

Biosystematic Studies
of Ceylonese Wasps, IX:
A Monograph of the Tiphidae
(Hymenoptera: Vespoidea)

KARL V. KROMBEIN

SMITHSONIAN CONTRIBUTIONS TO ZOOLOGY • NUMBER 374

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ABSTRACT

Krombein, Karl V. Biosystematic Studies of Ceylonese Wasps, IX: A Monograph of the Tiphidae (Hymenoptera: Vespoidea). *Smithsonian Contributions to Zoology*, number 374, 121 pages, 64 figures, 1982.—Forty-six species are recorded from Sri Lanka in the following subfamilies: Anthoboscinae with one species of *Anthobosca* Guérin; Tiphinae with 30 species of *Tiphia* Fabricius; Myzininae with five species of *Mesa* Saussure and two of *Hylomesa* Krombein; Methochinae with three species of *Methocha* subgenus *Methocha* Latreille, four species of *Methocha* subgenus *Dryinopsis* Brues, and one species of *Karlissa* Krombein. Thirty-seven species are known from both sexes, and nine from only one sex. Thirty-one species occur only in Sri Lanka, and 15 are found also in India or are more widely distributed in the Oriental Region. Specific hosts are unknown, but it is presumed that all taxa are parasitic on coleopterous larvae in the soil, in rotting wood, or in cavities in twigs or sound dead timber.

The 33 new taxa are *Anthobosca ceylonica*, *Tiphia leclercqi*, *T. kaszabi*, *T. sakagamii*, *T. knutsoni*, *T. hillyardi*, *T. bouceki*, *T. moczari*, *T. tsunekii*, *T. gurneyi*, *T. kurczewskii*, *T. bakeriana*, *T. weismani*, *T. pulawskii*, *T. wittmeri*, *T. wirthi*, *T. carvalhoi*, *T. vanlithi*, *T. hirashimai*, *T. dayi*, *T. fennahi*, *T. wahisi*, *T. sabroskyi*, *Mesa karunaratnei*, *M. flavipennis*, *Hylomesa anomala*, *Methocha (Methocha) litoralis*, *M. (M.) heveli*, *M. (M.) ubiquita*, *M. (Dryinopsis) taprobane*, *M. (D.) kandyensis*, *M. (D.) ceylonica*, and *M. (D.) anomala*. The previously unknown female of *Karlissa* is described. The following new synonyms are made: *Tiphia devalae* Allen under *T. tegulita* Allen; *T. conscia* Nurse and *T. batorea* Allen under *T. decrescens* Walker; and *T. brevipennis* Cameron, *T. petri* Turner, and *T. crinita* Roberts under *T. hirsuta* Smith. Lectotypes are designated for *Tiphia conscia* Nurse, *T. brevipennis* Cameron, and *Myzine petiolata* Smith. The following new combinations are made: *Myzine dimidiata* Guérin, *M. claripennis* Bingham, and *M. petiolata* Smith are all transferred to *Mesa* Saussure.

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Biosystematic Studies of Ceylonese Wasps, IX: A Monograph of the Tiphidae (Hymenoptera: Vespoidea)

Karl V. Krombein

Introduction

The Tiphidae, with 46 known species, is one of the largest families of Ceylonese aculeate wasps. Thirty-seven species are known from both sexes, and nine from only one sex. In addition, it is probable that some species, especially of Tiphinae, still await discovery because three species of *Tiphia* are known only from uniques and three others from two to five specimens each. Tiphidae occur from sea level to at least 2700 meters altitude and in both the Dry Zone and Wet Zone with the average rainfall ranging from 860 to 3900 millimeters.

Thirty-one species are known only from Sri Lanka, and 15 occur also in India or are more widely distributed in the Oriental Region. I anticipate that thorough collecting in South India will probably demonstrate that some of the 31 species apparently endemic to Sri Lanka occur also in that country.

So far as known, all Tiphidae parasitize coleopterous larvae. Members of most subfamilies parasitize larvae of Scarabaeidae in the soil or decaying wood, but *Hylomesa* of the Myzininae

parasitizes larvae of Cerambycidae in burrows in wood, and all members of the Methochinae parasitize larvae of Cicindelidae either in the soil or in cavities in twigs. Putative hosts are reported for the Ceylonese Methochinae in the discussion of that subfamily. *Hylomesa longiceps* (Turner) was reared in India from a cerambycid larva in dead wood. Hosts of the other Ceylonese Anthoboscinae, Tiphinae, and Myzininae are unknown but are presumed to be scarabaeid larvae.

Until this time relatively few species of Tiphidae have been described from Sri Lanka. The earliest was *Tiphia decrescens* Walker, 1859. Twenty years passed before Smith (1879) described *T. consueta*. Bingham described *Methoca* [sic] *nigra* in 1896, a species he synonymized a year later as the opposite sex of *T. consueta*. Cameron described *Methoca* [sic] *rugosa* in 1897, a species now placed in *Karlissa*. Cameron described *Myzine ceylonica* in 1900, a species now recognized as the opposite sex of the Indian *Mesa petiolata* (Smith).

The preceding number in my series "Biosystematic Studies of Ceylonese Wasps" is "VIII: A Monograph of the Philanthidae (Hymenoptera: Sphecoidea)," *Smithsonian Contribution to Zoology*, 343: 75 pages, 89 figures, 1981.

This present contribution also constitutes number XIII of my series "Studies in the Tiphidae"

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but will not be published under that series title. The preceding number in that series is "A New Genus of Methochinae with Notes on the Subgenera of *Methocha* Latreille (Hymenoptera Aculeata)," *Proceedings of the Entomological Society of Washington*, 81:424-434, 5 figures, 1979.

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C. O'Toole, University Museum, Oxford, lent the type series of *Myzine petiolata* Smith and part of the type series of *Tiphia brevipennis* Cameron. M.C. Day sent syntypes of *T. conscia* Nurse and *T. nervosa* Nurse, the remainder of the type series of *T. brevipennis* Cameron, and the unique type of *T. hirsuta* Smith.

I am grateful to Terry L. Erwin and Gloria House, Department of Entomology, National Museum of Natural History, Smithsonian Institution (SI), for providing identifications of a number of species of Cicindelidae that are putative hosts of the several species of Methochinae. T.L. Erwin helpfully brought to my attention the important contributions of Shelford on the behavior of arboreal cicindelid larvae.

Most illustrations are by George L. Venable, Department of Entomology (SI), but the late André Pizzini of the same department made Figure 39.

Sandra S. Gingras, Department of Entomology (SI), patiently transcribed and assembled the label data on an extensive number of specimens.

Mary-Jacque Mann and Susann G. Braden, Scanning Electron Microscope Laboratory (SI), took the photographs, and G.L. Venable prepared those plates.

Finally, I am most grateful to my wife Dorothy for offering astute editorial comments and for assisting in the tedious task of proofing galleys and page proof.

SYSTEMATICS

Six subfamilies are currently recognized in the primitive wasp family Tiphidae (Brothers, 1975), the Anthoboscinae, Thynninae, Tiphinae, Brachycistidinae, Myzininae, and Methochinae. Four of these subfamilies occur in Sri Lanka, but the Brachycistidinae are found only in the desert areas of the southwestern Nearctic Region, and the Thynninae range throughout the southern half of the Neotropical Region and in New Zealand, Australia, and Melanesia westward to Celebes and northward into the Philippines.

The habitus illustrations (Figures 1-8) of both sexes of the Ceylonese subfamilies of Tiphidae should assist readily in placement of these wasps in the proper groups.

The fully winged females of the Anthoboscinae, Tiphinae, and Myzininae except *Hylomesa* Krombein have well-developed modifications for fossorial existence, such as the enlarged femora and

tibiae armed on the outer surface with stout thorns. The female of *Hylomesa* is unique in having a porrect quadrate head with the mandibles placed anteriorly (Krombein, 1968, pl. 1: figs. 6, 7), whereas the other tiphid females from Sri Lanka have the head short and transverse with the mandibles placed ventrally. Female Methochinae are remarkable in being completely wingless and very antlike in appearance; however, they lack the characteristic node between the thorax and main part of the abdomen. Females of Anthoboscinae differ from those of the Tiphinae and Myzininae in having extensive yellow maculations, whereas those of the latter two subfamilies are entirely black or black and red. Females of Tiphinae have a propodeal areola and the tegulae covering the axillary sclerites of the forewing, whereas the propodeal areola is lacking in Myzininae, and the tegulae are smaller and do not completely cover the axillary sclerites.

Males of Tiphinae, Myzininae, and Methochinae are separated from those of all other Ceylonese wasps by having the apex of the eighth abdominal sternum protruding as a stout recurved aculeus. Males of Anthoboscinae lack such an aculeus and have more extensive yellow maculations than other tiphids. Male Tiphinae are stouter than those of Myzininae and Methochinae and lack notauli on the scutum, whereas the notauli are weakly defined and oblique in the latter two subfamilies. Finally, males of Myzininae differ from those of Methochinae in having a nodose first abdominal segment.

DISTRIBUTION AND ECOLOGY

This tabulation of species includes notes on distribution within Sri Lanka, the actual distribution for wider ranging species, and remarks on ecology.

1. *Anthobosca ceylonica*, new species: This new species is known only from several localities in the quite arid part of the Dry Zone of northwestern Sri Lanka.

2. *Tiphia coimbatorea* Allen: This rare species occurs both in the Dry Zone and the West Zone

from sea level to 2100 ft with an average annual rainfall of 860 to 1950 mm; it occurs also in South India at altitudes ranging from 1400 to 3400 ft.

3. *Tiphia tegulita* Allen: Another uncommon species that occurs in both the Dry Zone and the Wet Zone at altitudes ranging from 100 to 600 m; it is found also in South India, Nepal, and Assam.

4. *Tiphia oswini* Turner: This is a common montane species in the Wet Zone of the central highland area around Nuwara Eliya at altitudes ranging from 1900 to 2700 m.

5. *Tiphia leclercqi*, new species: This occurs in the Wet Zone on Adams Peak at altitudes from 1530 to 1690 m.

6. *Tiphia kaszabi*, new species: A rare species known only from a few males from the Wet Zone of the central highland area around Nuwara Eliya at altitudes from 1650 to 2035 m.

7. *Tiphia sakagamii*, new species: This occurs in several Dry Zone localities at low altitudes from sea level to 100 m.

8. *Tiphia knutsoni*, new species: This species occurs in the Wet Zone in the central hill country and in the Sinharaja Jungle at altitudes ranging from several hundred to 2100 ft; it occurs also in the Walayar Forest of South India.

9. *Tiphia hillyardi*, new species: This is a rare species of the Wet Zone ranging from several hundred to 2100 ft with average rainfall of 1950 to 3900 mm.

10. *Tiphia bouceki*, new species: This occurs primarily in the Dry Zone in areas of low rainfall but occasionally enters the Wet Zone at moderate altitudes with medium rainfall; it occurs also in the Walayar Forest of South India.

11. *Tiphia moczari*, new species: This montane species, known only from a few females, occurs in the Nuwara Eliya area from 1650 to 2050 m with an average annual rainfall of 2160 mm.

12. *Tiphia tsunekii*, new species: This is known from a unique female taken on Adams Peak at 1610–1690 m, an area of very heavy rainfall.

13. *Tiphia gurneyi*, new species: Closely related to the preceding species, this species occurs most commonly in lowland rain forest with av-

erage annual rainfall of as much as 3900 mm, but there is one record from the central hill country at 1800 ft with 1950 mm average annual rainfall and one record from a low arid area of the Dry Zone with an average annual rainfall of about 1075 mm.

14. *Tiphia nilgirensis* Allen: Within Sri Lanka this species occurs in both the Dry Zone and the Wet Zone at altitudes ranging from near sea level to 6200 ft and with average annual rainfall ranging from 1700 to 2400 mm; it was described from South India.

15. *Tiphia kurczewskii*, new species: This common widely distributed species is found both in the Dry Zone and drier parts of the Wet Zone with average annual rainfall ranging from 1700 to 2400 mm and at altitudes ranging from sea level to several hundred ft; it is known also from South India at an altitude of 2900 ft.

16. *Tiphia palmi* Krombein: This widely distributed species occurs in both the Dry Zone and the Wet Zone at altitudes of sea level to 1000 ft with average annual rainfall ranging from 965 to 3900 mm; it also ranges widely through India.

17. *Tiphia decrescens* Walker: This common species occurs chiefly in the Dry Zone from sea level to some 2000 ft with average annual rainfall of 965 to 1725 mm; however, it occurs sparingly in the Wet Zone where rainfall may be as much as 2900 mm; in India it ranges at least as far north as Deesa.

18. *Tiphia bakeriana*, new species: This is known from a single male collected in the lowland rain forest in the foothills of Adams Peak with an average annual rainfall about 3900 mm.

19. *Tiphia weismani*, new species: This is known from a unique female from primary jungle in the Wet Zone at an altitude of a few hundred feet and with average annual rainfall of about 2400 mm.

20. *Tiphia hirsuta* Smith: Within Sri Lanka this species is found both in the Dry Zone and the Wet Zone in areas of light to moderate average annual rainfall (965–2600 mm) and from sea level to 2100 ft; it also occurs throughout India and in Nepal.

21. *Tiphia pulawskii*, new species: This is another montane species of the Wet Zone confined to the Nuwara Eliya District at altitudes of 1650–2135 m.

22. *Tiphia wittmeri*, new species: This is more common in the Wet Zone in lowland rain forests with average annual rainfall as much as 3900 mm but occurs sparingly in Dry Zone localities with as little as 1700 mm.

23. *Tiphia wirthi*, new species: This rather uncommon species occurs in both the Dry Zone and the Wet Zone but chiefly in areas receiving no more than 1700 mm average annual rainfall and at altitudes near sea level to several hundred feet.

24. *Tiphia carvalhoi*, new species: This is another uncommon species known only from the Colombo District in the Wet Zone and the Trincomalee District in the Dry Zone at low altitudes and average annual rainfall of 2400 mm or less.

25. *Tiphia consueta* Smith: This abundant and widely distributed species is found in both the Dry Zone and the Wet Zone at altitudes from sea level to at least 2100 ft and with average annual rainfall of 1425–3900 mm.

26. *Tiphia vanlithi*, new species: This rare species has been collected at only two localities in the Wet Zone up to 1800 ft and with annual rainfall of at least 1950 mm.

27. *Tiphia hirashimai*, new species: This species is common in the central Hill Country of the Wet Zone at 1800–2100 ft and with average annual rainfall of at least 1950 mm.

28. *Tiphia dayi*, new species: This species is found at higher altitudes (1800–6500 ft) with average annual rainfall of 1950–2160 mm.

29. *Tiphia fennahi*, new species: This species occupies a range complementary to that of *T. dayi*, new species, being found in both the Dry Zone and the Wet Zone at altitudes near sea level to 2200 ft and with average rainfall of 965–3900 mm.

30. *Tiphia wahisi*, new species: This uncommon taxon is known from males from two localities, one in the Dry Zone at 200 ft and with about 1100 mm average rainfall, and the other in the

Wet Zone at 1000 ft and with over 2000 mm rainfall.

31. *Tiphia sabroskyi*, new species: This species, known only from males, is found mostly in the Dry Zone at quite low altitudes and with about 2400 mm rainfall.

32. *Mesa dimidiata* (Guérin): This large uncommon species is restricted to the Dry Zone at altitudes near sea level to 1850 ft and with average annual rainfall of 965–1500 mm; it occurs also throughout India.

33. *Mesa karunaratnei*, new species: This is known from only two localities on the west coast in the Dry Zone and the Wet Zone at very low altitudes and average annual rainfall of 1110–2400 mm.

34. *Mesa flavipennis*, new species: This species occurs at several localities in the Dry Zone at altitudes of 500 ft or less with average annual rainfall of 860–1705 mm; it occurs also in South India.

35. *Mesa claripennis* (Bingham): This common species is found in both the Dry Zone and the Wet Zone, though more commonly in the former, and at altitudes ranging from sea level to at least 2100 ft and with average annual rainfall of 860–2600 mm; it occurs also in India, Tenasserim, and Burma.

36. *Mesa petiolata* (Smith): This common species has almost exactly the same range in Sri Lanka as the preceding except that it occurs also in areas having average annual rainfall as high as 3900 mm; it is also widely distributed in India.

37. *Hylomesa longiceps* (Turner): This is rare in Sri Lanka and found mostly in the Dry Zone, although there is one record from Kandy in the Wet Zone; it occurs to altitudes of 2100 ft and with average annual rainfall of 1490–1950 mm; it has a wide distribution and occurs also in India, Assam, Burma, Malaysia, and Philippines.

38. *Hylomesa anomala*, new species: This rare species has been found in only one locality in the Wet Zone at an altitude of 740–760 m and with average annual rainfall of about 1950 mm.

39. *Methocha (Methocha) litoralis*, new species: This is known from a single locality in the inter-

tidal area of a sandy beach in the Dry Zone with average annual rainfall of 965 mm; it occurs also in a coastal locality in South India.

40. *Methocha (Methocha) heveli*, new species: This species occurs primarily in the Dry Zone, but there is one record from the Wet Zone; it is found near sea level to 200 ft with average annual rainfall of 1075–2400 mm.

41. *Methocha (Methocha) ubiquita*, new species: This is the most widely distributed taxon in the genus in Sri Lanka, where it occurs in both the Dry Zone and the Wet Zone at altitudes from 50 to some 2000 ft with average annual rainfall of 860–3900 mm.

42. *Methocha (Dryinopsis) taprobane*, new species: This is the most widely distributed species of the subgenus; it occurs in both the Dry Zone and the Wet Zone at altitudes near sea level to 2100 ft and with average annual rainfall of 860–1950 mm.

43. *Methocha (Dryinopsis) kandyensis*, new species: This is known from only a few males from the Kandy area at an elevation of 1800 ft and with average annual rainfall of 1950 mm.

44. *Methocha (Dryinopsis) ceylonica*, new species: This taxon occurs both in the Dry Zone and the Wet Zone at altitudes near sea level to 1800 ft and with average annual rainfall of 1725–1950 mm.

45. *Methocha (Dryinopsis) anomala*, new species: This species is known from just a few males from both the Dry Zone and the Wet Zone at altitudes of 330–2100 ft and with average annual rainfall of 1700–3900 mm.

46. *Karlissa rugosa* (Cameron): This rare taxon is known from the unique holotype from “Ceylon” and a pair from the most xeric part of the Dry Zone at an altitude of some 50 ft and with an average annual rainfall of 860 mm.

TREATMENT OF INDIVIDUAL TAXA

The Ceylonese taxa are treated according to their respective subfamilies. Under each subfamily heading is a discussion of the number of genera and species included, their distribution, and bio-

logical data. There follows a key to the genera and species of each subfamily.

In the section following the key are detailed treatments of each of the species. The references cited beneath each specific heading include the original description and those of any synonyms, notes on type fixation when appropriate, and all other references citing the taxon.

Several paragraphs of discussion follow on such subjects as distribution, synonymy, type fixation where required, and differentiating characters. Next are descriptions of the female and male when both sexes are known. Finally there is a listing of the specimens examined arranged by province and district.

Label data are given in full for the type series of all new species. Label data for specimens of previously described taxa have been consolidated insofar as possible. For example, one consolidated record under "4. *Tiphia oswini* Turner" reads "9♀,

12♂, Nuwara Eliya (includes Galway Natural Reserve, One Tree Hill, Mt. Pidurutalagala), 1900 m, 6500–8200 ft, 2 Jan, 14 Feb, 4 Mar, 28 Apr, 10, 27–29 May, 10 Jun, 30–31 Jul, 28 Sep–1 Oct, 8 Oct, 21 Nov, Brinck et al., Davis et al., Hevel et al., Karunaratne et al., Keiser, Krombein et al., Messersmith et al. (USNM, Colombo, Basel, Lund)." Following the number of specimens and locality are specific dates of collection, except that the year is omitted. Dates are followed by names of collectors, except that only the name of the first collector is cited from a label bearing the names of two or more collectors. Finally the depositories in which the specimens are located are cited in parentheses. The only abbreviation used is USNM (former United States National Museum collections deposited in the National Museum of Natural History, Smithsonian Institution); other depositories in parentheses are more fully identified in paragraph 3, "Acknowledgments."

Family TIPHIIDAE

Key to Subfamilies of Ceylonese Tiphidae

1. FEMALES: Antenna 12-segmented; abdomen with 6 exposed segments, dorsum of sixth usually with a triangular, gently convex pygidial area, but normally retracted seventh tergum exposed in Methochinae; sexual dimorphism well developed, apterous Methochinae very slender and with antlike habitus, other subfamilies stout-bodied forms with exterior surface of mid and hind tibiae with short, heavy thorns and foretarsus with a well-developed pecten except in *Hylomesa* Krombein (Myzininae) 2
- MALES: Antenna 13-segmented; abdomen with 7 exposed segments, pygidial plate usually lacking, and eighth sternum protruding as a stout reflexed aculeus except in Anthoboscinae; sexual dimorphism well developed, all species fully winged, body slender, and legs without modifications for fossorial use 5
2. Slender, wingless, antlike forms [Figure 8]; tibial spur formula 1–1–1; mesosternum truncate posteriorly and with a tooth or rounded angle in front of mid coxa; inner angle of mid coxa not overlaid by a triangular lamella; pygidial area glossy and relatively impunctate METHOCHINAE

- Stout, fully winged forms; tibial spur formula 1-2-2; inner angle of midcoxa overlaid by mesosternum in the form of a thin lamella except in *Hylomesa* (Myzininae); pygidial area punctate, longitudinally striate or shagreened, or a combination of 2 of these 3
3. Antennae arising beneath a pair of large frontal tubercles, apparently only 11-segmented because the pedicel is recessed into the apex of the scape [Figure 6]; tarsal claws cleft; forewing with closed marginal cell and 3 submarginal cells; mesopleuron without anterior vertical ridge **MYZININAE**
- Front without tubercles overlying antennal bases, antenna 12-segmented, pedicel not recessed into scape; others characters not all as given above 4
4. Body predominantly black, pronotum occasionally with testaceous posterior margin; mandible, antenna, tegula, and legs frequently red or testaceous in part or entirely; mesopleuron with a vertical ridge anteriorly; marginal cell open, costa not present beyond stigma [Figure 4], 2 submarginal cells; tarsal claws cleft **TIPHIINAE**
- Body abundantly marked with yellow including mandible and foreleg; mesopleuron without anterior ridge; marginal cell closed, costa complete to apex of cell [Figure 2], 3 submarginal cells; tarsal claws with 3 teeth **ANTHOBOSCINAE**
5. Forewing with 2 submarginal cells; integument black except hind margin of pronotum testaceous in a few Tiphiinae, appendages occasionally red in part or entirely; eighth sternum protruding as a stout reflexed aculeus 6
- Forewing with 3 submarginal cells; integument black with relatively abundant yellow markings, except in *Hylomesa* (Myzininae) in which the head is red and *Mesa dimidiata* (Myzininae) which has infuscated forewings, legs black-and-yellow in most species 7
6. Antennae arising beneath small frontal tubercles [Figure 7]; clypeus with a median process near base; tegula not covering axillary sclerites of forewing; anal lobe of hind wing shorter than submedian cell; dorsal surface of propodeum without enclosed median areola, rounding gradually into posterior surface **METHOCHINAE**
- Front without tubercles overlying antennal insertions [Figure 3]; clypeus gently convex or flat, without median process at base; tegula larger, covering axillary sclerites of forewing; anal lobe of hind wing longer than submedian cell; dorsal surface of propodeum with an enclosed median areola, separated from posterior declivous surface by a strong transverse ridge **TIPHIINAE**
7. Antennae arising beneath a pair of large frontal tubercles, apparently only 12-segmented because pedicel is recessed into apex of scape [Figure 5]; eighth sternum protruding as a stout reflexed aculeus; first tergum nodose at apex; occipital carina present **MYZININAE**
- Front without tubercles overlying antennal bases, antenna 13-segmented, pedicel not recessed into apex of scape [Figure 1]; eighth sternum simple, lingulate, not reflexed; first tergum gradually broadened, not nodose at apex; occipital carina absent **ANTHOBOSCINAE**

Subfamily ANTHOBOSCINAE

The only representative of this subfamily is *Anthobosca ceylonica*, new species, a species distinct from all other Ceylonese tiphiids in that both sexes are profusely maculated with pale yellow. Other distinguishing characters are mentioned in the foregoing key to subfamilies.

The genus *Anthobosca* occurs chiefly in the Southern Hemisphere where a number of species have been described from Australia, South America, and Africa, but none from the Orient. To date, the genus has not been recorded from India, and the closest geographical relative of *A. ceylonica* is *A. arabica* Turner, described from Aden and known only from the female.

A Chilean species of *Anthobosca* has been recorded as a parasite of a scarabaeid larva in the soil. It is presumed that the single Ceylonese species has a similar host, for the female wasp has the legs strongly modified for fossorial use.

1. *Anthobosca ceylonica*, new species

FIGURES 1, 2, 9

This Dry Zone species, known only from the northwestern part of Sri Lanka, is distinguished from its closest geographical relative, the Arabian *A. arabica* Turner as follows: clypeal margin gently rounded instead of truncate; apex of pygidium shagreened rather than finely punctate; marginal cell narrowly truncate at apex, not rounded, and extending slightly beyond third submarginal cell; clypeus with a yellow spot; scutellum lacking a yellow band; and wings slightly infumated rather than hyaline.

Most of the type series was collected 22–25 May 1976 just north of the Modaragam Aru near Kokmotte Bungalow, Wilpattu National Park. One female and 10 males were collected with hand nets, and 16 males were caught in a Malaise trap. We revisited this locality during January and October 1977 and February 1979 and set the Malaise trap at the identical site, but we obtained no additional specimens. Two females were col-

lected in January 1978 at two localities only 15 miles north of the type-locality.

HOLOTYPE.—♀, Sri Lanka, Northern Province, Mannar District, 0.5 mi NE Kokmotte Bungalow, Wilpattu Natl. Park, 21–25 May 1976, K.V. Krombein, P.B. and S. Karunaratne, D.W. Balasooriya (USNM Type 100258).

FEMALE (Figure 2).—Length 8.5 mm, forewing 5.2 mm. Black, the following pale yellow: clypeus, stripe along inner eye margin, tiny spot on middle of front, narrow lateral stripe on occiput behind eye, anterolateral spot on pronotum and narrow posterior band, large posterolateral spot on propodeum, lateral elliptical spots on middle of first four abdominal terga, that on first quite small and narrow, those on second to fourth broader and larger, and narrow stripe on outer surface of foretibia; the following ferruginous—mandible, antenna, and tarsi. Vestiture relatively sparse, glittering white, but dense, fiery red and subdecumbent on sixth abdominal tergum. Wings slightly infumated, stigma dark brown, veins testaceous.

Head 1.2 times as broad as high (apex of clypeus to occiput); interantennal distance 1.4 times antennular distance; apical margin of median lobe of clypeus gently rounded; ocelli in a low triangle, postocellar distance 0.8 times ocellular distance and subequal to ocelloccipital distance; front with small punctures, on lower half separated from each other by about the diameter of a puncture, becoming sparser above; vertex similarly punctate, quite sparsely behind ocelli and more densely toward side.

Pronotal disk with small punctures mostly separated by at least the diameter of a puncture but closer along posterior margin; scutum with punctures a bit larger, scattered on middle of disk and crowded toward notauli; scutellum with coarser, very scattered punctures; mesopleural disk with larger punctures separated by less than the diameter of a puncture; propodeal dorsum with quite small contiguous punctures, lateral surface smooth, posterior surface finely roughened; tarsal claws 3-toothed; marginal cell narrowly truncate at apex.

Pygidium on anterior half with dense, coarse, subdecumbent setae, posterior half shagreened.

ALLOTYPE.—♂, same label data as type (USNM).

MALE (Figure 1).—Length 9.5 mm, forewing 6.5 mm. Black, the following pale yellow: basal half of mandible, clypeus, stripe along inner eye margin, small oblique spot behind eye above, apex of scape beneath, pronotum entirely except anterior slope and upper half of lateral aspect, spot on tegula, disk of scutellum, spot on middle of postscutellum, oblique spot above on mesopleuron, posterolateral spot on propodeum and a median spot on posterior surface, large ovoid lateral spots on second to fourth abdominal terga and smaller one on fifth, apex of forecoxa, apices of all femora externally, tibiae almost entirely except dark blotch on posterior, and all tarsi. Vestiture glittering white, relatively short and dense on head and thorax, shorter, decumbent and cinereous on abdomen. Wings almost clear, stigma dark brown, veins light brown.

Head rounded, width 1.1 times height; inter-antennal distance subequal to antennocular distance; ocelli in a low triangle, postocellar distance 0.9 times both ocellocular and ocelloccipital distances; median lobe of clypeus bidentate at apex, shallowly emarginate between teeth; front finely and closely punctate; vertex with slightly larger and more separated punctures.

Thorax rather uniformly finely and closely punctate; propodeum with even smaller and more crowded punctures; tarsal claws with three teeth.

Abdomen with close, delicate punctation except sixth and seventh terga with larger punctures, contiguous on latter segment; genitalia (Figure 9).

