

Biosystematic Studies
of Ceylonese Wasps, XI:
A Monograph of the
Amiseginae and Loboscelidiinae
(Hymenoptera: Chrysididae)

KARL V. KROMBEIN

SMITHSONIAN CONTRIBUTIONS TO ZOOLOGY • NUMBER 376

SERIES PUBLICATIONS OF THE SMITHSONIAN INSTITUTION

Emphasis upon publication as a means of "diffusing knowledge" was expressed by the first Secretary of the Smithsonian. In his formal plan for the Institution, Joseph Henry outlined a program that included the following statement: "It is proposed to publish a series of reports, giving an account of the new discoveries in science, and of the changes made from year to year in all branches of knowledge." This theme of basic research has been adhered to through the years by thousands of titles issued in series publications under the Smithsonian imprint, commencing with *Smithsonian Contributions to Knowledge* in 1848 and continuing with the following active series:

Smithsonian Contributions to Anthropology
Smithsonian Contributions to Astrophysics
Smithsonian Contributions to Botany
Smithsonian Contributions to the Earth Sciences
Smithsonian Contributions to the Marine Sciences
Smithsonian Contributions to Paleobiology
Smithsonian Contributions to Zoology
Smithsonian Studies in Air and Space
Smithsonian Studies in History and Technology

In these series, the Institution publishes small papers and full-scale monographs that report the research and collections of its various museums and bureaux or of professional colleagues in the world of science and scholarship. The publications are distributed by mailing lists to libraries, universities, and similar institutions throughout the world.

Papers or monographs submitted for series publication are received by the Smithsonian Institution Press, subject to its own review for format and style, only through departments of the various Smithsonian museums or bureaux, where the manuscripts are given substantive review. Press requirements for manuscript and art preparation are outlined on the inside back cover.

S. Dillon Ripley
Secretary
Smithsonian Institution

SMITHSONIAN CONTRIBUTIONS TO ZOOLOGY • NUMBER 376

Biosystematic Studies
of Ceylonese Wasps, XI:
A Monograph of the
Amiseginae and Loboscelidiinae
(Hymenoptera: Chrysididae)

Karl V. Krombein



SMITHSONIAN INSTITUTION PRESS

City of Washington

1983

ABSTRACT

Krombein, Karl V. Biosystematic Studies of Ceylonese Wasps, XI: A Monograph of the Amiseginae and Loboscelidiinae (Hymenoptera: Chrysididae). *Smithsonian Contributions to Zoology*, number 376, 79 pages, 71 figures, 1 table, 1983.—Members of these two subfamilies are parasitic in the eggs of Phasmatodea (walking sticks). Preliminary sections discuss from a world standpoint the host relationships, systematics, phylogeny, zoogeography, and life history, and a separate section is devoted to the behavior of the Ceylonese species.

Twenty species from Sri Lanka are described, none of which is known to occur outside of that country. Nine genera and eighteen species of Amiseginae are described: *Cladobethylus ceylonicus* Krombein; *Isegama meaculpa*, new genus and species, and *I. aridula* (Krombein), new combination; *Perissosega venablei*, new genus and species; *Mahinda saltator*, new genus and species; *Indothrix wijesinhei*, new species; *Serendibula deraniyagalai* Krombein, *S. karunaratnei*, new species, *S. gracilis*, new species, *S. insolita*, new species, *S. paradoxa*, new species, and *S. kasyapai*, new species; *Imasega rufithorax*, new genus and species; *Baeosega torrida*, new genus and species, *B. humida*, new species, and *B. laticeps*, new species; and *Saltasega bella*, new genus and species, and *S. distorta*, new species. The Loboscelidiinae are represented by *Loboscelidia atra*, new species, and *L. castanea*, new species.

OFFICIAL PUBLICATION DATE is handstamped in a limited number of initial copies and is recorded in the Institution's annual report, *Smithsonian Year*. SERIES COVER DESIGN: The coral *Montastrea cavernosa* (Linnaeus).

Library of Congress Cataloging in Publication Data

Krombein, Karl V.

Biosystematic studies of Ceylonese wasps, XI.

(Smithsonian contributions to zoology ; no. 376)

Bibliography: p.

Supt. of Docs. no.: SI 1.27:376

1. Chrysididae—Classification. 2. Insects—Classification. 3. Insects—Sri Lanka—Classification. I. Title. II. Title: Amiseginae and Loboscelidiinae (Hymenoptera : Chrysididae) III.

Title: Loboscelidiinae (Hymenoptera : Chrysididae) IV. Series.

QL1.S54 no. 376 591s [595.79] 82-600297 [QL568.C47]

Contents

	<i>Page</i>
Introduction	1
Acknowledgments	2
Systematics	2
Phylogeny	4
Zoogeography	5
Host Relationships	7
Life History	9
Behavior of Ceylonese Amiseginae and Loboscelidiinae	11
Key to Ceylonese Amiseginae and Loboscelidiinae	14
Subfamily AMISEGINAE	20
<i>Cladobethylus</i> Kieffer	20
1. <i>Cladobethylus ceylonicus</i> Krombein	22
<i>Isegama</i> , new genus	23
2. <i>Isegama meaculpa</i> , new species	24
3. <i>Isegama aridula</i> (Krombein), new combination	25
<i>Perissosega</i> , new genus	26
4. <i>Perissosega venablei</i> , new species	27
<i>Mahinda</i> , new genus	28
5. <i>Mahinda saltator</i> , new species	29
<i>Indothrix</i> Krombein	31
6. <i>Indothrix wijesinhei</i> , new species	31
<i>Serendibula</i> Krombein	32
7. <i>Serendibula deraniyagalai</i> Krombein	34
8. <i>Serendibula karunaratnei</i> , new species	35
9. <i>Serendibula gracilis</i> , new species	37
10. <i>Serendibula insolita</i> , new species	38
11. <i>Serendibula paradoxa</i> , new species	39
12. <i>Serendibula kasyapai</i> , new species	40
<i>Imasega</i> , new genus	41
13. <i>Imasega rufithorax</i> , new species	42
<i>Baeosega</i> , new genus	43
14. <i>Baeosega torrida</i> , new species	44
15. <i>Baeosega humida</i> , new species	46
16. <i>Baeosega laticeps</i> , new species	48
<i>Saltasega</i> , new genus	48
17. <i>Saltasega bella</i> , new species	50
18. <i>Saltasega distorta</i> , new species	51
Subfamily LOBOSCELIDIINAE	52
<i>Loboscelidia</i> Westwood	52
19. <i>Loboscelidia atra</i> , new species	52
20. <i>Loboscelidia castanea</i> , new species	54
Literature Cited	56
Figures 6–71	58

Biosystematic Studies of Ceylonese Wasps, XI: A Monograph of the Amiseginae and Loboscelidiinae (Hymenoptera: Chrysididae)

Karl V. Krombein

Introduction

The Amiseginae and Loboscelidiinae are ancient groups of primitive chrysidid wasps that have coevolved with their hosts, the Phasmatodea (walking sticks), in whose eggs they are parasitic. The walking sticks are known from at least the Lower Triassic, the earliest amisegine dates from the Upper Cretaceous, and the loboscelidiines have no known fossil history. In a classic example of evolutionary radiation the wasps have invaded almost every ecological niche in which their hosts oviposit. This includes the majority of genera, which drop their eggs on leaf litter on the ground beneath shrubs or trees in which the female stick insects live, as well as those genera that glue their eggs on foliage or other arboreal substrate, and those genera that deposit their eggs in decaying wood or in crevices beneath bark. It is not known whether the wasps (whose females lack the fossorial adaptations) could parasitize eggs laid in shallow, partially covered holes in sandy soil, such

as Hetrick (1949) described for *Anisomorpha buprestoides* (Stoll).

Twenty-five years ago, in a generic reclassification of the Amiseginae, I stated that this subfamily "constitutes one of the rarely collected and very poorly known groups of Hymenoptera" (Krombein, 1957:147). This statement is largely true today with three notable exceptions. Collections by entomologists of the Bernice P. Bishop Museum, Honolulu, made mostly with Malaise traps, have provided a preliminary and tantalizing but scarcely exhaustive insight into the complex amisegine fauna of New Guinea and Southeast Asia. A disparate small lot collected in Sarawak by entomologists of the British Museum (Natural History) using Malaise and pitfall traps offered some illuminating comparisons of the differences and similarities between the amisegine faunas of that area and those of Sri Lanka. My collections (now deposited in the USNM collections of the National Museum of Natural History, Smithsonian Institution) in Sri Lanka from 1976 through 1981, during the Smithsonian's project, "Biosystematic Studies of the Insects of Ceylon" (Grants SFG-0-2854 and SFG-0-6955), have given us our first real appreciation of the relatively

Karl V. Krombein, Senior Scientist, Department of Entomology, National Museum of Natural History, Smithsonian Institution, Washington, D.C. 20560.

substantial and diverse amisegine fauna in a tropical country of rather small extent. The occurrence of not fewer than nine genera and 18 species in a country of only 65,584 km² with diversified ecosystems, suggests the great wealth of genera and species that await discovery when assiduous collecting is accomplished in such tropical areas as South America, Africa, India, Southeast Asia, Indonesia, the Philippines, and Melanesia.

A preliminary review of the Ceylonese species of Amiseginae was completed for a commemorative volume in 1976 (Krombein, 1980) based on eight specimens belonging supposedly to two genera and three species. The discovery of the brachypterous, flightless females of *Serendibula deraniyagalai* Krombein in 1976 impelled our team to an exhaustive scrutiny of leaf litter in varied habitats during the ensuing years. From 1977 to 1981 four Ceylonese technicians and I devoted many hours of seven trips totalling 36 weeks in the field to exploration of this ecological niche. Our efforts resulted in the acquisition of more than 300 specimens belonging to seven additional genera and 15 more amisegine species. Subsequent to my last visit, my colleague, P.B. Karunaratne collected two loboscelidiine species not taken earlier.

The preceding number in my series "Biosystematic Studies of Ceylonese Wasps" is "X: Taxonomic and Biological Notes on Some Oxybelinae (Hymenoptera: Sphecoidea, Crabronidae)," *International Journal of Entomology*, in press.

ACKNOWLEDGMENTS.—I am grateful to my colleagues for the loan of material: C. Besuchet, Natural History Museum, Geneva, Switzerland, for a specimen from South India; M.C. Day, British Museum (Natural History), London, England, for specimens from Sarawak and other Australasian areas; W.T.T.P. Gunawardane and P.B. Karunaratne, Department of National Museums, Colombo, Sri Lanka, for specimens from that country; the late J.L. Gressitt, B.P. Bishop Museum, Honolulu, Hawaii, for specimens from many areas in Melanesia, Indonesia, and Southeast Asia; L. Masner, Biosystematics Research

Institute, Ottawa, Canada, for specimens from India and Nepal; and A.P. Rasnitsyn, Paleontological Institute, Moscow, USSR, for the type of *Protamisega khatanga* Evans.

I am indebted to J.L. Readshaw, Commonwealth Scientific and Industrial Research Organization (CSIRO), Canberra, Australia, for photographs of *Myrmecomimesis semiglabra* (Riek) and its host egg, *Didymuria violescens* (Leach), and for permission to publish them (Figures 4, 5). Similarly, the late A. da Costa Lima, Instituto Osvaldo Cruz, Federal District, Brazil, furnished photographs of eggs of *Prisopus ohrtmanni* (Lichtenstein) which had been parasitized by *Duckeia cyanea* Costa Lima (Figures 2, 3).

I. Naumann, CSIRO, kindly furnished information on the distribution and characters of Australian species of both subfamilies.

J.T.C. Sellick (formerly J.T. Clark), Uppingham School, Rutland, England, made helpful comments on the sections on host relationships, phylogeny, and life history, based on his extensive knowledge of Phasmatodea and their eggs.

J.F.G. Clarke, K.W. Cooper, the late P.D. Hurd, Jr., and W.N. Mathis critically reviewed the entire introductory section and provided helpful and appreciated comments.

J.R. Walther, Freie Universität, Berlin, West Germany, examined scanning electron micrographs of antennae of both subfamilies, and identified the various kinds of sensilla.

As always, I am grateful to my dear wife, Dorothy, for helpful, perceptive criticism of the manuscript and patient assistance with proof-reading.

The pen and ink drawings are by George L. Venable, Department of Entomology (SI), and Michael Druckenbrod, formerly of the Department. The scanning electron micrographs were made by Mary-Jacque Mann, Scanning Electron Microscope Laboratory (SI), and were mounted by G.L. Venable.

Systematics

In his monograph of Chrysididae of the world Mocsáry (1889) erected the Amiseginae as a

subfamily close to the Cleptinae. In 1890 he described the subfamily Adelphinae, which he placed between the Amiseginae and Cleptinae. I maintained them as discrete subfamilies in 1957 and 1960, but merged the Adelphinae with the Amiseginae in 1979. This action was based on the discovery that the mid-coxae are slightly separated in the male of *Cladobethylus ceylonicus* Krombein, and that the pronotal lobes are contiguous with the tegulae in females of some Ceylonese *Serendibula* Krombein and *Baeosega*, new genus. Some of the other criteria supposedly separating the two groups are secondary sexual characters and appear not to be of subfamilial importance. Also, members of both groups parasitize eggs of Phasmatodea.

A. Mocsáry based the Amiseginae on the single Panamanian genus *Amisega* Cameron, for which no etymological derivation is given in the original description. I have concluded that it is just an arbitrary assemblage of letters, and I treat it as feminine in gender. It is not listed as a place name in any gazetteer, it apparently is not a classical name, and anthropologists have told me that it is neither the name of an Indian tribe nor of a noted chief or warrior. I have used the last syllables *-sega* in the formation of a number of generic names in the subfamily.

The Ceylonese Amiseginae belong to the Australasian Series (Krombein, 1957:168–170), but characters of some genera require modification of the series diagnosis to the following: malar space with a longitudinal groove except in females of *Serendibula*, *Baeosega*, and *Saltasega*, new genus; eyes with erect microtrichiae visible at $\times 50$ or less, which are comparatively longer and denser in males; occipital carina present except in both sexes of *Serendibula*, *Baeosega*, *Mahinda*, new genus, and males of *Imasega*, new genus; pronotum with a median longitudinal groove or posterior fovea except in females of *Exopapua* Krombein; tegula normal in size, both sexes fully winged except wings no larger than tegula in females of *Myrmecomimesis* Dalla Torre, *Exova* Riek, *Exopapua*, *Serendibula*, *Baeosega*, *Mahinda* and *Saltasega*; scutum not expanded laterally, parapsidal lines evanes-

cent or absent, notauli present except in females of *Exopapua*; mesopleuron with an anterior ridge in all females except those of *Perissosega*, new genus, and without such a ridge in all males except those of *Rohweria* Fouts and *Isegama*, new genus; postscutellum very large, covering much of hind part of thoracic dorsum; posterolateral angles of propodeum dentate or angulate except in both sexes of *Isegama* and females of *Serendibula*; posterior surface of propodeum abruptly declivous and perpendicular to thoracic dorsum except in females of *Exopapua*; and tarsal claw with an erect inner tooth except in males of *Baeosega* and females of *Cladobethylus*.

Brachyptery has developed independently at least four different times in the Australasian Series. Undoubtedly this is in response to the oviposition habits of a majority of Phasmatodea: the females merely drop their eggs onto leaf litter from the trees or shrubs where they live. It is worth noting here that the females of all Australian genera of Amiseginae are brachypterous, with the wings no larger than the tegulae. This suggests that all Australian walking sticks drop their eggs onto leaf litter.

Maa and Yoshimoto (1961) elevated the Loboscelidiinae to familial rank, transferring the group from the Diapriidae or Cynipidae, where it had been placed by earlier authors. In an important recent paper, however, Day (1979) established that the morphology of the terminal retracted metasomal segments of females of the Loboscelidiinae is closely similar to that of females of the Amiseginae. Day concluded that the subfamily unquestionably belongs to the Chrysididae, thus confirming my earlier conviction as to its affinities (Maa and Yoshimoto, 1961:527).

The Loboscelidiinae have many unusual features distinguishing them from the Amiseginae, such as the peculiarly developed vertex with lateral fimbria of long, flattened curled setae extending downward along the upper temporal margin (Figures 34b, 65, and 66), the enlarged clypeus with the mouth parts rotated ventrally rearward, enlarged tegulae (Figures 36, 37), loss of costa and stigma in the fore wing (Figure 33),

and membranous laminae of the femora and tibiae (Figure 35). However, the conformation of the female mandible is as in Amiseginae, and Australian species of *Loboscelidia* Westwood have been reared from eggs of the walking stick, *Ctenomorphodes tessulatus* (Gray). This Indo-Australian subfamily contains only the single genus, *Loboscelidia*.

Phylogeny

Inasmuch as the Amiseginae and Phasmatodea co-evolved over many millions of years, it will be useful to consider what is known of the origin and development of the two groups. It is probable that the Phasmatodea had an earlier origin, inasmuch as the Amiseginae parasitize their eggs.

A.G. Sharov (1968) considered that the order Phasmatodea consisted of two superfamilies, the Xiphopteroidea and Chresmodoidea. The former arose and became extinct during the Mesozoic, and none was ancestral to any group of recent stick insects. The superfamily Chresmodoidea contained three families, the Chresmodidae, Phasmatidae (= Areolatae?) and Phylliidae (= Anareolatae?). The Chresmodidae arose in the Lower Triassic and became extinct in the Upper Jurassic. This family gave rise to the most primitive Phasmatidae, which appear in the Lower Triassic in Fergana, Uzbekistan, where the most ancient phasmatid fossils have been found. The Phylliidae evolved from the Phasmatidae toward the end of the Cretaceous concomitantly with the appearance of broad-leaved forests.

V.N. Vishniakova (1980:172-173) made several nomenclatural changes and corrections in systematics. She noted that the Xiphopteroidea should be called the Aeroplanoidea based on the oldest included family and genus, Aeroplanidae Tillyard and *Aeroplana* Tillyard. She also stated that Chresmodoidea must be replaced by Phasmatodea, and Chresmodidae must be replaced by Prochresmodidae because the type-species of *Chresmoda* Germar is now considered a water-treader bug (Hemiptera), not an orthopteran.

A.P. Rasnitsyn (1980: fig. 38) placed the oldest

fossil Chrysididae in the Lower Cretaceous, and suggested that the group originated in the Upper Jurassic, somewhat later than the appearance of the first Phasmatidae in the Lower Triassic.

The Cleptinae are the most primitive Chrysididae and presumably gave rise to the Amiseginae. The Cleptinae are parasitic on diapausing larvae of Symphyta (sawflies). The sawfly hosts of the Cleptinae spin their tough shiny cocoons on the ground beneath the host trees, and the female Cleptinae chew a hole in the cocoon wall and oviposit on the larva. One can speculate that at some point a cleptine ancestor of the Amiseginae found a tough-skinned walking stick egg similar in shape to a sawfly cocoon and parasitized it successfully, thus giving rise to the new taxon.

The fossil record for Amiseginae is very scanty, and there are no known fossil Loboscelidiinae. The only known amisegine fossil is from a fragment of Upper Cretaceous amber and was described by Evans (1973) as *Protamisega khatanga*, new genus and new species. The type-locality is North Siberia, Taimyr Peninsula, Yantardakh Hill, 3 km up from the mouth of the Maimetcha River. *Protamisega* is a tiny, fully winged female only 1.2 mm long. The smallest recent specimen is from Sri Lanka; it is brachypterous and 2.0 mm long. It is noteworthy that Evans described the tiny (2.8 mm long) cleptine *Hypocleptes rasnitsyni*, new genus and new species, from this same amber.

I have studied the unique holotype of *Protamisega khatanga*. I agree with Evans that it belongs in the Amiseginae, but I do not believe that it bears much resemblance to *Amisega* Cameron. It differs from all known recent Amiseginae in several characters of the antennae and head. Although the antennae are inserted low on the face and the scape is quite elongate as in recent taxa, the first flagellar segment is no longer than the following segments, whereas it is 1.5 or more times as long as the second segment in all recent taxa. Also, the head is more strongly developed behind the eye than in recent amisegines.

Protamisega is not ancestral to any of the recent

Australasian Series of taxa, but is more closely related to those of the primitive American Series. The postscutellum in *Protamisega* is short, and the propodeum has an extensive dorsal surface as in the American taxa, whereas the Australasian Series has the postscutellum very large and covering much of the hind part of the thoracic dorsum. *Protamisega* has an anterior ridge on the pronotal disk and bluntly dentate posterolateral angles on the propodeal dorsum. These are unusual characters that occur in the American Series only in *Adelphé Mocsáry*.

The majority of recent Amiseginae are not good candidates for fossilization because they occur on or in leaf litter on the forest floor. This was probably just as true during the Mesozoic when there was an efflorescence of Phasmatodea. Consequently, the Amiseginae may have appeared much earlier than the Upper Cretaceous. Because *Protamisega* was trapped in resin that turned into amber, I suspect that it may have parasitized one of the more unusual walking sticks that deposited its eggs in bark crevices rather than dropping them on the ground. It is regrettable that the Amiseginae have such a meager fossil record. Consideration of the distribution and affinities of the recent fauna (Krombein, 1957) suggested that the group originated in the Southern Hemisphere, and that the most primitive members occurred in the New World, more advanced genera in the Indo-Australian area, and the most specialized in Africa.

Sharov stated that the Phasmatodea developed in hot climates, which was true of Fergana at that time, and that the order is still predominant in the Tropical and Subtropical Regions as is true of their egg parasites, the Amiseginae.

Zoogeography

The known distributions of recent Amiseginae and Loboscelidiinae, and their host Phasmatodea are shown in Figure 1. The distribution of Phasmatodea is a consolidation of Günther's maps (1953, figs. 1-4), while that of the Amiseginae is from Krombein (1957, and unpub. data) and

that of the Loboscelidiinae from Maa and Yoshimoto (1961) and Krombein (unpub. data).

Unquestionably the Amiseginae and Loboscelidiinae are more widely distributed than is indicated by previous collections. My experience in Sri Lanka clearly demonstrates the presence of a relatively large fauna consisting of several genera and a large number of species in this circumscribed tropical area. Most species have small flightless females that, for collecting purposes, must be sought while they are crawling on and beneath leaf litter on the ground in search of host eggs. Certainly, assiduous collecting in leaf litter may well demonstrate the occurrence of Amiseginae in other areas such as tropical Africa and parts of tropical South America. All known Australian and African amiseginine females are flightless, a character that essentially limits them to parasitizing the eggs of Phasmatodea broadcast in leaf litter from shrubs and trees. Females of the known South American species are fully winged, but the discovery of the flightless *Microsega* Krombein (1960, figs. 1, 2) in North America, suggests that flightless females of this or of other genera may also be found in the Neotropical Region. Actually, the Hispaniolan *Nesogyne* Krombein (1957, fig. 34) has such reduced wings that it may be incapable of flight.

However, the absence of Amiseginae in two areas, Madagascar and the Mediterranean region, appears to be well authenticated. The late A. Seyrig made numerous collections of Mutillidae, which also have flightless females, and W.L. Brown, Jr., made extensive collections of Formicidae (ants). Neither of these experienced hymenopterists found Amiseginae in Madagascar. One must assume that Madagascar separated from the African mainland before the African Series of Amiseginae was able to disperse into Madagascar, where a rich and diversified fauna of Phasmatodea presumably existed.

The absence of Amiseginae in the Mediterranean area also appears to be well authenticated. It must be presumed that the numerous collectors have thoroughly exploited the entire insect fauna of the region. The absence of Amiseginae in this

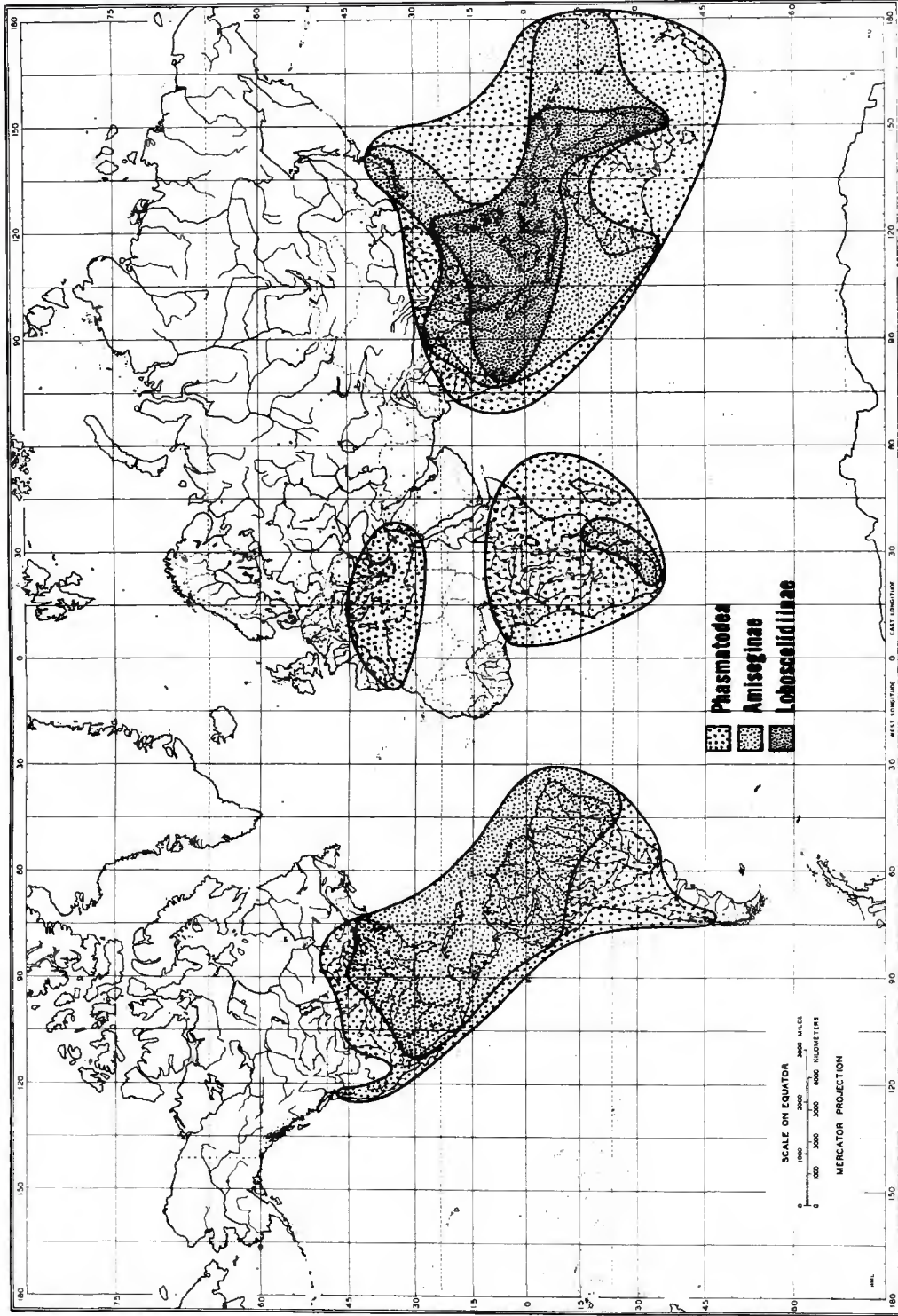


FIGURE 1.—World distribution of Amiseginae, Loboscelidiinae, and Phasmatoidea.

instance probably was caused by desertification of large areas of Africa and the Middle East rather than separation of land masses as with Madagascar. Members of the Bacillini (Bacillidae, Bacillinae) are some of the walking sticks in southern Europe. Other genera of this tribe occur in South Africa. We do not know the hosts of any of the entirely wingless African Amiseginae. If we assume that Bacillini may serve as suitable hosts, then the parasites did not disperse as rapidly as the hosts and could not bridge the gap caused by formation of the Sahara desert. Members of the Pachymorphini and Ramulini (Heteronemiidae, Pachymorphinae) also occur in southern Europe. The Pachymorphini occur also in Africa, Madagascar, Asia, Australia, New Guinea, and New Zealand, and the Ramulini occur also in Africa, Madagascar, Central Asia, and China. If any of the Pachymorphini or Ramulini serve as amisegine hosts in these other areas, then we may assume that desertification of the Sahara and Middle East may have occurred before the parasites could follow their hosts.

Members of the Australasian Series of Amiseginae are known specifically from Sri Lanka, India, Nepal, Thailand, Laos, Viet Nam, Hong Kong, Malaya, Singapore, Borneo, Sarawak, North Borneo, Philippines, Taiwan, Japan, New Guinea, Solomon Islands, New Hebrides, New Caledonia, the Fiji Islands, and eastern, northern, and western Australia. Undoubtedly they must occur throughout Indonesia, and perhaps in some of the island groups of Micronesia.

One possible means of dispersal of Amiseginae is suggested by Hinton's (1981:246-247) ingenious theory that granivorous birds may be the chief means of wider distribution of the predominantly apterous and sluggish walking sticks. The eggs of the latter are not only very similar in appearance to seeds, but the outer part of the chorion is a resistant protein and there is a thick inner layer of calcium oxalate resistant to pH higher than ~2. Some eggs might be destroyed mechanically in the gizzard, but others would pass unharmed through the digestive tract with its much higher pH and be voided at some dis-

tance and time from the feeding site. If walking stick eggs could be dispersed in this way, then it is reasonable to suppose that a certain number of parasitized eggs would be similarly dispersed, provided that the bird's gastric juices did not dissolve the coagulation sealing the feeding-oviposition puncture.

The Loboscelidiinae have been recorded from eastern Australia, New Guinea, New Britain, Borneo, Sarawak, North Borneo, Singapore, Viet Nam, and northward through the Philippines to Taiwan. Two new species described herein were captured recently in Sri Lanka, so the group may be anticipated elsewhere in Southeast Asia, Thailand, Burma, and India, as well as throughout Indonesia.

Host Relationships

Hosts are known for very few Amiseginae and Loboscelidiinae, but they include species belonging to three families of the two suborders of Phasmatodea. The recorded hosts and their parasites are listed in Table 1 together with the pertinent references.

The mandibular shape is basically the same in all female parasites, quite stout basally and tapering gradually to an acute apex. The mandible is adapted to penetrating the tough cuticle of the walking stick egg for feeding and oviposition. Inasmuch as the shape is uniform throughout the Amiseginae and Loboscelidiinae, it seems most probable that all of these wasps parasitize walking stick ova. Males have flattened mandibles, more or less truncate at the tip, and their feeding habits are unknown. Adults of both sexes burst off the operculum of the host egg to effect eclosion after they have completed development.

Of the hosts listed in Table 1, *Diapheromera*, *Ctenomorpha*, *Ctenomorphodes*, *Podacanthus*, and *Didymuria* broadcast their eggs down onto leaf litter from the shrubs or trees in which the adult females are resident. *Prisopus* glues its eggs in a row on the upper surface of a leaf (Figures 2, 3). *Anisomorpha* deposits its eggs in rotting pine stumps or beneath the bark of pine trees.

