, lateral aspect; 141, ♂ head, dorsal aspect; 142, ♂ wing; 143, peripheral organs, lateral aspect; 144, phallic organs, ventral aspect; 145, ♀ egg-guide. 146-151, *Liodrosophila nitida* Duda. 146, ♂ head, lateral aspect; 147, ♂ head, dorsal aspect; 148, ♂ wing; 149, ♀ egg-guide; 150, peripheral organs, lateral aspect; 151, phallic organs, ventral aspect.

about half as long as face. Cheeks brownish black, grey along eye margin, two-sevenths as broad as the greatest diameter of eye. Occiput black. Anterior reclinate orbital minute, equally distant from posterior reclinate and from proclinate; proclinate slightly inside others and shorter than posterior reclinate. Second oral about two-thirds as long as vibrissa.

Mesonotum usually brownish black, glossy, without punctures. Scutellum velvety black. Thoracic pleura dark brown, darker below and caudally. Three humerals. Acrostichal hairs in about six rows. Distance between anterior and posterior dorsocentrals about three-fifths distance between anterior pair; anterior dorsocentrals about two-thirds as long as posteriors. Anterior scutellars divergent; posteriors twice as long as anteriors, equidistant from each other and from anteriors. Sterno-index about 0.5. Legs dark yellow; fore and mid coxae and basal two-thirds of fore femur black; hind coxa and trochanter yellowish white. Front and hind metatarsi subequal to the next three segments together, mid metatarsi subequal to the remaining segments together. Preapicals on mid and hind legs; apicals strong on mid leg. Wings comparatively large, somewhat fuscous, crossveins clear.  $R_{2+3}$  gently curved to *costa* at tip;  $R_{4+5}$  and  $M$  nearly parallel. C-index about 1.1; 4V-index about 1.9; 4C-index about 1.6; 5x-index about 2.0; Ac-index about 4.5. C1-bristles two, lower weaker. C3-fringe sparse, on basal two-fifths. Halteres yellow. Abdominal tergites glossy black, somewhat purplish.

Periphallalic organs: Genital arch dark brown, rather narrow, posterior margin setigerous, dorsally and ventrally only moderately narrowed, ventral tip rounded; heel low, angular, somewhat curved upward; toe only slightly swollen. Anal plate yellowish brown, elongate, setigerous, basal margin dark. Clasper yellow, crescentric, projecting below genital arch, outer margin with a concave row of about nine black pointed teeth, the row not reaching ventral tip of clasper, and with a stout black submedian bristle. Decasternum large, yellowish brown, triangular. Phallic organs: Aedeagus dark brown, medially yellowish brown, fusiform in ventral aspect; basal apodeme slender, slightly longer than aedeagus. PI = 1.2. Anterior paramere small, conical, subapically with a few sensilla. Posterior parameres apparently fused to decasternum. Ventral fragma V-shaped, hypandrial plate yellowish brown, apically with a stout yellow submedian spine. p.f. = aBCdEfgHIklm'N. Egg-guide lobe yellowish orange, proximally darker, tip obtusely pointed, mediadorsally much swollen, with about twenty marginal and four discal yellowish brown teeth.

Holotype ♂. EAST NEPAL: Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', xi.1961-i.1962 (R.L.C.), BMNH.

Allotype ♀. Same data as holotype (R.L.C.), BMNH.

Paratypes: 4 ♂, 4 ♀, Taplejung District, between Sangu and Tamrang, mixed shrubs in deep gorge, c. 5,200', x-xi.1961; 2 ♀, collected with holotype; 3 ♀, below Sangu, by stream in shady ravine, c. 6,000', 30.x.1961; 1 ♂, river banks below Tamrang Bridge, c. 5,500', x-xi.1961; 3 ♂, below Sangu, mixed vegetation on sheltered slopes above river, c. 4,000', 3.i.1962; 1 ♀, Sangu, mixed vegetation in deep gully, c. 6,200', 2.i-13.ii.1962; 1 ♀, between Sangu and Tamrang, mixed plants by damp cliff in deep river gorge, c. 5,200', i-ii.1962; 1 ♂, edge of mixed forest above Sangu, c. 6,200', 17.x-i.xi.1961. 1 ♀, Arun Valley, east shore of River Arun below Tumlingtar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961 (R.L.C.), BMNH; 1 ♀, at the Tokyo Metropolitan University.

Resembles *L. aerea* Okada, 1956 (Japan) especially in the shape of phallic and periphallalic organs, and somewhat fuscous wings, but differs from it in having front mesonotum, and abdominal tergites not shining metallic blue, and clasper teeth less numerous, the row of teeth not extending to the lower tip of the clasper.

*Liodrosophila nitida* Duda

(Text-figs. 146-151)

*Liodrosophila nitida* Duda, 1922 : 157 (Annam, Formosa) ; Duda, 1924b : 241 (Formosa).*Liodrosophila nitida* var. *marginifrons* Duda, 1926 : 53 (Sumatra).

♂, ♀. Body about 1.6 mm. Head as broad as thorax. Eyes reddish brown, bare, oval in lateral aspect. Antennae with second segment large, rounded ; third black, basally brown, apically swollen and rounded, one and a half times as long as broad. Arista with about five dorsal and two ventral long branches and a large terminal fork. Palpus black, with a long apical and a few shorter ventral setae. Ocellar triangle black, glossy. Periorbit glossy chestnut-black, anteriorly narrowing, four-fifths as long as front. Front glossy blue-black, anterior one-fourth orange-brown ; posteriorly broadened and about two-thirds as broad as head width ; anteriorly broader than length down middle. Cheeks dark brown, pale along eye margin, about one-fourth as broad as the greatest diameter of eye, narrow below. Occiput black. Anterior reclinate orbital minute, twice as distant from posterior reclinate as from proclinate, outside latter. Posterior reclinate stout, one and a half times as long as proclinate. Second oral slightly shorter than vibrissa, which is relatively weak.

Mesonotum glossy bluish black, strongly convex, without punctures nor pubescence. Scutellum short, velvety black, apically with grey pubescence. Thoracic pleura glossy black, somewhat bluish. Two subequal humerals. Acrostichal hairs in six rows. Anterior scutellars divergent, two-thirds as long as posteriors, which are nearer to anteriors than to each other. Distance between anterior and posterior dorsocentrals two-thirds distance between anterior pair ; anterior dorsocentrals three-fourths as long as posteriors. Sterno-index about 0.9. Legs yellowish brown ; femora black, glossy, apically paler. Mid metatarsi as long as the other segments together, fore and hind metatarsi subequal to next three segments together. Pre-apicals prominent on fore and mid legs ; apicals on mid leg. Wings hyaline, veins brown, crossveins clear. *Costa* reaching *M*, weak beyond  $R_{4+5}$ ;  $R_{2+3}$  curved to *costa* at tip ;  $R_{4+5}$  and *M* slightly convergent at tip. C-index about 1.2 ; 4V-index about 1.8 ; 4C-index about 1.7 ; 5x-index about 1.3 ; Ac-index about 4.0. C1-bristle one, short ; C3-fringe on basal two-thirds. Halteres black, stalk yellow, knob large and triangular. Abdominal tergites glossy black, somewhat shining blue. Abdominal sternites small, quadrate, surrounded by pale membrane.

Periphallallic organs brownish black. Genital arch dorsally abruptly narrowed, ventrally slightly broadened and truncate below, apicoventrally black, projected caudally. Clasper oval, with a strongly convex row of about thirteen large black teeth, occupying entire outer margin, subapically with a large black spine on inferior surface. Anal plate elliptical, large, setigerous, ventrocaudal end with a tuft of short hairs. Phallic organs dark brown. Aedeagus elliptical in ventral aspect, medially pale ; basal apodeme slightly shorter than aedeagus, slender, straight, PI = 1.6. Anterior paramere small, elongate, subapically with a few sensilla. Hypandrial plate large, crescentic, apico-inferiorly with numerous minute tubercles. Ventral fragma quadrate, lateral arm pointed. p.f. = aBCdEFgHIklm'N. Egg-guide lobe brown, basally darker, fusiform, with both ends pointed, with about thirteen marginal and four long discal dark brown teeth, ultimate marginal tooth largest. Basal isthmus brown, straight, one-fifth as long as lobe.

Taplejung District, old mixed forest above Sangu, c. 6,200', ix-x.1961, 1 ♂ ; Sangu, mixed vegetation by stream in gully, c. 6,200', ix-x.1961, 1 ♀ ; below Sangu, edge of small mixed wood, c. 6,000', 4.xi.1961, 1 ♂ ; below Sangu, by stream in shady ravine, c. 6,000', 30.x.1961, 1 ♀ ; Dobhan, east bank of River Tamur, mixed vegetation by stream in deep gully, c. 3,500', i-ii.1962, 4 ♂, 1 ♀. Arun Valley, above River Sabhaya, east shore, swept from dwarf bamboos in deep ravine, c. 2,000', 12.xii.1961, 14 ♂, 15 ♀ ; below Tumlingtar, River Sabhaya, west shore, fermented



millet seeds on shore, c. 1,800', 24.xii.1961, 1 ♀; east shore of River Arun below Tumlingtar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961, 3 ♂ (*R.L.C.*).

Distribution : Nepal (new locality), Sumatra, Viet-Nam, Formosa.

Apart from its darker body, identical with the original form (Formosa), both having glossy blue metallic mesonotum without punctures, front anteriorly orange, six rows of acrostichal hairs, all femora black, somewhat convergent  $R_{4+5}$  and  $M$ , and anteriorly narrowing relatively short periorbit.

### ***PARAMYCODROSOPHILA* Duda**

*Paramycodrosophila* Duda, 1924a : 191.

Type-species : *Drosophila pictula* de Meijere, 1911 : 412 (Java).

### ***Paramycodrosophila pictula* (de Meijere)**

(Text-figs. 152-157)

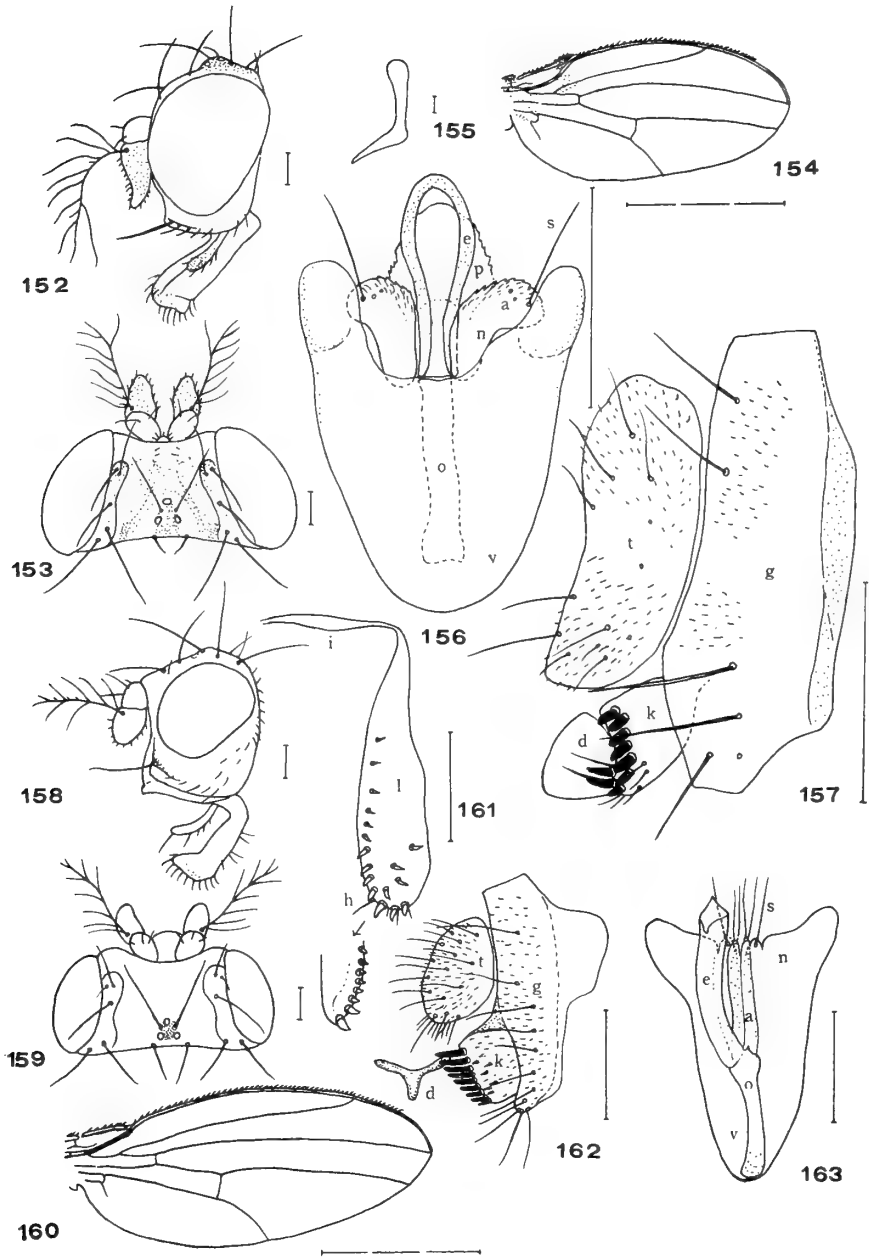
*Drosophila pictula* de Meijere, 1911 : 412 (Java).

*Paramycodrosophila pictula* (de Meijere) Duda, 1924a : 191 ; 1924b : 241 (Java, Formosa) ;

Duda, 1926 : 58 (Sumatra) ; Wheeler and Takada, 1964 : 206 (Palau).

♂. Body about 1.5 mm., greyish white with black patches. Head slightly broader than thorax. Eyes large, dark red, slightly purplish, sparsely pilose. Antennae with second segment yellow, conical ; third black, long, with long pubescence, anterior margin somewhat concave. Arista with six dorsal and one long subapicoventral branches and a large terminal fork. Palpus black, basally paler, slender, with a long apical seta. Ocellar triangle black. Periorbits two-thirds as long as front, straight, greyish white, medially narrowing, anterior end black. Front greyish brown, anteriorly pale yellow, posterolateral corner dark, pale around ocellar triangle ; anteriorly slightly narrower than length down middle ; posteriorly wider, half as broad as head. Face greyish white, parallel-sided. Carina high, narrow, short, pale grey, white at lower tip. Cheeks white, about one-sixth as broad as the greatest diameter of eye. Occiput brown. Postverticals minute. Anterior reclinate orbital outside and slightly before proclinate, as long as posterior reclinate ; posterior reclinate slightly shorter than proclinate, equidistant from proclinate and inner vertical. Vibrissae long, stout ; succeeding orals fine.

Mesonotum greyish white, pollinose, with black clouds as following : a large median one anteriorly bilobed to reach anterior margin, a pair of large lateral ones above suture, a pair of smaller lateral ones above humeral callus, a large caudomedian one anteriorly narrowing and mediolongitudinally pale. Scutellum flat, black, grey pollinose, apically pale yellow. Thoracic pleura greyish white, pollinose, with two long broad black stripes. Humeral callus whitish grey. Two long subequal humerals. Acrostichal hairs in eight rows. Posterior dorsocentrals twice as long as anteriors ; distance between anterior and posterior dorsocentrals slightly more than one-third distance between anterior pair. Anterior scutellars convergent, as long as posteriors and as scutellum ; posteriors nearer to each other than to anteriors. Sterno-index about 0.5 ; median sternopleural fine but long. Legs yellowish grey, with black rings, two on fore femur, one on mid and hind femora, and two on fore tibia. Mid and hind metatarsi as long as next three segments together, front metatarsi subequal to next two segments together. Preapicals on all legs ; apicals stout on mid leg. Wings broad, hyaline, rounded at tip, with dark cloud below second costal break and below it between  $R_{2+3}$  and  $M$ . Second costal section apically much swollen and black. Second costal break deep.  $R_{2+3}$  nearly straight ;  $R_{4+5}$  and  $M$  nearly parallel. C-index about 3.0 ; 4V-index about 2.3 ; 4C-index about 1.7 ; 5x-index about 1.9 ;



FIGS. 152-163. 152-157, *Paramycodrosophila pictula* de Meijere, ♂. 152, head, lateral aspect; 153, head, dorsal aspect; 154, wing; 155, ejaculatory apodeme; 156, phallic organs, ventral aspect; 157, peripheral organs, lateral aspect. 158-163, *Chaetodrosophilella coei* sp. n. 158, ♂ head, lateral aspect; 159, ♂ head, dorsal aspect; 160, ♂ wing; 161, ♀ egg-guide; 162, peripheral organs, lateral aspect; 163, phallic organs, dorsal aspect.

Ac-index about 3.8. C1-bristle one, short ; C3-fringe on basal half. Halteres white. Abdominal tergites mainly black ; 2-5T each with a pair of white spots on anterior margin ; 6T white.

Periphallalic organs pale yellow. Genital arch not narrowing above, pubescent and rather weakly setigerous, subapically dilated ; heel high. Clasper proximally narrowing, with about seven large black teeth in a weakly concave row on entire distal margin and two large subapical black teeth. Anal plate separated from genital arch, oblong, large, setigerous and pubescent. Phallic organs pale yellow. Aedeagus elliptical in ventral aspect ; basal apodeme rod-shaped, as long as aedeagus. PI = 1.0. Anterior paramere fused to oval hypandrial plate, apically with about two sensilla ; hypandrial plate with a long submedian hair inserted outside sensilla. Posterior parameres fused to become a fan-shaped oval flap, lateral margin serrated. Ventral fragma large, oval. p.f. = abCdEfgHIKlm'N. Ejaculatory apodeme pale yellow with narrow plate and distally broadened stalk, which is slightly longer than the plate.

Arun Valley, above River Sabhaya, east shore, swept from dwarf bamboos in deep ravine, c. 2,000', 12.xii.1961, 1 ♂ (R.L.C.).

Distribution : Nepal (new locality), Java, Sumatra, Formosa, Palau.

### *CHAETODROSOPHILELLA* Duda

*Chaetodrosophilella* Duda, 1923 : 40.

*Chaetodrosophila* Duda, 1924a : 180.

Type-species : *Drosophila quadrilineata* de Meijere, 1911 : 396 (Java).

### *Chaetodrosophilella coei* sp. n.

(Text-figs. 158-163)

♂, ♀. Body about 1.6 mm., slender. Head somewhat broader than thorax. Eyes oval, dark red, relatively small, finely pilose. Antennae with second segment greyish brown ; third oval, grey, pubescent, broader than second joint. Arista with about four dorsal and two ventral branches and a moderate terminal fork. Palpus yellowish grey, slender, curved upward, with a long subapical and a few shorter ventral setae. Ocellar triangle black. Periorbit grey, large, anteriorly rounded, medially narrowing, three-fourths as long as front. Front yellowish grey, convex, anteriorly paler, depressed along margin of frontal triangle, anteriorly one and a half times as broad as length down middle ; posteriorly two-thirds as broad as head width. Clypeus yellowish grey. Cheeks yellowish grey, broad, nearly half as broad as the greatest diameter of eye. Occiput yellowish grey. Postverticals long. Anterior reclinate orbital minute, just outside proclinate, which is slightly shorter than posterior reclinate. Mouth-parts slender. Only one long oral. Face broad, yellowish grey, anteriorly rounded, flat, parallel-sided. Carina low, short, pale, half as long as front.

Mesonotum greyish brown, somewhat pollinose, caudolateral side fuscous. Scutellum greyish brown. Thoracic pleura pale, darker above ; humeral callus dark. Thorax rather elongate. Two long humerals. Acrostichal hairs in six rows. Three pairs of dorsocentrals ; presutural pair slightly outside others ; distance between two posterior pairs four-fifths distance between individuals of each pair. Sterno-index about 0.6. Legs yellowish grey, tarsi slightly darker ; fore femur with a row of a few long black setae below, without a row of ventral spinules. All metatarsi as long as next three segments together. Preapicals on all legs ; apicals on fore and mid legs. Wings slightly fuscous, relatively narrow, weakly pointed at tip.  $R_{4+5}$  and  $M$  distally somewhat divergent, medially narrowing. Crossveins clear. C-index about 2.5 ; 4V-index about 2.7 ; 4C-index about 1.4 ; 5x-index about 2.6 ; Ac-index about 2.5. C1-bristles two, subequal ; C3-fringe on basal half. Halteres greyish brown, knob pale. Abdominal tergites yellowish grey, each with a broad black medially contiguous caudal transverse band. Female cercus yellow, longer than broad.

Periphallallic organs yellowish grey. Genital arch pubescent, ventrally narrowing, pointed caudoventrally; caudal margin with about twelve setae. Clasper quadrate, large, pubescent, with a row of about ten large pointed black teeth in a straight row on nearly entire distal margin; inner surface with about eight short setae. Anal plate, oval, separated from genital arch, setigerous and pubescent, ventral tip with a tuft of short setae. Phallic organs: Aedeagus pale brown, rod-shaped, slightly curved ventrally, apically triangularly pointed. Basal apodeme two-thirds length of aedeagus, straight.  $PI = 1.3$ . Anterior paramere elongate, orange-yellow, basally attached to aedeagus, apically partially fused to hypandrium, rounded, and with about two long sensilla. Hypandrial plate conical, with a stout submedian spine outside sensilla. Ventral fragma narrow, triangular, lateral arms apically rounded. p.f. = aBCdEfg<sub>0</sub>HIKIMN. Decasternum triangular, orange-brown, lateral sides concave. Egg-guide lobe yellowish brown, darker below, elongate elliptical, rounded to tip, basally narrowing, with about thirteen dark brown marginal and four discal teeth, distal marginal teeth being larger. Basal isthmus dark, long, moderately swollen, medially about half as long as the lobe.

Holotype ♂. EAST NEPAL: Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', xi.1961-i.1962 (R.L.C.), BMNH.

Allotype ♀. Same data as holotype (R.L.C.), BMNH.

Paratypes: 1 ♂, same data as holotype; 1 ♀, same locality as holotype, ix-x.1961; 1 ♂, between Sangu and Tamrang, mixed plants by damp cliff in deep river gorge, c. 5,200', i-ii.1962; 1 ♀, *ibid.*, mixed shrubs in deep gorge, c. 6,200', x-xi.1961; 1 ♀, above Sangu, evergreen scrub, c. 6,500', 5-13.x.1961; 1 ♀, *ibid.*, mixed vegetation in dried-up ravine, c. 6,800', 17.ii.1962; 1 ♂, 1 ♀, Sangu, mixed vegetation in deep gully, c. 6,200', 2.i-13.ii.1962 (R.L.C.).

Allied to *C. quadrilineata* (de Meijere, 1911) (Java, etc.), but differs in having mesonotal dark stripes obscurely demarcated (distinct in *quadrilineata*), six rows of acrostichal hairs (four in *q.*), two long sternopleurals (one long and two short in *q.*), and no row of spinules on fore femur.

## SCAPTOMYZA Hardy

*Scaptomyza* Hardy, 1849: 361.

Type-species: *Drosophila graminum* Fallén, 1823: 8 (Europe).

### KEY TO SPECIES

- 1 Only one prominent, median, humeral. Acrostichal hairs in two rows. ♂ genitalia with paralobes. ♀ egg-guide lobe weakly sclerotized, with a few subapical long setae . . . . . *S. (Parascaptomyza) pallida* (p. 59)
- Two or three prominent humerals. ♂ genitalia without paralobes. Egg-guide lobe well sclerotized, with numerous short stout bristles . . . . . *S. (Scaptomyza)* 2
- 2 Two rows of acrostichal hairs. Legs mostly yellowish grey. Genital arch narrowly pointed below . . . . . *parasplendens* (p. 59)
- Four rows of acrostichal hairs. Genital arch blunt below . . . . . 3
- 3 Arista without branches below terminal fork. Clasper with a row of large stout pointed teeth occupying entire outer margin. Legs yellowish grey, ultimate two tarsal segments dark. Ocellar triangle black, pollinose . . . . . *melanissima* (p. 62)
- Arista with one branch below fork. Clasper with a row of marginal teeth on basal two-thirds on outer margin, with numerous discal teeth on lower one-third. Legs mostly black, fore coxa yellow. Ocellar triangle matt velvety-black . . . . . *silvata* (p. 63)

Subgenus **PARASCAPTOMYZA** Duda

*Parascaptomyza* Duda, 1924 : 203.

Type-species : *Drosophila pallida* Zetterstedt, 1847 : 257I (Europe).

***Scaptomyza (Parascaptomyza) pallida*** (Zetterstedt)

*Drosophila pallida* Zetterstedt, 1847 : 257I (Europe).

*Scaptomyza (Parascaptomyza) pallida* (Zetterstedt) Hackman, 1959 : 4I (Asia, Australia, Hawaii, N. America, S. America, Europe, N. Africa, etc.) ; Wheeler and Takada, 1964 : 196 (Bonin Is.).

*Scaptomyza disticha* Duda, 1921 : 64 (N. Africa).

*Scaptomyza (Parascaptomyza) disticha* Duda, 1935 : 58 (Orbis Terrarum) : Okada, 1956 : 68 (Japan).

*Parascaptomyza disticha* (Duda) ; Basden, 1952 : 201 (Europe) ; Collin, 1953 : 149 (Europe) ; Basden, 1954 : 648 (Scotland) ; Hackman, 1955 : 80 (Finland).

Taplejung District, Sangu, yellow blooms of cultivated Composite (*Guizotia abyssinica* Cassini), c. 6,200', 16-29.x.1961, 1 ♂ ; *ibid.*, mixed vegetation by stream in gully, c. 6,200', ix-x.1961, 1 ♀ ; *ibid.*, xi.1961-i.1962, 1 ♀ ; below Sangu, mixed vegetation on sheltered slope above River Tamur, c. 4,000', 3.i.1962, 1 ♂, 2 ♀ ; Dobhan, shady places on shrubby slope above River Tamur, c. 3,500', 21-27.i.1962, 1 ♂ ; ex *Lycopodium* sp. on slope above Sangu, c. 7,800', 11-14.i.1962, 2 ♂, 5 ♀ ; above Sangu, mixed vegetation in dried-up ravine, c. 6,800', 16.ii.1962, 1 ♀. Arun Valley, east shore of River Arun below Tumlingtar, swept from *Ricinus communis* L., c. 1,800', 14-23.xii.1961, 7♂, 7 ♀ ; *ibid.*, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961, 1 ♀, (R.L.C.).

Distribution : Nepal (new locality), Viet-Nam, Java, China, Formosa, Japan, Korea, Siberia, Iraq, Turkestan, Bonin Is., Hawaii, N. America, S. America, Europe, Canary Is., Azores, Madeira, Cape Verde Is., N. Africa.

All of the Nepalese specimens examined belong to the type with dark body coloration.

Subgenus **SCAPTOMZYA** Hardy

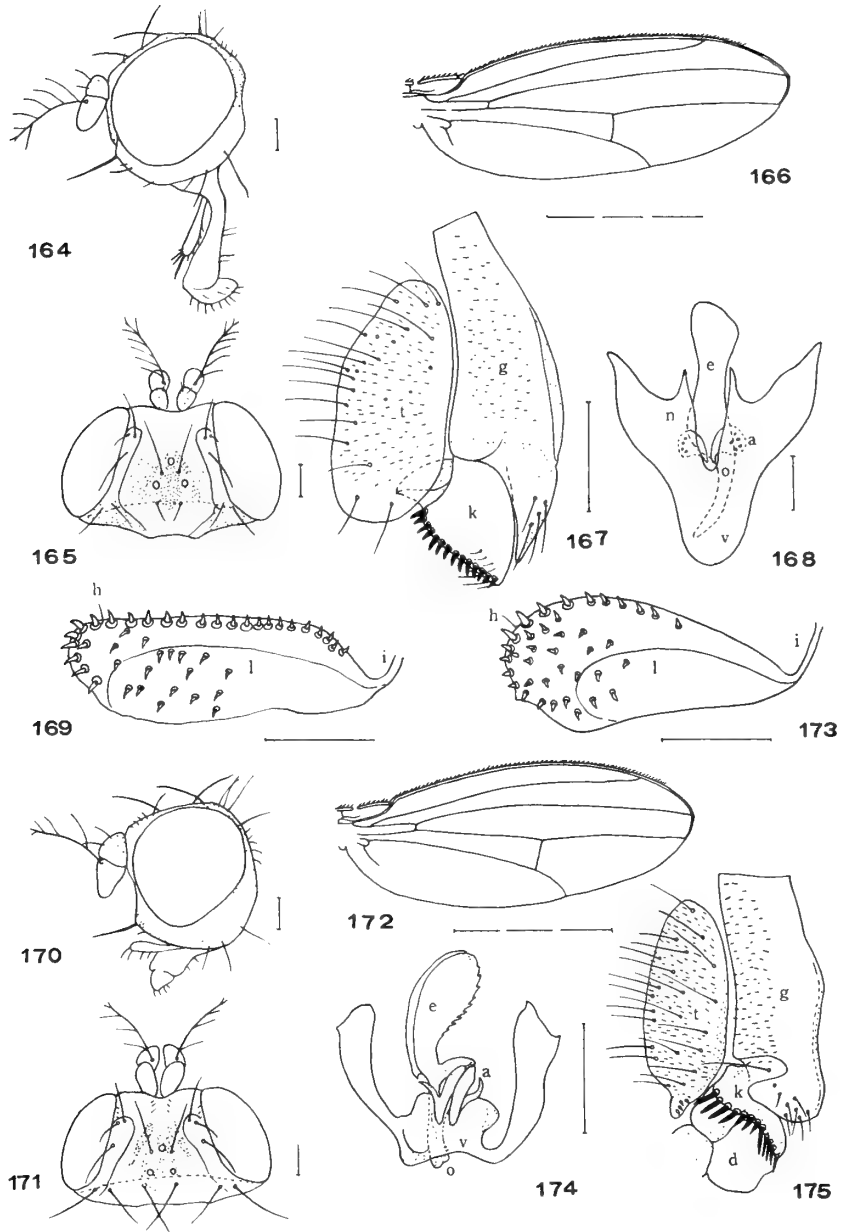
*Scaptomyza* Hardy, 1849 : 361.

Type-species : *Drosophila graminum* Fallén, 1823 : 8 (Europe).

***Scaptomyza (Scaptomyza) parasplendens* sp. n.**

(Text-figs. 164-169)

♂, ♀. Body about 2.2 mm., dark greyish brown. Head slightly broader than thorax. Eyes dark red, with thick long grey pilosity. Antennae with second segment black ; third yellowish orange. Arista with about five dorsal branches, a long ventral one, and a small terminal fork. Palpus yellow, slender, apically dark. Ocellar triangle black, large, somewhat grey pollinose. Periorbit grey, somewhat pollinose, three-fourths as long as front, anteriorly slightly broadened. Front mostly yellowish grey, dark orange between periorbits and ocellar triangle, dark around ocellar triangle, anteriorly somewhat narrowing and narrower than median length, posteriorly nearly half as broad as head width. Clypeus pale brown, narrow. Face white, flat, parallel-



FIGS. 164-175. 164-169, *Scaptomyza parasplendens* sp. n. 164, ♂ head, lateral aspect ; 165, ♂ head, dorsal aspect ; 166, ♂ wing ; 167, periphallial organs, lateral aspect ; 168, phallic organs, ventral aspect ; 169, ♀ egg-guide. 170-175, *Scaptomyza melanissima* sp. n. 170, ♂ head, lateral aspect ; 171, ♂ head, dorsal aspect ; 172, ♂ wing ; 173, ♀ egg-guide ; 174, phallic organs, ventral aspect ; 175, periphallial organs, lateral aspect.

sided, broad, mediolaterally with a small black spot. Carina very low, white. Cheeks yellowish white, black above, about one-fifth as broad as the greatest diameter of eye. Occiput black, medially yellow. Anterior reclinate orbital about half as long as proclinate, just outside proclinate, much nearer to proclinate than to posterior reclinate. Posterior reclinate slightly longer than proclinate. Vibrissa long, stout; second oral about one-third as long as vibrissa; succeeding orals shorter.