PARATYPES.—25♂, same label data as type. *Mannar District*: 1♀, Silavathurai, 24 Jan 1978, P.B. Karunaratne (USNM); 1♀, Kondachchi, 26 Jan 1978, P.B. Karunaratne (USNM); 2♂, Silavathurai, Kondachchi, 23–27 Jan 1978, in Malaise trap, P.B. Karunaratne, T. Wijesinha, M. Jayaweera, G. Ratnavira (USNM). Paratypes have been deposited in the National Museums of

Sri Lanka (Colombo), and in the British Museum (Natural History).

The female paratypes are 7.5 mm and 11.0 mm long. Both females have larger yellow markings than does the holotype, and in addition each has a small lateral spot on scutum, a small spot above on mesopleuron, a spot at base of propodeum and a pair of median spots on posterior surface, and small spots at apices of outer surface of all femora. Male paratypes are 5.4–10.0 mm long. There is considerable variation in the number and size of yellow maculations, and smaller specimens are darker. The most brightly marked specimen has larger spots on the abdomen, the spots on second meeting on midline, and those on third and fourth are narrowly separated, the femoral and propodeal markings are more extensive, and the first abdominal tergum has a small oblique spot on side. The least maculated specimen has much smaller maculations on front, vertex, abdominal terga, femora and tibiae, the pronotum has only a posterior band on dorsum and tiny spot on lateral surface, and yellow spots are lacking on scutellum, postscutellum, mesopleuron and propodeum.

Subfamily TIPHIINAE

Tiphia Fabricius is the only genus of Tiphinae that occurs in Sri Lanka. It is one of the most difficult genera in the Ceylonese wasp fauna insofar as specific discrimination is concerned. There are many species; sex associations are sometimes difficult because of the sexual dimorphism, and some species exhibit a disconcerting degree of variability in punctation and reddening of the appendages. Thirty species have been collected in Sri Lanka, 21 species occurring in Sri Lanka only, and nine occurring also in India. It is more than likely that some Dry Zone species now known only from Sri Lanka will be found in South India also when more thorough collecting is done in that area. Furthermore, six Ceylonese species are known from less than six specimens, three of them from uniques, so it is quite probable that we have not yet obtained the entire tiphine fauna.

Bingham (1896:431) recorded *T. rufofemorata* Smith from Sri Lanka, but this was certainly a misidentification of this Indian species; considering the locality from which he recorded it, I suspect that he had a female of what is described herein as *T. dayi*, new species.

The wealth of material collected during my 12 field trips in Sri Lanka has enabled me to make sex associations in 23 of the 30 species obtained. Previously, only the two sexes of *T. oswini* Turner had been associated. Of the seven remaining species, all of them new, three are known only from females (*T. moczari*, *T. tsunekii*, and *T. weismani*) and four only from males (*T. bakeriana*, *T. kaszabi*, *T. sabroskyi*, and *T. wahisi*).

Ideally, sex associations are based on the capture of mating pairs; however, only rarely are species of *Tiphia* taken in copula, suggesting that the female mates only once and for a relatively brief period. The only records I have are my capture in copula of a pair of *T. dayi*, new species, and of a pair of *T. consueta* Smith. P.B. Karunaratne captured newly emerged females and males of *T. hirsuta* Smith on the ground at the Colombo Museum but observed no mating. I have seen two newly emerged females of *T. dayi* and one of *T. tsunekii* resting quietly on foliage. I suspect that they were ready to mate and were releasing a pheromone to attract males. Newly emerged wingless females of a new mutillid genus and species to be described by Børge Petersen behave similarly, and the pair is often caught on the foliage or in flight.

The rarity of mating pairs requires that sex associations be based on other criteria. One important criterion is the capture of both sexes at several localities. These data must be considered together with characters such as coloration of the legs, antennae and wings, the shape and color of the tegulae, and comparative density of the punctuation which is sometimes similar in the two sexes.

Female species with light red legs and antennae usually have males with similar coloration except that parts of the legs, especially the hind tarsi, and the dorsal surface of the antennae may be infuscated. Species having such coloration in both

sexes are *T. carvalhoi*, new species, *T. hillyardi*, new species, *T. kurczewskii*, new species, *T. pulawskii*, new species, *T. palmi* Krombein, *T. sakagamii*, new species, *T. tegulita* Allen, *T. vanlithi*, new species, and *T. wirthi*, new species. The female of *T. gurneyi*, new species, has predominantly reddish legs, but not the male. The male of *T. bouceki*, new species, has reddish legs, but not the female. The females of *T. weismani* and *T. tsunekii* have light red legs, but the males are unknown.

Females of *T. dayi*, *T. fennahi*, new species, and *T. hirashimai*, new species, have dark legs except for the bright red mid and hind femora. Legs of their respective males are mostly dark, and the sexes are associated on the basis of relative density of punctuation, size and occurrence at some of the same localities, and, in the case of *T. dayi*, on the basis of the capture of a pair in copula.

Similarly colored wings in both sexes is extremely unusual. It occurs only in *T. pulawskii*, which has bright yellow wings in both sexes. Normally, the female forewing is darker, ranging from infumated to infuscated, whereas in males the forewing is clear or only slightly infumated. Two species, *T. hillyardi* and *T. hirsuta*, have yellow forewings in the female but clear or lightly infumated wings respectively in the male.

The shape of the tegula is the same in both sexes, and the color is usually similar, so these are useful corroborating characters for sex associations. Most species have tegulae with a more or less circular outline (Figure 41) and with the length only slightly greater than the width, but nine species have elongate tegulae (Figure 42) with the length at least 1.5 times greater than the width. Frequently the tegula is opaque black in both sexes, but there are some species with the posterior part and outer edge transparent and light brown or testaceous, and so part of the axillary sclerites of the forewing may be seen, and other species have the entire tegula transparent and testaceous or light red, so all of the axillary sclerites may be seen.

Emergence from the soil may occur during periods of inclement weather. At Nuwara Eliya during a continual overcast and very light drizzle,

newly emerged males and females were alighting on foliage, but no mating was observed. During a period of two hours, we collected a female of *T. pulawskii*, new species, five pairs of *T. oswini*, three females of *T. moczari*, and eight females and 25 males of *T. dayi*. On the Adams Peak Trail under constant overcast and intermittent heavier showers, we collected the type series of *T. leclercqi*, new species (1♀, 5♂), and the unique female of *T. tsunekii*.

Hosts of the Ceylonese *Tiphia* are unknown. It is presumed that they will consist of subterranean scarabaeid larvae, as has been ascertained for a number of species from India, China, Korea, and Japan. Females of the Ceylonese species have a pecten of spines along the posterior margin of the foretarsus and an armature of short coarse thorns covering the outer surfaces of the mid and hind tibiae (Figure 4a,b). These are normal for the

genus and indicate that the females lead a fossorial existence searching for host larvae. Some Ceylonese species have the tarsal pecten composed of shorter, weaker spines than is normal, and the mid and hind tibiae may bear fewer and weaker thorns. These developments suggest that the host larvae may occur in a more friable substrate such as sand or decaying wood.

The limited distribution and scarcity of some species suggests that they may be host specific or confined to hosts in very specialized ecological niches. Taxonomic difficulties due to variability in wide-ranging, common species may be associated with a broad host spectrum.

I have named certain new species for some collaborators on the Smithsonian Ceylonese Insect Project and others for some of the specialists who furnished identifications of prey, hosts, or parasites of Ceylonese solitary wasps.

Key to Ceylonese Species of Tiphinae

(Males of the following new species are unknown: *Tiphia moczari*, *T. tsunekii*, and *T. weismani*; females of the following new species are unknown: *T. bakeriana*, *T. kaszabi*, *T. sabroskyi*, and *T. wahisi*)

1. FEMALES [Figure 4]: Antenna 12-segmented; 6 visible abdominal segments, the last tergum flattened and with a pygidial area 2
 MALES [Figure 3]: Antenna 13-segmented; 7 visible abdominal segments, the last sternum terminating in a recurved, upwardly directed hook 27
2. Tegula at least 1.5 times as long as broad [cf. Figure 42] 3
 Tegula at most slightly longer than wide [Figure 41] 10
3. Propodeal areola quinquecarinate [cf. Figure 51]; hind basitarsus without longitudinal groove on inner surface [cf. Figure 44]; mandible, antenna, tegula, and legs except coxae light red 3. ***Tiphia tegulita*** Allen
 Propodeal areola tricarinate [cf. Figure 52]; hind basitarsus with a longitudinal groove of varying length on inner surface [cf. Figure 43]; appendages sometimes darker, sometimes colored as above 4
4. Lateral third of second abdominal tergum usually with many elongate pits; lower front with a strong, median longitudinal crest above antennae 5
 Pits on second tergum, if present, rounded not elongate, this area usually punctate only; front with a median crest only in *T. leclercqi*, new species 7
5. Forewing bright yellow on basal half, veins amber; antenna, tegula, and

- legs except coxae light red; vestiture golden; many of elongate pits on second tergum confluent in longitudinal rows 9. *Tiphia hillyardi*, new species
- Forewing lightly infumated or light yellow, veins amber or light brown; antenna, legs and anterior half or two-thirds of tegula dark, posterior half or third light brown and transparent; vestiture silvery; pits of second tergum sometimes not confluent in longitudinal rows, sometimes less elongate than in *T. hillyardi* 6
6. Forewing infumated, veins light brown; propodeal areola with basal width usually 1.1 times apical width; posterior third of tegula transparent 8. *Tiphia knutsoni*, new species
- Forewing light yellow, veins amber; propodeal areola twice as wide at base as at apex; posterior half of tegula transparent 10. *Tiphia bouceki*, new species
7. Larger forms, 10–13 mm long; antenna, tegula, and legs dark; lower two-thirds of lateral surface of pronotum with close, moderate to coarse oblique rugulae and a strong, median oblique groove; sensorium of hind tibia large, not impressed; apical third of pygidium shagreened 8
- Smaller forms, 6–8 mm long; antenna at least beneath, tegula and legs except coxae light red; lower two-thirds of lateral surface of pronotum smooth and shagreened or with only a few delicate, oblique rugulae and usually without a strong, median oblique groove; sensorium of hind tibia smaller, impressed; apical third of pygidium glossy 9
8. Front with median crest above antennae lacking or very weak; scutum anteriorly with a complete transverse carina extending to parapsidal furrows; disk of first abdominal tergum with a small, median chestnut mark 4. *Tiphia oswini* Turner
- Front with strong median crest above antennae; scutum anteriorly with transverse carina present only on median third; disk of first tergum entirely black 5. *Tiphia leclercqi*, new species
9. Upper half of front with a few impunctate interspaces wider than an ocellus, but many punctures separated by the diameter of a puncture or less; many punctures of mesopleural disk of similar density; subapical punctation of first abdominal tergum mostly 2 punctures wide 7. *Tiphia sakagamii*, new species
- Upper half of front with only a few, quite scattered punctures; most punctures of mesopleural disk separated by considerably more than the diameter of a puncture; subapical punctation of first tergum 1 puncture wide; male unknown 11. *Tiphia moczari*, new species
10. Disk of first abdominal tergum with a strong anterior transverse ridge; mesopleuron with large pits of third degree density scattered on a surface with dense minute setigerous punctures giving surface a sericeous appearance 2. *Tiphia coimbatorea* Allen
- First tergum not ridged anteriorly; mesopleuron without dense minute setigerous punctures, surface not sericeous 11

11. Hind basitarsus without a groove on inner surface [Figure 44]; hind tibia without a carina on inner surface [Figure 46]; propodeal areola bi-, tri-, or quinquecarinate 12
 Hind basitarsus with a groove on inner surface [Figure 43] or if groove very short or evanescent as in some specimens of *T. consueta* Smith, then inner surface of hind tibia with a longitudinal carina [Figure 45]; propodeal areola tricarinate 23
12. Wings yellow, veins yellow to testaceous 13
 Wings not yellow, usually feebly to strongly infumated with brownish, veins amber to brown 14
13. Mandible, antenna, posterior margin of pronotum, tegula, legs, and pygidium light red; erect vestiture golden with a reddish cast; punctation relatively much sparser, front with several impunctate areas larger than an ocellus, disk of mesopleuron with punctures separated by at least the diameter of a puncture ... 21. *Tiphia pulawskii*, new species
 These parts black except mandible and tegula dark red; erect vestiture silvery; punctation relatively much denser, front without impunctate interspaces except beneath anterior ocellus, disk of mesopleuron with punctures mostly separated by half the diameter of a puncture 20. *Tiphia hirsuta* Smith
14. Area between propodeal areola and side of propodeum with a sinuous carina running nearly the entire length of surface [Figure 51], the areola usually longitudinally quinquecarinate, rarely tricarinate 15
 This area without such a carina, the areola usually tricarinate [cf. Figure 52], sometimes bicarinate in 1 species 16
15. Propodeal areola tricarinate; mid and hind tibiae not inflated [cf. Figure 47], 2.7 times as long as wide; pronotum not ridged anteriorly; mid and hind femora and all tibiae light red; male unknown
 19. *Tiphia weismanni*, new species
 Propodeal areola quinquecarinate, rarely tricarinate, carinae between median and lateral carinae not extending to apex of areola; mid and hind tibiae inflated [Figure 48], 2.2 times as long as wide; pronotum weakly ridged anteriorly; legs dark except tarsi occasionally reddish in part 17. *Tiphia decrescens* Walker
16. Propodeal areola with lateral carinae only, the surface irregularly pitted, occasionally tricarinate and not pitted; mid and hind femora and tibiae bright red; tibiae of these legs darker than femora and inflated, 2.4 times as long as broad, hind margin strongly rounded; base of second tergum broadly grooved and with coarse, short longitudinal rugulae; front, vertex and pronotal disk mostly contiguously punctate 13. *Tiphia gurneyi*, new species
 Areola tricarinate, median carina usually strong and complete, surface usually not pitted; basal groove on second tergum not so deep, and rugulae, if present, very delicate and not extending completely across tergum; front, vertex and pronotal disk with more separated punctures

- except in *T. tsunekii*, new species, which has legs except coxae light red 17
17. Legs black, or at most dark brown 18
 Legs except coxae light red, hind tarsus and foretibia frequently infuscated 19
18. Mid and hind tibiae broadened [cf. Figure 48], twice as long as wide; hind tibia with sensorium rounded, not impressed
 14. *Tiphia nilgirensis* Allen
 Mid and hind tibiae normal [cf. Figure 47], 2.8 times as long as wide; hind tibia with sensorium elongate, impressed
 22. *Tiphia wittmeri*, new species
19. Mid and hind tibiae not broadened [cf. Figure 47], 3 times as long as wide; apical half of pygidium glossy, smooth 20
 Mid and hind tibiae broadened [cf. Figure 48], 2.0–2.5 times as long as broad; carinae of areola not margined by crenulate grooves 21
20. Carinae of propodeal areola margined by crenulate grooves; anterior escarpment of scutum present only in middle, not extending to notauli; only flagellum light red beneath 23. *Tiphia wirthi*, new species
 Carinae of areola not margined by crenulate grooves; anterior escarpment of scutum complete, extending to notauli; antenna entirely light red 24. *Tiphia carvalhoi*, new species
21. Large species, 12 mm long; head and thoracic dorsum with suberect golden vestiture; front, vertex and thoracic dorsum with dense punctation, interspaces much less than diameter of a puncture; abdominal punctation sparser than in following species, disk of second tergum with a very few scattered, tiny punctures; male unknown
 12. *Tiphia tsunekii*, new species
 Smaller species, not over 8 mm long; head and thorax with silvery vestiture; front, vertex, and thoracic dorsum with more scattered punctures, most of them separated by at least half or more the diameter of a puncture; abdominal punctation denser, disk of second tergum with numerous punctures separated by about the diameter of a puncture 22
22. Apical half of pygidium with fine, close longitudinal wrinkles; pronotal punctation sparser, most punctures separated by more than the diameter of a puncture; punctures near apical margin of first tergum 2 rows wide across middle; hind tibia not so strongly inflated, 2.5 times as long as wide 15. *Tiphia kurczewskii*, new species
 Apical half of pygidium glossy, smooth; pronotal punctation denser, many punctures separated by less than the diameter of a puncture; punctures near apical margin of first tergum 1 row wide across middle; hind tibia more strongly inflated, 2.0 times as long as wide
 16. *Tiphia palmi* Krombein
23. Legs dark; posterior surface of propodeum with median carina complete; lateral pronotal surface with deep oblique groove; groove on inner surface of hind basitarsus 0.3–0.5 times as long as segment, occasionally

- evanescent; tegula usually mostly black, opaque 25. *Tiphia consueta* Smith
 At least mid and hind femora light red; posterior surface of propodeum
 with median carina absent or present only on lower half 24
24. Legs except coxae, median lobe of clypeus, and antenna light red; erect
 vestiture of head and pronotum reddish golden 26. *Tiphia vanlithi*, new species
 Only mid and hind femora light red, tibiae, tarsi, clypeus, and antenna
 black to dark red 25
25. Larger species, 12–17 mm long; frontal punctation quite dense, those on
 upper part mostly subcontiguous, no impunctate interspaces except
 immediately below anterior ocellus; apical lobe of clypeus very broad,
 margin evenly and broadly rounded [Figure 49] 27. *Tiphia hirashimai*, new species
 Smaller species, 8–11 mm long; frontal punctation sparser, those on upper
 part usually separated by at least half the diameter of a puncture and
 usually with 1 or more impunctate interspaces as wide as or wider than
 an ocellus; apical lobe of clypeus narrow, the margin slightly emarginate
 [cf. Figure 51] 26
26. Subapical band of small punctures on first tergum only 1 puncture in
 width across middle of segment; usually less densely punctate, upper
 front with several impunctate areas wider than an ocellus, many of
 discal punctures on mesopleuron separated by 1 to several times the
 diameter of a puncture 28. *Tiphia dayi*, new species
 Subapical band 2 punctures in width across middle of first tergum;
 usually more densely punctate, upper front with fewer and smaller
 impunctate areas, most discal punctures on mesopleuron separated by
 the diameter of a puncture at most 29. *Tiphia fennahi*, new species
27. Disk of first abdominal tergum with a strong, anterior transverse ridge
 behind which are short longitudinal rugulae; punctures posteriorly on
 first tergum coarse; fifth sternum with a weak posterolateral
 process 2. *Tiphia coimbatorea* Allen
 Disk of first tergum not ridged anteriorly 28
28. Tegula elongate, at least 1.5 times as long as wide [Figure 42] 29
 Tegula shorter, not much longer than broad [Figure 41] 36
29. Sixth abdominal sternum clothed with dense, short suberect setae arising
 from subcontiguous punctures, in profile forming a conspicuous tuft
 except when many of bristles have been denuded [cf. Figure 57]
 8. *Tiphia knutsoni*, new species
 Sixth sternum without such a tuft, the setae sparser and arising from more
 separated punctures [cf. Figure 58] 30
30. Legs, except coxae, and antenna beneath light red; posterolateral process
 on fifth abdominal sternum high, curved and overlying an invagination
 [cf. Figure 56]; upper part of front sparsely punctate and glossy; hind
 tibia without carina or polished streak on inner surface; propodeal

- areola occasionally obscurely quinquecarinate
 3. *Tiphia tegulita* Allen
 Legs, except coxae, and antenna sometimes light red, sometimes dark or
 at most with fore and mid tibiae and tarsi red; process on fifth sternum
 lower, not overlying an invagination [cf. Figure 55]; inner surface of
 hind tibia with a longitudinal carina or polished streak; propodeal
 areola tricarinate 31
31. Lower front with a median carina 32
 Lower front not carinate 33
32. Legs, except coxae, and tegula light red; subapical row of punctures on
 first abdominal tergum only 1 puncture wide
 9. *Tiphia hillyardi*, new species
 At most the fore and mid tibiae and tarsi red; basal half of tegula dark,
 apical half testaceous; subapical row of first tergum 2 punctures wide
 except in smaller specimens 10. *Tiphia boucecki*, new species
33. Tegula glossy, transparent, testaceous on apical half; tibiae and tarsi and
 occasionally femora, in part or entirely, light red
 7. *Tiphia sakagamii*, new species
 Tegula shagreened, opaque; legs usually entirely dark, at most fore and
 mid tibiae beneath and tarsi reddish 34
34. Smaller species not over 5.5 mm long; fore and mid tibiae and tarsi red
 at least beneath; subapical row of punctures on first abdominal tergum
 consisting of shallow, narrow elongate gouges contiguous across middle;
 upper front sparsely punctate and with large impunctate areas several
 times as large as an ocellus; mesopleural disk with small scattered
 punctures, mostly separated by at least 3 times the diameter of a
 puncture; female unknown 6. *Tiphia kaszabi*, new species
 Larger species, rarely as small as 6.0 mm long; legs dark, fore tibia and
 tarsus very rarely light red beneath; subapical row of punctures on first
 tergum round and not so crowded; upper front more closely punctate,
 impunctate areas no wider than an ocellus; mesopleural disk more
 closely punctate, interspaces usually no greater than twice the diameter
 of a puncture 35
35. Upper front without impunctate interspaces as wide as an ocellus; clypeal
 lobe with apical margin shallowly emarginate and lateral angles obtu-
 sely angulate and rounded; lower half of lateral surface of pronotum
 with close, strong oblique rugulae 4. *Tiphia oswini* Turner
 Upper front with 2 impunctate interspaces as wide as an ocellus; clypeal
 lobe with apical margin deeply emarginate and lateral angles more
 sharply angled; lower half of lateral surface of pronotum with a few
 weak, short rugulae or none at all ... 5. *Tiphia leclercqi*, new species
36. Legs except coxae light red, hind tarsi occasionally brownish; flagellum
 usually light red, at least beneath 37
 Legs predominantly black or dark brown, tibiae and tarsi occasionally
 light red; flagellum black or dark brown, light red beneath 41
37. Marginal cell extending well beyond second submarginal cell 38

- Second submarginal cell extending almost as far toward wing apex as marginal cell 40
38. Scape and pedicel light red, flagellum infuscated, all coxae dark; mandible with a preapical denticle on inner margin [cf. Figures 59, 60, 62]; pronotal ridge with a series of short perpendicular carinae posteriorly 26. *Tiphia vanlithi*, new species
- Antenna entirely light red as well as mid and hind coxae; mandible with or without a preapical denticle on inner margin [cf. Figures 59–62]; pronotal ridge without a series of short perpendicular carinae posteriorly 39
39. Posterolateral process of fifth sternum straight, longitudinal [Figure 55]; lateral surface of pronotum without rugulae on lower half, anterior margin not sharply raised; first abdominal segment slender, disk of tergum 0.8 times as long as apical width; forewing membrane yellowish 21. *Tiphia pulawskii*, new species
- Process of fifth sternum curved, oblique; lateral surface of pronotum with close rugulae on lower half, anterior margin sharply raised; first abdominal segment broader, disk of tergum 0.6 times as long as wide; forewing membrane colorless 15. *Tiphia kurczewskii*, new species
40. Apical margin of clypeal lobe bilobate, narrowly emarginate in middle; inner margin of mandible with a weak subapical denticle; posterolateral process of fifth abdominal sternum curved, oblique, well developed 23. *Tiphia wirthi*, new species
- Apical margin of clypeal lobe subtruncate or weakly and more broadly emarginate; inner margin of mandible without subapical denticle [cf. Figure 61]; posterolateral process of fifth sternum evanescent or, when present, weaker and oblique 16. *Tiphia palmi* Krombein
41. Sixth abdominal sternum clothed with dense, short, suberect hair arising from contiguous punctures, the tuft most conspicuous in profile [Figure 57] 42
- Sixth sternum with more scattered subdecumbent vestiture [Figure 58] 45
42. Posterolateral process on fifth abdominal sternum higher, its posterior part overlying a pocket-like depression along inner edge [Figure 56]; apical fringes of second to sixth abdominal segments white, extremely long [Figure 53]; clypeus and lower front with dense, decumbent silvery vestiture [Figure 64] 20. *Tiphia hirsuta* Smith
- Posterolateral process of fifth sternum lower, not overlying a depression [cf. Figure 55]; apical fringes of abdominal segments shorter [cf. Figure 54]; clypeus and lower front without dense vestiture [Figure 63] ... 43
43. Second submarginal cell extending almost as far as marginal cell toward apex of forewing; dorsal surface of first abdominal tergum 2.1–2.3 times as broad as long, strip of preapical punctures 2 punctures wide and separated from apical margin by width of punctate strip; tibiae and tarsi light red except hind tarsi sometimes infuscated 24. *Tiphia carvalhoi*, new species

- Second submarginal cell farther removed from apex of forewing than marginal cell, usually by a distance as great as apical width of latter cell; dorsal surface of first abdominal tergum 1.5–1.9 times as broad as long, strip of preapical punctures 1 or 2 punctures wide across at least middle of tergum and separated from apical margin by twice or more the width of punctate strip 44
44. Posterior margin of pronotal disk, transparent tegula, tibiae, and tarsi light red; short perpendicular carinae behind pronotal ridge weak or lacking, disk medially with punctures separated by half the diameter of a puncture 17. *Tiphia decrescens* Walker
- Tegula opaque and dark, only foretibia and tarsus and mid tibia light red; short perpendicular carinae well developed behind pronotal ridge, disk medially with subcontiguous punctures; female unknown 18. *Tiphia bakeriana*, new species
45. Second submarginal cell extending as far or almost as far toward apex of forewing as the marginal cell which is short, rounded apically, and not forming an acute angle with costa; median lobe of clypeus with narrow truncate apex; posterolateral process of fifth sternum high, slightly arcuate, mainly longitudinal; tarsi light red or testaceous; female unknown 30. *Tiphia wahisi*, new species
- Apex of marginal cell meeting costa at an acute angle, the cell extending decidedly closer to apex of forewing than second submarginal, usually by a distance equal to half the length of vein closing second submarginal; otherwise with a different combination of characters, i.e., either apical margin of clypeal lobe emarginate, posterolateral process of fifth sternum oblique or transverse, or tarsi dark 46
46. Tegula testaceous and transparent except inner anterior section, wing base visible beneath 47
- Tegula dark, opaque, wing base not visible 48
47. Anterior transverse ridge of pronotal disk without a series of strong, short perpendicular carinae along posterior edge; dorsal surface of propodeum without a sinuous carina between lateral ridge and areola, the latter with sides converging only slightly toward apex; upper part of lateral surface of propodeum with closer weaker oblique carinae on upper section; posterolateral process on fifth abdominal sternum arcuate, mainly longitudinally oriented 22. *Tiphia wittmeri*, new species
- Anterior ridge of pronotum with a series of strong, short perpendicular carinae along posterior edge; dorsal surface of propodeum with a sinuous carina between lateral ridge and areola, the latter with sides converging more strongly toward apex; lateral surface of propodeum with strong, sparse oblique carinae on upper section; posterolateral process of fifth sternum arcuate, mainly transversely oriented; female unknown 31. *Tiphia sabroskyi*, new species

48. Inner surface of hind tibia with a median longitudinal ridge or narrow bare strip, remainder of surface with dense, short suberect setae ... 49
 Inner surface of hind tibia without a bare strip or carina, the surface uniformly covered with such setae 53
49. Mandible without a subapical denticle on inner margin [Figure 61]; posterior surface of propodeum with median carina extending to or almost to upper margin 50
 Mandible with a weak to strong subapical denticle on inner margin [Figures 59, 62], the denticle eroded in worn specimens; posterior surface of propodeum with median carina on lower two-thirds at most 51
50. Front with most punctures subcontiguous except for very narrow, smooth median strip; disk of first tergum twice as broad as median length, anterior half with denser small punctures, preapical strip with small contiguous punctures at least 2 punctures in width; anterior half of first sternum with small close punctures; disk of mesopleuron with most punctures separated by less than the diameter of a puncture
 13. *Tiphia gurneyi*, new species
 Some parts of upper front with most punctures separated by half the diameter of a puncture; disk of first tergum 1.6 times as broad as long, anterior half with scattered small punctures, preapical strip with small subcontiguous punctures; anterior half of first sternum with scattered small punctures; disk of mesopleuron with a number of punctures separated by the diameter of a puncture. .25. *Tiphia consueta* Smith
51. Erect vestiture black; first abdominal segment narrower, 1.3–1.4 times as long as broad 28. *Tiphia dayi*, new species
 Erect vestiture white, tinged with yellow at apex of abdomen; first abdominal segment 1.1–1.3 times as long as broad 52
52. Disk of first tergum 1.8 times as broad as median length, anterior two-thirds with quite scattered, very small punctures; propodeal areola mostly smooth on either side of median ridge, basal width subequal to length; median ridge on posterior surface of propodeum present on lower half at most 27. *Tiphia hirashimai*, new species
 Disk of first tergum 1.1 times as long as broad, anterior two-thirds with larger, relatively closer punctures especially anteriorly and laterally; propodeal areola irregularly and finely rugulose on either side of median ridge, basal width 0.9 times the length; median ridge on posterior surface of propodeum usually present on lower two-thirds 14. *Tiphia nilgirensis* Allen
53. Erect vestiture black, faded to brown in older specimens; punctuation relatively sparser, those on pronotal disk and mesopleuron frequently separated from each other by 1 to several times the diameter of a puncture; first abdominal segment relatively slender, 1.3–1.4 times as long as broad 28. *Tiphia dayi*, new species
 Erect vestiture silvery, cinereous or light brown; punctuation relatively denser, many of those on pronotal disk and mesopleuron separated by no more than the diameter of a puncture; first abdominal segment broader, 1.1 times as long as broad. .29. *Tiphia fennahi*, new species

2. *Tiphia coimbatorea* Allen

Tiphia (*Tiphia*) *coimbatorea* Allen, 1975:14, pl. 2: fig. 9 [♂; Coimbatore, Madras State, South India; type in Leiden Museum].