TABLE 1.—Phasmatodea hosts and Amiseginae and Loboscelidiinae parasites with references to literature (systematic arrangement of Phasmatodea according to Bradley and Galil, 1977)

Host		Parasite		References
Higher categories	Genus and species	Subfamily	Genus and species	
Anareolatae Heteronemiidae Heteronemiinae Heteronemiini	<i>Diapheromera femorata</i> Say	Amiseginae	<i>Mesitiopterus kahlii</i> Ashmead	Milliron, 1950 Krombein, 1957
Anareolatae Phasmatidae Phasmatinae Phasmatini	<i>Ctenomorpha chronus</i> (Gray)	Amiseginae	<i>Myrmecomimesis</i> spp.	Readshaw, 1965
Anareolatae Phasmatidae Phasmatinae Phasmatini	<i>Ctenomorphodes tessulatus</i> (Gray)	Amiseginae Loboscelidiinae Amiseginae Loboscelidiinae	<i>Myrmecomimesis</i> spp. <i>Loboscelidia</i> sp. <i>Myrmecomimesis nigripedice</i> (Riek) <i>striata</i> (Riek) <i>Loboscelidia</i> sp.	Hadlington and Hoshcke, 1959 Heather, 1965
Anareolatae Phasmatidae Tropidoderinae Tropidoderini	<i>Podacanthus wilkinsoni</i> Macleay	Amiseginae	<i>Myrmecomimesis bispinosa</i> (Riek) <i>nigricans</i> (Walker) <i>nigripedice</i> (Riek) <i>rubrifemur</i> (Riek) <i>semiglabra</i> (Riek) <i>Myrmecomimesis</i> spp.	Riek, 1955 Readshaw, 1965
Anareolatae Phasmatidae Tropidoderinae Tropidoderini	<i>Didymuria violescens</i> (Leach)	Amiseginae	<i>Myrmecomimesis bispinosa</i> (Riek) <i>semiglabra</i> (Riek) <i>Myrmecomimesis</i> spp.	Riek, 1955 Readshaw, 1965
Areolatae Pseudophasmatidae Pseudophasmatinae Prisopodini	<i>Prisopus ohrtmanni</i> (Lichtenstein)	Amiseginae	<i>Duckeia cyanea</i> Costa Lima	Costa Lima, 1936
Areolatae Pseudophasmatidae Pseudophasmatinae Anisomorphini	<i>Anisomorpha ferruginea</i> (Beauvois)	Amiseginae	<i>Adelpho anisomorphae</i> Krombein	Krombein, 1960

E.F. Riek (1970:910) reported that Loboscelidiidae had been "reared from the eggs of phasmatids, possibly *Acrophylla* sp., and one specimen is recorded from the nest of *Ectatomma metallicum*, the green-head ant." Ian Naumann (in litt.) advised me that there are no specimens in the Australian National Insect Collection substanti-

ating these records, so I have omitted them from the table. If, indeed, a loboscelidiid has been found in an ant nest, it probably emerged from a walking stick egg carried into the nest by an ant.

The Ceylonese walking stick fauna is very imperfectly known, and there are no host records for

any of the 20 species of Amiseginae and Loboscelidiinae. Most species of amisegine wasps have wingless females, however, which are found in or on leaf litter, so presumably they parasitize ova that have been dropped from the foliage above. *Loboscelidia* females are fully winged but they parasitize eggs in leaf litter. Winged females of *Isegama* frequent foliage, and those of *Perissosega* frequent dead tree trunks. Only once has a male of *Perissosega* been found on the ground. Presumably these two genera may parasitize eggs deposited on foliage or beneath loose bark. In this connection it may be noted that the Southeast Asian genus *Sipylloidea* Brunner (Heteronemiidae) may occur in Sri Lanka; the eggs of some, if not all, species have an adhesive ventral surface (Clark, 1979) and are presumably deposited on an arboreal substrate.

Females of most Ceylonese Amiseginae are found on and in leaf litter. It is probable that they are not at all host specific, but are opportunistic and parasitize any walking stick eggs of appropriate size. For example, I noted (Krombein, 1980:259) that females of the type series of *Serendibula deraniyagalai* were divided into two size groups having head widths of 1.9–2.2 mm (mean 2.0) and 1.5–1.6 mm (mean 1.5). This suggested that at least two species of walking sticks may have served as hosts in the type-locality, Ekgal Aru Sanctuary. However, Yasumatsu (1946:566) discovered in the laboratory rearing of the Japanese walking stick *Phraortes kumamotoensis* Shiraki, that the eggs laid by females with insufficient nutrition varied more in size and shape than did those of normally fed females. If this condition also occurs in wild populations, it could account for parasites of various sizes. I have found several deformed individuals. I attribute these deformities to those occasions when a wasp selects an egg that is too small or that is aberrant in shape or internal morphology.

Eight of 11 females of *Saltasega bella*, new species, have the posterior part of the head compressed and the sides of the second metasomal tergum indented. Five of seven males of *Saltasega distorta*, new species, have part of the vertex or the

ocellar area indented. Several males of *Indothrix wijesinhei*, new species, also have part of the vertex indented. One male of *Serendibula gracilis*, new species, has the head indented behind the ocelli. It is also possible that cephalic deformities may be caused by emergence of the wasp while it is still teneral. Recently I noted (Krombein, in press) that all 11 South African specimens belonging to two genera and three species had the vertex unevenly indented behind the ocelli. I ascribed this condition to pressure against the top of the head when the teneral wasp burst off the operculum of the egg. African Amiseginae do not always emerge as tenerals because the head was not deformed in any of the African specimens examined earlier (Krombein, 1957).

Life History

Only three contributions have been published on the life history of Amiseginae and none on Loboscelidiinae. The earliest and briefest was by Milliron (1950), who collected eggs of *Diapheromera femorata* Say at Brainerd, Minnesota, during the summer of 1947. Adults of *Mesitiopterus kahlui* Ashmead emerged from the overwintering eggs 11–20 June 1948. The wasps burst off the operculum of the host egg in order to emerge, a fact noted also by Costa Lima (1936) in his observations of *Duckeia cyanea* Costa Lima (see Figures 2, 3).

D.J. Pirone (in Krombein, 1960) contributed substantial information on the rearing and laboratory culture of *Adelpho anisomorphae* Krombein from ova of *Anisomorpha ferruginea* (Beauvois) from Atlanta, Georgia. He collected two series of eggs in mid-April 1957 and on 12 May 1957. Sixteen *Anisomorpha* nymphs hatched from the first set of eggs 8–19 May, and one male and four female wasps emerged 18 August to 6 September 1957. The second set of eggs yielded 27 nymphs 20 May to 27 June and five female and six male wasps 28 August to 15 September 1957. Some of the nymphs were mature and laying eggs by 22–31 August 1957, so emergence of the wasps was correlated with maturity of the walking stick host.

In the laboratory rearing of *Adelphes*, Pirone placed an individual unmated female in a cage with several *Anisomorpha* ova. He found that the female showed immediate interest in an egg, appressing her antennal flagella against the surface, gnawing a small hole in the chorion, and then inserting her ovipositor. The puncture was sealed by coagulation of fluid within the egg. An egg laid between 22 August and 1 September was placed with a wasp for the period 7-9 September and then dissected. The contents of the host egg were still fluid, but the wasp egg, 0.65 mm long and 0.15 mm wide, contained a developing larva. Eggs collected in Alexandria, Louisiana, in mid-winter contained *Adelphes* prepupae in cocoons in February. The adult wasp ruptured the operculum of the host egg to emerge. Female wasps lived 2-3 weeks in captivity and parasitized as many as 40 eggs. Twenty males constituted the maximum progeny from a single wasp. Only males were obtained because the parent female was segregated when she emerged and was not mated.

J.L. Readshaw (1965) noted that brachypterous females and winged males of several species of *Myrmecomimesis* Dalla Torre emerged in the summer in southern New South Wales and Victoria, Australia, when the eggs of *Didymuria violescens* (Leach) were being laid. She observed female wasps searching for *Didymuria* eggs in the leaf litter in *Eucalyptus* forests. When one was found, the female chewed a small hole in the shell and then fed on the exuding yolk (Figure 4). She then oviposited through the feeding puncture (Figure 5). A wasp might repeat this cycle several times with one host egg, but only one parasite larva developed. During reasonably warm weather and with an abundance of host eggs, some females lived several weeks, feeding and ovipositing once or twice a day. In warm areas the parasite larva was fully fed by the end of the summer, overwintered as a diapausing larva, and the adult emerged the following summer. In cooler areas many parasite larvae were not fully developed by the end of the summer; many died during the winter and the few survivors required another year to pupate and emerge as adults. Readshaw

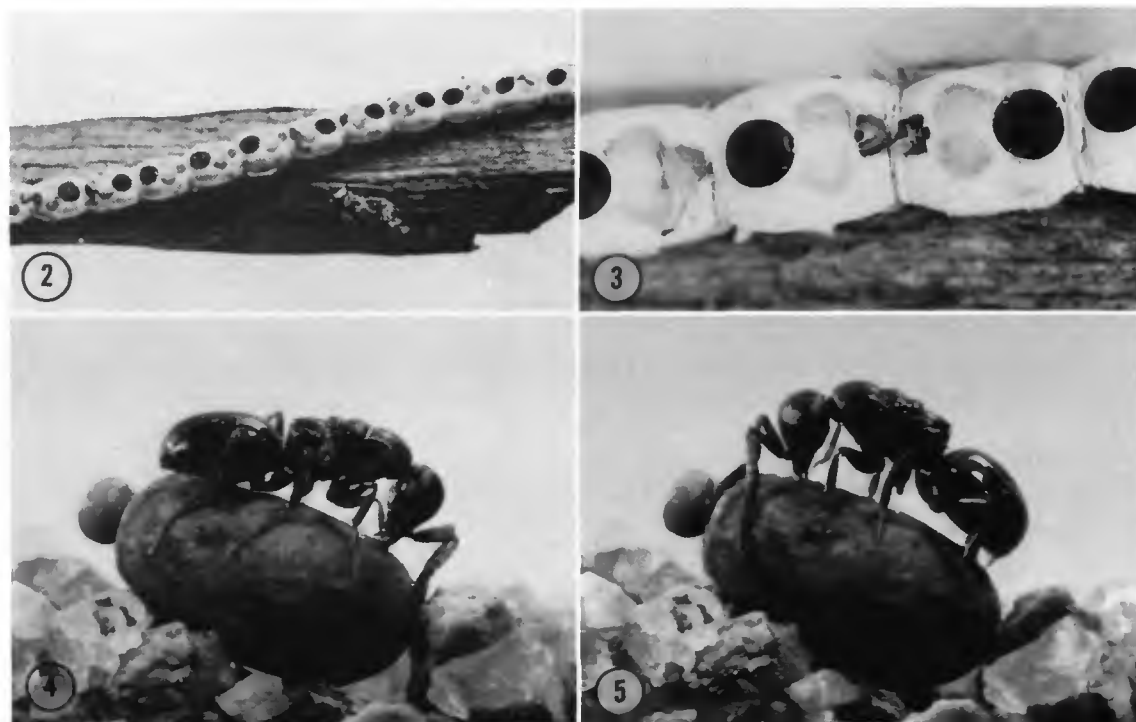
also noted that nearly all the host eggs might be parasitized in warm areas when the host density was low.

On the basis of the accounts by Pirone (in Krombein, 1957) and Readshaw one might hypothesize that the parasite larva feeds on the rich egg yolk rather than on a developing embryo. J.L. Readshaw noted two kinds of diapause in eggs of *Didymuria*: a pre-embryonic diapause and an embryonic diapause. Diapause occurred rarely in northern and coastal populations (i.e., in warmer areas) and most commonly in higher and more southern areas (i.e., in cooler areas). The delayed development she noted of some parasites in cooler areas might have been caused by oviposition in eggs that were in pre-embryonic diapause. The factor causing pre-embryonic diapause in the host may have had a similar inhibiting effect on development of the parasite.

The reports abstracted above refer to species of temperate areas. We have no information on synchrony of host and parasite development in tropical areas such as Sri Lanka. Obviously freshly laid host eggs must be available at the time parasites are active, particularly since Readshaw stated that females feed on the yolk of the host egg as it exudes from the mandibular puncture.

Very little is known of the life history of Loboscelidiinae other than the two rearing records cited under "Host Relationships" above. Hadlington and Hoschke (1959) stated that *Loboscelidia* adults emerged shortly after eggs and forest litter were obtained in New South Wales in April. There were no later emergences of *Loboscelidia* such as occurred with two species of *Myrmecomimesis* reared from the same lot of eggs, suggesting that certain differences exist in the life cycles of the two genera.

Our knowledge of Ceylonese Phasmatodea is regrettably most scanty. No faunal list has been published, and the large collection in the Colombo Museum, mostly obtained by the orthopterist G.M. Henry, is totally unworked. Several species have been reared, including a species of *Phyllium*, and emergence of a nymph occurred



FIGURES 2-5.—Host eggs from which wasps emerged: 2, eggs of *Prisopus ohrtmanni* (Lichtenstein) from which the South American *Duckeia cyanea* Costa Lima emerged ($\times 2$) (from Costa Lima, 1936); 3, same ($\times 6$) (photograph courtesy A. da Costa Lima); 4, ♀ of the Australian *Myrmecomimesis semiglabra* (Riek) puncturing egg of *Didymuria violescens* (Leach) with mandibles ($\times 30$); 5, ♀ ovipositing in the same puncture (photographs for Figures 4 and 5 courtesy of J.L. Readshaw).

months after oviposition. J.L. Readshaw noted that an egg of *Didymuria violescens* (Leach) required 6-18 months to hatch in temperate Australia. J.T.C. Sellick advised me (in litt.) that most eggs require many months (generally 6-12) of incubation, yet there are a few species, such as the European *Bacillus rossius* (Rossi), which emerge in as little as six weeks.

There are no reports of extensive defoliation of native trees by walking sticks in Sri Lanka. Destructive outbreaks of defoliation occur periodically in montane eucalyptus forests in southeastern Australia. J.L. Readshaw has theorized that populations of *Didymuria* are normally held at low density through the parasitism of eggs by *Myrmecomimesis*, predation of eggs by ants, birds and

small marsupials, and predation of nymphs and adults by large insectivorous birds. Outbreaks may occur during very cool summer weather when the low density system of control is disrupted.

It is of interest to note that the Ceylonese walking sticks apparently have not adapted to the introduced eucalyptus. Extensive plantings of these trees in both montane and Dry Zone localities at low altitudes have not suffered defoliation.

Behavior of Ceylonese Amiseginae and Loboscelidiinae

Both sexes of *Perissosega*, new genus, and *Isegama*, new genus, are fully winged. *Isegama* are

found most frequently alighting on plant foliage at least half a meter above the ground, running rapidly over the surface and then flying to another leaf; one male of *Isegama* was collected on the trunk of a live kumbuk (Combretaceae) 2.5 m above the ground. Three females and two males of *Perissosega* were found on dead tree trunks where we captured them 1.5–2.0 m above the ground; three males of *Perissosega* were collected in Malaise traps; and one male of *Perissosega* was captured on leaf litter, an unusual occurrence for this usually aboreal species.

The flightless females of *Serendibula* Krombein and *Baeosega*, new genus, are always associated with leaf litter, and one finds them crawling rapidly over and beneath the leaves searching for eggs. They are very alert and take cover at once upon the slightest movement by the observer. This reaction presumably has developed from predator pressure caused by small insectivorous birds and lizards exploiting the leaf litter for prey. The flightless females are collected most easily in relatively thin leaf litter by rapidly lowering a collecting tube over them. If there are several layers of leaf litter, collecting may be easier by snatching a handful of leaf litter just after the female has disappeared in it and throwing it into the net.

Females of most species of *Serendibula* and *Baeosega* usually crawl up the side of the killing tube, but occasionally they just crawl in circles at the bottom of the tube until they succumb to the fumes. In addition to this behavior, some females of *Baeosega humida*, new species, may hop upward into the tube a short distance. Males of *Serendibula* alight on the leaf litter, crawl rapidly on it for a few seconds and then fly onto another patch. They are captured easily by a sweep of the net as they crawl on the leaves. *Serendibula* males occasionally fly into Malaise traps and will crawl upward 2 m and sideways for 2 m or more to reach the killing jar. Males of the smaller species of *Baeosega* crawl less rapidly, take very short flights, and are most readily collected by lowering a killing tube over them.

Males of *Imasega*, new genus, were taken in only

two areas of the lowland rain forest, where they were flying low over the ground and alighting on leaf litter and on the low foliage of shrubs. We did not find any of the presumably wingless females.

We witnessed precopulatory behavior only in *S. deraniyagalai*. One female, observed on fallen leaves in a sunny patch, acted in an excited manner. A male was flying from side to side about 0.3 m on each side of the female and about 0.5 m above the ground. The male landed on a twig nearby, ran on it like a larrid wasp toward the female, and was frightened off by the observer. Shortly after that another female was observed on another sunny patch of leaf litter also behaving excitedly. A male was flying above her in the same manner as the first male. The pair was captured before any other mating behavior could occur.

Males of *Mahinda*, new genus, are rarely found on leaf litter but usually on plant foliage or grass blades, where they fly from one leaf to another. The female of this genus is a hopper, usually using that method of locomotion in preference to crawling, in contrast to *Serendibula* females. The few females of *Mahinda* were taken in rather moist situations where the leaves had fallen among rocks or on soil with a high gravel content. Two were collected after they had been observed hopping distances of up to 2 cm on large rocks. A third female captured on leaf litter had hopped 4–5 cm.

We observed behavior of males of the montane *Indothrix* Krombein on 23–24 April 1981 at Hakgala Natural Reserve. They were rather sluggish and most of them sat on foliage of *Sellaginella* or grass a few centimeters above ground, with their antennae quivering. A few flew from one leaf to another. The leaf litter was quite dry on 23 April and somewhat moistened on the 24th after a rain. We were unable to find any of the presumably brachypterous females. Several years earlier at Hakgala we had collected one male in a Malaise trap.

Males of *Cladobethylus* Kieffer behave similarly to those of *Mahinda*, and we have collected both

genera flying together in the rain forests in Kitulgala, the Sinharaja Jungle and the Induruwa Jungle, Gilimale. Females of *Cladobethylus* have never been collected in Sri Lanka, so they must occupy a very cryptic niche. Females are known from Borneo and Thailand; they are fully winged.

Both sexes of *Saltasega*, new genus, are small hoppers that progress from one section of leaf litter to another by hops of a couple of centimeters each. These wasps are capable of greater feats, though; one female actually leaped ~15 cm from one leaf to another. On the leaf surface, they crawl rapidly over it; the females also explore beneath the leaf surface. Males sometimes fly from leaf to leaf rather than hopping. Specimens of both sexes hopped upward into a killing tube placed over them except for one female, who crawled around on the leaf until she succumbed to the fumes.

Females of *Mahinda* and *Saltasega* are the only known taxa that occasionally use leaping as a method of locomotion. One might expect that the hind femora would be more enlarged than in other genera which have never been observed to use this means of locomotion. The hind femoral ratio (length : width), however, does not support this conjecture. This ratio is 3.6 in *Mahinda* and 4.7 in *Saltasega*, whereas it varies from 2.8 to 4.3 in females of non-saltatorial genera.

The several males of Ceylonese *Loboscelidia* were captured in virgin rain forest on low foliage close to the ground. This is probably the habitat in which males would frequently be found, because the winged females should occur on or in leaf litter. In Australia members of the genus have been reared from eggs of Phasmatodea found in leaf litter.

J.R. Walther examined my scanning electron micrographs of the antennae of several species of Ceylonese Amiseginae. He found (in litt.) four kinds of sensilla: sensilla chaetica, contact chemoreceptors having a gustatory function; sensilla basiconica, large sensilla having an olfactory function; sensilla trichoidea, small sensilla also having an olfactory function; and mechano-sensitive hairs having a tactile function.

Ceylonese females of both fully winged and brachypterous flightless genera have antennae that are very similar in shape (Figures 41, 49) and function. The scape is elongate, usually slightly longer than the pedicel and the first two flagellar segments together. The first flagellar segment is longer than the length of the following three together. The intermediate flagellar segments are slightly broader than long and are flattened on the ventral surface. The flattened surface is thickly clothed with several different kinds of sensilla that presumably enable the female to find a host egg and perhaps to locate an appropriate spot to penetrate the egg shell for feeding and oviposition. For example, the fully winged female of *Isegama meaculpa*, new species, has a large central area studded with numerous sensilla basiconica, a narrow area of sensilla trichoidea basad of the sensilla basiconica, scattered sparse sensilla chaetica and, laterally and basally, many mechano-sensitive hairs (Figure 43). The flightless female of *Serendibula deraniyagalai* Krombein has the same kinds of sensilla as *Isegama* but arranged somewhat differently (Figure 50). The sensilla basiconica are relatively fewer in number and arranged in a narrower area near the apex of the segment, and the sensilla trichoidea are more numerous and arranged in a wider band basad of the sensilla basiconica. In both species the large sensilla basiconica must be very weakly chitinized apically because the tips have collapsed (Figures 44, 53).

It seems probable that the large numbers of olfactory sensilla (basiconica and trichoidea) enable the female wasp to locate the host egg. D.J. Pirone's laboratory observation that the *Adelphe* female immediately appressed her antennal flagella against the egg supports this supposition. The flattened ventral surface bearing the olfactory sensilla would thus be immediately in contact with the egg.

Males of *Isegama* and *Perissosega* are unique in having antennae that are very similar in shape to those of the females of the respective genera (Figure 38). Males of the other genera of Ceylonese Amiseginae have elongate filiform anten-

nae (Figure 46) with the flagellar segments at least three times as long as wide; these flagellar segments are also circular in cross-section rather than flattened on the ventral surface.

The ventral surface of the flagellar segments of male *Isegama* have the same kinds of sensilla as those found in the female, but there are fewer sensilla basiconica, and the sensilla trichoidea are numerous and widely dispersed rather than being confined to a narrow area near the base as in the female. There are scattered sensilla chaetica as in the female, and many mechano-sensitive hairs laterally.

In contrast the flagellar segments of male *Serendibula kasyapai*, new species, (Figures 47, 48) and those of other male genera with elongate filiform

antennae differ in the kinds and number of sensilla. They are much more thickly clothed with mechano-sensitive hairs; this may assist them in locating the flightless females in leaf litter. Sensilla trichoidea are apparently lacking, but sensilla basiconica are well represented, as are sensilla chaetica.

The antennae of male Loboscelidiinae (Figures 69-71) are different from those of Amiseginae in that they possess large numbers of plate organs with elevated pore plates, which also have an olfactory function, relatively few sensilla chaetica with gustatory and tactile functions, large numbers of tactile hairs, and apparently no sensilla basiconica and sensilla trichoidea. Antennae of female Loboscelidiinae were not available for examination by scanning electron microscopy.

Key to Ceylonese Amiseginae and Loboscelidiinae

(Females are unknown in the following species: *Loboscelidia atra*, new species, and *L. castanea*, new species; *Cladobethylus ceylonicus* Krombein; *Indothrix wijesinhei*, new species; *Saltasega distorta*, new species; and *Imasega rufithorax*, new species. Males are unknown in the following species: *Isegama aridula* (Krombein); *Serendibula paradoxa*, new species; and *Baeosega laticeps*, new species)

1. Vertex narrowly produced behind ocelli for some distance, the margin fringed with a fimbria of dense, long, curled flattened setae [Figure 34*b*]; eye of male without visible microtrichiae at $\times 150$, that of female with microtrichiae visible at less than $\times 50$; antennae inserted considerably above mouthparts [Figure 34*a*]; scape, femora, and tibiae with transparent laminae on part of lower margin [Figure 35]; tegula enormously enlarged [Figures 36, 37]; fore wing [Figure 33] without costa or stigma. (**Loboscelidiinae**) 2
- Vertex not produced behind eyes and without a fimbria of long curled setae; eye with microtrichiae visible at $\times 50$ or less; antennae inserted low on front, just above mouthparts [Figures 6-9]; scape, femora, and tibiae without such laminae; tegula small [Figures 13, 15]; fore wing [Figure 12] with well-developed costa and stigma. (**Amiseginae**) .. 3
2. Integument intensely black; larger, 3.1 mm long; vertex 1.6 times as long as broad, sides subparallel; posterior half of scutellum with longitudinal arcuate ridges and subcontiguous punctures; postscutellum with median keel; notauli extending five-sixths of distance to apex of scutum; axilla flat; female unknown 19. ***Loboscelidia atra***, new species

- Integument castaneous, abdomen lighter; smaller, 1.9–2.1 mm long; vertex 1.9 times as long as broad, sides arched inwardly; posterior half of scutellum rugulosoreticulate; postscutellum with short median keel at base; notauli complete to apex of scutum; axilla concave; female unknown 20. *Loboscelidia castanea*, new species
3. FEMALES: Metasoma with only four exposed segments, the long telescoped ovipositor usually exerted between fourth tergum and sternum [Figures 10, 11]; many genera brachypterous [Figures 15, 16] with wings no longer than tegula, a few genera fully winged; antenna short and stout, flattened on inner ventral surface, first flagellar segment as long as the following two or three segments combined [Figure 9] .. 4
 MALES: Metasoma with five exposed segments [Figure 19], the genitalia rarely exerted but not elongate; all genera fully winged; antenna usually long and filiform [Figure 6], the flagellar segments at least three times as long as wide, but two genera with short, stout antennae [Figure 38] resembling those of females, with the first flagellar segment as long as the following two or three segments, the segments beyond first no longer than broad, and flattened on inner ventral surface . 18
4. Fully winged 5
 Brachypterous 8
5. Posterolateral angle of dorsal propodeal surface with a long acute spine [Figure 23]; fore wing mottled with infuscated areas; frontal concavity deep, strongly transversely rugulose, upper lateral and dorsal margins carinate [Figure 22]; pronotum posteriorly with a small fovea on midline 4. *Perissosega venablei*, new genus and species
 Posterolateral angle of dorsal propodeal surface at most bluntly angulate; fore wing infumated in part; frontal concavity shallow, delicately rugulose, margin not carinate; pronotum with a delicate median groove on posterior half 6
6. Mesopleural disk anteriorly with a marginal groove, and an oblique groove a third of the distance below wing base [Figure 14]; vertex punctate, without smooth median vitta; radial vein evenly curved, continued toward anterior wing margin by a darkened, curved streak [Figure 12]; disk of first and second metasomal terga with small punctures mostly separated by less than the diameter of a puncture [Figure 10]. (*Isegama*, new genus) 7
 Mesopleural disk without anterior or discal grooves; vertex punctate and with a raised, narrow, smooth ridge extending to anterior ocellus [see Figure 6]; radial vein straight on basal section, with apical thicker spur at an angle, and continued toward anterior wing margin by a straight darkened streak; first and second metasomal terga impunctate except for scattered minute punctures posterolaterally on second; tarsal claw without an inner tooth *Cladobethylus* Kieffer, p. 20
7. Head [Figure 7] width 1.22 times height (apex of clypeus to occiput), sides of lower front converging beneath more strongly; scape chestnut above, darker red below; mandible, clypeus, mesosternum, coxae, trochanters, and femora black, tibiae and tarsi darker red, or legs except coxae darker red 2. *Isegama meaculpa*, new species

- Head [Figure 8] width 1.02 times height, sides of lower front converging beneath less strongly; mandible clypeus, scape, large spot on mesosternum, and legs light red except coxae may be black; male unknown
 3. *Isegama aridula* (Krombein)
8. Posterolateral area of dorsal propodeal surface with a long acute spine [Figure 26]; malar groove present; vestiture of mid- and hind femora and tibiae, and metasoma, short and decumbent; metasoma dull, densely micropunctate [Figure 30]
 5. *Mahinda saltator*, new genus and species
- Posterolateral area of dorsal propodeal surface rounded [Figure 15] or bluntly angulate; malar groove absent; mid- and hind femora and tibiae, and metasoma with some erect long hairs; metasoma variously sculptured but never dull and densely micropunctate 9
9. Posterolateral area of dorsal propodeal surface rounded; second metasomal tergum with close longitudinal carinae on anterior area [Figure 11], the first occasionally with such carinae on posterior part. (*Serendibula* Krombein) 10
- Posterolateral area of dorsal propodeal surface bluntly angulate; metasomal terga without close longitudinal carinae 15
10. Dorsal surface of first metasomal tergum almost entirely covered with close longitudinal carinae and scattered interspersed punctures .. 11
- Dorsal surface of first tergum punctate but without longitudinal carinae 12
11. Head and antenna completely dark; close parallel carinae on second metasomal tergum present on basal two-thirds along midline and basal four-fifths laterally; male unknown
 11. *Serendibula paradoxa*, new species
- Head predominantly reddish, at least first flagellar segment testaceous or reddish, and frequently the scape and second to fourth flagellar segments also reddish; close parallel carinae on second tergum present on basal fourth along midline and basal two-thirds laterally
 12. *Serendibula kasyapai*, new species
12. Longitudinally carinate area of second metasomal tergum shorter, extending over basal eighth or sixth of the length along midline (0.12–0.16), and over less than half the length laterally (0.42–0.48) [Figure 11] 7. *Serendibula deraniyagalai* Krombein
- Longitudinally carinate area of second metasomal tergum longer, extending over basal fourth or third along midline (0.23–0.36) and on more than half the surface laterally (0.58–0.78) 13
13. First metasomal tergum comparatively broader, 0.58–0.60 times greatest width [Figure 64]; viewed from above the front not protruding noticeably beyond eyes 8. *Serendibula karunaratnei*, new species
- First metasomal tergum comparatively more slender, 0.64–0.73 times greatest width [Figures 62, 63]; viewed from above the front protruding noticeably beyond eyes 14

14. Horizontal area of first metasomal tergum with larger punctures, many separated from each other by no more than the width of a puncture; carinate area of second tergum extending further toward apex laterally (0.71–0.78) [Figure 63] 10. *Serendibula insolita*, new species
- Horizontal area of first metasomal tergum with minute punctures separated from each other by several times the diameter of a puncture; carinate area of second tergum not extending so far toward apex laterally (0.59–0.60) [Figure 62] 9. *Serendibula gracilis*, new species
15. Scutellum in profile distinctly raised above level of scutum [Figure 61]; pronotum strongly convex from side to side, posterior margin noticeably thickened, surface of disk with relatively coarse, scattered punctures, interspaces glossy [Figure 60]; second metasomal sternum with scattered minute punctures 17. *Saltasega bella*, new genus and species
- Scutum and scutellum at same level in profile; pronotum not so arched, posterior margin not thickened, disk with smaller, closer punctures, interspaces dull and granulate [Figure 58]; second metasomal sternum with larger punctures mostly separated by less than the diameter of a puncture. (*Bacosega*, new genus) 16
16. First and second metasomal terga delicately shagreened, not so glossy, erect and subdecumbent silvery vestiture more conspicuous [Figure 32]; declivous anterior surface of first tergum with a few weak longitudinal rugulae; legs light red except coxae, trochanters, and occasionally hind femur beneath which may be testaceous 14. *Bacosega torrida*, new species
- First and second terga not shagreened, appearing more glossy, erect and subdecumbent silvery vestiture less conspicuous; declivous surface of first tergum smooth; legs dark brown or black in part 17
17. Viewed from above head narrower in proportion to dorsal length (1.4–1.6:1) [Figure 56], upper front straight or slightly protuberant between eyes; head width 3.1–3.3 times least interocular distance; pronotal length and width subequal 15. *Bacosega humida*, new species
- Viewed from above head wider in proportion to dorsal length (1.7–1.9:1) [Figure 57], upper front concave between eyes; head width 2.8–2.9 times least interocular distance; pronotal length 0.8 times width; male unknown 16. *Bacosega laticeps*, new species
18. Sexual dimorphism very slight; antenna [Figure 38] short and stout as in female, flattened on inner ventral surface, first flagellar segment at least twice as long as second, intermediate segments as long as wide; posterolateral propodeal angles rounded or with a long acute spine 19
- Sexual dimorphism strong, females brachypterous except in *Cladobethylus*; antenna [Figure 46] long, filiform, flagellum not flattened on inner ventral surface, cylindrical, intermediate segments two or more times as long as wide; posterolateral propodeal angles bluntly and obtusely angulate 20