Mesonotum greyish brown, bluish grey pollinose, anteriorly pale, dark along dorsocentral lines and caudomedially. Scutellum grey pollinose, grey-brown, laterally pale. Thoracic pleura greyish brown, pollinose. Two long humerals, lower slightly longer. Acrostichal hairs in two rows. Anterior scutellar long, divergent; posterior scutellar three-fifths as long as anterior, one and a half times as distant from anterior as from each other. Sterno-index 0.6. Legs mostly yellowish grey; coxae yellow; fore tibia and fore tarsi brownish black; last two tarsal segments of mid and hind legs black. Pulvilli white, large. Front metatarsi as long as next two segments together, mid and hind metatarsi as long as next three segments together. Preapicals on all legs; apicals prominent on fore leg. Wings narrow, hyaline; crossveins clear.  $R_{2+3}$  gently curved to *costa* at tip;  $R_{4+5}$  and  $M$  parallel; *costa* reaching  $M$ . C-index about 2.6;  $4V$ -index about 1.4;  $4C$ -index about 0.7;  $5x$ -index about 1.8;  $Ac$ -index about 3.4.  $C1$ -bristle two;  $C3$ -fringe on basal one-third. Halteres yellow, elongate, dark at tip. Abdominal tergites greyish black, bluish grey pollinose. Abdominal sternites pale grey.

Peripheral organs: Genital arch brownish black, pubescent, dorsally narrowing, anterior margin with narrow projection below. Clasper brownish black, large, triangular, dorsocaudally with an acute black projection, distally with a convex row of about fourteen pointed black teeth on almost entire margin, and with a few short marginal setae below. Anal plate brownish black, very large, separated from genital arch, ventrally broadened, rounded below, setigerous and pubescent. Phallic organs: Aedeagus yellowish orange, oblong, apically rounded in lateral aspect, basally narrowing. Basal apodeme slender, rod-like, half as long as aedeagus.  $PI = 2.0$ . Anterior paramere minute, conical, distally with a few sensilla. Ventral fragma triangular, brownish; lateral arm broad and pointed apically; median notch deep, acute; submedian process narrow, without submedian spine. p.f. = aBCdEfg<sub>6</sub>HikLmn. Egg-guide lobe dark brownish black, robust, distal margin obliquely truncate, with about twenty-four marginal and twenty scattered discal strong black teeth. Basal isthmus short.

Holotype ♂. EAST NEPAL: Taplejung District, Sangu, mixed vegetation in deep gully, c. 6,200', 2.i-13.ii.1962 (R.L.C.), BMNH.

Allotype ♀. Same data as holotype (R.L.C.), BMNH.

Paratypes: Taplejung District, 7 ♂, 4 ♀, same data as holotype; 11 ♂, 8 ♀, Sangu, mixed vegetation by stream in gully, c. 6,200', xi.1961-i.1962; 1 ♂, 2 ♀, Sangu, mixed vegetation by stream in gully, c. 6,200', ix-x.1961; 1 ♂, *ibid.*, clearing in small wood, c. 6,200', 25.xi.1961; 1 ♀, *ibid.*, spray-splashed rocks in shallow ravine c. 6,200', 25-28.x.1961; 1 ♀, *ibid.*, damp evergreen oak forest, c. 9,200', 2-26.xi.1961; 7 ♂, 6 ♀, *ibid.*, mixed vegetation in dried-up ravine, c. 6,800', 16.ii.1962; 2 ♂, below Tamrang Bridge, river banks, c. 5,500', x-xi.1961; 1 ♂, below Sangu, edge of small mixed wood, c. 6,000', 2-26.xi.1961; 1 ♂, *ibid.*, 4.xi.1961; 2 ♀, *ibid.*, mixed vegetation on sheltered slope above river, c. 4,000', 3.i.1962; 2 ♀, *ibid.*, by stream in shady ravine, c. 6,300', 30.x.1961; 3 ♀, Dobhan, east bank of River Tamur, mixed vegetation by stream in deep gully, c. 3,000', i-ii.1962 (R.L.C.), BMNH, 1 ♂, 1 ♀ at the Tokyo Metropolitan University.

Closely allied to *S. subsplendens* Duda, 1935, (East Siberia) especially in having two rows of acrostichal hairs, medially pale occiput, and ♂ with large anal plate, but

differs from it in having paler periorbit (black in *subsplendens*), mostly yellow front (mostly dark in *s.*), ♂ anal plate as large as in *S. graminum* (Fallén) (smaller in *s.*), and black fore tibia.

***Scaptomyza (Scaptomyza) melanissima* sp. n.**

(Text-figs. 170–175)

♂, ♀. Body about 1.8 mm. Head slightly broader than thorax. Eyes dark purplish brown, thickly pilose, relatively small and oval. Antennae with second segment yellowish orange, dorso-anteriorly darker; third pale yellowish orange, triangular. Arista with five short branches including a moderate fork, without ventral branches. Palpus yellow, apically swollen, with a few stout black ventral setae. Ocellar triangle black, large, grey pollinose, convex. Periorbit broad, black, grey pollinose, anterior tip rounded, about three-fourths as long as front. Front mostly black, grey pollinose, anteriorly orange, especially dark between periorbits and ocellar triangle, with a few frontal hairs, anteriorly narrowing and narrower than length down middle, posteriorly two-thirds as broad as head width. Clypeus small, yellowish grey. Face greyish white matt, concave, wider below. Carina low, narrow, slightly wider below. Cheeks white, posteriorly black, about one-third as broad as the greatest diameter of eye. Occiput black. Postverticals long. Anterior reclinate orbital two-thirds as long as proclinate, just outside proclinate, thrice as distant from posterior reclinate as from proclinate. Posterior reclinate slightly longer than proclinate. Only one long stout black oral.

Mesonotum matt black, bluish grey pollinose, with diffuse median and lateral black longitudinal stripes, lateral pair extending to scutellum. Scutellum flat, bluish black pollinose. Thoracic pleura black, grey pollinose, somewhat bluish. Three long humerals, lowermost longest. Acrostichal hairs in six rows, relatively long. Posterior dorsocentrals more than twice as long as anteriors; distance between anterior and posterior dorsocentrals three-fifths distance between anterior pair. Anterior scutellars very long, divergent, twice as long as scutellum; posteriors about three-fifths as long as anteriors, twice as distant from anteriors as from each other. Sterno-index about 0.7. Legs yellowish grey, last tarsal segment large, black; penultimate black; front and hind metatarsi longer than the other segments together, hind metatarsi subequal to next three segments together. Preapicals on all legs, apicals prominent on mid leg. Wings hyaline, narrow, slightly pointed at tip; crossveins clear.  $R_{2+3}$  medially convex anteriorly, apically gently curved to *costa*;  $R_{4+5}$  and *M* somewhat convergent distally. C-index about 4.0; 4V-index about 1.1; 4C-index about 0.5; 5x-index about 1.5; Ac-index about 2.6. C1-bristle one; C3-fringe on basal one-third. Halteres white, knob rounded and large. Abdominal tergites slender, black, matt, somewhat bluish grey pollinose.

Periphallalic organs: Genital arch brownish black, pubescent, dorsally not narrowing, ventrally broadly truncate and with several setae, subapically pale on caudal half. Clasper brownish black, crescentic, marginally with a concave row of about twelve long stout black pointed teeth, the row covering entire distal margin of clasper. Anal plate pale brownish black, elliptical, setigerous, pubescent, lower tip narrowly pointed and with a few short setae. Decasternum large, quadrate, tripartite. Phallic organs: Aedeagus yellowish grey, elliptical, basally tapering, ventral margin serrated and with a yellow vertical rod; apodeme brown, straight. PI = 1.5. Anterior paramere minute, sensilla obscure, ventral fragma greyish brown, deeply notched, lateral arms distally broadened. p.f. = abCdEf<sub>0</sub>g<sub>0</sub>HikLmn. Egg-guide lobe large, oval, dark brown, distally broadly rounded, with about fifteen marginal and twenty scattered discal strong black teeth. Basal isthmus narrow, black, about one-fifth as long as egg-guide lobe.

Holotype ♂. EAST NEPAL: Taplejung District, damp evergreen oak forest above Sangu, c. 9,200', 2-26.xi.1961 (R.L.C.), BMNH.



Allotype ♀. Taplejung District, Sangu, clearing in small wood, c. 6,200', 25.x.1961 (R.L.C.), BMNH.

Paratype ♂: Taplejung District, ex *Lycopodium* sp. on slope above Sangu, c. 7,800', 11-14.i.1962 (Head missing) (R.L.C.), BMNH.

Closely allied to *S. grahami* Hackman, (China) but ocellar triangle not darker than any part of front, arista with three dorsal branches (four in *grahami*), thoracic pleura not dark reddish brown, scutellum not brown medially, and male clasper with fewer and stronger teeth on entire outer margin (on lower half and without stout teeth in *g.*).

### *Scaptomyza (Scaptomyza) silvata* sp. n.

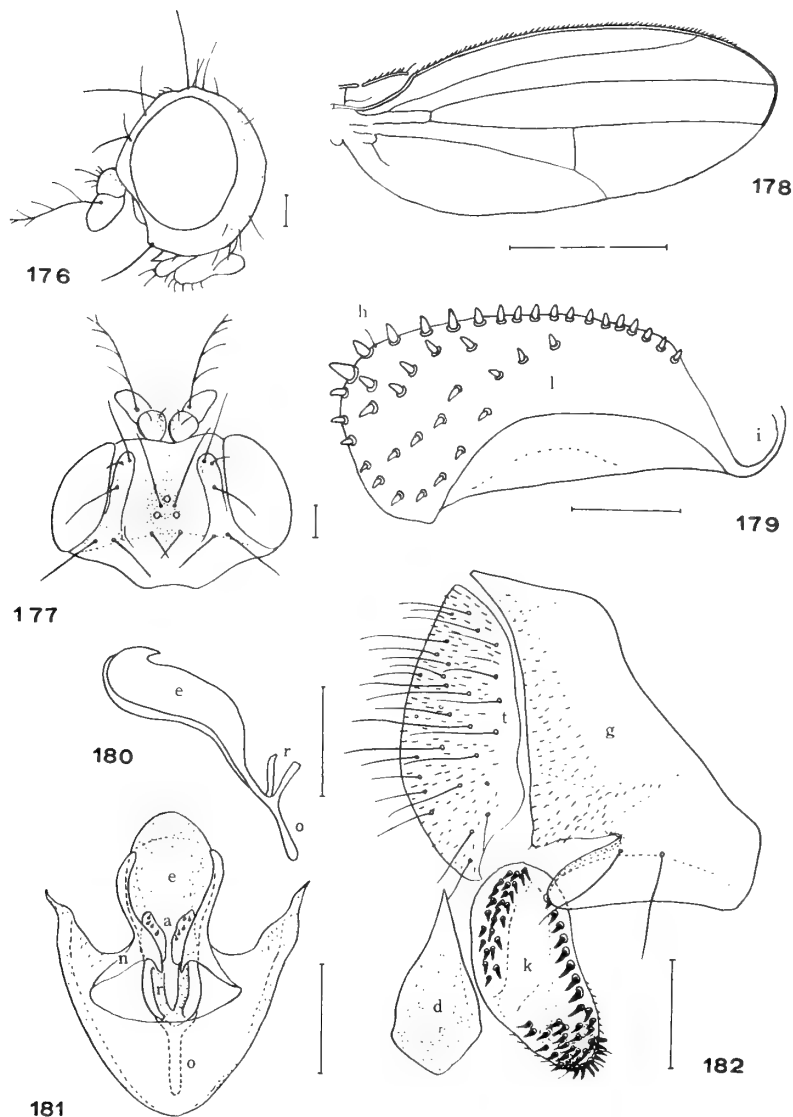
(Text-figs. 176-182)

♂, ♀. Body about 2.2 mm. Head very slightly broader than thorax. Eyes oval, relatively small, dark purplish brown, thickly pilose. Antennae orange-yellow; second segment brown at base; third broad, triangular. Arista with about three dorsal and a ventral short branches and a small terminal fork. Palpus orange in ♂, black in ♀, apically with a few rather short stout black setae. Ocellar triangle velvety black, large, longer than broad. Ocelli greyish brown. Periorbit grey, pollinose, without frontal hairs, apically rounded and not reaching anterior margin of front. Front grey, pollinose, anteriorly orange, somewhat narrowing, as broad as length down middle; posteriorly about half as broad as head width. Face yellowish white, slightly concave, nearly parallel-sided. Carina low, black, narrow, broadened below, reaching buccal margin. Cheek yellowish white, black posteriorly, about one-fourth as broad as the greatest diameter of eye. Occiput black, medially white, pollinose. Anterior reclinate orbital two-thirds as long as proclinate, outside proclinate, and thrice as distant from posterior reclinate as from proclinate. Proclinate slightly shorter than posterior reclinate. Vibrissae strong, second and third orals one-fourth as long as vibrissae.

Mesonotum black, bluish grey pollinose, with a median and lateral black longitudinal stripe, median one reaching end of scutellum. Scutellum black, bluish grey pollinose. Thoracic pleura black, somewhat glossy. Two humerals, upper longer. Acrostichal hairs in four rows. Anterior dorsocentrals four-fifths as long as posteriors; distance between anterior and posterior dorsocentrals about five-eighths distance between anterior pair. Anterior scutellars long, divergent, twice length of scutellum; posteriors two-thirds as long as anteriors, one and a half times as distant from anteriors as from each other. Sterno-index about 0.5. Legs greyish brown, trochanters and fore coxa yellow, femora black, last two tarsal segments black; all metatarsi as long as next three segments together. Preapicals on all legs; apicals on mid leg. Wings hyaline, veins brown, tip somewhat pointed.  $R_{2+3}$  medially convex anteriorly, gently curved to *costa* apically; *costa* reaching end of *M*;  $R_{4+5}$  and *M* parallel. C-index about 3.1; 4V-index about 1.4; C4-index about 0.7; 5x-index about 0.9; Ac-index about 2.5. C1-bristle one, long; C3-fringe on basal one-third. Halteres yellow. Abdominal tergites black, somewhat glossy. Abdominal sternites black, large quadrate.

Periphallallic organs: Genital arch dark brownish black, pubescent, dorsally much narrowing, ventrally broadly truncate and with a few long setae, subapically with a deep caudal incision. Clasper oval, dark brownish black, marginally with a row of about ten black teeth, discally with numerous black pointed teeth in about three rows above and six rows below. Anal plate dark brownish black, very large, fusiform, separated from genital arch, setigerous and pubescent. Decasternum rhombic, dark brownish black. Phallic organs: Aedeagus yellowish brown, somewhat sinuous, elliptical, tip rounded in lateral aspect. Apodeme black, narrow, short and straight, about one-fourth as long as aedeagus. PI = 4.0. Vertical rod as long as apodeme, black, slender. Anterior paramere small, oval, pubescent, brownish black, attached to the

vertical rod, with a few sensilla subapically. Hypandrial plate elongate, basally broad. Ventral fragma V-shaped. p.f. = aBCdEfg<sub>0</sub>HikLmn. Egg-guide lobe robust, brownish black, abruptly narrowing proximally, broadly truncate distally, with about twenty-four marginal and seventeen discal strong black pointed teeth. Basal isthmus black, short, one-sixth as long as egg-guide lobe.



FIGS. 176-182. *Scaptomyza silvata* sp. n. 176, ♂ head, lateral aspect; 177, ♂ head, dorsal aspect; 178, ♂ wing; 179, ♀ egg-guide; 180, aedeagus, lateral aspect; 181, phallic organs, ventral aspect; 182, peripheral phallic organs, lateral aspect.

Holotype ♂. EAST NEPAL : Taplejung District, damp evergreen oak forest above Sangu, c. 9,200', 2-26.xi.1961 (R.L.C.), BMNH.

Allotype ♀. Same data as holotype (R.L.C.), BMNH.

Paratypes : 3 ♀, same data as holotype (R.L.C.), BMNH, 1 ♀ at the Tokyo Metropolitan University.

Closely resembles *S. nigrita* Wheeler, 1952, (N. America) but differs slightly in having deep velvety black, not pollinose, large ocellar triangle and front only orange anteriorly.

### **DIATHONEURA** Duda

*Diathoneura* Duda, 1924a : 180.

Type-species : *Drosophila taeniati pennis* Duda, 1925 : 168 ; designated by Malloch, 1934 (S. America).

### ***Diathoneura ripa* sp. n.**

(Text-figs. 274-279, p. 94)

♂, ♀. Body about 2 mm., small, glossy black. Head slightly broader than thorax. Eyes large, dark reddish brown, with thick pilosity. Antennae black, third segment oval and with grey pubescence, apically widely apart from face. Palpus black, with a prominent apical bristle. Ocellar triangle black, convex, straight somewhat glossy. Periorbit black, slightly glossy, posteriorly somewhat narrowing, anteriorly blunt, not reaching anterior margin of front. Front evenly black, matt, grey pollinose, anteriorly grey, slightly broader than length down middle, posteriorly broader and slightly narrower than head width. Clypeus black. Face black, flat, parallel-sided, whitish between second segments of antennae. Carina entirely absent. Cheeks black, narrow, about one-ninth as broad as the greatest diameter of eye. Occiput black. Anterior reclinate orbital slender, half as long as proclinate, one-fourth as long as posterior reclinate, about twice as distant from posterior reclinate as from proclinate. Proclinate inside other orbitals. Vibrissae long, second oral one-third as long as vibrissae ; other orals shorter. Post-verticals fine, very short.

Mesonotum black, glossy, with fine punctures. Scutellum black, somewhat grey pollinose. Thoracic pleura glossy black. Two long humerals. No prescutellars. No propleurals. Acrostichal hairs in six to eight rows. Anterior dorsocentrals two-thirds as long as posteriors ; distance between anterior and posterior dorsocentrals half distance between anterior pair. Anterior scutellars divergent, slightly longer than posteriors, which are equally distant from each other and from anteriors. Sterno-index about 0.7. No prominent median sternopleural. Legs short, thick, dark brown, femora black. All metatarsi as long as the other segments together. Preapicals on all legs ; apicals on fore and mid legs. Wings hyaline, relatively slender, veins pale yellow, crossveins not clouded, tip rounded.  $R_{2+3}$  straight, curved to *costa* at tip.  $R_{4+5}$  and *M* distally somewhat convergent. C-index about 2.3 ; 4V-index about 3.1 ; 4C-index about 2.6 ; 5X-index about 3.1 ; Ac-index about 5.3. C1-bristles only one ; C3-fringe on basal five-eighths. Halteres white. Abdominal tergites entirely black, somewhat glossy. Abdominal sternites pale brown, small, elongate.

Periphallitic organs : Genital arch black, dorsally slightly narrowing, setigerous ventroposteriorly ; toe deep black, rounded ; heel somewhat high. Clasper black, crescentic, dorsally narrowly pointed, with a slightly concave row of about thirteen black teeth on entire distal margin. Anal plate fusiform, greyish black, setigerous, narrowly pointed ventroposteriorly. Phallic organs : Aedeagus black, short, apparently bifurcated and hooked apically,

medially broadened. Anterior paramere bifid, black, slender, basally recurved ventrocaudally and attached to hypandrium. Posterior parameres fused to form a large dorsally folded quadrate flap. Ventral fragma quadrate, finely pubescent medially, and distally with a pair of short submedian processes.  $PI = 0.3$ .  $p.f. = aBCdEf_0gHiKLMN$ . Egg-guide lobe brown, distally orange, fusiform, apically pointed, with about fifteen sharply pointed black marginal teeth, apical tooth largest, and with a prominent pale subterminal hair. Basal isthmus thick, black, half as long as lobe.

Holotype ♂. EAST NEPAL : Taplejung District, river banks below Tamrang Bridge, c. 5,500', x-xi.1961 (R.L.C.), BMNH.

Allotype ♀. Same data as holotype (R.L.C.), BMNH.

Paratypes : 6 ♂, 3 ♀, 1 ex. (abdomen missing), same data as holotype ; 1 ♀, Taplejung District, below Sangu, mixed vegetation on sheltered slopes above river, c. 4,000', 3.i.1962 (R.L.C.), BMNH, 1 ♂ and 1 ♀ (below Tamrang Bridge) deposited at the Tokyo Metropolitan University.

Small body size, minute postverticals, non-carinate face and relatively short anterior reclinate orbital are the features characteristic of the Neotropical genus, *Diathoneura* Duda. Differing from the American species of the genus, however, the present species has eyes with thick pilosity. Frota-Pessoa (1947) treats this genus as a synonym of *Clastopterymyia* Malloch, 1924 (in Malloch and McAtee, *Proc. Biol. Soc. Wash.* 37 : 27), but Wheeler (1952) considers them to be distinct genera.

## **DROSOPHILA** Fallén

*Drosophila* Fallén, 1823 : 4.

Type-species : *Musca funebris* Fabricius, 1787 : 345 (Sweden).

### KEY TO SUBGENERA

- |   |  |   |
|---|--|---|
| 1 | Preapicals prominent only on hind tibiae . . . . .   | 2 |
| – | Preapicals prominent on all three tibiae . . . . .   | 3 |
| 2 | The longest axis of eye nearly rectangular to body axis. ♂ with submedian spines of novasternum short and usually paired. Egg-guide teeth usually yellowish brown                                |   |
|   | <b>HIRTODROSOPHILA</b> Duda (p. 77)  |   |
| – | The longest axis of eye considerably oblique to body axis. ♂ novasternum with submedian spines rather long and in two pairs. Egg-guide teeth black   |   |
|   | <b>DORSILOPHA</b> Sturtevant (p. 81)   |   |
| 3 | Prescutellars present. ♂ with submedian spines of novasternum exceedingly long and stout. Egg-guide teeth yellowish brown . . . . .  |   |
| – | Prescutellars absent. ♂ with submedian spines of novasternum usually short and weak or frequently absent . . . . .   | 4 |
| 4 | The longest axis of eye very oblique to the body axis. Ocellars inserted well outside ocellar triangle. Clasper teeth and egg-guide teeth relatively large in size and few in number . . . . .   |   |
|   | <b>DICHAETOPHORA</b> Duda (p. 73)  |   |
| – | The longest axis of eye nearly rectangular to the body axis. Ocellars inserted inside ocellar triangle. Clasper teeth and egg-guide teeth relatively small in size and large in number . . . . . | 5 |
| 5 | Abdominal tergites with medially contiguous black cross-bands. Egg-guide teeth usually black . . . . .   |   |
|   | <b>SOPHOPHORA</b> Sturtevant (p. 81)   |   |
| – | Abdominal tergites usually with medially interrupted black cross-bands or spots. Egg-guide teeth usually yellowish brown   |   |
|   | <b>DROSOPHILA</b> Fallén, s. str. (p. 96)  |   |

Subgenus **SCAPTODROSOPHILA** Duda*Scaptodrosophila* Duda, 1923 : 37.*Pholadoris* Sturtevant, 1942 : 28 [teste Wheeler and Takada, 1964 : 185].? *Paradrosophila* Duda, 1923 : 43.Type-species : *Scaptodrosophila scaptomyzoidea* Duda, 1923 : 37 (New Guinea).

As pointed out by Wheeler (1957) and Wheeler and Takada (1964), re-examination of *Drosophila pictipennis* Kertész, the type-species of *Paradrosophila* designated by Sturtevant, 1927, is required in determining relationships between *Paradrosophila* and *Scaptodrosophila*. The characteristics of this subgenus are most clearly expressed in male genital organs, and *Drosophila brunnea* Duda and *D. pilicrus* Duda are tentatively included in this subgenus as they have been included by Duda in his *Paradrosophila*, although the females alone have been examined by the present author.

## KEY TO SPECIES

- |   |   |                                 |
|---|---|---------------------------------|
| 1 | Scutellum yellowish brown, laterally black, apically white. Eyes bare. Arista with three branches below fork. Abdominal tergites with medially contiguous, laterally not broadened, black cross-bands . . . . .         | <b><i>brunnea</i></b> (p. 67)   |
| - | Scutellum unicolorously yellowish brown, dark brown, or black. Arista with two branches below fork. Eyes pubescent. Abdominal tergites each with medially interrupted, laterally broadened, black cross-bands . . . . . | 2                               |
| 2 | Wings black at base . . . . .   | <b><i>pilicrus</i></b> (p. 67)  |
| - | Wings not black at base . . . . .   | 3                               |
| 3 | Mesonotum deep black. Front velvety black. Wings hyaline. Minute species with body length about 1 mm. . . . .   | <b><i>minima</i></b> (p. 69)    |
| - | Mesonotum yellowish or reddish brown. Wings fuscous . . . . .   | 4                               |
| 4 | Front reddish brown, somewhat velvety. Scutellum dark brown. Two long humerals. $R_{2+3}$ apically not curved to <i>costa</i> . . . . .   | <b><i>marginata</i></b> (p. 70) |
| - | Front golden brown. Scutellum yellowish brown, pollinose. Three long humerals. $R_{2+3}$ apically curved to <i>costa</i> . . . . .  | <b><i>alternata</i></b> (p. 72) |

***Drosophila (Scaptodrosophila) brunnea* de Meijere subgen. comb. n.***Drosophila brunnea* de Meijere, 1911 : 401 (Java).*Drosophila (Paradrosophila) brunnea* de Meijere ; Duda, 1924a : 206 (Java) ; Duda, 1926 : 79 (Sumatra) ; Okada, 1964b : 445 (Borneo).*Drosophila (Paradrosophila) scutellimargo* Duda, 1923 : 43 [nom. nud.] ; Duda, 1924a : 206 ; 243 (Formosa).

Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', ix-x. 1961, 1 ♀ (R.L.C.).

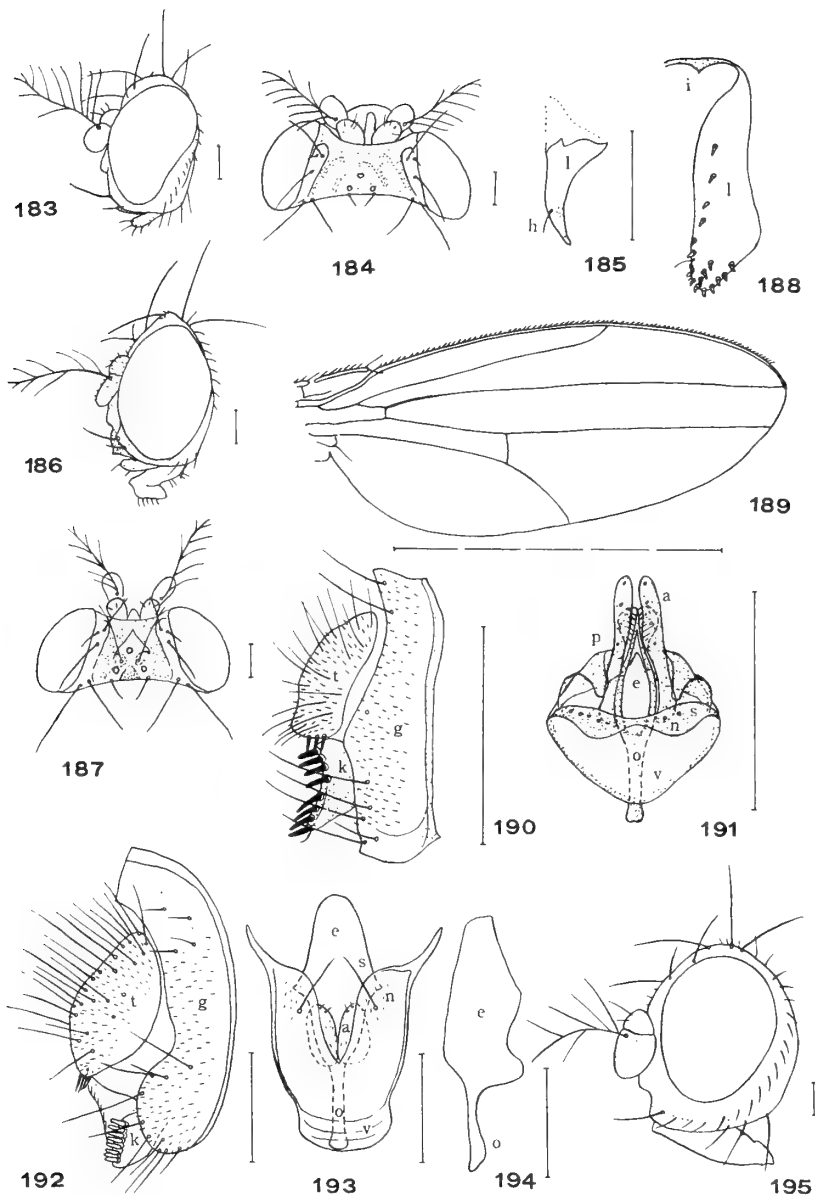
Distribution : Nepal (new locality), Java, Sumatra, Borneo, Formosa.

***Drosophila (Scaptodrosophila) pilicrus* Duda subgen. comb. n.**

(Text-figs. 183-185)

*Drosophila (Paradrosophila) pilicrus* Duda, 1926 : 74 (Sumatra).

♀. Body about 2 mm. Head slightly broader than thorax. Eyes dark red, with fine pilosity. Antennae yellowish brown, third segment one and a half times as long as broad. Arista with about seven or eight dorsal and two or three ventral branches and a moderate terminal fork. Palpus brown, with an apical and a few ventral setae. Ocellar triangle matt



FIGS. 183-195. 183-185, *Drosophila (Scaptodrosophila) pilicrus* Duda, ♀. 183, head, lateral aspect; 184, head, dorsal aspect; 185, egg-guide. 186-191, *Drosophila (Scaptodrosophila) minima* sp. n. 186, ♂ head, lateral aspect; 187, ♂ head, dorsal aspect; 188, ♀ egg-guide; 189, ♂ wing; 190, peripheral organs, lateral aspect; 191, phallic organs, ventral aspect. 192-195, *Drosophila (Drosophila) pentastrata* sp. n. ♂. 192, peripheral organs, lateral aspect; 193, phallic organs, ventral aspect; 194, aedeagus, lateral aspect, sinistral side ventral; 195, head, lateral aspect.

black, somewhat pollinose, narrowing posteriorly, anteriorly rounded and ending shortly before anterior margin of front, laterally entirely separated from eye margin. Front dark brown, somewhat grey pollinose, nearly parallel-sided, black around ocellar triangle, anteriorly deeply depressed downward and twice as broad as length down middle, posteriorly five-eighths as broad as head width. Frontal hairs absent. Clypeus black. Face greyish brown, laterally black, parallel-sided. Carina high, long, ending before buccal margin, mediolongitudinally pale grey, laterally black. Cheeks greyish white, one-fifth as broad as the greatest diameter of eye. Occiput black. Postverticals very slender. Anterior reclinate orbital just outside proclinate, two-thirds as long as proclinate, more than twice as distant from posterior reclinate as from proclinate; proclinate slightly shorter than posterior reclinate. Second oral slightly shorter than vibrissa; succeeding orals gradually shorter.

Mesonotum matt black. Scutellum matt black, grey pollinose. Thoracic pleura dark grey, lower tip of sternepisternum darker. Two long humerals. Sterno-index about 0.8. Prescutellar as long as anterior dorsocentral. Posterior dorsocentrals much longer than anterior; distance between anterior pair of dorsocentrals twice distance between anterior and posterior pair. Legs yellowish grey; femora and fore and mid tibiae brownish black; fore femur ventrally and apicodorsally with a few long black setae. Preapicals on all legs; apicals on mid leg. Front metatarsi slightly shorter than next two segments together, mid and hind metatarsi subequal to next two segments together. Wings hyaline, veins yellow; wing base and tip of second costal section black.  $R_{2+3}$  nearly straight;  $R_{4+5}$  and  $M$  parallel. C-index about 1.5; 4V-index about 2.0; 4C-index about 1.5; 5x-index about 1.5; Ac-index about 3.0. C1-bristle one, long; C3-fringe of basal two-thirds. Halteres black, grey pollinose. Abdominal tergites yellow; 1T-dark brown. Anal cerci conical. Egg-guide lobe orange brown, elongate, triangular, apically darker, narrowly pointed, basally much broadened, subterminally with a long marginal hair, without teeth.

Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', ix-x. 1961, 1 ♀ (*R.L.C.*).

Distribution: Nepal (new locality), Sumatra.

It is noticeable that the egg-guide resembles that found in the genus *Microdrosophila*.