Allen described this species from a single male from Coimbatore, South India, 1400 ft. It is one of the rarer species, known at this time also from a single female from Nilgiri Hills, South India, 3400 ft, and one female and eight males from widely separated, scattered localities in the Dry Zone and Wet Zone of Sri Lanka from sea level to an altitude of 2100 ft and average annual rainfall from 860 to 1950 mm.

The species is unique among Ceylonese and Indian *Tiphia* in having a strong transverse ridge anteriorly on the disk of the first abdominal tergum.

FEMALE.—Length 7.1–8.0 mm. Black, mandible except tip reddish, and occasionally the scape and tarsi. Vestiture white. Wings slightly infumated, stigma black, veins amber.

Median lobe of clypeus narrow, rounded apically; front with moderately coarse, close punctures, no impunctate interspaces wider than an ocellus except a narrow strip in front of fore ocellus.

Pronotal disk with a weak anterior ridge, with moderately coarse, confluent to subconfluent punctures except on smooth apical strip; lateral surface of pronotum with vague rugulae on lower half, oblique median groove lacking; scutum with well-developed notauli but no trace of an anterior escarpment, punctures more separated than on pronotum; tegula slightly longer than wide, opaque, lacking marginal groove and shagreening; mesopleuron with punctures separated by nearly the diameter of a puncture, the interspaces with numerous minute punctures; fore and mid tibiae not inflated; inner surface of hind tibia with a large triangular, slightly impressed sensorium; hind basitarsus not grooved on inner surface; propodeal areola with 3 strong carinae, basal width twice apical width and 0.6 times the length, surface delicately roughened, areas adjacent to areola delicately shagreened; lateral sur-

face of propodeum with close, weak oblique rugulae which are evanescent on lower anterior area; posterior surface without median ridge, finely punctate, more densely so laterally.

Disk of first abdominal tergum with strong anterior ridge, with coarse, mostly subconfluent punctures and a subapical row of confluent punctures; pygidium punctate on basal half, without smooth median vitta, apical half glossy and smooth.

MALE.—Length 4.4–5.4 mm. Coloration and vestiture as in female but flagellum beneath, foretibia and all tarsi usually reddish, wings paler.

Mandible without preapical denticle; punctures on upper front weaker, more dispersed than in female, smooth median vitta not well developed; head width 1.4–1.5 times interocular distance at anterior ocellus.

Pronotal disk with a strong anterior carina margined posteriorly by many short ridges, surface mostly with small subconfluent punctures except smooth posterior strip; lateral surface of pronotum without oblique groove, with fine irregular wrinkles on lower half; notauli well developed, but anterior escarpment lacking; tegula as in female; mesopleuron with small punctures, mostly separated by less than the diameter of a puncture, interspaces smooth; inner surface of hind tibia not ridged but with a smooth median streak terminating apically in a small, triangular nonimpressed sensorium; second submarginal cell extending as far apically as radial cell; propodeal areola with 3 strong ridges, irregularly rugulose, basal width 1.6 times apical width and 0.8 times length, finely roughened laterad of areola and with a strong sinuous carina parallel to lateral ridge and curving around the spiracular area; posterior propodeal surface without median carina, punctate as in female; lateral propodeal surface with stronger, sparser rugulae than in female.

First abdominal tergum with a strong transverse ridge anteriorly, surface behind ridge with sparse coarse punctures anteriorly becoming closer posteriorly; posterolateral process of fifth sternum erect, oriented mostly longitudinally; sixth sternum with a tuft of erect setae.

SPECIMENS EXAMINED.—NORTHERN PROVINCE. *Mannar District*: 1♂, Cashew Corp., Ma Villu, 17–21 Feb, in Malaise trap, Krombein et al. (USNM).

NORTH CENTRAL PROVINCE. *Anuradhapura District*: 2♂, Hunuwilagama, near Wilpattu, 200 ft, in Malaise trap, 28 Oct–3 Nov, Hevel et al. (USNM).

CENTRAL PROVINCE. *Kandy District*: 1♂, Kandy, Udawattakele Sanct., 2100 ft, 9–13 Feb, in Malaise trap, Krombein et al. (USNM).

NORTH WESTERN PROVINCE. *Puttalam District*: 1♂, swamp 10 mi E Puttalam, 2 Feb, Brinck et al. (Lund).

UVA PROVINCE. *Monaragala District*: 2♂, Mau Ara, 10 mi E Uda Walawe, 100 m, 24–26 Sep, Krombein et al. (USNM); 1 ♂, Angunakolapelessa, 27–28 Mar, in Malaise trap, Krombein et al. (USNM).

SOUTHERN PROVINCE. *Matara District*: 1♂, near Deniyaya, 1000 ft, in Malaise trap, 19–20 Oct, Hevel et al. (USNM). *Hambantota District*: 1♂, Palatupana tank, 15–50 ft, in Malaise trap, 18–20 Jan, Krombein et al. (USNM); 1♀, Vilapala Wewa, 9–10 Dec, Henry (Colombo).

3. *Tiphia tegulita* Allen

Tiphia (Tiphia) tegulita Allen, 1975:16, 17, pl. 2: figs. 10, 11 [♂; Godavari, Katmandu, Nepal; holotype in Canadian Entomology Research Institute, Ottawa].

Tiphia (Tiphia) devalae Allen, 1975:61, 62 [♀; Devala, Nilgiri Hills, South India, and Assam; holotype in Leiden Museum]. [New synonymy.]

The sexes of *T. tegulita* have not been associated previously. One male was captured with a female in a Malaise trap in Sri Lanka in Ekgal Aru Sanctuary Jungle, a locality in which three other males were taken previously. Both sexes have elongate tegulae. Females of *T. tegulita* and *T. decrescens* Walker are unique in the Ceylonese fauna in having the propodeal areola quinquecarinate. Those of the former species are easily distinguished from the latter by the elongate tegulae, entirely red legs and noninflated mid and hind tibiae. The male of *T. tegulita* usually

has the legs except coxae red, the propodeal areola is sometimes quinquecarinate, the posterolateral process of the fifth abdominal sternum is high, curved, and overlies an invagination, and the sixth sternum lacks a tuft of dense erect hair.

The species occurs in both the Wet Zone and the Dry Zone in Sri Lanka and at altitudes ranging from 100 to 600 meters. It is found also in South India, Nepal, and Assam.

FEMALE.—Length 6.0–8.0 mm. Black; mandible except apex, scape, and flagellum at least beneath, tegula, and legs except coxae and occasionally hind tarsus, light red. Vestiture sparse, white with a slight yellowish tinge. Wings slightly infumated, stigma dark, veins amber.

Median lobe of clypeus narrow, apical margin slightly emarginate; head width 1.5 times interocular distance at anterior ocellus; lower front subconfluent punctate, upper front more sparsely so and with at least 2 impunctate interspaces wider than an ocellus.

Anterior margin of pronotal disk with a weak transverse ridge, discal punctures ranging from subconfluent to separated by the diameter of a puncture, wide apical margin impunctate; lateral pronotal surface usually with delicate, oblique median groove, delicately lineolate above and with delicate rugulae in lower corner; notauli meeting well-developed anterior escarpment, discal scutal punctures sparse laterally, close medially; tegula transparent, elongate, about 1.7 times as long as median width; mesopleural punctation rather sparse, mostly separated by the diameter of a puncture or more; mid and hind tibiae not inflated; hind tibia not carinate on inner surface, sensorium subtriangular and impressed; hind basitarsus not grooved on inner surface; propodeal areola quinquecarinate, basal width 1.5 times apical width and 0.7 times length, surface adjacent to areola with some small punctures; lateral surface with close oblique carinae on upper posterior area, delicately irregularly lineolate on lower anterior section; posterior surface rather densely and minutely punctate, sometimes with a short median ridge at base.

Preapical band of punctures on first abdominal

tergum ranging from 1 to 2 punctures in width across middle; pygidium punctate on basal half or two-fifths but with an impunctate median space posteriorly, apical half or more glossy.

MALE.—Length 4.2–5.5 mm. Black, the following light red: mandible in middle, usually flagellum beneath, posterior half or more of tegula, frequently legs except coxae, but mid tibia, hind femur, and tarsi rarely brownish. Vestiture pale with slight yellowish cast. Wings clear, stigma and veins dark brown.

Mandible with a faint preapical denticle; head width 1.6 times interocular distance at anterior ocellus; lower front with small confluent punctures, upper front with scattered punctures and many impunctate interspaces wider than an ocellus.

Pronotal disk with a well-developed anterior carina behind which are a series of weak ridges, discal punctures subconfluent anteriorly, becoming sparser toward middle, the apical margin broadly impunctate; lateral surface with weak oblique median groove which may be lacking, surface delicately obliquely lineolate; mesopleural disk with most punctures separated by at least the diameter of a puncture; tegula elongate, posterior half transparent, 1.8 times as long as median width; hind tibia not carinate on inner surface, sensorium small, narrow, slightly impressed; propodeal areola sometimes quinquecarinate but middle pair not complete, basal width 1.6–1.7 times apical width and 0.9–1.0 times length, surface adjacent to areola delicately roughened, lacking lateral submarginal carina; posterior surface with or without a short median ridge at base, with moderately close, small punctures; lateral surface with close, oblique weak carinae on upper posterior section, irregularly lineolate anteriorly below.

First abdominal segment 1.4 times as long as wide, disk of first tergum glossy, with sparse scattered punctures, preapical concentration 2 to 3 punctures wide; second tergum glossy; third to sixth segments shagreened and with small punctures separated by about the diameter of a puncture; posterolateral process of fifth sternum mod-

erately high, arcuate, and overlying an invagination; sixth sternum without a tuft of dense erect hair.

SPECIMENS EXAMINED.—EASTERN PROVINCE. *Amparai District*: 1♀, 4♂, Ekgal Aru Sanctuary Jungle, 1 pair in Malaise trap, 100 m, 19–22 Feb, 9–11 Mar, Krombein et al. (USNM).

CENTRAL PROVINCE. *Kandy District*: 1♂, Peradeniya, Mahaweli River, 22–24 Feb, Stubbs et al. (London); 2♂, Kandy, Udawattakele Sanctuary, 1800 ft, 1–3 Oct, Krombein et al. (USNM).

SOUTHERN PROVINCE. *Matara District*: 1♀, Hayes, 8 mi from Deniyaya, 28 Dec (Colombo).

4. *Tiphia oswini* Turner

FIGURES 42, 54

Tiphia oswini Turner, 1911:152 [♀, ♂; Pattipola and Matale, Ceylon; type series in British Museum (Natural History) except ♂ syntype in Colombo Museum].—Allen and Jaynes, 1930:102 [descriptive note].

Tiphia (Tiphia) oswini Turner.—Allen, 1969:391–393 [redescription of lectoholotype and lectoallotype]; 1975:14–16 [redescription].

Tiphia oswini and the following two species, *T. leclercqi*, new species, and *T. kaszabi*, new species, are unique among the Ceylonese taxa with elongate tegulae, in that the tegulae are dark, opaque, and sometimes finely shagreened, rather than being testaceous and transparent on at least the apical half and nonshagreened. Females are known only in *T. oswini* and *T. leclercqi*; the former differs from the latter in lacking an interantennal crest on the lower front and in having the anterior escarpment of the scutum complete to the notauli. The males of *T. oswini* and *T. leclercqi* are larger (6.0 mm or longer) than those of *T. kaszabi* (5.8 mm maximum length); *T. oswini* differs from *T. leclercqi* in lacking impunctate interspaces as large as an ocellus on the upper front, the lower half of the lateral pronotal surface is strongly and closely rugulose rather than having only a few weaker rugulae at most, and the clypeal lobe has a very shallowly emarginate apical margin with rounded lateral angles rather than being more deeply emarginate and with more sharply angu-

late, upturned lateral angles. All three species are montane forms occurring at altitudes of 4900 ft or more, *T. oswini* and *T. kaszabi* in the central highland areas centered around Nuwara Eliya, and *T. leclercqi* in the Adams Peak Range to the west.

FEMALE.—Length 10.0–13.0 mm. Black, mandible except base and apex and a small median spot on disk on first abdominal tergum red. Vestiture white. Wings lightly infumated, stigma and basal veins dark, apical veins brown.

Head width 1.6 times interocular distance at anterior ocellus; median clypeal lobe with subtruncate apex in middle, rounded toward side, width 1.8 times diameter of antennal fossa; lower front without median crest and with most punctures subcontiguous; upper front with more scattered punctures and several impunctate interspaces wider than an ocellus.

Pronotal disk without anterior ridge, punctures anteriorly subcontiguous, posterior impunctate area wider than anterior punctate section; lateral pronotal surface with strong oblique rugulae on lower two-thirds and a strong median groove; median escarpment of scutum complete to notauli, lateral third of scutum to notauli practically impunctate; tegula opaque, faintly shagreened, 1.8 times as long as median width; subalar patch of mesopleuron densely micropunctate and as wide as tegula; disk of mesopleuron with scattered large and small punctures mostly separated by more than the diameter of a puncture; mid and hind tibiae not inflated; inner surface of hind tibia with a low median ridge terminating in an elongate, nonimpressed sensorium; inner surface of hind basitarsus with a shallow median groove about a third as long as segment; propodeal areola tricarinate, median carina sometimes weak and incomplete apically, quite narrow, basal width 1.2 times apical width and 0.4 times length, area laterad of areola irregularly lineolate, submarginal carina absent; posterior propodeal surface with a median ridge on lower half or two-thirds, surface with dense small punctures; lateral propodeal surface with numerous fine oblique

carinae on posterior and upper areas, becoming obliquely lineolate on lower anterior area.

Preapical band on first abdominal tergum 1 puncture in width, most punctures small and separated by at least half the diameter of a puncture; pygidium punctate on basal half and with a narrow smooth median vitta posteriorly, the apical half shagreened.

MALE.—Length 6.5–9.5 mm. Black. Vestiture white to cinereous. Wings very faintly infumated, stigma and veins dark.

Head 1.6 times as wide as interocular distance at anterior ocellus; mandible with a preapical denticle; median lobe of clypeus slightly convex, apical margin slightly emarginate, lateral angles rounded and not upturned; lower front with subcontiguous punctures, median ridge lacking; upper front with punctures more separated, but no impunctate interspaces as wide as an ocellus.

Pronotal disk with a medium transverse carina anteriorly behind which are some short weak longitudinal rugulae; lower half of lateral pronotal surface with strong oblique rugulae; scutum without anterior escarpment; tegula (Figure 42) opaque, shagreened, twice as long as median width; most punctures on mesopleural disk separated by about the width of a puncture; inner surface of hind tibia with a median ridge terminating in a slightly raised, narrow sensorium; marginal cell extending farther toward wing apex than second submarginal; propodeal areola tricarinate, median carina occasionally absent, basal width 1.5 times apical width and 0.8 times length, area adjacent to areola closely transversely lineolate, submarginal carina absent or weak and extending only to spiracular area; posterior propodeal surface with a weak median ridge on lower half or two-thirds, surface very finely roughened; lateral propodeal surface with close oblique carinae on posterior and upper sections, finely obliquely lineolate on lower anterior area.

Dorsum of abdomen (Figure 54); first abdominal segment 1.5 times as long as wide; disk of first tergum not carinate anteriorly, preapical impression 2 punctures in width except in middle; posterolateral process of fifth sternum moderately

raised, arcuate; sixth sternum without a tuft of dense erect hair.

SPECIMENS EXAMINED.—CENTRAL PROVINCE. *Nuwara Eliya District*: 9♀, 12♂, Nuwara Eliya (includes Galway Natural Reserve, One Tree Hill, Mt. Pidurutalagala), 1900 m, 6500–8200 ft, 2 Jan, 14 Feb, 4 Mar, 28 Apr, 10, 27–29 May, 10 Jun, 30–31 Jul, 28 Sep–1 Oct, 8 Oct, 21 Nov, Brinck et al., Davis et al., Hevel et al., Karunaratne et al., Keiser, Krombein et al., Messersmith et al. (USNM, Colombo, Basel, Lund); 3♀, 25♂, Hakgala (includes Botanic Garden, Natural Reserve), 1650–1900 m, 6200 ft, 6–7, 23–25 Feb, 23–24 Apr, 31 May, 15, 24 Aug, 6–8 Oct, Henry, Keiser, Krombein et al. (USNM, Colombo, Basel); 1♀, Kanda-ela Reservoir, 5.6 mi SW Nuwara Eliya, 6200 ft, 10–21 Feb, Davis et al. (USNM); 2♀, 2♂, Kandapola, 20–21 Sep, Henry (Colombo); 2♂, Ohiya, 13–18 Apr, Henry (Colombo).

UVA PROVINCE. *Badulla District*: 1♀, 1♂, Haputale and West Haputale, 4900 and 6000 ft, 6 Apr, 2–7 Aug, Henry (Colombo).

MISCELLANEOUS. 2♀, 4♂, Ceylon, Nietner (Berlin).

5. *Tiphia leclercqi*, new species

This species is known only from a short series from Adams Peak, 1530–1770 m, an area of extremely heavy rainfall. It is closely related to *T. oswini* Turner and *T. kaszabi*, new species. The female of *T. leclercqi* differs in having a strong median crest on the lower front and in having the anterior escarpment of the scutum present only in the middle. The males of *T. leclercqi* and *T. oswini* are larger (6.0 mm long or more) than those of *T. kaszabi* (5.8 mm maximum length). The male of *T. leclercqi* has two interspaces on the upper front wider than an ocellus; these impunctate interspaces are lacking in *T. oswini*. Also, the lateral pronotal surface has only a few weak rugulae below instead of being strongly and closely rugulose on the lower half, and the apical margin of the clypeal lobe is more deeply emar-

ginate, and the lateral angles are more acute and slightly upturned.

ETYMOLOGY.—The species is named for Jean Leclercq, Institut Agronomique de l'État, Gembloux, Belgium, collaborator on Ceylonese Crabroninae.

HOLOTYPE.—♀, Sri Lanka, Central Province, Kandy District, Adams Peak trail, 4.5 mi W Maskeliya, 1690–1770 m, 20–21 Oct 1977, K.V. Krombein, T. Wijesinhe, M. Jayaweera, P.A. Panawatta (USNM Type 100259).

FEMALE.—Length 11.7 mm. Black, mandible red except base and apex. Vestiture white. Wings more strongly infumated than in *T. oswini*, stigma and veins dark.

Head 1.7 times as wide as interocular distance at anterior ocellus; median lobe of clypeus 2.5 times as wide as antennal fossa, apical margin truncate; lower front with strong median crest and mostly contiguous punctures; upper front with 2 impunctate interspaces wider than on ocellus.

Pronotal disk without anterior ridge, punctures anteriorly subcontiguous, posterior impunctate area wider in middle than anterior punctate section; lateral pronotal surface with a strong median groove and moderate oblique rugulae on lower section; anterior escarpment present only on median third of scutum, not reaching notauli; scutum punctate only on median third; tegula opaque, not shagreened, 1.9 times as long as median width; subalar patch of mesopleuron densely micropunctate, as wide as tegula; punctation of mesopleural disk comparatively denser than in *T. oswini*; mid and hind tibiae not inflated; inner surface of hind tibia with a low median ridge terminating in a large, subcircular nonimpressed sensorium; inner surface of hind basitarsus with a shallow median groove about half the length of segment; propodeal areola tricarinate, the median carina very weak on apical fourth, basal width twice apical width and half the length, surface adjacent to areola delicately, transversely lineolate, submarginal carina lacking; posterior propodeal surface with dense small punctures, median ridge lacking; lateral propo-

deal surface with numerous fine, oblique carinae on upper and posterior sections, and close oblique lineolations on lower anterior section.

Preapical band on first abdominal tergum 1 puncture wide, the punctures closer and larger than in *T. oswini*; pygidium punctate on basal half and without smooth median space posteriorly, apical half more coarsely shagreened than in *T. oswini*.

ALLOTYPE.—♂, same data as holotype (USNM).

MALE.—Length 6.9 mm. Black. Vestiture white, tinged with yellowish toward apex of abdomen. Wings faintly infumated, stigma and veins dark.

Head 1.6 times as wide as interocular distance at anterior ocellus; mandible with preapical denticle; median lobe of clypeus slightly convex, apical margin more deeply emarginate than in *T. oswini*, and lateral angles more angulate, slightly upturned; lower front with subcontiguous punctures, median carina lacking; upper front with 2 impunctate interspaces larger than an ocellus.

Pronotal disk with a medium transverse carina anteriorly; lateral pronotal surface lacking a median groove and with only a few oblique wrinkles on lower section; scutum without median escarpment; tegula opaque, delicately shagreened, 1.6 times as long as median width; most punctures on mesopleural disk separated by somewhat more than the diameter of a puncture; inner surface of hind tibia with a median carina terminating in a narrow impressed sensorium; marginal cell extending farther toward apex of wing than second submarginal; propodeal areola tricarinate, median carina evanescent toward apex, width at base 1.1 times apical width and 0.6 times length, area adjacent to areola transversely lineolate, submarginal carina absent; posterior propodeal surface with weak radiating wrinkles which are better developed above than below; lateral propodeal surface with close oblique carinae on posterior and upper areas and oblique lineolations on lower anterior area.

First abdominal segment 1.5 times as long as wide; disk of first tergum not carinate anteriorly,

preapical row of punctures 1 row wide across middle, 2 rows wide on sides; posterolateral process of fifth sternum low, arcuate; sixth sternum without median tuft of dense erect hair.

PARATYPES.—4♂, same data as holotype but 1 at white light, 1530 m, and 3 at 1610–1690 m (USNM). One paratype has been deposited in the National Museums of Sri Lanka (Colombo), and one in the British Museum (Natural History).

The paratypes are 6.0–7.0 mm long and agree very well with the allotype.

6. *Tiphia kaszabi*, new species

Tiphia kaszabi, known only from males, is most closely related to *T. oswini* Turner and *T. leclercqi*, new species, in having dark opaque tegulae rather than partly or entirely lighter, transparent tegulae as in other Ceylonese species with elongate tegulae. *Tiphia kaszabi* is smaller (5.8 mm maximum length) than its closest relatives (6.0 mm or longer), and the preapical impression of the first abdominal tergum has close, shallow elongate gouges rather than rounded punctures. The species is known from only three specimens from the Nuwara Eliya area.

ETYMOLOGY.—I am pleased to name this odd little species for Zoltan Kaszab, Hungarian Natural History Museum, Budapest, collaborator on Ceylonese Tenebrionidae.

HOLOTYPE.—♂, Sri Lanka, Central Province, Nuwara Eliya District, Hakgala Natural Reserve, 1650–1800 m, 23–25 Feb 1977, K.V. Krombein, P.B. Karunaratne, P. Fernando, D.W. Balasooriya (USNM Type 100260).

MALE.—Length 5.6 mm. Black, apical half of mandible and foretibia beneath red, foretibia above and fore and mid tarsi brown. Vestiture sparse, weakly yellowish. Wings slightly infumated, stigma black, veins brown.

Head 1.6 times as wide as interocular distance at anterior ocellus; mandible with slight preapical denticle; emargination of apical margin of median clypeal lobe intermediate between that of *T. oswini* and of *T. leclercqi*, lateral angles not upturned but more angulate than in *T. oswini*; lower

part of front without median ridge, punctures subcontiguous; upper part of front impunctate except small area beneath ocelli and along inner eye margins where punctures are mostly separated by half or the diameter of a puncture.

Pronotal disk with an anterior carina behind which are a few weak, short rugulae, punctures mostly separated by the diameter of a puncture, posterior area impunctate; lateral pronotal surface with a weak oblique median groove, weakly rugulose on lower area; scutum without median escarpment; tegula shagreened, opaque, 1.8 times as long as median width; mesopleuron sparsely punctate, many punctures separated by twice the diameter of a puncture; inner surface of hind tibia without a median ridge or polished streak, sensorium not impressed; marginal cell extending farther toward apex of forewing than second submarginal; propodeal areola tricarinate, basal width 1.2 times apical width and 0.7 times the length, area adjacent to areola transversely lineolate, submarginal carina not extending beyond spiracular area; lateral propodeal surface delicately obliquely rugulose on posterior and upper areas, obliquely lineolate on the lower anterior section; posterior propodeal surface without median carina, lower half very finely transversely rugulose, upper half delicately shagreened.

First abdominal segment 1.5 times as long as wide; disk of first tergum not ridged anteriorly, virtually impunctate, preapical impression with short, delicate, close gouges rather than punctures; posterolateral process of fifth sternum short, low, arcuate with a small depression adjacent to inner edge; sixth sternum without erect median tuft of dense hair.

FEMALE.—Unknown.

PARATYPES.—1♂, same data as holotype (USNM); 1♂, Nuwara Eliya, Galway Natural Reserve, 6200 ft, 10 Jun 1978, P.B. Karunaratne, V. Kulasekare, L. Jayawickrema (USNM). One paratype has been placed in the National Museums of Sri Lanka (Colombo).

The paratypes are 4.5–5.8 mm long. The preapical mandibular denticle is eroded on one specimen, and the other specimen lacks a propo-

deal areola, and there are only a few oblique rugulae on the lateral surface of the propodeum.

7. *Tiphia sakagamii*, new species

The female of this species is distinguished from other species with elongate tegulae except *T. moczari*, new species, by a combination of the tricarinate propodeal areola, short groove on inner surface of hind basitarsus, front without median crest, and legs entirely light red except coxae. The front is more densely punctate than in *T. moczari*, as is the mesopleural disk, the submarginal carina of the dorsal surface of the propodeum is complete and curves around the spiracular area, and the subapical punctation of the first abdominal tergum is mostly two punctures in width. The male of *T. sakagamii* lacks a tuft of dense erect hair on the sixth abdominal sternum and a frontal carina, the tibiae and tarsi are usually red and occasionally the femora also, and the tegula is glossy, transparent, and testaceous on the apical half.

Tiphia sakagamii occurs only in Sri Lanka and has been collected at several localities in the Dry Zone.

The species is named for my colleague Shoichi F. Sakagami, Hokkaido University, collaborator on Ceylonese Halictinae and Meliponinae.

HOLOTYPE.—♀, Sri Lanka, Eastern Province, Trincomalee District, Kanniyai, 15 m, 10 Oct 1977, K.V. Krombein, P.B. Karunaratne, P. Fernando, T. Wijesinhe, M. Jayaweera (USNM Type 100261).

FEMALE.—Length 5.8 mm. Black, the following light red: mandible except apex, antenna, tegula and legs except coxae; posterior margin of pronotal disk and apex of pygidium testaceous. Vestiture white with faint yellowish tinge. Wings slightly infumated, veins near base amber, stigma and veins toward apex brown.

Head 1.5 times as wide as interocular distance at anterior ocellus; lower front without median crest, most of punctures separated by half the diameter of a puncture, upper half of front with many punctures separated by no more than the

diameter of a puncture but with several interspaces wider than an ocellus.

Pronotal disk without an anterior ridge, anterior area contiguously punctate, punctures more separated across middle, and apical third smooth; lateral pronotal surface weakly lineolate and with a moderate oblique median furrow; notauli well developed, but anterior escarpment lacking on scutum; mesopleuron with many punctures separated by the diameter of a puncture but some closer, especially posteriorly; tegula 1.7 times as long as broad in middle, posterior half transparent; mid and hind tibiae not inflated, inner surface of latter with a polished median ridge; hind basitarsus on inner surface with a median groove about half as long as segment; basal width of propodeal areola 1.5 times apical width and 0.6 times the length; submarginal carina of dorsal propodeal surface ending at spiracle, surface to areola delicately, transversely lineolate; posterior propodeal surface with small punctures, median ridge evanescent; lateral propodeal surface with close oblique carinae on posterior upper two-thirds, lower anterior third obliquely lineolate.

Preapical band of punctures on first abdominal tergum 2 punctures wide; pygidium punctate on basal half with a small smooth median area posteriorly, posterior half glossy.

ALLOTYPE.—♂, Eastern Province, Amparai District, Ekgal Aru Reservoir Jungle, 100 m, 19–22 Feb 1977, K.V. Krombein, P.B. Karunaratne, P. Fernando, D.W. Balasooriya (USNM).

MALE.—Length 4.7 mm. Black, the following light red: mandible except tip, antenna beneath, basal half of tegula, legs except coxae; posterior margin of pronotal disk and apical half of tegula testaceous. Vestiture white, tinged with yellowish on abdomen. Wings clear, stigma dark, veins brown.

Head 1.6 times as wide as interocular distance at anterior ocellus; mandible without preapical denticle; median lobe of clypeus flat, apex truncate; lower half of front without median carina, punctures separated at most by half the diameter of a puncture; upper part of front with scattered punctures except along eye margins where they

are denser, and with several impunctate areas as wide as an ocellus or more.

Dorsal pronotal disk with strong anterior ridge behind which are some scattered short longitudinal rugulae, punctures separated by half or more the diameter of a puncture, apical strip smooth; lateral surface of pronotum with a weak oblique median groove, upper surface delicately obliquely lineolate, lower surface with a few oblique rugulae; notauli distinct but no anterior escarpment, punctures anteriorly separated by half or more the diameter of a puncture, subcontiguous posteriorly; tegula 1.8 times as long as median width; mesopleuron irregularly punctate, with density varying from 1 to several times the diameter of a puncture; marginal cell extending farther toward apex of forewing than second submarginal cell; inner surface of hind tibia with a strong median ridge terminating in a small, narrow impressed sensorium; propodeal areola tricarinate, basal width 1.6 times apical width and 0.8 times the length, area adjacent to areola obliquely lineolate, submarginal carina curving around spiracular area; lateral propodeal surface obliquely and closely rugulose on upper and posterior two-thirds, obliquely lineolate on lower anterior third; posterior propodeal surface irregularly and finely lineolate, median ridge lacking.