19. Posterolateral angle of dorsal propodeal surface with a long acute spine [cf. Figure 23]; fore wing mottled with infuscated areas, radial vein at apex with angulate darkened streak running toward wing margin [cf. Figure 28]; frontal concavity deep, strongly transversely rugulose, upper lateral and dorsal margins carinate [cf. Figure 22]; pronotum posteriorly with a small fovea in middle; mesopleuron without anterior or oblique discal grooves [cf. Figure 24]
 4. *Perissosega venablei*, new genus and species
- Posterolateral angle of dorsal propodeal surface rounded [cf. Figure 13]; fore wing not mottled with infuscations, radial vein evenly curved and continued toward wing margin by a darkened curved streak [cf. Figure 12]; frontal concavity shallower, more weakly transversely rugulose, dorsal and lateral margins not carinate [cf. Figure 7]; pronotum not foveate, median groove very faint; mesopleuron anteriorly with a marginal groove and with an oblique groove a third of the distance below wing base [cf. Figure 14]; lower face with sides converging strongly [cf. Figure 7]; male of *I. aridula* (Krombein) unknown, but lower face should be as in Figure 8
 2. *Isegama meaculpa*, new genus and species
20. Head with a narrow smooth ridge extending from anterior ocellus to occiput [Figure 6]; occipital carina well developed; head and thorax with bronzy reflections; mesopleural disk with a slightly oblique, punctate transverse groove near upper margin; femora and tibiae with scattered long setae, mostly exceeding width of segment; first two metasomal terga laterally with scattered minute punctures bearing long erect setae; female unknown
 1. *Cladobethylus ceylonicus* Krombein
- Top of head uniformly punctate, without smooth, median vitta; occipital carina absent except in *Indothrix* Krombein and *Saltasega*, new genus; head and thorax black or black and red, with weak bronzy reflections only in *Indothrix*; mesopleuron without a transverse discal groove; femora and tibiae usually with appressed or subappressed vestiture, suberect setae, if present, shorter than width of segment; metasomal punctation denser, larger, not confined to sides, vestiture shorter, appressed or suberect 21
21. Occipital carina complete across top of head; stigma with a distal veinlike extension along wing margin half or more as long as enlarged basal part of stigma 22
- Occipital carina lacking; stigma without such a distal prolongation except in *Mahinda*, new genus, and *Imasega*, new genus 24
22. Head and thorax with weak bronzy reflections; lower surface of flagellar segments 5-10 slightly broadened a third or half the distance from base [Figure 59]; posterior propodeal surface transversely rugulose in middle, smooth laterally; female unknown
 6. *Indothrix wijesinhei*, new species

- Head and thorax black; flagellar segments not tuberculate; posterior propodeal surface punctate in middle, smooth laterally. (*Saltasega*, new genus) 23
23. Head viewed from above comparatively narrower [Figure 60], length 0.76–0.78 times the width, front noticeably protuberant beyond eyes; least interocular distance 0.55–0.60 times the head width; pronotum comparatively narrower, median length 0.72–0.82 times width at pronotal lobes 17. *Saltasega bella*, new species
- Head viewed from above comparatively broader [Figure 54], length 0.48–0.63 times the width, front scarcely protuberant beyond eyes; least interocular distance 0.72–0.86 times head width; pronotum comparatively broader, median length 0.56–0.60 times width at pronotal lobes; female unknown 18. *Saltasega distorta*, new species
24. Stigma with a distal veinlike extension along wing margin two-thirds or more as long as basal widened part of stigma 25
- Stigma without such an extension, the apex acutely angulate 26
25. Hind coxa with a short carina at base on upper surface; notaulus well developed only on apical half, evanescent anteriorly; clypeal margin not thickened; thorax black 5. *Mahinda saltator*, new genus and species
- Hind coxa not carinate above; notaulus well developed over entire length of scutum; clypeal margin thickened; thorax usually light red, but occasionally infuscated in part; female unknown 13. *Imasega rufithorax*, new genus and species
26. Parapsides lacking; flagellum more slender, third segment 2.60 times as long as wide, microtrichiae longer, half as wide as segment; tarsal claw without inner tooth; head, thorax, and metasoma red and black. (*Bacosega*, new genus) 27
- Parapsides present on median half of scutum, well developed except in *S. gracilis*, new species, where they are weak and obscured by coarse punctation; flagellum stockier, third segment 2.47 times as long as wide, microtrichiae shorter, only a fourth or third as wide as segment; tarsal claw with an inner tooth; head, thorax, and metasoma black except declivous surface of first metasomal tergum red. (*Serendibula* Krombein) 28
27. Head and pronotum entirely red except ocellar triangle rarely infuscated; mesopleural disk with large subcontiguous shallow pits; head width 1.93–2.04 times least interocular distance; median pronotal length 0.71–0.73 times width at lobes 14. *Bacosega torrida*, new species
- Dorsum of head black, pronotal disk infuscated; mesopleural disk with large shallow pits, some subcontiguous but others separated by half or more the diameter of a pit; head width 1.80–1.96 times least interocular distance; median pronotal length 0.77–0.95 times width at lobes except in one specimen where it is 0.71 times 15. *Bacosega humida*, new species

28. Coarse punctures of pronotal disk contiguous to subcontiguous, but not arranged in oblique or arcuate rows; parapsides absent or indicated only faintly; smaller forms, 2.3–2.7 mm long, with light red scape and tibiae 9. *Serendibula gracilis*, new species
Some of coarse punctures of pronotal disk contiguous in oblique or arcuate rows; parapsides well developed on median half of scutum; larger forms, 3.6–5.1 mm long 29
29. Some of coarse punctures on scutum contiguous in transverse rows 12. *Serendibula kasyapai*, new species
Scutal punctures contiguous or slightly separated, but not arranged in transverse rows 30
30. Scape light red; fore and mid-tibiae predominantly light red; digitus shorter than aedeagus 7. *Serendibula deraniyagalai* Krombein
Scape usually black, sometimes light red beneath either in part near base or entirely; fore and mid-tibiae predominantly dark, light red areas limited; digitus as long as aedeagus 31
31. Metasoma relatively broader, width at juncture of first and second terga 2.85 times length of first and 1.59 times length of second; mesopleural punctures separated from each other by much less than half the diameter of a puncture ... 8. *Serendibula karunaratnei*, new species
Metasoma relatively narrower, width at juncture of first and second terga 2.49 times length of first and 1.47 times length of second; some of mesopleural punctures toward anterior margin separated from each other by half the diameter of a puncture 10. *Serendibula insolita*, new species

Subfamily AMISEGINAE

Nine genera and eighteen species of Amiseginae are known to occur in Sri Lanka at the present time. Two genera are known from males only and seven genera from both sexes. Females of four species and males of three species are unknown. These data suggest the possibility that one or more additional genera and species may be collected eventually in Sri Lanka.

All species are restricted to Sri Lanka, and five genera (*Perissosega*, new genus, *Mahinda*, new genus, *Serendibula* Krombein, *Imasega*, new genus, and *Saltasega*, new genus) are known so far only from that country. *Indothrix* Krombein and *Baeosega*, new genus, are found also in southern India. *Cladobethylus* Kieffer is known also from southern India, Thailand, Malaya, Viet Nam, Sarawak, North Borneo, and the Philippines. *Isegama*, new genus, is known also from Nepal, Thailand, Ma-

laya, Laos, Viet Nam, Hong Kong, Sarawak, and North Borneo. Undoubtedly we can expect significant extensions of range for the five genera known only from Sri Lanka and the two genera occurring only there and in southern India. Assiduous collecting will be required in other areas of the Orient before the total amisegine fauna can be elucidated.

It would be premature to attempt to integrate the Ceylonese fauna with my earlier work on the Australasian Series (1957:168–170). I have recognized a number of additional new genera among the material mentioned earlier from the B.P. Bishop and British Museums, and also that from several other collections.

Cladobethylus Kieffer

Cladobethylus Kieffer, 1922:67–68.—Krombein, 1957:192–194, fig. 7 [♂; redescription].—Krombein, 1980:252–253, figs. 1, 7 [♂ redescription; ♀ misidentified].

Males of this genus are known from four described taxa, *C. coeruleus* Kieffer, the type-species *C. cruciger* Kieffer, and *C. cruciger* var. *antennalis* Kieffer, all from the Philippines, and *C. ceylonicus* Krombein from Sri Lanka. I have also seen males of undescribed taxa from Sarawak, North Borneo, Malaya, Viet Nam, Thailand, and South India. When I completed my first manuscript on the Ceylonese Amiseginae in November 1976 (Krombein, 1980), I supposed that I had correctly associated females with the males of *C. ceylonicus*. Subsequently, however, we collected males that were not *Cladobethylus*, but which were certainly the true opposite sex of my supposed *Cladobethylus* females. These are referred herein to *Isegama*, new genus.

We searched diligently but unsuccessfully for true females of *Cladobethylus* in Sri Lanka from 1978 to 1981. Males of *C. ceylonicus* are quite abundant in the Induruwa Jungle at Gilimale, and less common in the Bandarakele Jungle at Kitulgala, and in the Sinharaja Jungle at Kanneliya and at Kudawe, all Wet Zone localities with relatively heavy average rainfall, ranging from 2400 to 3900 mm. Fortunately, there are definitely associated winged females of two undescribed taxa from Thailand and Sarawak, so a generic diagnosis can be provided below to facilitate recognition of the as yet unknown female of *C. ceylonicus*. Inasmuch as most males of *C. ceylonicus* were collected on plant foliage or grass blades close to the ground, it is likely that females confine their activities mostly to a cryptic niche, such as beneath leaf litter or in decaying wood, perhaps emerging only to mate.

Both sexes of *Cladobethylus* are fully winged with a large, lanceolate stigma, the costa not extending beyond stigma, the radial vein short, curved, occasionally straight, and with a thickened apical spur at a slight angle, and a radial vein continued toward costa by a curved, darkened streak. This taxon is unique in that both sexes have a narrow, raised, smooth, longitudinal ridge on the vertex between and behind the ocelli. Other characters shared by both sexes, a combination of which serves to distinguish them from other genera, are

the long scattered erect setae on femora, tibiae, and sides of metasomal terga, and the thickened clypeal apex. The tarsal claws of the female lack an inner tooth, whereas those of the male have a tiny erect tooth.

MALE.—Head (Figure 6) width 0.90–0.95 times the height (apex of clypeus to occiput); eyes moderately bulging, with very short erect microtrichiae, sides of lower front strongly to moderately convergent beneath; apex of clypeus thickened; frontal concavity weakly rugose or almost smooth; malar space long, with a groove running from lower edge of eye to mandibular articulation; interocular distance at anterior ocellus about half as wide as head; head from above quadrate to subquadrate, flat, lower part of front abruptly declivous and perpendicular to upper part; vertex with a low, narrow polished median ridge extending from fore ocellus to occiput; occipital carina present, weak above, stronger laterally; antenna filiform, rather elongate, scape as long as or a bit longer than first flagellar segment; flagellar segments clothed with moderately dense, long, erect setae; second to eleventh flagellar segments subequal in length, basal tubercle lacking, about three times as long as wide.

Thoracic dorsum entirely punctate or only postscutellum impunctate; pronotal disk with a weak median groove on posterior half; notauli straight posteriorly, usually curving strongly laterad anteriorly; postscutellum with a median triangular area, posterior margin in middle with a pair of blunt appressed teeth; mesopleuron not grooved or ridged anteriorly, upper third with an ill-defined punctate groove separating it from lower two-thirds, upper third more delicately punctate; fore wing (Figure 12) with large lanceolate stigma, costa not continued beyond stigma, and darkened streak nearly closing marginal cell curved evenly forward and outward from stub of radial vein; femora and tibiae above and femora beneath with scattered, long erect setae; hind femur extending almost to apex of abdomen, hind femoral ratio 2.9; hind coxa above with a short carina at base along outer edge; tarsal claw with a tiny erect tooth on inner mar-

gin; dorsal surface of propodeum short, longitudinally rugose, posterolaterally with a weak, blunt tooth; posterior surface abruptly declivous, margined above by an arched carina, laterally by a straight carina.

First metasomal tergum almost impunctate; that and succeeding terga with very scattered minute punctures bearing long erect setae.

FEMALE.—Same as male except as follows: head width 0.97–1.04 times height (apex of clypeus to occiput); interocular distance at anterior ocellus 0.35–0.38 times as wide as head; head from above subquadrate; scape slightly longer than pedicel and first two flagellar segments combined, flagellum otherwise short and stout, tapering gradually to apex, underside flattened, intermediate segments broader than long, microtrichiae short, subappressed; mesopleuron ridged anteriorly on lower half, upper third not set off by a punctate groove; hind femoral ratio 3.0; tarsal claw without a tooth on inner margin; and radial vein short, slightly curved or straight, sometimes at apex with a thicker stub at a slight angle, darkened streak beyond vein as in male.

1. *Cladobethylus ceylonicus* Krombein

FIGURES 6, 12

Cladobethylus ceylonicus Krombein, 1980:253–255, figs. 1, 7 [♂, ♀ misidentified; various localities in Sri Lanka; holotype in USNM].

This species occurs only in Wet Zone localities as noted above and is known only from males. Most of them are very similar except for the color variations noted in the description below. One small male from Kitulgala and another from Gilimale are included in *C. ceylonicus*, though with some doubt. The thoracic punctation, particularly on the pronotum, is sparser, most interspaces being half the diameter of a puncture rather than having subcontiguous punctation. The thorax of the Gilimale specimen is also unusual in being dark blue, whereas that of the Kitulgala specimen is dark bronze.

MALE.—Length 3.2–4.7 mm. Head and tho-

racic dorsum with bright green to dark bronze reflections, mesopleuron with darker green reflections; propodeum and most of metasoma usually black; antennal scape and legs above light red; palpi, mandible, and legs beneath testaceous; first flagellar segment and base of first metasomal tergum chestnut, although much of ventral metasoma and dorsal surface along sides occasionally light red. Dorsum of head, thorax, and second to fourth metasomal terga on sides with erect, light-brown setae. Wings clear, fore wing with relatively sparse microtrichiae within the cells and with quite dense ones beyond the cells, stigma and veins light brown.

Head in frontal view (Figure 6); height (apex of clypeus to occiput) 1.1 times width; frontal concavity very shallow, practically impunctate, transverse ridges lacking or very weakly and incompletely developed; front immediately in front of and laterad of ocelli with scattered small punctures; vertex with contiguous, somewhat larger punctures on either side of low, smooth median ridge; width of top of head 1.5–1.6 times length.

Median lengths of pronotum and scutum subequal and twice median length of scutellum and postscutellum; pronotum and scutum with subcontiguous, somewhat coarser punctures than vertex; fore wing (Figure 12); scutellum with punctation finer, becoming quite sparse posteriorly; median triangular area of postscutellum about as long as basal width, with subcontiguous punctures of same size as on scutellum, an adjacent narrow strip with about six ridges perpendicular to triangular area on each side; lower two-thirds of mesopleuron with punctation similar to that on pronotal dorsum, the upper third with smaller, more scattered punctures.

First metasomal tergum with only a few minute, very scattered punctures; second tergum with very small punctures on basal half or third separated by two or three times the diameter of a puncture anteriorly, more scattered or absent posteriorly.

FEMALE.—Unknown.

SPECIMENS EXAMINED.—CENTRAL PROVINCE. *Kandy District*: 1♂, Adams Peak, 6000 ft (1824 m),

6 mi (10.8 km) W Maskeliya (incorrectly labeled 6 mi S), 17 Feb, Davis et al. (USNM; holotype).

WESTERN PROVINCE. *Colombo District*: 1♂, Labugama, 18 Feb, Stubbs et al. (British Museum).

SABARAGAMUWA PROVINCE. *Kegalla District*: 3♂, Kitulgala, Bandarakele Jungle, 4 Feb, 17, 18 Mar, Gunawardane, Kurunaratne (USNM). *Ratnapura District*: 40♂, Gilimale, Induruwa Jungle, 2 Feb, 8, 14, 15, and 26 Mar, 3, 16–19 Apr, Krombein et al. (USNM); 2♂, Sinharaja Jungle, Waturawa Forest, 3 km S of Kudawe, on foliage 4–10 in (10.2–25.4 cm) above ground, 2 Jul, Kurunaratne (USNM); 5♂, Daminagala Hill, Sinharaja Jungle, 530 m, 5 km S of Kudawe, 20–23 Oct, on foliage 3–6 in (7.6–15.2 cm) above ground, Kurunaratne (USNM).

SOUTHERN PROVINCE. *Galle District*: 2♂, Kanneliya section, Sinharaja Jungle, 14–16 Jul, Krombein et al. (USNM, Colombo Museum; paratypes).

Isegama, new genus

Cladobethylus Kieffer.—Krombein, 1980:253, figs. 2, 3, 5, 8, 9 [♀, not ♂; erroneous sex association].

In my 1976 manuscript I mistakenly placed two female species as the previously unknown opposite sex of *Cladobethylus* Kieffer. One was described subsequently as the opposite sex of *C. ceylonicus* Krombein, 1980, and the other, known only from females, was described as *C. aridulus* Krombein, 1980. Now that I have recognized the true males of the misidentified female of *C. ceylonicus*, I am describing here the new genus *Isegama* for the reception of females of the two species assigned in error to *Cladobethylus*. *Isegama* is also known from undescribed species from Nepal (♀), Thailand (♀, ♂), Laos (♀, ♂), Viet Nam (♂), Malaya (♂), Sarawak (♀), North Borneo (♂), and Hong Kong (♀, ♂).

The species of *Isegama* exhibit very little sexual dimorphism. Both sexes are fully winged and the antennae are remarkably similar in morphology, being stout, short, tapering toward apex, flagellum flattened on lower surface, and intermediate flagellar segments slightly broader than long.

Normally, males of Ceylonese Amiseginae have long filiform antennae with the flagellar segments two to three times as long as broad. *Perissosega*, new genus, is the only other Ceylonese genus exhibiting a similar lack of sexual dimorphism. The two sexes of *Isegama* and *Perissosega* may be readily distinguished by examination of the abdomen; the female has only four exposed segments and the tubular telescoped ovipositor is partially exerted, whereas the male has five exposed segments and lacks an ovipositor.

Isegama is a relatively short compact form as compared with most other Ceylonese genera, only *Perissosega* sharing the same body form. *Isegama* is distinguished by a combination of the rounded posterolateral angle of the dorsal propodeal surface, the mesopleuron with a groove on the anterior margin and another oblique groove about a third of the length below the wing base, the radial vein curved evenly outward and continued toward the costal margin by a darkened curved streak, and the narrow elongation of the stigma along the costal margin.

Specimens of *Isegama* are most frequently collected as they alight on foliage 0.5 m above the ground; one male was collected when it alighted upon the trunk of a kumbuk tree 2.5 m above the ground. Specimens are also frequently captured in Malaise traps. Inasmuch as they are not found on leaf litter, I presume that they may parasitize walking stick eggs glued on leaves or perhaps deposited in bark crevices or beneath loose bark.

TYPE-SPECIES.—*Isegama meaculpa*, new species.

ETYMOLOGY.—The generic name is feminine, and an anagram of *Amisega* Cameron.

FEMALE.—Head (Figures 7, 8) width 1.0–1.22 times height (apex of clypeus to occiput); eyes bulging, clothed with very short microtrichiae; sides of front converging below; apex of clypeus not thickened; frontal concavity moderately deep, with close, short transverse rugulae; malar space with a deep groove running from lower eye margin to mandibular articulation; interocular distance at anterior ocellus 0.42–0.44 times head width; front rounding more gradually into vertex than in *Cladobethylus*, the vertex without smooth

median ridge; occipital carina complete, more strongly developed dorsally; scape a bit longer than pedicel and first two flagellar segments combined, flagellum short, stout, tapered toward apex, lower surface flattened, intermediate flagellar segments 0.78–0.89 times as long as wide, flagellar setae short, subappressed.

Thorax short, compact (Figures 13, 14); pronotal disk with extremely weak median groove; notauli straight posteriorly, curved outward anteriorly; postscutellum with a short median area with rounded outer margin, narrow adjacent strip weakly obliquely ridged, lacking apical appressed teeth; mesopleuron anteriorly with a groove and with an oblique discal groove about one-third below wing base; fore wing with elongate stigma whose distal end is quite attenuate along costal margin, radial vein curved, relatively short, continued toward costal margin by a curved, darkened streak; tibiae with sparser, shorter, erect setae than in *Cladobethylus*; hind coxa above lamellate along inner margin; hind femoral ratio of 2.8:1; tarsal claws with a small erect tooth along inner margin; posterolateral angles of propodeal dorsum rounded.

First two metasomal terga dorsally (Figure 10), and second sternum with small subcontiguous punctures and a narrow median impunctate strip.

MALE.—Characters as in female except intermediate flagellar segments as long as wide, and hind femoral ratio 2.4:1.

2. *Isegama meaculpa*, new species

FIGURES 7, 14, 38–45

Cladobethylus ceylonicus Krombein, 1980:254, figs. 2, 9 [♀, not ♂].

This species has a wide distribution both in the Dry Zone and Wet Zone, occurring in areas having an average annual rainfall ranging from 1300 to 3900 mm, and from sea level to 2200 ft (668.8 m). It is distinguished at once from *I. aridula* (Krombein), the only other Ceylonese *Isegama*, by the more strongly converging sides of the lower front of the head (see Figures 7, 8).

HOLOTYPE.—♀; Sri Lanka, Uva Province, Monaragala District, Angunakolapelessa, 23 Jan 1979, in Malaise trap, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, S. Siriwardane, T. Gunawardane (USNM Type 100443).

FEMALE.—Length 3.3 mm. Integument mostly black and shining, without metallic reflections; legs except coxae and most of mesosternum light red; erect setae on head, thorax, and metasomal terga short, cinereous; wings clear; stigma, costa, and radius dark brown, other veins lighter brown.

Head in frontal view (Figure 7); width 1.25 times height (apex of clypeus to occiput), sides of lower front converging beneath more strongly than in *I. aridula*; interocular distance at anterior ocellus 0.43 times head width; frontal concavity with short, close, transverse rugulae, laterad of this the front subcontiguously punctate; front above concavity and vertex with slightly more separated small punctures except within ocellar triangle, where they are denser.

Median lengths of pronotum, scutum, scutellum, and postscutellum 18:21:12:10; thoracic dorsum with punctures of same size as on vertex; pronotal punctation subcontiguous; scutum similarly punctured except somewhat more closely; punctures on scutellum mostly separated by about the diameter of a puncture, becoming sparser posteriorly; median triangular area of postscutellum more closely punctate, bordered laterally by a moderately broad groove bearing about six weak oblique rugulae; mesopleuron (Figure 14) with very scattered punctures on upper posterior third, lower two-thirds with relatively large, confluent to subconfluent pits; propodeum with a strong median carina on dorsal and posterior surfaces; sculpture of dorsal surface very weak; posterior surface with a narrow, median, finely ruguloso-reticulate triangular area, laterad of this a smooth area except for shallow pits above and below, adjacent to which is a narrow strip bounded on each side by a low ridge and bearing transverse ridges.

Dorsum of first and second metasomal terga with a very narrow, median impunctate strip, the rest of surface with small, very close punctures

tending to be confluent in longitudinal rows, punctation on second becoming smaller and sparser on apical sixth; punctation of last two terga fine and dense; punctures of second sternum a bit larger than on second tergum, mostly confluent in longitudinal rows.

ALLOTYPE.—♂; same locality and date as holotype, but K.V. Krombein (USNM).

MALE.—Length 3.1 mm. Color, vestiture, and punctation as in female except interocular distance at fore ocellus 0.40 times head width, and median lengths of pronotum, scutum, scutellum, and postscutellum 17:17:11:9.

PARATYPES.—All USNM. NORTHERN PROVINCE. *Mannar District*: 1♂, Ma Villu, 16–19 Sep 1980, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, V. Gunawardane; 2♀, 0.5 mi (0.8 km) NE Kokmotte Bungalow, Wilpattu National Park, 15–16 Feb 1979, in Malaise trap, K.V. Krombein, T. Wijesinhe, S. Siriwardane, T. Gunawardane; 1♀, same location, 6 Oct 1977, T. Wijesinhe. NORTH CENTRAL PROVINCE. *Anuradhapura District*: 2♂, Ritigala Natural Reserve, 19 Sep 1980, in Malaise trap, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, V. Gunawardane. CENTRAL PROVINCE. *Kandy District*: 1♀, Kandy, Udawattakele Sanctuary, 22 Mar 1981, K.V. Krombein, T. Wijesinhe, L. Weerasinghe; 1♀, same location 1–3 Oct 1973, at black light, K.V. Krombein, P.B. Karunaratne, P. Fernando. 1♀, Thawalammenne, 2200 ft (668.8 m), 7–8 Sep 1980, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, V. Gunawardane. NORTH WESTERN PROVINCE. *Kurunegala District*: 1♀, Kurunegala, Badagamuwa Jungle, 10 Sep 1980, T. Wijesinhe. WESTERN PROVINCE. *Colombo District*: 1♂, Labugama, 400 ft (122 m), 9 May 1976, K.V. Krombein, P.B. and S. Karunaratne, D.W. Balasooriya. SABARAGAMUWA PROVINCE. *Kegalla District*: 1♀, Kitulgala, Bandarakele, 17 Mar 1979, L. Jayawickrema. *Ratnapura District*: 1♀, Gilimale, Induruwa Jungle, 10 Oct 1980, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, V. Gunawardane. 3♂, 1♀, same locality as holo- and allotype as follows: 2♂, 22 and 23 Jan 1979, K.V. Krombein; 1♂, 27, 28 Mar

1981, K.V. Krombein, T. Wijesinhe, L. Weerasinghe; 1♀, 18 Jun 1978, T. Wijesinhe. SOUTHERN PROVINCE. *Galle District*: 3♀, Kanneliya section, Sinharaja Jungle, 14–16 Jul 1978, K.V. Krombein, P.B. Karunaratne; 1♀, same location, 3 Oct 1980, K.V. Krombein. *Hambantota District*: 2♂, Palatupana, WLNPS Bungalow, 20–22 Jun 1978, in Malaise trap, K.V. Krombein, P.B. and N. Karunaratne, T. Wijesinhe, L. Jayawickrema. Paratypes of both sexes will be placed in the Colombo and British Museums. A male presumed to be *I. meaculpa* from Monaragala District, Mau Ara, 10 mi E Uda Walawe, 18 Jun 1978, K.V. Krombein, has been excluded from the type series because the head is missing.

Female paratypes are 3.3–3.9 mm long and males are 3.1–3.6 mm. The red markings may be darker and reduced so that only the tibiae and tarsi are red, but the underside of the scape may be red, as well as the first laterotergum. The punctation may also be closer so that the punctures of the pronotum and scutum tend to be confluent in transverse rows.

3. *Isegama aridula* (Krombein), new combination

FIGURES 8, 10, 13

Cladobethylus aridulus Krombein, 1980:255–256, figs. 3, 5, 8 [?].

This species is known from only four females from two Dry Zone localities. The female is easily distinguished from *I. meaculpa*, new species, in that the sides of the lower front of the head converge less strongly (see Figures 7, 8). Inasmuch as the head of the male *I. meaculpa* has similar conformation to that of the female, it is most probable that the unknown male of *I. aridula* will agree in that respect with its female.

FEMALE.—Length 3.4–3.7 mm. Integument mostly black and shining, the following light red: mandible except chestnut tip, clypeus, scape, large spot on mesosternum and legs, the clypeus sometimes chestnut, coxae black and hind femur infuscated above. Vestiture of body and wings as

in *L. meaculpa* but lighter. Wings clear, costal and subcostal veins and stigma medium brown, other veins light brown.

Head in frontal view (Figure 8), the width 1.02 times the height (apex of clypeus to occiput), sides of lower front converging beneath less strongly than in *I. meaculpa*; interocular distance at anterior ocellus 0.42 times head width; frontal concavity with short, close transverse rugulae, laterad of which the front is contiguously punctate; front above concavity and vertex with slightly more separated, small punctures except within ocellar triangle, where they are denser.

Thorax (Figure 13), the median lengths of pronotum, scutum, scutellum, and postscutellum 19:19:12:10; thoracic dorsum with punctures of same size as on vertex; pronotal punctures separated from each other by less than the diameter of a puncture, not arranged in rows; scutal punctures slightly more separated than on pronotum; most punctures on scutellum separated by more than the diameter of a puncture; postscutellar punctures on triangular area a bit closer, the area bordered laterally by a moderately broad groove bearing about six weak, oblique rugulae; mesopleuron with very scattered small punctures on upper third, lower two-thirds with relatively large, confluent to subconfluent pits; dorsal surface of propodeum (Figure 13); posterior surface usually with a narrow, central triangular area of close rugulae radiating outward and upward from abdominal insertion but sometimes smooth, area laterad of this with a few transverse rugulae below, smooth above, the side of posterior area with a pair of rugae separated by a narrow strip bearing a few transverse ridges.

Abdomen as in Figure 10; dorsum of first and second metasomal terga with a very narrow, median impunctate strip, the rest of surface with small punctures, punctures slightly more separated than in *I. meaculpa*, thus not confluent in longitudinal rows, apical sixth of second tergum with punctures becoming smaller and sparser; punctuation of last two terga very fine, not so dense as in *I. meaculpa*; punctures of second ster-

num larger and closer than on second tergum, but not confluent in longitudinal rows.

MALE.—Unknown.

SPECIMENS EXAMINED.—EASTERN PROVINCE. *Am-parai District*: 1♀, Ekgal Aru Sanctuary, 150 m, 11 Jun, Karunaratne (USNM; holotype).

CENTRAL PROVINCE. *Kandy District*: 4♀, Thawalammenne, 820 m, 16–18 Sep, Krombein et al. (USNM, Colombo; paratypes).

Perissosega, new genus

Perissosega and *Isegama*, new genus, are unique among the Ceylonese Amiseginae in the almost total lack of sexual dimorphism. Both sexes are fully winged and the antennae are remarkably similar in morphology, being stout, short, tapering toward the apex, and with the flagellum flattened on the lower surface. This is the shape of the female antenna in all genera of the Australasian Series, and males of the other genera have longer, more or less filiform antennae, with the flagellar segments not flattened on the lower surface and the intermediate segments 1.5 or more times as long as broad. The only detectable dimorphism in *Perissosega* is that the intermediate flagellar segments are slightly broader than long in the female and as broad as long in the male, and the female has only four visible metasomal segments and the ovipositor is exerted, whereas the male has five visible segments and no ovipositor.

Superficially, *Perissosega* resembles a small species of *Atoposega* Krombein in that the upper posterolateral propodeal angle is armed with an elongate acute process. The present genus differs from *Atoposega*, however, in having a deeper frontal concavity margined above and on upper side by a ridge, in lacking longitudinal lineations on the thoracic dorsum and first two metasomal terga, and in lacking an oblique anterior groove and ridge on the mesopleuron.

This genus contains only the single Ceylonese species *P. venablei*, new species. I have seen no specimens of the genus from elsewhere in the Indo-Australian area.

TYPE-SPECIES.—*Perissosega venablei*, new species.

ETYMOLOGY.—The generic name is feminine and is based on the Greek *perissos* (extraordinary) plus *-sega* (from *Amisega* Cameron).

FEMALE.—Head (Figure 22) width 1.1 times height (apex of clypeus to posterior ocelli); eyes strongly bulging, clothed with very short microtrichiae; sides of front converging below; apex of clypeus not thickened; frontal concavity deep, with strong transverse rugulae and a weak median ridge, margined above and on upper side by a ridge, abruptly declivous from upper front; malar space with a groove from lower eye margin to mandibular articulation; interocular distance at anterior ocellus 0.3 times head width; ocelli in a narrow triangle, postocellar distance 0.86 times lateral ocellar distance; occipital carina present; scape a bit longer than pedicel and first two flagellar segments combined, flagellum short, stout, lower surface flattened, tapering toward apex, intermediate flagellar segments 1.1 times as long as wide.

Thorax (Figures 23, 24) more elongate than in *Isegama*, dorsum coarsely and contiguously pitted; pronotal disk with a small median circular fovea at anterior and posterior margins, median groove very weak; notauli complete, diverging anteriorly where they curve outwardly; postscutellum as long as dorsal surface of propodeum, with a median triangular pitted area adjacent to which is a depressed curved area bearing several radiating rugulae; mesopleuron without anterior ridge and groove; fore wing (Figure 28) with marginal vein slightly curved, short, continued at an angle toward anterior wing margin by a straight darkened streak; legs with short appressed setae; hind femoral ratio 2.8:1; tarsal claws with a small erect tooth on inner margin; dorsal propodeal surface coarsely, irregularly rugosoreticulate, posterolateral angle with a long acute spine.