### *Drosophila (Scaptodrosophila) minima* sp. n.

(Text-figs. 186-191)

♂, ♀. Body about 1 mm., velvety black. Head black, as broad as thorax. Eyes dark red, finely pilose. Antennae with second segment dark brown; third black, one and a half times as long as broad, rounded at tip. Arista with about four dorsal and two ventral long branches and a large terminal fork. Palpus black, with a strong apical and a weaker ventral setae. Ocellar triangle convex, large, black, somewhat grey pollinose. Periorbit dark greyish black, pollinose, anteriorly somewhat broadened and ending near the anterior margin of front. Front velvety black, anterior margin deeply concave, anteriorly narrowing and slightly narrower than length down middle, posteriorly half as broad as head width. Clypeus black, somewhat glossy blue. Face greyish black, medially somewhat broadened. Carina dark brown, long, high, almost reaching buccal margin. Cheeks narrow, black, grey pollinose, about one-seventh as broad as the greatest diameter of eye. Occiput black. Postverticals moderate in size. Mouth-parts greyish brown. Anterior reclinate orbital just outside proclinate, twice as distant from posterior reclinate as from proclinate, slightly shorter than proclinate, which is about two-fifths as long as posterior reclinate. Vibrissae strong; second oral weak, half as long as vibrissae; other orals shorter.

Mesonotum deep black, somewhat glossy, setigerous. Scutellum velvety black. Thoracic pleura black. Two humerals. Prescutellars five times as long as anterior dorsocentrals. Acro-

stichal hairs in eight rows. Anterior dorsocentrals half as long as posteriors ; distance between anterior and posterior dorsocentrals about one-third distance between anterior pair. Anterior scutellars parallel, long, as long as posteriors or as scutellum itself ; posteriors equally distant from anteriors and from each other. Sterno-index about 0.7. Median sternopleural long, intermediate in size between anterior and posterior ones. Legs black, femora darker. All metatarsi as long as rest of tarsal segments together. Preapicals on all legs ; apicals strong on mid leg. Wings hyaline, tip rounded, veins brown. Crossveins clear. Costa reaching end of  $R_{4+5}$  ;  $R_{2+3}$  medially straight, apically slightly curved to *costa* ;  $R_{4+5}$  and  $M$  parallel. C-index about 1.3 ; 4V-index about 2.2 ; 4C-index about 2.3 ; 5x-index about 2.8 ; Ac-index about 5.0. C1-bristles two, subequal ; C3-fringe on basal five-sixths. Halteres black. Abdominal tergites entirely black, somewhat glossy.

Periphallallic organs : Genital arch greyish brown, pubescent, not narrowing dorsally, broadly truncate ventrally, ventral tip black and somewhat swollen, posterior margin with a few long setae in a row, lateromedially somewhat swollen caudally. Clasper black, quadrate, lower tip pointed ; distal margin broad and with a concave row of about eight strong pointed black teeth, the row occupying entire length of distal margin. Anal plate greyish brown, separated from genital arch, oblong, setigerous and pubescent, caudal tip truncate and with a few strong short setae. Phallic organs : Aedeagus apparently bilobed, elongate, black, fusiform in ventral aspect. Apodeme straight, black, slightly shorter than aedeagus. Anterior paramere large, dark brown, basally black, apically rounded, basally contiguous with aedeagus, with a row of about four sensilla on distal half. Posterior parameres dark brown, fused to be a broad distally flattened medially pale lobe. Hypandrial plate large, crescentric, dark brown, with a few submedian spines. Ventral fragma broad, brown, V-shaped, marginally black. PI = 1.5. p.f. = ABCDeFgHIKLMN. Egg-guide lobe dark brown, elliptical, apically narrowly rounded, with about fourteen marginal and three discal stout black teeth, ventral margin with a prominent subterminal hair. Basal isthmus black, one-third as long as lobe, medially broadened.

Holotype ♂. EAST NEPAL : Arun Valley, east shore of River Arun below Tumlingar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961 (R.L.C.), BMNH.

Allotype ♀. Same data as holotype (R.L.C.), BMNH.

Paratypes : 1 ♂, 2 ♀, same data as holotype (R.L.C.), BMNH, 1 ♀ at the Tokyo Metropolitan University.

Distinguished from other members of the subgenus by extremely small body. Somewhat resembles *D. coracina* Kikkawa and Peng, 1938 (Japan and China), in the shape of genital arch of male periphallallic organs, but differs in having much smaller and less glossy body and spiny clasper teeth.

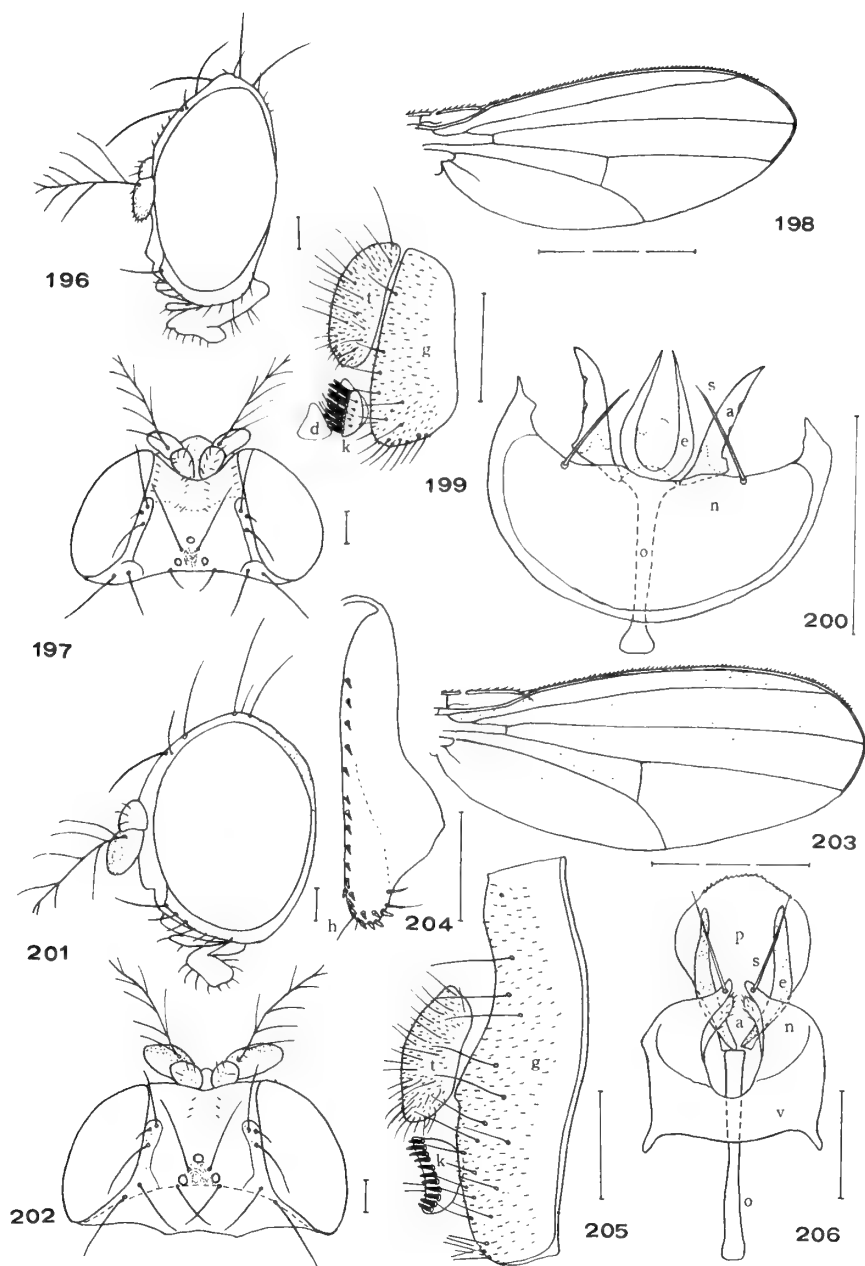
### ***Drosophila (Scaptodrosophila) marginata* Duda subgen. comb. n.**

(Text-figs. 201-206)

*Drosophila (Paradrosophila) marginata* Duda, 1924a : 209 (Formosa) ; Duda, 1923 : 46 [nom. nud.] (Formosa).

♂, ♀. Body about 2.4-2.8 mm. Head as broad as thorax. Eyes dark reddish brown, finely pilose. Antennae with second segment brown ; third dark brown, posterior margin pale. Arista with about four dorsal and two ventral branches and a fine terminal fork. Palpus yellowish orange, with an apical and a ventral black setae. Ocellar triangle black. Periorbit greyish brown, somewhat glossy, short, half as long as front, anteriorly blunt, posteriorly pale and broadened. Front yellowish brown, somewhat velvety, parallel-sided, anteriorly somewhat darker and as broad as length down middle, posteriorly about half as broad as head width.





FIGS. 196-206. 196-200, *Drosophila (Scaptodrosophila) alternata* de Meijere, ♂. 196, head, lateral aspect; 197, head, dorsal aspect; 198, wing; 199, peripheral phallic organs, lateral aspect; 200, phallic organs, ventral aspect. 201-206, *Drosophila (Scaptodrosophila) marginata* Duda. 201, ♂ head, lateral aspect; 202, ♂ head, dorsal aspect; 203, ♂ wing; 204, ♀ egg-guide; 205, peripheral phallic organs, lateral aspect; 206, phallic organs, ventral aspect.

Face yellowish grey. Carina yellowish grey, high, broad, long. Clypeus yellowish brown. Cheek yellowish brown, very narrow, about one-fifteenth as broad as the greatest diameter of eye. Occiput dark brownish black. Postverticals long, slightly shorter than inner verticals. Anterior reclinate orbital short, just outside and shortly behind proclinate, one-third as long as proclinate, one-fourth as long as posterior reclinate, thrice as distant from posterior reclinate as from proclinate. Second oral half as long as vibrissae; succeeding orals as long as second.

Mesonotum dark brown, matt, humeral callus paler, along dorsocentral line pale. Scutellum flat, dark brown, somewhat velvety, elongate. Thoracic pleura dark brown, paler below. Two humerals, lower shorter. Prescutellars as long as anterior dorsocentrals. Acrostichal hairs in six rows. Anterior dorsocentrals one-third as long as posteriors; distance between anterior and posterior dorsocentrals about half distance between anterior pair. Anterior scutellars divergent, slightly longer than posteriors, which are nearer to each other than to anteriors. Sterno-index about 0.7; median sternopleural as long as posteriors. Legs yellow, including coxa. Preapicals on all legs; apicals prominent on mid leg. All metatarsi much longer than the other tarsal segments together. Wing very fuscous especially along costal margin, relatively large; veins dark; crossveins not clouded but distinct.  $R_{2+3}$  nearly straight, not curved to *costa* apically;  $R_{4+5}$  and  $M$  slightly divergent; *costa* reaching  $M$ . C-index about 4.5; 4V-index about 1.5; 4C-index about 0.5; 5x-index about 1.3; Ac-index about 1.4. C1-bristles two; C3-fringe on basal one-third. Abdomen elongate; abdominal tergites yellowish brown, each with a caudal, medially contiguous, latero-anteriorly curved, black cross-band. Abdominal sternites pale yellow.

Periphallallic organs: Genital arch pale brownish black, densely pubescent and setigerous, dorsally not distinctly narrowing, ventral half broader, apically sharply truncate. Clasper pale brownish black, hemispherical, not extending below genital arch, outer margin with about thirteen strong black pointed teeth in a slightly concave row, occupying entire length of outer margin. Anal plate small, elliptical, separated from genital arch, setigerous and pubescent, ventrally obtusely pointed. Phallic organs: Aedeagus bifid, black, crescentic in lateral aspect; basal apodeme one and a half times as long as aedeagus, brownish black, straight. Anterior parameres small, slender, pale yellowish brown, pubescent, attached to hypandrium. Posterior parameres (?) fused to form a large pale brown flat oval process, finely serrated along distal margin. Hypandrium brown, large, triangular, distally narrowly pointed and with a stout long submedian spine. Ventral fragma quadrate, anterolateral corners shortly projected forward, with deep median notch. PI = 0.5. p.f. = ABCdefgHIkLMN. Egg-guide elongate elliptical, swollen dorsally, pale yellowish brown, distally and ventrally darker, apically narrowly rounded, with about twenty two marginal and two apical discal pointed brown teeth, upper two teeth being very long, and with a subterminal hair near apex. Basal isthmus very short and pale.

Taplejung District, between Sangu and Tamrang, mixed plants by damp cliff in deep river gorge, c. 5,200', 22.xi.1961, 2 ♂, 1 ♀; between Sangu and Tamrang, mixed shrubs in deep gorge, c. 5,200', 1 ♂, 1 ♀, x-xi.1961, (R.L.C.).

Distribution: Nepal (new locality), Formosa.

***Drosophila (Scaptodrosophila) alternata* de Meijere subgen. comb. n.**

(Text-figs. 196-200)

*Drosophila alternata* de Meijere, 1911: 402 (Java).

*Drosophila (Paradrosophila) alternata* (de Meijere) Duda, 1924a: 207 (Java); Duda; 1931: 194 (Sumatra); Mayer, 1935: 467 (Sumatra).

♂. Body about 2 mm. Head as broad as thorax. Eyes dark red, large, finely pilose. Antennae with second segment orange-brown, conical; third greyish black, basally orange-brown, oblong, twice as long as broad. Arista with about four dorsal and two ventral branches and a small fork. Palpus yellowish brown, with a few setae. Ocellar triangle medially black,

marginally pale brown, well demarcated. Periorbit narrow, black, extending for upper half of front. Front flat, golden yellowish orange, anterior one-third paler and slightly narrower than length down middle, posteriorly half as broad as head width, with several frontal hairs and anterior periorbital microtrichia. Face grey, narrow. Carina high, long, greyish brown. Cheeks narrow, greyish yellow, about one-twelfth as broad as the greatest diameter of eye. Occiput yellowish brown, dark below. Anterior reclinate orbital small, one-fourth as long as proclinate. Vibrissae rather short; second oral one-third as long as vibrissa; succeeding orals shorter.

Mesonotum greyish brown, with indistinct dark brownish patches. Scutellum yellowish brown, pollinose. Thoracic pleura dark yellowish brown, sternepisternum pale yellow. Humerals three, median longest. Prescutellar long, as long as anterior dorsocentrals. Anterior dorsocentrals one-third as long as posteriors; distance between anterior and posterior dorsocentrals about one-fourth distance between anterior pair. Anterior scutellars divergent; posteriors as long as anteriors, nearer to each other than to anteriors. Sterno-index about 0.3. Median sternopleural as long as posteriors. Legs yellow; fore and mid metatarsi as long as the other segments together, hind metatarsi longer than rest of segments together. Preapicals on all legs; apicals prominent on mid leg. Wings deeply fuscous, relatively narrow; *costa* reaching end of *M*;  $R_{2+3}$  nearly straight, apically curved to *costa*;  $R_{4+5}$  and *M* slightly divergent. C-index about 3.5; 4V-index about 1.5; 4C-index about 0.7; 5x-index about 2.0; Ac-index about 1.8. C1-bristles two, subequal; C3-fringe on basal two-ninths. Halteres yellowish brown. Abdominal tergites yellowish grey, caudolaterally with a black medially interrupted laterally broadened cross-band. Abdominal sternites pale.

Periphallic organs: Genital arch pale yellowish brown, setigerous and pubescent, ventrally gradually broadened, with high heel and rounded toe. Clasper low, semicircular, pale yellowish brown, relatively small, distal margin with a straight row of about eleven large long black teeth for entire length. Anal plate elliptical, yellowish brown, separated from genital arch, setigerous and pubescent; ventral corner with a tuft of short setae. Phallic organs: Aedeagus apparently bifid, oval in ventral aspect, pale yellowish orange, distally narrowing, basally rounded. Basal apodeme pale yellowish grey, straight, longer than aedeagus. PI = 0.8. Anterior paramere blade-like, pale yellowish orange, basally contiguous with aedeagus and hypandrium, apically pointed, laterally with two small pale depressions, which are probably sensory pits. Posterior paramere obscure. Ventral fragma pale yellowish grey, broad semicircular, distal margin straight, without median notch, with a pair of stout long yellowish brown submedian spines. p.f. = ABCDEFg<sub>0</sub>HIKLMN.

Taplejung District, Sangu, yellowish blooms of cultivated Compositae (*Guizotia abyssinica* Cassini), c. 6,200', 16-29.x.1961, 1 ♂ (*R.L.C.*).

Distribution: Nepal (new locality), Java, Sumatra.

Strikingly like the original form except for larger 5x-index (slightly over 1.0 in original form) and distinctly interrupted abdominal cross-bands (obscurely interrupted in original form). Mayer (1935) described larva and puparium of this species from Sumatra.

### Subgenus *DICHAETOPHORA* Duda

*Dichaetophora* Duda, 1940: 19.

Type-species: *Drosophila aberrans* Lamb, 1914: 334 (Seychelles).

Duda (1940) established this subgenus for one species, *aberrans* Lamb. Burla (1954) added two species, *agbo* Burla and *suruk* Burla from Africa, and two other species, *magredientata* Lee, 1964, from Korea and *raridentata* Okada and Chung,

were suggested by Lee (1964) to belong to this subgenus. Although this subgenus was originally characterized by only one pair of dorsocentrals, anterior pair being absent, some species have two pairs with anterior pair fine, and yet other species have both anterior and posterior pairs well developed. These species are characterized in having very oblique eyes and ocellars inserted outside ocellar triangle, by which they can be assigned to *Dichaetophora*. Consequently, the occurrence of only one pair of dorsocentrals is an "archestinic" character (Stenzel, 1963) which means a diagnostic character of a taxon occurring only in some individual units of that taxon (cf. p. 119).

## KEY TO SPECIES

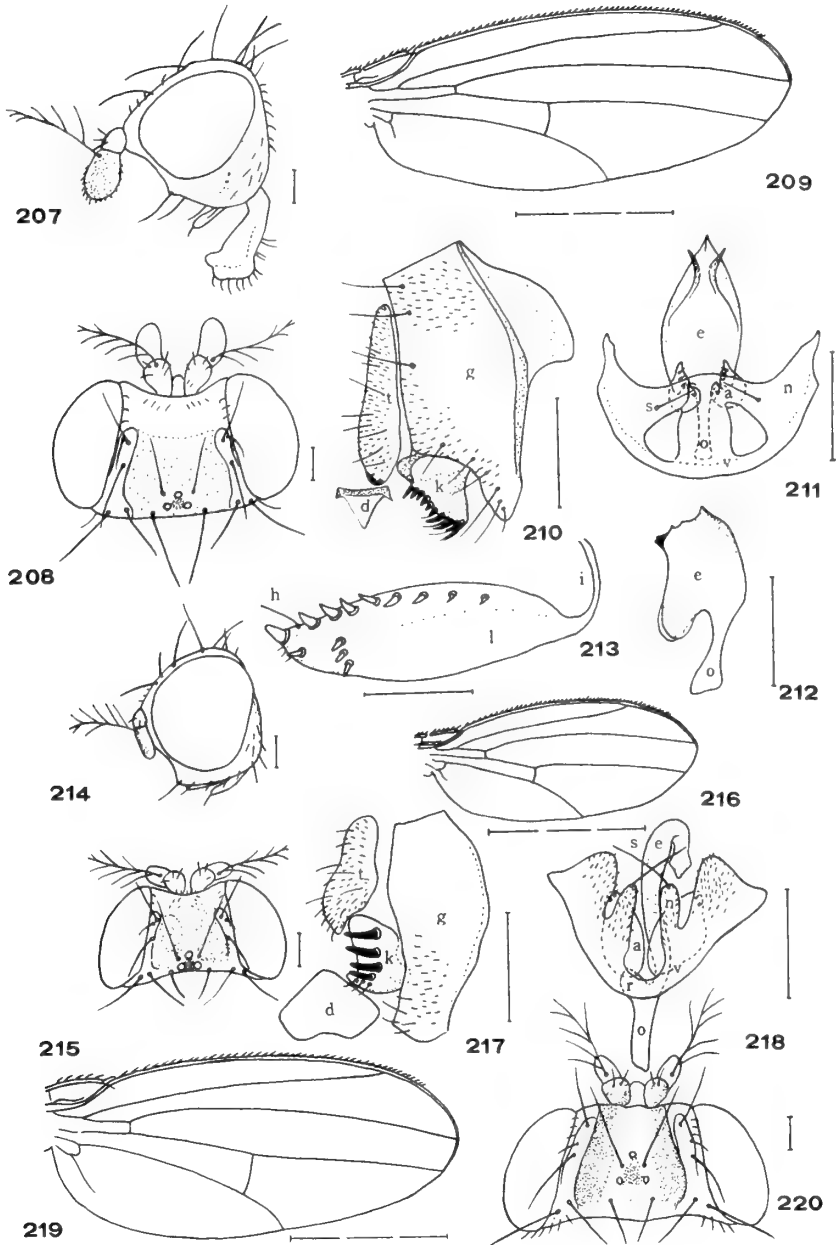
- 1 Antennae vertically erected from head, with the third segment remarkably swollen distally. Arista with only one branch below fork. Abdominal tergites almost entirely black . . . . . ***rotundicornis*** (p. 74)  
 - Antennae recumbent on the head, with the third segment not remarkably swollen distally. Arista with two branches below fork. Abdominal tergites with distinct black cross-bands . . . . . ***raridentata*** (p. 76)

***Drosophila (Dichaetophora) rotundicornis* sp. n.**

(Text-figs. 207-213)

♂, ♀. Body about 1.8 mm. Head slightly broader than thorax. Eyes dark red, triangular in lateral aspect, finely pilose and faint green iridescence. Antennae yellowish brown, large, upright; second segment somewhat longer than broad; third with thick long pubescence, distally dark brown and much swollen. Arista with about four dorsal and one ventral branches and a small terminal fork. Palpus yellow, tip rounded, with a prominent apical seta. Ocellar triangle black, marginally pale. Periorbit yellowish grey, not sharply demarcated from front, about two-thirds length of front. Front matt yellowish grey, flat, anterior one-third yellow, anteriorly narrower than median length; posteriorly twice as broad as head width. A few frontal hairs present. Carina low, narrow, half of face, distally broadened. Face broad, grey-brown, much broadened below, buccal margin with a broad white transverse band, narrowly pale on carina and along eye margin. Clypeus dark brown. Cheeks yellowish white, somewhat pollinose, about one-third as broad as the greatest diameter of eye. Occiput greyish brown. Postverticals very long, longer than outer verticals. Ocellars long, inserted well outside ocellar triangle. Anterior reclinate orbital slightly before and outside proclinate, three-fifths as long as proclinate, two-thirds as long as posterior reclinate, thrice as distant from posterior reclinate as from proclinate. Second oral about half as long as vibrissa; succeeding orals shorter.

Mesonotum deep greyish brown, matt. Scutellum deep greyish brown, marginally and centrally somewhat pale. Thoracic pleura greyish orange, pollinose, with a dark brown longitudinal stripe on upper half. Three humerals, median longest. Acrostichal hairs in six rows. Anterior dorsocentrals two-thirds as long as posteriors; distance between anterior and posterior dorsocentrals two-thirds distance between anterior pair. Anterior scutellars divergent, as long as posteriors, which are twice as distant from anteriors as from each other. Sterno-index about 0.3. Legs dusty yellow, coxae paler, all metatarsi as long as the other segments together. Pre-apicals on all legs; apicals prominent on mid leg. Wings hyaline; veins yellowish brown; crossveins not clouded; *costa* paler and reaches the end of  $R_{4+5}$ ;  $R_{2+3}$  gently curved to *costa* at tip;  $R_{4+5}$  and *M* slightly divergent distally. C-index about 3.5; 4V-index about 2.4; 4C-index about 1.0; 5x-index about 2.3; Ac-index about 2.0. Cr-bristles two; C<sub>3</sub>-fringe on basal three-sevenths. Halteres yellowish white. Abdominal tergites mostly black, somewhat glossy; 1T pale yellow at anterior corner.



FIGS. 207-220. 207-213, *Drosophila (Dichaetophora) rotundicornis* sp. nov. 207, ♂ head, lateral aspect; 208, ♂ head, dorsal aspect; 209, ♂ wing; 210, periphallallic organs, lateral aspect; 211, phallic organs, ventral aspect; 212, aedeagus, lateral aspect; 213, ♀ egg-guide. 214-218, *Drosophila (Dichaetophora) varidentata* Okada and Chung, ♂. 214, head, lateral aspect; 215, head, dorsal aspect; 216, wing; 217, periphallallic organs, lateral aspect; 218, phallic organs, ventral aspect. 219-220, *Drosophila (Drosophila) pentastrata* sp. n. ♂. 219, wing; 220, head, dorsal aspect.

Periphallalic organs : Genital arch black, pubescent, medially and apically bare, with a few setae, ventrally conically projected, caudal margin rectangular above insertion of clasper. Clasper black, ovoid, with a row of about eleven black teeth along entire distal margin, median teeth smaller than upper and lower teeth. Anal plate white, pubescent and setigerous, narrow and long, dorsally somewhat narrowing. Phallic organs : Aedeagus robust, dark brown, apparently bifid laterally, quadrate in lateral aspect, caudodorsally round, upper margin truncate and with a few serrations. Basal apodeme shorter than aedeagus.  $PI = 1.5$ . Anterior paramere small, conical, contiguous to hypandrium, medially with a few sensilla. Ventral fragma black, semicircular, with a very deep and wide median notch and a median process projected from the bottom of the notch, laterally with submedian spines.  $p.f. = ab'CdeFg_0HI$  kLMN. Egg-guide lobe deep brown, fusiform, with about ten marginal and four discal dark brown teeth, apical one largest and directed ventrally. Anal cercus of female yellow, elongate.

Holotype ♂. EAST NEPAL : Taplejung District, between Sangu and Tamrang, mixed plants by damp cliff in deep river gorge, c. 5,200', 22.xi.1961 (R.L.C.), BMNH.

Allotype ♀. Same data as holotype (R.L.C.), BMNH.

Paratypes : Taplejung District, 1 ♂, same data as holotype ; 1 ♂, 2 ♂, Sangu, mixed vegetation by stream in gully, c. 6,200', xi.1961-i.1962 ; 1 ♂, 2 ♀, between Sangu and Tamrang, mixed plants by damp cliff in deep river gorge, c. 5,200', i-ii.1962 ; 4 ♀, 1 ex. (abdomen missing), river banks below Tamrang Bridge, c. 5,500', x-xi.1961. 1 ♀, Arun Valley, east shore of River Arun below Tumlingtar, c. 1,800', 14-23.xii.1961 (R.L.C.), BMNH ; 1 ♂ and 1 ♀ from between Sangu and Tamrang, deposited at the Tokyo Metropolitan University.

Resembles *D. (Dichaetophora) suruk* Burla, 1954 (Ivory Coast, Africa), in having rather well developed anterior dorsocentrals, which are widely distant from posterior dorsocentrals, but differs from the latter in having only one ventral branch of arista (three in *suruk*), front narrower than length down middle (broader in *s.*), six rows of acrostichal hairs (four in *s.*),  $R_{4+5}$  and  $M$  not sinuated (much sinuated in *s.*), and male anal plate narrow and long (broad in *s.*).

### *Drosophila (Dichaetophora) raridentata* Okada and Chung

(Text-figs. 214-218)

*Drosophila (Drosophila) raridentata* Okada and Chung, 1960 : 28 (S. Korea).

*Drosophila raridentata* Okada and Chung ; Wakahama, Kaneko, and Tokumitsu, 1963 : 94 (Japan) ; Wakahama, 1964 : 56 (Japan).

*Drosophila (Dichaetophora?) raridentata* Okada and Chung ; Lee, 1964 : 108.

♂. Body about 1.2 mm. Head somewhat broader than thorax. Eyes oval, dark red, pilose. Arista with about five dorsal and two ventral branches and a small fork. Palpus yellowish grey, slender, with a prominent apical seta. Ocellar triangle medially black. Periorbit yellowish grey, anteriorly somewhat swollen inward and one-third as long as front. Front dark grey, pale along median longitudinal line, anteriorly slightly narrowing and orange-yellow, with scattered frontal hairs, narrower than length down middle, posteriorly half as broad as head width. Clypeus grey. Face flat, grey, parallel-sided, buccal margin straight and narrowly white. Carina very small and low, yellowish grey, with a pair of small black spots apically. Occiput yellowish grey. Cheeks pale yellow, darker above, about one-fifth as broad as the greatest diameter of eye. Postverticals moderate in size, shorter than outer verticals. Anterior reclinate orbital two-thirds as long as proclinate, one-third as long as posterior reclinate,

twice as distant from posterior reclinate as from proclinate. Proclinate inside others. Second oral half as long as vibrissa.

Mesonotum yellowish grey, matt. Scutellum yellowish grey, pollinose. Thoracic pleura paler, with two or three dark longitudinal stripes. Humeral callus paler. Humerals two, subequal. Acrostichal hairs in six rows. Anterior dorsocentrals two-thirds as long as posteriors; distance between anterior and posterior dorsocentrals two-thirds distance between anterior pair. Anterior scutellars longer than posteriors, divergent; posteriors thrice as distant from anteriors as from each other. Sterno-index about 0.4. Legs yellowish grey, coxa paler; all metatarsi as long as three following segments together. Last tarsal segment large. Preapicals on all legs; apicals on mid leg. Wings hyaline, slightly fuscous.  $R_{2+3}$  gently curved to *costa* at tip;  $R_{4+5}$  and *M* nearly parallel, *costa* reaches *M*, but weak beyond  $R_{4+5}$ . C-index about 2.1; 4V-index about 2.5; 4C-index about 1.7; 5x-index about 4.5; Ac-index about 2.7. C1-bristles two; C3-fringe on basal half. Halteres yellowish grey, tip somewhat dark. Abdominal tergites yellowish brown, each with a distinct not medially interrupted, broad median black transverse band.

Periphallic organs: Genital arch greyish brown, setigerous and pubescent, truncate below. Clasper large, quadrate, greyish brown, submedially with a row of about four very large pointed black teeth. Anal plate setigerous and pubescent, pale yellowish grey, oval, lower tip narrowing. Phallic organs: Aedeagus rod-shaped, yellowish grey, apically truncate; apodeme one-third as long as aedeagus; vertical rod short but thick. Anterior paramere large, oval, pale grey, basally contiguous with vertical rod, apically with a few sensilla. Ventral fragma pale grey, pubescent, with a deep median notch and a pair of finger-like submedian processes, apically with a pair of long submedian spines, lateral arms triangular. Decasternum triangular, large. PI = 3.0. p.f. = aBCDEfg<sub>0</sub>HIklmn.

Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', ix-x. 1961, 1 ♂ (*R.L.C.*).

Distribution: Nepal (new locality), Japan, Korea.

Differs somewhat from the original form (Korea) in having smaller body, longer anterior dorsocentral, and two ventral branches of arista (one in the original form). Originally described from ♂, the ♀ was recorded by Wakahama, Kaneko, and Tokumitsu (1963) from Japan.

### Subgenus *HIRTODROSOPHILA* Duda

*Hirtodrosophila* Duda, 1924a: 203.

Type-species: *Drosophila longecrinita* Duda, 1924a: 204; 1924b: 242 (Formosa, New Guinea).

#### KEY TO SPECIES

- 1 Arista with two branches below fork. Palpus with only one prominent apical seta. Cheeks broad, about two-fifths as broad as the greatest diameter of eye. Mesonotum glossy dark reddish brown. Acrostichal hairs in six rows. Preapicals on all legs. Third costal section with strong bristles. Postverticals longer than verticals . . . . . *tripartita* (p. 78)
- Arista with only one branch below fork. Palpus with a few prominent ventral setae. Cheeks narrow, about one-eighth as broad as the greatest diameter of eye. Mesonotum dark chestnut-brown. Acrostichal hairs in eight rows. Preapicals on mid and hind legs. Third costal section without strong bristles. Postverticals much shorter than inner verticals . . . . . *limbicostata* (p. 79)

*Drosophila (Hirtodrosophila) tripartita* sp. n.

(Text-figs. 262-267, p. 90)

♂, ♀. Body about 2.2 mm. Head as broad as thorax. Eyes deep red, fusiform in lateral aspect, with thick pilosity. Antennae orange-yellow; third segment fuscous at tip, oval, much broader than second segment, slightly longer than broad. Arista with about four dorsal and two ventral branches and a large terminal fork. Palpus yellowish orange, with an apical seta. Ocellar triangle small, deep reddish brown. Periorbit glossy grey-brown, anteriorly somewhat curved inward, posteriorly slightly broadened and paler. Front orange-grey, paler anteriorly, nearly parallel-sided, frontal triangle fuscous, anteriorly broader than length down middle, posteriorly about four-sevenths as broad as head width. A few frontals present. Clypeus dark brown. Carina long, low, broadened below to reach buccal margin. Cheeks orange-yellow, broad, about two-fifths as broad as the greatest diameter of eye. Occiput yellowish brown, ventromedially fuscous. Postvertical very long, much longer than outer vertical. Anterior reclinate orbital about one-third as long as posterior reclinate, slightly nearer to proclinate than to posterior reclinate. Proclinate slightly shorter than posterior reclinate, inside others. Only one pair of long vibrissae, second oral one-fourth as long as vibrissa.