First abdominal segment 1.2 times as long as wide, disk of first tergum without anterior ridge, scattered small punctures on anterior half, posterior half smooth except preapical impressed row 2 punctures wide; first 2 terga glossy, third to sixth dull, finely shagreened and with small punctures separated by 1 to 2 times the diameter of a puncture; posterolateral process of fifth sternum low, slightly arcuate, mostly longitudinally oriented and adjacent to a small shallow depression along inner edge; sixth sternum without a tuft of erect dense hair.

PARATYPES.—NORTH CENTRAL PROVINCE. *Anuradhapura District*: 1♂, Ritigala Natural Reserve, 8 mi NW Habarana, 8 Feb 1962, swept on grass in forest, Brinck, Andersson, Cederholm (Lund). EASTERN PROVINCE. *Trincomalee District*: 1♀, Trincomalee, China Bay Ridge bungalow, 0–100 ft.

in Malaise trap, 16–17 May 1976, K.V. Krombein, P.B. and S. Karunaratne, D.W. Balasooriya (USNM); 1♀, Trincomalee, M.A. Humbert (Geneva). *Amparai District*: 1♀, 33♂, same data as allotype (USNM). **NORTHERN PROVINCE.** *Vavuniya District*: Vavuniya, 18 Dec 1923, G.M. Henry (Colombo), 1♂ is excluded from the type series because the head is lacking. A pair of paratypes has been deposited in the National Museums of Sri Lanka (Colombo), and a male paratype in the British Museum (Natural History).

Female paratypes are 6.1–6.5 mm long and agree well with the holotype in all essential details. Male paratypes are 3.8–5.1 mm long. Most males have the legs except coxae light red, but some specimens have brownish femora. The punctuation is relatively less dense in some specimens, especially on upper front and mesopleuron, and somewhat more dense in a few.

8. *Tiphia knutsoni*, new species

The female of *T. knutsoni* is separated from the closely related *T. hillyardi*, new species, and *T. bouceki*, new species, by the infumated rather than light or deep-yellow wings. All three species have a strong frontal crest above antennae which distinguishes them from most other females with elongate tegulae. The male of *T. knutsoni* is the only one with elongate tegulae that also has a tuft of dense erect hair on the sixth abdominal sternum.

Both sexes of *T. knutsoni* key to *T. tegelonga* Allen in Allen's (1975) keys to *Tiphia* of the Indian subcontinent; however, the female of the latter species lacks a frontal crest, the punctures are smaller and much sparser on the head, pronotum, and mesopleuron, and the scutal escarpment and notauli are not connected. The male of *T. tegelonga* also is more sparsely punctate on the head, pronotum, and mesopleuron, and the stigma is two-thirds as long as the section of the costa beyond the stigma instead of only half as long.

Within Sri Lanka, *T. knutsoni* has been collected only in Udawattakele Sanctuary, Kandy, and

Sinharaja Jungle in the Wet Zone. It occurs also in the Walayar Forest, South India.

ETYMOLOGY.—I am pleased to name this species for Lloyd V. Knutson, Insect Identification and Beneficial Insect Introduction Institute, U.S. Department of Agriculture, who has identified brachycerous Diptera prey of various Ceylonese sphecoid wasps.

HOLOTYPE.—♀, Sri Lanka, Central Province, Kandy District, Kandy, Udawattakele Sanctuary, 2100 ft, 20–30 Jul 1976, S. Karunaratne (USNM Type 100262).

FEMALE.—Length 8.8 mm. Black, the following red: mandible except base and apex, first 4 flagellar segments beneath, and foretibia beneath; apical margin of pronotal disk and apex of tegula testaceous. Vestiture white, faintly tinged with yellowish on head and thorax. Forewing moderately infumated, stigma and veins brown.

Head width 1.6 times interocular distance at fore ocellus; median lobe of clypeus 1.2 times diameter of antennal fossa, apex truncate; lower front with a well-developed median crest and contiguous coarse punctures becoming sparser on upper front where they are separated from each other by half the diameter of a puncture, no impunctate interspaces as wide as an ocellus.

Pronotal disk without an anterior ridge, punctures coarse and contiguous to separated by about the diameter of a puncture toward middle and side, apical third smooth; lateral surface of pronotum with a moderate oblique median groove, finely lineolate above and finely rugulose below; notauli meeting well-developed median escarpment, scutum with scattered large pits laterally; tegula 1.9 times as long as median width, apical third transparent; mesopleural disk with subcontiguous punctures anteriorly becoming more separated in middle, posterior slope with numerous tiny punctures; mid and hind tibiae not inflated, inner surface of hind with a median ridge terminating in a subtriangular nonimpressed sensorium; hind basitarsus with a groove about one-third as long as segment; basal width of propodeal areola 1.1 times apical width and 0.5 times the length, the median carina extending only four-

fifths toward apex, submarginal carina straight, extending only to spiracle; posterior propodeal surface with small close punctures and a weak median ridge on lower half, and larger close punctures on upper third; lateral propodeal surface with numerous fine oblique rugulae on upper posterior two-thirds, lower anterior third finely lineolate.

Anterior half of disk of first tergum with punctures separated by about the diameter of a puncture, apical half very sparsely punctate, subapical row 1 puncture in width; terga glossy, not shagreened; anterior half of pygidium punctate and with a small posterior smooth median area, posterior half very delicately shagreened.

ALLOTYPE.—♂, same locality as holotype but 9–11 Feb 1979, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, S. Siriwardane, T. Gunawardane (USNM).

MALE.—Length 5.7 mm. Coloration and vestiture as in female, but wings clear, apical third of tegula testaceous.

Head width 1.6 times interocular distance at anterior ocellus; mandible without preapical denticle; clypeal lobe flat, apex slightly emarginate; lower front with median carina, punctures confluent to subconfluent, upper front delicately shagreened, punctures separated by about the diameter of a puncture, no impunctate interspaces as wide as an ocellus.

Pronotal disk with an anterior ridge behind which are a number of short longitudinal rugulae, punctures mostly separated by about the diameter of a puncture, apical fourth smooth; lateral surface of pronotum with a weak, oblique median groove, upper area delicately lineolate, lower corner roughened; notauli distinct but no median escarpment, punctures confluent posteriorly on scutum but separated by at least half the diameter of a puncture anteriorly; tegula 1.8 times as long as median width; mesopleuron with punctures crowded anteriorly and separated usually by the width of a puncture or more on disk; inner surface of hind tibia with a median carina; marginal cell extending farther toward apex than second submarginal; basal width of propodeal areola 1.4

times apical width and 0.8 times length, submarginal carina curving around spiracular area, surface adjacent to areola finely transversely lineolate; posterior propodeal surface without median ridge, glossy, upper area with scattered punctures; lateral propodeal surface with fine, close oblique rugulae on upper posterior two-thirds, finely lineolate on lower anterior third.

First abdominal segment 1.1 times as long as wide; disk of first tergum without anterior ridge, with scattered small punctures, the preapical row 2 punctures in width; third to sixth terga delicately shagreened; posterolateral process of fifth sternum low, curved, overlying a small invagination; sixth sternum with an erect tuft of dense hair.

PARATYPES.—CENTRAL PROVINCE. *Kandy District*: 1♀, Kandy, Roseneath, 29 Nov 1953, F. Keiser (Basel); 1♀, 1♂, Kandy, Udawattakele Sanctuary, 2100 ft, 5–15 Jul 1976 (♀) and 20–30 Jul 1976 (♂), S. Karunaratne (USNM). SABARAGAMUWA PROVINCE. *Ratnapura District*: 2♂, Sinharaja Jungle, Waturawa Forest, 7 Oct 1981, P.B. Karunaratne (USNM). SOUTH INDIA. *S. Malabar*: 1♀, Walayar Forest, Aug 1952, P.S. Nathan (Corvallis). A pair of paratypes has been deposited in the National Museums of Sri Lanka (Colombo).

Female paratypes are 7.1–8.6 mm long. Two of them have the typically narrow propodeal areola, but in one from Roseneath the basal width is twice the apical width. The male paratypes are 5.6–6.5 mm long, the median frontal carina is evanescent or absent, and the flagellum and foretibia beneath and the foretarsus may be light red.

9. *Tiphia hillyardi*, new species

The female of *T. hillyardi* is readily distinguished by the elongate tegula, light red mandible, antenna, tegula, and legs except coxae, by the strongly yellowish wings, and by the strong interantennal crest. The male is similar except that the flagellum is darkened above, the wings are clear, and the interantennal crest is reduced to a carina.

Tiphia hillyardi is a rare species known from only five specimens from three localities in the Wet Zone.

ETYMOLOGY.—The species is named for Paul D. Hillyard, Department of Zoology, British Museum (Natural History), in grateful acknowledgment of his identification of the spider prey of a number of Ceylonese Pompilidae.

HOLOTYPE.—♀, Sri Lanka, Central Province, Kandy District, Udawattakele Sanctuary, 27–28 Oct 1972, P.B. Karunaratne (USNM Type 100263).

FEMALE.—Length 7.5 mm. Black, the following light red: mandible, antenna, tegula, legs except coxae, and apex of pygidium; apical margin of pronotal disk testaceous. Vestiture yellowish. Wings strongly yellow, stigma and veins amber.

Head 1.6 times as wide as interocular distance at anterior ocellus; median clypeal lobe narrow, margin truncate; lower front with strong inter-antennal crest and coarse contiguous punctures, becoming sparser on upper front and separated by about half the diameter of a puncture, no impunctate interspaces as wide as an ocellus.

Pronotum not ridged anteriorly, disk with coarse contiguous punctures, apical third smooth; lateral pronotal surface with an oblique median groove, above with a few punctures anteriorly, below with weak oblique rugulae; notauli distinct, anterior escarpment lacking, disk with coarse contiguous punctures; tegula 1.8 times as long as median width; mesopleuron with coarse confluent to subconfluent punctures, interspaces without minute punctures; mid and hind tibiae not inflated; inner surface of hind tibia with a median polished streak terminating in a subtriangular, nonimpressed sensorium; inner surface of hind basitarsus with a groove on median third; basal width of propodeal areola 1.9 times apical width and 0.6 times the length, side of dorsal surface with an almost straight submarginal carina; posterior propodeal surface with irregular shallow pits, median ridge lacking; lateral surface with close oblique rugulae on upper posterior two-thirds, finely lineolate on lower anterior third.

Disk of first tergum with coarse round punctures laterally, preapical row of punctures 1 row wide in middle; sides and anterior area of second tergum with coarse, confluent elongate pits; third to fifth terga with subconfluent smaller punctures and shiny interspaces; pygidium punctate on basal half and no impunctate median space posteriorly, apical half glossy.

ALLOTYPE.—♂, Sri Lanka, Sabaragamuwa Province, Ratnapura District, Gilimale, Induruwa Jungle, 7–8 Mar 1979, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, S. Siriwardane, L. Jayawickrema (USNM).

MALE.—Length 4.9 mm. Color as in female except flagellum infuscated above. Vestiture paler yellow. Wings clear, stigma and veins dark brown except amber at extreme base.

Head width 1.7 times interocular distance at anterior ocellus; mandible without a preapical denticle; clypeal lobe flat, apex truncate; front with median carina on lower half and subconfluent punctures; upper front shagreened, more sparsely punctate with several interspaces wider than an ocellus.

Pronotal disk with a strong anterior ridge behind which are a number of short longitudinal rugulae, the disk moderately sparsely punctate except laterally, posterior half to third impunctate; lateral pronotal surface with a very weak median oblique groove, above delicately lineolate, below delicately rugulose; notauli distinct, but no median escarpment, most of discal punctures separated by half or more the diameter of a puncture; tegula elongate, 1.5 times as long as median width; mesopleuron with punctures anteriorly separated by more than the diameter of a puncture and becoming sparser posteriorly; inner surface of hind tibia with a longitudinal carina; marginal cell extending well beyond second submarginal; propodeal areola with basal width 1.3 times apical width and 0.8 times length, surface laterad of areola delicately lineolate and with a strong curved submarginal carina; posterior propodeal surface without a median ridge, finely lineolate on lower half, with a few scattered punctures on upper half.

First abdominal segment 1.1 times as long as wide, disk of tergum without anterior ridge, surface impunctate except laterally, preapical row impressed, 1 puncture wide; third to sixth terga shagreened and with small punctures separated by at least twice the width of a puncture; posterolateral process of fifth sternum moderately high, curved; sixth sternum without median tuft of dense erect hair.

PARATYPES.—1♀, same locality as holotype but 2100 ft, 9–13 Feb 1975, K.V. Krombein, P.B. Karunaratne, P. Fernando, S. Karunaratne (USNM); 1♀, Kandy, 1 Jan 1931, G.M. Henry (Colombo). SABARAGAMUWA PROVINCE. *Kegalla District*: 1♀, Kitulgala, Bandarakele Jungle, 17–18 Mar 1979, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, T. Gunawardane (USNM). A second female paratype has been deposited in the National Museums of Sri Lanka (Colombo).

The three paratypes are very similar to the holotype in all essential details and are 7.5–8.0 mm long.

10. *Tiphia bouceki*, new species

The female of *T. bouceki* is one of three species with elongate tegulae and a strong median crest on the lower front above the antennae. It differs from *T. hillyardi*, new species, in lacking strongly yellowish wings and in having dark antenna, tegula, and legs rather than light red. The light-yellow wings with amber veins and propodeal areola strongly narrowed posteriorly separate *T. bouceki* from *T. knutsoni*, new species, which has infumated wings with light-brown veins and a propodeal areola with apical width only slightly less than basal width. The male of *T. bouceki* lacks a tuft of dense erect hair on the sixth abdominal sternum, which separates it from *T. knutsoni*. It has a median carina on the lower front as does *T. hillyardi*, but it differs from that species in having only the fore and mid tibiae and tarsi red and the first abdominal tergum with the subapical impressed area two punctures in width.

Tiphia bouceki occurs primarily in the Dry Zone

in Sri Lanka, but it occasionally enters the Wet Zone at moderate altitudes with medium rainfall. It occurs also in the Walayar Forest of South India. Three females and one male from Vavuniya were identified as *T. decrescens* Walker by Turner.

ETYMOLOGY.—The species is named for Zdenek Boucek, Commonwealth Institute of Entomology, London, our valued collaborator on Ceylonese Chalcidoidea.

HOLOTYPE.—♂, Sri Lanka, North Central Province, Anuradhapura District, Ritigala Natural Reserve, 24–25 Feb 1979, K.V. Krombein, T. Wijesinhe, S. Siriwardane, L. Jayawickrema, V. Gunawardane (USNM Type 100264).

MALE.—Length 4.5 mm. Black, the following red: mandible except base and apex, flagellum beneath, fore and mid tibiae and tarsi; posterior margin of pronotum and apical half of tegula testaceous, the latter transparent. Vestiture cinereous with a yellowish cast on apical abdominal segments. Wings slightly infumated beyond veins, stigma dark, veins light brown.

Head 1.5 times as wide as interocular distance at anterior ocellus; mandible with a small preapical denticle; median lobe of clypeus flat, apex slightly emarginate; lower front with a median carina and subcontiguous punctures; upper front shagreened and with 2 impunctate interspaces as wide as an ocellus.

Pronotal disk with a strong sharp anterior ridge behind which are a number of short longitudinal rugulae, disk with punctures separated by about the width of a puncture except laterally where the interspaces are half the width, apical strip impunctate; lateral pronotal surface with a curved median groove, upper area with oblique lineolations, lower surface with weak oblique rugulae; notauli distinct, but median escarpment lacking, scutum subcontiguously punctate; tegula 1.6 times as long as median width; anterior half of mesopleuron with most punctures separated by the diameter of a puncture or less, posterior half with more separated punctures; marginal cell extending well beyond second submarginal; inner surface of hind tibia with a longitudinal carina;

propodeal areola tricarinate, basal width 1.8 times apical width and 1.2 times the length, surface laterad of areola shagreened, submarginal carina strong, curved around spiracular area; posterior propodeal surface delicately roughened; upper and posterior areas of lateral propodeal surface closely, obliquely rugulose, lower anterior area obliquely lineolate.

First abdominal segment 1.2 times as long as wide, disk of first tergum without anterior ridge, preapical impression 2 punctures wide; third to sixth terga delicately shagreened, the third and fourth with small punctures separated by several times the diameter of a puncture, latter 2 terga more closely punctate; posterolateral process of fifth sternum low, arcuate; sixth sternum without tuft of dense erect hair.

ALLOTYPE.—♀, Sri Lanka, Northern Province, Vavuniya District, Vavuniya, 18 Dec 1923, G.M. Henry (London).

FEMALE.—Length 7.0 mm. Black, the following reddish: mandible except tip, flagellum beneath, apical margin of pronotum, posterior half of tegula, fore and mid tarsi. Wings light yellowish, veins amber. Vestiture white.

Head 1.5 times as wide as interocular distance at anterior ocellus; median clypeal lobe narrow, margin truncate; lower front with strong interantennal crest and coarse contiguous punctures becoming sparser on upper front but with no impunctate interspaces as wide as an ocellus.

Pronotum not ridged anteriorly, punctures coarse and subcontiguous, posterior half of disk impunctate; lateral pronotal surface with curved median groove, scattered punctures on upper area, obliquely lineolate and with a few punctures on lower area; notauli distinct and meeting complete median escarpment, disk of scutum with coarse contiguous punctures; tegula 1.7 times as long as median width, posterior half transparent; anterior half of mesopleuron contiguously punctate, posterior half with moderately dense, fine punctures, subalar patch with large punctures only; mid and hind tibiae not inflated; inner surface of hind tibia with a median ridge terminating in a flat rounded sensorium; hind basitar-

sus with a median groove about half as long as segment; propodeal areola tricarinate, basal width 1.4 time apical width and 0.6 times length, area laterad of areola delicately roughened, submarginal carina extending only to spiracular area; posterior propodeal surface with close minute punctures, median carina lacking; lateral surface of propodeum with close oblique rugulae on posterior and upper areas, lower anterior area finely obliquely lineolate.

Disk of first abdominal tergum with coarse subconfluent punctures laterally, impressed subapical row 1 puncture in width across middle; sides and anterior area of second tergum with coarse, confluent elongate pits; third to fifth terga with subconfluent smaller punctures and shiny interspaces; pygidium confluent punctate on basal half and without a median impunctate area, posterior half glossy.

PARATYPES.—2♀, 1♂, same data as allotype (Colombo, London); 20♂, same data as holotype, 1 in Malaise trap (USNM). NORTH CENTRAL PROVINCE. *Polonnaruwa District*: 1♂, Hingurakgoda, 20 Dec 1953, F. Keiser (Basel). CENTRAL PROVINCE. *Kandy District*: 1♂, Kandy, Udawattakele Sanctuary, 26–30 Jul 1978, K.V. Krombein, T. Wijesinhe, V. Kulasekare, L. Jayawickrema (USNM); 1♂, same locality but 1800 ft, 1–3 Sep 1980, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, V. Gunawardane (USNM). UVA PROVINCE. *Monaragala District*: 1♂, Angunakolapelessa, 27–28 Mar 1981, K.V. Krombein, T. Wijesinhe, L. Weeratunge (USNM). SOUTH INDIA. *S. Malabar*: 1♂, Walayar Forest, Jul 1957, P.S. Nathan (Corvallis). One female, from Pulilankulam, Vavuniya District, Jan 1913 (Colombo), is excluded from the type series because the head is lacking. Male paratypes have been deposited in the National Museums of Sri Lanka (Colombo), and one female paratype has been deposited in the National Museum of Natural History, Smithsonian Institution.

Male paratypes are 4.3–5.3 mm long; they agree well with the holotype, except that the preapical mandibular denticle has been eroded in some specimens, and the punctation of some

smaller specimens is comparatively sparser. The two female paratypes are 6.6 and 7.3 mm long and agree very well with the allotype in all essential details.

11. *Tiphia moczari*, new species

This montane species is known only from a short series of females from the area around Nuwara Eliya in the Central Highlands. It shares with *T. sakagami*, new species, the distinction of being the only small female with elongate tegulae that are transparent on the apical half, in having the legs light red except for the coxae, and in lacking a median crest on the lower front. *Tiphia moczari* is more sparsely punctate than *T. sakagami*, having only a few scattered punctures on the upper front and on the mesopleural disk. It is presumed that the male will have similar coloration and also the very sparse punctation that is characteristic of some other montane species such as *T. pulawskii*, new species, and *T. dayi*, new species.

ETYMOLOGY.—The species is named for Laszlo Moczar, Szeged University, Hungary, collaborator on Mesitiinae (Bethyridae) and Ceropalinae (Pompilidae).

HOLOTYPE.—♀, Sri Lanka, Central Province, Nuwara Eliya District, Hakgala Natural Reserve, 1650–1800 m, 23–25 Feb 1977, K.V. Krombein, P.B. Karunaratne, P. Fernando, D.W. Balasooriya (USNM Type 100265).

FEMALE.—Length 7.5 mm. Black, the following light red: mandible except tip, median lobe of clypeus, scape, pedicel, first flagellar segment, remainder of flagellum beneath, posterior margin of pronotal disk, tegula, legs except coxae, and apical half of pygidium. Vestiture with a slight yellowish cast. Wings lightly infumated, veins amber on basal half, light brown on apical half as is the stigma.

Head 1.5 times as wide as interocular distance at anterior ocellus; median clypeal lobe narrow, slightly convex, apex truncate; lower front without median ridge, punctures subcontiguous to separated by about the diameter of a puncture;

upper front with a few scattered punctures below ocellar triangle and subcontiguous punctures along inner eye margin, otherwise impunctate.

Pronotal disk without an anterior ridge, punctures on anterior half of disk relatively large, subcontiguous to separated by the diameter of a puncture, posterior half of disk impunctate in middle; lateral pronotal surface with a weak, slightly curved median groove, obliquely lineolate on upper area, with some weak rugulae on lower area; anterior escarpment present only on median half of scutum, not reaching notauli, center of disk with moderately large contiguous punctures; tegula transparent on apical half, 1.8 times as long as median width; subalar patch of mesopleuron with dense minute punctures anteriorly and small scattered ones posteriorly, mesopleural disk with scattered punctures mostly separated by 2 or more times the diameter of a puncture; mid and hind tibiae not inflated; inner surface of hind tibia without a median ridge; hind basitarsus with a groove on median half of inner surface; propodeal areola tricarinate, median carina present only on basal two-thirds, basal width 1.2 times apical width and 0.4 times the length, area laterad of carina very delicately transversely lineolate, submarginal carina straight, extending only to spiracular area; posterior surface of propodeum with a median ridge on basal fourth, the surface delicately roughened and micropunctate; lateral propodeal surface with close weak oblique rugulae on upper and posterior areas and oblique lineolations on lower anterior area.

First abdominal tergum without an anterior ridge, preapical impression consisting of small shallow subcontiguous pits, 1 pit wide; anterior half of pygidium closely punctate and with a small median impunctate space posteriorly, the posterior half smooth.

MALE.—Unknown.

PARATYPES.—1♀, same locality as holotype but 6–7 Feb 1979, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, S. Siriwardane, T. Gunawardane (USNM); 3♀, Galway Natural Reserve, Nuwara Eliya, 6200 ft, 10 Jun 1978, P.B. Karunaratne, V. Kulasekare, L. Jayawickrema (USNM);

1♀, Nuwara Eliya, 27–29 May 1975, D.H. Messersmith, G.L. Williams, P.B. Karunaratne (USNM). Paratypes have been deposited in the National Museums of Sri Lanka (Colombo) and in the British Museum (Natural History).

The paratypes are 6.5–7.3 mm long and agree in most details with the holotype. The median carina of the propodeal areola may be longer but it is never complete, and the ridge on the posterior propodeal surface may occur on the apical third.

12. *Tiphia tsunekii*, new species

This species is known only from the unique, newly emerged female holotype from Adams Peak, an area of very heavy rainfall. The specimen was resting quietly on a leaf of an herbaceous plant, probably waiting for a male to mate with her.

The female of *T. tsunekii* is readily recognized by a combination of the large size, short tegula, light red legs, nonsulcate hind basitarsus, inflated mid and hind tibiae, and moderately infumated wings. It is closest to *T. gurneyi*, new species, in size, dense punctation of head and thoracic dorsum, and inflated mid and hind tibiae but differs in having lighter red legs, suberect golden pubescence on head and thoracic dorsum, and in possessing a median carina on the propodeal areola.

ETYMOLOGY.—I am pleased to name this handsome species for my good friend and respected colleague Professor Katsuji Tsuneki of Mishima, Japan.

HOLOTYPE.—♀, Sri Lanka, Central Province, Kandy District, Adams Peak Trail, 4.5 mi W of Maskeliya, 1610–1690 m, 21 Oct 1977, K.V. Krombein (USNM Type 100266).

FEMALE.—Length 10.0 mm. Black, glossy, mandible except tip, apex of median lobe of clypeus, scape, and pedicel medium red, the following light red: narrow posterior margin of pronotal disk, tegula, legs except coxae, and apex of pygidium. Forewing moderately infumated, stigma and veins amber. Vestiture of head and thoracic dorsum golden.

Head 1.2 times as wide as high, and 1.6 times

interocular distance at anterior ocellus; mandible with a weak preapical denticle; frontal crest lacking, punctation of front and vertex coarse, mostly contiguous, front with short, very narrow impunctate strip below anterior ocellus; flagellum moderately stout, segments all longer than broad, first 3 segments 3.8 times as long as greatest width.

Pronotal disk with discrete but not strong anterior ridge, coarsely and contiguously punctate except for narrow apical strip broader in middle; lateral surface of pronotum practically impunctate above oblique groove, a few small punctures, but no trace of rugulae below groove; scutum contiguously punctate between notauli which extend anteriorly to sharp escarpment; tegula as broad as long, transparent so wing bases can be seen, without marginal groove, surface faintly shagreened; mesopleuron with anterior slope finely and densely punctate, subtegular area with dense small punctures and scattered larger ones, disk with scattered moderate-sized punctures; dorsal surface of propodeum glossy except anterior half laterad of areola dull and shagreened, areola with well-developed median carina, basal width half the length and 1.5 times apical width, lateral area without sinuous carina between areola and carinate margin; upper part of lateral surface of propodeum with sparser oblique rugulae than in *T. gurneyi*, new species, lower area delicately shagreened and with some minute punctures on posterior third; posterior surface of propodeum with moderately dense, minute punctures except laterally where they are larger, median carina present only at extreme apex; mid and hind tibiae inflated, 2.7 times as long as broad; sensorium on inner surface of hind tibia circular, not impressed; hind basitarsus without longitudinal groove on inner surface.

First abdominal tergum without anterior carina, disk with scattered small punctures, preapical row of punctures weakly impressed, close, mostly 1 puncture in width; base of second tergum grooved with weak, short longitudinal rugulae on lateral third; second and third terga with scattered small punctures, each with a preapical,

nonimpressed row of closer punctures; pygidium delicately shagreened, basal half with moderately large punctures and impunctate median strip, apical half smooth.

MALE.—Unknown.

13. *Tiphia gurneyi*, new species

The female is close to *T. tsunekii*, new species, and shares with it the large size, dense punctation of head and thoracic dorsum, short tegula, non-sulcate hind basitarsus, and inflated mid and hind tibiae. It differs from *T. tsunekii* in having only mid and hind femora and tibiae red rather than all legs except coxae, somewhat more infuscated wings, a broader propodeal areola sometimes lacking the median carina, and in having cinereous rather than golden pubescence on head and thoracic dorsum.

The putative male of *T. gurneyi* also is large, has coarse punctation on head and thoracic dorsum, dark legs, lacks a tuft of erect hairs on sixth sternum, has a median ridge on hind tibia, and a weak subapical denticle on inner edge of mandible.

The holotype, allotype, and paratype female and most paratype males are from localities in the Wet Zone, but one paratype male is from the Dry Zone.

ETYMOLOGY.—The species is named for Ashley B. Gurney, a valued colleague for many years, to whom I am particularly grateful for numerous identifications of orthopterous prey of solitary wasps.

HOLOTYPE.—♀, Sri Lanka, Southern Province, Galle District, Kanneliya, Sinharaja Jungle, 13–16 Aug 1972, K.V. Krombein and P.B. Karunaratne (USNM Type 100267).

FEMALE.—Length 12.0 mm. Black, glossy, mid and hind femora medium red, the following darker red: mandible except apex, margin of tegula, forefemur and tibia beneath, mid and hind tibiae, and apex of pygidium. Forewing moderately infuscated, stigma black, veins brown. Vestiture of head and thoracic dorsum cinereous.

Head 1.3 times as wide as high and 1.8 times interocular distance at anterior ocellus; mandible without preapical denticle (possibly eroded?); frontal crest lacking; punctation of front and vertex coarse, mostly contiguous, front with very short, narrow smooth strip below anterior ocellus; flagellum moderately stout, first three flagellar segments 3.9 times as long as greatest width.