First two metasomal terga (Figure 29) closely and coarsely punctate, without median impunctate strip; second sternum coarsely and closely punctate.

MALE.—Characters as in female except inter-

mediate flagellar segments as broad as long, and hind femoral ratio 2.9:1.

4. *Perissosega venablei*, new species

FIGURES 22-24, 28, 29

Perissosega venablei has a wide distribution in Sri Lanka, where it occurs in both the Dry Zone and the Wet Zone at elevations from near sea level to about 600 m and with average annual rainfall of 1000-3900 mm. The species is probably parasitic in walking stick eggs, which are deposited in crevices in bark or beneath loose bark of dead trees or in fissures of the trunk of dead trees without bark. We captured four females and one male in two localities on the trunks of dead standing trees, one of them with loose bark, the other without bark but with fissures in the sound dead wood.

ETYMOLOGY.—I take pleasure in naming this species for George L. Venable, Department of Entomology, Smithsonian Institution, in recognition of the superb illustrations he has provided for this and other contributions.

HOLOTYPE.—♀; Sri Lanka, Southern Province, Galle District, Kanneliya section, Sinharaja Jungle, 14 July 1978, K.V. Krombein, P.B. Karunaratne (USNM Type 100444).

FEMALE.—Length 3.5 mm. Black, the following light red: base of mandible, narrow streak on each side of midline of mesosternum, posterolateral propodeal spine, trochanters, and narrow bases of femora and tibiae. Integument glossy, except dorsum of head and thorax dull. Vestiture short and appressed on body and appendages. Fore wing mostly infumated, except clear at extreme base as well as on a band across distal areas of costal, medial, and submedial cells; stigma and veins brown, the latter testaceous in clear areas.

Characters otherwise as listed for the genus: head as in Figure 22; thorax as in Figures 23, 24; wing, see Figure 28; and abdomen, see Figure 29.

ALLOTYPE.—♂; Sri Lanka, Sabaragamuwa Province, Ratnapura District, Gilimale, Induruwa Jungle, 2 Feb 1979, in Malaise trap, K.V.

Krombein, P.B. Karunaratne, T. Wijesinhe, S. Siriwardane, T. Gunawardane (USNM).

MALE.—Length 2.9 mm. Color, integument, vestiture, and wings as in holotype. Characters otherwise as listed for genus.

PARATYPES.—NORTHERN PROVINCE. *Mannar District*: 1♀, 0.5 mi (0.8 km) NE of Kokmotte Bungalaw, Wilpattu National Park, 22 Jan 1977, on fissured dead tree trunk, K.V. Krombein (USNM). EASTERN PROVINCE. *Amparai District*: 2♂, Ekgal Aru Sanctuary, 5, 6 Jul 1978, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, V. Kulasekare (USNM). CENTRAL PROVINCE. *Matale District*: 1♀, 1♂, Kibissa Jungle, 0.5 mi (0.8 km) W of Sigiriya, 2 Jul 1978, ♂ in Malaise trap, K.V. Krombein, P.B. Karunaratne (USNM). *Kandy District*: 1♀, Kandy, Reservoir Jungle, 10 Feb 1979, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, S. Siriwardane, T. Gunawardane (USNM). The following from Kandy, Udawat-takele Sanctuary (USNM): 1♂, 18–20 Mar 1981, on leaf litter, T. Wijesinhe; 3♀, 1♂, 27 Apr 1981, on dead tree trunk with loose bark, K.V. Krombein (2♀, 1♂), T. Wijesinhe (1♀); 1♀, 1800 ft (547 m), 1–3 Sep 1980, T. Wijesinhe; 1♂, 1800 ft (547 m), 23–25 Sep 1980, in Malaise trap, K.V. Krombein, P.B. Karunaratne, L. Jayawickrema, V. Gunawardane, P. Leanage. Paratypes of both sexes will be placed in the Colombo and British museums.

Female paratypes are 2.9–3.0 mm long, and males 2.6–2.9 mm. There is very little variation in the type-series. The trochanters are dark in one male, and the outer surfaces of the fore and mid-tibiae and all tarsi are light red in two other males.

Mahinda, new genus

The brachypterous flightless female of *Mahinda* resembles those of several other Indo-Australian genera in having the posterolateral dorsal angles of the propodeum prolonged into a long, acute spine. *Exopapua* Krombein from New Guinea differs in the very weak frontal concavity, the strongly convex pronotum, the very short post-

scutellum, and the propodeum gradually sloping in profile. The posterior surface of the propodeum is abruptly declivous in *Mahinda*, *Myrmecomimesis* Dalla Torre, and an undescribed genus from New Guinea. In *Myrmecomimesis* and the undescribed genus the postscutellum is triangular, so that the propodeum is present dorsally both on the sides and posteriorly, whereas in *Mahinda* the postscutellum occupies almost the entire posterior dorsal area of the thorax, and the propodeum is present dorsally on only a small lateral area and a narrow posterior strip.

Of the four genera mentioned above, males have been associated with females only in *Mahinda* and *Myrmecomimesis*. Most amisegine males are quite conservative and males of these two genera lack the acutely spinose posterolateral angles of the propodeal dorsum which are present in females. These angles are obtusely and shortly angulate in males of both genera, and are more strongly developed in *Mahinda* than in *Myrmecomimesis*. The notauli are evanescent in the middle in *Mahinda* but completely developed in *Myrmecomimesis*. The radial vein in *Myrmecomimesis* extends as far toward the fore wing apex as the stigma, but it is shorter than the stigma in *Mahinda*.

TYPE-SPECIES.—*Mahinda saltator*, new species. The genus is known only from this single Ceylonese species.

ETYMOLOGY.—The generic name is masculine and is that of the Indian monk whose missionary efforts in the third century B.C. led to Buddhism being adopted as the established religion of the ancient Sinhalese kingdom.

FEMALE.—Head (Figure 25) width 1.1 times height from apex of clypeus to posterior ocelli; eyes bulging, clothed with very short microtrichiae; sides of front converging slightly below; apex of clypeus not thickened; frontal concavity moderately concave, with close transverse rugulae and a weak median ridge, abruptly declivous from upper front; malar space with groove from lower eye margin to mandibular articulation; interocular distance at anterior ocellus one-fourth head width; ocelli in a relatively broad triangle,

postocellar distance 1.2 times the lateral ocellar distance; occipital carina present only behind ocelli; scape 1.1 times as long as pedicel and first two flagellar segments combined, intermediate flagellar segments 1.3–1.5 times as broad as long.

Thorax (Figures 26, 27) rather narrow, dorsum with close small dense punctures; pronotal disk with a median groove on posterior half or more which becomes evanescent anteriorly; notauli straight, oblique, becoming weaker anteriorly; postscutellum large, longer than scutellum and covering most of hind part of mesosoma; mesopleuron with an oblique anterior ridge and groove; brachypterous, fore wing slightly larger than tegula; legs with short appressed setae; hind femoral ratio 3.6:1; hind coxa with a delicate carina above on outer surface; tarsal claws with a large erect tooth on inner margin near base; dorsal surface of propodeum very short, armed posterolaterally with a large acute spine; posterior and lateral propodeal surfaces abruptly declivous.

Abdomen (Figure 30) with vestiture short and appressed; first two metasomal terga closely and minutely punctate.

MALE.—Head width 1.1 times height (from apex of clypeus to posterior ocelli); eyes strongly bulging, densely clothed with longer microtrichiae than in female; sides of front converging slightly below; apex of clypeus not thickened; lower front abruptly declivous from upper front, concavity shallow with close transverse rugulae and a weak median ridge; malar space with a groove from lower eye margin to posterior mandibular articulation; interocular distance at anterior ocellus 0.4 times head width; ocelli in shallow concavities, arranged in a low triangle, postocellar distance 1.8 times lateral ocellar distance; occipital carina absent; scape 0.9 times as long as pedicel and first flagellar segment combined, subequal in length to the first flagellar segment, which in turn is 0.7 times as long as second and third combined; intermediate flagellar segments 3.5 times as long as wide, densely clothed with suberect setae about a fourth as long as width of segment.

Thorax more elongate than in *Serendibula* (Fig-

ure 21); pronotum with weak median groove on posterior half; notauli complete but weak in middle, straight on posterior two-thirds, curved laterad anteriorly; parapsides short, barely visible; postscutellum slightly longer than scutellum; mesopleuron not grooved or ridged anteriorly, discal groove lacking; stigma with an elongate veinlike extension apically that is as long as wider basal part of stigma; radial vein straight, shorter than stigma, continued to margin of wing by a curved darkened streak; legs with short appressed setae; hind femoral ratio 3.5:1; hind coxa with a delicate carina along upper outer margin; tarsal claw with an erect inner tooth; dorsal propodeal surface with short blunt posterolateral angles, posterior and lateral surfaces abruptly declivous.

First two metasomal terga with small, moderately close punctures and quite short suberect vestiture; third and fourth terga with smaller close punctures; second to fourth sterna with denser small punctures.

5. *Mahinda saltator*, new species

FIGURES 25–27, 30

The brachypterous female of *Mahinda saltator* is separated at once from other brachypterous Ceylonese females by the long acute posterolateral spine of the dorsal propodeal surface, and by the dull, densely, and minutely punctate first two metasomal terga. The male is readily distinguished by a combination of the black integument of the body, mostly pallid legs, long, veinlike extension of the stigma, lack of an occipital carina, and the delicate carina on the upper outer margin of the hind coxa.

The species occurs only in the lowland rain forests of southwestern Sri Lanka, where the average rainfall is nearly 3900 mm. The females are found on damp leaf litter or rocks, and males alight on plant foliage near the ground or on leaf litter in the same habitat.

ETYMOLOGY.—The female is a leaper, making jumps of as much as 5 cm, hence the specific name from the Latin *saltator* (leaper).

HOLOTYPE.—♀; Sri Lanka, Sabaragamuwa

Province, Kegalla District, Kitulgala, Bandarakele Jungle, 4 Feb 1979, leaping on damp rock, K.V. Krombein (USNM Type 100445).

FEMALE.—Length 4.5 mm. Black, head and mesosomal dorsum with bronzy reflections, mandible except tip red, the following light reddish-brown: upper surface of scape, second and third flagellar segments above, tegula, hind femur at apex on posterior surface, fore tibia anteriorly, hind tibia above, and tarsi; the following white: pedicel and first flagellar segment, coxae except dark blotches on part of ventral surface, trochanters, fore and mid-femora anteriorly, and hind femur at base. Vestiture short and appressed on body and appendages.

Head (Figure 25) with characters of genus; small, contiguous punctures adacent to inner eye margin and on top of head.

Thorax (Figures 26, 27) with characters of genus; relative lengths of pronotum, scutum, scutellum and postscutellum, 32:23:14:21; punctures of thoracic dorsum small and contiguous, many of those on pronotum arranged in oblique rows from midline; mesopleuron with larger subcontiguous pits; metapleuron narrow, glossy, and smooth; dorsal surface of propodeum punctate on triangular lateral area, and with short longitudinal ridges on narrow posterior area; lateral propodeal surface glossy and smooth; posterior propodeal surface with close transverse carinae.

Abdomen (Figure 30) with characters of genus; first two terga dull from dense, minute punctation; sterna also dull, the second with dense, minute punctures and larger, interspersed punctures mostly separated by the diameter of a puncture or slightly more.

ALLOTYPE.—♂; same locality and date as holotype, but collected by P.B. Karunaratne (USNM).

MALE.—Length 4.4 mm. Black, apex of mandible, pedicel, tegula, and fore and mid-tarsi light red, the following white to creamy: clypeus, scape, and rest of legs except for infuscated hind tarsi. Wings lightly infumated, costal and subcostal veins and stigma black, other veins brown. Vestiture short, dense, pale, subappressed.

Head with characters of genus; front adjacent to concavity shining, with moderate sized subcontiguous punctures; upper front and vertex dull, with contiguous punctures of same size.

Thorax with characters of genus; dorsum of thorax dull except postscutellum glossy, propodeum and sides of thorax glossy; median lengths of pronotum, scutum, scutellum, and postscutellum 28:36:17:16; pronotum at posterior lobes twice as wide as median length; pronotum, scutum, and scutellum with similar punctation to that of vertex; median enclosed area of postscutellum with basal width 1.3 times length, sides converging posteriorly to narrowly rounded apex, punctures as on scutellum but slightly separated, area laterad of enclosure weakly transversely ridged; mesopleuron with large shallow pits, mostly separated by half the width of a pit; metapleuron glossy, smooth except for a few close weak ridges above; dorsal propodeal surface with oblique ridges laterally, longitudinal ridges posteriorly, and with a strong carina separating it from the glossy smooth lateral surface and the irregularly closely and transversely rugulose posterior surface.

Abdomen with characters of genus.

PARATYPES.—Same locality as holotype; 1♀, 5♂, as follows (USNM): 1♀, 1♂, 4 Feb 1979, ♀ among damp rocks, P.B. Karunaratne; 2♂, 17 Mar 1979, P.B. Karunaratne; 2♂, 18 Mar 1979, K.V. Krombein. *SABARAGAMUWA PROVINCE. Ratnapura District:* 2♀, 4♂, Gilimale, Induruwa Jungle as follows (USNM): 1♀, 16 Apr 1981, on damp leaf litter, K.V. Krombein; 1♀, 17 Apr 1981, on rock and then on leaf litter, L. Weeraturunge; 4♂, 17–19 Apr 1981, 3 on vegetation near ground, 1 on leaf litter, K.V. Krombein and L. Weeraturunge. Same province and district, 1♀, Sinharaja Jungle, Waturawa Forest, 7 Oct 1981, on leaf litter, P.B. Karunaratne (USNM). 7♂, same data as preceding except Daminagala Hill, 20–23 Oct 1981, P.B. Karunaratne (USNM). *SOUTHERN PROVINCE. Galle District:* 1♂, Kanneliya section, Sinharaja Jungle, 16 Jul 1978, K.V. Krombein and P.B. Karunaratne (USNM). Paratypes of both sexes will be placed in the Colombo and British Museums.

Female paratypes are 4.0–4.5 mm long. They are very similar to the holotype except that the carinae on the posterior propodeal surface may be more separated. Male paratypes are 2.9–4.6 mm long. The males are quite like the allotype, though the scape is occasionally reddish and the frontal concavity is rarely smooth.

Indothrix Krombein

Indothrix Krombein, 1957:198–199, figs. 9, 23.

This montane genus was known previously only from the type-species, *I. longicornis* Krombein, from Kodaikanal, Pulney Hills, South India, 6500 ft (1976 m). The discovery of a Ceylonese taxon, *I. wijesinhei*, new species, at Hakgala Natural Reserve, at 1650–1800 m, requires some slight modification of the original generic diagnosis.

The females are unknown and may be either fully winged as in *Cladobethylus* Kieffer or brachypterous as in the majority of Ceylonese *Amiseginae*. The entire type series of *I. wijesinhei* was captured on vegetation only a few centimeters above the ground. It is presumed, therefore, that the females will frequent leaf litter on the ground searching for host eggs.

MALE.—Head with sides of lower front moderately convergent below (Krombein, 1957, fig. 9), width 1.1–1.2 times distance from clypeal apex to posterior ocelli; eyes strongly bulging, densely clothed with moderately long microtrichiae; apex of clypeus not thickened; lower front not so abruptly declivous as in *Mahinda*, concavity weakly to moderately shallow, smooth or with close transverse rugulae and a median ridge, area laterad of concavity moderately to closely punctate; malar space with a groove from lower eye margin to posterior mandibular articulation; interocular distance at anterior ocellus half the head width; ocelli in shallow concavities arranged in a low triangle, postocellar distance 1.5–1.7 times lateral ocellar distance; occipital carina present; antenna very elongate, scape 0.6–0.8 times as long as pedicel and first flagellar segment combined, the latter 0.8–1.0 times as long as the second and third segments combined, intermediate flagellar

segments subequal in length and 3.8–4.7 times as long as wide; flagellar segments clothed with suberect microtrichiae as long as width of segments, the fifth to tenth slightly broadened beneath about a third from base of segment (Figure 59).

Thorax more elongate than in *Serendibula* (Figure 21); pronotum and scutum subequal in length, each about twice as long as the scutellum, the postscutellum subequal in length to the scutellum; pronotum with a weak to evanescent median groove on posterior two-thirds; notauli complete, diverging slightly anteriorly; parapsides short, weakly impressed; mesopleuron not grooved or ridged anteriorly, discal groove beneath wing lacking; fore wing stigma with an elongate veinlike extension apically that is about as long as wider basal section, radial vein slightly curved, shorter than stigma and continued to wing margin by a darkened, curved streak; legs with short subappressed setae; hind femoral ratio 4.1:1; coxa without a carina along upper outer margin; tarsal claws with a small erect subbasal tooth; dorsal propodeal surface with short blunt posterolateral angles, lateral and posterior propodeal surfaces abruptly declivous.

First two metasomal terga with minute to small punctures separated from each other by at least slightly more than the diameter of a puncture, the vestiture short and subappressed.

FEMALE.—Unknown.

6. *Indothrix wijesinhei*, new species

FIGURE 59

This species has a superficial resemblance to *Cladobethylus ceylonicus* Krombein because of the bronzy integument of the head and mesosomal dorsum. It is, however, easily distinguished by the lack of a narrow smooth ridge on the vertex, the broadening in the middle underside of the fifth through tenth flagellar segments (Figure 59), and the short appressed vestiture on the legs and first two metasomal terga.

The two known species of *Indothrix* are quite distinct. The present species has a smooth frontal

concavity, the postocellar distance is 1.7 times the lateral ocellar distance, the scape is 0.8 times as long as the pedicel and first flagellar segment, the latter segment is 0.8 times as long as the second and third combined, the intermediate flagellar segments are 4.7 times as long as wide, the first two metasomal terga have small punctures mostly separated by not much more than the diameter of a puncture, and the apical margin of the second metasomal sternum is straight. In the South Indian *I. longicornis* Krombein, the frontal concavity has transverse rugulae and a median ridge, the postocellar distance is 1.5 times the lateral ocellar distance, the scape is 0.6 times as long as the pedicel and first flagellar segment, the latter segment is subequal in length to the second and third combined, the intermediate flagellar segments are 3.8 times as long as wide, the first two metasomal terga have minute, widely separated punctures, and the apical margin of the second metasomal sternum is emarginate in the middle.

ETYMOLOGY.—I am pleased to name this species for my expert principal technician and jeep driver during my visit in 1981, Theekshana Wijesinhe, who collected most of the type series.

HOLOTYPE.—♂; Sri Lanka, Central Province, Nuwara Eliya District, Hakgala Natural Reserve, 1650–1800 m, 23–24 Apr 1981, K.V. Krombein, T. Wijesinhe, L. Weeratunge (USNM Type 100446). (Actually erroneously labeled Hakgala sanctuary.)

MALE.—Length 4.1 mm. Head and mesosomal dorsum bronze, rest of body black except coxae, trochanters and femora beneath pale yellow, and the following light to dark red: mandible except tip, underside of scape, femora above, tibiae, and declivous anterior surface of first metasomal tergum. Vestiture cinereous, short, suberect on head and mesosoma, subappressed on legs and metasoma. Wings slightly infumated, stigma black, veins brown.

Head with characters of genus; width 1.2 times distance from clypeal apex to posterior ocelli; lower front with concavity smooth and glossy, area laterad mostly subcontiguously punctate;

upper front and vertex dull, contiguously punctate; postocellar distance 1.7 times lateral ocellar distance; scape 0.8 times as long as pedicel and first flagellar segment, latter segment 0.8 times as long as second and third combined, intermediate flagellar segments 4.7 times as long as wide (Figure 59).

Thorax with characters of genus; dorsal mesosomal punctures contiguous; mesopleural punctures larger, subcontiguous; metapleuron smooth and glossy; dorsal propodeal surface narrowly glossy along midline, laterally with oblique rugulae and a narrow punctate strip adjacent to ridge separating the smooth lateral propodeal surface; posterior propodeal surface separated from dorsal surface by an arcuate ridge, medially with transverse rugulae adjacent to a small smooth area, and laterally irregularly ruguloso-reticulate.

Dorsal surface of first two metasomal terga with small punctures mostly separated by slightly more than the width of a puncture; third and fourth terga with smaller, closer punctures on basal half and scattered punctures apically; second sternum with small punctures that are more crowded medially, apical margin straight.

FEMALE.—Unknown.

PARATYPES.—24♂, same data as holotype (USNM); 1♂, same locality but 23–25 Feb 1977, K.V. Krombein, P.B. Karunaratne, P. Fernando, D.W. Balasooriya (USNM). Paratypes will be deposited in the Colombo and British museums.

The paratypes are 2.3–4.2 mm long. They are very similar to the holotype except that the red parts of the legs may occasionally be brownish, and the dorsal propodeal surface may be less coarsely sculptured in smaller specimens. Several males have part of the vertex indented as in many males of *Saltasega distorta*, new species, apparently a malformation due to the internal sculpturing of the host egg.

Serendibula Krombein

Serendibula Krombein, 1980:256–257, figs. 4, 6, 10–16.

This genus was based on both sexes of the type-

species from Sri Lanka, *S. deraniyagalai* Krombein, and a unique female of a smaller undescribed species from South India. These were the first brachypterous females known from the Oriental Region, and on that basis I suggested that *Serendibula* and the Australian *Myrmecomimesis* Dalla Torre, also a genus with brachypterous females, might be closely related Gondwanian relicts. That notion has been negated by the subsequent discovery in the Oriental Region of other genera with brachypterous females, and the realization that female brachypterism has arisen independently at least four times in the Australasian Series of Amiseginae.

The collection of five additional species of *Serendibula* in Sri Lanka from 1978 to 1981 requires slight modification of the original generic diagnosis. Some changes in that diagnosis are also needed because the smaller undescribed female from South India must be transferred to *Baeosega*, new genus. Critical study of specimens representing the males of two newly collected Ceylonese species and the females of three species of this new genus demonstrates that *Baeosega* is generically discrete from *Serendibula*. Female *Serendibula* have the posterolateral area of the propodeal dorsum rounded instead of being bluntly angulate, relatively longer ocular microtrichiae, numerous long erect setae on the dorsal meso- and metasoma, femora, and tibiae rather than sparser, much shorter setae, and the second metasomal tergum has the anterior area closely longitudinally carinate rather than smooth. Male *Serendibula* have parapsides on the median half of the scutum, the flagellum is stockier with the third segment 2.5 times as long as wide rather than 2.6 times, the suberect flagellar microtrichiae are only a fourth or a third as long as the width of the segment rather than half as wide, and the tarsal claw has an erect subbasal inner tooth rather than lacking such a tooth.

FEMALE.—Head in frontal view (Figure 9); width 1.1–1.2 times distance from clypeal apex to posterior ocelli; malar space without groove; apex of clypeus thickened; frontal concavity shallow, transversely rugose, median ridge weak or lack-

ing, abruptly declivous from upper front; eyes strongly bulging and with relatively long microtrichiae; vertex flat; occipital carina lacking; scape as long as pedicel and first two flagellar segments combined; flagellum fusiform, intermediate segments broader than long and with flattened sensory area beneath.

Thorax (Figure 15) relatively narrow compared to *Isegama* (Figure 13), the dorsum mostly coarsely and contiguously punctate and with quite long erect setae; median length of pronotum about twice the combined lengths of scutum and scutellum, the latter two sclerites 0.5–0.9 times as long as postscutellum; dorsum of pronotum with a deep median groove on posterior half or three-fourths; notauli deep, complete, curved outwardly toward anterolateral angle of scutum; parapsides absent; posterolateral angle of scutum with a small suberect lamella; tegula small, wings reduced to small pads no larger than tegula; postscutellum an elongate triangle with a pair of median, blunt recumbent teeth at apex; mesopleuron with an anterior ridge, discal groove beneath tegula absent; femora and tibiae with long erect setae; hind femoral ratio 4.2:1–4.3:1; hind coxa without a carina above on outer surface; tarsal claws with an erect subbasal tooth; propodeum with dorsal posterolateral angles rounded, lateral and posterior surfaces abruptly declivous.

Abdomen (Figure 11) not strongly flattened, the first two terga with tiny to small scattered punctures bearing long erect setae; second tergum with close longitudinal carinae on basal area.

MALE.—Head (Figure 18) width 1.2–1.3 times distance from clypeal apex to posterior ocelli; malar space with a groove sometimes obscured by close coarse punctation; clypeal apex not thickened; frontal concavity shallow, transversely rugose, median ridge lacking or weak, abruptly declivous from upper front; antenna filiform, longer than in female; scape as long as pedicel and first flagellar segment combined; flagellar segments circular in cross-section, clothed with dense suberect microtrichiae about a third or less as wide as segment; eyes strongly bulging with

relatively short microtrichiae; ocelli set in shallow concavities, arranged in a low triangle; vertex flat; occipital carina lacking.

Thorax (Figures 20, 21); pronotum coarsely punctate and with a median groove on posterior third or half; scutum, scutellum, postscutellum and mesopleuron shallowly pitted; notauli complete but not deep, gradually curving laterally toward base; parapsides feebly impressed or evanescent, extending only over median half of scutum; tegula normal in size, as are wings; venation of fore wing (Figure 17), stigma short, apical section acute, radial vein as long as stigma, slightly curved, continued to wing margin by a curved darkened streak; postscutellum with a pair of median, blunt recumbent teeth at apex; mesopleuron not ridged or grooved anteriorly, no discal groove below tegula; legs with dense, short subappressed setae; hind femoral ratio 3.0–3.4:1; dorsal surface of hind coxa carinate basally along outer margin; tarsal claw with a small erect sub-basal tooth; propodeum with dorsal posterolateral angles bluntly angulate, lateral and posterior surfaces abruptly declivous.

Abdomen slightly convex above (Figure 19), strongly convex beneath; dorsum of first two terga and second sternum with small, mostly somewhat separated punctures bearing short, suberect setae.

7. *Serendibula deraniyagalai* Krombein

FIGURES 9, 11, 15–21, 49–53

Serendibula deraniyagalai Krombein, 1980:257–259, figs. 4, 6, 10–16.

This species is known from several localities in the Dry Zone of the southeast quadrant of Sri Lanka.

Females are readily distinguished by the absence of close longitudinal carinae on the first metasomal tergum and by having these carinae on the second tergum covering a lesser area than in the other species, being restricted to the basal seventh along the midline and the basal half laterally. Males are more difficult to separate but

have some of the coarse punctures on the pronotal disk contiguous in oblique or arcuate rows, do not have the scutal punctures contiguous in transverse rows, the scape and most of the fore and mid-tibiae are light red, and the digitus is shorter than the aedeagus.

In my original discussion I suggested that two species of walking sticks with different sizes of eggs might be serving as hosts for *S. deraniyagalai* at Ekgal Aru. This observation was occasioned because the extensive series of females from this locality represented two size groups having mean head widths of 1.5 and 2.0 mm, respectively. Only one host might have been involved, however, if there was variation in the size of the eggs.

FEMALE.—Length 3.7–5.7 mm. Black and shining, top of head and dorsum of thorax dull from close punctation; mandible, malar space, occasionally scape and face, and thorax ferruginous, scutum rarely infuscated; undersides of scape and coxae castaneous at base; first flagellar segment amber; coxae at apex, mid-, and hind trochanters, and extreme base of hind femur, stramineous. Erect vestiture moderately long, black except cinereous on eye, mixed black and cinereous on femora and tibiae, and whitish on metasomal sterna and edges of terga.

Head in frontal view (Figure 9) with characters of genus; frontal concavity without median ridge; front adjacent to concavity and vertex with coarse, contiguous punctures; interocular distance at anterior ocellus 0.4 times head width; eyes clothed with relatively long microtrichiae.

Thorax (Figures 15, 16) with characters of genus; median length of pronotal dorsum 2.0–2.3 times combined lengths of scutum and scutellum; combined lengths of latter two sclerites 0.8–0.9 times the length of postscutellum; pronotum with median groove on posterior three-fourths; enclosed triangular area of postscutellum rugulospunctate, median length 1.2–1.4 times basal width; propodeum with posterior and lateral surfaces rugulosopunctate.

Abdomen with characters of the genus; metasomal terga (Figure 11) with scattered tiny punctures, each bearing a long erect seta; punctures

on first tergum sometimes small rather than tiny; base of second tergum with numerous, close, longitudinal carinae which are half as long as tergum laterally and gradually decrease in length to midline, where they are one-seventh the median length.

MALE.—Length 3.7–5.0 mm. Black; head and thorax somewhat dull from close punctation, abdomen shining; scape, anterior and mid-tibiae, mid-metatarsus, base and apex narrowly of hind tibia and declivous surface of first metasomal tergum, ferruginous. Erect vestiture half as long as in female, whitish to cinereous, except black on flagellum. Wings clear, veins testaceous (Figure 17).

Head (Figure 18) with characters of the genus; width 1.1–1.3 times distance from clypeal apex to posterior ocelli; malar space grooved, the groove sometimes obscured by coarse punctation; frontal concavity without median ridge; front adjacent to concavity and vertex punctured as coarsely but a bit more sparsely than in female; interocular distance at anterior ocellus 0.4 times head width; ocular microtrichiae half as long as in female.

Thorax (Figures 20, 21) with characters of genus; pronotum 0.8–1.0 times as long as scutum; pronotum with median groove on posterior half, dorsal surface with coarse punctures arranged more or less in slightly oblique rows; scutum with smaller, shallower subcontiguous punctures becoming larger toward apex, 1.0–1.3 times combined lengths of scutellum and postscutellum; scutellum subequal in length to postscutellum, with shallow pits the same size as posterior area of scutum, separated in middle by half or more the diameter of a puncture, becoming crowded laterally; U-shaped enclosed area of postscutellum 0.8–1.0 times as long as basal width, the central part with sparse shallow punctures flanked by about six radiating rugulae; mesopleuron without anterior ridge or groove, with moderately large, shallow, subcontiguous pits; lateral surface of propodeum glossy and impunctate except for a few small close punctures posteriorly, the posterior surface with close, fine, and irregular rugulae.

Abdomen (Figure 19) with characters of genus; declivous surface of first metasomal tergum glabrous and impunctate; dorsal surface of first and second terga and second sternum with small punctures mostly separated by half the diameter of a puncture except laterally on the second tergum where they are subcontiguous; digitus shorter than aedeagus.

SPECIMENS EXAMINED.—EASTERN PROVINCE. *Batticaloa District*: 1♀, Kalmunai, 1914 (Colombo Museum). *Amparai District*: 43♀, 7♂, Ekgal Aru Sanctuary, 150 m, 20–22 Feb, 10–11 Mar, 11–12 Jun, 5–6 Jul, 11–14 Sep, Karunaratne, Krombein, Krombein et al., Wijesinhe (USNM, Colombo, London; all but 5♀, 1♂ the type series).

UVA PROVINCE. *Badulla District*: 1♀, Bintenne Division, Nov, Henry (Colombo); 1♀, 6♂, Ulhitiya Oya, 15 mi (24 km) NNE Mahiyangana, 5–6 Sep, 6♂ in Malaise trap, Krombein et al. (USNM); *Monaragala District*: 2♀, Angunakolapelessa, 100 m, 27–28 Mar, 25 Sep, Karunaratne, Krombein (USNM, 1 paratype).

8. *Serendibula karunaratnei*, new species

FIGURE 64

This species occurs in the hill country of the Wet Zone in areas having a moderate annual rainfall averaging 1950 mm. It is particularly common along the highest ridge in Udawattakele Sanctuary, Kandy, where we collected 60 females and 15 males in or on leaf litter during March, April, July, September, and October. Presumably it is active in Kandy during much of the year except possibly during the two driest months, January and February.