Mesonotum glossy dark reddish brown. Scutellum dark reddish brown, unicolorous. Thoracic pleura paler than mesonotum. Two humerals, lower longer. Acrostichal hairs in six rows. No prescutellars. Anterior dorsocentrals nearly half as long as posteriors; distance between anterior and posterior dorsocentrals about five-ninths distance between anterior pair. Anterior scutellars divergent, longer than posteriors, which are nearer to each other than to anteriors. Sterno-index about 0.5; sternopleurals situated close to each other. Legs yellow; all metatarsi as long as other segments together. Male fore leg without sex-combs; mid leg without hooked scaly bristles. Preapicals on all legs; apicals prominent on mid leg. Wings hyaline, crossveins clear. *Costa* reaching *M*.  $R_{2+3}$  gently convex at middle, gently curved to *costa* at tip.  $R_{4+5}$  and *M* parallel. C-index about 3.8; 4V-index about 1.6; 4C-index about 0.6; 5x-index about 1.7; Ac-index about 2.1. C1-bristles two; C3-fringe on basal three-eighths. Halteres yellowish orange, stalk paler. Abdominal tergites mostly dark brownish black, somewhat glossy; 1T and 2T anteriorly yellowish orange; terminal T greyish white.

Periphallallic organs: Genital arch pale yellowish orange, setigerous and pubescent, dorsally gently narrowing, medially swollen, ventrally tapering triangularly. Clasper dark brown, oblong, with a sinuous row of about thirteen black pointed teeth occupying nearly entire length of outer margin, and with a few short fine setae on inferior surface of distal half. Anal plate pale yellowish brown, fusiform, separated from genital arch, pubescent and shortly setigerous, lower tip pointed ventrally and with about five strong black bristles in a clump. Phallic organs yellowish brown. Aedeagus rod-shaped, hairy, apically somewhat broadened, proximally much swollen. Anterior paramere slender, curved, tapering, orange-brown, basally contiguous with hypandrium. Posterior parameres fused to form a large quadrate flap, distal and proximal margins medially concave. Ventral fragma triangular, pale brown, with deep median notch. PI = 2.3. p.f. = aBcDEf<sub>0g</sub>HiKlMN. Egg-guide lobe triangular, proximally narrowing, yellowish orange, with about seventeen marginal and twenty-two discal short scattered yellowish orange bristles on distal half. Subterminal hair short but distinct. Basal isthmus short.

Holotype ♂. EAST NEPAL: Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', xi.1961-i.1962 (R.L.C.), BMNH.

Allotype ♀. Same locality as holotype, ix-x.1961 (R.L.C.), BMNH.

Paratypes: Taplejung District, 1 ♂, same data as holotype; 1 ♂, between Sangu and Tamrang, mixed shrubs in deep gorge, c. 5,200', x-xi.1961; 1 ♂, above Sangu, mixed vegetation in dried-up ravine, c. 6,800', 16.ii.1962 (R.L.C.), BMNH, (2 ♂), and at the Tokyo Metropolitan University (1 ♂, between Sangu and Tamrang).



Closely similar to *D. (H.) denticeps* Okada and Sasakawa, 1956 (Japan), especially in male periphallidic organs and female egg-guide, but differing from it and also in general from species of the subgenus in having two ventral branches of arista and well developed preapicals on all legs. This species is, consequently, only tentatively included in the subgenus *Hirtodrosophila*.

***Drosophila (Hirtodrosophila) limbicostata* sp. n.**

(Text-figs. 221-225)

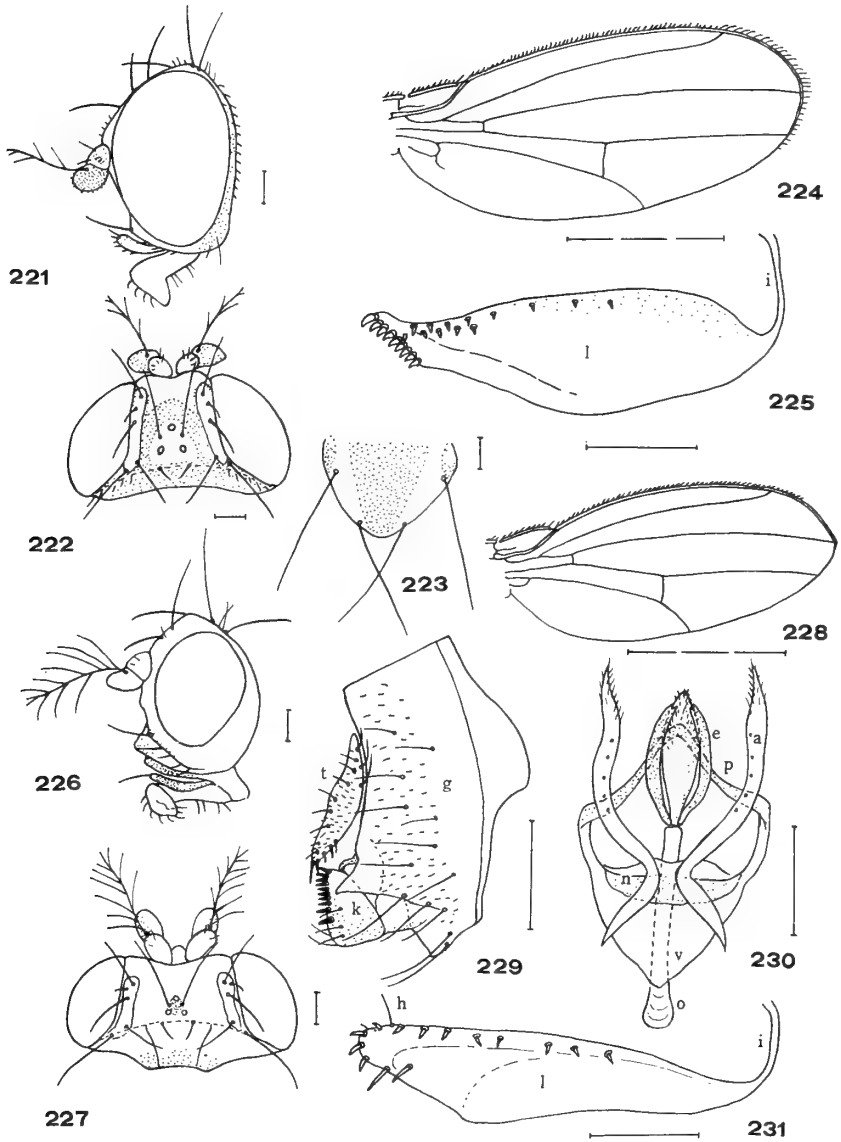
♀. Body about 2 mm. Head slightly broader than thorax. Eyes dark purplish brown, large, with thick pilosity. Antennae with second segment conical, yellowish brown, medio-laterally dark; third black, large, and rounded. Arista with about two dorsal and one ventral short branches and a fine terminal fork. Palpus yellowish orange, thick, tip rounded, with a few short black apical and ventral setae. Ocellar triangle large, black, grey pollinose, convex. Periorbit posteriorly somewhat narrowing, black, grey pollinose, anteriorly nearly reaching anterior margin of front. Front velvety black, nearly parallel-sided, anterior half deep orange-brown anteriorly as broad as length down middle, posteriorly two-fifths as broad as head width. Clypeus brown. Face grey, concave. Carina grey, narrow, low, less than half length of face. Cheeks narrow, yellow, about one-eighth as broad as the greatest diameter of eye; postgena black. Occiput black. Postverticals short. Anterior reclinate orbital slightly shorter than proclinate, which is as long as posterior reclinate. Three orbitals nearly equally distant from eye margin, anterior reclinate equidistant from proclinate and from posterior reclinate.

Mesonotum dark chestnut-brown, somewhat glossy, with fine yellow punctures. Humeral callus pale yellowish grey. Scutellum dark yellowish brown, medially and anterolaterally blackish brown. Thoracic pleura pale brown. Three humerals, uppermost shortest. Acrostichal hairs in eight rows. Prescutellars fine. Anterior scutellars divergent, slightly longer than posteriors, which are one and a half times as distant from anteriors as from each other. Postscutellum chestnut-black. Sterno-index about 1.0; median sternopleural as long as others. Anterior dorsocentrals half as long as posteriors; distance between anterior and posterior pair less than one-third distance between anterior pair. Legs yellow, last tarsal segment dark, claw large. All metatarsi subequal to next segments together. Preapicals on mid and hind legs; apicals prominent on mid leg. Wings somewhat fuscous, broad, tip rounded.  $R_{2+3}$  apically gently curved to *costa*;  $R_{4+5}$  and *M* parallel. C-index about 2.6; 4V-index about 1.5; 4C-index about 0.9; 5x-index about 1.6; Ac-index 2.3. C1-bristles two, fine, subequal; C3-fringe absent, strong costal bristles ending before tip of  $R_{2+3}$ . Halteres yellow. Abdominal tergites: 1T yellowish grey, others brownish black, each medioanteriorly with a small triangular yellow spot. Abdominal sternites paler.

Egg-guide lobe fusiform, apically pointed and somewhat curved downward, with about eighteen marginal and five apicodiscal pale brown teeth, nine upper marginal ones arranged in a compact straight row, apical tooth largest. Subterminal hair distinct. Basal isthmus yellow, narrow, straight, about one-fourth length of lobe.

Holotype ♀. EAST NEPAL: Taplejung District, between Sangu and Tamrang, mixed plants by damp cliff in deep river gorge, c. 5,200', 22.xi.1961 (*R.L.C.*), BMNH.

Peculiar among the family Drosophilidae in having strong costal bristles ending before end of  $R_{2+3}$ . Somewhat similar to *D. (H.) hirticornis* de Meijere, 1914, (Java) in having very narrow cheeks and fuscous wings, but differs from it in short branches of arista, pubescent eyes, and brownish black abdominal tergites.



FIGS. 221-231. 221-225, *Drosophila (Hirtodrosophila) limbicostata* sp. n., ♀. 221, head, lateral aspect; 222, head, dorsal aspect; 223, scutellum; 224, wing; 225, egg-guide. 226-231, *Drosophila (Sophophora) coei* sp. n. 226, ♂ head, lateral aspect; 227, ♂ head, dorsal aspect; 228, ♂ wing; 229, periphallallic organs, lateral aspect; 230, phallic organs, ventral aspect; 231, ♀ egg-guide.

Subgenus **DORSILOPHA** Sturtevant*Dorsilopha* Sturtevant, 1942 : 28.Type-species : *Drosophila busckii* Coquillett, 1901 : 16 (N. America).***Drosophila (Dorsilopha) busckii*** Coquillett*Drosophila busckii* Coquillett, 1901 : 16 (N. America).

Taplejung District, Sangu, from rotten Naspati fruits in traps, c. 6,200', 8-31.x. 1961, 15 ♂, 12 ♀; ibid., from rotten bananas in traps, c. 6,200', x-xii.1961, 2 ♀; below Sangu, by stream in shady ravine, c. 6,000', 30.x.1961, 1 ♂; river banks below Tamrang Bridge, c. 5,500', x-xi.1961, 1 ♂ (*R.L.C.*).

Distribution : Nepal (new locality), India, Sumatra, Formosa, China, Japan, Korea, Bonin Is., Australia, Africa, Europe, N. America, S. America.

Subgenus **SOPHOPHORA** Sturtevant*Sophophora* Sturtevant, 1939 : 139.Type-species : *Drosophila melanogaster* Meigen, 1830 : 85 (Europe).

## KEY TO SPECIES

- |   |  |                              |    |
|---|--|------------------------------|----|
| 1 | Anterior reclinate orbital minute, one-fifth or less as long as posteriors. ♂ fore legs without sex-combs. Mesonotum strongly convex . . . . .                   | <b>mommai-group</b>          | 2  |
| - | Anterior reclinate orbital usually large, about one-third or more as long as posteriors. ♂ fore legs with sex-combs. Mesonotum usually not very convex . . . . . | <b>melanogaster-group</b>    | 4  |
| 2 | Palpus with only one prominent apical seta. Crossveins clear. Head much broader than thorax . . . . .  | <b>coei</b> (p. 82)          |    |
| - | Palpus with a few prominent ventral setae. Crossveins clouded. Head as broad as thorax . . . . .   |                              | 3  |
| 3 | Palpus black. Front glossy brown. Median sternopleural fine. Third abdominal tergite entirely black . . . . .  | <b>zonaria</b> (p. 83)       |    |
| - | Palpus yellow. Front matt orange. Median sternopleural as long as anteriors. Third abdominal tergite not entirely black . . . . .                                | <b>serriflabella</b> (p. 84) |    |
| 4 | Palpus with a few prominent ventral setae . . . . .  | <b>melanogaster</b> (p. 92)  |    |
| - | Palpus with a prominent apical seta . . . . .  |                              | 5  |
| 5 | ♂ wings distally with a large black patch . . . . .  |                              | 6  |
| - | ♂ wings without black patch distally . . . . .   |                              | 8  |
| 6 | Large distal black patch of ♂ wing not extending to the wing tip. Small black patches at wing base . . . . .   | <b>pulchrella</b> (p. 89)    |    |
| - | Large distal black patch of ♂ wing extending to the wing tip. No black patches at wing base . . . . .  |                              | 7  |
| 7 | Large distal black patch of ♂ wing crescentic, extending below <i>M</i> . Anterior reclinate orbital about five-eighths as long as posteriors . . . . .          | <b>tristipennis</b> (p. 89)  |    |
| - | Large distal black patch of ♂ wing oval, not extending below <i>M</i> . Anterior reclinate orbital about half as long as posteriors . . . . .                    | <b>nepalensis</b> (p. 91)    |    |
| 8 | Two humerals subequal in length . . . . .  |                              | 9  |
| - | Upper humeral longer than lower. ♂ sex-combs large, longitudinal. Second oral nearly as long as vibrissae . . . . .  |                              | 11 |

- 9 ♂ sex-combs larger, in two oblique sets on metatarsus. Second oral nearly as long as vibrissae . . . . . *bipectinata* (p. 95)
- ♂ sex-comb smaller, transverse. Second oral much shorter than vibrissae . . . . . 10
- 10 Acrostichal hairs in six rows. Anterior reclinate orbital about half as long as posteriors, one-third as long as proclinate. Distance between anterior and posterior dorsocentrals about two-fifths distance between anterior pair *immacularis* (p. 87)
- Acrostichal hairs in eight rows. Anterior reclinate orbital one-third as long as other orbitals. Distance between anterior and posterior dorsocentrals about half distance between anterior pair . . . . . *takahashii* (p. 92)
- 11 Front nearly parallel-sided. Periorbit greyish brown, posteriorly narrowing, anteriorly curved inward. Anterior scutellars convergent. . . . . *kikkawai* (p. 92)
- Front considerably narrowed anteriorly. Periorbit black, narrow, anteriorly not curved inward. Anterior scutellars divergent . . . . . *trapezifrons* (p. 93)

#### THE MOMMAI GROUP

♂ foreleg without sex-comb. Mesonotum highly convex. Anterior reclinate orbital minute. Only one prominent oral. Anterior paramere of phallic organs large, hairy, usually with a longitudinal row of sensilla. Aedeagus hairy, often with a pair of basal elongate processes.

#### *Drosophila (Sophophora) coei* sp. n.

(Text-figs. 226-231)

♂, ♀. Body about 1.8 mm. Head slightly broader than thorax. Eyes deep purplish red, fusiform, relatively small, pilose. Antennae with second segment yellowish orange, third greyish orange and triangularly pointed. Palpus black, slender, with a long terminal seta. Ocellar triangle deep reddish brown. Periorbit glossy greyish white, somewhat convex, broad, three-fourths as long as front. Front greyish white, glossy. Carina high, broadened below. Clypeus brown. Cheeks yellowish brown, about two-sevenths as broad as the greatest diameter of eye. Occiput yellowish brown, centrally somewhat fuscous. Postverticals rather short. Anterior reclinate orbital minute, outside and slightly posterior to proclinate, somewhat nearer to proclinate than to posterior reclinate. Proclinate about three-fourths as long as posterior reclinate. Vibrissae long; second oral half as long as vibrissa, others shorter.

Mesonotum glossy brown or yellowish brown, sometimes deep brown, strongly convex, laterally with a dark longitudinal stripe. Scutellum glossy brown or deep brown, unicolorous. Thoracic pleura pale, glossy, dark brown below. Humeral callus mostly dark brown. Only one long lower humeral, upper one very fine. Acrostichal hairs in six rows. Anterior dorsocentrals three-fifths as long as posteriors; distance between anterior and posterior dorsocentrals about half distance between anterior pair. Anterior scutellars parallel or convergent, as long as posteriors, which are nearer to each other than to anteriors. Sterno-index about 0.4. Legs yellow, glossy, relatively slender; tarsi fuscous; coxae white, fore coxa sometimes black (in darker specimens); all metatarsi subequal to the next segments together. Preapicals on all legs; apicals prominent on fore and mid legs. Wings relatively large, somewhat fuscous, veins yellow, crossveins clear. *Costa* reaching *M*, *R*<sub>2+3</sub> nearly straight and apically curved to *costa*; *R*<sub>4+5</sub> and *M* somewhat convergent distally. C-index about 2.7; 4V-index about 1.8; 4C-index about 1.0; 5x-index about 1.5; Ac-index about 2.5. C1-bristles two; C3-fringe on basal one-fourth. Halteres yellow. Abdomen slender and dorsally convex, tergites mostly glossy black. Female cercus yellow or yellowish brown, triangular in dorsal aspect.

Periphallic organs: Genital arch black, pubescent and setigerous, broad, ventrally triangular, caudal margin with a large acute triangular projection below anal plate, deeply incised below the projection. Anal plate black, relatively small, narrow fusiform, setigerous and pubescent, separated from genital arch, ventrally exceedingly narrowing and with a few stout short black

setae. Clasper large, black, triangular, with a straight row of about ten pointed black teeth occupying dorsal two-thirds of distal margin. Phallic organs mostly deep brownish black. Aedeagus elongate fusiform, hairy, pale yellow, ventrally with a pair of elongate apically bifid gently curved projections. Apodeme straight, about twice as long as aedeagus. Anterior paramere elongate, medially curved, proximally broadened, distally narrowing and thickly hairy, with a longitudinal row of several sensilla on median two-thirds, and basally with a large pointed ventrally directed processes. Posterior parameres fused to form a pale large triangular flap, laterally attached to the lateral processes of ventral fragma. PI = 0.5. p.f. = Ab'CDE fgHiKLMN. Egg-guide lobe orange-yellow or dark orange, elongate oval, distally narrowly rounded, proximally tapering, with about thirteen marginal and a discal pointed orange-yellow teeth, ultimate marginal tooth longest. Subterminal hair distinct. Basal isthmus yellow, straight, about one-fifth as long as lobe.

Holotype ♂. EAST NEPAL : Taplejung District, between Sangu and Tamrang, mixed plants by damp cliff in river gorge, c. 5,200', i-ii.1962 (R.L.C.), BMNH.

Allotype ♀. Taplejung District, Sangu, mixed vegetation in deep gully, c. 6,200', 2.i-13.ii.1962 (R.L.C.), BMNH.

Paratypes : 6 ♂, same data as holotype ; 10 ♀, same data as allotype ; Taplejung District, 1 ♂, 2 ♀, Sangu, by stream in gully, c. 6,200', ix-x.1961 ; 1 ♂, *ibid.*, clearing in small wood, c. 6,200', 25.xi.1961 ; 7 ♂, 20 ♀, *ibid.*, mixed vegetation by stream in gully, c. 6,200', xi.1961-i.1962 ; 2 ♂, between Sangu and Tamrang, collected with holotype ; 1 ♂, 1 ♀, *ibid.*, dense vegetation in tree shade by hill stream, c. 5,500', 23.x.1961 ; 1 ♂, *ibid.*, mossy ground under bushes by hill stream, c. 5,500', 20.x.1961 ; 1 ♂, 5 ♀, above Sangu, old mixed forest, c. 6,200', 25-28.x.1961 ; 1 ♀, *ibid.*, damp evergreen oak forest, c. 9,200', 2.26.xi.1961 ; 4 ♂, 17 ♀, *ibid.*, mixed vegetation in dried-up ravine, c. 6,800', 16.ii.1962 ; 1 ♂, 2 ♀, below Sangu, by stream in shady ravine, c. 6,000', 30.x.1961 ; 2 ♀, *ibid.*, mixed vegetation on sheltered slopes above river, c. 4,000', 3.i.1962 ; 1 ♂, 1 ♀, north of Sangu, dry grass above river bank, c. 5,000', 5.i.1962 ; 1 ♂, 1 ♀, river banks below Tamrang Bridge, c. 5,500', x-xi.1961 (R.L.C.), BMNH.

Closely resembles *D. (S.) mommai* Takada and Okada, 1960 (Japan), in having highly convex mesonotum and abdominal tergites, and in the general features of phallic and periphallic organs, but distinguished from it in having genital arch less prominently narrowing below, lateral lobes of aedeagus apically bifid (simple in *mommai*), discal teeth of egg-guide only one (several in *m.*), and posterior scutellars as long as anteriors and not upright (short and upright in *m.*).

### *Drosophila (Sophophora) zonaria* sp. n.

(Text-figs. 232-237)

♂, ♀. Body about 1.7 mm. Head as broad as thorax. Eyes dark purplish red, thickly pilose, somewhat fusiform in lateral aspect. Antennae with second segment orange-yellow ; third yellowish grey, basally pale, and nearly twice as long as broad. Arista with about six dorsal and three ventral branches and a small terminal fork. Palpus black, slender, with a few strong ventral black setae. Ocellar triangle glossy black. Periorbit glossy pale brown, anteriorly broader and curved inward, not reaching anterior margin. Front glossy greyish brown, parallel-sided, anterior one-third yellowish, anteriorly one and a half times as broad as length down middle, posteriorly half as broad as head width. Face white, glossy. Carina white, high,

broad, broader below. Clypeus white, laterally black. Cheeks broad, white, about one-fourth as broad as the greatest diameter of eye. Occiput yellowish brown, ventromedially black. Anterior reclinate orbital very fine, equidistant from proclinate and from posterior reclinate, slightly outside proclinate; proclinate about two-thirds as long as posterior reclinate. Vibrissae long; second oral fine, two-fifths as long as vibrissa; succeeding orals finer. Postverticals moderate in size.

Mesonotum and scutellum glossy grey-brown, unicolorous. Thoracic pleura pale yellowish white. Two humerals, upper half as long as lowers. Acrostichal hairs in six rows. Anterior dorsocentrals half as long as posteriors; distance between anterior and posterior dorsocentrals one-third distance between anterior pair. Anterior scutellars divergent, longer than posteriors, which are nearer to each other than to anteriors. Sterno-index 0.4. Legs yellow, tibiae and tarsi slightly fuscous; all metatarsi subequal to next three segments together. Preapicals on all legs; apicals prominent on mid leg. Wings somewhat fuscous; crossveins clouded; *costa* reaching  $R_{4+5}$ , strong bristles on *costa* relatively fine.  $R_{4+5}$  and  $M$  distally somewhat convergent. C-index about 2.7; 4V-index about 2.1; 4C-index about 1.1; 5x-index about 0.8; Ac-index about 2.6. C1-bristles two; C3-fringe on basal three-tenths. Halteres yellowish brown. Abdominal tergites yellowish-brown, glossy, each with a caudal black medially contiguous cross band; 3T nearly entirely black (thus the specific name).

Periphallallic organs pale brown. Genital arch pubescent and setigerous, much narrowed dorsally, gently projected at middle caudally, ventrally narrowing and rectangularly curved caudally at tip. Clasper large, triangular, distally broadened, with a nearly straight row of about twelve pointed black teeth, occupying almost entire distal margin. Anal plate separated from genital arch, elliptical, pubescent and setigerous, with short hairs at ventral tip. Phallic organs yellowish orange. Aedeagus short, thickly hairy, apically pointed, proximally much broadened; apodeme slender, straight, nearly twice as long as aedeagus. Anterior paramere orange, hairy, slender. Posterior paramere absent? Ventral fragma quadrate, large, with lateral arms conically projected ventrally, without median notch.  $PI = 0.5$ . p.f. = ABcDef<sub>0</sub>g<sub>0</sub>HiKLMN. Egg-guide lobe orange-brown, well sclerotized, fusiform, with about thirteen marginal and three large brownish discal teeth; subterminal hair distinct. Basal isthmus about one-fourth as long as lobe.

Holotype ♂. EAST NEPAL: between Sangu and Tamrang, mixed shrubs in deep gorge, c. 5,200', x-xi.1961 (R.L.C.), BMNH.

Allotype ♀. Same data as holotype (R.L.C.), BMNH.

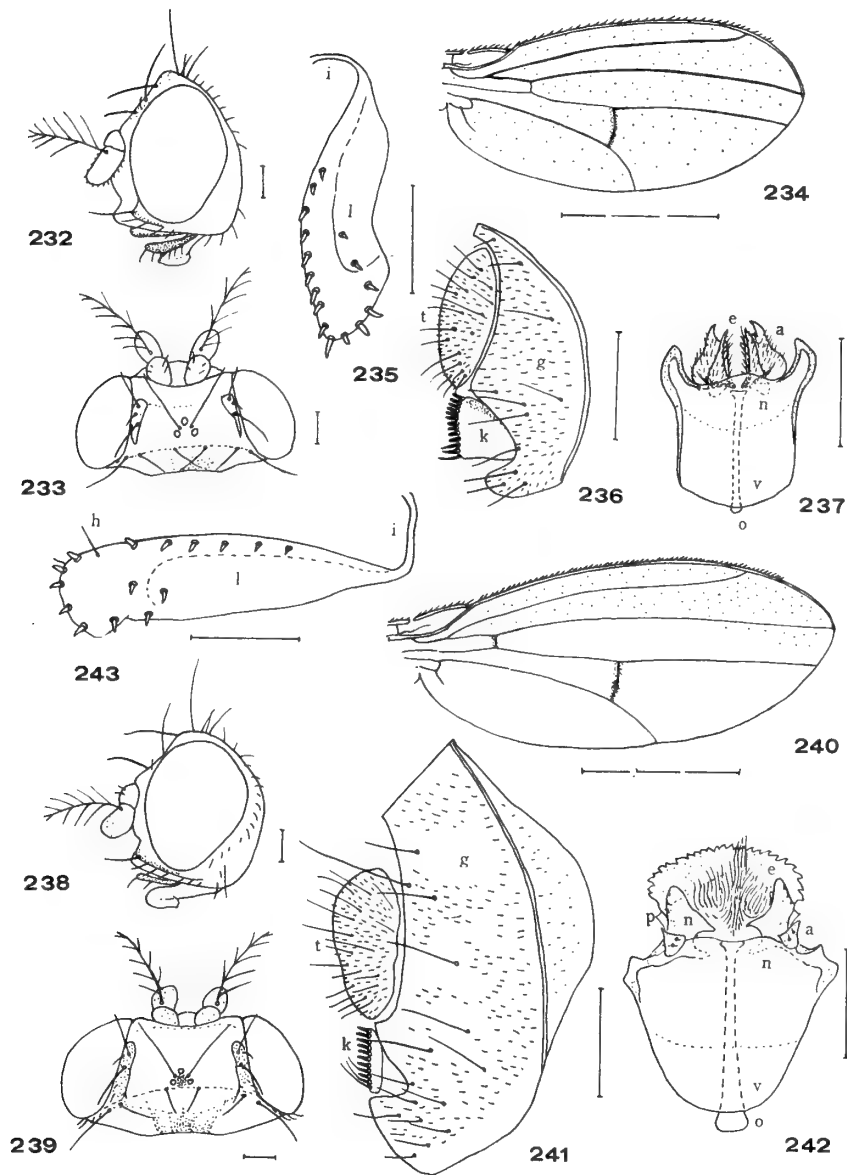
Paratypes: 1 ♂, 1 ♀, Sangu, mixed vegetation by stream in gully, c. 6,200', xi.1961-i.1962; 1 ♂, 3 ♀, same data as holotype; 1 ♀, river banks below Tamrang Bridge, c. 5,500', x-xi.1961; 1 ♂, between Sangu and Tamrang, mixed plants by damp cliff in deep river gorge, c. 5,200', 22.xi.1961 (R.L.C.), BMNH.

Somewhat resembles *D. (S.) coei*, in having broad front, minute anterior reclinate orbitals, broad cheeks, hairy aedeagus, and hairy anterior paramere, but differs from it in having paler body, white face, unicolorous mesonotum, clouded wings, and clouded crossveins. It differs also in the details of genital organs.

### *Drosophila (Sophophora) serriflabella* sp. n.

(Text-figs. 238-243)

♂, ♀. Body about 2.5 mm. Head as broad as thorax. Eyes deep purplish red, fusiform at lateral aspect, relatively small, pilose. Antennae with second segment dark yellowish orange; third greyish brown, oval, as broad as long, basally paler. Arista with about five dorsal and three ventral branches and a small terminal fork. Palpus narrow, yellowish brown, with a



FIGS. 232-243. 232-237, *Drosophila (Sophophora) zonaria* sp. n. 232, ♂ head, lateral aspect; 233, ♂ head, dorsal aspect; 234, ♂ wing; 235, ♀ egg-guide; 236, periphallallic organs, lateral aspect; 237, phallic organs, ventral aspect. 238-243, *Drosophila (Sophophora) serriflabella* sp. n. 238, ♂ head, lateral aspect; 239, ♂ head, dorsal aspect; 240, ♂ wing; 241, periphallallic organs, lateral aspect; 242, phallic organs, ventral aspect; 243, ♀ egg-guide.

long apical and two ventral black setae. Ocellar triangle small, glossy brown. Periorbit glossy grey-brown, broad, posteriorly pale, anteriorly rounded, three-fourths as long as front. Front matt orange-brown, broad, nearly parallel-sided, anteriorly one and a half times as broad as length down middle, posteriorly three-fifths as broad as head width. Face greyish yellow, concave, whitish along eye margin. Carina high, short, half as long as face. Clypeus grey-brown. Cheeks yellowish brown, broad, about two-sevenths as broad as the greatest diameter of eye. Occiput yellowish brown, ventromedially orange. Postverticals moderate in size. Anterior reclinate orbital very fine, outside proclinate, twice as distant from proclinate as from posterior reclinate, which is one and a half times as long as proclinate. Vibrissae long, second oral one-third as long as vibrissa.

Mesonotum glossy yellowish brown, strongly convex. Scutellum glossy yellowish brown. Thoracic pleura paler. Two humerals, upper much shorter, two-fifths as long as lower. Acrostichal hairs in six rows. Anterior dorsocentrals half as long as posteriors; distance between anterior and posterior dorsocentrals about half distance between anterior pair. Anterior scutellars divergent, slightly longer than posteriors; posteriors nearer to each other than to anteriors. Sterno-index about 0.5; median sternopleural as long as anteriors. Legs fuscous yellow; femora paler above. All metatarsi as long as other segments together. Preapicals on all legs; apicals on fore and mid legs. Wings relatively large, tip slightly pointed, somewhat fuscous along *costa*; crossveins clouded.  $R_{2+3}$  medially gently convex anteriorly, apically strongly curved to *costa*;  $R_{4+5}$  and  $M$  parallel. C-index about 2.4; 4V-index about 1.5; 4C-index about 1.0; 5x-index about 1.7; Ac-index about 3.0. C1-bristles two; C3-fringe on basal three-eighths. Halteres dark yellowish brown. Abdominal tergites glossy yellowish brown with sharply demarcated caudal black bands, which medially jut out triangularly in front. The triangular patches increasingly larger on the more caudal tergites; 1T yellowish brown; 6T mostly black.

Peripheral organs yellowish brown. Genital arch large, distally wider, setigerous and pubescent, ventrally curved posteriorly, subapically with deep incision on caudal margin, with a low triangular process above insertion of clasper. Clasper small, triangular, distal margin broad and straight, with a row of about ten long black teeth, occupying nearly entire distal margin. Anal plate relatively small, pubescent and setigerous, fusiform. Phallic organs: Aedeagus short, thickly hairy. Apodeme straight, twice as long as aedeagus. PI = 0.4. Anterior paramere small, conical, medially with a few sensilla. Posterior parameres fused to form a large fan-shaped marginally finely serrated yellowish orange lobe. Hypandrial plate large, conically projected posteriorly. Ventral fragma triangular. p.f. = ABCdefgHiKLMN. Egg-guide lobe brownish black, proximally tapering, distal margin broadly truncate, with about twelve marginal and two discal large brown teeth. Subterminal hair prominent. Basal isthmus black, about one-fifth as long as lobe.