Pronotal disk with discrete but not strong anterior ridge, coarsely and contiguously punctate except for narrow apical strip broader in middle; lateral surface of pronotum practically impunctate above oblique groove, with a few scattered punctures below groove and some very weak posterolateral rugulae; scutum contiguously punctate between notauli which extend anteriorly to sharp escarpment; tegula as broad as long, opaque except posterior margin, without marginal groove, surface faintly shagreened; mesopleuron with anterior slope shagreened except for small punctures along outer margin, sub-regular area with dense, small punctures and scattered larger ones, disk with mostly subcontiguous larger punctures; dorsal surface of propodeum glossy except much of lateral area faintly shagreened and without sinuous carina between spiracle and areola, the latter lacking a median carina, the surface shallowly pitted anteriorly and with longitudinal gouges posteriorly, basal width 0.6 times length and 1.5 times apical width; lateral propodeal surface with closer, weaker oblique rugulae than in *T. tsunekii*, lower area delicately shagreened and with some minute punctures on posterior half; posterior surface of propodeum with moderately dense, minute punctures except laterally where they are larger, median carina present on lower half; mid and hind tibiae inflated, 2.4 times as long as broad; sensorium on inner surface of hind tibia circular, smaller than in *T. tsunekii*, not impressed; hind basitarsus without longitudinal groove on inner surface.

First abdominal tergum without anterior carina, disk with scattered small punctures, preapical row weakly impressed, close, mostly 1 puncture in width; base of second tergum broadly grooved

and with short, coarse longitudinal rugulae, the disk of tergum with scattered small punctures in middle, denser ones laterally and a preapical, nonimpressed row; third tergum with moderately dense small punctures, somewhat sparser on a narrow transverse strip in middle; basal half of pygidium with coarse, subcontiguous punctures and a short impunctate strip toward apex, apical half delicately shagreened.

ALLOTYPE.—♂, Sri Lanka, Southern Province, Matara District, Deniyaya, near 1000 ft, in Malaise trap, 19–20 Oct 1976, G.F. Hevel, R.E. Dietz IV, S. Karunaratne, D.W. Balasooriya (USNM).

MALE.—Length 8.3 mm. Black, the following red: spot near apex of mandible, outer and posterior margins of tegula, inner surface of foretibia, and narrow apices of tarsal segments. Wings very faintly infumated, stigma black, veins brown. Vestiture white to cinereous.

Head width 1.4 times distance from clypeal apex to anterior ocellus, 1.7 times upper interocular distance and 2.2 times interocular distance at upper margin of antennal fossae; mandible without preapical denticle on inner margin; clypeal lobe with rounded lateral angles and shallow median emargination; front without median crest, with coarse, mostly subcontiguous punctures, and with a narrow impunctate strip on upper half below ocellus; flagellum with linear tyloids on second to eleventh segments, first 3 segments 1.7 times as long as greatest width; cheek narrower than antennal fossa.

Pronotal disk with a strong anterior ridge behind which is a series of short, close weak rugulae; lateral pronotal surface with a weak oblique groove, posteroventrally with a few weak rugulae; mesoscutum with most punctures separated by about half the diameter of a puncture except posteriorly where they are contiguous; tegula 1.2 times as long as median width, margins not grooved, surface opaque except lateral and posterior margins and delicately shagreened; scutellum with most punctures subcontiguous; anterior mesopleural disk with coarse punctures mostly separated by half the diameter of a puncture and with a few interspersed small punctures, subalar

area contiguously punctate; propodeal areola 1.1 times basal width and 1.4 times apical width, median and lateral ridges strong, the latter slightly curved inward, surface glossy and minutely roughened; area laterad of areola mostly shagreened but with small punctures adjacent to areola and posterior ridge; posterior propodeal surface with a complete median carina, the area with small punctures concentrated adjacent to median carina and lateral ridge, rest of area virtually impunctate; upper and posterior halves of lateral propodeal surface with close, moderately coarse carinae, rest of surface delicately shagreened; inner surface of hind tibia with a median longitudinal ridge terminating in a small raised oval sensorium.

Disk of first tergum twice as broad as median length, anterior half with denser small punctures, preapical strip with small contiguous punctures at least 2 punctures in width; basal groove on second tergum with delicate rugulae laterally, smooth in middle; first sternum with small close punctures on anterior half; fifth sternum with moderately raised, oblique, posterolateral process; sixth sternum without tuft of erect dense hairs.

PARATYPES.—CENTRAL PROVINCE. *Kandy District*: 1♀, Kandy, Udawattakele Sanctuary, 1800 ft., 23–25 Sep 1980, K.V. Krombein, P.B. Karunaratne, L. Jayawickrema, V. Gunawardane (USNM). SABARAGAMUWA PROVINCE. *Ratnapura District*: 5♂, Gilimale, Induruwa Jungle, 10 Oct 1980, 1♂ in Malaise trap, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, V. Gunawardane (USNM). SOUTHERN PROVINCE. *Hambantota District*: 1♂, Katagamuwa, 7–11 Feb 1936, G.M. Henry (Colombo). A pair of paratypes is in the National Museums of Sri Lanka (Colombo), and a male paratype is in the British Museum (Natural History).

The male paratypes are 7.0–8.0 mm long and agree well with the allotype in most details of punctation and sculpture. The female paratype is only 8.1 mm long but agrees well in all details with the holotype, except that the propodeal areola is tricarinate with the median carina ex-

tending almost to the apex, and the basal width is 1.7 times the apical width.

14. *Tiphia nilgirensis* Allen

FIGURES 58, 62

Tiphia (Tiphia) nilgirensis Allen, 1975:72, 73, pl. 6: fig. 39 [♀; Nilgiri Hills and Coimbatore, South India; type in Leiden Museum].

Females of *T. nilgirensis*, *T. palmi* Krombein, and *T. kurczewskii*, new species, share with *T. tsunekii*, new species, and *T. gurneyi*, new species, the distinction of being the only five taxa with inflated mid and hind tibiae (2.0–2.5 times as long as broad). The females of these species also agree in having short tegulae and in lacking a median groove on the inner surface of the hind basitarsus and a submarginal carina on the propodeal dorsum. *Tiphia nilgirensis*, *T. kurczewskii*, and *T. palmi* are much smaller than *T. tsunekii* and *T. gurneyi* and more sparsely and delicately punctate. The former three species are easily separated because *T. nilgirensis* has dark legs and lacks a median groove on lateral pronotal surface, whereas the legs except coxae are red in *T. palmi* and *T. kurczewskii*.

The male of *T. nilgirensis* has dark legs, the sixth abdominal sternum lacks a tuft of dense erect hair, the inner surface of the hind tibia has a median ridge, and the mandible has a preapical denticle in unworn specimens.

The species occurs both in Sri Lanka and South India. In the former country it is found in both the Dry Zone and the Wet Zone and at altitudes near sea level to 2100 ft.

FEMALE.—Length 6.7–7.1 mm. Black, mandible except base and apex and tegula reddish. Vestiture white. Wings slightly infumated, stigma brown, veins amber.

Head 1.6 times as wide as interocular distance at anterior ocellus; median lobe of clypeus 1.9 times as wide as antennal fossa, slightly convex, anterior margin truncate, angles rounded; lower front without median ridge, punctures mostly subcontiguous; upper front usually with a narrow

impunctate vitta beneath anterior ocellus, punctures elsewhere irregularly spaced from subcontiguous to separated by the diameter of a puncture, no impunctate interspaces as wide as an ocellus.

Pronotal disk with a weak anterior ridge, punctures mostly subconfluent, posterior half impunctate except laterally; lateral pronotal surface without a median groove, upper area finely obliquely lineolate, lower area with some delicate oblique rugulae; scutum with anterior escarpment complete, extending to notauli, disk mostly subcontiguously punctate; tegula transparent on apical half, 1.3 times as long as broad; subalar patch of mesopleuron densely micropunctate and with a few larger punctures, disk on anterior half with most punctures separated by half the width of a puncture, posterior area with fine close punctures; mid and hind tibiae inflated, twice as long as wide; inner surface of hind tibia without a median ridge, sensorium subcircular, not impressed; hind basitarsus not grooved on inner surface; propodeal areola tricarinate, median carina extending two-thirds or more toward apex, basal width 1.4 times apical width and 0.7 times length, area laterad of areola delicately shagreened anteriorly, with a few scattered small punctures, submarginal carina lacking; posterior propodeal surface with small, rather close punctures, median ridge present on apical third; lateral propodeal surface with fine, oblique, moderately separated rugulae on posterior and upper surfaces, delicately shagreened on lower anterior surface.

First abdominal tergum with preapical impression 2 punctures in width except in middle where it is only 1; anterior half of pygidium closely punctate with a small smooth space posteriorly in middle, posterior half smooth.

MALE.—Length 4.1–7.4 mm. Black, the following reddish: mandible near tip, flagellum beneath, lateral and usually posterior margin of tegula, foretibia beneath and apices of tarsal segments. Vestiture white, tinged with yellow on last 3 abdominal segments. Wings clear except

faintly infumated at apex, stigma black, veins brown.

Head 1.6–1.7 times as wide as interocular distance at anterior ocellus; mandible with a strong to weak preapical denticle (Figure 62) which is eroded in worn specimens; clypeal lobe slightly convex, apical margin emarginate, lateral angles rounded, apical width 1.3 times diameter of antennal fossa; lower front contiguously punctate, median ridge absent; upper front with many punctures separated by half the diameter of a puncture, rarely with an impunctate interspace as wide as an ocellus.

Pronotal disk with anterior ridge behind which are a number of short longitudinal rugulae, punctures anteriorly and laterally separated by about half the diameter of a puncture, posterior third of disk impunctate except at sides; tegula 1.2 times as long as broad; many of scutal punctures separated by half the diameter of a puncture but with some wider interspaces; mesopleuron with punctures of moderate size separated mostly by half the diameter of a puncture and with some interspersed small punctures; marginal cell extending well beyond second submarginal; inner surface of hind tibia with a longitudinal ridge ending in narrow, nonimpressed sensorium; propodeal areola tricarinate, median carina sometimes incomplete at apex, basal width 1.3–1.4 times apical width and 0.9 times length, area laterad of areola transversely to obliquely, and delicately lineolate, submarginal carina weak and extending only to spiracular area; posterior propodeal surface with median ridge on basal half or two-thirds, lower area with fine, moderately dense punctures, upper area with more scattered larger punctures; lateral propodeal surface with longitudinal rugulae on posterior and upper areas, longitudinally lineolate on lower anterior area.

First abdominal segment 1.1 times as long as broad; disk of first tergum without anterior ridge, preapical impression 2 to 3 punctures wide; posterolateral process of fifth sternum low, oblique, slightly curved; sixth sternum (Figure 58) without a tuft of dense suberect hair.

SPECIMENS EXAMINED.—EASTERN PROVINCE. *Am-*

parai District: 38♂, Ekgal Aru Reservoir Jungle, 100 m, 19–22 Feb, Krombein et al. (USNM).

CENTRAL PROVINCE. *Matale* District: 2♂, Gam-maduwa, 5–9 Nov, Henry (Colombo). *Kandy* District: 2♂, Kandy, Udawattakele Sanctuary, 1600–2100 ft, 18–21 Jan, 16–31 Aug, Karunaratne, Krombein et al. (USNM); 2♀, Kandy, Peak View Motel, 1800 ft, 15–24 Jan, Davis et al. (USNM). *Nuwara Eliya* District: 1♂, Hakgala, 24 Aug, Henry (Colombo).

WESTERN PROVINCE. *Colombo* District: 4♂, Gam-paha Botanical Garden, 27 Sep, 8 Nov, Krombein et al. (USNM).

UVA PROVINCE. *Badulla* District: 1♀, Bandara-wela, 7 Apr, Henry (Colombo).

SOUTHERN PROVINCE. *Matara* District: 1♂, Deni-yaya, near 1000 ft, 19–20 Oct, Hevel et al. (USNM).

MISCELLANEOUS. 2♀, 2♂, Ceylon, 6019, 6095, 10471, Nietner (Berlin); 1♀, Ceylon, 56/43 (London).

15. *Tiphia kurczewskii*, new species

The female of this species is another of the few with inflated tibiae, 2.0–2.5 as long as wide. It is smaller and more sparsely punctate than *T. tsuneki*, new species, and *T. gurneyi*, new species. It is similar to *T. palmi* Krombein in having the legs red except coxae but differs in having the apex of the pygidium delicately wrinkled and shagreened rather than smooth and glossy and in having the hind tibia less strongly inflated, with the length 2.5 times the width rather than 2.1 times.

The males of *T. kurczewskii* and *T. palmi* are among the four species in which the legs are entirely red except the coxae. These two species lack a tuft of dense suberect hair on the sixth abdominal sternum and a longitudinal ridge on the inner surface of the hind tibia. The former species differs from the latter in having the marginal cell extend farther toward the apex of the forewing than the second submarginal rather than having the two cells subequal in this respect. Also, in *T. kurczewskii* the lateral surface of the

propodeum has closer weaker carinae on the posterior and upper areas.

Tiphia kurczewskii occurs both in Sri Lanka and South India. In the former country it is found mostly in the Dry Zone at rather low altitudes, although it is quite common in Colombo where the average annual rainfall is 2400 mm.

ETYMOLOGY.—The species is named for Frank E. Kurczewski, Syracuse University, New York, who has made substantial contributions to our ethological knowledge of solitary wasps.

HOLOTYPE.—♀, Sri Lanka, Western Province, Colombo District, Colombo, Museum Gardens, 50 ft, 13–15 Apr 1977, P.B. Karunaratne (USNM Type 100268).

FEMALE.—Length 6.7 mm. Black, the following light red: mandible except extreme base and apex, most of clypeal lobe, antenna, posterior margin of pronotum, tegula, legs except coxae, and apical half of pygidium. Vestiture white. Wings slightly infumated, stigma brown, veins amber.

Head 1.5 times as wide as interocular distance at anterior ocellus; clypeal lobe flat, margin truncate, angles rounded, apex 1.1 times as wide as antennal fossa; lower front without median ridge, many of punctures separated by half the width of a puncture; upper front with a narrow smooth vitta before anterior ocellus, 2 impunctate interspaces twice as wide as an ocellus, punctures separated by 1 or more times the width of a puncture except subcontiguous along eye margin.

Pronotal disk with a weak anterior ridge, many of punctures separated by once or twice the diameter of a puncture except subcontiguous laterally, posterior third or more impunctate; median escarpment complete, reaching notauli, side of scutal disk with scattered punctures; tegula transparent, 1.3 times as long as wide; subalar patch of mesopleuron with small anterior area of dense minute punctures, anterior half of pleuron with larger punctures mostly separated by half the width of a puncture; mid and hind tibiae inflated, 2.5 times as long as wide; inner surface of hind tibia without median ridge; inner surface of hind basitarsus without median groove; pro-

podeal areola tricarinate, median carina complete, basal width 1.3 times apical width and 0.6 times length, lateral area delicately transversely lineolate and without submarginal carina; posterior surface of propodeum without median ridge, finely and quite closely punctate; lateral propodeal surface obliquely rugulose on posterior and upper areas, slightly more closely than in *T. palmi*, lower anterior area obliquely lineolate.

Preapical impression of first abdominal tergum 2 punctures wide; anterior half of pygidium contiguously punctate and with a small, narrow posteromedian smooth area, posterior half delicately wrinkled and finely shagreened.

ALLOTYPE.—♂, same locality and collector but 23 Apr 1976 (USNM).

MALE.—Length 5.7 mm. Black, colored as in female except mid and hind tarsi also red, and posterior margin of pronotum and tegula testaceous. Vestiture white, tinged with yellow on last 4 abdominal segments. Wings clear, stigma brown, veins amber.

Head 1.6 times as wide as interocular distance at anterior ocellus; mandible without preapical denticle; clypeal lobe flat, apex truncate, angles rounded, apical width 1.3 times width of antennal fossa; lower front with contiguous small punctures, median ridge absent; upper front with no impunctate interspaces as wide as an ocellus, punctures below anterior ocellus separated by about half the diameter of a puncture, those along inner eye margin subcontiguous, rest of area with punctures separated by a little more than the width of a puncture.

Pronotal disk with an anterior ridge, rugulae behind it evanescent, surface of disk with punctures separated by half of the width of a puncture or of equal width, posterior third to half smooth; scutum with subcontiguous punctures anteriorly in middle, sparser elsewhere except along notauli; tegula 1.1 times as long as broad; mesopleuron lacking minute punctures, the punctures irregularly spaced, separated by distances of half to as much as the width of a puncture, and with a few wider interspaces; hind tibia without a longitudinal ridge on inner surface; marginal cell of

forewing extending farther toward wing apex than second submarginal; propodeal areola tricarinate, median carina not quite reaching apex, lateral carinae arched inward, basal width 1.4 times apical width and 0.8 times length, lateral area delicately lineolate, submarginal carina lacking; posterior propodeal surface without median ridge, finely and quite closely punctate; lateral surface of propodeum with closer weaker carinae on upper and posterior surfaces than *T. palmi*, anterior area longitudinally lineolate.

First abdominal segment 1.2 times as long as wide; first tergum without anterior ridge, preapical impression shallow, 2 punctures wide except in middle where it is 1; posterolateral process of fifth sternum arcuate, oblique, moderately raised; sixth sternum without a tuft of dense subrect hair.

PARATYPES.—NORTH CENTRAL PROVINCE. *Polonnaruwa District*: 1♀, Medirigiriya, 21–27 Mar 1958, R.L.A. Perera (Lawrence). EASTERN PROVINCE. *Amparai District*: 2♂, Lahugala Sanctuary, 15 Jun 1976, K.V. Krombein, P.B. and S. Karunaratne (USNM). WESTERN PROVINCE. *Colombo District*: 2♀, 4♂, Colombo, as follows: 1♂, Feb 1908, O.S. Wickwar (Colombo); 1♀, 1♂, May 1904 (Colombo); 2♂, 2 Jul 1929 and 26 Nov 1928, G.M. Henry (Colombo); 1♀, 11–12 Nov 1969, P.B. Karunaratne (USNM). 22♂, Colombo, Museum Gardens, as follows: 1♂, 28–31 Jan 1975, K.V. Krombein, P.B. Karunaratne, P. Fernando (USNM); 2♂, 25 Feb 1977, K.V. Krombein, P.B. Karunaratne, P. Fernando, D.W. Balasooriya (USNM); 19♂, 23 Apr 1976, P.B. Karunaratne (USNM). 1♂, Colombo, Colpetty, 103 Galle Rd., 21 Nov 1968, flight trap 1000–1500 hrs, T.F. Halstead (San Francisco). 2♂, Battaramulla, 24 Jun 1929, G.M. Henry (Colombo). SABARAGAMUWA PROVINCE. *Ratnapura District*: 1♂, Uggalkaltota, in Malaise trap, 23–26 Jun 1978, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, N. Karunaratne (USNM). UVA PROVINCE. *Monaragala District*: 1♂, Angunakolapelessa, in Malaise trap, 17–19 Jun 1978, K.V. Krombein, T. Wijesinhe, V. Kulasekare, L. Jayawickrema (USNM). SOUTHERN PROVINCE. *Galle District*: 1♂, Hikkaduwa, 11

mi NW Galle, 25 Jan 1962, Brinck, Andersson, Cederholm (Lund). 1♀, Ceylon, 6096, Nietner (Berlin). SOUTH INDIA. *Nilgiri Hills*: 1♀, Moyar Camp, 2900 ft, Jun 1954, P.S. Nathan (Corvallis). A pair of paratypes has been deposited in the National Museums of Sri Lanka (Colombo), and a male paratype in the British Museum (Natural History).

Female paratypes are 6.3–7.4 mm long and are very similar to the holotype in most details, but the clypeal lobe may be black. Male paratypes are 4.9–6.5 mm long. There is relatively little variation, but there may be short rugulae behind the pronotal ridge, the median carina of the propodeal areola may be complete, the preapical band of punctures on first abdominal tergum may be two punctures wide across entire length, the apex of the clypeal lobe may be slightly emarginate, and the flagellum above and mid and hind coxae may be dark.

16. *Tiphia palmi* Krombein

Tiphia rufipes Smith, 1855:83 [not Latreille, 1797] [♀; northern India; type in British Museum (Natural History)].—Magretti, 1892:249 [♀; Burma; misidentified?].—Bingham, 1897:61, 62 [♀; brief description].—Turner, 1908b:120 [♀; Ceylon; misidentified].—Allen and Jaynes, 1930:100 [brief note].—Hedicke, 1936:23 [listed].
Tiphia palmi Krombein, 1938:187 [new name for *T. rufipes* Smith, not Latreille, 1797].
Tiphia (Tiphia) rufipes Smith.—Allen, 1969:396–398 [type redescription]; 1975:63, 64 [description].

Tiphia palmi is the fifth species in which the mid and hind tibiae of the female are inflated. That sex is distinguished by its small size (5.9–7.0 mm long), relatively sparse punctation, the lack of a median groove on inner surface of the hind basitarsus, the lack of a submarginal carina on the dorsal propodeal surface, entirely light red legs except coxae, hind tibia only twice as long as wide, and the glossy pygidial apex. The male also has light red legs, the second submarginal cell extends as far toward the wing apex as the marginal cell, the mandible lacks a preapical denticle, and the margin of the clypeal lobe is truncate or slightly emarginate.

The species occurs throughout the Indian subcontinent. Within Sri Lanka it occurs in both the Dry Zone and the Wet Zone and at altitudes ranging from sea level to 1000 ft.

FEMALE.—Length 5.9–7.0 mm. Black, the following light red: mandible except base and apex, flagellum beneath, posterior margin of pronotal disk, tegula, legs except coxae; mid and hind tarsi occasionally brown. Vestiture white. Wings faintly infumated, stigma black, veins brown.

Head width 1.5–1.6 times interocular distance at anterior ocellus; clypeal lobe slightly convex, apical margin gently convex, angles rounded, 1.4 times as wide as antennal fossa; lower front without median carina, many punctures separated by half the width of a puncture; upper front with a narrow smooth vitta in front of anterior ocellus, sometimes with 2 impunctate interspaces as wide as an ocellus, punctures a bit more separated than on lower front.

Pronotal disk anteriorly with weak transverse ridge, disk mostly subcontiguously punctate except for smooth apical area which is two-thirds as wide as disk in middle and a fifth as wide laterally; lateral surface with weak to evanescent oblique groove across middle, upper area obliquely and closely aciculate, lower area obliquely lineolate and punctate along anterior margin; scutum with anterior escarpment complete, extending to notauli, posterior half of scutum subcontiguously punctate, laterally and anteriorly with punctures separated by at least half the width of a puncture; tegula transparent, length and width subequal; mesopleuron with subalar patch densely micropunctate and as wide as tegula, anterior half of pleuron with punctures separated by the diameter of a puncture or less, posterior half with crowded small punctures; mid and hind tibiae inflated, twice as long as wide; inner surface of hind tibia not ridged, sensorium small, oval, not impressed; inner surface of hind basitarsus without median groove; propodeal areola tricarinate, median carina extending to apex or almost so, basal width 1.4–1.7 times apical width and 0.6–0.7 times the length, lateral area glossy with a few scattered punctures except den-

ser posterolaterally and weakly roughened anterolaterally, submarginal carina lacking; posterior propodeal surface with small, rather dense punctures, median ridge lacking; lateral propodeal surface obliquely rugulose on upper and posterior areas, the rugulae more separated than in *T. kurczewskii*, new species, anterior lower area delicately shagreened.

Preapical impression of first abdominal tergum usually 1 puncture wide across middle, though occasionally 2 punctures wide; pygidium on anterior half with sparser elongate punctures and sometimes a small medioapical smooth spot, posterior half smooth and glossy.

MALE.—Length 4.1–5.7 mm. Coloration as in female except clypeal lobe sometimes red in middle. Vestiture white, tinged slightly with yellow on apical abdominal segments. Wings clear, stigma black, veins brown.

Head width 1.5–1.7 times interocular distance at anterior ocellus; median lobe of clypeus almost flat, apical margin subtruncate to slightly emarginate, angles rounded, 1.8 times as wide as antennal fossa; lower front without median ridge and with contiguous small punctures; upper front with a small smooth area below anterior ocellus but no other impunctate interspaces as wide as an ocellus, with small punctures separated by width of a puncture except laterally where they are closer.

Pronotal disk with a rather weak anterior ridge, rugulae behind it weak or evanescent, punctures anteriorly small and mostly separated by half the diameter of a puncture, posterior area of disk impunctate on posterior third in middle and posterior fourth laterally; scutum with punctures separated by half the width of a puncture except anterolaterally where they are sparser; tegula transparent, 1.2–1.3 times as long as wide; mesopleuron with small punctures on anterior half separated by half the width of a puncture and by about the width of a puncture on posterior half; forewing with second submarginal cell extending as far as or almost as far as the marginal cell toward apex; hind tibia without a median ridge on inner surface; propodeal areola tricarinate,

median carina extending almost to apex, basal width 1.5–1.8 times apical width and 0.9 times the length, lateral area glossy and smooth except roughened anterolaterally, submarginal carina lacking; posterior propodeal surface with numerous small punctures, median ridge lacking; lateral propodeal surface with stronger, more separated rugulae on posterior and upper areas than in *T. kurczewskii*, anterior area glossy.

First abdominal segment 1.0–1.1 times as long as wide; first tergum without anterior ridge, preapical impression moderately deep, usually 2 punctures wide across middle; posterolateral process of fifth sternum short, weak or evanescent, oblique; sixth sternum without median tuft of dense suberect hair.

SPECIMENS EXAMINED.—NORTHERN PROVINCE. *Jaffna District*: 1♂, Kilinochchi, 80 ft, in Malaise trap, 24–27 Jan, Krombein et al. (USNM). *Mannar District*: 1♀, 1♂, 0.5 mi NE Kokmotte, Wilpattu Natl. Park, ♂ in Malaise trap, 15–16 Feb, Krombein et al. (USNM).

NORTH CENTRAL PROVINCE. *Anuradhapura District*: 1♀, 1♂, Hunuwilagama, near Wilpattu Natl. Park, 200 ft, in Malaise trap, 28 Oct–3 Nov, Hevel et al. (USNM); 1♂, Kandurukanda, 20 mi NE Habarana, 8 Feb, swept in meadow, Brinck et al. (Lund); 2♂, Ritigala Nat. Reserve, 8 Feb, dry meadow, Brinck et al. (Lund).

NORTH WESTERN PROVINCE. *Puttalam District*: 3♀, Wilpattu Natl. Park, Kali Villu, 12–14 Jun, Messersmith et al. (USNM). *Kurunegala District*: 1♀, Kurunegala, Badagamuwa Jungle, 24–27 Jan, Krombein et al. (USNM).

WESTERN PROVINCE. *Colombo District*: 1♀, 3♂, Colombo (includes Museum Gardens), 7 Feb, Jul, Henry, Karunaratne, Wickwar (USNM, London); 1♂, Yongamulla, 3 mi E Yakkala, 18 mi NE Colombo, 24 Jan–6 Mar, Brinck et al. (Lund).

SABARAGAMUWA PROVINCE. *Ratnapura District*: 1♀, Gilimale, Induruwa Jungle, 5–7 Feb, Krombein et al. (USNM).

UVA PROVINCE. *Badulla District*: 1♀, Bandara-wela, 9th mi on Welimada Rd, 4 Apr, Henry (Colombo).

SOUTHERN PROVINCE. *Matara District*: 1♂, Deni-

yaya, near 1000 ft, in Malaise trap, 19–20 Oct, Hevel et al. (USNM).

17. *Tiphia decrescens* Walker

FIGURES 44, 46, 48, 50, 51, 57, 63

Tiphia decrescens Walker, 1859:376 [♂, not ♀ as stated; Ceylon; type in British Museum (Natural History)].—Walker in Tennent, 1861:454 [listed].—Motschulsky, 1863:22 [listed].—Bingham, 1896:431 [listed].—Dalla Torre, 1897:135 [listed].—Turner, 1908b:125 [synonymizes ♂ *T. nervosa* Nurse and suggests it may be ♂ of *T. pollicarinata* Magretti].—Hedicke, 1936:8 [listed].

Tiphia conscia Nurse, 1902:81 [♀; Deesa; syntype series in British Museum (Natural History)].—Turner, 1908b:124 [synonymized *T. conscia* under *T. pollicarinata* Magretti]. [New synonymy.] [Lectotype designated herein.]

Tiphia (Tiphia) batorea Allen, 1975:34, 35 [♂; Coimbatore, South India; type in Leiden Museum]. [New synonymy.]

This small species is relatively abundant and occurs chiefly in the Dry Zone in altitudes ranging near sea level to some 2000 ft. It occurs also in India as far north as Deesa.

I have examined the types of *T. decrescens* and *T. batorea* and find them to be conspecific. The syntype series of *T. conscia* Nurse consists of six females from Deesa, one collected in October 1898 and five in June 1901. These specimens have the wings weakly tinged with yellow, the tegula, tibiae, and tarsi usually reddish, and the hind margin of the propodeum testaceous. Most Ceylonese females have the wings infumated, lack the reddish tegula, tibiae, and tarsi and testaceous margin of the propodeum, but there are a few specimens having the coloration of Nurse's type series, and I have no hesitation in making this synonymy. I have selected one of the June 1901 specimens as lectotype because the 1898 specimen is aberrant in having three rather than five carinae composing the propodeal areola. Turner suggested that *T. decrescens* was the opposite sex of *T. pollicarinata* Magretti, 1892; I exclude the latter from the synonymy because I have not seen the type from Burma. Turner also synonymized *T. nervosa* Nurse under *T. decrescens*. M.C. Day informed me (in litt.) that there were two syntypes of *T. nervosa* in the British Museum (Natural

History) but could locate only one in 1981. I have examined this syntype and find that it is not *T. decrescens* or any other species occurring in Sri Lanka. Accordingly, I have removed *T. nervosa* from the synonymy of *T. decrescens* pending study of the second syntype.