Females of *S. karunaratnei* are similar in appearance to those of *S. deraniyagalai* Krombein, a species of the Dry Zone in the southeastern part of Sri Lanka. The female has close longitudinal carinae on the second metasomal tergum only, but they cover a more extensive area than in *S. deraniyagalai*, being present on the basal fourth or third of the length along the midline rather than the basal eighth or sixth, and on more than half the surface laterally instead of less than half. The

female of *S. karunaratnei* is similar in the extent of this basal carinate area to females of *S. insolita*, new species, and *S. gracilis*, new species, but has a relatively broader abdomen (first metasomal tergum 0.58–0.60 times as long as broad, see Figure 64) rather than the narrower abdomen (first metasomal tergum 0.64–0.73 times as long as broad) of those two species (Figures 62, 63).

Males of *S. karunaratnei* are also quite similar in appearance to those of *S. deraniyagalai*. Both species have some of the pronotal punctures arranged contiguously in oblique or arcuate rows, but lack transverse rows of contiguous punctures on the scutum as in *S. kasyapai*, new species. The appendages are predominantly dark in *S. karunaratnei*, whereas the scape is entirely light red in *S. deraniyagalai* and the fore and mid-tibiae are predominantly so. The metasoma is relatively broader in *S. karunaratnei*, the apical width of first being 2.85 times the length, whereas in *S. insolita* the width of the first is only 2.49 times the length.

ETYMOLOGY.—I take pleasure in naming this species for P.B. Karunaratne, former Curator of Insects in the Colombo Museum, companion on most of my collecting trips in his country, and collector of many of the specimens on which this contribution is based.

HOLOTYPE.—♀; Sri Lanka, Central Province, Kandy District, Kandy, Udawattakele Sanctuary, 600 m, on or in leaf litter, 12–14 Oct 1980, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, V. Gunawardane (USNM Type 100447).

FEMALE.—Length 4.5 mm. Black and shining, top of head and dorsum of thorax dull from close punctation; mandible, lower half of malar space and thorax ferruginous; first flagellar segment amber; coxae in part and trochanters stramineous. Erect vestiture moderately long, black except cinereous on eye, mixed black and cinereous on femora and tibiae, and whitish on metasomal sterna and edges of terga.

Head as in *S. deraniyagalai*.

Thorax as in *S. deraniyagalai* except median length of pronotal dorsum 1.9 times combined lengths of scutum and scutellum; combined

lengths of latter two sclerites 0.9 times the length of postscutellum; enclosed triangular area of postscutellum 1.4 times as long as basal width.

Abdomen as in *S. deraniyagalai* except punctures on first two terga tiny and scattered; close longitudinal carinae on second tergum a fourth as long as tergum on midline and 0.6 times as long as lateral length (Figure 64).

ALLOTYPE.—♂; same locality as holotype, but 18–20 Mar 1981, on leaf litter, K.V. Krombein, T. Wijesinhe, L. Weeratunge (USNM).

MALE.—Length 4.0 mm. Black, dorsum of head and thorax dull from coarse punctation but the interspaces between punctures glossy; apical half of mandible and scape beneath dark red; fore tibia brown, paler beneath as is the declivous surface of first metasomal tergum. Vestiture shorter than in female, whitish to cinereous except dark on flagellum. Wings clear, costa and stigma black, other veins medium brown.

Head as in *S. deraniyagalai* except: width 1.1 times height from clypeal apex to posterior ocelli; frontal concavity with weak median ridge; interocular distance at anterior ocellus 0.5 times head width.

Thorax as in *S. deraniyagalai* except: pronotum and scutum subequal in length; scutum subequal in length to scutellum and postscutellum combined, the latter two sclerites also subequal in length; U-shaped enclosed area of postscutellum 1.1 times as long as basal width.

Abdomen as in *S. deraniyagalai* except digitus as long as aedeagus in a paratype.

PARATYPES.—68♀, 18♂, as follows (all USNM). 2♀, 5♂, same label data as allotype; 4♂, same label data as allotype but 22 Mar 1981; 4♀, 4♂, same label data as allotype but 25–27 Apr 1981; 1♂, same locality but 2100 ft (628 m), 13 Jul 1976, S. Karunaratne; 6♀, same locality but 1800 ft (547 m), 21–22 Sep 1980, in or on leaf litter, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, V. Gunawardane; 6♀, same label data as preceding but 23–25 Sep 1980; 41♀, same label data as holotype. CENTRAL PROVINCE. *Kandy District*: 2♂, Thawalamtenne, in Malaise trap, 7–8 Sep 1980, K.V. Krombein, P.B. Karunaratne,

T. Wijesinhe, L. Jayawickrema, V. Gunawardane. SABARAGAMUWA PROVINCE. *Kegalla District*: 9♀, 2♂, Kitulgala, Bandarakele, in or on leaf litter, 15 Apr 1981, K.V. Krombein, L. Weeratunge, P. Leanage. Paratypes of both sexes will be placed in the Colombo and British museums. Three females from Kandy, May 1917, O.S. Wickwar (Colombo Museum) are excluded from the type series because they are moldy and broken.

Female paratypes are 4.0–5.2 mm long and may vary from the holotype in certain details: malar space may be red only above mandibular articulation; antenna may be entirely black; coxae may be black to a greater extent; median pronotal length is 1.9–2.2 times as long as combined lengths of scutum and scutellum; latter two sclerites are 0.8–0.9 times as long as postscutellum; postscutellar length is 0.6–0.8 times basal width of enclosed area; first metasomal tergum may have small rather than tiny punctures and the carinate area of second tergum is 0.2–0.3 times length of tergum along midline and 0.5–0.7 times as long as lateral length.

Male paratypes are 3.7–5.1 mm long and may vary from the allotype as follows: scape beneath and declivous surface of first metasomal tergum are rarely lighter red; mid-tibia is rarely light brown beneath toward apex; head width is 1.1–1.2 times height from apex of clypeus to posterior ocelli; frontal concavity may have median ridge evanescent or absent; interocular distance at anterior ocellus is 0.4–0.6 times head width; pronotal length is 0.9–1.0 times length of scutum; scutum is 1.0–1.3 times combined lengths of scutellum and postscutellum; scutellum is 1.0–1.2 times as long as postscutellum; and length of U-shaped area of postscutellum is 1.1–1.2 times basal width.

9. *Serendibula gracilis*, new species

FIGURE 62

The female of *S. gracilis* is similar to that of *S. karunaratnei*, new species, in having the carinate area of the second metasomal tergum more extensive than in *S. deraniyagalai*. It has a more slender abdomen than *S. karunaratnei*, the first tergum

being 0.64–0.73 times as long as wide rather than 0.58–0.60 times as long as broad, and viewed from above the front protrudes noticeably beyond the eyes instead of not protruding noticeably. The male of *S. gracilis* is smaller than other males (2.3–2.7 mm long instead of 3.6–5.1 mm long), the punctures on the pronotal disk are subcontiguous but are not arranged in oblique or arcuate rows, and the parapsides are absent or indicated only faintly.

The species is known only from two pairs from Udawattakele Sanctuary, Kandy, where it occurs with *S. karunaratnei*.

ETYMOLOGY.—The specific name is from the Latin *gracilis* (slender) and alludes to the shape of the abdomen.

HOLOTYPE.—♀; Sri Lanka, Central Province, Kandy District, Kandy, Udawattakele Sanctuary, 600 m, in or on leaf litter, 12–14 Oct 1980, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, V. Gunawardane (USNM Type 100448).

FEMALE.—Length 3.9 mm. Black and shining except top of head and thoracic dorsum dull from close punctation; mandible except tip, lower half of malar space and thorax light red; scape stramineous; apical half of fore and mid-coxae beneath, hind coxa beneath, trochanters and base of hind femur pallid white; extreme base of femora and mid- and hind tarsi light brown. Vestiture black except white on front, eyes, sides of last three metasomal terga and the sterna.

Head as in *S. deraniyagalai* except viewed from above front protrudes noticeably beyond eyes.

Thorax as in *S. deraniyagalai* except: median length of pronotal dorsum 1.8 times combined lengths of scutum and scutellum; combined lengths of latter two sclerites 1.1 times length of postscutellum; pronotal disk with a median groove on posterior two-thirds; median length of enclosed triangular area of postscutellum 1.2 times basal width.

Metasoma slender (Figure 62), the first tergum with length 0.7 times apical width, discal surface with scattered minute punctures; basal carinate

area of second tergum extending over basal fourth along midline and over lateral seven-tenths.

ALLOTYPE.—♂; same locality and collectors as holotype but 1800 ft (547 m), 21–22 Sep 1980, on leaf litter (USNM).

MALE.—Length 2.4 mm. Black; head and thorax somewhat dull from rough punctation but the interspaces shining as is abdomen; mandible except tip, scape beneath, and declivous surface of first metasomal tergum light red; fore and mid-tarsi light brown. Erect vestiture half as long as in female, whitish except brown on flagellum. Wings clear, costa and stigma dark brown, other veins light brown.

Head width 1.2 times distance from apex of clypeus to anterior ocellus; malar groove obscured by coarse punctation; frontal concavity shallow, weakly transversely rugulose, median ridge lacking; viewed from above the front somewhat protuberant; interocular distance at anterior ocellus 0.5 times head width; ocular microtrichiae half as long as in female.

Pronotum with median groove on posterior half, punctures contiguous but not arranged in oblique rows, 1.1 times as long as scutum; scutum with shallower punctures than pronotum but equally large, parapsides evanescent, 0.9 times as long as scutellum and postscutellum combined; scutellum 1.5 times as long as postscutellum, punctures somewhat separated; U-shaped area of postscutellum with length and basal width subequal, with sparse shallow punctures and flanked laterally by several oblique rugulae; mesopleuron with large, shallow, mostly subcontiguous pits; lateral surface of propodeum glossy, posterior surface closely, irregularly rugulosoreticulate.

Declivous surface of first metasomal tergum glossy and smooth; dorsum of first and second terga and second sternum with small punctures mostly separated by half the width of a puncture; digitus as long as aedeagus in paratype.

PARATYPES.—1♀, 1♂, same label data as holotype and allotype, respectively (USNM). The paratypes will be deposited in the Colombo Museum.

The female paratype is 3.6 mm long and is

similar in vestiture and color to the holotype, except that the tarsi and bases of femora are darker brown. It agrees in most other details, but the median pronotal length is 1.7 times combined lengths of scutum and scutellum.

The male paratype has the head indented behind the ocelli, a deformation possibly due to too small a host egg. It is very similar to the holotype in most details, but the scutellum is 1.1 times as long as postscutellum.

10. *Serendibula insolita*, new species

FIGURE 63

The female of *S. insolita* is very like that of *S. gracilis* in having a more slender abdomen than that of *S. karunaratnei*, and in having the front protruding noticeably beyond the eyes instead of not protruding noticeably. The horizontal area of the first metasomal tergum in *S. insolita* has larger punctures, many of which are separated from each other by no more than twice the width of a puncture, whereas on this area in *S. gracilis* the tiny punctures are quite scattered. Also, the carinate area of the second tergum extends farther toward the apex laterally in *S. insolita* (0.71–0.78) than in *S. gracilis* (0.59–0.60).

The male of *S. insolita* differs from that of *S. gracilis* in having some of the contiguous punctures on the pronotal disk arranged in oblique or arcuate rows. It differs from males of *S. deraniyagalai* and *S. karunaratnei* in having the metasoma relatively narrower, the width at juncture of first and second terga 2.49 times the length of the first and 1.47 times the length of the second, rather than 2.85 times the length of the first and 1.59 times the length of the second.

The species is known only from two females and one male from the Badegamuwa Jungle, Kurunegala, in the Wet Zone where the average annual rainfall is 2075 mm.

ETYMOLOGY.—The specific name is based on the Latin *insolitus* (unusual).

HOLOTYPE.—♀; Sri Lanka, North Western Province, Kurunegala District, Kurunegala, Badegamuwa Jungle, in or on leaf litter, 14–15 Mar

1981, K.V. Krombein, T. Wijesinha, L. Weerantunge (USNM Type 100449).

FEMALE.—Length 3.8 mm. Black and shining, except top of head and thoracic dorsum dull from close punctation; mandible except tip, apex of malar space, thorax except middle of scutum, and tarsi beneath light red; scape beneath and tarsi above medium brown; apical half of fore and mid-coxae beneath, hind coxa beneath and trochanters pallid white; extreme bases of mid- and hind femora and of all tibiae stramineous. Vestiture black except white on front, eyes, sides of last three metasomal terga and sterna.

Head as in *S. deraniyagalai* except viewed from above, front protrudes noticeably beyond eyes.

Thorax as in *S. deraniyagalai* except median length of pronotal dorsum 2.0 times combined lengths of scutum and scutellum which are equal in length; combined lengths of latter two sclerites 0.9 times length of postscutellum; enclosed triangular area of postscutellum 1.4 times basal width.

Metasoma slender (Figure 63), the first tergum with length 0.78 times apical width, dorsal area with relatively large punctures, many of them separated by not more than twice the width of a puncture; carinate basal area of second tergum 0.3 times as wide as length along midline and extending over lateral four-fifths.

ALLOTYPE.—♂; same locality, date and collector as holotype (USNM).

MALE.—Length 3.5 mm. Black; head and thorax somewhat dull from coarse punctation but interspaces shining as is abdomen; scape beneath, fore tibia beneath, and declivous surface of first metasomal segment, medium red; rest of fore tibia, mid-tibia, base of hind tibia, and fore tarsus brown; mid-tarsus stramineous. Erect vestiture shorter than in female, whitish except brown on flagellum. Wings clear, costa and stigma medium brown, other veins light brown.

Head width 1.2 times distance from clypeal apex to posterior ocelli; malar groove distinct; frontal concavity shallow, transversely rugulose, median ridge lacking; viewed from above the front protruding somewhat beyond eyes; inter-

ocular distance at anterior ocellus 0.4 times head width; ocular microtrichiae shorter than in female.

Pronotum with median groove on posterior two-thirds, punctures contiguous, some of them arranged in arcuate rows, 0.9 times as long as scutum; scutum with shallower contiguous punctures but equal in size to those on pronotal disk, not arranged in transverse rows, 1.1 times as long as combined lengths of scutellum and postscutellum, the latter two equally long; scutellar punctures more separated in middle than on scutum but contiguous at sides; U-shaped area of postscutellum 1.6 times as long as basal width, with sparse shallow punctures and flanked laterally by short oblique rugulae; mesopleuron with large, shallow, mostly subcontiguous pits, but anteriorly some separated by half the width of a puncture; lateral surface of propodeum glossy, posterior surface closely, irregularly rugulosoreticulate.

Metasoma relatively slender, width at juncture of first and second terga 2.5 times length of first and 1.5 times length of second; declivous surface of first tergum glossy and smooth; dorsum of first tergum, and second tergum and sternum with small punctures mostly separated by half the width of a puncture; digitus as long as aedeagus.

PARATYPE.—1♀, same label data as holotype (USNM). It will be deposited in the Colombo Museum.

The paratype also is 3.8 mm long and differs from the holotype as follows: thorax entirely light red; median length of pronotal dorsum 1.8 times combined lengths of scutum and scutellum; scutum 1.25 times as long as scutellum, and combined lengths of these sclerites 1.1 times as long as postscutellum; enclosed triangular area of postscutellum 1.3 times basal width; and first metasomal tergum with median length 0.71 times apical width, apically with a few short longitudinal striae.

11. *Serendibula paradoxa*, new species

Females of *S. paradoxa* and the following new species, *S. kasyapai*, differ at once from those of

the preceding four species because the dorsal surface of the first metasomal tergum is covered with close longitudinal carinae and interspersed punctures rather than being punctate only. In *S. paradoxa* the head and antenna are entirely dark except for apex of malar space and the carinate area of the second tergum is longer, two-thirds as long on midline, whereas in *S. kasyapai* the head is predominantly light red, as are one or more of the basal antennal segments, and the carinate area of the second tergum is shorter, one-fourth as long on midline.

The species is known from a single female from the same locality as the type series of *S. insolita*, new species.

ETYMOLOGY.—The specific name is based on the Latin *paradoxus* (strange).

HOLOTYPE.—♀; Sri Lanka, North Western Province, Kurunegala District, Kurunegala, Badegamuwa Jungle, in leaf litter, 20 Sep 1980, K.V. Krombein (USNM Type 100450).

FEMALE.—Length 3.8 mm. Black and shining except top of head and thoracic dorsum dull from close punctation; middle of scutum light red; fore and mid-coxae beneath at apex, white; extreme base of tibiae stramineous. Vestiture black except white on sides of front, eyes, third and fourth metasomal terga, and all sterna.

Head as in *S. deraniyagalai*.

Thorax as in *S. deraniyagalai* except median length of pronotal dorsum 1.6 times combined lengths of scutum and scutellum, the scutum 1.5 times as long as scutellum, and these two sclerites combined subequal in length to postscutellum; pronotum with median groove on posterior half; enclosed triangular area of postscutellum with length and basal width subequal.

Abdomen as in *S. deraniyagalai* except most of dorsal area of first tergum closely longitudinally carinate with interspersed, scattered small punctures except laterally where punctures are contiguous; second tergum with close longitudinal carinae extending over basal two-thirds along midline and basal four-fifths laterally.

MALE.—Unknown.

12. *Serendibula kasyapai*, new species

FIGURES 31, 46-48

The females of this species and of *S. paradoxa*, new species, are distinguished from females of other species by having the dorsal aspect of the first metasomal tergum closely longitudinally carinate with scattered punctures rather than being punctate only. The head of *Serendibula kasyapai* is predominantly red, and the carinate area of the second tergum is shorter, one-fourth the length of the segment along the midline, whereas in *S. paradoxa* the head is almost entirely dark, and the carinate area extends over the basal two-thirds along the midline. The male of *S. paradoxa* is unknown, but that of *S. kasyapai* is readily separated from those of all other species by having many of the contiguous punctures of the scutum arranged in transverse rows.

ETYMOLOGY.—The species is named after the parricide king, Kasyapa, who built his fabulous palace on Sigiriya Rock near the end of the fifth century A.D. The type series was collected in the jungle at Kibissa just half a mile from Sigiriya.

HOLOTYPE.—♀; Sri Lanka, Central Province, Matale District, Kibissa, 0.5 mi (0.8 km) W of Sigiriya, jungle, 3 Jul 1978, K.V. Krombein, P.B. Karunaratne (USNM Type 100451).

FEMALE.—Length 5.7 mm. Black and shining, except top of head and dorsum of thorax dull from close punctation; the following light red; mandible except tip, entire first flagellar segment and underside of second, front, upper half of temple, occiput, thorax, fore femur, underside of tibia and tarsus, and mid- and hind tarsi except apical segment; coxae except narrowly at base and trochanters pallid white; mid- and hind femora and tibiae stramineous at base. Erect vestiture moderately long, black except cinereous on eye, mixed black and cinereous on femora and tibiae, and whitish on last two terga and most sterna.

Head as in *S. deraniyagalai*.

Thorax as in *S. deraniyagalai* except pronotal groove present only on posterior half; median length of pronotal dorsum 1.6 times combined lengths of scutum and scutellum, the latter two

sclerites subequal in length to postscutellum; enclosed triangular area of postscutellum 1.4 times as long as basal width.

Abdomen (Figure 31) as in *S. deraniyagalai* except dorsal area of first tergum with close longitudinal carinae with interspersed, scattered small punctures except laterally where they are larger and subcontiguous; close parallel carinae on second tergum present on basal fourth along midline and basal two-thirds laterally.

ALLOTYPE.—♂; same locality and collectors as holotype, but 2 Jul 1978, in yellow pan trap (USNM).

MALE.—Length 4.9 mm. Black, dorsum of head and thorax dull from coarse punctation, but interspaces between punctures glossy; the following light red: basal two-thirds of mandible, scape, rest of antenna beneath, fore tibia beneath, tarsi, and declivous surface of first metasomal tergum; fore tibia above light brown. Vestiture shorter than in female, whitish to cinereous except dark on flagellum. Wings slightly infumated, costa and stigma dark brown, other veins light brown.

Head as in *S. deraniyagalai* except: head width 1.2 times distance from clypeal apex to posterior ocelli; frontal concavity with a weak median ridge; interocular distance at anterior ocellus 0.5 times head width.

Thorax as in *S. deraniyagalai* except: pronotum 1.1 times as long as scutum, the latter with some of contiguous punctures arranged in transverse rows; scutellum and postscutellum combined 1.2 times as long as scutum, and postscutellum 1.2 times as long as scutellum; U-shaped enclosure of postscutellum with length and basal width equal.

Abdomen as in *S. deraniyagalai* except digitus as long as aedeagus in a paratype.

PARATYPES.—4♀, 10♂, same locality and collectors as holotype but other data as follows: 2♀, 4♂, 30 Jun 1978, 1♂ in yellow pan trap; 1♀, 5♂, 2 Jul 1978, 1♂ in Malaise trap, 1♂ in yellow pan trap; and 1♀, 1♂, 3 Jul 1978. Paratypes of both sexes will be deposited in the Colombo and British museums.

Female paratypes are 4.7–5.2 mm long. They are similar in coloration to the holotype except

that occasionally the head is entirely red except for the ocellar triangle. The median pronotal groove may extend over the posterior three-fifths, the pronotal length varies from 1.8–2.0 times combined lengths of scutum and scutellum, the latter two sclerites together may be 0.8–0.9 times as long as the postscutellum, and the triangular area of the postscutellum is 1.4–1.5 times as long as basal width.

Male paratypes are 3.5–5.5 mm long and the mid-tibia is rarely light red beneath. The head width is 1.2–1.3 times the distance from clypeal apex to posterior ocelli, and the interocular distance at anterior ocellus is 0.4–0.5 times head width. The pronotum is 1.0–1.1 times as long as scutum, the scutellum and postscutellum combined are 1.1–1.2 times as long as scutum, the postscutellum is 1.2–1.4 times as long as scutum, and the length of the U-shaped enclosed area of postscutellum is 1.0–1.1 times basal width.

Imasega, new genus

This distinctive genus is known only from a short series of males of the type-species, *I. rufithorax*, collected at several localities in the Sinharaja Jungle, the largest remaining tract of lowland rain forest in Sri Lanka. The specimens were taken on vegetation only a few inches above the ground. A search on the leaf litter in the same areas revealed no females, but the leaf litter was very thick and we may have missed them. The female may be fully winged, or brachypterous and flightless, as are most females of Ceylonese genera.

The combination of characters separating *Imasega* from males of other genera are the evanescence or lack of transverse ridges on the frontal concavity (Figure 55), the thickened clypeal apex, filiform antenna with flagellar microtrichiae half as long as the width of the segment, short parapsides, blunt posterolateral angle of the propodeal dorsum, absence of a carina on upper inner margin of hind coxa, appressed to subappressed short vestiture on legs, and the narrow linear extension of the stigma (cf. Figure 28).

TYPE-SPECIES.—*Imasega rufithorax*, new species.

ETYMOLOGY.—The generic name is feminine and is an anagram of *Amisega* Cameron.

MALE.—Head, 1.24–1.36 times as wide as distance from clypeal apex to hind ocelli and 2.0–2.2 times as wide as interocular distance at anterior ocellus; malar space sparsely punctate and with a groove from lower eye margin to mandibular articulation; clypeal apex thickened; frontal concavity with transverse ridges evanescent or absent, median vertical ridge lacking (Figure 55); antenna filiform, scape 0.8 times as long as pedicel and first flagellar segment combined; flagellar segments cylindrical, clothed with dense microtrichiae half as long as width of segment, intermediate segments 4–5 times as long as wide; eyes strongly bulging, clothed with short microtrichiae; ocelli in a low triangle, set in shallow concavities; vertex flat; occipital carina lacking.

Pronotal disk with moderately small confluent punctures, median groove present on posterior two-thirds; scutum with smaller confluent punctures between notauli and larger confluent punctures laterally, notauli complete, parallel except curving outwardly at extreme base, parapsides weakly impressed, present on median half; scutellum with shallow confluent punctures; tegula normal in size as are wings; stigma of fore wing with a linear apical extension 0.7 times as long as wider basal section, radial vein curved, not as long as stigma and continued toward wing margin by an evenly curved dark streak; postscutellum with a pair of median appressed blunt teeth at apex; mesopleuron without anterior oblique groove and without discal groove below tegula; legs with dense, short subappressed setae; hind femoral ratio 2.9:1; hind coxa above without a dorsal carina along inner margin; tarsal claw with a large erect subbasal tooth; propodeum with dorsal posterolateral angles bluntly angulate, lateral and posterior surfaces abruptly declivous.

Abdomen flattened above, convex beneath; dorsum of first two terga and second sternum with small punctures separated by half or more the diameter of a puncture and bearing short suberect setae.

FEMALE.—UNKNOWN.

13. *Imasega rufithorax*, new species

FIGURE 55

The combination of characters listed in the generic discussion separates males of *I. rufithorax* from those of all other Ceylonese species. The predominantly or entirely light red thorax distinguishes *I. rufithorax* from all taxa except males of *Baeosega*, new genus. However, in the latter genus the head also is partly red (black in *Imasega*), the dorsum of the thorax is mostly dark, and the stigma does not have a linear apical extension.

The unknown female of *I. rufithorax* may be brachypterous and flightless as are females of most Ceylonese genera, or she may be fully winged as in the new genera *Perissosega* and *Isegama*. I anticipate that the female will have a light red thorax as does the male. This is true of *Baeosega* females, whose males also have a partially red thorax.

HOLOTYPE.—♂; Sri Lanka, Southern Province, Galle District, Sinharaja Jungle, Kanneliya section, 16 Jul 1978, K.V. Krombein, P.B. Karunaratne (USNM Type 100452).

MALE.—Length 4.2 mm. Black, the following light red: mandible except tip, clypeus, scape, thorax, declivous surface of first metasomal tergum, and first sternum; coxae, trochanters, femora and fore tibiae white; mid- and hind tibiae, and mid-basitarsus ivory; rest of tarsal segments brown. Wings clear, costa, radius and stigma dark brown, other veins light brown. Vestiture short, sparse, suberect, white to cinereous on body, dark on flagellum, and with a slightly yellowish tinge on legs.

Head (Figure 55) with characters of the genus and the following: 1.29 times as wide as distance from clypeal apex to posterior ocelli and 2.2 times the interocular distance at anterior ocellus; frontal concavity with vestiges of a few transverse ridges, median carina lacking; intermediate flagellar segments four times as long as wide.

Thorax as described for genus and as follows: pronotal disk with many punctures tending to be confluent in oblique rows from midline, subequal in length to scutum and 0.6 times as long as

combined lengths of scutum and scutellum; post-scutellum 1.1 times as long as scutellum, the median triangular area 0.8 times as long as basal width; propodeal dorsum narrow, with a low posterior carina and short irregular longitudinal rugulae; posterior propodeal surface with a weak median ridge and transverse rugulae becoming irregular laterally; lateral propodeal surface glossy except for a few short oblique rugulae posteriorly above.

Abdomen as described for genus.

FEMALE.—Unknown.

PARATYPES.—3♂, same data as holotype (USNM). SABARAGAMUWA PROVINCE. *Ratnapura District*: 1♂, Sinharaja Jungle, Waturawa Forest, 2 Jul 1981, P.B. Karunaratne (USNM). 1♂, same data as preceding, but Daminagala Hill, 20–23 Oct 1981 (USNM). A paratype will be placed in both the Colombo and British museums.

The paratypes are 2.5–4.8 mm long and are similar to the holotype in many respects. The color is the same except three smaller specimens have small infuscated areas on scutum and post-scutellum, and the fourth smaller specimen has more extensive infuscated areas on dorsum and sides of thorax and propodeum; the latter specimen also has only coxae and trochanters white, the other white areas replaced by amber. The head is 1.24–1.36 times as wide as distance from clypeal apex to posterior ocelli and 2.0–2.2 times interocular distance at anterior ocellus; the intermediate flagellar segments are 4.0–5.0 times as long as wide; the pronotum is 0.8–1.2 times as long as scutum; the scutellum and postscutellum are 1.4–1.8 times as long as pronotum; the post-scutellum is 1.1–1.2 times as long as scutellum; and the median triangular area of postscutellum is 0.7–0.8 times as long as width at base.

Baeosega, new genus

Superficially, the species of *Baeosega* resemble small, comparatively more slender species of *Serendibula*. Females of *Baeosega* have the posterolateral angles of the propodeal dorsum bluntly angulate rather than rounded; the second metaso-

mal dorsum lacks the close longitudinal carinae of *Serendibula*; the dorsal surfaces of meso- and metasoma, and the femora and tibiae have much shorter, sparser setae than in *Serendibula*; and the ocular microtrichiae are noticeably shorter. Males of *Baeosega* differ from those of *Serendibula* in lacking parapsides on the scutum, the tarsal claws lack a minute, erect subbasal tooth, the antennal flagellum is more slender and bears dense erect microtrichiae which are half as long as the width of a segment rather than a third or less the width.

Four species of *Baeosega* are known: *B. torrida*, new species, from several localities in the Dry Zone, *B. humida*, new species and *B. laticeps*, new species, both from Udawattakele Sanctuary, Kandy, in the Wet Zone, and an undescribed new species from Madras, South India, which I considered earlier (Krombein, 1980:256) to be a species of *Serendibula*.

TYPE-SPECIES.—*Baeosega torrida*, new species.

ETYMOLOGY.—The generic name is feminine, and is based on the Greek *baios* (small) plus *-sega* (from *Amisega* Cameron).

FEMALE.—Small forms, 1.8–2.9 mm long; head and mesosoma dull from close punctation, interspaces between punctures finely granulate, abdomen shining.

Head width 1.1–1.9 times the distance from clypeal apex to posterior ocelli and 2.6–5.7 times interocular distance at anterior ocellus; malar space not grooved; clypeal apex not thickened; frontal concavity shallow, weakly to strongly transversely ridged, median ridge lacking; eyes not strongly bulging, microtrichiae shorter than in *Serendibula*; vertex flat to slightly convex; occipital carina lacking; scape as long as pedicel and first two flagellar segments combined; flagellum fusiform, intermediate segments broader than long, and with flattened sensory areas beneath.

Thorax slightly more slender than in *Serendibula*, dorsum with punctures more separated and with granular interspaces (Figure 58), the erect setae much sparser and shorter; pronotum with median groove on posterior three-fourths, 0.7–1.0 times as long as greatest width; notauli complete, deep, diverging toward base and curved out-

wardly there; parapsides absent; posterolateral angles of scutum slightly upturned; tegula small, wings reduced to small pads which extend only to posterior margin of scutellum; postscutellum triangular, relatively shorter than in *Serendibula*, apex with a pair of recumbent teeth, triangular punctate area at base shorter than in *Serendibula*, margined by an area of oblique rugulae; mesopleuron with an anterior ridge, discal groove beneath tegula absent; femora and tibiae mostly with short, subappressed setae and only scattered, short erect setae; hind femoral ratio 4.3:1; tarsal claws with a small erect subbasal tooth; propodeum with dorsal posterolateral angles bluntly angulate, lateral and posterior surfaces abruptly declivous.

Abdomen (Figure 32) not strongly flattened; first two terga with scattered minute punctures and sparse erect to subappressed setae; second without basal longitudinally carinate area.

MALE.—Small forms, 2.3–2.7 mm long; head and mesosoma dull from close punctation, abdomen shining.

Head width 1.6–1.8 times distance from clypeal apex to posterior ocelli and 1.8–2.0 times interocular distance at anterior ocellus; malar space with a groove from lower eye margin to mandibular articulation; clypeal apex not thickened; frontal concavity shallow, with weak transverse rugulae, median ridge absent, abruptly declivous from upper front; antenna filiform, longer than in female; scape as long as pedicel and first flagellar segment combined; flagellar segments cylindrical, clothed with numerous erect microtrichiae half as wide as segment, intermediate segments three times as long as wide; eyes strongly bulging, clothed with somewhat longer microtrichiae than female; ocelli set in shallow concavities, arranged in a low triangle; vertex flat; occipital carina lacking.