Holotype ♂. EAST NEPAL: Taplejung District, between Sangu and Tamrang, mixed plants by damp cliff in deep river gorge, c. 5,200', x-xi.1961 (R.L.C.), BMNH.

Allotype ♀. Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', xi.1961-i.1962 (R.L.C.), BMNH.

Paratypes: Taplejung District, 1 ♂, same data as holotype; 1 ♀, between Sangu and Tamrang, mixed shrubs in deep gorge, c. 5,200', x-xi.1961; 2 ♂, between Sangu and Tamrang, mixed plants by damp cliff in deep river gorge, c. 5,200', i-ii.1962 (R.L.C.), BMNH, and the Tokyo Metropolitan University (1 ♂ from between Sangu and Tamrang).

Closely resembles *D. fruhstorferi* Duda, 1924 (India), especially in having broad front, only one long oral, clouded crossveins, and medially triangularly projected black caudal bands of abdominal tergites, but differs from it in having three ventral branches of arista (only one in *fruhstorferi*).



THE *MELANOGASTER* GROUPTHE *SUZUKII* SUBGROUP***Drosophila (Sophophora) immacularis* sp. n.**

(Text-figs. 244-250)

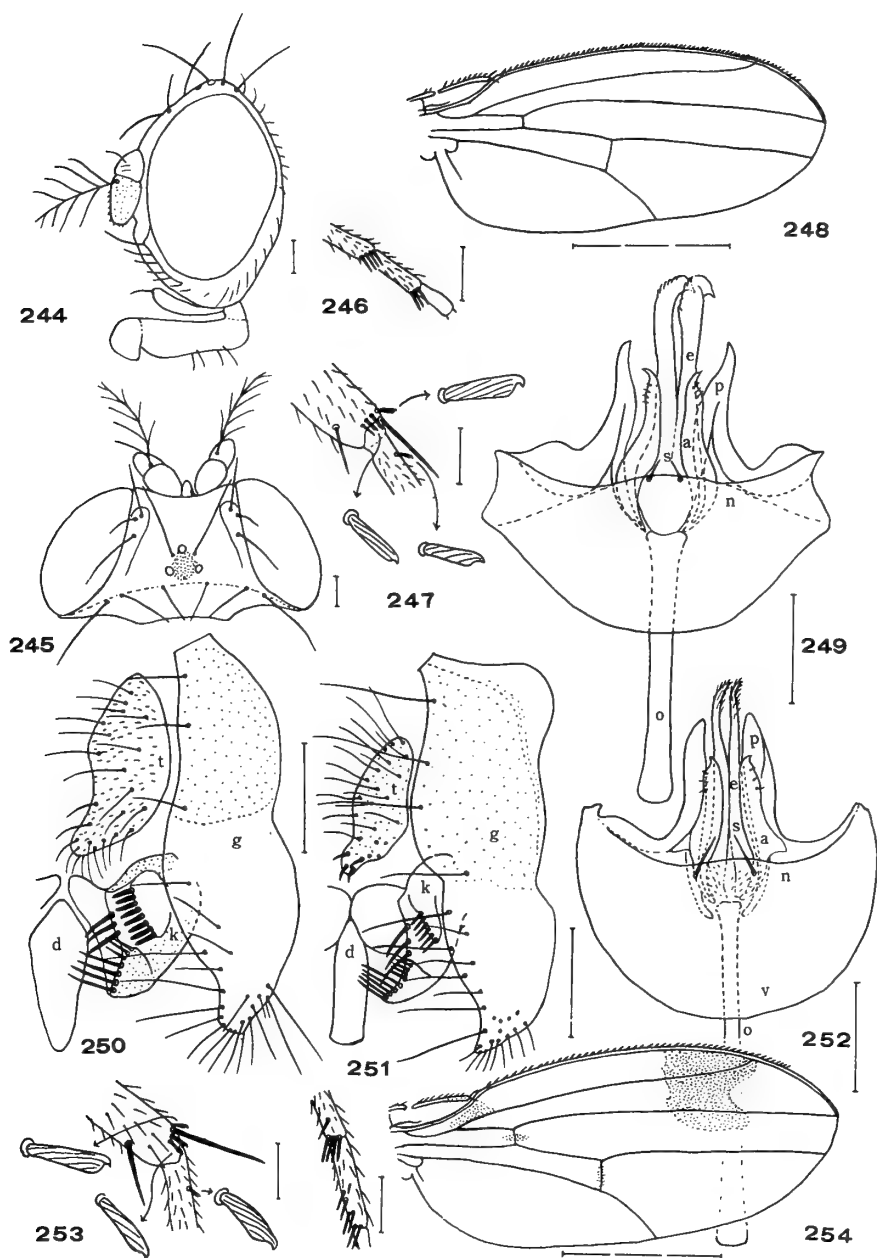
♂. Body about 2 mm. Head as broad as thorax. Eyes dark red. Antennae with second segment yellowish orange, third yellowish grey, one and a half times as long as broad. Arista with about four dorsal and three ventral branches and a large terminal fork. Palpus yellow, with an apical seta. Ocellar triangle dark reddish brown. Periorbit greyish brown, posteriorly narrowing, anteriorly rounded, not reaching anterior margin of front. Front somewhat glossy greyish brown, anteriorly orange and as broad as length down middle, posteriorly broadened and about four-ninths as broad as head width. Clypeus pale brown. Face greyish white, parallel sided. Carina high, long, anteriorly somewhat broadened. Cheeks yellowish orange, one-sixth as broad as the greatest diameter of eye. Occiput yellowish brown, fuscous below. Anterior reclinate orbital about half posterior reclinate and two-thirds as long as proclinate, twice as far from posterior reclinate as from proclinate. Proclinate inside others. Postverticals long. Second oral half as long as vibrissa, succeeding orals shorter.

Mesonotum dark yellowish brown, somewhat glossy, medially with a darker longitudinal stripe. Scutellum greyish brown, slightly glossy. Thoracic pleura paler, unicolorous. Two long subequal humerals. Acrostichal hairs in six rows. Anterior dorsocentrals half as long as posteriors; distance between anterior and posterior dorsocentrals about two-fifths distance between anterior pair. Anterior scutellars convergent, as long as posteriors, which are nearer to each other than to anteriors. Sterno-index about 0.7. Median sternopleural slightly shorter than anteriors. Legs yellow; ♂ fore tarsus with a terminal transverse sex-comb composed of five black bristles; second tarsal segment with a similar sex-comb of two bristles. All metatarsi subequal to the next three segments together. Male mid leg with black hooked scaly bristles, four at the apex of tibia and one at the proximal end of metatarsus. Preapicals on all legs; apicals on fore and mid legs. Wings hyaline, crossveins clear; costa weak beyond  $R_{4+5}$ ;  $R_{2+3}$  apically weakly curved to costa;  $R_{4+5}$  and  $M$  parallel. C-index about 2.9; 4V-index about 2.2; 4C-index about 2.5; 5x-index about 2.2; Ac-index about 2.5. C1-bristles two, long; C3-fringe on basal four-ninths. Halteres yellowish orange. Abdominal tergites yellowish brown, each with a broad black medially entire cross-band; 1T pale.

Periphallallic organs: Genital arch elongate, fusiform, medially somewhat constricted, dorsal half black, dorsal end narrowing, ventral half yellowish grey, posteriorly triangularly projected, setigerous on posterior margin and ventral tip. Claspers two. Primary clasper large, brown lower tip recurved, with a row of about ten long black bristles on distal margin; secondary clasper quadrate, situated above primary clasper, with a row of about eight large black teeth along distal margin. Anal plate setigerous, fusiform, ventrocaudally narrowly projected. Phallic organs: Aedeagus pale yellowish grey, rod-shaped, subapically pubescent, apically curved and pointed dorsally; apodeme black, straight, curved and pointed dorsally; apodeme black, straight, slightly longer than aedeagus.  $PI = 1.0$ . Anterior paramere black, rod-shaped, basally curved to attach the base of aedeagus, apically narrowly pointed and curved, subapically with a few sensilla. Posterior paramere pale yellowish grey, nearly as long as anterior paramere, apically pointed, basally bilobed to attach aedeagus by one arm and to ventral fragma by another. Ventral fragma quadrate, distal margin nearly straight, with a pair of short submedian spines, which are close to each other. p.f. = ABCDEfGHIKLMN.

Holotype ♂. EAST NEPAL: Taplejung District, between Sangu and Tamrang, shrubs by path, c. 5,800', 6.xi.1961 (*R.L.C.*), BMNH.

Closely allied to *D. (S.) suzukii* (Matsumura, 1931) (China and Japan), especially similar in phallic and periphallallic organs, but differs in having ♂ wings without black patch and aedeagus distally pubescent.



FIGS. 244-254. 244-250, *Drosophila (Sophophora) immacularis* sp. n., ♂. 244, head, lateral aspect; 245, head, dorsal aspect; 246, sex-combs on proximal two tarsal joints of fore leg; 247, hooked scaly bristles on tibia and metatarsus of mid leg; 248, wing; 249, phallic organs, ventral aspects; 250, peripheral phallic organs, lateral aspect. 251-254, *Drosophila (Sophophora) pulchvella* Tan, Hsu, and Sheng, ♂. 251, peripheral phallic organs, lateral aspect; 252, phallic organs, ventral aspect; 253, left: hooked scaly bristles on tibia and metatarsus of mid leg; right: sex-combs on proximal two tarsal joints of fore leg; 254, wing.

***Drosophila (Sophophora) pulchrella*** Tan, Hsu, and Sheng

(Text-figs. 251-254)

*Drosophila (Sophophora) pulchrella* Tan, Hsu, and Sheng, 1949 : 198 (China) ; Okada, 1956 : 106 (Japan).

♂, ♀. General features as described by Tan, Hsu, and Sheng (1949) and redescribed by Okada (1956). Head as broad as thorax. Ocellar triangle grey. Periorbit grey, glossy, constricted near caudal end. Front yellowish grey, slightly narrowing anteriorly, where it is as broad as length down middle, posteriorly four-ninths as broad as head width. Face white. Anterior dorsocentral half as long as posteriors. Anterior scutellars convergent, as long as posteriors, which are slightly nearer to each other than to anteriors. All metatarsi subequal to next three segments together. ♂ mid leg with hooked scaly bristles, four on tibia, one on metatarsus. Wings with a large distal costal patch and small basal black spots, one below  $R_{2+3}$ , one on anterior crossvein. PI = 0.7. p.f. = ABcDEfGHIKLMN.

Taplejung District. Sangu, yellow blooms of cultivated composite (*Guizotia abyssinica* Cassini), c. 6,200', 16-20.x.1961, 1 ♂ ; *ibid.*, clearing in small wood, c. 6,200', 25.xi.1961, 1 ♂ ; *ibid.*, mixed vegetation by stream in gully, c. 6,200', xi.1961-i.1962, 7 ♂, 4 ♀ ; *ibid.*, mixed vegetation in deep gully, c. 6,200', 2.i-13.ii.1962, 2 ♀ ; between Sangu and Tamrang, in tree shade by hill stream, mossy ground under bushes, c. 5,500', 20.x.1961, 1 ♂, 1 ♀, 23.x.1961, 1 ♀ ; *ibid.*, mixed plants by damp cliff in deep river gorge, c. 5,200', i-ii.1962, 2 ♀ ; *ibid.*, mixed shrubs in deep gorge, c. 5,200', x-xi.1961, 1 ♂ ; below Sangu, edge of small mixed wood, c. 6,000', 4.xi.1961, 1 ♀ ; above Sangu, ex *Lycopodium* sp. on slope, c. 7,800', 11-14.i.1962, 1 ♂ ; *ibid.*, mixed vegetation in dried-up ravine, c. 6,800', 16.ii.1962, 1 ♂, 4 ♀ ; *ibid.*, old mixed forest, c. 6,200', 25-28.x.1961, 1 ♀ ; Dobhan, evergreen trees overhanging stream in gully, c. 3,500', 30.i.1962, 1 ♂ ; *ibid.*, east bank of River Tamur, mixed vegetation by stream in deep gully, c. 3,500', i-ii.1962, 1 ♂ (*R.L.C.*).

Distribution : Nepal (new locality), China, Japan.

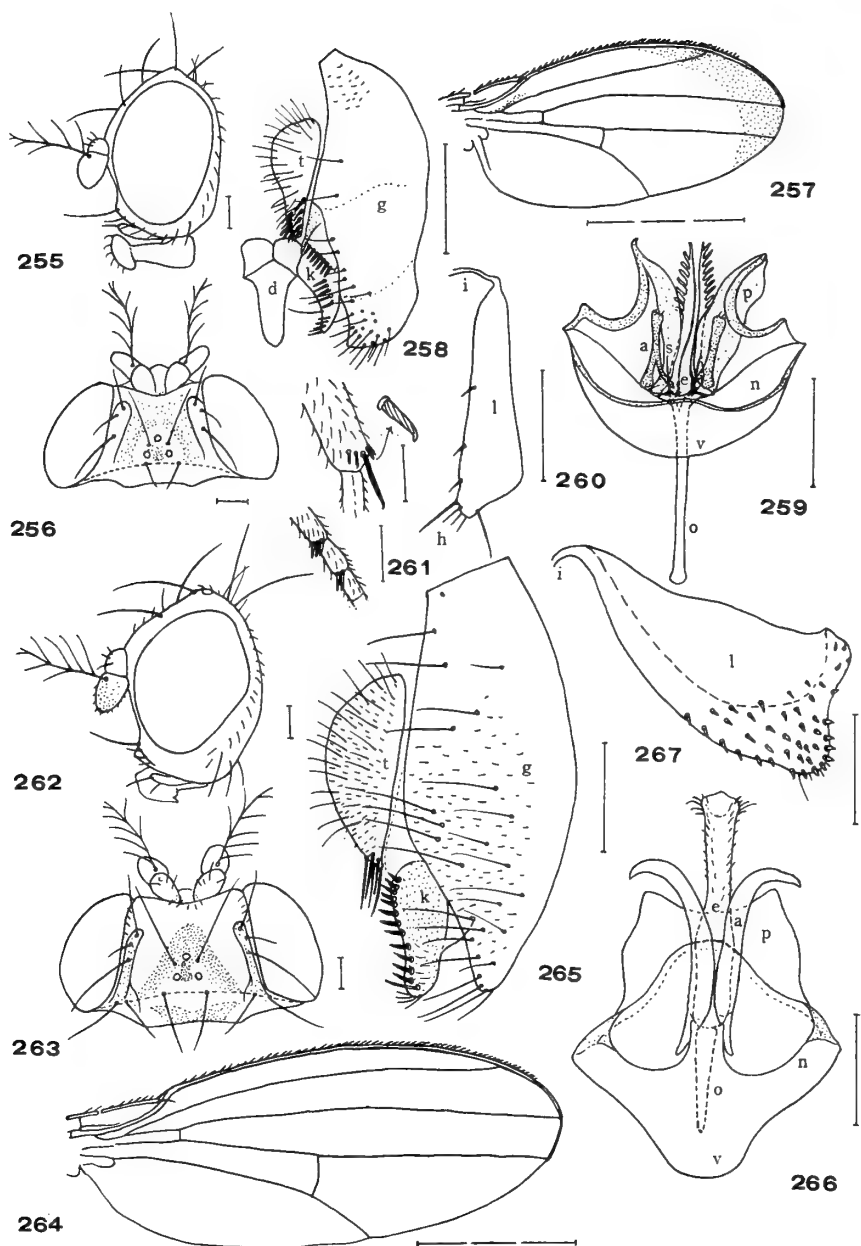
The ♂ has two small black markings near the wing base besides a large distal costal black marking. This type of wing pattern is the same as in the original form (China) (Tan, Hsu, and Sheng, 1949). In the Japanese form, however, the basal black markings are absent or very weak except in a form from the southern island, Yakushima, Kyushu, collected by the author in summer, 1962.

***Drosophila (Sophophora) tristipennis*** Duda

(Text-figs. 255-261)

*Drosophila tristipennis* Duda, 1924a : 215 ; 1924b : 247 (Formosa) ; Sturtevant, 1927 : 371 (India).

♂, ♀. Body about 1.7 mm. Head as broad as thorax. Eyes dark red, pilose. Antennae with second segment yellow and third grey in female, second white and third pale yellowish white in ♂ ; third oval. Arista with three dorsal and two ventral branches and a large terminal fork. Palpus yellow, apically broadened, with an apical prominent and a few ventral shorter setae. Ocellar triangle grey, posteriorly black. Periorbit grey, glossy in ♀, milky white in ♂. Front yellowish grey, frontal triangle with brown margin in ♀, milky white and posteriorly somewhat orange in ♂, anteriorly one and one-third times as broad as length down middle, posteriorly slightly broader than half head width. Face matt greyish white. Carina long,



FIGS. 255-267. 255-261, *Drosophila (Sophophora) tristipennis* Duda. 255, ♂ head, lateral aspect; 256, ♂ head, dorsal aspect; 257, ♂ wing; 258, peripheral organs, lateral aspect; 259, phallic organs, ventral aspect; 260, ♀ egg-guide; 261, hooked scaly bristles on ♂ mid tibia (upper), sex-combs on proximal two tarsal joints of ♂ fore leg (lower). 262-267, *Drosophila (Hirtodrosophila) tripartita* sp. n. 262, ♂ head, lateral aspect; 263, ♂ head, dorsal aspect; 264, ♂ wing; 265, peripheral organs, lateral aspect; 266 phallic organs, ventral aspect; 267, ♀ egg-guide.

narrow, low. Clypeus greyish yellow. Cheeks white in ♂, yellowish grey in ♀, about one-sixth as broad as the greatest diameter of eye. Occiput yellow, medially black. Anterior reclinate orbital five-eighths as long as others, twice as distant from posterior reclinate as from proclinate. Vibrissae long; second oral half as long as vibrissa; succeeding orals shorter.

Mesonotum yellowish grey, somewhat glossy, nearly unicolorous. Scutellum pale yellowish brown, somewhat glossy. Thoracic pleura pale yellowish brown; humeral callus pale. Two long humerals. Acrostichal hairs in six rows. Anterior dorsocentrals about half as long as posteriors; distance between anterior and posterior dorsocentrals about two-fifths distance between anterior pair. Anterior scutellars convergent, slightly shorter than posteriors, which are nearer to each other than to anteriors. Sterno-index about 0.7. Legs yellowish white; fore femur ventrally with several long hairs; mid tibia apically with four hooked scaly bristles; metatarsus without such bristles. Front and hind metatarsi as long as next three segments together, mid metatarsi as long as the other segments together. Preapicals on all legs; apicals prominent on mid leg. Wings hyaline, broad, in ♂ with a crescentic black patch along outer margin and a black stripe below  $R_1$ , in ♀ with a black spot at the apex of  $R_{2+3}$ . *Costa* reaching  $M$ ,  $R_{2+3}$  straight, not curved to *costa* at tip;  $R_{4+5}$  and  $M$  parallel. C-index about 2.0; 4V-index about 2.7; 4C-index about 1.6; 5x-index about 4.0; Ac-index about 3.1. C1-bristles two; C3-fringe on basal one-fourth. Halteres yellow. Abdominal tergites mostly black; 1T yellow, 2T yellow on anterior half. Female cercus dark brown.

Periphallal organs: Genital arch black, medially widely pale, mediocaudally gently projected, dorsally exceedingly narrowing, ventrally truncate, pubescent at dorsal tip, setigerous along caudal margin. Clasper pale yellow, elongate, ventrally narrowing, subapically with a row of about five large teeth on distal margin. Secondary clasper present, above the primary clasper, with a straight row of about seven large black teeth on entire distal margin. Anal plate black, setigerous, rounded above, ventrally narrowing and with a few thick black bristles. Phallic organs: Aedeagus slender, bifid, orange, marginally with long serration; basal apodeme slightly longer than aedeagus. P.I. = 0.7. Anterior paramere short, rod-like, black, attached to aedeagus basally, apically somewhat broadened and with a few sensilla. Posterior paramere pale, broad, fusiform in lateral aspect, proximally bilobed, attached to aedeagus by one arm and to the lateral corner of ventral fragma by the other. Ventral fragma semicircular, with a pair of short submedian spines; hypandria pubescent. p.f. = AbCd'EfGHIKIMN. Egg-guide lobe pale yellow, oblong, subapically swollen dorsally, with about eight marginal black slender setae, ventrosupical one longest. Basal isthmus yellow, one-sixth as long as lobe.

Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', ix-x.1961, 1 ♀, xi.1961-i.1962, 1 ♂; edge of mixed forest above Sangu, c. 6,500', 17.x-i.xi.1961, 11 ♂, 8 ♀; between Sangu and Tamrang, dense vegetation in tree shade by hill stream, c. 5,500', 23.x.1961, 1 ♂, 2 ♀; *ibid.*, mixed plants by damp cliff in deep river gorge, c. 5,200', 22.xi.1961, 1 ♀; Dobhan, evergreen trees overhanging stream in deep gully, c. 3,500', 30.i.1962, 1 ♂ (*R.L.C.*).

Distribution: Nepal (new locality), India, Formosa.

Differs somewhat from the original form (Formosa) in having six rows of acrostichal hairs (eight in original form), and posteriorly black ocellar triangle (yellowish white in original form). The pectinate aedeagus shows a close relationship to the members of the *melanogaster*-subgroup.

### *Drosophila (Sophophora) nepalensis* Okada

*Drosophila nepalensis* Okada, 1955: 388 (Nepal).

♂, ♀. Body dark brown, especially dark in ♂. Head as broad as thorax. Arista with about four dorsal and three ventral long branches and a moderate terminal fork. Front matt yellowish grey, with silver-white pollinosity, anteriorly narrowing and somewhat broader than length

down middle. Ocellar triangle black, outer margin also black. Periorbit black, two-thirds as long as front, posteriorly narrowing, anterior end rounded. Anterior scutellars nearly as long as posteriors, which are equidistant from each other and from anteriors. All metatarsi subequal to next three segments together. Face deep black above, white below. Egg-guide lobe yellow, broadly truncate apically, with about twenty pointed black marginal teeth, ultimate three teeth widely apart from each other. Basal isthmus brown, long, nearly half as long as lobe. Sub-terminal hair long. Other features as described by Okada (1955).

Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', ix-x. 1961, 1 ♀; *ibid.*, rotten fruits of Bhor trees on ground, c. 6,200', 7-31.x.1961, 10 ♂, 3 ♀. Arun Valley, below Tumlingtar, River Sabhaya, west shore, fermented millet seeds on shore, c. 1,800', 24.xii.1961, 4 ♂, 1 ♀ (*R.L.C.*).

Distribution : Nepal, India.

#### THE *TAKAHASHII* SUBGROUP

##### *Drosophila (Sophophora) takahashii* Sturtevant

*Drosophila takahashii* Sturtevant, 1927 : 371 (Formosa) ; Chino, 1927 : 473 (Japan) ; Peng 1937 : 27 (China) ; Kikkawa and Peng, 1938 : 534 (Formosa, Manchuria) ; Okada, 1955 : 388 (Nepal).

*Drosophila (Sophophora) takahashii* Sturtevant ; Sturtevant, 1942 : 29 ; Okada, 1956 : 109 (Japan) ; Okada, 1964a, : 111 (Japan : Amami) ; Okada, 1964b : 449 (Borneo) ; Wheeler and Takada, 1964 : 174 (Mariana Is.).

Taplejung District, Sangu, rotten fruits of Bhor tree on ground, c. 6,200', 7-31.x. 1961, 15 ♂, 6 ♀ (*R.L.C.*).

Distribution : Nepal, Formosa, China, Ryukyu, Manchuria, Japan, Mariana Is.

#### THE *MELANOGASTER* SUBGROUP

##### *Drosophila (Sophophora) melanogaster* Meigen

*Drosophila melanogaster* Meigen, 1830 : 85 (Europe).

Taplejung District, Sangu, from rotten Naspati fruits in traps, c. 6,200', 8-31.x. 1961, 13 ♂, 6 ♀; *ibid.*, mixed vegetation by stream in gully, c. 6,200', xi.1961-i.1962, 1 ♀; *ibid.*, from rotten bananas in traps, c. 6,200', x-xii.1961, 20 ♂, 16 ♀; between Sangu and Tamrang, mixed plants by damp cliff in deep river gorge, c. 5,200', 22.xi.1961, 1 ♀ (*R.L.C.*).

Distribution : Nepal, India, China, Manchuria, Korea, Formosa, Japan, Micronesia, Hawaii, Australia, Africa, Europe, N. America, S. America.

#### THE *MONTIUM* SUBGROUP

##### *Drosophila (Sophophora) kikkawai* Burla

*Drosophila (Sophophora) kikkawai* Burla, 1954a : 47 (Japan, China, Brazil, Hawaii?, Samoa?) ; Okada, 1955 : 387 (Nepal) ; Okada, 1956 : 118 (Japan) ; Okada, 1964b : 457 (Borneo) ; Kang, Chung, and Lee, 1959 : 62 (Korea) ; Wheeler and Takada, 1964 : 176 (Mariana Is., Palau, Ponape).

*Drosophila montium* de Meijere, 1917 ; Duda, 1923 : 53 (Formosa, India) ; Duda, 1924 : 215 ; 247 (Java, Formosa, India) ; Duda, 1926 : 99 (Sumatra) ; Chino, 1927 : 473 (Japan) ;

Kikkawa and Peng, 1938 : 530 (Japan, Korea, Manchuria, Saipan) ; Pavan and da Cunha, 1947 : 20 ; 23 (Brazil) ; Tan, Hsu, and Sheng, 1949 : 197 (China). [Mis-identification].

Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', ix-x. 1961, 1 ♂, 1 ♀ ; *ibid.*, rotting fruits of Bhor tree on ground, c. 6,200', 7-31.x.1961, 2 ♂, 3 ♀ ; *ibid.*, from rotten Naspati fruits in traps, c. 6,200', 8-31.x.1961, 18 ♂, 10 ♀, 1 puparium ; *ibid.*, from rotten bananas in traps, c. 6,200', x-xii.1961, 33 ♂, 4 ♀ ; *ibid.*, mixed vegetation by stream in gully, c. 6,200', xi.1961-i.1962, 1 ♀ ; between Sangu and Tamrang, mixed shrubs in deep gorge, c. 5,200', x-xi.1961, 1 ♀ ; Arun Valley, below Tumlingtar, River Sabhaya, west shore, fermented millet seeds on shore, c. 1,800', 24.xii.1961, 14 ♂, 11 ♀ ; east shore of River Arun below Tumlingtar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961, 1 ♂ (*R.L.C.*).

Distribution : Nepal, India, Java, Borneo, Sumatra, Viet-Nam, Formosa, China, Japan, Korea, Micronesia, Hawaii, Samoa.

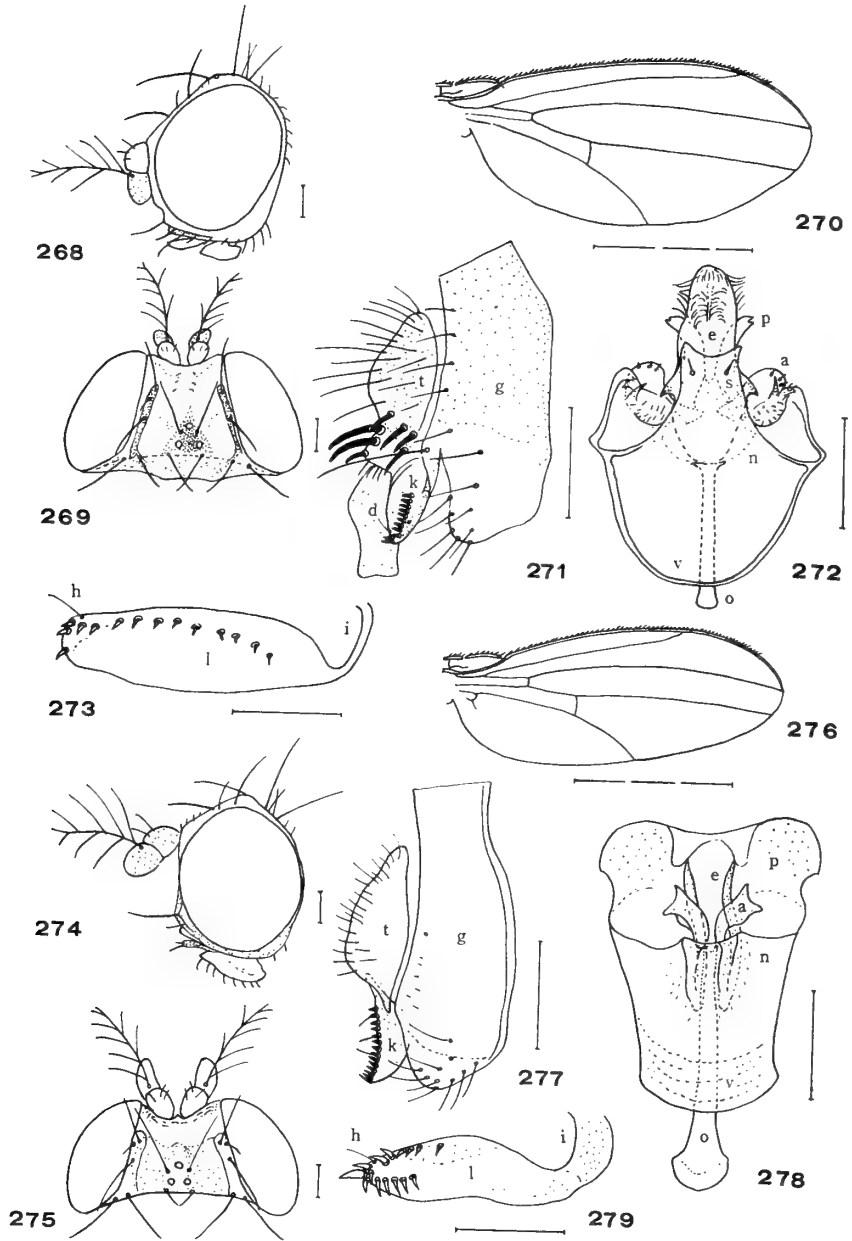
The males and some females from Arun Valley are evidently smaller and darker than those from Taplejung, the former having sex-combs composed of lesser number of teeth (17 and 16 in the first and second tarsal joints, respectively) than in the latter (33 and 23), and the egg-guide teeth also few in number (12 to 16) than in the latter (20). These two forms agree however in the general features of phallic and periphallic organs.

### *Drosophila (Sophophora) trapezifrons* sp. n.

(Text-figs. 268-273)

♂, ♀. Body about 2 mm. Head slightly broader than thorax. Eyes oval, dark reddish brown, thickly pilose. Antennae with second segment yellowish orange ; third greyish brown, slightly longer than broad. Arista with about four dorsal and two ventral long branches and a small terminal fork. Palpus yellow, slender, with only one apical seta. Ocellar triangle black, somewhat glossy ; frontal triangle black. Periorbit black, narrow, straight, five-sevenths as long as front. Front dark orange-yellow, anteriorly paler and much convergent, anteriorly about two-thirds as broad as length down middle, posteriorly about half as long as head width. Face black, pollinose greyish white, paler along eye margin. Clypeus pale brown. Carina high, white, anteriorly broadened and fuscous, laterally fuscous. Cheek whitish grey, fuscous above, about one-seventh as broad as the greatest diameter of eye. Occiput brownish black, medially darker. Postverticals long. Anterior reclinate orbital about one-third as long as posterior reclinate, one and a half times as distant from posterior reclinate as from proclinate ; three orbitals nearly equidistant from eye margin, proclinate slightly inside others. Two long orals, succeeding orals finer.