The sex association is based on the collection of both sexes together, though not in copula, on three different dates in Gampaha Botanic Garden, on two different dates in Kandy, and on one date in Padaviya.

Females are readily distinguished by the normal tegula, lack of a groove on the inner surface of the hind tibia, the inflated, broadened mid and hind tibiae, and the quinquecarinate propodeal areola. Males are recognized by the normal tegula, the tuft of dense, suberect setae on the sixth abdominal sternum, predominantly dark legs except reddish fore and mid femora and tibiae, and the lengthy marginal cell.

FEMALE.—Length 6.8–8.0 mm. Black, mandible red except base and apex; tegula brown, and sometimes tarsi in part. Vestiture white. Wings lightly infumated, stigma dark, veins amber.

Head 1.5 times as wide as interocular distance at anterior ocellus; median clypeal lobe (Figure 50) with margin gently emarginate, angles rounded, 1.1 times as wide as antennal fossa; lower front without median ridge, punctures mostly contiguous; upper front usually with 2 or 3 impunctate interspaces wider than an ocellus, majority of punctures separated by at most half the width of a puncture.

Pronotal disk with weak anterior ridge sometimes lacking in middle, most of punctures on anterior half separated by half the width of a puncture or more, apical area impunctate, half the width of disk in middle and about a quarter at side; lateral pronotal surface with oblique median groove, aciculate above groove and finely wrinkled below, a few scattered punctures above and anteriorly; anterior escarpment of scutum complete only across middle, not attaining notauli; center of disk contiguously punctate, elsewhere with scattered punctures; tegula opaque, length 1.2 times width; subalar patch as wide as

tegula, densely micropunctate and with scattered larger punctures, anterior half of mesopleural disk with punctures separated by half or more the width of a puncture, posteriorly with rather dense small punctures and a few interspersed larger ones; mid and hind tibiae inflated (Figure 48), 2.2 times as long as wide; inner surface of hind tibia not ridged (Figure 46), sensorium small, subcircular, slightly impressed; inner surface of hind metatarsus without median groove (Figure 44); propodeal areola quinquecarinate (Figure 51, "ar"), median carina usually complete to apex, intermediate carinae usually extending two-thirds toward apex, basal width 1.4–1.5 times apical width and 0.6–0.7 times length, area laterad of areola finely transversely aciculate, submarginal carina (Figure 51, "sc") sinuous and terminating in lateral ridge about four-fifths toward apex; posterior propodeal surface finely and closely punctate, median ridge absent; lateral propodeal surface with close oblique rugulae posteriorly and above, closely obliquely lineolate below anteriorly.

Preapical impression of first abdominal tergum lightly impressed, usually 1 puncture in width across middle, but occasionally 2; pygidium closely punctate on anterior half except for a narrow median smooth space posteriorly, apical half smooth, delicately shagreened.

MALE.—Length 4.3–5.8 mm. Black, the following light red: mandible except base and apex, flagellum beneath, posterior impunctate margin of pronotum, tegula, apex of femora, all of tibiae and tarsi, but hind tibia and tarsus sometimes brownish, or legs rarely entirely dark. Vestiture white but reddish or yellowish on posterior abdominal segments. Wings clear, stigma dark brown, veins testaceous near base, amber or light brown toward apex.

Head 1.5–1.6 times as wide as interocular distance at anterior ocellus; mandible with or without a small preapical denticle on inner margin; clypeal lobe (Figure 63) large, flat, apex truncate or slightly emarginate, lateral angles rounded, 1.3 times as wide as antennal fossa; lower front with median ridge very weak or usually absent, punc-

tures small and subconfluent; upper front with punctures larger, mostly separated by half the width of a puncture, occasionally with 2 impunctate interspaces wider than an ocellus.

Pronotal disk with strong anterior ridge, short rugulae behind it weak or lacking, discal punctures small and mostly separated by half the diameter of a puncture, impunctate posterior area about a third of the disk medianly and a sixth laterally; side of pronotum with an oblique median groove, obliquely lineolate above except for some rugulae anteriorly and obliquely rugulose below; scutum on posterior half with subcontiguous punctures in middle, elsewhere the punctures separated by half or more the width of a puncture; tegula transparent, 1.0–1.2 times as long as width; mesopleural disk with many punctures separated by half the diameter of a puncture or more, sometimes with interspersed smaller punctures; inner surface of hind tibia with a median ridge; marginal cell extending farther toward apex than second submarginal; propodeal areola tricarinate, median carina usually extending to apex, basal width 1.3–1.5 times apical width and 0.7–0.8 times length, area laterad of areola minutely roughened, submarginal carina sinuous, terminating in lateral ridge about four-fifths from base; posterior propodeal surface with numerous close strong punctures; lateral propodeal surface with strong oblique rugulae posteriorly and above, obliquely lineolate elsewhere.

First abdominal segment 1.1–1.2 times as long as wide; first tergum with preapical impression shallow, 1 or 2 punctures wide across middle; posterolateral process of fifth sternum well developed, arcuate, oblique; sixth sternum (Figure 57) with median tuft of dense suberect hair.

SPECIMENS EXAMINED.—NORTHERN PROVINCE. *Mannar District*: 1♂, 0.5 mi NE Kokmotte Bungalow, Wilpattu Natl. Park, 21–25 May, Krombein et al. (USNM).

NORTH CENTRAL PROVINCE. *Anuradhapura District*: 2♀, 5♂, Padaviya Irrigation Bung., 180 ft, 3♂ in Malaise trap, 27 Feb–9 Mar, 18 May, Davis et al., Krombein et al. (USNM); 1♂, Maradan Maduwa, Wilpattu Natl. Park, 23 mi W Anuradhap-

ura, 2 Feb, Brinck et al. (Lund). *Polonnaruwa District*: 1♀, 1♂, Polonnaruwa, 3 Mar, 17 Jul, Keiser, Krombein et al. (USNM, Basel).

EASTERN PROVINCE. *Trincomalee District*: 1♀, Tamalakaman, Naval Head Works Sanctuary, 29 Jan, Krombein et al. (USNM). *Batticaloa District*: 1♂, 15 mi SSW Batticaloa, 8 Mar, in dry meadow, Brinck et al. (Lund). *Amparai District*: 1♂, Inginiyagala, Samudra Gardens, 250 ft, in Malaise trap, 22–23 Nov, Hevel et al. (USNM).

CENTRAL PROVINCE. *Kandy District*: 1♂, 5 mi NW Mahiyangana, in Malaise trap at Irrigation Bung., 30 Mar–9 Apr, Spangler et al. (USNM); 5♀, 16♂, Kandy (includes Udawattakele Sanctuary, 2100 ft, Kandy Reservoir Jungle, Roseneath, Deiyannawela, Peradeniya Expt. Sta., Peak View Motel, 1800 ft), 15–24 Jan, 25 Feb, 29 Mar, 16–31 Aug, 30 Sep, Davis et al., Karunaratne et al., Keiser, Krombein et al., Spangler et al. (USNM, Basel, Ottawa). *Matale District*: 1♂, Nalanda, 4 Mar, Krombein et al. (USNM).

NORTH WESTERN PROVINCE. *Kurunegala District*: 2♂, Kurunegala, Badagamuwa Jungle, 1 in Malaise trap, 24–27 Jan, Krombein et al. (USNM).

WESTERN PROVINCE. *Colombo District*: 18♀, 50♂, Gampaha Botanical Garden, 14 Jan, 24 May, 27 Sep, 8 Nov, Krombein et al., Messersmith et al. (USNM); 1♂, Kotte, 5 Jul, Henry (Colombo); 2♀, 3♂, Nugegoda, Papiliyana, 1 May, 24 Nov, Karunaratne (USNM); 6♀, 26♂, Colombo (includes Museum Gardens, Colpetty), 28–31 Jan, 4, 16 Apr, 22, 23 June, 11–21 Nov, Halstead, Henry, Karunaratne, Krombein et al., Perera, Wickwar, Wijesinhe (USNM, Colombo, London, Lawrence, San Francisco); 1♂, Negombo, 10–11 Feb, Stubbs et al. (London); 1♂, Udugalla, 12 mi from Colombo, 15 Feb, Perera (Lawrence); 1♀, Battaramulla, 22 May, Henry (Colombo); 1♂, Handapangoda Timber Reserve, 18 Jan, Krombein et al. (USNM).

SABARAGAMUWA PROVINCE. *Ratnapura District*: 1♀, Uggalkaltota, Malaise trap, 23–26 Jun, Krombein et al. (USNM); 1♂, Gilimale, Induruwa Jungle, Malaise trap, 10 Oct, Krombein et al. (USNM); 2♂, Karagal Oya, 3 mi ENE Belihul Oya, 1900 ft, 2 Mar, Brinck et al. (Lund); 1♀,

Ratnapura, Pompakele, 25 Mar, Krombein et al. (USNM).

UVA PROVINCE. *Badulla District*: 1♂, Bintenne, Nov, Henry (Colombo).

SOUTHERN PROVINCE. *Galle District*: 1♀, Hikkaduwa, 11 mi NW Galle, 25 Jan, Brinck et al. (Lund). *Matara District*: 1♀, Enselwatte, above 2500 ft, 19–20 Oct, Hevel et al. (USNM).

MISCELLANEOUS. 2♀, 2♂, Ceylon, #11746, Nietner (Berlin); 1♀, Ceylon, 4 Oct, Yerbury (Geneva).

18. *Tiphia bakeriana*, new species

This is known from single male from the Induruwa Jungle, Gilimale, an area of lowland rain forest with heavy rainfall averaging 3900 mm annually. It is distinguished by the normal tegula, predominantly dark legs, tuft of dense suberect hair on the sixth abdominal sternum, by having the marginal cell extending farther toward the wing apex than the second submarginal cell, the dark tegula, and lack of a light red apical margin of the pronotal disk.

ETYMOLOGY.—The species is named for Edward W. Baker, Systematic Entomology Laboratory, U.S. Department of Agriculture, in appreciation of his many identifications of parasitic mites infesting Ceylonese and other solitary wasps and bees.

HOLOTYPE.—♂, Sri Lanka, Sabaragamuwa Province, Ratnapura District, Gilimale, Induruwa Jungle, 16–19 April 1981, in Malaise trap, K.V. Krombein, L. Weeratunge, P. Leanage (USNM Type 100269).

MALE.—Length 6.2 mm. Black, the following light red: apical half of mandible except tip, flagellum beneath, fore and mid tibiae except infuscated areas on outer surface, foretarsus and narrow apices of mid tarsal segments. Vestiture silvery except light brown at apex of abdomen. Wings clear, stigma black, veins light brown at base and dark brown at apex.

Head width 1.6 times interocular distance at anterior ocellus; mandible without a small preapical denticle on inner margin; apical lobe of

clypeus large, flat, 1.2 times as wide as antennal fossa, apex slightly emarginate, angles rounded; lower front contiguously punctate, median ridge absent; upper front with a narrow impunctate strip below anterior ocellus, punctures separated by half to the width of a puncture except several rows contiguously punctate along eye margin, no impunctate interspaces wider than an ocellus.

Pronotal disk with a strong anterior ridge behind which is a series of short perpendicular carinae, most discal punctures separated by half the width of a puncture, medially punctures more crowded, apical impunctate strip a third as wide as disk at midline and narrowing to the side; lateral pronotal surface with an oblique median groove, upper area finely, closely lineolate, lower area finely closely wrinkled; tegula opaque, 1.1 times as long as wide; mesopleural disk with most punctures separated by half the width of a puncture and with many interspersed smaller punctures; inner surface of hind tibia with a strong median ridge; marginal cell extending farther toward wing apex than second submarginal; propodeal areola tricarinate, the median carina extending four-fifths toward apex, vestiges of short carina present on either side of median carina, basal width 1.9 times apical width and 0.9 times length; area adjacent to areola minutely roughened and with a curved submarginal carina terminating in lateral ridge four-fifths from base; posterior propodeal surface with numerous close small punctures; lateral propodeal surface with oblique rugulae posteriorly and above, obliquely lineolate anteriorly below.

First abdominal segment 1.1 times as long as broad; preapical impression of first tergum shallow, 2 punctures wide across middle; posterolateral process of fifth sternum low, long, arcuate, mostly transversely oriented; sixth sternum with tuft of dense suberect hair.

FEMALE.—Unknown.

19. *Tiphia weismani*, new species

This species is known only from the unique female holotype from a low altitude in the Wet

Zone with moderate rainfall. It is distinguished from other females which lack a groove on the inner surface of the hind basitarsus by the normal sized tegula, lightly infumated wings, almost entirely red legs, and sinuous submarginal carina on the propodeal dorsum.

ETYMOLOGY.—I take pleasure in naming it for Donald M. Weisman, Systematic Entomology Laboratory, U.S. Department of Agriculture, who furnished many identifications of lepidopterous larval prey or hosts of sphecids, eumenid and bethylid wasps.

HOLOTYPE.—♀, Sri Lanka, Western Province, Colombo District, Mirigama Scout Camp, primary jungle, 8–9 Jul 1978, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, V. Kulasekare, L. Jayawickrema (USNM Type 100270).

FEMALE.—Length 7.0 mm. Black, the following light red: mandible except base and apex, antenna beneath, tegula, apex of pygidium, forefemur beneath, mid and hind femora, tibiae, foretarsi, and apices of mid and hind tarsal segments. Vestiture white, tinged with yellow on dorsum of thorax. Forewing infumated, stigma black, veins brown.

Head 1.8 times as wide as interocular distance at anterior ocellus; median lobe of clypeus with apical margin slightly emarginate, angles rounded, apical width 1.7 times width of antennal fossa; lower front without median ridge, most punctures separated by less than half the width of a puncture; upper front with some large impunctate areas, many punctures separated by at least the width of a puncture except along eye margin where they are contiguous.

Pronotal disk without anterior ridge, anteriorly the punctures separated by the width of a puncture, but adjacent to apical impunctate area are 2 rows of punctures separated by half the width of a puncture or less, impunctate apical strip half the width of disk medianly and about a fifth laterally; anterior escarpment of scutum present only across middle, not reaching notauli; a patch of subcontiguous to contiguous punctures behind escarpment, sparsely punctate laterally except adjacent to notauli; tegula transparent, 1.1 times as

long as broad; subalar patch as wide as tegula, densely micropunctate and with a few scattered larger punctures, anterior half of mesopleuron with scattered punctures mostly separated by at least the diameter of a puncture, posteriorly with close, small punctures; hind tibia 2.7 times as long as wide, without median ridge on inner surface, sensorium small, oval, not impressed; hind basitarsus without median groove on inner surface; propodeal areola tricarinate, median carina extending to apex, basal width 1.5 times apical width and 0.6 times length, lateral area with some small punctures adjacent to areola and glossy elsewhere, submarginal carina sinuous and terminating in lateral ridge four-fifths toward apex; posterior propodeal surface with weak median ridge on lower two-thirds, closely and finely punctate elsewhere; lateral propodeal surface with weak, rather scattered oblique rugulae on upper and posterior areas, glossy elsewhere.

Preapical row of punctures on first abdominal tergum slightly impressed, with 2 rows of close punctures except in middle where it is 1 puncture wide; pygidium on anterior half with small subcontiguous punctures and a small impunctate space in middle posteriorly, posterior half smooth and glossy.

MALE.—Unknown.

20. *Tiphia hirsuta* Smith

FIGURES 53, 56, 64

Tiphia hirsuta Smith, 1855:83 [♂; northern India; type in British Museum (Natural History)].—Cameron, 1892:115.—Bingham, 1897:63, 64.—Dalla Torre, 1897:137.—Hedicke, 1936:13.—Allen, 1969:393, 394 [type redescription and synonymy of *T. tarsata* and *T. clypealis*]; 1975:33, 34 [northern India, Nepal].

Tiphia tarsata Cameron, 1897:44 [♂; Missouri; type in Oxford University].—Hedicke, 1936:24.

Tiphia clypealis Cameron, 1897:47, 48 [♂ not ♀; Missouri; type in Oxford University].—Turner, 1908b:124 [incorrectly synonymizes *T. flavipennis* Bingham and *T. quinquecarinata* Cameron].—Allen and Jaynes, 1930:97.—Hedicke, 1936:7.

Tiphia brevipennis Cameron, 1900:17, 18 [♀; Barrackpore; syntypes in Oxford University and British Museum (Nat-

- ural History); preoccupied by *T. brevipennis* Lucas, 1846]. [New synonymy.] [Lectotype designated herein.]
- Tiphia petri* Turner, 1908b:128 [new name for *T. brevipennis* Cameron, preoccupied].—Hedicke, 1936:20. [New synonymy.]
- Tiphia crinita* Roberts, 1930:190 [new name for *T. brevipennis* Cameron, preoccupied]. [New synonymy.]
- Tiphia* (*Tiphia*) *hirsuta* Smith.—Allen, 1969:393, 394 [type redescription and synonymy of *T. tarsata* and *T. clypealis*]; 1975:33, 34 [redescription; northern India, Nepal].
- Tiphia* (*Tiphia*) *petri* Turner.—Allen, 1969:399, 400 [redescription and designation lectotype *T. brevipennis*]; 1975:71, 72 [description].

I have examined the unique male types of *T. hirsuta*, *T. tarsata*, and *T. clypealis* and can confirm Allen's synonymy of the latter two under *T. hirsuta*. The species is quite common in several localities in Sri Lanka and South India, but males show decreasing amounts of red in the latter areas suggesting that there is a north-south cline in the taxon. For example, the type of *T. hirsuta* has the following light red: mandible except apical third, apical two-thirds of clypeus, flagellum beneath, foretibia, and fore and mid tarsi; the tegula is entirely testaceous. Males from South India and Sri Lanka have the mandible and flagellum beneath darker red, the clypeus with a narrower reddened apical half or sometimes red only laterally, at most the foretibia and tarsus a darker red, but these segments sometimes brownish, and the tegula is brown on the inner anterior angle. The posterior marginal groove on the tegula is well developed in the type of *T. hirsuta*, weaker in the South Indian population and evanescent in Ceylonese specimens.

Allen (1975) described the sensorium of the hind tibia as almost threadlike, but this must be based on his Nepalese specimens, for the type of *T. hirsuta* has the sensorium quite broad toward the apex as in Ceylonese and South Indian males. Concerning the type of *T. hirsuta*, Allen (1969) noted that the propodeal areola was 1.3 times as wide at base as at apex and 2.75 times as long as apical width, and that the lower part of lateral surface of propodeum was aciculate. My examination of the type has the base of propodeal areola 1.5 times as wide as apex (range 1.5–1.8 in

Ceylonese specimens) and the length 2.1 times the apical width (range 1.8–2.1 in Ceylonese specimens). Also, the lower part of lateral surface of propodeum has closer, finer rugulae than the upper part; this feature varies in the Ceylonese population from having the same sculpture to a condition where the lower part is mostly shagreened.

The association of sexes is based on the fact that both sexes are the most hirsute of the Ceylonese and South Indian fauna and on the capture of both sexes flying together at several localities in Sri Lanka and South India.

The Ceylonese and South Indian females agree in all essential details with the entire syntype series of *T. brevipennis* Cameron not Lucas, described from Barrackpore, Bengal, India, and collected by Rothney. The syntype series consists of two females in Oxford University and three females in the British Museum (Natural History). One specimen in Oxford bears a label in Cameron's handwriting, "Tiphia/brevipennis/Cam. Type/Barrackpore." The other Oxford specimen bears only a small label with what appears to be "U" or "V"; another label added later by C. O'Toole states that the specimen was "in Rothney/Coll. under/Tiphia brevipennis/Cameron . . . /Almost certainly a/syntype because Rothney's/annotated reprint indicates/two specimens." The three specimens in the British Museum (Natural History) all bear labels in Cameron's handwriting. One label is "Tiphia/brevipennis/Cam. Type/Bengal," another is "Tiphia/brevipennis/Cam. Type," and the third is "Tiphia/brevipennis/Cam./Bengal." Allen (1969), unaware of the specimens in Oxford, treated the first specimen cited above as the lectotype, although he called it "holotype." The lectotype must be selected from material in the Rothney collection, and I am designating as lectotype the specimen bearing Cameron's label with "type" written upon it. The specimen is not in the best condition, for the abdomen was broken off during shipment, and the vestiture is largely denuded. It is, however, clearly identical with the other syntypes.

The female is distinguished from any of its congeners in the Indian subcontinent by a combination of the strongly yellowish wings, comparatively denser and longer vestiture on the abdomen, lack of a groove on inner surface of hind basitarsus, complete anterior ridge on pronotal disk, and the lateral surface of the propodeum completely and closely obliquely rugulose. The male also is readily distinguished by the combination of the dark legs, conspicuous tuft of dense suberect setae on the sides of the sixth abdominal sternum, the higher posterolateral process on fifth sternum overlying a pocket-like depression, the longer apical fringes on the terga, and comparatively denser appressed vestiture on the clypeus and lower front.

Tiphia hirsuta has a wide range, occurring from northern India and Nepal southward into Sri Lanka. In the latter country the species is most common in Dry Zone areas and at low altitudes, but there are a few records from the Hill Country to an altitude of 2100 ft and with moderately heavy rainfall.

FEMALE.—Length 9.6–12.5 mm. Black, the following medium red: mandible except base and apex, scape and flagellum beneath, posterior margin of pronotal disk and tegula posterolaterally. Vestiture white, longer than usual particularly at apices and sides of abdominal segments. Wings strongly yellowish, stigma amber, veins yellow.

Head 1.5–1.6 times as wide as interocular distance at anterior ocellus; clypeal lobe slightly convex, margin subtruncate, lateral angles broadly rounded, width twice the diameter of antennal fossa; lower front without median ridge, contiguously punctate; upper front with narrow smooth median vitta in front of anterior ocellus, occasionally with 2 impunctate interspaces as wide as an ocellus, most punctures separated by at most half the width of a puncture.

Pronotal disk with low anterior ridge, narrowly and contiguously punctate behind ridge and before smooth anterior area, elsewhere with most punctures separated by half the width of a puncture, the smooth posterior area half as wide as disk medianly and a fourth as wide laterally;

lateral pronotal surface with a weak median oblique groove, closely punctate anteriorly, upper half closely obliquely lineolate, lower half with close oblique rugulae; anterior escarpment of scutum complete to notauli, contiguously punctate in middle, laterally with punctures separated by half or more the width of a puncture; tegula transparent except inner anterior area, 1.3 times as long as broad; subalar patch of mesopleuron broader than tegula, densely micropunctate and with a few scattered larger punctures, anterior half of disk with punctures of several sizes mostly separated by half the width of a puncture, posterior half with dense small punctures; mid and hind tibiae moderately inflated, 2.4 times as long as broad; inner surface of hind tibia without a ridge, sensorium elongate, broadened toward apex, slightly impressed; hind basitarsus without median groove; propodeal areola tricarinate, median carina not reaching apex, basal width 1.5–1.8 times apical width and 0.5–0.6 times length, surface of areola finely roughened, adjacent area mostly finely aciculate and with a few scattered small punctures, submarginal carina lacking; posterior propodeal surface with numerous close oblique rugulae.

Preapical impression of first tergum weakly impressed, 2 punctures wide across middle and 3 or 4 laterally; basal half of pygidium contiguously punctate in longitudinal rows and with a narrow smooth median vitta at apex, posterior half smooth.

MALE.—Length 6.3–10.7 mm. Black, the following medium red: mandible except base and apex, occasionally apex of clypeal lobe, flagellum beneath, tegula except inner anterior area; posterior margin of pronotal disk and fore and mid tarsi entirely or in part testaceous. Vestiture white, denser and longer than usual especially on clypeus (Figure 64), lower front and abdomen (Figure 53). Wings slightly infumated, stigma dark, veins brown.

Head 1.6 times as wide as interocular distance at anterior ocellus; mandible without preapical denticle; clypeus very densely punctate with subdecumbent vestiture, median lobe flat, apex

slightly to more deeply emarginate, lateral angles rounded, width 1.5–1.7 times the diameter of antennal fossa; lower front with median ridge very weak or lacking, punctation small and contiguous, vestiture dense; upper front with larger contiguous punctures except for broad impunctate vitta in front of anterior ocellus.

Pronotal disk with anterior ridge, rugulae lacking behind it, punctures contiguous over a narrow strip behind ridge and in front of apical smooth area, punctures elsewhere subcontiguous to separated by about half the width of a puncture, impunctate area a third as wide as disk in middle and a sixth as wide laterally; tegula 1.2–1.3 times as long as wide, transparent except for inner anterior area; mesopleuron with subcontiguous large punctures and some interspersed smaller ones; hind tibia without a median ridge on inner surface; marginal cell extending farther toward wing apex than second submarginal; propodeal areola tricarinate, median carina rarely reaching apex, surface roughened, basal width 1.4–1.8 times apical width and 0.8–0.9 times length, a narrow strip of small punctures adjacent to areola, rest of area glossy and delicately lineolate anterolaterally, submarginal carina lacking; posterior propodeal surface with close small punctures, median ridge lacking; lateral propodeal surface closely obliquely rugulose, more delicately so below anteriorly.

First abdominal segment 1.2–1.3 times as long as broad; first tergum without anterior ridge, preapical impression weakly impressed, 2 or 3 punctures wide across middle and 3 or 4 at sides; posterolateral process (Figure 56) of fifth sternum high and only slightly arcuate, more or less longitudinal, overlying an invagination along inner edge; sixth sternum without a median tuft of dense suberect hair, the setae dense on either side of smooth median vitta.

SPECIMENS EXAMINED.—NORTHERN PROVINCE. *Mannar District*: 1♂, 0.5 mi NE Kokmotte bungalow, Wilpattu Natl. Park, 20 m, 6–7 Oct, Krombein et al. (USNM).

NORTH CENTRAL PROVINCE. *Anuradhapura District*: 2♂ Padaviya archeological site, 60 m, 11–14 Oct,

Krombein et al. (USNM); 9♀, 1♂, Hunuwilagama, near Wilpattu Natl. Park, 200 ft, in Malaise trap, Hevel et al. (USNM).

CENTRAL PROVINCE. *Kandy District*: 3♂, Kandy, Udawattakele Sanctuary, 2100 ft, 16–31 Aug, Karunaratne (USNM).

WESTERN PROVINCE. *Colombo District*: 6♀, 46♂, Colombo (includes Museum Gardens, 50 ft, and Colpetty), 11–12, 15, 17–23 Jan, 25 Feb, Mar, 3, 7, 8, 16 Apr, 18 Jun, 2, 3, 12, 14 Jul, 17, 26 Aug, 8 Oct, 26 Nov, Halstead, Henry, Karunaratne, Krombein et al., Perera (USNM, Colombo, Lawrence, San Francisco); 3♂, Ratmalana near airport, 15 Feb, 6 Jun, Krombein et al. (USNM).

21. *Tiphia pulawskii*, new species

FIGURE 55

This handsome montane species is one of the most distinctive species of *Tiphia* in the Ceylonese fauna. Both sexes have yellow wings (brighter in female than in male), light red antennae, tegulae, and legs, golden vestiture, normal, not elongate, tegulae and lack an anterior ridge on the first abdominal tergum. The female lacks a groove on the inner surface of the hind basitarsus, and the hind tibia is not ridged on the inner surface. In the male the marginal cell extends farther toward the wing apex than the second submarginal, and the ridge separating the dorsal and posterior propodeal surfaces is usually evanescent but is always weaker than normal.

The species occurs only in a limited area of the Central Highlands in Nuwara Eliya District at altitudes over 5000 ft.

ETYMOLOGY.—It is named for Wojciech J. Pulawski, California Academy of Sciences, San Francisco, collaborator on Ceylonese Larridae.

HOLOTYPE.—♀, Sri Lanka, Central Province, Nuwara Eliya District, Hakgala Sanctuary, 23–24 Apr 1981, K.V. Krombein, T. Wijesinha, L. Weeratunge (USNM Type 100271).

FEMALE.—Length 10.2 mm. Black, the following light red: mandible except tip, apical half of clypeus, antenna, posterior margin of pronotal

disk, tegula, legs except forecoxa, mid and hind coxae above, and apical half of pygidium. Vestiture golden. Wings bright yellow, stigma light red, veins yellow to amber.

Head 1.7 times as broad as interocular distance at anterior ocellus; mandible with preapical denticle on inner margin; clypeal lobe narrow, margin truncate, lateral angles rounded, 1.3 times as wide as antennal fossa; lower front not ridged along midline, contiguously to subcontiguously punctate; upper front with large areas impunctate, punctures very sparse except along eye margin where they are separated by about half the width of a puncture.