Pronotum closely punctate with a shallow median groove on posterior half; scutum similarly punctate, parapsides lacking, notauli complete, diverging slightly toward base except strongly curved outward on basal fourth; tegula normal in size as are wings, fore wing stigma shorter than

radial vein and lacking a linear extension at apex, radial vein slightly curved and continued toward margin by a darkened curved streak; scutellar punctation as on scutum; postscutellum with a pair of blunt recumbent teeth at apex; mesopleuron not ridged or grooved anteriorly, discal groove below tegula absent; legs with short, subappressed setae; hind femoral ratio 3.2:1; dorsal surface of hind coxa carinate along outer margin at base; tarsal claws without a subbasal tooth; propodeum with dorsal posterolateral angles weakly, bluntly angulate, lateral and posterior surfaces abruptly declivous.

Abdomen above slightly convex, second sternum strongly convex; dorsum of first two terga and second sternum with small punctures separated by distances varying from half to the diameter of a puncture and bearing short subappressed setae.

14. *Bacosega torrida*, new species

FIGURE 32

This species occurs in several Dry Zone localities at altitudes ranging from 15 to 660 m, and with rainfall ranging from 860 to 1450 mm. Both sexes are more erythristic than *B. humida*, new species, and *B. laticeps*, new species. The male of *B. torrida* has the dorsum of the head and pronotum light red except occasionally the ocellar area, whereas these areas are mostly or entirely infuscated in *B. humida*. In addition, males of *B. torrida* have the head comparatively wider than the least interocular distance (1.93–2.04 as compared to 1.80–1.96 in *B. humida*), the pronotal width at lobes is comparatively wider than median length (1.36–1.41 as compared to usually 1.05–1.30), and the mesopleural disk has contiguous shallow pits rather than pits ranging from contiguous to separated by half the diameter of a pit. Females of *B. torrida* are easily separated from those of the other two species by the presence of a few delicate, longitudinal rugulae on declivous surface of first metasomal tergum, the light red and testaceous legs rather than having these partly dark brown or black, the delicately shagreened first and sec-

ond metasomal terga (Figure 32) with more conspicuous erect and subdecumbent silvery vestiture rather than having these areas glossy and with less conspicuous vestiture.

HOLOTYPE.—♀; Sri Lanka, Southern Province, Uva District, Angunakolapelessa, 27–28 Mar 1981, on or in leaf litter, K.V. Krombein, T. Wijesinhe, L. Weeratunge (USNM Type 100453).

FEMALE.—Length 2.4 mm. Black, the following light red: mandible except tip, clypeus, lower part of the malar space, scape except apex above, first three flagellar segments, thorax except brown scutum, and legs except coxae, trochanters, femora beneath and mid and hind tarsi testaceous. Vestiture silvery to cinereous, erect setae on head, thoracic dorsum, legs and metasomal dorsum relatively short and sparse, most of that on side of thorax denser and subdecumbent, that on abdomen suberect to subappressed and more conspicuous than in *B. humida*.

Head with characters of the genus and the following: head width 1.1 times the distance from clypeal apex to posterior ocelli and 3.1 times interocular distance at anterior ocellus; scape as long as pedicel and first three flagellar segments.

Thorax with characters of the genus and the following: median pronotal length 0.8 times greatest width; median length of pronotum 1.6 times combined lengths of scutum and scutellum, the latter 0.7 times as long as scutum and half the length of postscutellum; punctate basal area of postscutellum with length half the basal width and 0.4 times length of postscutellum; posterior propodeal surface with close transverse rugulae which carry over onto posterior area of lateral surface.

Abdomen (Figure 32) with characters of the genus and the following: declivous anterior surface of first tergum with a few delicate radiating rugulae; dorsal surface of first two terga with delicate shagreening and a mixture of longer erect sparse setae and shorter subdecumbent setae.

ALLOTYPE.—♂; same locality as holotype but 100 m, 23 Jan 1979, in Malaise trap, K.V. Krom-

bein, P.B. Karunaratne, T. Wijesinhe, S. Siriwardane, T. Gunawardane (USNM).

MALE.—Length 2.3 mm. Black, the following light red: head and appendages except apical half of flagellum light brown, thorax and appendages except scutum and scutellum dark red and postscutellum and propodeal dorsum infuscated, and basal half of first metasomal tergum, rest of abdomen light brown. Vestiture short, silvery, subappressed except light brown and erect on flagellum. Wings slightly infumated, costa, radius, and stigma light brown, other veins amber.

Head with characters of genus and as follows: width twice the interocular distance at anterior ocellus and 1.7 times distance from clypeal apex to posterior ocelli; ocelli in a flatter triangle than in *B. humida*, new species, ocellocular distance 0.45 times postocellar distance and 0.83 times lateral ocellar distance.

Thorax with characters of the genus and as follows: pronotum 0.7 times as long as wide, and three-fourths as long as combined lengths of scutum and scutellum; latter sclerite 0.6 times as long as scutum and 1.3 times as long as postscutellum; mesopleural pits large, shallow, and subcontiguous.

Abdomen with characters of genus; most punctures on disk of first and second terga separated by about half the diameter of a puncture.

PARATYPES.—All USNM. 15♀, same label data as holotype; 2♀, same locality as holotype but 17, 18 Jun 1978, K.V. Krombein; 1♂, same label data as allotype. **SOUTHERN PROVINCE.** *Hambantota District:* 18 ♀, Palatupana tank, 15 m, in or on leaf litter, 29 Mar–2 Apr 1981, K.V. Krombein, T. Wijesinhe, L. Weeratunge. **CENTRAL PROVINCE.** *Kandy District:* 1 ♂, Thawalammenne, 2220 ft (669 m), 4 Sep 1980, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, V. Gunawardane. **CENTRAL PROVINCE.** *Matale District:* 1 ♀, 2 ♂, Kibissa jungle, 0.5 mi (0.8 km) W of Sigiriya, 30 Jun–3 Jul 1978, K.V. Krombein, P.B. Karunaratne. Paratypes of both sexes will be deposited in the Colombo and the British museums.

Female paratypes are 1.8–2.7 mm long. The color is slightly variable; the scutum is frequently

red, the pronotum occasionally has an antero-medial infuscation and more rarely such a spot laterally, and the femora may be infuscated in part. Variation otherwise is as follows: head width is 2.5–3.2 times the interocular distance at anterior ocellus and 1.0–1.1 times the distance from clypeal apex to posterior ocelli; median pronotal length is 0.8–0.9 times greatest width, and 1.2–1.4 times combined lengths of scutum and scutellum; and scutellum is 0.5–0.7 times as long as scutum, and 0.5–0.6 times as long as postscutellum.

Male paratypes are 2.3–2.5 mm long. There is the following variability in coloration: ocellar triangle is infuscated in one specimen; scutum is light red in one specimen; and in three specimens the thoracic dorsum ranges from darker red to almost entirely infuscated. Variation otherwise is as follows: head width is 1.9–2.0 times interocular distance at anterior ocellus and 1.6–1.7 times distance from clypeal apex to posterior ocelli; median pronotal length is 0.67–0.71 times combined lengths of scutum and scutellum; and latter sclerite is 0.48–0.50 times as long as scutum and 1.0–1.1 times as long as postscutellum.

15. *Baeosega humida*, new species

FIGURES 56, 58

Baeosega humida has been found in or on leaf litter only on the highest ridge of Udawattakele Sanctuary, Kandy, in the Wet Zone at an altitude of 600 m, where the average annual rainfall is 1950 mm. It is known from both sexes, and occurs in the same areas as *B. laticeps*, new species, which is known only from females. Females of those two species are readily separated from those of *B. torrida*, new species, by the lack of delicate rugulae on the declivous anterior surface of the first metasomal tergum, the glossic first and second terga with less conspicuous suberect vestiture, and in having the legs partly to predominantly dark brown or black rather than light red and testaceous. Females of *B. humida* and *B. laticeps* are very similar to each other, differing chiefly in cephalic and thoracic indices as follows: in the

former species the head width is 3.1–3.3 times the least interocular distance (Figure 56), the head is narrower in proportion to dorsal length (1.4–1.6:1), the upper front is straight or slightly protuberant between the eyes, and the pronotal length and width are subequal, whereas in the latter species the head width is 2.8–2.9 times least interocular distance (Figure 57), the head is broader in proportion to the dorsal length (1.7–1.9:1), the upper front is slightly concave between the eyes, and the pronotal length is 0.8 times the width. The abdomen is more weakly chitinized in females of *B. humida* than in those of *B. laticeps*; the sides of the second metasomal segment are always partially collapsed in the former species but not at all deformed in the latter. Males of *B. humida* are less erythristic than those of *B. torrida*, especially on the dorsum of the head and thorax, the head is comparatively narrower than the least interocular distance (1.80–1.96 as compared to 1.93–2.04), and the pronotal width at the lobes is comparatively narrower than median length (usually 1.05–1.30 as compared to 1.36–1.41).

HOLOTYPE.—♀; Sri Lanka, Central Province, Kandy District, Kandy, Udawattakele Sanctuary, 1800 ft (547 m), 23–25 Sep 1980, on or in leaf litter, K.V. Krombein, P.B. Karunaratne, L. Jayawickrema, V. Gunawardane, P. Leanage (USNM Type 100454).

FEMALE.—Length 2.4 mm. Black, the following light red: mandible except tip, scape, pedicel, first three flagellar segments, anterior and lateral margin of pronotum, prosternum, upper half of mesopleuron, lower half of posterior propodeal surface, undersides of femora and tibiae, and tarsi; coxae partially and trochanters wholly testaceous; the following light to dark brown—pronotum, postscutellum, lower half of mesopleuron, propodeum except lower half of posterior surface, upper surface of femora and tibiae, and declivous surface of first metasomal tergum. Vestiture silvery to cinereous, erect setae on head, thoracic dorsum, legs and metasomal dorsum relatively short and sparse, most of that on side of thorax dense and suberect, that on abdomen suberect to subappressed but sparser than in *B. torrida*.

Head with characters of the genus and the following: width only slightly greater (1.06) than distance from apex of clypeus to posterior ocelli, and 2.9 times interocular distance at anterior ocellus; viewed from above (Figure 56) head 1.6 times length, upper front slightly protuberant.

Thorax with characters of the genus and the following: pronotum as long as greatest width and 1.5 times as long as combined lengths of scutum and scutellum, the latter 0.7 times as long as scutum and 0.6 times as long as postscutellum; posterior surface of propodeum with transverse rugulae which carry over onto posterior part of lateral surface.

Abdomen with characters of the genus and the following: Declivous surface of first metasomal tergum smooth; surface of terga glossy, vestiture sparser and less conspicuous than in *B. torrida*; second laterotergum collapsed inward.

ALLOTYPE.—♂; same location as holotype, 21–22 Sep 1980, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, V. Gunawardane (USNM).

MALE.—Length 2.6 mm. Black, the following light red: Mandible except apex, clypeus, front to level of anterior ocellus, malar area, scape, pedicel, first two flagellar segments, lateral surface of pronotum, mesopleuron except infuscation near lower margin, legs except tarsi, declivous surface of first metasomal tergum, first and second lateroterga, and first and second sterna; remainder of flagellum and tarsi brown. Vestiture short, silvery, subappressed except light brown and erect on flagellum. Wings slightly infumated, costa, radius, and stigma dark brown, other veins light brown.

Head with characters of genus and as follows: width twice interocular distance at anterior ocellus and 1.8 times distance from clypeal apex to posterior ocelli; ocelli in a higher triangle than in *B. torrida*, ocellocular distance 0.36 times post-ocellar distance and 0.57 times lateral ocellar distance.

Thorax with characters of genus and as follows: pronotum 0.7 times as long as wide and 0.7 times as long as combined lengths of scutum and scu-

tellum; latter sclerite half as long as scutum, and subequal in length to postscutellum; mesopleural pits large, shallow, some of them subcontiguous but others separated by half the diameter of a pit.

Abdomen with characters of genus and as follows: most punctures on disk of first and second terga separated by about half the diameter of a puncture; second laterotergum collapsed inward.

PARATYPES.—All USNM; 30♀, 6♂, same locality as holotype, other data as follows: 7♀, 1♂, same label data as holotype; 5♀, 1♂, same data as allotype; 6♀, 2♂, 600 m, 12–14 Oct 1980, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, V. Gunawardane; 1♂, 22 Mar 1981, K.V. Krombein, T. Wijesinhe, L. Weerantunge; 12♀, 1♂, 25–27 Apr 1981, same collectors as preceding. Paratypes of both sexes will be placed in the Colombo and British museums.

Female paratypes are 2.3–2.7 mm long. There is an extensive range of color variation in *B. humida*, the holotype being representative of the darkest phase. The most erythristic individuals have the following light red in addition to that noted for the holotype: pronotum except infuscated blotch across middle, entire mesopleuron, postscutellum, propodeum, femora, and hind tibia. Other variations from the holotype are as follows: head width 1.04–1.13 times distance from clypeal apex to posterior ocelli, and 2.7–3.0 times interocular distance at anterior ocellus; viewed from above, head 1.4–1.6 times length; pronotal length 0.9–1.0 times greatest width and 1.5–1.8 times as long as combined lengths of scutum and scutellum, the latter 0.5–0.8 times as long as scutum and 0.4–0.6 times as long as postscutellum; and the side of the second metasomal tergum may be collapsed inward as well as the laterotergum.

Male paratypes are 2.3–2.7 mm long. There is relatively little variation in the color pattern as follows: temple, posterior occiput, and posterior margin of pronotal disk may be light red, and mesopleuron may be infuscated. Other variations are as follows: head width is 1.8–2.0 times interocular distance at anterior ocellus and 1.6–1.7 times distance from clypeal apex to posterior

ocelli; pronotal length 0.8–0.9 times width and 0.7–0.8 times combined lengths of scutum and scutellum; latter sclerite 0.4 times as long as scutum and 0.9–1.1 times as long as postscutellum.

16. *Baeosega laticeps*, new species

FIGURE 57

Baeosega laticeps is known only from a short series of females collected in or on leaf litter along the highest ridge in Udawattakele Sanctuary, Kandy, where they occurred with *B. humida*, new species.

HOLOTYPE.—♀; Sri Lanka, Central Province, Kandy District, Kandy, Udawattakele Sanctuary, on or in leaf litter, 25–27 Apr 1981, K.V. Krombein, T. Wijesinhe, L. Weeratunge (USNM Type 100455).

FEMALE.—Length 2.7 mm. Black, except the following light red: mandible except tip, scape, pedicel, first three flagellar segments, pronotal disk except oblique infuscation from middle anteriorly to posterolateral angle, prosternum, mesopleuron, postscutellum, propodeum, underside of femora and tibiae, tarsi, and small median blotch on declivous surface of first metasomal tergum; trochanters and most of coxae testaceous; femora and tibiae above, and lateroterga dark brown. Vestiture silvery to cinereous, erect setae on head, thoracic dorsum, legs and metasomal terga short and sparse, that on metasoma less conspicuous than in *B. torrida*, new species, most of that on side of thorax subdecumbent, that on abdomen suberect to subappressed and sparser than in *B. torrida*.

Head with characters of genus and as follows: width 1.5 times distance from clypeal apex to posterior ocelli and 2.9 times interocular distance at anterior ocellus; viewed from above (Figure 57) head width 2.9 times length, upper front slightly concave.

Thorax with characters of the genus and the following: pronotum three-fourths as long as wide and 1.8 times as long as combined lengths of scutum and scutellum; latter sclerite half as long

as scutum and 0.3 times as long as postscutellum; posterior surface of propodeum with transverse, somewhat irregular rugulae which carry over onto the posterior part of lateral surface.

Abdomen with characters of the genus and the following: declivous surface of first metasomal tergum smooth; surface of terga glossy, vestiture sparser and less conspicuous than in *B. torrida*.

MALE.—Unknown.

PARATYPES.—4♀, same locality as holotype, other data as follows (all USNM): 1♀, same label data as holotype; 3♀, 600 m, 12–14 Oct 1980, on or in leaf litter, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, V. Gunawardane. Paratypes will be placed in the Colombo and British museums.

The paratypes are 2.4–2.7 mm long. There is not as much variation in color as in *B. humida*. The pronotum is red except for an anterior infuscated spot in two specimens, and the postscutellum and propodeum are somewhat infuscated in one specimen. Other differences are as follows: head width is 1.15–1.24 times distance from clypeal apex to posterior ocelli and 2.6–2.8 times interocular distance at anterior ocellus; pronotal length is 1.5–1.9 times combined lengths of scutum and scutellum; and latter sclerite is 0.7 times length of scutum and 0.4 times length of postscutellum.

Saltasega, new genus

This distinctive female is unusual in that the scutellum is raised above the level of the scutum and postscutellum (Figure 61), a feature not found in females of other Ceylonese genera. Another distinctive character is the somewhat thickened posterior margin of the pronotum. Behaviorally, it shares with the female of *Mahinda*, new genus, the unique characteristic of occasionally leaping as much as 15 cm from one area of leaf litter to another, rather than continually crawling as do other flightless females.

The male is separated from males of other genera by the following combination of characters: clypeal apex not thickened; frontal concavity

slightly concave and smooth; cylindrical flagellar segments; occipital carina present; stigma with an apical linear extension; vestiture of femora and tibiae short and suberect; and tarsal claw with subbasal tooth.

Saltasega is known from two species, *S. bella*, new species, and *S. distorta*, new species, both occurring in or on leaf litter on the highest ridge of Udawattakele Sanctuary, Kandy, which is also the type-locality, indeed the only known locality for *Baeosega humida*, new species, and *B. laticeps*, new species.

TYPE-SPECIES.—*Saltasega bella*, new species.

ETYMOLOGY.—The generic name is feminine and is based on the Latin *saltus* (leap) plus *-sega* (from *Amisega* Cameron).

FEMALE.—Small forms, predominantly light reddish-brown, 2.0–2.7 mm long; body shining; thoracic punctation sparser than usual; abdomen with only scattered minute punctures.

Head width 1.2–1.8 times (*S. bella*) and 3.7–4.9 times (*S. distorta*) interocular distance at anterior ocellus; malar space not grooved; frontal concavity very hollow, smooth to very delicately transversely rugulose, median ridge lacking; eyes large but not bulging, microtrichiae moderately long; vertex slightly convex; occipital carina present; scape as long as pedicel and first two flagellar segments; flagellum fusiform, intermediate segments broader than long and with flattened sensory areas beneath.

Thorax in dorsal view relatively slender (Figure 60); pronotum with median length 0.8–0.9 times greatest width and 1.1–1.5 times combined lengths of scutum and scutellum, median groove on posterior half, apical margin somewhat thickened; notauli complete, deep, diverging anteriorly and curved outward toward base; parapsides absent; tegula small, wings reduced to small pads which extend to apex of scutellum; in profile (Figure 61) scutellum raised above scutum and postscutellum; postscutellum triangular, apex with a pair of recumbent separated blunt teeth, triangular punctate area on basal half margined laterally by a narrow, obliquely rugulose area; mesopleuron with an anterior ridge, transverse

discal groove lacking below tegula; femora and tibia with scattered suberect setae; hind femoral ratio 4.7:1; tarsal claw with an erect subbasal tooth; posterolateral angles of dorsal propodeal surface bluntly, obtusely rounded, lateral and posterior surfaces abruptly declivous.

Dorsal surface of abdomen slightly convex above, both terga and sterna with scattered minute punctures bearing erect to subappressed setae.

MALE.—Small forms, predominantly black, 2.3–2.8 mm long; head and thorax relatively closely punctate, interspaces shining; abdomen with sparser punctation and shiny.

Head width 1.3–1.8 times length of dorsal surface and 2.0–2.3 times interocular distance at anterior ocellus; malar space with a groove from lower eye margin to mandibular articulation; clypeal apex not thickened; frontal concavity only slightly depressed, smooth, median ridge lacking, abruptly declivous from upper front; antenna filiform, longer than in females; scape as long as pedicel and first flagellar segment combined; flagellar segments cylindrical, clothed with numerous erect microtrichiae almost as long as width of segment, intermediate segments three times as long as wide; eyes slightly to moderately bulging, clothed with longer microtrichiae than in female; ocelli set in shallow concavities, arranged in a low to an almost equilateral triangle; vertex usually slightly convex, but irregularly indented in some specimens of *S. distorta*; occipital carina present.

Pronotum closely punctate with a weak median groove on posterior half or third; scutum similarly punctate, parapsides lacking, notauli complete, almost parallel, but curved strongly outward near base; tegula normal in size as are wings, fore wing stigma with a linear distal extension at least half as long as enlarged basal section, radial vein slightly curved, shorter than stigma, continued to wing margin by a darkened, curved streak; scutellum with slightly larger, more separated punctures than scutum; postscutellum with a pair of vaguely defined recumbent teeth at apex in middle; mesopleuron not ridged or grooved anteriorly, discal groove below tegula absent; legs with short subappressed to suberect setae; hind

femoral ratio 3.4:1; hind coxa not carinate above on inner margin; tarsal claw with an erect sub-basal tooth; dorsal posterolateral angles of propodeum weakly, bluntly angulate, lateral and posterior surfaces abruptly declivous, the latter surface punctate in middle and smooth at sides.

Abdomen above slightly convex, second sternum strongly so; first two metasomal terga and second sternum with more separated punctures than in *Baeosega*, new genus, most punctures separated by the diameter of a puncture and bearing short subappressed setae.

17. *Saltasega bella*, new species

FIGURES 60, 61

The female of this species is readily distinguished by the characters noted in the generic discussion. Only three of the 11 specimens in the type-series have a normally shaped head and uncollapsed second metasomal segment. The other eight specimens are somewhat deformed, presumably due to the internal morphology of the host egg. The head is compressed posteriorly so that the eyes are not rounded out, and part of the sides of the second metasomal segment are indented. The general impression is that these deformed individuals came from host eggs that were too small to permit normal development.

Males are known in two species of *Saltasega*. That of *S. bella* differs from that of *S. distorta*, new species, in proportions of the head and thorax, the former being perceptibly a more slender species. The dorsal length of the head is 0.76–0.78 the width in *S. bella*, 0.48–0.63 the width in *S. distorta*, the least interocular distance is 0.55–0.60 times the width in *S. bella* as compared to 0.72–0.86 times the width in *S. distorta*, and the front is noticeably protuberant between the eyes in *S. bella*, scarcely so in *S. distorta*. The thorax also is more slender in *S. bella*, the median pronotal length being 0.72–0.82 times the width at the lobes, whereas it is 0.56–0.60 times the width in *S. distorta*.

HOLOTYPE.—♀; Sri Lanka, Central Province, Kandy District, Kandy, Udawattakele Sanctu-

ary, 1800 ft (547 m), 21–22 Sep 1980, on or in leaf litter, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrama, V. Gunawardane (USNM 100456).

FEMALE.—Length 2.7 mm. Predominantly light red, dorsum of propodeum and of metasoma light brown; top of head infuscated; last seven flagellar segments black; first four segments testaceous; the following pale white—coxae, basal half beneath of fore and mid-femora, and basal third of hind femur; trochanters and femora elsewhere dark brown. Vestiture short, cinereous, and appressed on front and side of thorax, dark brown, sparse and erect on top of head and thorax, light brown quite scattered and suberect to subappressed on metasoma.

Head with characters of genus and as follows: width slightly more than distance from clypeal apex to posterior ocelli, and 4.2 times interocular distance at anterior ocellus; frontal concavity smooth; viewed from above head slightly concave between eyes, and not compressed posteriorly.

Thorax in dorsal view (Figure 60 of paratype) with median pronotal length 0.8 times greatest width and 1.2 times combined lengths of scutum and scutellum; latter sclerite 0.6 times length of scutum and half as long as postscutellum; punctures on pronotal disk moderately large, many separated by half the width of a puncture; scutum anteriorly with closer smaller punctures, posteriorly with larger more separated punctures; scutellum smooth anteriorly, with large punctures posteriorly; postscutellum with scattered large punctures anteriorly, smooth posteriorly.

Abdomen as noted for genus, second tergum not collapsed laterally.

ALLOTYPE.—♂; same label data as holotype (USNM).

MALE.—Length 2.3 mm. Black; head and thorax closely punctate but interspaces shiny, the following creamy to pale yellow: mandible except apex, clypeus, scape, tegula, legs except tarsi, declivous area of first metasomal tergum, and side of second sternum; tarsi brown. Wings clear, stigma and veins light brown. Vestiture cinereous,

short, relatively dense and suberect on head and thorax, sparser and subdecumbent on abdomen.

Head width 1.1 times distance from clypeal apex to posterior ocelli, 2.2 times interocular distance at anterior ocellus, and 1.3 times dorsal length; ocelli nearly in an equilateral triangle, postocellar distance 1.2 times lateral ocellar distance and 3.0 times ocellocular distance; vertex slightly convex.

Pronotum with a weak median groove on posterior half, its median length 0.8 times greatest width, and 0.7 times as long as combined lengths of scutum and scutellum; latter sclerite half as long as scutum and three-fourths as long as post-scutellum; distal linear extension of stigma half as long as enlarged basal section.

First two metasomal terga with quite small punctures, many separated by twice the width of a puncture; second sternum similarly punctate; part of side of second tergum collapsed inward.

PARATYPES.—10♀, 2♂, same locality as holotype and with the following data (all USNM): 1♀, same date and collectors as holotype; 5♀, 1♂, 23–25 Sep 1980, K.V. Krombein, P.B. Karunaratne, L. Jayawickrema, V. Gunawardane; 4♀, 1♂, 600 m, 12–14 Oct 1980, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, V. Gunawardane. Paratypes of both sexes will be deposited in the Colombo Museum and a female paratype in the British Museum.

Female paratypes are 2.0–2.7 mm long, and are very similar to the holotype in coloration and vestiture. Some differences are as follows: head width 0.9–1.0 times distance from clypeal apex to posterior ocelli and 3.7–4.9 times interocular distance at anterior ocellus; frontal concavity sometimes delicately transversely rugulose; head frequently compressed posteriorly so that eyes are not uniformly rounded out; median pronotal length 0.8–0.9 times greatest width and 1.1–1.5 times combined lengths of scutum and scutellum; latter sclerite 0.5–0.8 times as long as scutum and 0.5–0.6 times as long as postscutellum.

Male paratypes are 2.5 mm long and are like the holotype in coloration except that one is more yellowish than creamy. Other differences are as

follows: head width is 2.2–2.3 times least interocular distance; median pronotal length is 0.7–0.8 times greatest width.

18. *Saltasega distorta*, new species

FIGURE 54

This species is known from a short series of males captured together with the type series of both sexes of *S. bella*, new species. These specimens are very similar in coloration to males of that species but have a stockier build and comparatively broader heads. The differences between males of the two species are discussed in detail in the remarks under *S. bella*. They appear to be distinct species based on the available material. It is possible, however, that *S. distorta* is just an extreme variant of *S. bella* and that a longer series of males might exhibit intergradation between the two. If, indeed, *S. distorta* is a good species, I anticipate that the presently unknown female will differ from the female of *S. bella* in having a comparatively broader head and stockier build.

HOLOTYPE.—♂; Sri Lanka, Central Province, Kandy District, Kandy, Udawattakele Sanctuary, 1800 ft (547 m), 23–25 Sep 1980, on leaf litter, K.V. Krombein, P.B. Karunaratne, L. Jayawickrema, V. Gunawardane, P. Leauge (USNM Type 100457).

MALE.—Length 2.8 mm. Black, head and thorax closely punctate but interspaces shiny, the following creamy to pale yellow: mandible except apex, clypeus, tegula, legs except tarsi, and declivous area of first metasomal tergum; apex of mandible, scape and first laterotergum light red; tarsi brown. Wings clear, stigma and veins light brown. Vestiture cinereous, short, relatively dense and suberect on head and thorax, sparser and subdecumbent on abdomen.

Head (Figure 54) width 1.2 times distance from clypeal apex to posterior ocelli, 2.1 times ocellocular distance at anterior ocellus, and 1.6 times dorsal length; ocelli in a flatter (more acute) triangle than in *S. bella*, postocellar distance 1.4 times lateral ocellar distance and 2.0 times ocellocular distance; vertex slightly convex.

Pronotum with a well-developed groove on posterior half, its median length 0.58 times greatest width and 0.7 times combined lengths of scutum and scutellum; latter sclerite 0.7 times as long as scutum and slightly shorter than post-scutellum; distal linear extension of stigma half as long as the enlarged basal section.

Punctures of first and second metasomal terga small, most of them separated by about the diameter of a puncture; second sternum similarly punctate.

FEMALE.—Unknown.

PARATYPES.—All USNM; 6♂, same locality as holotype, other data as follows: 2♂, 21–22 Sep 1980, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, V. Gunawardane; 3♂, same data as holotype; 1♂, 600 m, 12–14 Oct 1980, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, V. Gunawardane. Paratypes will be deposited in the Colombo and British museums.

Paratypes are 2.5–2.6 mm long and are very similar in coloration. Two specimens have part of the ocellar area indented, and two have part of the occipital area indented. Other differences are as follows: head width is normally 1.1–1.2 times distance from clypeal apex to posterior ocelli (0.7–0.8 in specimens having part of head indented), 2.1–2.2 times interocular distance at anterior ocellus, and 1.4–1.8 times dorsal length; pronotum with median length 0.56–0.60 times greatest width, and 0.6–0.7 times combined lengths of scutum and scutellum; latter sclerite 0.5–0.7 times as long as scutum and 0.86–0.95 times as long as postscutellum.

Subfamily LOBOSCELIDIINAE

This Indo-Australian subfamily contains only the single genus *Loboscelidia* Westwood. The group has been recorded previously from Viet Nam and Singapore eastward through Indonesia to the Bismarck Archipelago, New Guinea, and eastern Australia, and northward to the Philippines and Taiwan. Two new species have been collected recently in the lowland rain forest of the Sinha-

raja Jungle, Sri Lanka, on foliage close to the ground, an area where the average annual rainfall is about 3900 mm.

Loboscelidia Westwood

FIGURES 33–37, 65–71

Loboscelidia Westwood, 1874:171.

Loboscelidoidea Rye, 1876:365 [incorrect spelling].

Lacomerista Cameron, 1910:21.

Loboscelidia subgenus *Scelidoloba* Maa and Yoshimoto, 1961:529.

The synonymy given above was proposed by Day (1979:29).

Loboscelidia is unique among Hymenoptera in having fimbriae on the sides of the head and vertex, pronotum, and propleura. Earlier authors interpreted these as striated membranes, although Fouts (1922:622) came close to the actual condition when he described that on the head of *L. antennata* Fouts as being “a striated membrane of the appearance of matted hairs.” Actually, the fimbria is composed of flattened setae with broad bases, as may be seen clearly in Figures 34c, 67, 68. The edges of the setae overlap, giving the fimbria the striate appearance.

Presumably the Ceylonese *Loboscelidia* are parasitic in eggs of walking sticks in leaf litter on the ground. Hadlington and Hoschke (1959) and Heather (1965) reported rearing species of *Loboscelidia* from eggs of *Ctenomorphodes tessulatus* (Gray) collected in leaf litter in New South Wales and Queensland, Australia, respectively. *Loboscelidia* females are collected very rarely, suggesting that they are usually beneath leaf litter searching for host eggs. The greatly enlarged tegulae and lack of a costa and stigma in the fore wing indicate that *Loboscelidia* is undoubtedly a very weak flier.

19. *Loboscelidia atra*, new species

FIGURES 33–37

Loboscelidia atra is distinguished immediately by its intense black integument, other known species ranging from dark brown, chestnut, and lighter

shades of brown to light red. Structurally it is most similar to the Bornean *L. maculipennis* Fouts and the Philippine *L. philippinensis* Fouts in having incomplete notauli which do not reach the posterior margin of the scutum, and in having an elongated vertex. *Loboscelidia maculipennis* has stout clavate setae on the cheeks and fine close arcuate carinae on the upper front, whereas *L. atra* has only fine setae on the cheeks and delicately alutaceous upper front. In *L. philippinensis* the submarginal frontal ridge is evanescent at the upper eye margin and does not attain the occiput and the anterior part of the pronotum is concave from side to side, whereas the submarginal frontal ridge is well developed for the entire length in *L. atra* and reaches the occiput, and the anterior part of the pronotum is convex from side to side.