Mesonotum dark yellowish brown, glossy, posteriorly darker. Scutellum dark yellowish brown, slightly pollinose. Thoracic pleura yellowish grey, paler below. Two humerals, upper longer. Acrostichal hairs in six rows. Anterior dorsocentrals half as long as posteriors ; distance between anterior and posterior dorsocentrals two-fifths distance between anterior pair. Anterior scutellars divergent, slightly shorter than posteriors, which are slightly nearer to each other than to anteriors. Sterno-index about 0.6 ; median sternopleural one-third as long as posteriors. Legs yellow ; all metatarsi as long as next three segments together. Male fore leg with large longitudinal sex-combs, composed of about twenty-one black teeth on metatarsi and eighteen similar teeth on the second segment. Preapicals on all legs ; apicals on mid and hind legs. Wing hyaline, veins brown, crossveins clear. *Costa* reaching *M* ;  $R_{4+5}$  and *M* nearly parallel ;  $R_{2+3}$  straight, not curved to *costa* at tip. C-index about 2.8 ; 4V-index about



FIGS. 268-279. 268-273, *Drosophila (Sophophora) trapezifrons* sp. n. 268, ♂ head, lateral aspect; 269, ♂ head, dorsal aspect; 270, ♂ wing; 271, periphallallic organs, lateral aspect; 272, phallic organs, ventral aspect; 273, ♀ egg-guide. 274-279, *Diathoneura ripa* sp. n. 274, ♂ head, lateral aspect; 275, ♂ head, dorsal aspect; 276, ♂ wing; 277, periphallallic organs, lateral aspect; 278, phallic organs, ventral aspect; 279, ♀ egg-guide.



3·4 ; 4C-index about 1·4 ; 5x-index about 3·7 ; Ac-index about 2·2. C1-bristles two, subequal ; C3-fringe on basal two-sevenths. Halteres yellow. Tergites yellowish brown, with broad black cross-band towards tip of abdomen.

Periphallalic organs : Genital arch broad, black, pale grey at lower one third, caudal margin setigerous and gently convex below middle. Clasper in two sets : primary clasper ventrally narrowing, triangular, grey, with about ten small black teeth in a straight row on lower two-thirds of distal margin ; secondary clasper quadrate, above the primary one, partly attached to the lower tip of anal plate, with two large and one small black ventrally curved stout bristles on distal margin and a strong spine on inner margin, lower margin hairy. Anal plate separated from genital arch, oval, setigerous, with about three strong black bristles below. Phallic organs : Aedeagus compact, hairy, distally somewhat narrowing, subbasally with paired lateral black acute projections ; basal apodeme slightly shorter than aedeagus, straight, pale yellowish orange. PI = 1·4. Anterior paramere conical, black, rounded and with a few sensilla apically, with two acute projections medially, basally prolonged to join the base of aedeagus. Posterior paramere elongate, pale orange, gently curved outward, apically tapering. Ventral fragma quadrate, pale, with a large broad caudomedian process, which is apically shallowly concave and subapically with a pair of short submedian spines. p.f. = aBcDeFGHIKLMN. Egg-guide lobe yellowish brown, oblong, gently narrowing apically and broadly truncate, with about fourteen black pointed marginal teeth, last tooth well removed from penultimate. Subterminal hair distinct. Basal isthmus black, one fourth as long as lobe.

Holotype ♂. EAST NEPAL : Taplejung District, Sangu, rotten fruits of Bhor tree on ground, c. 6,200', 7-31.x.1961 (R.L.C.), BMNH.

Allotype ♀. Same data as holotype (R.L.C.), BMNH.

Paratypes : Taplejung District, 1 ♂, 1 ♀, same data as holotype ; 1 ♂, between Sangu and Tamrang, mossy ground under bushes by hill stream, c. 5,500', 20.x.1961 ; 4 ♂, *ibid.*, mixed shrubs in deep gorge, c. 5,200', x-xi.1961 ; 1 ♂, old mixed forest above Sangu, c. 6,200', 25-28.x.1961 ; 1 ♀, Sangu, from rotten Naspatis fruits in traps, c. 6,200', 8-31.x.1961 ; 2 ♀, *ibid.*, from rotten bananas in traps, c. 6,200', x-xii.1961 ; 1 ♀, *ibid.*, mixed vegetation by stream in gully, c. 6,200', ix-x.1961 ; 1 ♀, below Sangu, mixed vegetation on sheltered slopes above river, c. 4,000', 3.i.1962 ; 1 ♂, between Sangu and Tamrang, deep river gorge, c. 5,200', x-xi.1961 ; 1 ♂, *ibid.* mixed plants by damp cliff in deep river gorge, c. 5,200', 22.xi.1961 ; 1 ♀, Dobhan, shady places on shrubby slope above River Tamar, c. 3,500', 21-27.i.1962 ; 1 ♀, above Sangu, mixed vegetation in dried-up ravine, c. 6,800', 16.ii.1962 (R.L.C.), BMNH ; 2 ♂ (from Sangu and between Sangu and Tamrang) deposited at the Tokyo Metropolitan University.

Resembles *D. (S.) auraria* Peng, 1937 (China and adjacent countries) in having trapezoid front and laterally clawed aedeagus, but differs in having ♂ face not whitish, periorbit black (grey in *auraria*), aedeagus hairy (bare in *a.*), anterior paramere conical and hairy (elongate and not hairy in *a.*), and caudal margin of genital arch without prominent conical projection.

#### THE ANANASSAE SUBGROUP

### *Drosophila (Sophophora) bipectinata* Duda

*Drosophila bipectinata* Duda, 1923 : 52 (India).

No specimens were found in the present collection. The author (1955) recorded it from Central Nepal.

Distribution : Nepal, India, Borneo, Formosa, Ryukyu, Japan (Amami Is.).

Subgenus *DROSOPHILA* Fallén

*Drosophila* Fallén, 1823 : 4.

Type-species : *Musca funebris* Fabricius, 1787 : 345.

KEY TO SPECIES

- 1 Body and legs dark brownish black. ♂ anal plate contiguous with genital arch  
*virilis section, robusta group* . . . *lacertosa* (p. 97)
- Body and legs usually yellowish or yellowish brown, if dark brown, fore femur with a row of spinules. ♂ anal plate separated from genital arch *quinaria section* 2
- 2 Fore femur antero-ventrally with a longitudinal row of short stout spinules  
*immigrans group* 7
- Fore femur antero-ventrally without a row of spinules . . . . . 3
- 3 Second oral as long as or only slightly shorter than vibrissa. Palpus with a few prominent ventral setae . . . . . 4
- Second oral small or minute, at most half as long as vibrissa. Palpus with only one long apical seta . . . . . *grandis group* 5
- 4 Two long sternopleurals. Posterior parameres fused to form a large distal bow  
*bizonata group* . . . *trizonata* (p. 97)
- Three long sternopleurals. Posterior parameres apparently absent  
*histrion group*, part . . . *trisetosa* (p. 99)
- 5 Mesonotum with six dark longitudinal stripes . . . . . *editinares* (p. 103)
- Mesonotum without distinct dark longitudinal stripes . . . . . 9
- 6 Thoracic pleura with three distinct dark longitudinal stripes . . . *acutissima* (p. 101)
- Thoracic pleura without distinct dark longitudinal stripes, with only one faint small dark patch above . . . . . *flexicauda* (p. 101)
- 7 Front and thoracic pleura with distinct dark longitudinal stripes . . . . . 8
- Front and thoracic pleura without distinct dark longitudinal stripes . . . . . 11
- 8 Mesonotum and scutellum brownish black ; humeral callus and lateral sides of scutellum yellow. Wing slightly fuscous along *costa* . . . *cubicivittata* (p. 105)
- Mesonotum and scutellum pale yellowish brown, with dark longitudinal stripes . . . . . 9
- 9 Mesonotum with six dark longitudinal stripes. Scutellum with two dark longitudinal stripes. Arista with only five branches including a ventral branch and a terminal fork . . . . . *notostriata* (p. 107)
- Mesonotum with five or seven dark longitudinal stripes. Scutellum with or without distinct dark longitudinal stripes . . . . . 10
- 10 Mesonotum with seven dark longitudinal stripes. Scutellum with two dark longitudinal stripes. Legs with dark ring . . . . . *annulipes* (p. 110)
- Mesonotum with five dark longitudinal stripes. Scutellum without distinct dark longitudinal stripes. Legs without dark ring . . . . . *pentastrata* (p. 109)
- 11 Wing intensively clouded along *costa*. Posterior half of mesonotum and scutellum largely brownish black. Femora largely black . . . . . *fuscicostata* (p. 111)
- Wing without dark clouds along *costa*. Mesonotum uniformly yellowish brown or yellowish orange. Femora yellow . . . . . 12
- 12 Tips of longitudinal veins  $R_{2+3}$ ,  $R_{4+5}$  and  $M$  black. ♂ front not silvery shining. ♂ fore metatarsi thick and with a tuft of long hairs . . . . . *immigrans* (p. 112)
- Tips of longitudinal veins not black. ♂ front silvery shining. ♂ fore metatarsi not thick and without a tuft of long hairs . . . . . *nasuta* (p. 112)

THE *VIRILIS* SECTIONTHE *ROBUSTA* GROUP***Drosophila (Drosophila) lacertosa* Okada**

*Drosophila (Drosophila) lacertosa* Okada, 1956 : 158 (Japan).

*Drosophila lacertosa* Okada ; Takada and Lee, 1958 : 114 (Korea).

♂, ♀. Body about 3.5 mm., brownish black. Head as broad as thorax. Ocellar triangle glossy greyish black, strongly convex. Periorbit glossy greyish black, anteriorly rounded, posteriorly narrowing. Front anteriorly broader than length down middle. Anterior reclinate orbital slightly nearer to proclinate than to posterior reclinate. Anterior dorsocentral three fourths as long as posteriors. Front metatarsi as long as next three segments together, mid and hind metatarsi much longer than the other segments.  $R_{2+3}$  nearly straight. p.f. = aBCdef<sub>g</sub>o<sub>h</sub>HIkLmn. PI = 3.5. Other features as described by Okada (1956) for the Japanese form.

Taplejung District, Sangu, from rotten Naspati fruits in traps, c. 6,200', 8-31.x. 1961, 1 ♂ ; *ibid.*, mixed vegetation by stream in gully, c. 6,200', xi.1961-i.1962, 1 ♀ ; above Sangu, old mixed forest, c. 6,200', 25-28.x.1961, 1 ♀ ; between Sangu and Tamrang, spray-splashed rocks in deep gorge, c. 5,200', 6-28.xi.1961, 3 ♂ ; Dobhan, spray-splashed rocks in River Maewa, c. 3,500', 25.i.1962, 1 ♀ (*R.L.C.*).

Distribution : Nepal (new locality), Japan, Korea.

THE *QUINARIA* SECTIONTHE *BIZONATA* GROUP

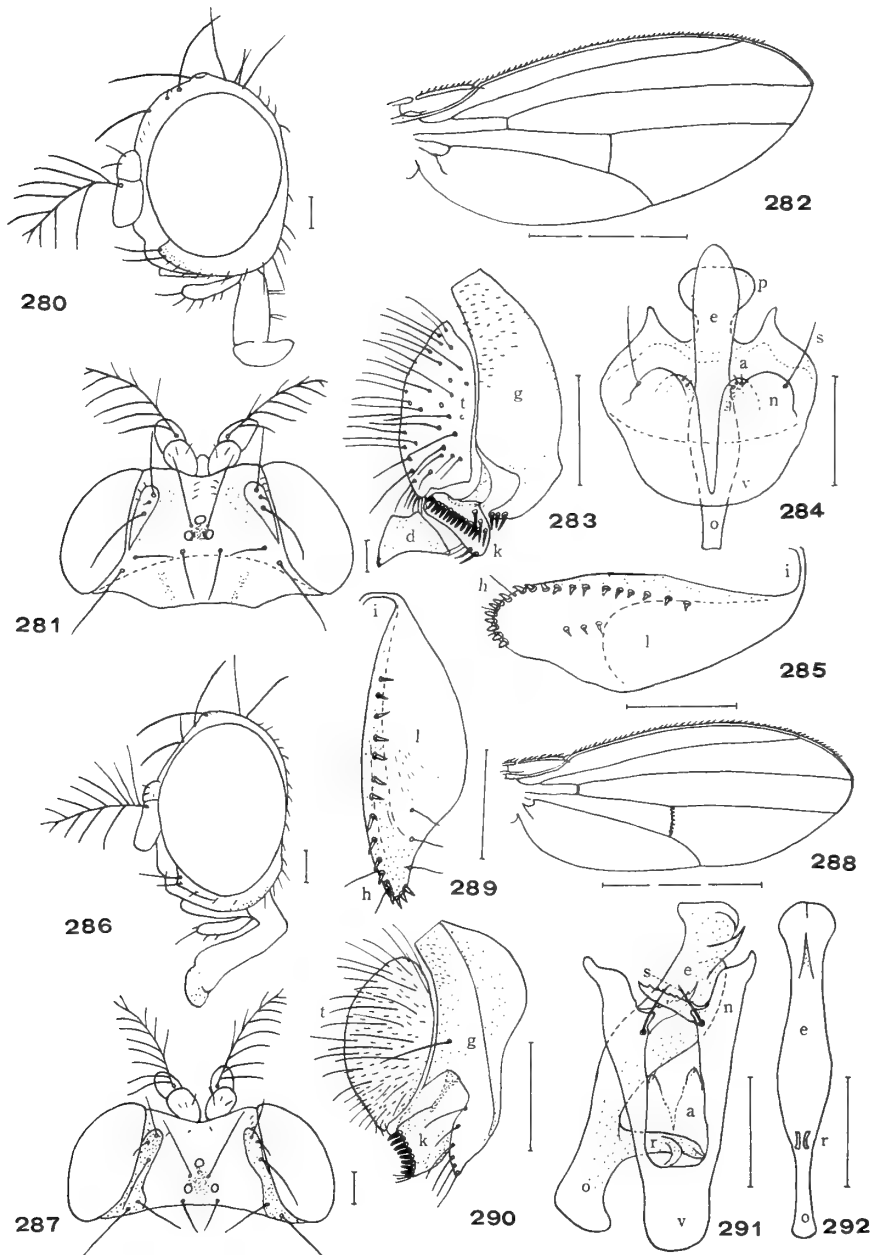
Anterior reclinate orbital minute. Second oral long. Palpus with a few prominent ventral setae. Posterior parameres present, fused to form a broad distal bow.

***Drosophila (Drosophila) trizonata* sp. n.**

(Text-figs. 280-285)

♂, ♀. Body about 2 mm. Head slightly broader than thorax. Eyes bright red, large, pilose. Antennae with second segment orange-yellow ; third greyish orange, apically rounded, about twice as long as broad. Arista with about five dorsal and three ventral branches and a small terminal fork. Palpus yellow, distally broadened, ventrally with a few long black setae. Ocellar triangle reddish brown ; inner margin of ocelli black. Periorbit orange-grey, somewhat glossy, posteriorly narrowing, anteriorly rounded and ending before the anterior margin of front. Front matt velvety orange, flat, laterally somewhat fuscous, anteriorly slightly narrowing and one and one-third times as broad as length down middle, posteriorly slightly more than twice as broad as head width. A few frontal hairs present. Clypeus yellowish brown. Face yellowish grey. Cheeks yellowish brown, about one-fourth as broad as the greatest diameter of eye. Occiput yellowish brown. Orbitals nearly equally distant from eye margin ; anterior reclinate orbital minute, not distinguished from neighbouring hairs, slightly nearer to proclinate than to posterior reclinate. Proclinate orbital slightly shorter than posterior reclinate. Postverticals long. Two long subequal orals, succeeding orals much shorter.

Mesonotum glossy pale yellowish brown, medially and laterally with obscure fuscous patches. Scutellum yellowish brown, mediolaterally fuscous. Thoracic pleura yellowish brown, paler than mesonotum, with obscure fuscous patches on mesepisternum and sternepisternum. Two long humerals, lower one slightly longer. Acrostichal hairs in six rows. Anterior dorsocentrals half as long as posteriors ; distance between anterior and posterior dorsocentrals half distance



FIGS. 280-292. 280-285, *Drosophila (Drosophila) trizonata* sp. n. 280, ♂ head, lateral aspect; 281, ♂ head, dorsal aspect; 282, wing; 283, peripheral organs, lateral aspect; 284, phallic organs, ventral aspect; 285, ♀ egg-guide. 286-292, *Drosophila (Drosophila) trisetosa* sp. n. 286, ♂ head, lateral aspect; 287, ♂ head, dorsal aspect; 288, ♂ wing; 289, ♀ egg-guide; 290, peripheral organs, lateral aspect; 291, phallic organs, ventral aspect, with aedeagus laterally placed; 292, aedeagus, ventral aspect.

between anterior pair. Anterior scutellars convergent, as long as posteriors, which are upright and nearer to each other than to anteriors. Sterno-index about 0.5; median sternopleural short. Legs yellow, all metatarsi as long as the next segments together. Preapicals on all legs; apicals on mid leg. Wings hyaline, crossveins clear. *Costa* reaching *M*, weak beyond  $R_{4+5}$ .  $R_{4+5}$  and *M* parallel;  $R_{2+3}$  gently curved to *costa* at tip. C-index about 3.2; 4V-index about 1.8; 4C-index about 0.8; 5x-index about 1.4; Ac-index about 2.1. C1-bristles two; C3-fringe on basal two-sevenths. Halteres dark yellowish brown. Abdominal tergites glossy yellowish brown, each with a caudal black transverse band which is broadly interrupted at middle and narrowing laterally and is especially large on 2-4T, somewhat triangular on 2T.

Periphallalic organs: Genital arch pale yellowish brown, dorsally pubescent and not distinctly narrowing, ventrally narrowing abruptly and directed posteroventrally like a finger, apically with about four strong black setae. Clasper basally brown, short and broad, with a straight row of about thirteen long black teeth on entire outer margin, medially with about two strong black bristles. Anal plate large, pale yellowish brown, setigerous, dorsally pointed, ventrally broadly truncate, ventrocaudally with a short projection on which are inserted a few short stout setae. Phallic organs: Aedeagus dark orange, straight, rod-like, apically rounded. Anterior paramere brown, conical, partly fused to hypandrium, distally with a few sensilla. Posterior parameres fused to make a brownish, horizontally flattened, laterally deeply concave flap. Hypandrial plate oval, terminally with a long submedian spine. Ventral fragma triangular, pale brown, with deep acute median notch. p.f. = aBCdefgHIklMN. PI = 2.0. Egg-guide lobe yellow, elliptical, broadly rounded apically, with about twenty marginal and three discal yellowish orange short thick teeth, ventrally with a short subterminal hair. Basal isthmus orange-brown, narrow, about one-fifth as long as lobe.

Holotype ♂. EAST NEPAL: Taplejung District, old mixed forest above Sangu, c. 6,200', 25-29.x.1961 (R.L.C.), BMNH.

Allotype ♀. Same data as holotype (R.L.C.), BMNH.

Paratypes: Taplejung District, 2 ♂, same data as holotype (R.L.C.), one at BMNH, the other at the Tokyo Metropolitan University.

Closely resembles *D. (D.) bizonata* Kikkawa and Peng, 1938 (Japan and neighbouring countries), in having several long ventral setae on palpus, two long orals, glossy yellowish brown mesonotum and in general similar features of periphallalic and phallic organs, but distinguished from it by having flat front, upright posterior scutellars, aedeagus less dilated distally, ventrally narrowing genital arch, somewhat triangular black bands on tergites, and clear crossveins.

#### THE HISTRIO GROUP

Anterior reclinate orbital minute or small, about one-third to one-fifth as long as proclinate. Second oral nearly as long as vibrissa. Palpus with a few prominent ventral setae. Posterior parameres apparently absent. Including *histris* Meigen, 1830, *sternopleuralis* Okada and Kurokawa, 1957, and *trisetosa* Okada in this paper.

#### *Drosophila (Drosophila) trisetosa* sp. n.

(Text-figs. 286-292)

♂, ♀. Body about 1.8 mm. Head slightly broader than thorax. Eyes red, pilose. Antennae with second segment orange-brown, third greyish brown with rounded tip. Arista with about seven dorsal and four ventral branches and a small terminal fork. Palpus orange-brown, rounded at tip, with a long terminal and a few ventral black setae. Ocellar triangle black.

marginally grey pollinose. Periorbit greyish brown, somewhat glossy, anteriorly blunt and not reaching anterior margin of front. Front matt orange-grey, anteriorly orange, and one and one-third times as broad as long, posteriorly half as broad as head width. Clypeus brown. Face greyish yellow, laterally concave. Carina high, long, laterally fuscous. Cheeks greyish yellow, about one-eighth as broad as the greatest diameter of eye. Occiput yellowish brown. Anterior reclinate orbital outside other orbitals, about one-third as long as posterior reclinate, half as long as proclinate, twice as distant from posterior reclinate as from proclinate. Postverticals moderate in size. Second oral nearly as long as vibrissa, succeeding orals short.

Mesonotum and scutellum matt yellowish brown, somewhat pollinose; humeral callus paler. Thoracic pleura greyish brown, sometimes with two broad obscurely demarcated dark brown longitudinal patches. Two humerals, lower longer. Acrostichal hairs in six rows. Anterior dorsocentrals less than half as long as posteriors; distance between anterior and posterior dorsocentrals half distance between anterior pair. Anterior scutellars parallel, longer than posteriors, which are slightly nearer to each other than to anteriors. Sterno-index about 0.5. Median sternopleural strong, longer than anteriors, but shorter than posteriors. Legs fuscous yellow. Front metatarsi as long as next three segments together, mid and hind metatarsi as long as the other segments together. Preapicals on all legs; apicals on mid leg. Wings hyaline, crossveins clouded. *Costa* reaching *M*.  $R_{2+3}$  gently convex at middle, apically nearly straight.  $R_{4+5}$  and *M* parallel. C-index about 3.3; 4V-index about 1.8; 4C-index about 0.8; 5x-index about 1.6; Ac-index about 1.7. C1-bristles two, subequal; C3-fringe on basal two-thirds. Halteres yellow. Abdominal tergites matt yellowish grey, each with a medially interrupted clearly indicated straight black caudal band; caudal tergites mostly black.

Periphallallic organs: Genital arch brownish black, caudal margin medially protruded triangularly and with a few long hairs, deeply and broadly concave at the base of clasper, narrowing below. Clasper brownish black, quadrate, large, with a slightly concave row of about eight black teeth on nearly entire length of distal margin. Anal plate oval, setigerous and pubescent, ventrally somewhat pointed and with a tuft of short hairs. Phallic organs: Aedeagus robust, yellowish orange, rod-like, apicodorsally with a short acute projection, which is directed caudally, apically somewhat dilated, basally with a large vertical rod. Apodeme of aedeagus thick, short, about one-third as long as aedeagus. PI = 3.0. Anterior paramere pale, narrow, apically with a long sensilla. Ventral fragma long, narrow, triangular. Hypandrial plate slender, laterally serrated, apically curved, basally attached on lateral arm of ventral fragma. A stout long submedian spine inserted below hypandrial plate. Median notch of ventral fragma very deep and wide. p.f. = ab'Cdefg<sub>0</sub>HIklmn. Egg-guide lobe yellowish brown, apically narrowing, with about sixteen marginal yellow teeth and three slender dorsal and discal setae.

Holotype ♂. EAST NEPAL: Arun Valley, east shore of River Arun below Tumlingtar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961 (R.L.C.), BMNH.

Allotype ♀. Same data as holotype (R.L.C.), BMNH.

Paratypes: 33 ♂, 20 ♀, same data as holotype; 1 ♂, river banks below Tamrang Bridge, c. 5,500', x-xi.1961; 1 ♀, between Sangu and Tamrang, mixed shrubs in deep gorge, c. 5,200', x-xi.1961; 1 ♀, Arun Valley, above River Sabhaya, east shore, swept from dwarf bamboos in deep ravine, c. 2,000', 12.xii.1961; 2 ♂, 6 ♀, below Tumlingtar, River Sabhaya, west shore, evergreen shrubs on sandy shore, c. 1,800', 9-17.xii.1961; 4 ♂, 4 ♀, *ibid.*, west shore, fermented millet seeds on shore, c. 1,800', 24.xii.1961; 2 ♀, Dobhan, east bank of River Tamur, mixed vegetation by stream in deep gully, c. 3,500', i-ii.1962 (R.L.C.), BMNH, and 1 ♂, 1 ♀ at the Tokyo Metropolitan University.

Closely allied to *D. (D.) sternopleuralis* Okada and Kurokawa, 1957 (Japan and

Korea) in general features of ♂ and ♀ genitalia, in having three long sternopleurals, and dark patches of thoracic pleura, but differs from it in the details of phallic and periphallallic organs : lower tip of genital arch pointed (rounded in *sternopleuralis*), aedeagus more robust, and hypandrial plate serrated (non-serrated in s.).

#### THE *GRANDIS* GROUP

Yellowish brown or dark brown species, with black patches or stripes on thoracic pleura. Anterior reclinate orbital small, less than one-third as long as posterior reclinate. Second oral much shorter than vibrissa. Phallic organs without posterior parameres. Including *D. (D.) grandis* Kikkawa and Peng, 1938, *tenuicauda* Okada, 1956, *acutissima* Okada, *flexicauda* Okada, and *editinares* Okada, the latter three species included in this paper.

#### *Drosophila (Drosophila) acutissima* Okada

(Text-figs. 293-298)

*Drosophila (Drosophila) acutissima* Okada, 1956 : 139 (Japan).

Taplejung District, between Sangu and Tamrang, dense vegetation in tree shade by hill stream, c. 5,500', 23.x.1961, 1 ♂ ; *ibid.*, mixed shrubs in deep gorge, c. 5,200', x-xi.1961, 4 ♂, 3 ♀ ; *ibid.*, mixed plants by damp cliff in deep river gorge, c. 5,200', 22.xi.1961, 4 ♂, 3 ♀ ; below Sangu, edge of small mixed wood, c. 6,000', 4.xi.1961, 1 ♀ ; Sangu, mixed vegetation by stream in gulley, c. 6,200', xi.1961-i.1962, 7 ♂, 8 ♀ ; above Sangu, mixed vegetation in dried-up ravine, c. 6,800', 16.ii.1962, 3 ♂ (*R.L.C.*).

Distribution : Nepal (new locality), Japan.

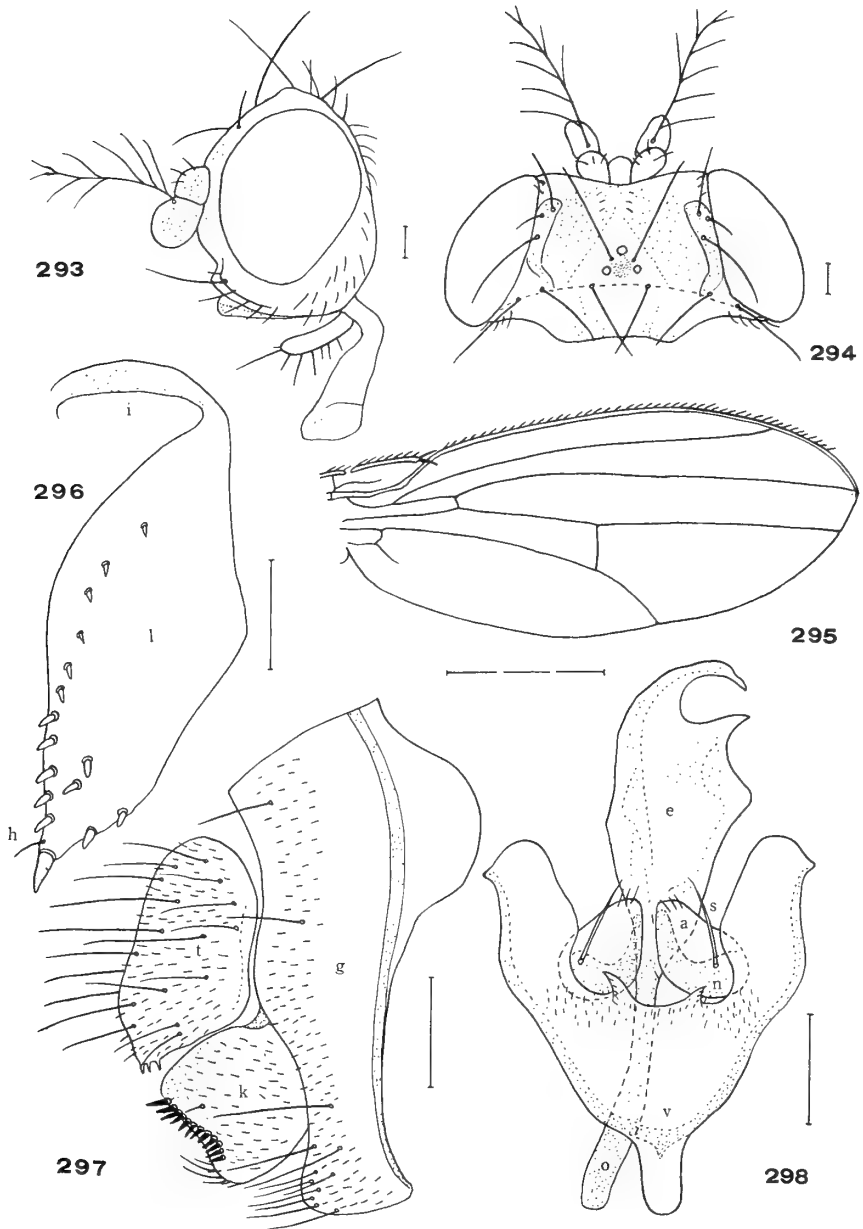
Slightly differing from original form (Japan) in having medioventrally swollen aedeagus and no distinct lateral lobe of aedeagus. Other features strictly agree with those of the Japanese form.

#### *Drosophila (Drosophila) flexicauda* sp. n.

(Text-figs. 299-305)

♂, ♀. Body 1.5-2 mm. Head somewhat narrower than thorax. Eyes oval, small, purplish red, pilose. Antennae with second segment orange-grey, third yellowish grey, apically somewhat narrowing. Arista with about six dorsal and two ventral branches and a small terminal fork. Palpus yellowish grey, slender, rounded at tip, with a long apical seta. Ocellar triangle black, small. Ocelli pale yellow. Periorbit pale greyish yellow, broad, anteriorly extending near the anterior margin of front. Front broad, yellowish grey, anteriorly orange-yellow and broader than length down middle, nearly parallel-sided, posteriorly about three-fifths as broad as head width. A few frontal hairs present. Clypeus orange-grey. Face yellowish white. Carina broad, high. Cheeks yellowish white, dark at the insertion of orals, more than one-third as broad as the greatest diameter of eye. Occiput yellowish grey. Postverticals moderate in size. One strong oral, much longer than posterior reclinate orbital ; succeeding orals very slender.

Mesonotum and scutellum uniformly yellowish brown, somewhat glossy. Thoracic pleura paler, with diffuse dark patch below humerus. Two humerals, upper longer. Acrostichal hairs



FIGS. 293-298. *Drosophila (Drosophila) acutissima* Okada. 293, ♂ head, lateral aspect ; 294, ♂ head, dorsal aspect ; 295, ♂ wing ; 296, ♀ egg-guide ; 297, peripheral organs, lateral aspect ; 298, phallic organs, ventral aspect, with aedeagus laterally placed.



in six rows. Anterior dorsocentrals two-thirds as long as posteriors; distance between anterior and posterior dorsocentrals three-fourths distance between anterior pair. Anterior scutellars long, divergent; posterior scutellars shorter than anteriors, as long as posterior dorsocentral. Sterno-index about 0.6. Legs yellow; fore femur ventrally with about three very long setae; all metatarsi nearly as long as the other segments together. Preapicals on all legs; apicals on mid leg. Wings hyaline; veins yellowish brown; crossveins clear. *Costa* reaching slightly beyond  $R_{4+5}$ .  $R_{2+3}$  only weakly curved to *costa* apically;  $R_{4+5}$  and *M* nearly parallel. C-index about 2.7; 4V-index about 2.2; 4C-index about 1.1; 5x-index about 2.1; Ac-index about 2.5. C1-bristles two, subequal; C3-fringe on basal one-third. Halteres yellowish white. Abdominal tergites pale yellow, each with a broad black entire caudal band.

Periphallalic organs pale yellowish grey. Genital arch narrowly pointed ventrally, setigerous along caudal margin and on ventral tip, caudal margin acutely projected caudally above insertion of clasper, with a straight row of about eight long black teeth occupying ventral three-fifths of distal margin. Anal plate oval, large, with short hairs, ventrally broadened and truncate. Decasternum flat, triangular. Phallic organs pale brown. Aedeagus rod-shaped, straight, apically tapering and recurved dorso-anteriorly, two basally inserted elongate distally tapering appendages; apodeme shorter than aedeagus, apically swollen. PI = 2.5. Anterior paramere slender, as long as lateral appendages of aedeagus, proximally tapering and attached to the base of aedeagus, apically with a few sensilla. Hypandrial plate large, oval, basally with a stout submedian spine. Ventral fragma V-shaped, with deep median notch. Posterior paramere apparently absent. p.f. = aBCdEfg<sub>0</sub>HIklmn. Egg-guide lobe yellowish orange, ventrally dark, elongate fusiform, with about fifteen marginal and four orange-brown discal teeth, distal marginal teeth large. Basal isthmus yellowish brown, medially much swollen, more than one-third as long as lobe.