Pronotal disk not ridged anteriorly, most punctures separated by about half the width of a puncture except more crowded laterally, impunctate posterior area half as wide as disk medianly and about a third laterally; lateral surface of pronotum with median arcuate groove, smooth except for fine wrinkles below; anterior scutal escarpment present only in middle, not reaching notauli, middle of disk closely punctate, elsewhere sparsely so; tegula transparent, 1.1 times as long as broad; subalar patch of mesopleuron narrower than tegula, densely micropunctate and with a few scattered large punctures, anterior disk with scattered punctures of several sizes, mostly separated by several times the width of a puncture, posterior disk with close small punctures; posterior tibia not inflated, 3 times as long as wide, not ridged on inner surface, sensorium large, subcircular, not impressed; inner surface of hind basitarsus not grooved; propodeal areola tricarinate, median carina extending almost to apex, basal width 1.2 times apical width and 0.6 times length, area laterad of areola glossy and delicately roughened, submarginal carina lacking; posterior propodeal surface with a median ridge on apical half, with fine close punctures elsewhere; lateral propodeal surface with close oblique weak rugulae posteriorly and above, very delicately lineolate anteriorly below.

Preapical impression of first abdominal tergum shallow, punctures large and subcontiguous, 2 punctures wide on sides and 1 puncture wide

across middle; pygidium closely punctate on anterior half and with a moderately broad smooth vitta posteriorly in middle, apical half smooth and glossy.

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

MALE.—Length 7.7 mm. Coloration as in holotype. Wings paler yellow, stigma dark brown, veins on basal half yellow, light brown on apical half. Vestiture golden.

Head 1.7 times as wide as interocular distance at anterior ocellus; mandible with stout preapical denticle on inner margin; clypeal lobe flat, apex emarginate, lateral angles broadly rounded, 1.5 times as wide as antennal fossa; lower front with weak median ridge, contiguously punctate except more sparsely toward side; upper front with large impunctate areas, a narrow patch of punctures separated from each other by half the width of a puncture below anterior ocellus, eye margin with a strip 2 to 3 punctures in width.

Pronotal disk with a relatively weak anterior ridge and no rugulae behind it, disk with most punctures separated by half to about the width of a puncture except posterior impunctate strip which is half the width of disk in middle and about a sixth at the sides; lateral pronotal surface lacking median groove, smooth except for some fine close wrinkles below; tegula transparent, 1.2 times as long as broad; anterior half of mesopleuron with larger punctures separated by 1 or more times the diameter of a puncture and with some interspersed smaller ones, posterior half with scattered fine punctures; inner surface of hind tibia without median ridge, sensorium ovate, not impressed; marginal cell of forewing extending farther toward apex than second submarginal; propodeal areola tricarinate, carinae weak, median one extending to apex, basal width 1.1 times apical width and 0.6 times length, area adjacent to areola delicately shagreened and subopaque, submarginal carina lacking; ridge separating dorsal and posterior surfaces weaker than usual; posterior propodeal surface with very short median ridge at apex, surface finely roughened and with a few punctures; lateral propodeal surface

with close, oblique weak rugulae posteriorly and above, delicately shagreened below anteriorly.

First abdominal segment 1.4 times as long as broad, preapical impression shallow, 2 punctures wide across middle; posterolateral process (Figure 55) of fifth sternum low, very slightly arcuate, almost longitudinal; sixth sternum without a median tuft of dense suberect hair.

PARATYPES.—All CENTRAL PROVINCE, *Nuwara Eliya District*: 3♀, 1♂, Nuwara Eliya, G.M. Henry (Colombo), 1♀, 25 Apr 1923, 1♂, 28 Apr 1923, 2♀, 12 May 1938; 1♀, Galway Natural Reserve, Nuwara Eliya, 6200 ft, 10 Jun 1978, P.B. Karunaratne, V. Kulasekare, L. Jayawickrema (USNM); 1♂, Kanda-ela, 2 Jun 1975, S.L. Wood, J.L. Petty (USNM); 1♀, Hakgala, 3 Apr 1924, G.M. Henry (Colombo). 1♀, 56♂, same locality as holotype but with following data (USNM): 1♂, 6–7 Feb 1979, K.V. Krombein, T. Wijesinhe, S. Siriwardane, T. Gunawardane; 2♂, 1650–1800 m, 23–25 Feb 1977, K.V. Krombein, P.B. Karunaratne, P. Fernando, D.W. Balasooriya; 1♀, 53♂, 23–24 Apr 1981, 5♂ in Malaise trap, K.V. Krombein, T. Wijesinhe, L. Weeratunga. 1♀, Ohiya, 6500 ft, 28 Apr 1928, G.M. Henry (Colombo). Paratypes have been deposited in the National Museums of Sri Lanka (Colombo) and in the British Museum (Natural History).

Female paratypes are 10.0–11.8 mm long and differ in no essential details from the holotype. Male paratypes are 7.3–8.1 mm long and are quite similar to the allotype except that the clypeus may be black, the ridge between dorsal and posterior propodeal surfaces may be present but weak, and the preapical impression of first abdominal tergum may be only 1 puncture wide across the middle.

22. *Tiphia wittmeri*, new species

FIGURE 60

The female of *T. wittmeri* is distinguished by the lack of an anterior ridge on the first abdominal tergum, of a groove on inner surface of hind basitarsus, of a submarginal carina on the pro-

podal dorsum, and the dark legs and noninflated mid and hind tibiae. The male also lacks a ridge on the first tergum and a submarginal carina on the propodeal dorsum as well as lacking a median tuft of dense suberect hair on the sixth abdominal sternum and a ridge on the inner surface of hind tibia, the marginal cell extends farther toward wing apex than second submarginal, the tegula is testaceous and transparent on apical half, and short rugulae are lacking behind the anterior pronotal ridge. The sexes are associated on the basis of having been captured together, although not in copula, at several localities in the lowland rain forests at Kanneliya, Weddagala, and Gilimale, and also in the Dry Zone at Lahugala Sanctuary. The species appears to be quite common in lowland rain forests with high rainfall but occurs sparingly at several Dry Zone localities with lower rainfall. Several males were collected on foliage of kenda, *Macaranga digyna* (Wight) Mueller-Argovensis, presumably attracted by secretions from the extrafloral nectaries on the upper leaf surface near attachment of the leaf stem.

ETYMOLOGY.—The species is named for Walter Wittmer, Naturhistorisches Museum, Basel, Switzerland, collaborator on Ceylonese Cantharidae.

HOLOTYPE.—♀, Sri Lanka, Subaragamuwa Province, Ratnapura District, Gilimale, Induruwa Jungle, 5–7 Feb 1977, K.V. Krombein, P. Fernando, D.W. Balasooriya, V. Gunawardane (USNM Type 100272).

FEMALE.—Length 9.5 mm. Black, the following light red: mandible except base and apex, flagellum beneath, outer and posterior margins of tegula, and apices narrowly of tarsal segments. Vestiture white. Wings slightly infumated, stigma black, veins light brown.

Head 1.7 times as wide as interocular distance at anterior ocellus; clypeal lobe slightly convex, apex slightly emarginate, lateral angles rounded, width 1.7 times as wide as antennal fossa; lower front without median ridge, subcontiguously punctate; upper front with 2 impunctate interspaces hardly larger than an ocellus, most punctures separated by half the width of a puncture but closer along eye margin.

Pronotal disk with a weak anterior ridge, most punctures separated by half or more the width of a puncture except subcontiguous laterally, posterior impunctate area half as wide as disk medianly and about a fifth as wide laterally; anterior scutal escarpment present only in middle, not reaching notauli; tegula 1.3 times as long as broad, with a delicate incised submarginal groove posteriorly and on posterior half of lateral margin; subalar patch of mesopleuron as wide as tegula, densely and finely punctate and with a few scattered larger ones, anterior half of disk with most punctures separated by half the width of a puncture or less, posterior half with dense small punctures and interspersed larger ones anteriorly; hind tibia not inflated, 2.8 times as long as wide, median ridge lacking on inner surface, sensorium moderately long, broad at apex, not impressed; hind basitarsus without median groove on inner surface; propodeal areola tricarinate, median carina complete to apex, surface finely roughened, basal width 1.3 times apical width and 0.6 times length, adjacent area delicately shagreened anteriorly, glossy and with scattered punctures posteriorly, submarginal carina lacking; posterior propodeal surface with a well-developed ridge on apical two-thirds, elsewhere with dense fine punctures and a few interspersed larger ones; lateral propodeal surface with fine, close oblique rugulae above and posteriorly, glossy and with moderately scattered tiny punctures anteriorly below.

Preapical impression of first abdominal tergum shallow, mostly 2 punctures wide across middle and 3 at sides; pygidium on basal two-thirds contiguously punctate in longitudinal rows and with a smooth median vitta posteriorly, apical third glossy and smooth.

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

MALE.—Length 7.8 mm. Black, the following light red: mandible except base and apex, flagellum beneath, fore and mid tibiae beneath, and narrow apices of tarsal segments; tegula testaceous. Vestiture white, tinged with yellow on

apical abdominal segments. Wings very lightly infumated, stigma black, veins brown.

Head 1.5 times as wide as interocular distance at anterior ocellus; mandible with a weak preapical denticle (Figure 60); clypeal lobe flat, apex slightly emarginate, lateral angles rounded, apex 1.4 times as wide as antennal fossa; lower front with contiguous small punctures and no median ridge; upper front with 2 impunctate interspaces barely wider than an ocellus, elsewhere with punctures separated by half the width of a puncture or less especially along eye margin.

Pronotal disk with a strong anterior ridge but without adjacent short rugulae posteriorly, discal punctures mostly separated by half the width of a puncture, posterior smooth area about one-fourth as wide as disk in middle and about an eighth at sides; tegula transparent except anterolaterally, 1.3 times as long as wide, posterior half of side and apical margin with a delicate submarginal groove; anterior half of mesopleural disk with moderately large punctures separated by half or more the width of a puncture and with many interspersed small punctures, posterior half with close small punctures; hind tibia without a longitudinal ridge on inner surface, sensorium long, narrow, slightly impressed; marginal cell of forewing extending farther toward apex than second submarginal; propodeal areola tricarinate, median carina complete, basal width 1.3 times apical width and 0.9 times length, surface irregularly roughened, area next to areola mostly transversely lineolate, submarginal carina lacking; posterior propodeal surface with a short median ridge near apex, closely punctate elsewhere; lateral propodeal surface with slightly separated oblique rugulae posteriorly and above, glossy and with a few scattered punctures below anteriorly.

First abdominal segment 1.1 times as long as wide; preapical impression of first tergum shallow, 2 punctures wide across middle and 3 at sides; posterolateral process of fifth sternum moderately high, arcuate, mainly longitudinally oriented; sixth sternum without a median tuft of dense suberect hair.

PARATYPES.—EASTERN PROVINCE. *Amparai Dis-*

trict: 1♀, 1♂, Lahugala Sanctuary tank, in Malaise trap, 14–15 Jun 1976, K.V. Krombein, P.B. and S. Karunaratne (USNM). CENTRAL PROVINCE. *Kandy District*: 1♀, Kandy, Udawattakele Sanctuary, 1800 ft, 3–5 Jun 1976, K.V. Krombein, P.B. and S. Karunaratne, D.W. Balasooriya (USNM); 1♀, Hangarapitiya, 1200 ft, 29 Sep 1970, O.S. Flint, Jr., R.E. Faycik (USNM); 1♂, Peradeniya Botanic Garden, 13 Feb 1975, K.V. Krombein, P.B. and S. Karunaratne, P. Fernando (USNM). WESTERN PROVINCE. *Kalutara District*: 1♀, Morapitiya, near Agalawatta, 13–14 Oct 1976, G.F. Hevel, R.E. Dietz IV, S. Karunaratne, D.W. Balasooriya (USNM). SABARAGAMUWA PROVINCE. *Kegalla District*: 3♀, 1♂, Kitulgala, Bandarakele, 180–210 m (USNM) as follows: 2♀, 1♂, 15 Apr 1981, K.V. Krombein, L. Weeratunge, P. Leanage; 1♀, 25–26 Oct 1977, K.V. Krombein, T. Wijesinhe, M. Jayaweera, P.A. Panawatta. *Ratnapura District*: 4♀, 39♂, Sinharaja Jungle, 2–3 mi S of Weddagala, 490–530 m (USNM) as follows: 3♀, 32♂, 8–12 Feb 1977, 5♂ on foliage of *Macaranga digyna*, K.V. Krombein, P. Fernando, D.W. Balasooriya, V. Gunawardane; 2♂, 18–21 Jun 1976, K.V. Krombein, P.B. and S. Karunaratne; 1♀, 5♂, 22–23 Sep 1977, 2♂ on foliage of *Macaranga digyna*, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, M. Jayaweera; 3♂, 8–9 Sep 1979, 1♂ in Malaise trap, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, R. Subasinhe. 1♀, 4♂, Gilimale, Induruwa Jungle (USNM) as follows: 1♀, 7–8 Mar 1979, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, S. Siriwardane, L. Jayawickrema; 1♂, same label data as allotype; 1♂, 16–19 Apr 1981, K.V. Krombein, L. Weeratunge, P. Leanage; 2♂, 19–22 Jun 1976, K.V. Krombein, P.B. and S. Karunaratne. 1♀, Morningside, Rakwana, 4000 ft, 8 May 1929, G.M. Henry (Colombo). UVA PROVINCE. *Monaragala District*: 2♂, Angunakolapelessa, in Malaise trap, 17–19 Jun 1978, K.V. Krombein, T. Wijesinhe, V. Kulasekare, L. Jayawickrema (USNM). SOUTHERN PROVINCE. *Galle District*: 1♂, Kottawa Forest Reserve, Hiniduma, 11 Mar 1972, K.V. Krombein, P.B. Karunaratne (USNM). 4♀, 7♂, Kanneliya section, Sinharaja Jungle (USNM) as follows: 1♂, 11–16 Jan 1975,

K.V. Krombein, P.B. Karunaratne, P. Fernando, N.V.T.A. Weragoda; 1♂, 11–12 Mar 1972, K.V. Krombein, P.B. Karunaratne; 1♀, 13–16 Aug 1972, K.V. Krombein, P.B. Karunaratne; 3♀, 5♂, 2–5 Oct 1980, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, V. Gunawardane. MISCELLANEOUS. 1♂, Ceylon (London). Paratypes have been deposited in the National Museums of Sri Lanka (Colombo) and in the British Museum (Natural History).

Female paratypes are 6.5–9.2 mm long, the head is 1.5–1.7 times as wide as interocular distance at anterior ocellus, and the basal width of the propodeal areola is 1.3–1.4 times apical width and 0.6–0.7 times length. Male paratypes are 4.2–7.1 mm long, the head is 1.5–1.7 times as wide as interocular distance at anterior ocellus, and the basal width of the propodeal areola is 1.3–1.5 times apical width and 0.8–1.0 the length. Smaller specimens are comparatively more sparsely punctate than the larger.

23. *Tiphia wirthi*, new species

The female of *T. wirthi* is distinguished by a combination of the light red legs, normal tegula, lack of a groove on inner surface of hind basitarsus, noninflated hind tibia, lightly infumated wings, the anterior escarpment of scutum not extending to notauli, and the crenulate furrows margining the carinae of the propodeal areola. The male also has light-red legs and normal tegulae and is further distinguished by a combination of the weak preapical denticle on inner margin of mandible, bilobate clypeal lobe, the second submarginal cell extending almost as far toward wing apex as the marginal, and the comparatively well-developed, oblique arcuate process of the fifth abdominal sternum.

The species occurs in both the Dry Zone and Wet Zone but chiefly in areas of lower rainfall.

ETYMOLOGY.—It is named for Willis W. Wirth, Systematic Entomology Laboratory, U.S. Department of Agriculture, who has provided identifications for dipterous prey of some Ceylonese sphecoid wasps.

HOLOTYPE.—♀, Sri Lanka, Southern Province, Hambantota District, Yala, Palatupana, 8–10 Mar 1972, K.V. Krombein, P.B. Karunaratne (USNM Type 100273).

FEMALE.—Length 7.2 mm. Black, the following light red: mandible except base and apex, antenna beneath, tegula, legs except coxae, and apex of pygidium. Vestiture white. Wings lightly infumated, stigma dark brown, veins light brown.

Head 1.5 times as wide as interocular distance at anterior ocellus; clypeal lobe flat, apex slightly emarginate, lateral angles rounded, 1.4 times as wide as antennal fossa; lower half of front without median ridge, contiguously punctate on a narrow strip below and then with larger punctures separated by half the width of a puncture; upper front with several impunctate interspaces wider than an ocellus, most punctures below anterior ocellus and along eye margin separated by half the width of a puncture.

Pronotal disk with a weak but complete anterior ridge, most punctures separated by half or more the width of a puncture, apical impunctate area half as wide as disk along midline and a fourth as wide at sides; lateral pronotal surface delicately obliquely aciculate and with a weak oblique median furrow; scutum with anterior escarpment present only across middle, not reaching notauli; tegula transparent, 1.1 times as long as wide; subalar patch of mesopleuron densely micropunctate and with a few scattered large punctures, anterior half of disk with most punctures separated by half or more the width of a puncture, posterior half with numerous small punctures and a few interspersed larger ones; hind tibia not inflated, 3 times as long as wide, inner surface not ridged, sensorium subcircular, not impressed; hind basitarsus not grooved on inner surface; propodeal areola tricarinate, median carina extending to apex, all carinae margined by crenulate grooves, basal width 1.4 times apical width and half the length, area adjacent to areola delicately aciculate, submarginal carina lacking; posterior surface of propodeum with a median ridge on apical half, with small relatively close punctures elsewhere; lateral propodeal sur-

face with oblique, relatively close rugulae on posterior and upper areas, obliquely lineolate anteriorly below.

Preapical impression of first abdominal tergum shallow, contiguously punctate, 1 puncture wide across middle and 2 at sides; basal half of pygidium with small and large subcontiguous punctures and a smooth median vitta posteriorly, apical half glossy and smooth.

ALLOTYPE.—♂, Sri Lanka, Central Province, Kandy District, 5 mi NW Mahiyangana, in Malaise trap at Hasalaka Irrigation Bungalow, 30 Mar–9 Apr 1971, P. and P. Spangler (USNM).

MALE.—Length 6.5 mm. Black, the following red: mandible except base and apex, flagellum beneath, narrow posterior margin of pronotal disk, tegula, and legs except coxae. Vestiture white tinged with yellow on apical abdominal segments. Wings clear, stigma dark brown, veins light brown.

Head 1.6 times as wide as interocular distance at anterior ocellus; mandible with a small preapical denticle on inner margin; clypeal lobe with apex emarginate, angles broadly rounded, 1.5 times as wide as antennal fossa; upper front with 3 impunctate interspaces wider than an ocellus, most punctures separated by half or more the width of a puncture except 4 rows along eye margin subcontiguous.

Pronotal disk with a strong anterior ridge, behind which are short longitudinal rugulae, most discal punctures separated by half the width of a puncture, impunctate apical area a third as wide as disk in middle and an eighth at sides; lateral surface of pronotum with oblique median groove, lower half with oblique rugulae; tegula transparent, 1.2 times as long as wide; anterior half of mesopleuron with punctures of uniform size separated by half the width of a puncture, posterior half with extremely small punctures separated by slightly more than the width of a puncture; hind tibia without a median ridge on inner surface; second submarginal cell of forewing extending almost as far toward apex as marginal cell; propodeal areola tricarinate, median carina extending almost to apex, basal width 1.4 times apical

width and 0.8 times length, area adjacent to areola glossy except delicately aciculate anterolaterally, submarginal carina lacking; posterior propodeal surface with small close punctures, median ridge lacking; lateral propodeal surface with somewhat separated oblique rugulae above and posteriorly, delicately aciculate below anteriorly.

First abdominal segment 1.1 times as long as broad; preapical impression of first tergum shallow, 1 puncture wide; posterolateral process of fifth sternum moderately developed, oblique, arcuate; sixth sternum without a median tuft of dense suberect hair.

PARATYPES.—2♂, same label data as allotype (USNM). CENTRAL PROVINCE. *Kandy District*: 1♀, Thawalammenne, 18 Feb 1977, K.V. Krombein, P.B. Karunaratne, P. Fernando, D.W. Balasooriya (USNM). WESTERN PROVINCE. *Colombo District*: 1♀, Colombo, Museum Gardens, 50 ft, 21 Apr 1977, P.B. Karunaratne (USNM). 1♀, same label data as holotype (USNM). A pair of paratypes has been deposited in the National Museums of Sri Lanka (Colombo).

Female paratypes are 6.3 mm long and are very similar to the holotype except that the head is 1.6 times as wide as interocular distance at anterior ocellus, the basal width of propodeal areola is 0.6 times the length, and the preapical band of punctures on first abdominal tergum may be 2 punctures wide across middle. Male paratypes are 5.9–6.2 mm long and are quite like the allotype; the head width is 1.5–1.7 times the interocular distance at anterior ocellus, and the basal width of the propodeal areola ranges from 0.7 to 0.9 the length.

24. *Tiphia carvalhoi*, new species

This female is similar to that of *T. wirthi*, new species, in having light red legs and normal tegula, in lacking a groove on inner surface of hind basitarsus, and in having a noninflated hind tibia. It differs from *T. wirthi* in having the anterior escarpment of scutum complete and reaching the notauli, in lacking crenulate furrows adjacent to

carinae of propodeal areola, in having completely red antennae, and in having the wing membrane clear rather than lightly infumated. The male has a normal tegula, light red tibiae and tarsi except that hind basitarsi are occasionally infuscated, a tuft of dense short suberect hair on sixth abdominal sternum, and the second submarginal cell of forewing extending as far toward wing apex as the marginal cell.

Tiphia carvalhoi is known from only a few specimens from the Colombo area on the west coast and from the Trincomalee area on the east coast. The sex association is based on the capture of both sexes at Colpetty, although not on the same date.

ETYMOLOGY.—The species is named for Jose C.M. Carvalho, Museu Nacional, Rio de Janeiro, Brazil, collaborator on Ceylonese Miridae.

HOLOTYPE.—♂, Sri Lanka, Western Province, Colombo District, Gampaha Botanic Garden, 14 Jan 1977, K.V. Krombein, P. Fernando, D.W. Balasooriya, V. Gunawardane (USNM Type 100275).

MALE.—Length 5.7 mm. Black, the following light red: mandible except base and apex, flagellum beneath, posterior margin of pronotum, apices of femora, all tibiae and tarsi except hind tibia and tarsus infuscated in part; tegula testaceous. Vestiture white, that on apical abdominal segments tinged with red. Wings very slightly infuscated, stigma almost black, veins medium brown.

Head 1.6 times as wide as interocular distance at anterior ocellus; clypeal lobe flat, apex slightly emarginate, lateral angles broadly rounded, 1.5 times as wide as antennal fossa; lower front without median ridge, with contiguous, rather small punctures; upper front without impunctate interspaces as wide as an ocellus, a narrow impunctate vitta in front of fore ocellus, punctures adjacent to vitta and along eye margin separated by half the width of a puncture.

Pronotal disk with a strong anterior ridge, short rugulae behind it absent, discal punctures rather uniform in size, separated from each other by half to the diameter of a puncture, apical impunctate

strip a third as wide as disk in middle and a fifth at side; lateral pronotal surface with a strong, oblique, slightly arcuate median groove, upper area obliquely, closely lineolate, lower area with a few oblique rugulae; tegula transparent, 1.2 times as long as wide; mesopleuron with larger punctures of about same density as pronotal disk and with some interspersed smaller ones; second submarginal cell of forewing extending almost as far toward apex as marginal cell; hind tibia with a low weak ridge on inner surface; propodeal areola tricarinate, median carina complete, basal width 1.8 times apical width and subequal to length, area laterad of areola finely and closely aciculate, submarginal carina strong, curving around spiracular area and terminating in lateral ridge four-fifths distance to apex; posterior propodeal surface without a median ridge, with close small punctures; lateral propodeal surface with close oblique rugulae above and posteriorly, and close oblique lineolations anteriorly below.

First abdominal segment unusually broad, length 0.9 times width; first tergum with preapical impression very shallow, 2 punctures wide across middle, and 3 or 4 at sides; posterolateral process of fifth sternum moderately raised, oblique, arcuate; sixth sternum with dense tuft of suberect hair except along narrow median streak.

ALLOTYPE.—♀, Sri Lanka, Western Province, Colombo District, Colombo, Colpetty, 103 Galle Rd., 15 May 1968, T.F. Halstead (San Francisco).

FEMALE.—Length 6.3 mm. Black, the following light red: mandible except apex, apical half of clypeal lobe, antenna, posterior margin of pronotal disk, tegula, legs except coxae and infuscated hind tarsus, and apical half of pygidium. Vestiture white. Wings clear, stigma brown, veins testaceous.

Head 1.5 times as wide as interocular distance at fore ocellus; clypeal lobe narrow, margin subtruncate, angles broadly rounded, 1.2 times as wide as antenna fossa; lower front with median ridge lacking, punctures separated by about half the width of a puncture; upper front with several impunctate interspaces wider than an ocellus, area below fore ocellus with a row of punctures

separated by half the width of a puncture, and inner eye margin with 3 rows of contiguous punctures, remainder of area with very scattered punctures.

Pronotal disk with a complete but weak anterior ridge, most discal punctures separated by 2 or more times the diameter of a puncture except laterally where they are separated by half the width and a posterior contiguous row just before apical impunctate area which is half as wide as disk in middle and a fifth at sides; scutum with complete anterior escarpment reaching notauli, center of disk contiguously punctate, otherwise smooth except for a few scattered punctures adjacent to notauli; tegula transparent, 1.2 times as long as wide; subalar patch of mesopleuron narrower than tegula, dense minute punctures missing but area minutely roughened and with larger punctures separated by half their width; mesopleural disk on anterior half with moderate-sized punctures mostly separated by half to the width of a puncture, posterior half with small, moderately close punctures; hind tibia not inflated, almost 3 times as long as broad, inner surface without median ridge; hind basitarsus without a groove on inner surface; propodeal areola tricarinate, median carina complete, carinae not margined by crenulate grooves, basal width 1.4 times apical width and 0.6 times length, adjacent area finely aciculate and with a few small punctures anterolaterally, submarginal carina lacking; posterior propodeal surface with evanescent median ridge on apical two-thirds, finely and closely punctate; lateral propodeal surface with oblique rugulae on upper and posterior areas more separated than in *T. wirthi*, lower anterior area obliquely lineolate.

First abdominal tergum with preapical impression shallow, 2 punctures wide laterally, and 1 puncture across middle, disk before impression with rather numerous smaller punctures on median area; basal half of pygidium contiguously punctate and with a small median smooth area posteriorly, apical half smooth and glossy.

PARATYPES.—EASTERN PROVINCE. *Trincomalee District*: 2♂, Nilaveli, 18–19 Nov 1979, M. Kosz-

tarab, T. Wijesinhe, L. Jayawickrema (USNM). WESTERN PROVINCE. *Colombo District*: 1♂, same label data as holotype (USNM). 1♂, Ratmalana, 29 Sep 1976, S. Karunaratne (USNM); 1♂, Ratmalana, near airport, 50 ft, 6 Jun 1976, K.V. Krombein, P.B. and S. Karunaratne, D.W. Balasooriya (USNM). 2♂, same locality and collector as allotype but 4 Apr 1968 (San Francisco). A male paratype has been deposited in the National Museums of Sri Lanka (Colombo) and in the British Museum (Natural History).

Male paratypes are 4.5–6.0 mm long. They agree extremely well with the holotype in most details, but the basal width of the propodeal areola is 1.5–1.8 times the apical width and 0.9–1.0 times the length, and the femora may be more extensively to entirely light red.

25. *Tiphia consueta* Smith

FIGURES 3, 4, 41, 52, 61

Tiphia consueta Smith, 1879:184 [♀; Ceylon; type in British Museum (Natural History)].—Cameron, 1892:116.—Bingham, 1896:431 [listed]; 1897:61 [♀, ♂; Ceylon; synonymized ♂ *Methoca* [sic] *nigra* Bingham, 1896].—Dalla Torre, 1897:135 [listed].—Allen and Jaynes, 1930:101.—Hedicke, 1936:8 [listed].

?*Methoca* [sic] *nigra* Bingham, 1896:427, 428, pl. 15: fig. 4 [♂, Pundaloya, Ceylon and Tenasserim; type lost?; preoccupied in *Tiphia* by *T. nigra* Gmelin].—Hedicke, 1936:8 [listed as synonym of *T. consueta*].

Tiphia (Tiphia) consueta Smith.—Allen, 1969:408, 409 [♀; redescription of type]; 1975:87, 88 [redescription].

Tiphia consueta Smith occurs in both the Wet Zone and the Dry Zone from sea level to at least 2100 ft. The association of sexes is based on both having been taken together at several localities, including a pair in copula, and on the fact that both have a complete median carina on the posterior surface of the propodeum.

Bingham's syntype series of *M. nigra* consisted of two specimens from Pundaloya (correctly Pundaluoya) collected by Green and three specimens in his collection from various parts of Tenasserim. Undoubtedly it is a mixed series, for I am not aware that any Ceylonese species occurs in Tenasserim. There are no specimens of *Tiphia* from

Pundaluoya in the British Museum (Natural History), Zoologisches Museum (Berlin), or National Museums of Sri Lanka (Colombo), nor in the Ministry of Agriculture collection, Sri Lanka, where Green was employed. Bingham's identification label is now inexplicably on a male *Tiphia* from Aden in the British Museum (Natural History); this specimen cannot be part of Bingham's type series, for the tegulae are elongate, whereas Bingham's illustration is of a male with short tegulae. There are two unidentified *Tiphia* males from Tenasserim in the British Museum (Natural History) and the Zoologisches Museum (Berlin). Either or both may be syntypes of *M. nigra*, but designation of one as lectotype should await a revisionary study of the fauna of Tenasserim based on quantities of material as yet uncollected. I would prefer to designate one of the two Pundaluoya specimens as lectotype if either is ever found. Undoubtedly, it would be a senior synonym of one of my new species but would not take precedence inasmuch as *T. nigra* (Bingham) is preoccupied.