Loboscelidia nigra Fouts is misnamed. The holotype and single paratype from the Philippines are castaneous, not black. The species also differs from *L. atra* in having complete notauli that reach the posterior margin of the scutum and in having a very reduced inconspicuous lamina on the scape.

Loboscelidia atra is known only from the unique male holotype from the lowland rain forest of Sinharaja Jungle. Inasmuch as sexual dimorphism is not at all well developed in this subfamily, the female of *L. atra* should be readily recognized by its probable black color, presence of an ovipositor, short stout antenna in which the sixth through tenth flagellar segments are broader than long, and the basal segments about as broad as long.

HOLOTYPE.—♂; Sri Lanka, Sabaragamuwa Province, Ratnapura District, Sinharaja Jungle, Waturawa Forest, 3 km S of Kudawe, on low foliage 4–10 in (10.2–25.4 cm) above ground, 2 Jul 1981, P.B. Karunaratne (USNM Type 100458).

MALE.—Length 3.1 mm, 5.1 mm to apex of fore wing. Intense black, entirely glossy except upper front and cheeks, and lower tegula somewhat dull. Vestiture white, very sparse on body, denser on legs especially on tarsi beneath. Wings very lightly infumated and with darker infuscated

areas, veins testaceous at base, brown across middle (Figure 33).

Head much narrower than thorax (0.65 times its width) at tegulae and 1.7 times least interocular distance; clypeus with two delicate transverse carinules, its upper margin delimited by an arcuate ridge, lateral ridge lacking; process below antennae two-tiered, the lower plate narrower and with gently emarginate apex, the upper plate broader, deeply emarginate between rounded lateral lobes; upper horizontal front delicately alutaceous, with a strong lateral ridge near inner eye margin extending to occiput (Figure 34*b*); vertex shallowly impressed behind ocelli, strongly arched in profile, 1.6 times as long as wide, sides subparallel; vertex and side of cheek margined by a fimbria of long flattened, close-set, curved transparent setae whose edges overlap slightly so that the fimbria has a ribbed appearance (Figures 34*a,c*); ocelli in a low triangle, postocellar and ocellocular distances subequal; antenna very elongate, filiform, 1.5 times as long as body, scape with a complete, narrow transparent lamina on lower margin, scape 1.3 times as long as pedicel and first flagellar segment combined, first through tenth flagellar segments subequal in length, 2.3–2.5 times as long as broad, last flagellar segment 1.3 times as long as preceding segment; flagellar segments subcircular in cross-section, clothed with numerous short, appressed sensory setae, many lying in elongate pits.

Thorax (Figures 36, 37) entirely glossy except lateral area of tegula very delicately alutaceous, pronotum, scutum, mesopleuron and propodeum with extremely scattered micropunctures each bearing a short decumbent seta; anterior two-thirds of pronotal disk convex, posterior third with a shallow oblique impression from near posterolateral angle toward midline, anterior width 0.76 times posterior width and 0.85 times length; anterior margin of lateral pronotal surface with a fringe of dense, short, straight flattened setae on upper half; tegula enormous, in dorsal view 2.4 times as long as greatest width, lower area very delicately alutaceous, surface with a few scattered decumbent setae; scutum with notauli

straight, diverging anteriorly, extending five-sixths of the distance to apex; axilla not foveate; scutellum anteriorly with somewhat larger, closer punctures and posteriorly with longitudinal arcuate ridges and subcontiguous punctures; post-scutellum with a small median triangular roughened area; fore wing (Figure 33) lacking costa and stigma, basal vein complete; fore and mid-femur with transparent lamina on apical half of lower edge, narrow at base, rounded and broader toward apex; hind femur with a similarly placed lamina which extends four-fifths toward base (Figure 35); fore and mid-tibiae with a transparent narrower lamina on basal half of lower edge; hind tibia with a broader lamina extending three-fourths toward apex (Figure 35); tarsal claws with a small erect subbasal tooth.

Metasoma glossy, the four exposed segments impunctate except for a narrow area of close tiny punctures at base of third tergum.

FEMALE.—Unknown.

20. *Loboscelidia castanea*, new species

Loboscelidia castanea is easily distinguished from *L. atra* by its smaller size, chestnut color, complete notauli on the scutum, concave surface of axilla, and the rugulosoreticulate posterior half of the scutellum.

The species is known from only two males from the lowland rain forest of the Sinharaja Jungle collected in exactly the same type locality as *L. atra*. The unknown female will probably be very similar to the male of *L. castanea* in size and color.

HOLOTYPE.—♂; Sri Lanka, Sabaragamuwa Province, Ratnapura District, Sinharaja Jungle, Waturawa Forest, 3 km S of Kudawe, on foliage near ground, 7 Oct 1981, P.B. Karunaratne (USNM Type 100459).

MALE.—Length 1.9 mm, 3.1 mm to fore wing apex. Castaneous, the abdomen somewhat lighter, entirely glossy except lower edge of tegula. Vestiture white, very sparse on body, denser on legs. Wings very lightly infumated and with darker infuscated areas, veins testaceous at base, brown across middle.

Head narrower (0.76 times) than thorax at tegulae and 1.6 times least interocular distance; clypeus with one delicate transverse carinule, its upper margin delimited by an arcuate ridge, lateral ridge lacking; process below antenna two-tiered, lower plate narrower and with truncate apex, the upper plate broader, deeply emarginate between subtruncate lateral lobes; upper horizontal front more delicately alutaceous than in *L. atra*, with a weaker lateral ridge near inner eye margin extending to occiput; vertex shallowly impressed behind ocelli, strongly arched in profile, 1.9 times as long as median width, sides arched inwardly; vertex and side of cheek with a curved fimbria of flattened setae as in *L. atra*; ocelli in a low triangle, the postocellar distance 0.8 times ocellocular distance; antenna 1.5 times as long as body, scape with a complete, narrow transparent lamina on lower margin, scape 1.6 times as long as pedicel and first flagellar segment combined, first through tenth flagellar segments subequal in length, 2.1–2.3 times as long as broad, last flagellar segment 1.5 times as long as penultimate; flagellar segments subcircular in cross-section, clothed with numerous short, subappressed and appressed sensory setae, the latter lying in elongate pits.

Thorax entirely glossy except narrow lower margin of tegula delicately alutaceous, pronotum, scutum, mesopleuron, and propodeum with extremely scattered micropunctures, each bearing a short decumbent seta; pronotal disk evenly convex except posterolateral area with a small depression, anterior width 0.69 times posterior width and 0.89 times length; anterior margin of lateral pronotal surface with a fringe of dense, short, flattened setae on upper half; tegula enormous, in dorsal view 2.3 times as long as greatest width, surface with a few scattered decumbent setae; scutum with notauli straight, diverging anteriorly, complete posteriorly; axilla concave; scutellum anteriorly with a few larger punctures, posterior half rugulosoreticulate; postscutellum with a small median roughened triangular area bearing a short median keel; fore wing as in *L. atra* (Figure 33); fore and mid-femur with trans-

parent lamina on apical half of lower edge, narrow at base, rounded and broader toward apex; hind femur with a similarly placed lamina which extends four-fifths toward base; fore and mid-tibiae with a transparent narrower lamina on basal half of lower edge; hind tibia with a broader lamina extending three-fourths toward apex; tarsal claws with a small erect subbasal tooth.

Abdomen glossy, impunctate.

FEMALE.—Unknown.

PARATYPE.—1♂, same label data as holotype (USNM). The paratype is very similar to the holotype in all details except that it is larger, comparable lengths being 1.9 and 3.3 mm, and the third metasomal tergum has several larger scattered punctures across midline. It will be deposited in the Colombo Museum.

Literature Cited

- Bradley, J.C., and B.S. Galil
 1977. The Taxonomic Arrangement of the Phasmatodea with Keys to the Subfamilies and Tribes. *Proceedings of the Entomological Society of Washington*, 79:176-208.
- Cameron, P.
 1910. Description of a New Genus and Species of *Oxyura* (Hymenoptera) from Kuching, Borneo. *Entomologist*, 43:21-23.
- Clark, J.T.
 1979. A Key to the Eggs of Stick and Leaf Insects (Phasmida). *Systematic Entomology*, 4:325-331, 60 figures.
- Costa Lima, A. da
 1936. Sur un nouveau chryside: *Duckeia cyanea*, parasite des oeufs de phasmide. In *Livre Jubilaire E.L. Bouvier*, pages 173-175, 6 figures. Paris: Firmin-Didot et Cie.
- Day, M.C.
 1979. The affinities of *Loboscelidia* Westwood (Hymenoptera: Chrysididae, Loboscelidiinae). *Systematic Entomology*, 4:21-30, 7 figures.
- Evans, H.E.
 1973. Cretaceous Aculeate Wasps from Taimyr, Siberia (Hymenoptera). *Psyche*, 80:166-178, 16 figures.
- Fouts, R.M.
 1922. New Parasitic Hymenoptera from the Oriental Islands. *The Philippine Journal of Science*, 20:619-637, 2 figures.
- Günther, K.
 1953. Über die taxonomische Gliederung und die geographische Verbreitung der Insektenordnung der Phasmatodea. *Beiträge zur Entomologie*, 3:541-563, 4 figures.
- Hadlington, P., and F. Hoschke
 1959. Observations on the Ecology of the Phasmatid *Ctenomorphodes tessulata* (Gray). *Proceedings of the Linnaean Society of New South Wales*, 84:146-159, 2 figures, 5 tables, 2 plates.
- Heather, N.W.
 1965. Occurrence of Cleptidae (Hymenoptera) Parasites in Eggs of *Ctenomorphodes tessulatus* (Gray) (Phasmida: Phasmidae) in Queensland. *Journal of the Entomological Society of Queensland*, 4:86-87.
- Hetrick, L.A.
 1949. The Oviposition of the Two-striped Walkingstick, *Anisomorpha buprestoides* (Stoll) (Orthoptera). *Proceedings of the Entomological Society of Washington*, 51:103-104.
- Hinton, H.E.
 1981. *Biology of Insect Eggs*, volume 1, 475 pages, 155 plates, 296 figures. Oxford: Pergamon Press.
- Kieffer, J.J.
 1922. Philippine Serphidae (Proctotrupidae). *The Philippine Journal of Science*, 20:65-103.
- Krombein, K.V.
 1957. A Generic Review of the Amiseginae, a Group of Phasmatid Egg Parasites and Notes on the Adelphinae (Hymenoptera, Bethyloidea, Chrysididae). *Transactions of the American Entomological Society*, 82:147-215, 35 figures.
 1960. Additions to the Amiseginae and Adelphinae (Hymenoptera, Chrysididae). *Transactions of the American Entomological Society*, 86:27-39, 6 figures.
 1979. Subfamily Amiseginae. In K.V. Krombein et al., editors. *Hymenoptera in America North of Mexico*, 3 volumes, 2735 pages. Washington, D.C.: Smithsonian Institution Press.
 1980. Biosystematic Studies of Ceylonese Wasps, I: A Preliminary Revision of the Amiseginae (Hymenoptera: Chrysididae). *P.E.P. Deraniyagala Commemoration Volume (Sri Lanka 1980)*, pages 246-260, 16 figures [Preprint Number 20].
 In press. Three New South African Parasites of Walking Stick Eggs (Hymenoptera: Chrysididae, Amiseginae). *Journal of the Entomological Society of Southern Africa*.
- Maa, T.C., and C.M. Yoshimoto
 1961. Loboscelidiidae, a New Family of Hymenoptera. *Pacific Insects* 3:523-548, 7 figures.
- Milliron, H.E.
 1950. The Identity of a Cleptid Egg Parasite of the Common Walking Stick, *Diapheromera femorata* Say. *Proceedings of the Entomological Society of Washington*, 52:47.
- Mocsáry, A.
 1889. Amiseginae. In *Monographia Chrysididarum orbis terrarum universi*, 643 pages, 51 figures. Földünk Fém-darázsainak Magánrajza [Text in Latin].
 1890. Adelphinae. In *Additamentum primum ad monographium Chrysididarum orbis terrarum universi*. *Természetrájsi Füzetek*, 13:45-66.
- Rasnitsyn, A.P.
 1980. Proiskhozhdenie i Evoliutsia Pereponchato-krylykh Nasekomykh [The Origin and Evolution

- of Hymenoptera]. *Trudy Paleontologicheskogo Instituta* [Transactions of the Institute of Paleontology, Academy of Sciences of the USSR], volume 174, 191 pages, 210 figures, 5 tables, 3 plates.
- Readshaw, J.L.
1965. A Theory of Phasmatid Outbreak Release. *Australian Journal of Zoology*, 13:475-490, 4 text figures, 3 tables, 1 plate.
- Riek, E.F.
1955. Australian Cleptid (Hymenoptera: Chrysoidea) Egg Parasites of Cresmododea (Phasmodea). *Australian Journal of Science*, 3:118-130, 7 figures.
1970. Hymenoptera. In *The Insects of Australia*, pp. 867-959, 40 figures. Melbourne: Melbourne University Press. (Commonwealth Institute of Scientific and Industrial Research.)
- Rye, E.C.
1876. Insecta. In E.C. Rye, editor, *Zoological Record for 1874*, pp. 239-489, London.
- Sharov, A.G.
1968. Filogeniya ortopteroidnykh nasekomykh. *Trudy Paleontologicheskogo Instituta* [Transactions of the Institute of Paleontology, Academy of Sciences of the USSR], volume 118, 213 pages, 53 figures, 1 table, 12 plates. [Translated 1971 as Phylogeny of the Orthopteroidea, U.S. Department of Commerce, National Technical Information Service, TT 70-50176, 251 pages, 53 figures, 12 plates, 1 table.]
- Vishniakova, V.N.
1980. Otryad Phasmatida Plochniki [Order Phasmatida, Walking Sticks]. In *Istoricheskoe Razvitiye Klassy Nasekomykh* [Historical Development of the Class Insecta]. *Trudy Paleontologicheskogo Instituta* [Transactions of the Institute of Paleontology, Academy of Sciences of the USSR], 175:1-269 pages, 99 figures, 8 plates.
- Yasumatsu, K.
1946. Some Analyses on the Growth of Insects, with Special Reference to a Phasmid, *Phraortes kumamotoensis* Shiraki (Orthoptera). *Journal of the Department of Agriculture, Kyusyu Imperial University*, 8:1-579, 47 figures, 160 tables.

FIGURES 6-9.—Head in frontal aspect: 6, ♂, *Cladobethylus ceylonicus* Krombein; 7, ♀, *Isegama meaculpa*, new species; 8, ♀, *Isegama aridula* (Krombein); 9, ♀, *Serendibula deraniyagalai* Krombein.

FIGURES 10, 11.—Dorsum of abdomen: 10, ♀, *Isegama aridula* (Krombein); 11, ♀, *Serendibula deraniyagalai* Krombein.

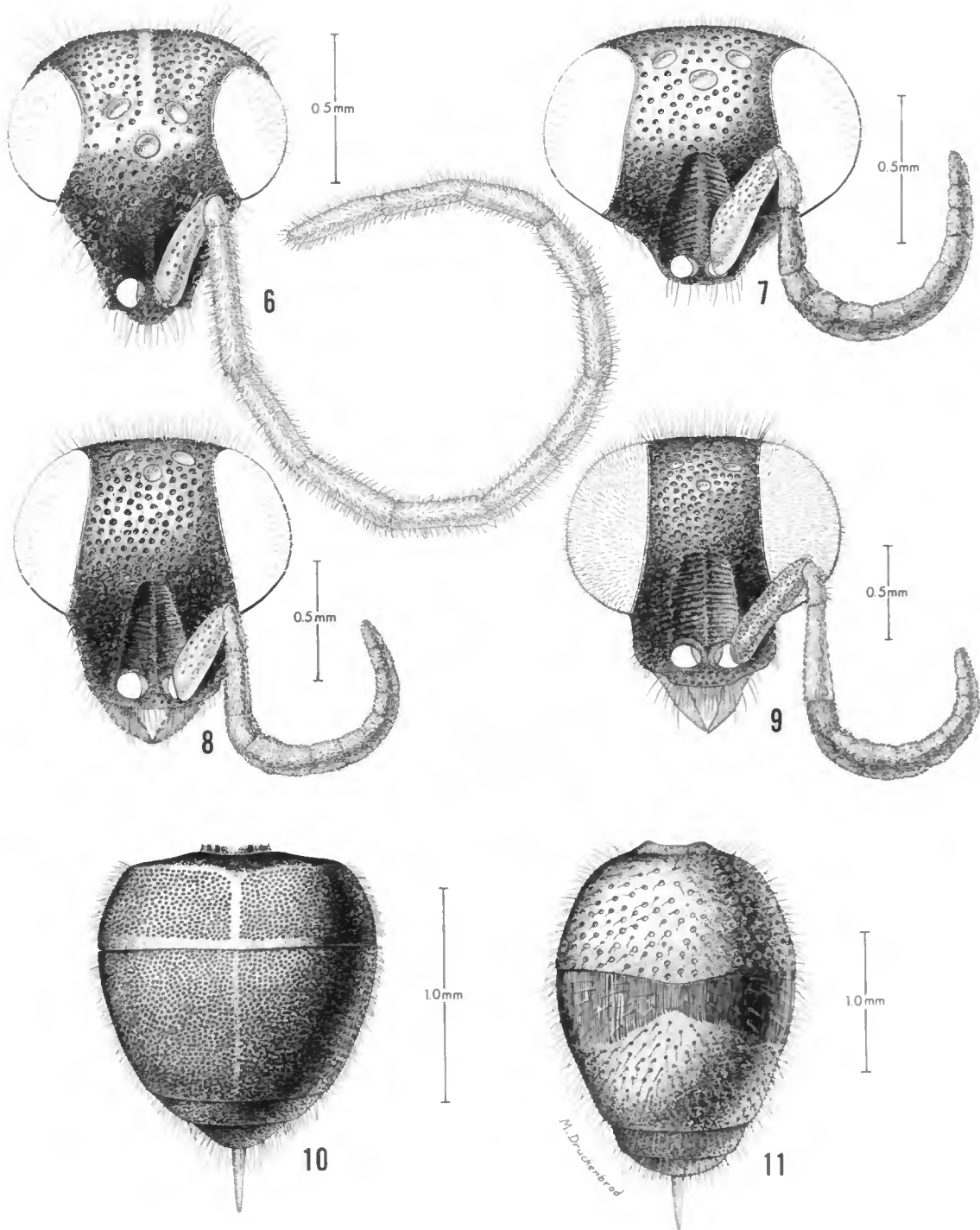
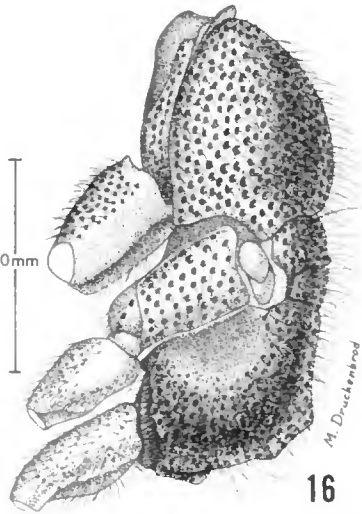
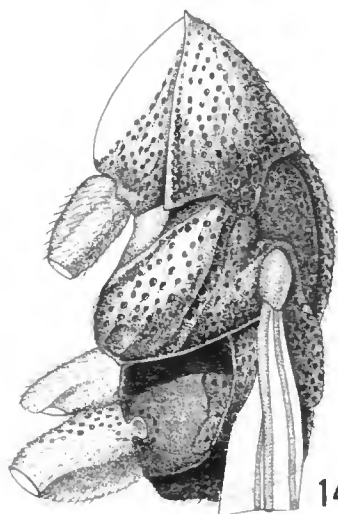
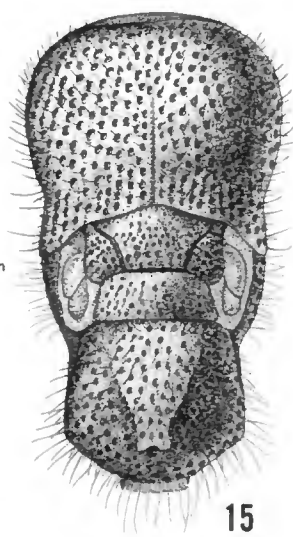
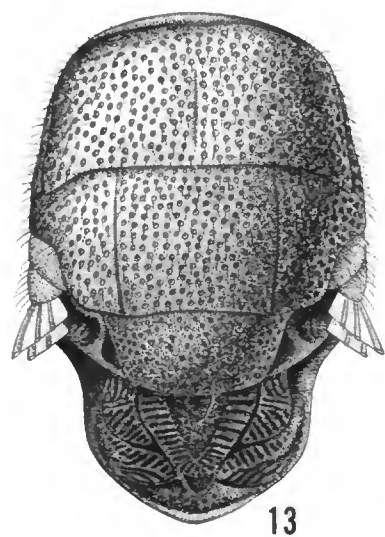
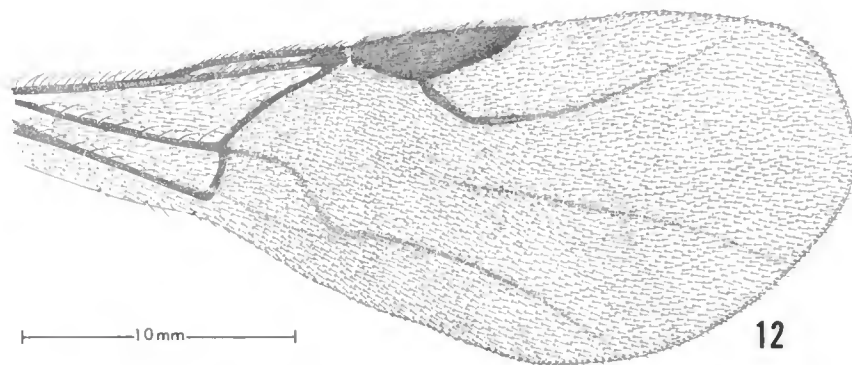


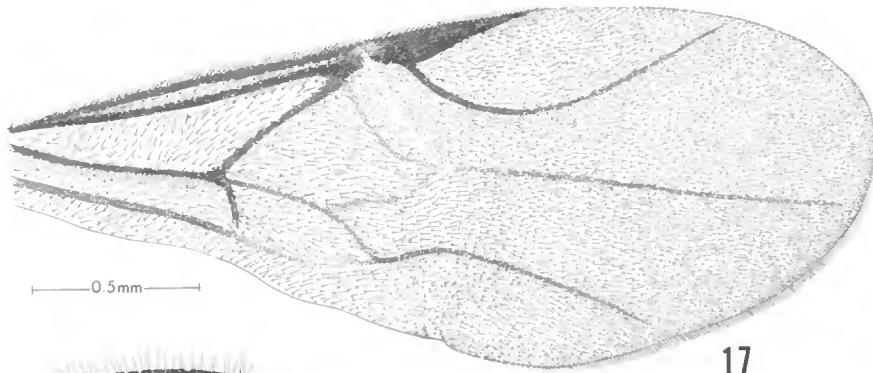
FIGURE 12.—Fore wing, ♂, *Cladobethylus ceylonicus* Krombein.

FIGURES 13, 14.—♀, thorax, *Isegama* species, wings abbreviated: 13, dorsal aspect, *I. aridula* (Krombein); 14, lateral aspect, *I. meaculpa*, new species.

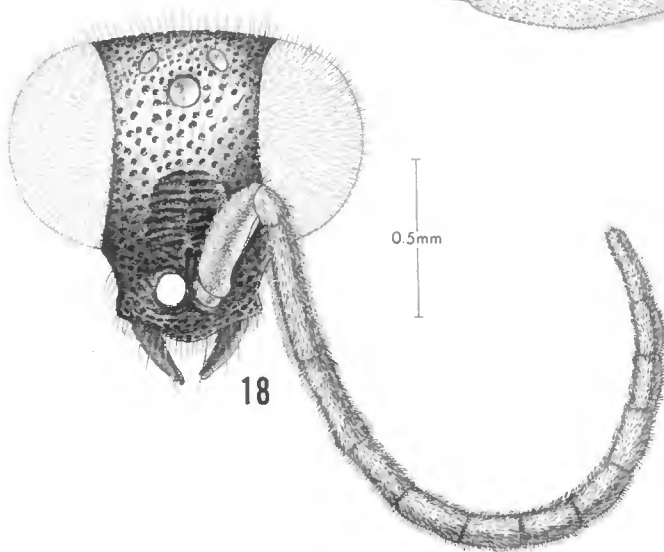
FIGURES 15, 16.—♀ thorax, *Serendibula deraniyagalai* Krombein: 15, dorsal aspect; 16, lateral aspect.



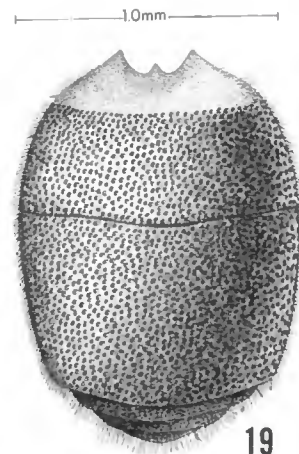
FIGURES 17-21.—♂, *Serendibula deraniyagalai* Krombein: 17, fore wing; 18, head in frontal aspect; 19, abdomen in dorsal aspect; 20, thorax in lateral aspect, wings abbreviated; 21, thorax in dorsal aspect, wings abbreviated.



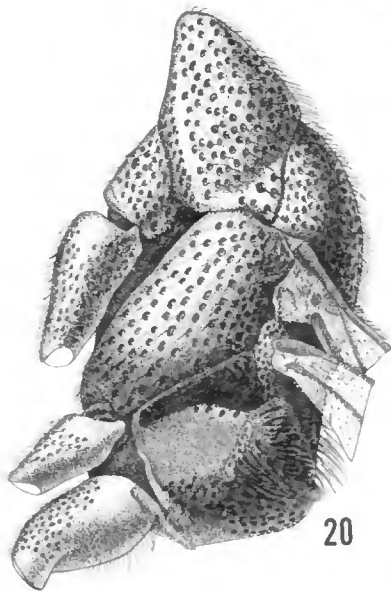
17



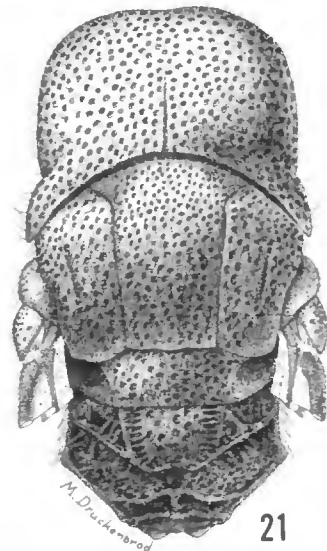
18



19



20

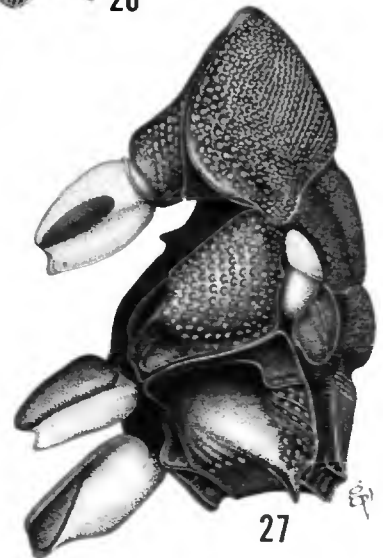
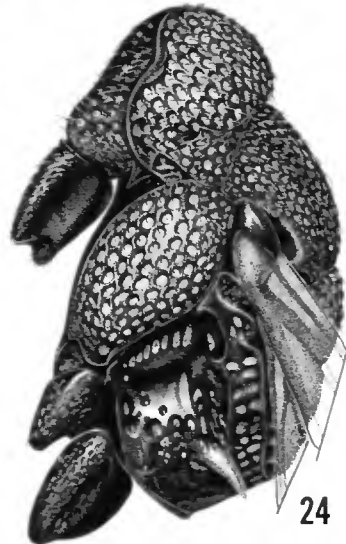
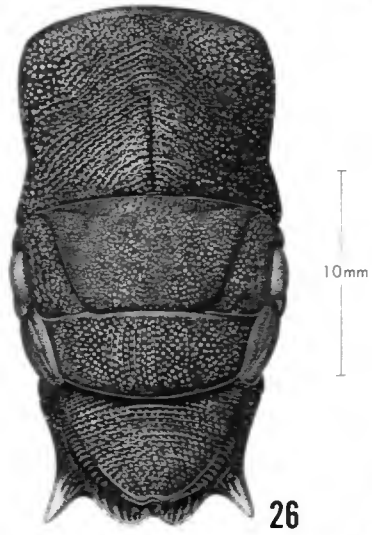
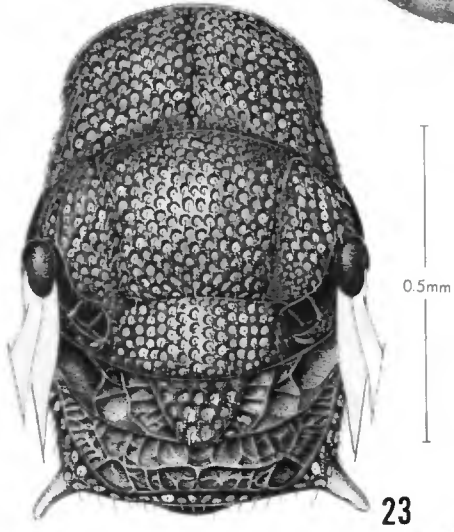
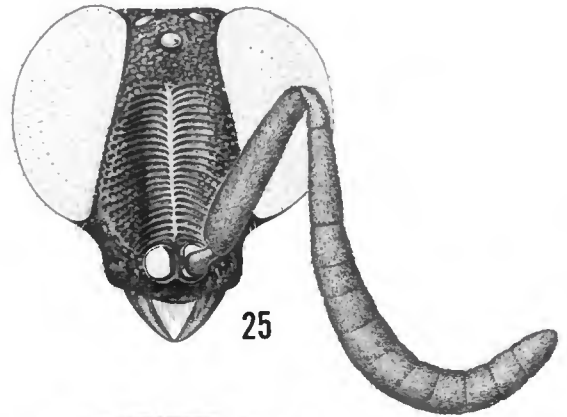
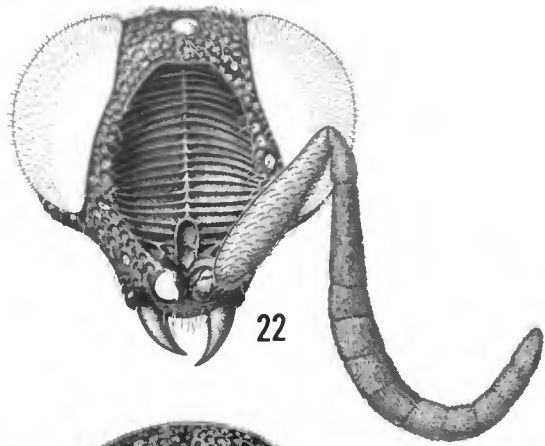


21

M. Durcke brood

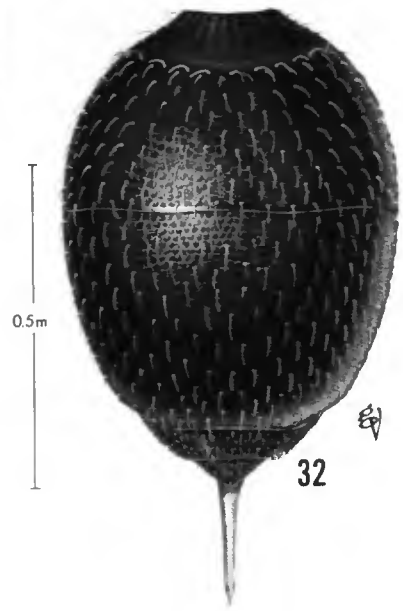
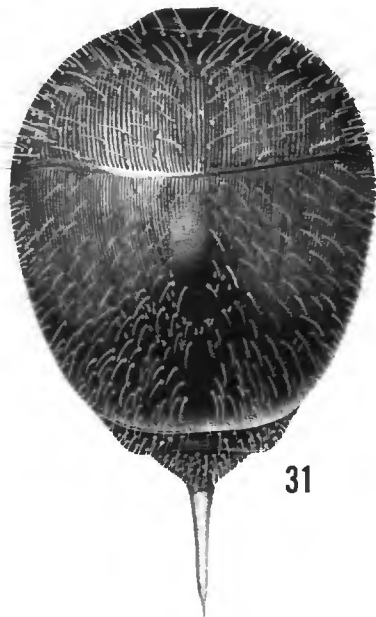
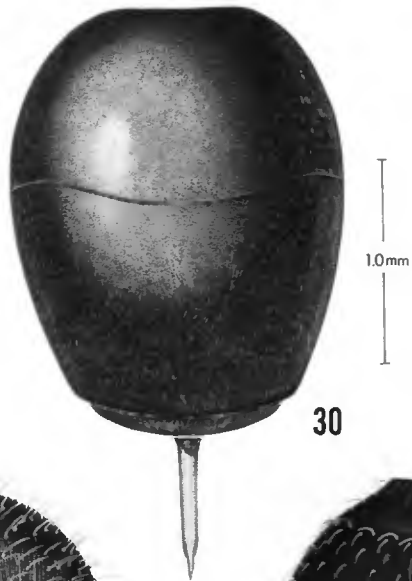
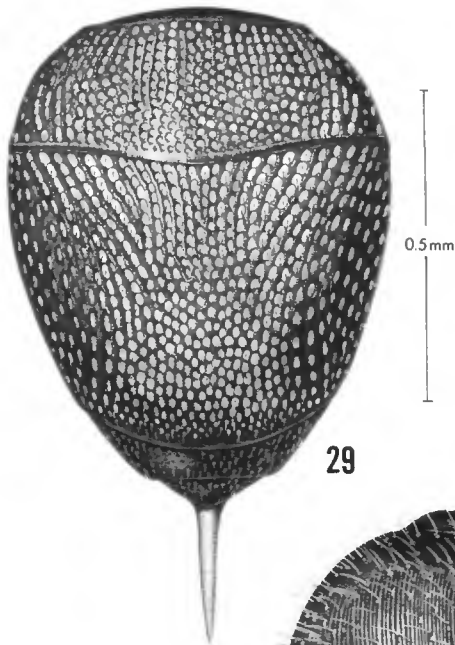
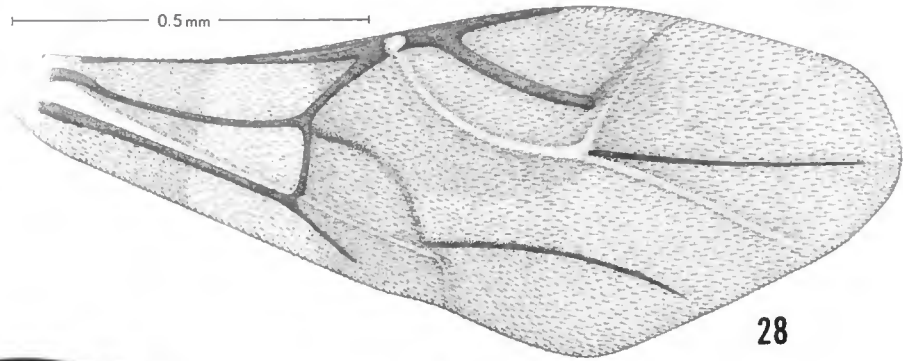
FIGURES 22-24.—♀, *Perissosega venablei*, new species: 22, frontal aspect of head; 23, dorsal aspect of thorax, wings abbreviated; 24, lateral aspect of thorax, wings abbreviated.