Holotype ♂. EAST NEPAL: Taplejung District, between Sangu and Tamrang, mixed plants by damp cliff in deep river gorge, c. 5,200', 22.xi.1961 (R.L.C.), BMNH.

Allotype ♀. Taplejung District, above Sangu, mixed vegetation in dried-up ravine, c. 6,800', 16.ii.1962 (R.L.C.), BMNH.

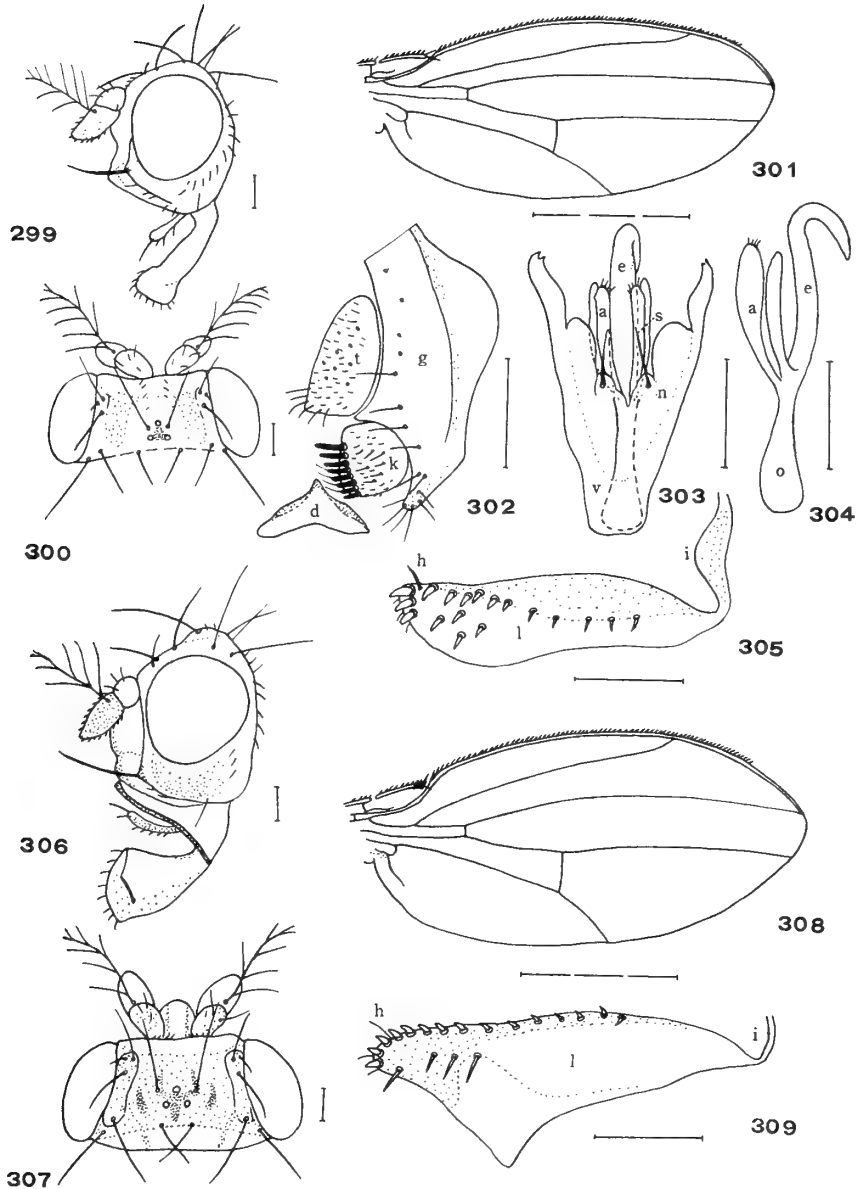
Paratypes: Taplejung District, 2 ♂, 2 ♀, 1 ex., between Sangu and Tamrang, deep river forge, c. 5,200', x-xi.1961; 1 ♂, Sangu, mixed vegetation in deep gully, c. 6,200', 2.i-13.ii.1962. 1 ♂, Arun Valley, east shore of River Arun below Tumlingtar, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961 (R.L.C.), BMNH, 1 ♂, 1 ♀, from between Sangu and Tamrang deposited at the Tokyo Metropolitan University.

Closely resembles *D. (D) tenuicauda* Okada, 1956 (Japan), especially in general structure of ♂ and ♀ genital apparatus, and in having anterior reclinate orbital minute, only one strong oral, and a long apical seta of palpus, but distinguished from it by having non-striped mesopleura and apically recurved aedeagus.

### *Drosophila (Drosophila) editinares* sp. n.

(Text-figs. 306-309)

♀. Body about 1.4 mm. Head greyish yellow, as broad as thorax. Eyes dark purplish red, pilose. Antennae with second segment pale brown, third dark brown, oval, tip rounded. Arista with about four dorsal and two ventral branches and a small terminal fork. Palpus slender, dark brown, with a long apical seta. Ocellar triangle black, convex. Periorbit somewhat glossy grey, convex, relatively broad, medially narrowing, anteriorly almost reaching the anterior margin of front. Front broad, yellowish grey, matt, darker between ocellar triangle



FIGS. 299-309. 299-305, *Drosophila (Drosophila) flexicauda* sp. n. 299, ♂ head, lateral aspect ; 300, ♂ head, dorsal aspect ; 301, ♂ wing ; 302, peripheral phallic organs, lateral aspect ; 303, phallic organs, ventral aspect ; 304, aedeagus, lateral aspect, dextral side dorsal ; 305, ♀ egg-guide. 306-309, *Drosophila (Drosophila) editinares* sp. n., ♀. 306, head, lateral aspect ; 307, head, dorsal aspect ; 308, wing ; 309, egg-guide.

and periorbits, parallel-sided, anteriorly paler and one and a half times as broad as length down middle, posteriorly three-fifths as broad as head width. Clypeus greyish yellow, medially with a narrow dark transverse stripe. Face broad, pale yellowish grey, paler along eye margin, parallel-sided. Carina very large, broad, high, and long. Cheeks glossy yellowish grey, black at the insertion of vibrissa, nearly half as broad as the greatest diameter of eye. Anterior reclinate orbital half as long as proclinate, one-fourth as long as posterior reclinate, situated outside proclinate, twice as distant from posterior reclinate as from proclinate. Vibrissae very long and black, succeeding orals slender. Postverticals relatively short, half as broad as inner verticals.

Mesonotum yellowish grey, with three pairs of brownish longitudinal stripes, median pair broadest and reaching to the tip of scutellum, which is yellowish in ground colour. Thoracic pleura yellowish grey, with three longitudinal brownish stripes. Two humerals, lower weaker. Acrostichal hairs in six rows. Anterior dorsocentrals three-fourths as long as posteriors; distance between anterior and posterior dorsocentrals equal to distance between anterior pair or slightly shorter. Anterior scutellars divergent, posteriors four-fifths as long as anteriors and somewhat nearer to each other than to anteriors. Legs yellow; fore femur with several long setae below; all metatarsi subequal in length to next three segments together. Preapicals on all legs; apicals on mid leg. Wings broad, hyaline; crossveins clear, tip of second costal section somewhat swollen and black.  $R_{2+3}$  not prominently curved to *costa* at tip;  $R_{4+5}$  and  $M$  parallel; *costa* weak beyond  $R_{4+5}$ . C-index about 1.7; 4V-index about 2.3; 4C-index about 1.5; 5x-index about 1.6; Ac-index about 3.1. C1-bristles two, subequal; C3-fringe on basal half. Halteres yellowish white. Abdominal tergites yellowish grey, each with a broad entire caudal black band. Egg-guide lobe orange-yellow, apically narrowing and rounded, with about sixteen orange-brown thick marginal teeth and four slender discal teeth. Basal isthmus black, short, about one-eighth as long as lobe.

Holotype ♀. EAST NEPAL: Taplejung District, between Sangu and Tamrang, mixed shrubs in deep gorge, c. 5,200', x-xi.1961. (R.L.C.), BMNH.

Resembles *D. grandis* Kikkawa and Peng, 1938 (Japan), in having striped mesonotum and thoracic pleura, but differs from it in the swollen tip of second costal section and rounded tip of egg-guide.

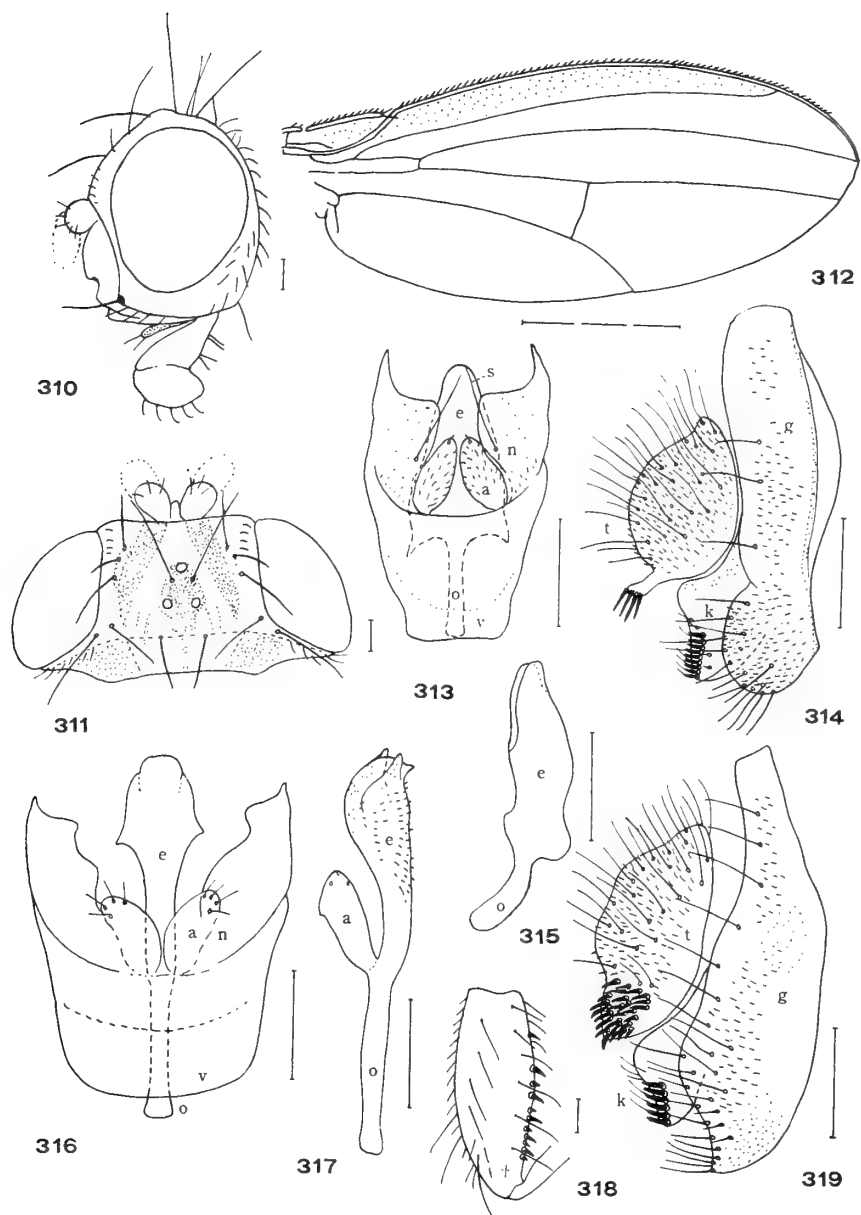
#### THE IMMIGRANS GROUP

#### *Drosophila (Drosophila) cubicivittata* sp. n.

(Text-figs. 310-315)

♂. Body about 2.8 mm. Head as broad as thorax. Eyes dark brownish red, with grey pollinosity and pilose. Antennae with second segment greyish brown, third segment and arista missing. Palpus black, slender, with a long apical seta and a ventral one. Ocellar triangle glossy black, the black spot extending caudally to vertex. Periorbit yellowish white, obscurely limited, dark along either side between orbitals. Front matt yellowish white, with a pair of broad dark anteriorly convergent longitudinal stripes, parallel-sided, anteriorly broader than length down middle, posteriorly slightly broader than half head width. Clypeus pale brown, small. Face yellowish grey, somewhat glossy. Carina high, long, yellowish white, with a small brownish spot at lower tip. Postverticals moderate in size. Occiput yellowish grey, laterally black. Cheeks yellowish white, somewhat glossy, about one-fourth as broad as the greatest diameter of eye. Anterior reclinate orbital about half as long as proclinate, one-third as long as posterior reclinate, slightly nearer to proclinate than to posterior reclinate. Proclinate slightly inside other orbitals. Vibrissae long, succeeding orals less than half as long as vibrissa.

Mesonotum dark chestnut-black, grey pollinose. Humeral callus yellow. Scutellum dark chestnut-black, pollinose, laterally yellow. Thoracic pleura pale yellowish grey, with three



FIGS. 310-319. 310-315, *Drosophila (Drosophila) cubicivittata* sp. n., ♂. 310, head, lateral aspect; 311, head, dorsal aspect; 312, wing; 313, phallic organs, ventral aspect; 314, peripheral organs, lateral aspect; 315, aedeagus, lateral aspect, dextral side dorsal. 316-319, *Drosophila (Drosophila) notostriata* sp. n., ♂. 316, phallic organs, ventral aspect; 317, aedeagus, lateral aspect, dextral side dorsal; 318, fore femur; 319, peripheral organs, lateral aspect.

dark brown longitudinal stripes, upper two anteriorly convergent and fused. Two humerals, upper longer. Acrostichal hairs in six rows. Anterior dorsocentrals half as long as posteriors; distance between anterior and posterior dorsocentrals half distance between anterior pair. Anterior scutellars divergent, posteriors missing. Sterno-index about 0.6; median sternopleural as long as anteriors. Legs yellow; all metatarsi subequal in length to the other segments together. Fore femur anteroventrally with a row of about ten short stout black spinules on distal two-thirds. Preapicals on all legs; apicals on mid leg. Wings hyaline, somewhat fuscous along *costa*. *C* reaching *M*;  $R_{2+3}$  medially convex forward, gently curved to *costa* apically;  $R_{4+5}$  and *M* nearly parallel. C-index about 3.9; 4V-index about 1.6; 4C-index about 0.6; 5x-index about 1.4; Ac-index about 2.1. C1-bristles two; C3-fringe on basal half. Halteres white. Abdominal tergites matt yellowish white, each with four large quadrate caudal black patches, 1T yellowish white. Abdominal sternites yellowish grey.

Periphallic organs: Genital arch pale grey, pubescent and setigerous, anterior and posterior margins nearly straight and parallel, ventrally rounded and darker. Clasper pale grey, nearly quadrate, distal margin convex caudally on upper half and with a straight row of about eight black teeth on lower half. Anal plate brown, oval, setigerous and pubescent, narrowly projected caudoventrally, apically with about four stout black pointed bristles. Phallic organs: Aedeagus yellowish orange, elliptical at lateral aspect, laterally flattened, ventro-anteriorly projected roundly; basal apodeme rod-like, half as long as aedeagus. Anterior paramere small, conical, pubescent, attached to aedeagus basally, apically with a few sensilla. Ventral fragma quadrate, pale grey; hypandrial plate large, quadrate, pale grey; median notch deep and broad. PI = 2.2. p.f. = aBCdEfg<sub>0</sub>HIklmn.

Holotype ♂. EAST NEPAL: Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', xi.1961-i.1962 (R.L.C.), BMNH.

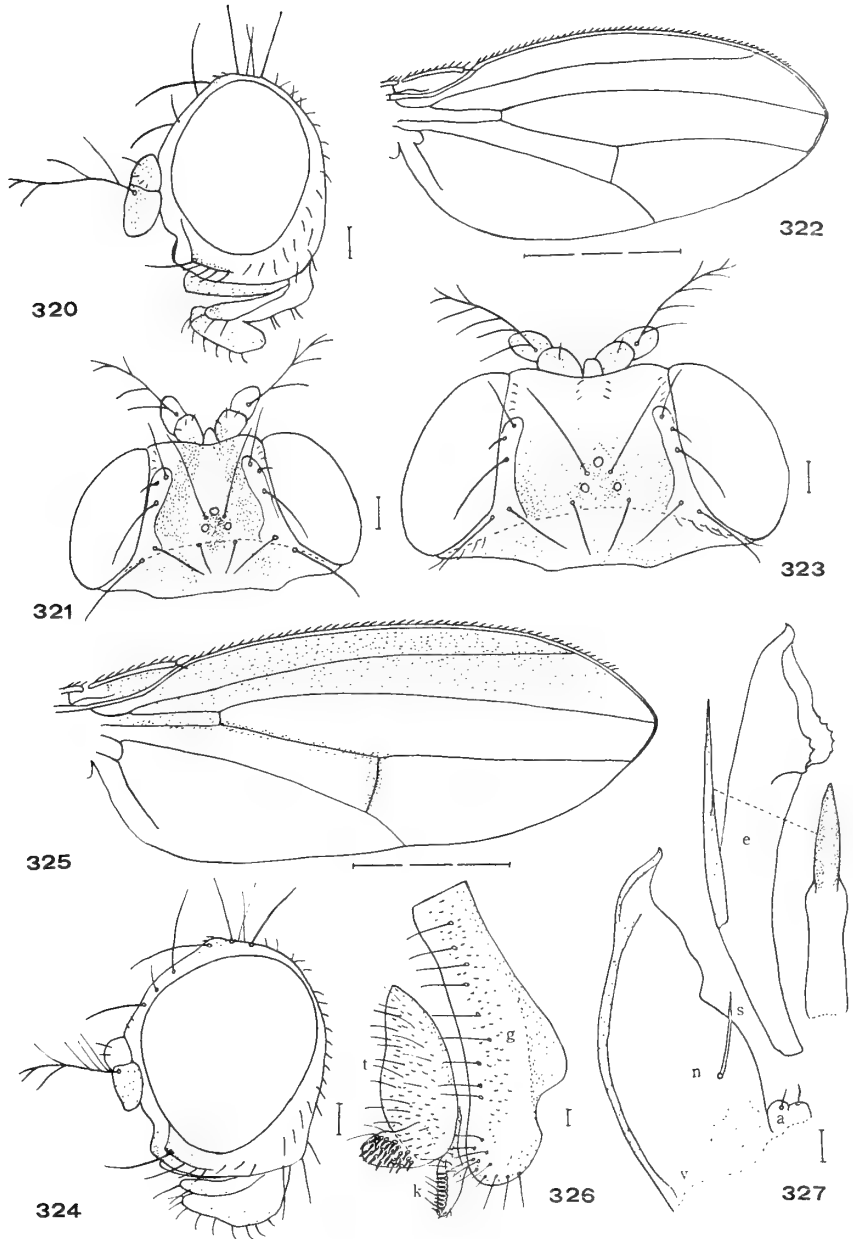
Peculiar among the *immigrans*-group in having black mesonotum, striped front, and anal plate ventrally narrowly projected with stout apical bristles. *D. (D.) annulipes* Duda, 1924 and *D. (D.) circumdata* Duda, 1924, as well as the two succeeding species in this paper, have also striped fronts, but their mesonota are similarly striped, thus differing from the present species.

### *Drosophila (Drosophila) notostriata* sp. n.

(Text-figs. 316-322)

♂. Body about 2.6 mm. Head slightly narrower than thorax. Eyes dark brownish red, pilose. Antennae with second segment dark brown, especially anteriorly; third yellowish orange, anteriorly black. Arista with only two dorsal and one ventral branches and a large terminal fork. Palpus yellowish brown, distally broadened, apically darker, with a few stout ventral and an apical setae. Ocellar triangle black. Periorbit dull yellow, medially slightly narrowing, anteriorly somewhat curved inward and blunt, about two-thirds as long as front. Front yellowish orange, matt, with a pair of broad anteriorly convergent dark brown stripes, anteriorly somewhat narrowing, as broad as length down middle, posteriorly slightly narrower than half head width. Clypeus reddish brown, with a black median spot on buccal margin. Face yellowish grey. Carina high, grey, relatively short. Cheeks yellowish brown, about one-fifth as broad as the greatest diameter of eye. Occiput yellowish brown, laterally dark. Postverticals relatively short. Anterior reclinate orbital one-third as long as posterior reclinate and of proclinate, slightly nearer to proclinate than to posterior reclinate. Proclinate inside others. Second oral about one-third as long as vibrissa; succeeding orals shorter.

Mesonotum dull yellow, matt, with six narrow brownish black longitudinal stripes, outermost pair interrupted at sutures. Scutellum dull yellow, matt, with two broad brown longitudinal stripes. Thoracic pleura brownish black, grey pollinose, paler at sutures. Two long humerals,



FIGS. 320-327. 320-322, *Drosophila (Drosophila) notostriata* sp. n., ♂. 320, head, lateral aspect; 321, head, dorsal aspect; 322, wing. 323-327, *Drosophila (Drosophila) fuscicostata* sp. n., ♂. 323, head, dorsal aspect; 324, head, lateral aspect; 325, wing; 326, periphallic organs, lateral aspect; 327, phallic organs.

subequal. Acrostichal hairs in six rows. Anterior dorsocentrals half as long as posteriors ; distance between anterior and posterior dorsocentrals half distance between anterior pair. Anterior scutellars divergent, as long as posteriors, which are somewhat nearer to anteriors than to each other. Sterno-index about 0.6 ; median sternopleural slender. Legs yellow ; fore femur anteroventrally with a row of about ten stout black spinules on distal two-thirds, larger and smaller teeth alternating. Preapicals and apicals on all legs. All metatarsi subequal in length to the next three segments together. Wings hyaline, vein *Cu* and posterior crossvein darker but not clouded, tip slightly pointed.  $R_{2+3}$  nearly straight ;  $R_{4+5}$  and *M* slightly convergent apically. C-index about 3.1 ; 4V-index about 1.6 ; 4C-index about 0.8 ; 5x-index about 1.5 ; Ac-index about 2.3. C1-bristles two ; C3-fringe on basal two-sevenths. Halteres yellow. Abdominal tergites matt yellow, each with a medially widely interrupted, and laterally somewhat broadened, posterior black transverse band, which is sometimes divided into four spots on posterior tergites.

Periphallallic organs greyish brown. Genital arch tapering above, swollen subventrally, somewhat caudally curved apically, setigerous and pubescent, apically with several stout setae. Clasper triangular, somewhat caudally projected on upper half, with a straight row of about six stout black teeth along lower half of distal margin. Anal plate separated from genital arch as usual, fusiform, setigerous and pubescent, with about thirty-five short stout black pointed bristles in several rows ventro-apically. Phallic organs pale yellowish brown. Aedeagus straight, pubescent, distally swollen and club-shaped, laterally angulated, with a few short conical processes apically. Anterior paramere oval, half as long as aedeagus, with a few prominent sensilla apically, basally attached to aedeagus. Posterior parameres apparently fused to form a broad quadrate lobe. Ventral fragma quadrate ; hypandrial plate large and fusiform. Apodeme of aedeagus slender, straight, as long as aedeagus. PI = 1.2. p.f. = ab/CdEfgHikImN.

Holotype ♂. EAST NEPAL : Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200' xi.1961-i.1962 (R.L.C.), BMNH.

Allied to *D. hexastriata* Tan, Hsu, and Sheng, 1949 (China), but differs from it in having dark longitudinal stripes on front, branches of arista much fewer, second oral shorter, and acrostichal hairs in six rows (eight in *hexastriata*). The presence of a "sinous bow" or "distal bow" of fused posterior parameres in this species suggests a connection with the *tripunctata*-group. Although some species of this group have the row of spinules on fore femur, like the members of the *immigrans*-group, this resemblance was considered by Frota-Pessoa (1954 : 265) to be superficial, since the latter group lacks the distal bow.

### ***Drosophila (Drosophila) pentastrata* sp. n.**

(Text-figs. 192-195, p. 68, 219-220, p. 75)

♂. Body about 2.4 mm., relatively slender. Head slightly broader than thorax. Eyes deep red, thickly pilose. Antennae with second segment dark yellow ; third broader, oval, yellow with anterior half black. Arista with about three dorsal and one ventral very long branches and a very large terminal fork. Palpus and mouth-parts unfortunately missing. Ocellar triangle black. Periorbit yellowish grey, somewhat glossy, somewhat narrowing anteriorly, four-fifths as long as front. Front orange-yellow, with two broad dark brown anteriorly convergent longitudinal stripes, proximal half of these diffusely dilated inferiorly. Front anteriorly narrowing and as broad as length down middle, posteriorly slightly narrower than half head width. Clypeus yellow, medially with a narrow brownish transverse band. Face wide, greyish white, parallel-sided, white along eye margin. Carina high, long, narrow, yellowish white. No frontal hairs. Cheeks yellowish white, about two-sevenths as broad as the greatest diameter of eye.

Occiput yellowish orange. Postverticals moderate in size. Anterior reclinate orbital about half as long as others, nearly equally spaced from posterior reclinate and from proclinate, which is inside others. Only one long oral, others much shorter.

Mesonotum orange-brown, with five narrow dark brown longitudinal stripes, median one faint and ending before posterior extremity, lateral one interrupted at suture, becoming more dorsal behind suture. Scutellum yellowish brown, pollinose. Thoracic pleura paler than mesonotum, with two narrow obscurely dark longitudinal stripes, upper one longer and reaching propleura anteriorly. Two humerals, upper much shorter. Acrostichal hairs in six rows. Anterior dorsocentrals half as long as posteriors; distance between anterior and posterior dorsocentrals subequal to distance between anterior pair. Anterior scutellars divergent, as long as posteriors, which are slightly nearer to each other than to anteriors. Sterno-index about 0.5; anterior sternopleural much thinner; median one as long as anteriors. Legs yellow; front and mid metatarsi subequal in length to next three segments together, mid metatarsi slightly longer than next three segments together. Preapicals on all legs; apicals on fore and mid legs. Fore femur anteroventrally with a row of small black equal-sized spinules on median half. Wings hyaline, *costa* reaching *M*;  $R_{2+3}$  straight;  $R_{4+5}$  and *M* gently convergent distally. C-index about 3.0; 4V-index about 1.5; 4C-index about 0.8; 5x-index about 1.3; Ac-index about 2.7. CI-bristles two; 3C-fringe on basal one-fourth. Halteres yellow. Abdominal tergites dark yellowish orange; 1T pale, others each with a broad black, medially narrowly interrupted, posterior transverse band.

Periphallalic organs: Genital arch pale yellowish grey, relatively narrow, swollen and oval ventrally, pubescent and setigerous. Clasper pale brown, triangular, proximally narrowing, narrowly projected upward dorsally to reach the lower tip of anal plate, with a straight row of about eight stout blunt black teeth on entire distal margin. Anal plate large, fusiform, setigerous and pubescent, ventrally with a tuft of a few short stout black setae directed ventrally. Decasternum pale, broad, triangular. Phallic organs pale yellow. Aedeagus robust, apically blunt, rhombic and basally swollen upward in lateral aspect. Basal apodeme of aedeagus straight, half as long as aedeagus. Anterior parameres oval, small, close to each other, finely pubescent, basally attached to aedeagus, subapically with about two sensilla. Hypandrial plate quadrate, finely pubescent, medially with a long submedian spine. Ventral fragma elongate, quadrate; lateral corners sharply pointed apically. PI = 2.0. p.f. = aBCdefg<sub>0</sub>H1klmn.

Holotype ♂. EAST NEPAL: Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', xi.1961-i.1962 (R.L.C.), BMNH.

Allied to *notostriata* in having striped front and mesonotum as well as thoracic pleura, but differing from it in having an odd number of mesonotal stripes, larger fork of arista, rounded wing tip, equal-sized short spinules on fore femur, non-pubescent aedeagus, and in the details of ♂ genital armatures.

### *Drosophila (Drosophila) annulipes* Duda

*Drosophila annulipes* Duda, 1924a: 209; 221 (Formosa); Duda, 1923: 58 [nom. nud.], (Formosa); Wheeler and Takada, 1964: 183 (Bonin Is.).

*Drosophila (Drosophila) virgata* Tan, Hsu, and Sheng, 1949: 203 (China); Okada, 1956: 149 (Japan); Kim, 1963: 73 (Korea).

Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', ix-x. 1961, 1 ♂; *ibid.*, xi.1961-i.1962, 1 ♂; below Sangu, by stream in shady ravine, c. 6,000', 30.x.1961, 1 ♀; above Sangu, old mixed forest, c. 6,200', 25-28.x.1961, 1 ♀; *ibid.*, mixed vegetation in dried-up ravine, c. 6,800', 16.ii.1962, 1 ♀ (R.L.C.).

Distribution: Nepal (new locality), Formosa, China, Korea, Japan, Bonin Is.



*Drosophila (Drosophila) fuscicostata* sp. n.

(Text-figs. 323-327)

♂. Body about 3 mm. Head as broad as thorax. Antennae with second segment brown ; third greyish brown, slightly longer than broad. Arista with about four dorsal and one ventral branches and a large terminal fork. Palpus yellowish brown, ventrally with about two black setae. Ocellar triangle black, marginally grey pollinose. Periorbit glossy greyish brown, posteriorly broadened, two-thirds as long as front. Front orange, anteriorly somewhat narrowing and slightly broader than length down middle, posteriorly fuscous and broader than half head width, caudolaterally black and grey pollinose outside insertion of postverticals. Face glossy brown ; buccal margin strongly convex. Carina high, short, medially whitish grey, broader below. Cheeks yellowish grey, dark at bases of orals, broad, about two-ninths as broad as the greatest diameter of eye. Occiput yellowish grey, black below. Anterior reclinate orbital slender, about one-third as long as posterior reclinate, half proclinate, slightly nearer to proclinate than to posterior reclinate ; proclinate inside others. Postvertical moderate in size. Second oral fine, about two-fifths as long as vibrissa ; succeeding orals finer.

Mesonotum orange-brown, matt, posteriorly and laterally dark glossy brown. Scutellum brown, anterolaterally and apically yellowish orange, with two diffuse black stripes. Thoracic pleura black, grey pollinose, pale along suture. Only one long humeral. Acrostichal hairs in six rows. Distance between anterior and posterior dorsocentrals about half distance between anterior pairs. Scutellars missing. Posterior scutellars nearer to each other than to anteriors. Sterno-index about 0.6 ; median sternopleural half as long as anteriors. Legs yellowish grey ; fore femur anteroventrally with a row of about twelve black spinules on distal two thirds ; femora black except at ends ; tibiae fuscous, with indistinct dark rings subbasally and subapically. Front and mid metatarsi subequal in length to next three segments together, hind metatarsi longer than the rest of segments together. Wings extensively fuscous from costal margin up to below  $R_{2+3}$ , in the cell  $R_{4+5}$  before anterior crossvein, along  $M$ , and along crossveins.  $R_{2+3}$  straight, not curved to *costa* apically ;  $R_{4+5}$  and  $M$  somewhat convergent distally. C-index about 3.8 ; 4V-index about 1.7 ; 4C-index about 0.7 ; 5x-index about 1.1 ; Ac-index about 2.3. C1-bristles two ; C3-fringe on basal two-thirds. Halteres yellow. Abdominal tergites matt yellowish grey, each with a glossy black caudal transverse band, which is laterally curved anteriorly, medially interrupted on 2-3T, medially contiguous and projected anteriorly on 4-5T ; 1T mostly yellow ; 6T black.

Periphallalic organs brownish black. Genital arch not narrowing above, ventrally rounded, setigerous and pubescent. Clasper projected below genital arch, ventrally prolonged, with a slightly concave row of about ten stout black teeth occupying nearly entire distal margin. Anal plate setigerous and pubescent, dorsally tapering, ventrally broadened and with numerous short stout black bristles. Phallic organs : Aedeagus orange-brown, straight, subapically broadened and dentated on lateral sides, proximally tapering, subbasally with an elongate distally black and caudally pointed dorsal appendage. Anterior paramere small, conical, distally with about two sensilla. Hypandrial plate pale yellow, marginally black, broad, elliptical, with a stout submedian spine. p.f. = ab'Cdef<sub>0</sub>HiklMn.

Holotype ♂. EAST NEPAL : Taplejung District, Sangu, mixed vegetation by stream in gully, c. 6,200', xi.1961-i.1962 (R.L.C.), BMNH.

Somewhat resembles *D. hypocausta* Osten Sacken, 1882 (Philippines, Java, Sumatra, and Caroline Islands) in having black femora, black thoracic pleura, and apically pale scutellum, but differs from it in having six rows of acrostichal hairs (eight in *hypocausta*), only one strong oral (two strong in *h.*), anteriorly fuscous wings, only one ventral branch of arista (four in *h.*), ventrally setigerous anal plate and long dorsal projection of aedeagus.

***Drosophila (Drosophila) immigrans* Sturtevant**

*Drosophila immigrans* Sturtevant, 1921 : 83 (N. America).

Taplejung District, Sangu, rotting fruits of Bhor tree on ground, c. 6,200', 7-31.x. 1961, 19 ♂, 15 ♀; *ibid.*, from rotten bananas in traps, c. 6,200', x-xii.1961, 2 ♀; *ibid.*, mixed vegetation by stream in gully, c. 6,200', xi.1961-i.1962, 1 ♀; between Sangu and Tamrang, mixed shrubs in deep gorge, c. 5,200', x-xi.1961, 1 ♀. Arun Valley, below Tumlingtar, River Sabhaya, west shore, from rotten bananas in traps, c. 1,800', x-xii.1961, 13 ♂, 27 ♀; *ibid.*, evergreen shrubs on sandy shore, 9-17.xii. 1961, 1 ♀; *ibid.*, fermented millet seeds on shore, c. 1,800', 24.xii.1961, 2 ♀; *ibid.*, east shore of River Arun, evergreen shrubs bordering dry stream-beds, c. 1,800', 14-23.xii.1961, 1 ♀ (*R.L.C.*).

Distribution : Nepal, India, Formosa, China, Korea, Japan, Philippines, Micronesia, Hawaii, Australia, Africa, Europe, N. America, S. America.

***Drosophila (Drosophila) nasuta* Lamb**

*Drosophila nasuta* Lamb, 1914 : 346 (Seychelles).

*Drosophila (Drosophila) nasuta* Lamb : Okada, 1964b : 463 (Borneo) [synonymy]; Wheeler and Takada, 1964 : 180 (Mariana Is., Truk, Ponape, Kusaie, Wake Is.) [synonymy].

Taplejung District, Sangu, rotting fruits of Bhor tree on ground, c. 6,200', 7-31.x. 1961, 16 ♂, 11 ♀; between Sangu and Tamrang, mixed shrubs in deep gorge, c. 5,200', x-xi.1961, 1 ♀. Arun Valley, below Tumlingtar, River Sabhaya, west shore, from rotten bananas in traps, c. 1,800', x-xii.1961, 1 ♀ (*R.L.C.*).

Distribution : Nepal (new locality), Borneo, Sumatra, Seychelles, Formosa, Japan, Moluccas, New Guinea, Micronesia, Samoa, Fiji, Hawaii.

## GEOGRAPHICAL DISTRIBUTION OF THE NEPALESE SPECIES

Table 1 shows that the drosophilid fauna of Nepal seems to be most closely related to that of Formosa, nearly one-third of the known Nepalese species being in common (twenty-five species). Much fewer Nepalese species have been found in common with the adjacent areas, India, Viet-Nam or China, and this is certainly due mainly to the poor knowledge of the fauna in these areas as compared with the relatively rich records from Formosa. Similar relationships between the number of species in common and the degree of survey can be recognized among the islands of Java, Sumatra, and Borneo. Of these, Java has been best surveyed and is richest in the number of species in common (fourteen species), while Borneo is poorest in the degree of survey as well as in the number of species in common (three).

Japan comes next to Formosa in the number of species in common (nineteen species), which is about one-fourth of the total Nepalese species. This is undoubtedly due partly to the extensive surveys made in Japan and partly to the biogeographical similarity between the two countries. The latter has frequently been proved concerning various groups of insects and plants, e.g., *Epiophlebia* (Anisozyoptera, Odonata) and *Deuterophlebia* (Deuterophlebiidae, Diptera) in insects and *Balanophora*, *Burmannia*, and *Hydrobryum* in Angiosperms, referring only to special

cases. In regard to the drosophilid fauna, *Cryptochaetum nipponense*, *Drosophila acutissima* and *D. lacertosa*, which are common to both countries and are so-called "wild species", and *D. trizonaria* and *D. trisetosa*, which are closely related to the Japanese species, *D. bizonata* and *D. sternopleuralis* respectively, should be the examples proving connection between fauna of the two countries. Table 2 shows that one hundred and twenty-seven species, so far known from Japan, belong to sixteen genera, of which ten also occur in Nepal. The remaining six genera, *Curtonotum*, *Amiota*, *Mycodrosophila*, *Dettopsomyia*, *Lissocephala*, and *Chymomyza* have not been found in Nepal, while five genera, *Campichoeta*, *Apsinota*, *Lissodrosophila*, *Diathoneura* and *Paramycodrosophila*, recorded from Nepal in this paper, have not been found in Japan. Six subgenera of the genus *Drosophila* (*Scaptodrosophila*, *Dichaetophora*, *Hirtodrosophila*, *Dorsilopha*, *Sophophora*, and *Drosophila* s. str.) occur in both countries. The subgenus *Lordiphosa* is absent from Nepal, while occurring in Japan. The occurrence of an originally African subgenus, *Dichaetophora*, in both Nepal and Japan is rather easily interpreted biogeographically, but the discovery of an originally South American genus, *Diathoneura*, is harder to explain. This might be a phenomenon of "trans-palaeo-equatorial distribution" (Maekawa, 1963).

The Nepalese species which also occur in Europe (five species), Australia (eight), Africa (nine), N. America (four), and S. America (five) are mostly cosmopolitan or circumtropical, except *Campichoeta obscuripennis* and *Leucophenga leucozona*, which, outside Nepal, are found only in Europe and Australia, respectively. The genus *Leucophenga* and the *melanogaster*-group are the taxa flourishing especially in the Oriental Region and seem to have spread simultaneously to Nepal and Japan, which have several species in common.







TABLE 2  
Comparison of Nepalese and Japanese drosophilid faunae

Genus and Subgenus	Nepalese species	Japanese species	Species in common
<i>Cryptochaetum</i>	1	1	1
<i>Diastata</i>	2	2	1
<i>Campichoeta</i>	1	0	0
<i>Apsinota</i>	2	0	0
<i>Stegana</i>	1	3	0
<i>Leucophenga</i>	16	12	4
<i>Microdrosophila</i>	6	6	0
<i>Lissodrosophila</i>	1	0	0
<i>Hypselothyrea</i>	1	1	0
<i>Liodrosophila</i>	4	2	0
<i>Paramycodrosophila</i>	1	0	0
<i>Chaetodrosophillela</i>	1	1	0
<i>Diathoneura</i>	1	0	0
<i>Scaptomyza</i>	4	8	1
<i>Drosophila</i>	35	65	12
Other six genera	0	26	0
	—	—	—
Total	77	127	19
<i>Scaptodrosophila</i>	5	5	0
<i>Dichaetophora</i>	2	1	1
<i>Hirtodrosophila</i>	2	9	0
<i>Dorsilopha</i>	1	1	1
<i>Sophophora</i>	12	17	5
<i>Drosophila</i> s. str.	13	31	5
<i>Lordiphosa</i>	0	1	0

#### ECOLOGICAL DISTRIBUTION OF THE NEPALESE SPECIES

Following is a summarized list of the collection data recorded by Mr. R. L. Coe for the present material. The numbers following the generic and subgeneric names are those given to the species in Table 1.

#### Taplejung Districts

Sangu, c. 6,200'.

Mixed vegetation by stream in gully. *Leucophenga* (8, 17, 20, 23), *Microdrosophila* (26, 28, 29), *Liodrosophila* (32, 33, 34, 35), *Chaetodrosophillela* (37), *Scaptomyza* (38, 39), *Drosophila* (43, 44, 48, 49, 50, 53, 54, 55, 57, 58, 59, 61, 62, 63, 65, 68, 71, 72, 73, 74, 75, 76, 77).

Rotting fruits of Bhor tree on ground. *Hypselothyrea* (31), *Liodrosophila* (33), *Drosophila* (59, 60, 62, 63, 76, 77).

Mixed vegetation in deep gully. *Liodrosophila* (34), *Chaetodrosophillela* (37), *Scaptomyza* (39), *Drosophila* (53, 69).

Clearing in small wood. *Scaptomyza* (39, 40), *Drosophila* (53, 57).

Yellow blooms of cultivated Composite (*Guizotia abyssinica* Cassini). *Scaptomyza* (38), *Drosophila* (47, 57).

From rotten Naspati fruits in traps. *Drosophila* (52, 61, 62, 63, 65).

From rotten bananas in traps. *Drosophila* (52, 61, 62, 63, 76).

By stream in gully. *Drosophila* (53).

Above Sangu.

Old mixed forest, c. 6,200'. *Leucophenga* (21, 23), *Microdrosophila* (27), *Liodrosophila* (35), *Scaptomyza* (39), *Drosophila* (53, 57, 63, 65, 66, 74).

Mixed vegetation in dried-up ravine, c. 6,800'. *Microdrosophila* (28), *Chaetodrosophilella* (37), *Scaptomyza* (38, 39), *Drosophila* (50, 53, 57, 63, 68, 69, 74).

Damp evergreen oak forest, c. 9,200'. *Cryptochaetum* (1), *Diastata* (3), *Scaptomyza* (39, 40, 41), *Drosophila* (53).

Ex *Lycopodium* sp. on slope, c. 7,800'. *Scaptomyza* (38, 40), *Drosophila* (57).

Evergreen scrub, c. 6,500'. *Leucophenga* (22), *Chaetodrosophilella* (37).

Edge of mixed forest, c. 6,500'. *Liodrosophila* (34), *Drosophila* (58).

Below Sangu.

By stream in shady ravine, c. 6,000'. *Cryptochaetum* (1), *Leucophenga* (8), *Lissodrosophila* (30), *Hypselothyrea* (31), *Liodrosophila* (32, 33, 34, 35), *Drosophila* (52, 53, 74).

Mixed vegetation on sheltered slopes above river, c. 4,000'. *Diastata* (2), *Leucophenga* (10, 21, 23), *Liodrosophila* (34), *Scaptomyza* (38, 39), *Diathoneura* (42), *Drosophila* (53, 63).

Edge of small mixed wood, c. 6,000'. *Leucophenga* (21, 23), *Liodrosophila* (35), *Scaptomyza* (39), *Drosophila* (57, 68).

Below stream in shady ravine, c. 6,200'. *Scaptomyza* (39).

North of Sangu.

Dry grass above river bank, c. 5,000'. *Leucophenga* (20), *Drosophila* (53).

Mossy ground under bushes by hill stream, c. 5,500'. *Leucophenga* (20), *Drosophila* (53, 63).

Between Sangu and Tamrang.

Mixed shrubs in deep gorge, c. 5,200'. *Campichoeta* (4), *Leucophenga* (9, 13, 17, 20, 21, 22), *Liodrosophila* (33, 34), *Chaetodrosophilella* (37), *Drosophila* (46, 50, 53, 54, 55, 57, 62, 63, 67, 68, 70, 76, 77).

Mixed plants by damp cliff in deep river gorge, c. 5,200'. *Stegana* (7), *Leucophenga* (17, 20), *Microdrosophila* (28), *Liodrosophila* (34), *Chaetodrosophilella* (37), *Drosophila* (46, 48, 51, 53, 54, 55, 57, 58, 61, 63, 68, 69).

Dense vegetation in tree shade by hill stream, c. 5,500'. *Leucophenga* (21), *Drosophila* (53, 58, 68).

Shrubs by path, 5,800'. *Leucophenga* (17), *Drosophila* (56).

In tree shade by hill stream, c. 5,500'. *Drosophila* (57).

Spray-splashed rocks in deep gorge, c. 5,200'. *Drosophila* (65).

Deep river gorge, c. 5,200'. *Drosophila* (63, 69).



Below Tamrang Bridge.

River banks, c. 5,500'. *Leucophenga* (10), *Liodrosophila* (34), *Scaptomyza* (39), *Diathoneura* (42), *Drosophila* (48, 52, 53, 54, 67).

Dobhan, c. 3,500'.

East bank of River Tamur, mixed vegetation by stream in deep gully. *Microdrosophila* (24), *Liodrosophila* (35), *Scaptomyza* (39), *Drosophila* (57, 67).

Evergreen trees overhanging stream in deep gully. *Leucophenga* (15, 20), *Drosophila* (57, 58).

Shady places on shrubby slope above River Tamur. *Leucophenga* (10), *Scaptomyza* (38), *Drosophila* (63).

Small pockets of plants on arid slopes above River Maewa. *Leucophenga* (10), *Microdrosophila* (29).

Spray-splashed rocks in River Maewa. *Drosophila* (65).

Mixed vegetation in dry gully on wooded slope. *Leucophenga* (19).

### Arun Valley

Below Tumlingtar.

East shore of River Arun, evergreen shrubs bordering dry stream-beds, c. 1,800'. *Apsinota* (6), *Leucophenga* (8, 9, 10, 11, 13, 15, 16, 18, 19, 21, 22), *Microdrosophila* (28), *Liodrosophila* (33, 34, 35), *Scaptomyza* (38), *Drosophila* (45, 48, 62, 67, 69, 76).

East shore of River Arun, swept from *Ricinus communis* L, c. 1,800'. *Scaptomyza* (38).

West shore of River Arun, evergreen shrubs bordering dry stream-beds, c. 1,800'. *Leucophenga* (14).

River Sabhaya, west shore, fermented millet seeds on shore, c. 1,800'. *Liodrosophila* (33, 35), *Drosophila* (59, 62, 67, 76).

River Sabhaya, west shore, evergreen shrubs on sandy shore, c. 1,800'. *Apsinota* (5), *Leucophenga* (17), *Liodrosophila* (33), *Drosophila* (76).

River Sabhaya, west shore, from rotten bananas in traps, c. 1,800'. *Drosophila* (76, 77).

Tumlingtar

Bare rocky slopes above River Sabhaya, west bank, c. 1,900'. *Apsinota* (5).

Above River Sabhaya.

East shore, swept from dwarf bamboos in deep ravine, c. 2,000'. *Leucophenga* (12, 15), *Liodrosophila* (33, 35), *Diathoneura* (36), *Drosophila* (67).

## NOTES ON SOME SPECIAL DIAGNOSTIC CHARACTERS

### A. ARCHESTINIC CHARACTERS

Stenzel (1963) proposed the terms "archestinic" and "archekastic" for the diagnostic generic characters which occur in *some* and *all* of the member taxa, respectively. The idea "archestinic" can be ascribed to the polythetic principle

of the Neo-Adansonian school (Sneath, 1961) or of numerical taxonomy (Sokal and Sneath, 1963). Although much conflict and dispute has been raised between the orthodox or phylogenetic taxonomists and the Neo-Adansonians, the principle claiming overall similarity or using the "greatest possible number of characters" in classification is unequivocally accepted by most of the current phylogenetic as well as numerical taxonomists. The archestinic character should be of taxonomic importance in this context (Kiriakoff, 1965 : 64 ; Mayr, 1965 : 73).

Some examples of the archestinic characters can be cited from the present investigation. The subgenus *Dichaetophora* of the genus *Drosophila* has necessarily been characterized by the absence or abbreviation of the anterior dorsocentrals, while *D. rotundicornis* possesses rather well developed anterior dorsocentrals, which can be explained as archestinic. Likewise, the occurrence of six rows of acrostichal hairs in *Chaetodrosophilella coei* should be archestinic, because the genus *Chaetodrosophilella* shows essentially two or four rows of acrostichal hairs (Wheeler and Takada 1964). Incidentally, accepting the overall similarity principle, the author agrees with L. H. Throckmorton (personal communication) to treat *Drosophila subtilis* Kikkawa and Peng, 1938, from Japan as a member of the subgenus *Scaptodrosophila*, although this species differs from ordinary species of *Scaptodrosophila* in having no prescutellars.

#### B. HOMEOTIC EXPRESSION OF THE HOOKED SCALY BRISTLES

The "hooked scaly bristles" (Okada, 1963) are special thick bristles of a secondary sexual character found on the male tibia and metatarsus of the mid leg in some *melanogaster* group species belonging to the *suzukii*, *takahashii*, and *fusciphila* subgroups and in *Drosophila (Tanigastrella) gracilis* (Duda, 1924) (Okada, 1964b). It was proved that amongst present material, *D. (Sophophora) tristipennis* and *D. (S.) immacularis*, both belonging to the *suzukii* subgroup, also have such bristles. So far as examined by the author, the species possessing the hooked scaly bristles have, without exception, also sex-combs on the male fore legs, but the species having sex-combs do not always possess the hooked scaly bristles. This fact makes it plausible that the occurrence of the hooked scaly bristles pre-requires the possession of the sex-combs and that the development of the sex-combs on the fore leg homeotically induce the hooked scaly bristles on the homonymial organ, the mid leg. The excessive development of the sex-combs, however, seems to diminish the homeotic expression of the hooked scaly bristles through "enantiomorphosis" (Okada, 1960c) or through "material compensation" (Rensch, 1954). The compensation would be manifested in two such structures with the same function as these two kinds of bristles of similar secondary sexual character. The same is true for the reversal correlation found by Prevosti (1954) between the number of sex-comb teeth and of clasper teeth among the species of the *obscura* group as well as among the natural populations of *Drosophila subobscura* Collin, 1936 in Europe.

The homeotic and compensatory developments of the hooked scaly bristles and sex-combs can be divided into five stages (Text-fig. 328). Stage 1. Both sex-combs and hooked scaly bristles are absent (*willistoni* and *mommai* groups). Stage

2. Sex-combs are present but the hooked scaly bristles absent (*ananassae* and *melanogaster* subgroups, *obscura* group). Stage 3. Sex-combs are better developed, inducing homeotic expression of the hooked scaly bristles (*suzukii* and *takahashii* subgroups, *D. (T.) gracilis*). Stage 4. Sex-combs are further well developed, the hooked scaly bristles being compensatorily weakened in expression (*ficuspbila* subgroup). Stage 5. Further compensation is pronounced, resulting in disappearance or non-development of the hooked scaly bristles (*montium* and *nipponica* subgroups).

Fig. 328

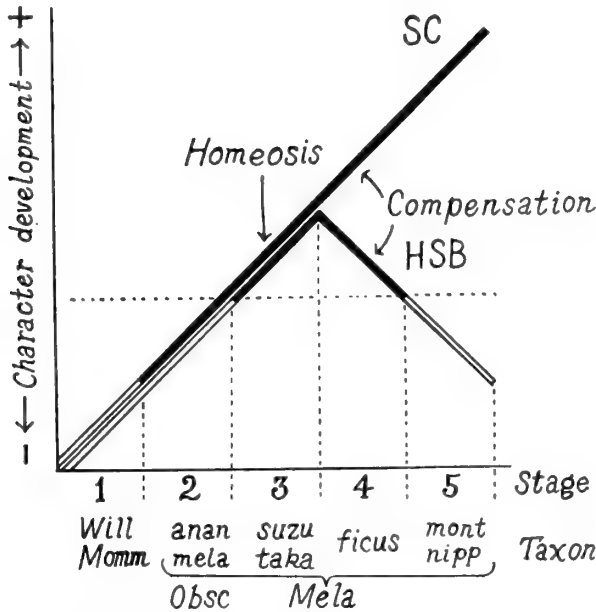


FIG. 328. Homeotic and compensatory relationships between the hooked scaly bristles (HSB) of male mid leg and the sex-combs (SC) of male fore leg. *Mela.*, *melanogaster* group; *Obsc.*, *obscura* group; *Momm.*, *momma* group; *Will.*, *willistoni* group; *anan.*, *ananassae* subgroup; *ficus.*, *ficuspbila* subgroup; *mela.*, *melanogaster* subgroup; *mont.*, *montium* subgroup; *nipp.*, *nipponica* subgroup; *suzu.*, *suzukii* subgroup; *taka.*, *takahashii* subgroup. For further explanations see text.

C. HOMOLGY IN THE COMPONENTS OF PHALLIC ORGANS AND THE SYSTEMATIC ANALYSIS OF PHALLIC FORMULAE

As is frequently stressed, the phallic organs of insects are systematically and diagnostically essential key characters. Their extensive diversification, however, makes it often difficult to establish homology of their components even between closely related taxa. Those of Drosophilidae are not exceptional, e.g., the present author (1956) considered the ventral recurved process of aedeagus (u) of the genus

*Leucophenga* (p. 17) to be the main part of the aedeagus. The present research revealed the real homology in the components of aedeagus between the genera *Leucophenga* and *Microdrosophila*. *Microdrosophila nigrohalterata* (p. 41) and *M. marginata* (p. 42) have the ventral recurved process well developed as in *Leucophenga*, and the former species shows the posterior parameres contiguous to the subapical part of aedeagus (Text-fig. 117) as in *Leucophenga*. The facts indicate that these two genera are closely related, and this is confirmed by the analysis of phallic formulae.

As a means to analyse phallic formulae the ideas of "divergency index" (d.i.) and "difference value" (d.v.) (Okada, 1954, 1956) have been taken into consideration. The d.i. is a sum of values 0, 0.5, 1.0, and 2.0 afforded to a large letter, small letter with dash, small letter, and small letter with attached <sub>0</sub> respectively, in the phallic formula. The phallic formula of a higher taxon is obtained by calculating mean value for each letter of the member species. The d.v. means a sum of differences in value for each of corresponding letters between two taxa.

The phallic formula and d.i. thus determined for each genus or subgenus are as listed below. The d.v. between every two genera or subgenera is shown in Tables 3 and 4.

Genus or Subgenus	Number of species examined	phallic formula	d.i.
<i>Cryptochaetum</i>	1	a' B C d <sub>0</sub> E f <sub>0</sub> g <sub>0</sub> H I k L m n	9.5
<i>Diastata</i>	1	a B C D E f g H i k L m N	6.0
<i>Campichoeta</i>	1	A B C D E F g H i k L M N	3.0
<i>Apsinota</i>	1	A B C d e f g <sub>0</sub> H i k l M N	9.0
<i>Leucophenga</i>	10	A B C D e F g H i k L m N	5.0
<i>Microdrosophila</i>	2	a b' C d e F g H i k' l' m n	8.5
<i>Liodrosophila</i>	4	a B C d E f g <sub>0</sub> H I k l m N	8.0
<i>Paramycodrosophila</i>	1	a b C d E f g H I k l m' N	7.5
<i>Chaetodrosophilella</i>	1	a B C d E f g H I K l M N	5.0
<i>Scaptomyza</i>	3	a b' C d E f g <sub>0</sub> H i k L m n	9.5
<i>Diathoneura</i>	1	a B C d E f <sub>0</sub> g H i K L m N	7.0
<i>Drosophila</i>	21	a' B c' d' e' f g H i' k' l' m N	6.5
<i>Scaptodrosophila</i>	3	A B C d' e' f' g H I k' L M N	3.5
<i>Dichaetophora</i>	2	a B C d' e' f' g <sub>0</sub> H I k l' m' n'	7.0
<i>Hiriodrosophila</i>	1	a B c D E f <sub>0</sub> g H i K l M N	7.0
<i>Sophophora</i>	7	A B c' D E f g H i' K L M N	3.0
<i>Drosophila</i> s. str.	8	a B C d e' f g <sub>0</sub> H I k l m' n'	8.5

The genus *Leucophenga* shows d.v. with *Microdrosophila* 4.5, which is the lowest among the values shown between *Leucophenga* and any genus of Drosophilinae (Table 3). Although the d.v. between *Leucophenga* and *Drosophila* is also 4.5, this low value is due to high diversification of the phallic organs among the species of *Drosophila*. Indeed, except with the subgenus *Scaptodrosophila*, *Leucophenga* shows d.v. higher than 4.5 with each subgenus of *Drosophila*.

The analysis of phallic formulae also indicates that among the genera of Diastatidae, *Diastata* is nearer to *Campichoeta* than to *Apsinota*, the d.v. between *Diastata* and *Campichoeta* (3.0) being smaller than that between *Campichoeta* and *Apsinota*

(6.0) and between *Diastata* and *Apsinota* (5.0), and that among the genera of Drosophilinae, *Liodrosophila*, *Paramycodrosophila*, and *Chaetodrosophilella* are mutually closely related and the subgenus *Dichaetophora* is closer to *Drosophila* s. str. than to any other subgenus of the genus *Drosophila* (Tables 3 and 4).

TABLE 3

The difference value (d.v.) of phallic formulae between every two genera.

Cryptochaetum	0											
Diastata	6.5	0										
Campichoeta	8.5	3.0	0									
Apsinota	7.5	5.0	6.0	0								
Leucophenga	8.5	3.0	2.0	6.0	0							
Microdrosophila	10.0	5.5	6.5	5.5	4.5	0						
Liodrosophila	4.5	4.0	7.0	3.0	7.0	6.5	0					
Paramycodrosophila	7.0	4.5	6.5	4.5	7.5	7.0	2.5	0				
Chaetodrosophilella	7.5	5.0	6.0	4.0	8.0	6.5	3.0	2.5	0			
Scaptomyza	6.0	3.5	6.5	4.5	6.5	4.0	3.5	5.0	6.5	0		
Diathoneura	5.5	5.0	6.0	6.0	6.0	5.5	5.0	5.5	4.0	4.5	0	
Drosophila	7.0	3.5	5.5	5.5	4.5	5.0	4.5	5.0	4.5	6.0	4.5	0

Cryptochaetum	Diastata	Campichoeta	Apsinota	Leucophenga	Microdrosophila	Liodrosophila	Paramycodrosophila	Chaetodrosophilella	Scaptomyza	Diathoneura	Drosophila
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TABLE 4

The difference value (d.v.) of phallic formulae between every two subgenera of the genus *Drosophila*, and between each subgenus and *Leucophenga*.

Leucophenga	0					
Scaptodrosophila	3.5	0				
Dichaetophora	6.0	4.5	0			
Hirtodrosophila	8.0	7.5	7.5	0		
Sophophora	5.0	3.5	7.0	7.5	0	
Drosophila	7.5	5.5	1.5	7.5	7.5	0

Leucophenga	Scaptodrosophila	Dichaetophora	Hirtodrosophila	Sophophora	Drosophila s. str.
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## INDEX

## Synonyms printed in italics

- |                        |                        |
|------------------------|------------------------|
| aberrans, 73           | Apsinota, 8, 11        |
| abbreviata, 17, 18     | argentata, 17, 24      |
| acutissima, 96, 101    | auraria, 95            |
| area, 53               |                        |
| agbo, 73               | basdeni, 8             |
| albiceps, 18, 33, 36   | bimaculata, 48         |
| <i>albicincta</i> 27   | bipectinata, 82, 95    |
| albifascia 17, 22      | bizonata, 99, 113      |
| alternata, 67, 72      | bizonata-group, 96, 97 |
| ananassae-subgroup, 95 | brunnea, 67            |
| annulipes, 96, 107     | busckii, 81            |

- Campichoeta, 8, 10  
*Chaetodrosophila* 57  
 Chaetodrosophilella, 15, 57  
 circumdata, 107  
 Clastopteromyia, 66  
 coei (Chaetodrosophilella) 57  
 coei (Sophophora), 81, 82, 84  
 coeruleifrons, 48  
 coleoprata, 15  
 coracina, 70  
 costata, 17, 19  
 cristata, 40  
 Cryptochaetidae, 6  
 Cryptochaetum, 6  
 cubicivittata, 96, 105  
 curvipennis, 15  
*curvipila*, 30
- denticeps, 79  
 Diastata, 8  
 Diastatidae, 8  
 Diathoneura, 14, 65  
 Dichaetophora, 66, 73  
 dimidiata, 47  
*disticha*, 59  
 Dorsilopha, 81  
 Drosophila, 66  
 Drosophila, 15, 66  
 Drosophila s. str., 66, 96  
 Drosophilidae, 14  
 Drosophilinae, 14, 37
- editinares, 96, 101, 103
- flavipalpis, 34  
 flexicauda, 96, 101  
 fruhstorferi, 86  
 funebris, 66, 96  
 fuscicostata, 96, 111  
*fuscipennis* (Leucophenga), 30  
*fuscipennis* (Liodrosophila), 48, 51
- grahami, 63  
 graminum, 58, 59, 62  
 grandicorne, 6  
 grandis, 101, 105  
 grandis-group, 96, 101  
 guttata, 47  
 guttiventris, 18, 30
- halteropunctata, 17, 25  
 hexastriata, 109  
 hirticornis, 79
- Hirtodrosophila, 66, 77  
 histrio, 99  
 histrio-group, 96, 99  
 hypocausta, 111  
 Hypselothyrea, 15, 47
- immacularis, 82, 87  
 immigrans, 96, 112  
 immigrans-group, 96, 105  
 interrupta, 17, 21
- kikkawai, 82, 92
- lacertosa, 96, 97  
 Leucophenga, 14, 17  
 leucozona, 17, 21  
 limbicostata, 77, 97  
 Liodrosophila, 15, 47, 48  
 Lissocephala, 45  
 Lissodrosophila, 15, 45  
 longecrinita, 77  
 longicornis, 45
- maculata (Drosophila), 17  
 maculata (Microdrosophila), 43  
*maculiventris*, 30  
 magnidentata, 73  
 marginata (Microdrosophila), 37, 42  
 marginata (Scaptodrosophila), 67, 70  
*marginifrons*, 54  
*meijerea*, 36  
*meijerei*, 36  
 melanissima, 58, 62  
 melanogaster, 81, 92  
 melanogaster-group, 81, 87  
 melanogaster-subgroup, 92  
 Microdrosophila, 14, 37, 40, 69  
 minima, 67, 69  
 mommai, 83  
 mommai-group, 81, 82  
*montium*, 92  
 montium-subgroup, 92
- nasuta, 96, 112  
 nepalensis, 81, 91  
 nigriceps, 18, 31  
 nigrifrons, 15  
 nigripalpis (Microdrosophila), 37, 41, 42  
 nigripalpis (Leucophenga), 18, 28  
 nigrita, 65  
 nigrohalterata, 37, 41  
 nigroscutellata, 18, 19, 34  
 nipponense, 6

- nitida, 48, 54  
 notostriata, 96, 107, 110
- obscuripennis, 10  
 obscuripes, 13  
 onychopyga, 48, 50  
 ornata, 17, 21  
*ornatipennis*, 21  
 Oxystyloptera, 39, 40
- pallida, 58, 59  
*Paradrosophila*, 67  
 Paramycodrosophila, 15, 55  
 Parascaptomyza, 58, 59  
 parasplendens, 58, 59  
 pauciramosa, 37, 40  
 pectinata, 37  
 pentastrata, 96, 109  
*Pholadoris*, 67  
 pictipennis, 67  
 pictiventris, 11, 13  
 pictula, 55  
 pilicrus, 67  
 pulchrella, 81, 89  
 purpurata, 41
- quadrata, 37  
 quadrilineata, 58  
 quinarium-section, 96, 97
- raridentata, 73, 74, 76  
 rectinervis, 18, 33  
 ripa, 65  
 robusta-group, 96, 97  
 rotundicornis, 74  
 rufipes, 11  
 rugulosa, 51
- salatigae, 18, 27  
 Scaptomyza, 15, 58, 59  
 Scaptodrosophila, 66, 67  
 scaptomyzoidea, 67  
*scutellimargo*, 67  
 serrifabella, 81, 84  
 silvata, 58, 63  
 Sophophora, 66, 81  
 sp., *Microdrosophila*, 39  
 Stegana, 14, 15  
 Steganina, 15  
 Steganinae, 14, 15  
 sternopleuralis, 99, 100, 101  
 Styloptera, 40  
 subpollinosa, 17, 21  
 subsplendens, 61  
 suruk, 73, 76  
 suzukii, 87  
 suzukii-subgroup, 87
- takahashii, 82, 92  
 takahashii-subgroup, 92  
 taeniatipennis, 65  
 tectifrons, 39  
 tenuicauda, 101, 103  
 trapezifrons, 82, 93  
 tripartita, 77, 79  
 tripunctata-group, 109  
 trisetosa, 96, 99  
 tristipennis, 81, 89  
 trizonata, 96, 97
- ussurica, 8
- vagans, 10  
*virgata*, 110  
 virilis-section, 96, 97
- zonaria, 81, 83







5/18



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TO THE ENTOMOLOGICAL SERIES  
OF THE BULLETIN OF  
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