FIGURES 25-27.—♀, *Mahinda saltator*, new species: 25, frontal aspect of head; 26, dorsal aspect of thorax; 27, lateral aspect of thorax.

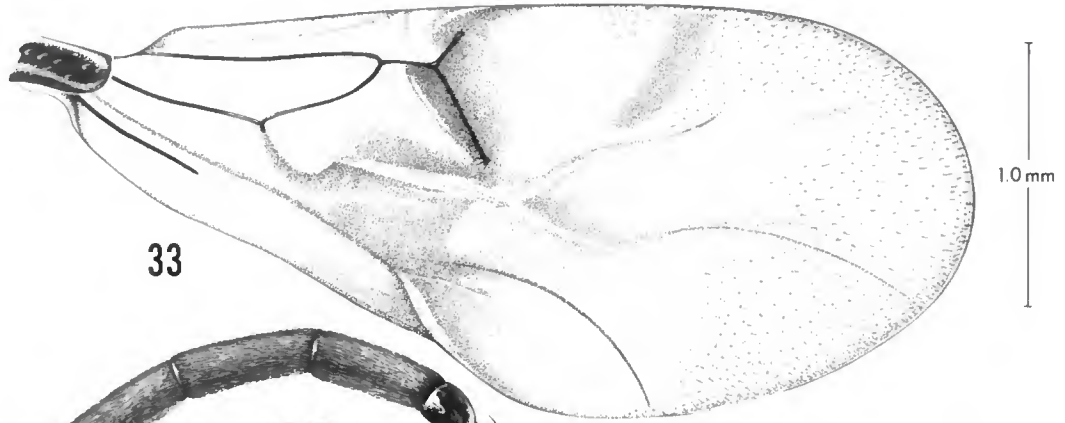


FIGURES 28, 29.—♀, *Perissosega venablei*, new species: 28, fore wing; 29, dorsal aspect of abdomen.

FIGURES 30-32.—Dorsal aspect of ♀ abdomen: 30, *Mahinda saltator*, new species; 31, *Serendibula kasyapai*, new species; 32, *Baeosega torrida*, new species.

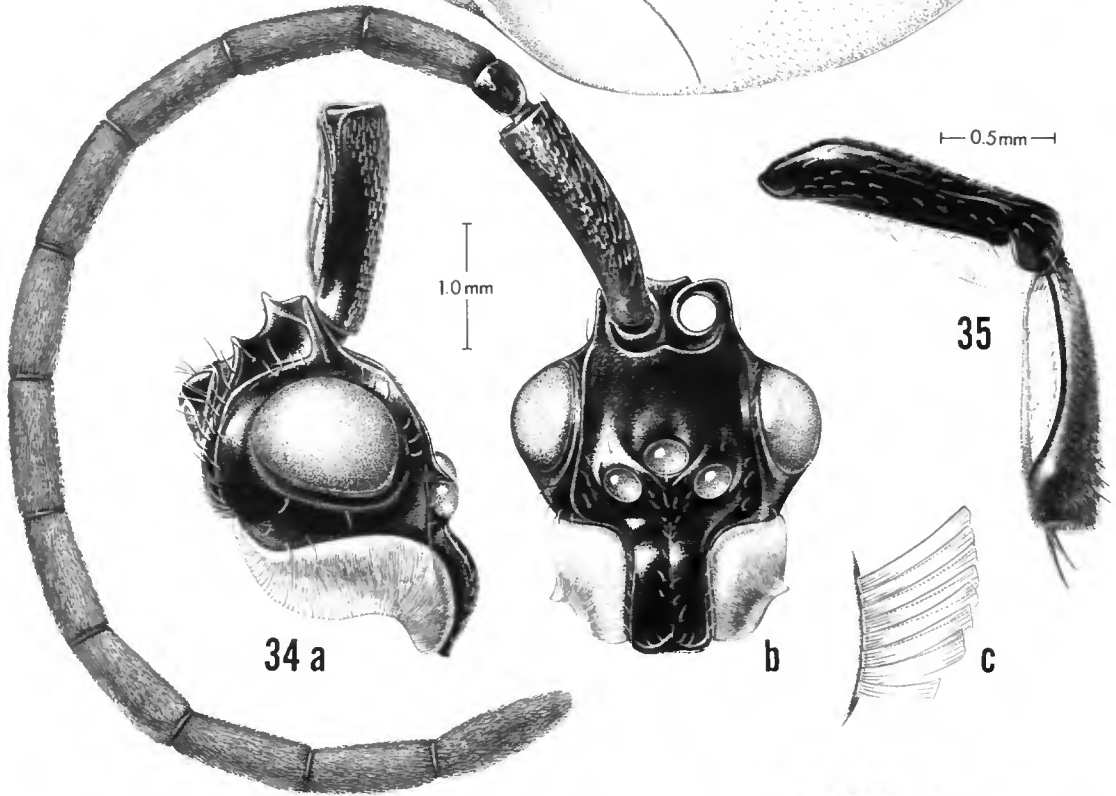


FIGURES 33-37.—♂, *Loboscelidia atra*, new species: 33, fore wing; 34a, head in lateral view, 34b, head in dorsal view, 34c, setae from vertexal fimbria (× 95); 35, hind femur and tibia; 36, thorax in lateral view, wings removed; 37, thorax in dorsal view, wings removed (reproduced at 77.5%).



33

1.0 mm



1.0 mm

0.5 mm

34 a

b

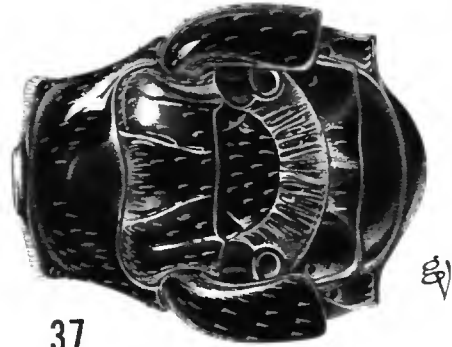
35

c



36

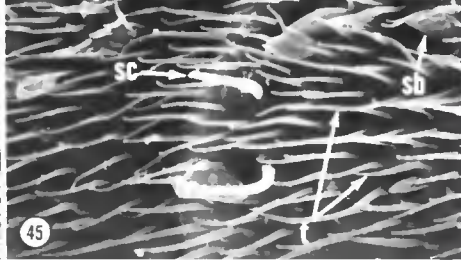
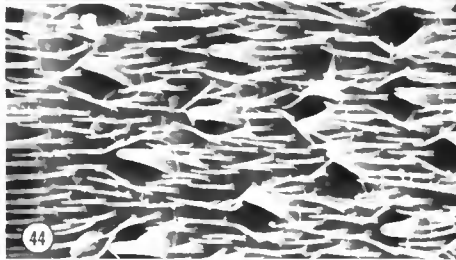
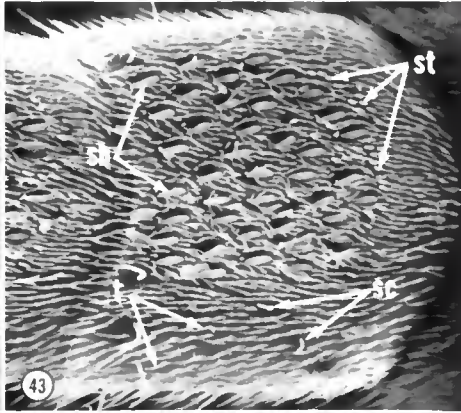
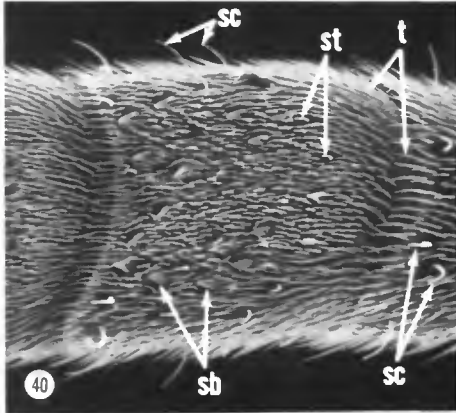
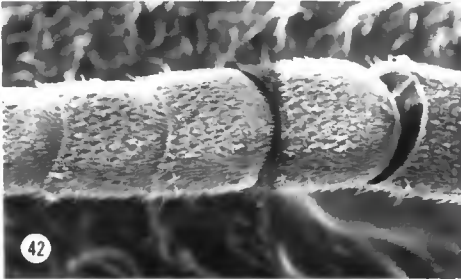
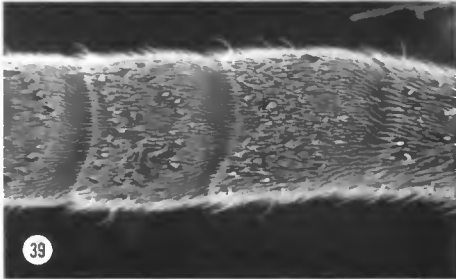
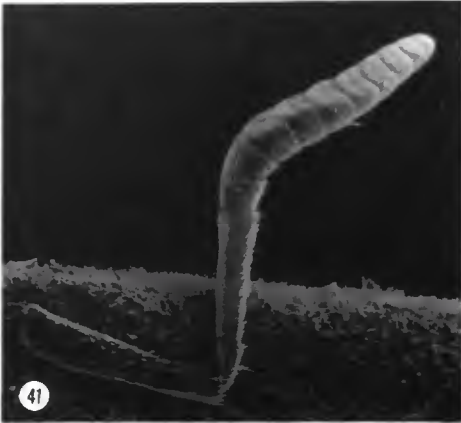
1.0 mm



37

EJ

FIGURES 38-45.—Antenna, *Isegama meaculpa*, new species (sb = sensillum basiconicum, sc = sensillum chaeticum, st = sensillum trichoideum, t = tactile hair): 38, ♂, whole antenna showing stout shape and flattened ventral surface of most of flagellum ($\times 46$); 39, ♂, segments 5, 6 ($\times 193$); 40, ♂, segment 5 ($\times 350$); 41, ♀, whole antenna showing stout shape and flattened surface of most of flagellum ($\times 35$); 42, ♀, segments 6-8 ($\times 161$); 43, ♀, segment 7 ($\times 469$); 44, ♀, detail of segment 7 showing numbers of sensilla basiconica and tactile hairs ($\times 1190$); 45, ♀, detail of segment 7 ($\times 1190$).



FIGURES 46-53.—Antenna, *Serendibula* spp. (p = dense patch of sensilla trichoidea, sb = sensillum basiconicum, sc = sensillum chaeticum, st = sensillum trichoideum, t = tactile hair): 46, ♂, *S. kasyapai*, new species, whole antenna showing elongate filiform flagellar segments ($\times 21$); 47, same sex and species, segment 7 ($\times 245$); 48, same sex and species, detail of segment 7 ($\times 980$); 49, ♀, *S. deraniyagalai* Krombein, whole antenna showing stout shape and flattened ventral surface of most of flagellum ($\times 32$); 50, same sex and species, segments 6, 7 ($\times 161$); 51, same sex and species, detail of segment 7 ($\times 70$); 52, same sex and species, detail of segment 6 ($\times 1610$); 53, same sex and species, detail of segment 6 ($\times 4200$).

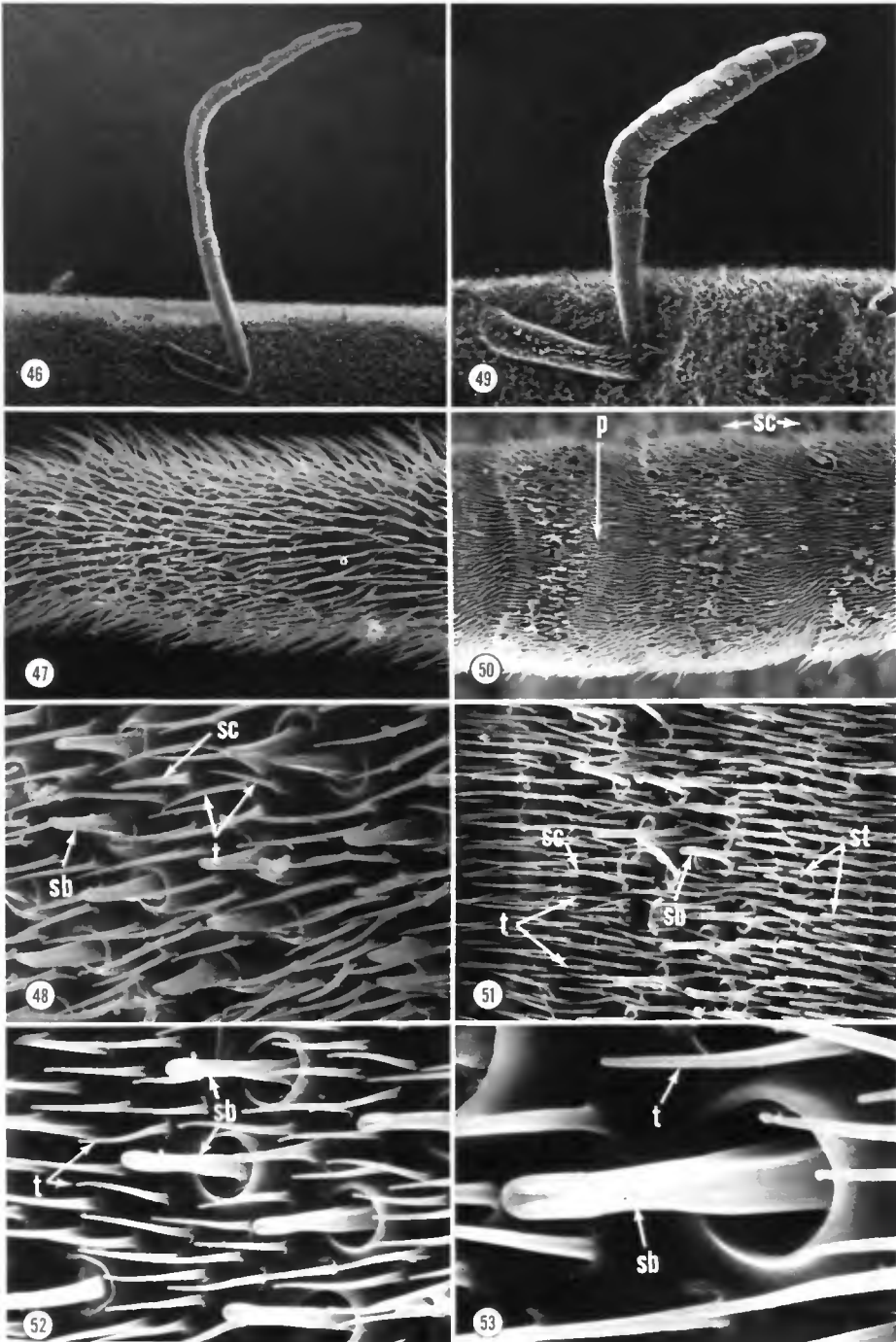


FIGURE 54.—Oblique view of top and front of head, ♂ *Saltasega distorta*, new species (× 63).

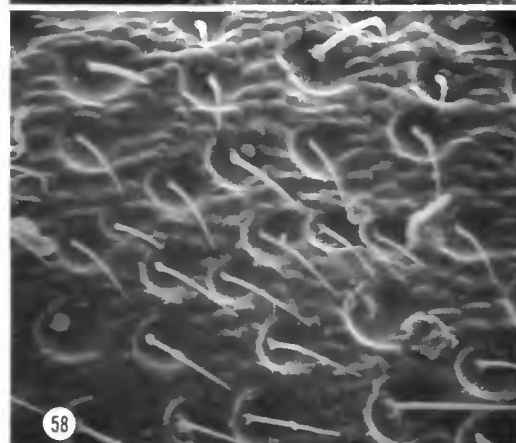
FIGURE 55.—Frontal view of head, ♂ *Imasega rufithorax*, new species (× 50).

FIGURE 56.—Dorsal view of head, ♀ *Baeosega humida*, new species (× 68).

FIGURE 57.—Dorsal view of head, ♀ *Baeosega laticeps*, new species (× 55).

FIGURE 58.—Dorsal view of side of pronotal dorsum, ♀ *Baeosega humida*, new species (× 355).

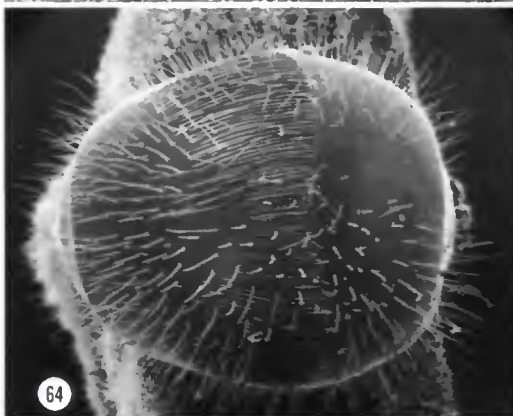
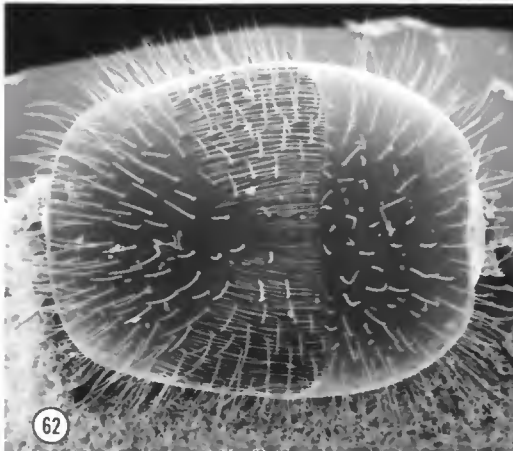
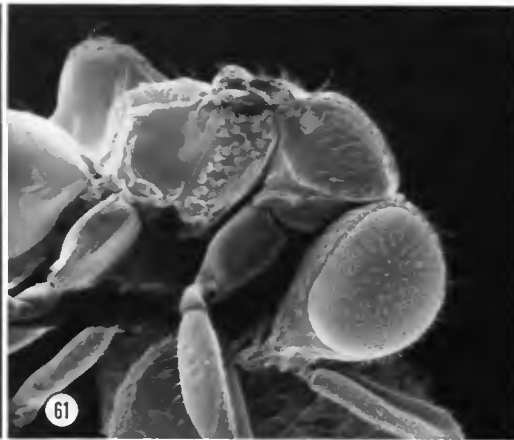
FIGURE 59.—Fifth flagellar segment, ♂ *Indothrix wijesinhei*, new species (× 158).



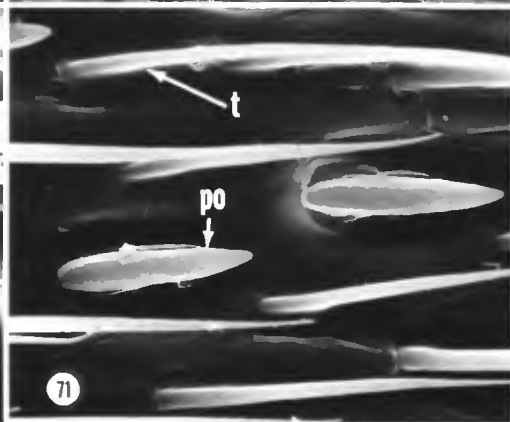
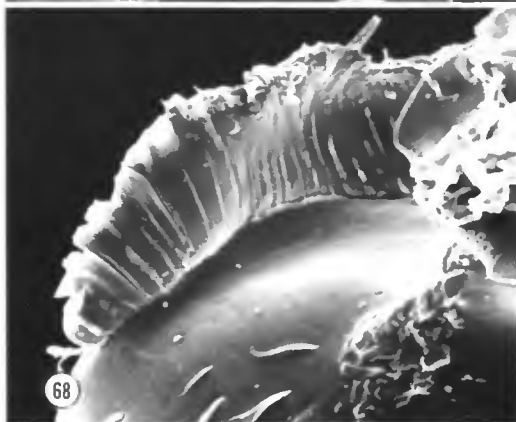
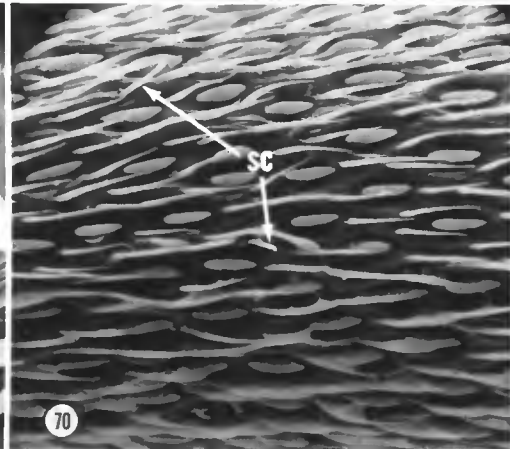
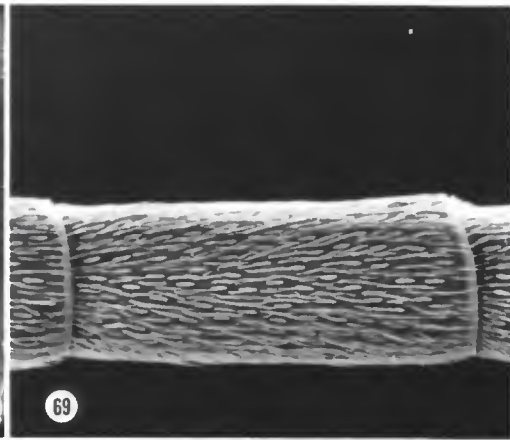
FIGURES 60-61.—Head and thorax, ♀ *Saltasega bella*, new species (× 43): 60, dorsal view; 61, lateral view.

FIGURES 62-64.—Dorsal view of abdomen, ♀ *Serendibula*: 62, *S. gracilis*, new species (× 43); 63, *S. insolita*, new species (× 40); 64, *S. karunaratnei*, new species (× 36).

FIGURE 65.—Oblique lateral view of head, ♂ *Loboscelidia rufa* Fouts from Philippines, antennae removed (× 59).



FIGURES 66-71.—♂, *Loboscelidia rufa* Fouts from Philippines (po = plate organ, sc = sensillum chaeticum, t = tactile hair): 66, oblique posterolateral view of head showing vertexal-temporal fimbria ($\times 120$); 67, part of temporal fimbria from dorsal aspect ($\times 217$); 68, temporal fimbria from ventral aspect ($\times 118$); 69, fifth flagellar segment ($\times 158$); 70, part of fifth flagellar segment ($\times 475$); 71, part of fifth flagellar segment ($\times 1580$).



REQUIREMENTS FOR SMITHSONIAN SERIES PUBLICATION

Manuscripts intended for series publication receive substantive review within their originating Smithsonian museums or offices and are submitted to the Smithsonian Institution Press with Form SI-36, which must show the approval of the appropriate authority designated by the sponsoring organizational unit. Requests for special treatment—use of color, foldouts, case-bound covers, etc.—require, on the same form, the added approval of the sponsoring authority.

Review of manuscripts and art by the Press for requirements of series format and style, completeness and clarity of copy, and arrangement of all material, as outlined below, will govern, within the judgment of the Press, acceptance or rejection of manuscripts and art.

Copy must be prepared on typewriter or word processor, double-spaced, on one side of standard white bond paper (not erasable), with 1¼" margins, submitted as ribbon copy (not carbon or xerox), in loose sheets (not stapled or bound), and accompanied by original art. Minimum acceptable length is 30 pages.

Front matter (preceding the text) should include: **title page** with only title and author and no other information; **abstract page** with author, title, series, etc., following the established format; table of **contents** with indents reflecting the hierarchy of heads in the paper; also, **foreword** and/or **preface**, if appropriate.

First page of text should carry the title and author at the top of the page; **second page** should have only the author's name and professional mailing address, to be used as an unnumbered footnote on the first page of printed text.

Center heads of whatever level should be typed with initial caps of major words, with extra space above and below the head, but with no other preparation (such as all caps or underline, except for the underline necessary for generic and specific epithets). Run-in paragraph heads should use period/dashes or colons as necessary.

Tabulations within text (lists of data, often in parallel columns) can be typed on the text page where they occur, but they should not contain rules or numbered table captions.

Formal tables (numbered, with captions, boxheads, stubs, rules) should be submitted as carefully typed, double-spaced copy separate from the text; they will be typeset unless otherwise requested. If camera-copy use is anticipated, do not draw rules on manuscript copy.

Taxonomic keys in natural history papers should use the aligned-couplet form for zoology and may use the multi-level indent form for botany. If cross referencing is required between key and text, do not include page references within the key, but number the keyed-out taxa, using the same numbers with their corresponding heads in the text.

Synonymy in zoology must use the short form (taxon, author, year:page), with full reference at the end of the paper under "Literature Cited." For botany, the long form (taxon, author, abbreviated journal or book title, volume, page, year, with no reference in "Literature Cited") is optional.

Text-reference system (author, year:page used within the text, with full citation in "Literature Cited" at the end of the text) must be used in place of bibliographic footnotes in all Contributions Series and is strongly recommended in the Studies Series: "(Jones, 1910:122)" or "... Jones (1910:122)." If bibliographic footnotes are required, use the short form (author,

brief title, page) with the full citation in the bibliography.

Footnotes, when few in number, whether annotative or bibliographic, should be typed on separate sheets and inserted immediately after the text pages on which the references occur. Extensive notes must be gathered together and placed at the end of the text in a notes section.

Bibliography, depending upon use, is termed "Literature Cited," "References," or "Bibliography." Spell out titles of books, articles, journals, and monographic series. For book and article titles use sentence-style capitalization according to the rules of the language employed (exception: capitalize all major words in English). For journal and series titles, capitalize the initial word and all subsequent words except articles, conjunctions, and prepositions. Transliterate languages that use a non-Roman alphabet according to the Library of Congress system. Underline (for italics) titles of journals and series and titles of books that are not part of a series. Use the parentheses/colon system for volume(number):pagination: "10(2):5-9." For alignment and arrangement of elements, follow the format of recent publications in the series for which the manuscript is intended. Guidelines for preparing bibliography may be secured from Series Section, SI Press.

Legends for illustrations must be submitted at the end of the manuscript, with as many legends typed, double-spaced, to a page as convenient.

Illustrations must be submitted as original art (not copies) accompanying, but separate from, the manuscript. Guidelines for preparing art may be secured from Series Section, SI Press. All types of illustrations (photographs, line drawings, maps, etc.) may be intermixed throughout the printed text. They should be termed **Figures** and should be numbered consecutively as they will appear in the monograph. If several illustrations are treated as components of a single composite figure, they should be designated by lowercase italic letters on the illustration; also, in the legend and in text references the italic letters (underlined in copy) should be used: "Figure 9*b*." Illustrations that are intended to follow the printed text may be termed **Plates**, and any components should be similarly lettered and referenced: "Plate 9*b*." Keys to any symbols within an illustration should appear on the art rather than in the legend.

Some points of style: Do not use periods after such abbreviations as "mm, ft, USNM, NNE." Spell out numbers "one" through "nine" in expository text, but use digits in all other cases if possible. Use of the metric system of measurement is preferable; where use of the English system is unavoidable, supply metric equivalents in parentheses. Use the decimal system for precise measurements and relationships, common fractions for approximations. Use day/month/year sequence for dates: "9 April 1976." For months in tabular listings or data sections, use three-letter abbreviations with no periods: "Jan, Mar, Jun," etc. Omit space between initials of a personal name: "J.B. Jones."

Arrange and paginate sequentially every sheet of manuscript in the following order: (1) title page, (2) abstract, (3) contents, (4) foreword and/or preface, (5) text, (6) appendixes, (7) notes section, (8) glossary, (9) bibliography, (10) legends, (11) tables. Index copy may be submitted at page proof stage, but plans for an index should be indicated when manuscript is submitted.