I believe it is unlikely that Bingham's male can be the opposite sex of *T. consueta*. The village of Pundaluoya is in a valley at about 3500 ft surrounded by hills of at least 4000 ft, and I have never collected *T. consueta* at more than 2100 ft. I collected at Pundaluoya for an hour in April 1981 but obtained no *Tiphia*.

Both sexes of *T. consueta* have a normal tegula, lack a transverse carina on the first abdominal tergum, have predominantly or entirely dark legs, and have a complete median ridge on the posterior propodeal surface. In addition, the female has a median groove on the inner surface of the hind basitarsus, and the legs are entirely dark except for the narrow apices of the tarsal segments. The male has a long marginal cell, lacks a preapical denticle on the inner surface of the mandible, has a median ridge on the inner surface of the hind tibia, and the preapical impression of the first abdominal tergum has subcontiguous punctures.

FEMALE (Figure 4).—Length 6.0–10.9 mm. Black, the following light to medium red: man-

dible except base and apex, frequently base of flagellum beneath and narrow apices of tarsal segments. Vestiture white. Forewing moderately infumated, stigma black, veins light to medium brown.

Head 1.6–1.7 times as wide as interocular distance at fore ocellus; clypeal lobe slightly convex, lateral angles broadly rounded, 1.6–2.0 times as wide as antennal fossa; front without median ridge below, coarsely punctate, and most punctures separated by half or less the width of a puncture, usually a narrow impunctate vitta on middle of front, no impunctate interspaces as wide as an ocellus.

Pronotal disk without an anterior ridge, center of disk about as coarsely and closely punctate as front, laterally the punctures less crowded and separated by at least half the width of a puncture, apical impunctate strip half as wide as disk at midline and a third as wide laterally; anterior escarpment of scutum present only in middle, not reaching notauli, center of disk contiguously punctate, laterally sparsely so; tegula (Figure 41) 1.2–1.3 times as long as broad, opaque; subalar patch of mesopleuron as wide as tegula, densely and minutely punctate and with a few scattered larger punctures; anterior half of mesopleuron with subcontiguous smaller punctures than on pronotal disk, posterior half with numerous small punctures; mid and hind tibiae not inflated, about 3 times as long as broad, inner surface of hind tibia with a strong median ridge ending in an impressed sensorium; hind basitarsus with a shallow median groove about half as long as segment; propodeal areola tricarinate (Figure 52), median carina complete, basal width 1.3–1.6 times apical width and 0.5–0.6 times length, surface irregularly roughened; area adjacent to areola with small scattered punctures on inner half, finely aciculate on outer half, submarginal carina lacking, posterior ridge margined anteriorly by very short close rugulae; posterior propodeal surface with a complete median ridge, elsewhere with moderately close fine punctures; lateral propodeal surface with close oblique rugulae poste-

riorly and above, delicately aciculate and usually with some fine punctures anteriorly below.

Preapical impression of first tergum shallow, usually 1 puncture wide across middle and 2 at sides; basal half of pygidium contiguously punctate in longitudinal rows, without a median impunctate space posteriorly, apical half irregularly wrinkled and delicately shagreened.

MALE (Figure 3).—Length 5.8–7.3 mm. Black, the following light to medium red: sometimes middle of mandible, usually entire flagellum beneath, foretibia beneath, and narrow apices of tarsal segments. Vestiture white to cinereous, tinged with reddish or infuscated on apical abdominal segments. Forewing very lightly infumated, stigma black, veins dark brown.

Head 1.6–1.7 times as wide as interocular distance at fore ocellus; mandible without a preapical denticle (Figure 61); clypeal lobe almost flat, apex emarginate, lateral angles narrowly rounded, 1.3–1.6 times as wide as antennal fossa; lower front contiguously punctate and lacking median ridge; upper front with most punctures separated from each other by half or less the width of a puncture, rarely with 1 or 2 impunctate interspaces as wide as an ocellus.

Pronotal disk with a strong anterior ridge usually margined posteriorly by a series of short weak rugulae, most punctures separated by half or less the diameter of a puncture, apical impunctate area about a third the width of disk medianly and very narrow laterally; lateral surface of pronotum with an arcuate median groove, otherwise obliquely aciculate except narrow area below with delicate ridges; tegula opaque, 1.1–1.2 times as long as wide; anterior half of mesopleural disk with many punctures separated by half their width or less, posterior half with smaller denser punctures; marginal cell of forewing extending farther toward apex than second submarginal; hind tibia with a median ridge on inner surface; propodeal areola tricarinate, median carina complete, basal width 1.4 times apical width and 0.8–0.9 times length, surface irregularly roughened, area laterad of areola finely aciculate, submarginal carina lacking; posterior propodeal sur-

face with a strong, complete median ridge, upper area mostly impunctate, lower area finely and closely punctate; lateral propodeal surface with oblique, more separated rugulae posteriorly and above, anteriorly below with oblique lineolations.

First abdominal segment 1.3–1.6 times as long as broad; preapical impression of first tergum shallow, 2 punctures wide across middle, 3 or 4 at sides, anterior half of disk with scattered small punctures; posterolateral process of fifth sternum low, arcuate, oblique; sixth sternum without a tuft of dense suberect hair.

SPECIMENS EXAMINED.—NORTH CENTRAL PROVINCE. *Anuradhapura District*: 1♀, 2♂, Ritigala Natural Reserve, 24–25 Feb, Krombein et al. (USNM).

EASTERN PROVINCE. *Amparai District*: 10♀, 19♂, Ekgal Aru Sanctuary Jungle, 100 m, 19–22 Feb, 9–11 Mar, Krombein et al. (USNM).

CENTRAL PROVINCE. *Matale District*: 1♀, Kibissa Jungle, 0.5 mi W Sigiriya, 1–3 Mar, Krombein et al. (USNM). *Kandy District*: 1♀, 1♂, 5 mi NW Mahiyangana, Hasalaka Irrigation Bung., 30 Mar–9 Apr, in Malaise trap, Spangler et al. (USNM); 1♀, Hasalaka, 107 m, 16–19 Feb, Krombein et al. (USNM); 1♀, Hantane Hill, 10 Dec, Piyadasa et al. (USNM); 23♀, 5♂, Kandy (includes Roseneath, Deiyannawela, Peak View Motel, 1800 ft, Udawattakele Sanctuary, 510–580 m, 600 m, 2100 ft), 12, 15–24 Jan, 1, 9–13, 25 Feb, 26–28 May, 5–15, 20–30 Jul, 16–31 Aug, 1–17, 23–25 Sep, 12–14 Oct, Davis et al., Henry, Karunaratne, Keiser, Krombein et al., Messersmith et al. (USNM, Colombo, Basel); 1♀, 3♂, Peradeniya (includes Botanical Garden), 24 Jan, 13, 28 Feb, Dec, Buttler-Reepen, Henry, Krombein et al., Piyadasa et al. (USNM, Colombo, Berlin); 1♂, Teldeniya, 19 Nov, Keiser (Basel); 1♂, Thawalammenne, 12–13 Mar, Krombein et al. (USNM).

NORTH WESTERN PROVINCE. *Kurunegala District*: 2♀, Kurunegala, Badagamuwa Jungle, 24–27 Jan, 16–19 Apr, Krombein et al. (USNM).

WESTERN PROVINCE. *Colombo District*: 4♀, 1♂, Lagoon Reservoir Jungle, 15 Jan, 23 Jun, 11, 15–18 Jul, 13–14 Oct, Henry, Krombein et al. (USNM, Colombo); 2♀, 3♂, Gampaha Botanical

Garden, 28 Jan, 24 May, 27 Sep, 8 Nov, Krombein et al., Messersmith et al. (USNM); 1♂, Godagama, 25 Oct, Robinson et al. (USNM); 2♂, Colombo, Museum Gardens, 50 ft, 6, 14 Jun, Krombein et al., Wijesinhe (USNM). *Kalutara District*: 1♀, Agalawatta, in Malaise trap, 23–25 Jul, Huang et al. (USNM).

SABARAGAMUWA PROVINCE. *Kegalla District*: 1♀, Kitulgala Jungle, 180–210 m, in Malaise trap, 25–26 Oct, Krombein et al. (USNM). *Ratnapura District*: 1♂, Kahawatta, 15 mi SE Ratnapura, 500 ft, swept from vegetation in rubber plantation, Brinck et al. (Lund); 1♂, Ratnapura, 21 Dec, Henry (Colombo); 2♂, Kiriwadeniya, 13 mi E Wewelwatta, 20 Jun, Krombein et al. (USNM); 3♀, 3♂, Gilimale, Induruwa Jungle, 26 Mar, 16–19 Apr, 10 Oct, 1♂ in Malaise trap, 1 pair in copula (32681A), Krombein et al. (USNM).

UVA PROVINCE. *Badulla District*: 1♀, Kalugalla, Namunakula, May (Colombo). *Monaragala District*: 1♀, Bibile, 18 Jul, Henry (Colombo).

SOUTHERN PROVINCE. *Galle District*: 1♀, Kottawa Forest, 23 Oct, Robinson et al. (USNM). *Matara District*: 2♀, near Deniyaya, 1000 ft, in Malaise trap, Hevel et al. (USNM).

MISCELLANEOUS. 1♀, Ceylon, Wickwar (Colombo); 2♀, Ceylon, Nietner, #6095 (Berlin).

26. *Tiphia vanlithi*, new species

The female of *T. vanlithi* is unique among the females of the five Ceylonese species having a grooved inner surface of the hind basitarsus in that the legs except coxae are light red, the forewing is yellowish, and the vestiture is reddish golden to yellowish. In the other species only the mid and hind femora may be red, the vestiture is white, and the wings are infumated. The male is distinguished by having the scape, pedicel, and legs except coxae light red, flagellum infuscated, mandible with a preapical denticle on inner surface, pronotal ridge with a series of short perpendicular carinae posteriorly, and normal tegula.

The species is known only from four specimens from two localities in the Wet Zone.

ETYMOLOGY.—It is named for the late J.P. van Lith, Rotterdam, Netherlands, collaborator on Ceylonese Psenitinae.

HOLOTYPE.—♀, Sri Lanka, Central Province, Kandy District, Kandy, Udawattakele Sanctuary, 12–14 Sep 1980, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, V. Gunawardane (USNM Type 100275).

FEMALE.—Length 8.0 mm. Black, the following light red: mandible except tip, median lobe of clypeus, antenna, posterior edge of pronotal disk, tegula, legs except coxae and apical half of pygidium. Vestiture reddish golden. Wings yellowish but not so strongly as in *T. pulawskii*, new species, stigma reddish, veins amber to light brown.

Head 1.8 times as wide as interocular distance at fore ocellus; lower front without median ridge, most punctures contiguous; upper front with scattered punctures except narrowly along eye margin where they are contiguous, with several impunctate areas wider than an ocellus.

Pronotal disk without anterior ridge, many punctures separated by half the width of a puncture except sparser toward side, apical impunctate area half as wide as disk at midline and a third as wide at side; lateral pronotal surface with a weak, oblique, slightly arcuate groove across middle, upper area delicately, obliquely aciculate, lower area with close oblique carinules; anterior scutal escarpment weak, present only across middle, not reaching notauli; tegula transparent, 1.2 times as long as broad; subalar patch of mesopleuron as wide as tegula, densely micropunctate and with a few scattered larger punctures; anterior half of mesopleuron with larger punctures, many separated by half the width of a puncture or more, posterior half with fine close punctures and a few scattered small punctures; hind tibia not inflated, about 3 times as long as broad, without median ridge on inner surface, sensorium not impressed; inner surface of hind basitarsus with a shallow median groove about a third as long as segment; propodeal areola tricarinate, median carina almost reaching apex, basal width 1.3 times apical width and half the length, area laterad of areola delicately aciculate, sub-

marginal carina lacking; posterior propodeal surface with weak median ridge on apical two-thirds, rest of area with fine close punctures; lateral propodeal surface with close oblique rugulae on posterior and upper areas, obliquely lineolate anteriorly below.

First abdominal tergum with subapical impression shallow, contiguously punctate, 1 puncture wide across middle, 2 at sides; anterior half of pygidium contiguously punctate except smooth median area posteriorly, apical half glossy and smooth.

ALLOTYPE.—♂, same locality and collectors as holotype but 1800 ft, in Malaise trap, 1–3 Sep 1980 (USNM).

MALE.—Length 5.7 mm. Black, the following light red: mandible except extreme tip and base, scape and pedicel, tegula except inner anterior area, and legs except coxae. Vestiture slightly yellowish, more intensely so at apex of abdomen. Wings clear, stigma black, veins dark brown.

Head width 1.6 times interocular distance at anterior ocellus; inner margin of mandible with small preapical denticle on inner surface; clypeal lobe twice as wide as antennal fossa, apex arcuately emarginate, lateral angles rounded; lower half of front contiguously punctured, median ridge lacking; upper front with several impunctate interspaces wider than an ocellus, a narrow line of close punctures below anterior ocellus, 2 rows of contiguous punctures along eye margin, other punctures rather scattered.

Pronotal disk with moderately strong anterior ridge behind which is a series of short perpendicular carinae, most discal punctures separated by once to twice the width of a puncture, apical impunctate strip about a third as wide as disk at midline and a sixth as wide laterally; lateral pronotal surface with a weak arcuate groove, upper area delicately shagreened, lower area obliquely wrinkled; tegula transparent except darker inner anterior area, delicately shagreened, 1.3 times as long as wide; discal mesopleural punctures mostly separated by once to twice the width of a puncture; hind tibia without a median ridge on inner surface; propodeal areola tricari-

nate, median carina reaching apex, surface finely roughened, basal width 1.4 times apical width and 1.1 times length, area adjacent to areola mostly shagreened, submarginal carina lacking; posterior propodeal surface without median ridge, lower area finely and closely punctate, upper area glossy and smooth; lateral propodeal surface obliquely rugulose posteriorly and anteriorly above, shagreened on lower anterior area.

First abdominal segment 1.3 times as long as wide; preapical impression of first tergum shallow, mostly 2 punctures wide; posterolateral impression of fifth sternum weak, oblique, arcuate; sixth sternum without a tuft of dense suberect hair.

PARATYPES.—1♀, same locality as holotype but 26–28 May 1975, D.H. Messersmith, G.L. Williams, P.B. Karunaratne (USNM). SOUTHERN PROVINCE. *Matara District*: 1♀, Enselwatte, 25 May 1975, S.L. Wood, J.L. Petty (USNM). One paratype has been deposited in the National Museums of Sri Lanka (Colombo).

The paratypes are 7.3 and 8.3 mm long, the tegula is 1.2–1.4 times as long as broad, the basal width of the propodeal areola is 1.2–1.3 times apical width and 0.5–0.6 times the length, and the clypeal lobe has an emarginate apex, broadly rounded lateral angles and is 1.3–1.4 times as wide as antennal fossa. The topotypic paratype is colored as in the holotype, but that from Enselwatte lacks red on clypeus and antenna above, and the vestiture is weakly yellowish.

27. *Tiphia hirashimai*, new species

FIGURES 43, 45, 47, 49, 59

Tiphia hirashimai is the largest known Ceylonese *Tiphia* (♀, 11.6–15.1 mm; ♂, 6.5–8.4 mm). The female is readily separated from those of all other Ceylonese species except *T. dayi*, new species, and *T. fennahi*, new species, by the bright-red mid and hind femora. In addition to being larger than those two species, *T. hirashimai* has a much more densely punctate front, and the clypeus has an evenly and broadly rounded apical margin. The

male is distinguished by the predominantly black legs, lack of a tuft of dense suberect hair on the sixth abdominal sternum, the marginal cell extending farther toward apex of forewing than the second submarginal, the opaque, shagreened tegula, the median ridge on inner surface of hind tibia, the preapical denticle of the mandible, and the relatively very broad first abdominal tergum with weak and finely punctate preapical impression.

The species is known from a number of specimens from localities in a circumscribed area of the central Hill Country of the Wet Zone and seems to be abundant only in Kandy.

ETYMOLOGY.—I take pleasure in naming it for my colleague Yoshihiro Hirashima, Kyushu University, Fukuoka, Japan, collaborator on Ceylonese Nomiinae and Ceratininae.

HOLOTYPE.—♀, Sri Lanka, Central Province, Kandy District, Kandy, Udawattakele Sanctuary, 2100 ft, 20–30 Jul 1976, S. Karunaratne (USNM Type 100276).

FEMALE.—Length 12.3 mm. Black, the following bright red: mandible except base and apex, and mid and hind femora; flagellum light reddish brown beneath. Vestiture white. Forewing infuscated, stigma black, veins medium brown.

Head 1.8 times as wide as interocular distance at fore ocellus; clypeal lobe not set off, entire clypeal margin broadly and evenly rounded (Figure 49); front without median ridge, coarsely punctate, most punctures contiguous or subcontiguous but some on upper front separated by the width of a puncture, no impunctate interspaces as wide as an ocellus.

Pronotal disk with a weak anterior ridge, punctures contiguous anterolaterally and in a row adjacent to impunctate apical section, elsewhere separated by half the diameter of a puncture, apical impunctate area two-thirds as wide as disk in middle and a third at sides; lateral pronotal surface with an oblique median groove, upper area closely obliquely aciculate, lower angle finely wrinkled; anterior escarpment of scutum present only on middle, not extending to notauli; tegula opaque, delicately shagreened, 1.2 times as long

as broad; subalar patch of mesopleuron as wide as tegula, closely micropunctate and with scattered larger punctures; anterior half of mesopleuron with most punctures separated by half the width of a puncture or less, posterior half with fine dense punctures; hind tibia not inflated (Figure 47), 3 times as long as broad, inner surface (Figure 45) with a median ridge ending in a slightly depressed sensorium; hind basitarsus (Figure 43) with a median groove half as long as segment; propodeal areola triearinate, median carina extending almost to apex, narrow strip adjacent to median carina irregularly roughened, basal width 1.3 times apical width and half the length, area adjacent to areola delicately shagreened, submarginal carina evanescent, present only on basal half; posterior propodeal surface with a weak median ridge on apical half, with dense fine punctures and a few scattered small ones; lateral propodeal surface with close oblique rugulae on posterior and upper areas, delicately aeculate anteriorly below.

Preapical impression of first abdominal tergum weak, with contiguous punctures that are 1 puncture wide across middle and 2 or 3 laterally; basal half of pygidium contiguously punctate in longitudinal rows and with a median impunctate area posteriorly, apical half with a few wrinkles at base, smooth at tip.

ALLOTYPE.—♂, same locality as holotype but 600 m, 12–14 Oct 1980, in Malaise trap, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, V. Gunawardane (USNM).

MALE.—Length 8.3 mm. Black, the following red: middle of mandible, foretibia and tarsus beneath, and narrow apices of mid tarsal segments; flagellum light brown beneath. Vestiture white, tinged with yellow on apical abdominal segments. Forewing very lightly infumated, stigma black, veins dark brown.

Head 1.7 times as wide as interocular distance at fore ocellus; mandible with a preapical denticle (Figure 59) on inner margin; elypeal lobe with emarginate apex and broadly rounded angles, 1.7 times as wide as antennal fossa; lower front contiguously punctate and without a median ridge;

upper front predominantly contiguously punctate but some punctures separated by half or more the width of a puncture and with 2 impunctate interspaces almost as wide as an ocellus.

Pronotal disk with strong anterior ridge but lacking short rugulae behind ridge, punctures small, mostly separated by the width of a puncture or more except laterally where they are separated by half the width of a puncture, posterior impunctate area a third as wide as disk in middle and a fifth as wide at sides; tegula opaque, shagreened, 1.3 times as long as wide; anterior half of mesopleuron with most punctures separated by half or more the width of a puncture and with scattered smaller punctures, posterior half more closely punctate with very small punctures along posterior margin; marginal cell extending farther toward forewing apex than second submarginal; inner surface of hind tibia with a strong median ridge; propodeal areola triearinate, median carina extending to apex, basal width 1.4 times apical width and equal to length, area adjacent to areola delicately aeculate and with a few scattered punctures, submarginal carina present on basal half; posterior propodeal surface with weak median ridge on basal half, and with moderately close small punctures except narrow area above impunctate; lateral propodeal surface with close oblique rugulae posteriorly and above, obliquely lineolate on lower anterior area.

First abdominal segment 1.3 times as long as broad; preapical impression of first tergum very shallow and broad, with a single row of small punctures separated from each other by the width of a puncture; posterolateral process of fifth sternum strong, slightly arcuate, oblique; sixth sternum without tuft of dense suberect hair.

PARATYPES.—CENTRAL PROVINCE. *Matale District*: 1♀, Mousakande, Gammaduwa, G.M. Henry, 11 Nov 1929 (Colombo). *Kandy District*: 1♀, Mandagaloya, 1900 ft, Peak Wilderness area, 29 Sep 1970, O.S. Flint, Jr., R.J. Fayeik (USNM); 1♀, Woodside, Urugalla, Sep 1922, G.M. Henry (Colombo); 21♀, 21♂, Kandy as follows: 2♀, 2♂, Udawattakele Sanctuary, 2100 ft, 5–15 Jul 1976, S. Karunaratne (USNM); 5♀, 2♂, same label data

as holotype (USNM); 3♀, 3♂, Udawattakele Sanct., 26–30 Jul 1978, 1♀ in yellow pan trap, 1♂ in Malaise trap, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, V. Kulassekare (USNM); 1♀, Udawattakele Sanct., 2–13 Aug 1976, S. Karunaratne (USNM); 1♀, Udawattakele Sanct., 16–31 Aug 1976, S. Karunaratne (USNM); 1♀, 24 Aug 1914, G.M. Henry (Colombo); 3♀, 3♂, Udawattakele Sanct., 1800 ft, 1–3 Sep 1980, 1♂ in Malaise trap, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, V. Gunawardane (USNM); 1♂, Lady Horton's, 7 Sep 1953, F. Keiser (Basel); 1♂, Udawattakele Sanct., 8–10 Sep 1977, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, M. Jayaweera (USNM); 2♀, 2♂, Udawattakele Sanct., 21–22 Sep 1980, 1♀ in pitfall trap, 1♂ in Malaise trap, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, V. Gunawardane (USNM); 2♂, Udawattakele Sanct., 23–25 Sep 1980, 1 in Malaise trap, K.V. Krombein, P.B. Karunaratne, L. Jayawickrema, V. Gunawardane, P. Leanage (USNM); 3♀, Sep 1910, O.S. Wickwar (Colombo); 4♂, same label data as allotype, 2 in Malaise trap (USNM); 1♂, Udawattakele Sanct., 14–16 Oct 1977, K.V. Krombein, P.B. Karunaratne, P. Fernando, T. Wijesinhe, M. Jayaweera (USNM); 1♂, Udawattakele Sanct., 2–5 Nov 1977, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, M. Jayaweera (USNM). MISCELLANEOUS. 2♀, Ceylon, Nietner, #6091 (Berlin). A pair of paratypes has been deposited in both the National Museums of Sri Lanka (Colombo) and British Museum (Natural History).

Female paratypes are 11.6–15.1 mm long and agree in most details with the holotype, except that lateral pronotal surface below groove may be obliquely rugulose, lower anterior area of lateral propodeal surface may have some dense, fine punctures, tegula may be 1.4 times as long as broad, head width may be 1.9 times as great as interocular distance at fore ocellus, and basal width of propodeal areola may be 1.5 times apical width. Male paratypes are 6.5–8.4 mm long and agree in most details with the allotype, but the head width may be 1.8 times the interocular

distance, the lower front may have a median ridge, the tegula may be only 1.1 times as long as broad, the basal width of the propodeal areola may be 1.6 times as great as apical width, and in large specimens the first abdominal segment may be only 1.1 times as long as broad, and the clypeal lobe only 1.5 times as wide as antennal fossa.

28. *Tiphia dayi*, new species

?*Tiphia rufofemorata* Smith.—Bingham, 1896:431 [♀; Pundaloya, Ceylon; misidentification].

Tiphia rufofemorata Smith does not occur in Sri Lanka. Considering the altitude and locality, it is probable that Bingham misidentified as *T. rufofemorata* a female of the species described here as *T. dayi*. It is the only female with red femora that is likely to occur at Pundaloya.

Tiphia dayi, *T. fennahi*, new species, and *T. hirashimai*, new species, are unique in the Ceylonese fauna in that the females have light-red mid and hind femora and a median groove on the inner surface of the hind basitarsus. The female of the latter species is considerably larger than the former two and is also easily distinguished by having the clypeal margin broadly and evenly rounded rather than having a relatively narrow median lobe extending beyond the rest of the margin.

Tiphia dayi occurs most commonly at higher altitudes and is rarely found below about 2000 ft elevation, whereas *T. fennahi* is more common at low altitudes and is not found higher than 2200 feet. Typical females of the two species are normally separated without difficulty because those of *T. dayi* are usually more sparsely punctate, having several impunctate areas on the upper front wider than an ocellus, many discal punctures on the mesopleuron separated by one to several times the diameter of a puncture, and the subapical band of punctures on the first abdominal tergum only one puncture wide across the middle. Females of *T. fennahi* are usually more densely punctate, the upper front with smaller and fewer impunctate interspaces, mesopleural

punctures separated at most by the width of a puncture, and the preapical band of punctures of first tergum two punctures wide across the middle; however, the frontal and mesopleural punctation is occasionally denser in *T. dayi*, particularly at lower altitudes such as Udawattakele Sanctuary, Kandy, and the two species must then be separated by the preapical punctation on first tergum.

The males of *T. dayi* and *T. fennahi* have the legs predominantly dark, the sixth abdominal sternum without a tuft of dense suberect hair, the marginal cell extending farther toward apex of forewing than the second submarginal, the tegula dark, opaque, and normal in size, the inner surface of the hind tibia usually without a longitudinal ridge or narrow smooth strip, and the mandible with a preapical denticle on the inner margin. Males of these species are readily separated from each other by the shape of the first abdominal segment, which is 1.3–1.4 times as long as broad in *T. dayi* and 1.1 times as long as broad in *T. fennahi*, by the erect vestiture of the body, which is black in the former species and silvery, cinereous or light brown in the latter, and by the usually relatively sparser punctation of *T. dayi*.

ETYMOLOGY.—The species is named for Michael C. Day, British Museum (Natural History), London, collaborator on Ceylonese Pompilinae.

HOLOTYPE.—♀, Sri Lanka, Central Province, Nuwara Eliya District, Hakgala Natural Reserve, 1650–1800 m, 23–25 Feb 1977, K.V. Krombein, P.B. Karunaratne, P. Fernando, D.W. Balasooriya (USNM Type 100277).

FEMALE.—Length 8.1 mm. Black, the following light red: mandible except tip, mid and hind femora, and narrow apices of tarsal segments. Vestiture white to cinereous. Wings lightly infumated, stigma black, veins brown.

Head 1.7 times as wide as interocular distance at fore ocellus; clypeal lobe with subtruncate apex, 1.3 times as wide as antennal fossa; front without median ridge, upper part with scattered punctures except for contiguous punctures along eye margin and with several impunctate interspaces wider than an ocellus.

Pronotal disk without an anterior ridge, punctures subcontiguous anteriorly, laterally, and in a row adjacent to broad posterior impunctate area, elsewhere punctures separated by 1 or more times the width of a puncture, posterior impunctate strip half as wide as disk in middle and a fourth as wide at sides; lateral pronotal surface with a weak oblique median furrow, delicately obliquely lineolate above and with fine oblique carinules below; scutum with anterior escarpment present only in middle; tegula opaque, shining, 1.3 times as long as wide; subalar patch of mesopleuron smaller than tegula, densely micro-punctate and with a few scattered larger punctures; mesopleural disk with most punctures separated by 1 to several times the width of a puncture, comparatively sparser below; hind tibia not inflated, 2.8 times as long as broad, inner surface without a median ridge, sensorium not impressed; hind basitarsus with a median groove on inner surface half as long as segment; propodeal areola tricarinate, median carina extending four-fifths of distance to apex, basal width 1.4 times apical width and half the length, surface smooth with a few small punctures; area laterad of areola smooth on posterior half, finely shagreened on anterior half, submarginal carina lacking; posterior propodeal surface finely and closely punctate and with a weak ridge on lower half; lateral propodeal surface with close oblique rugulae on posterior and upper areas, smooth anteriorly below.

Preapical impression of first abdominal tergum weak, 1 puncture wide across middle, several punctures wide at side; pygidium contiguously punctate on basal half and with a narrow median impunctate space posteriorly, apical half smooth.

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

MALE.—Length 6.3 mm. Black, foretibia beneath red. Erect vestiture on body black. Forewing moderately infumated, stigma black, veins brown.

Head 1.7 times as wide as interocular distance at anterior ocellus; mandible with preapical denticle on inner margin; clypeal lobe shallowly

emarginate at apex, bluntly rounded laterally, 1.3 times as wide as antennal fossa; lower front with very weak median ridge, subcontiguously punctate; upper front with 2 impunctate interspaces as wide as an ocellus, punctures separated by half or once the diameter of a puncture except a narrow strip along inner eye margin subcontiguously punctate.

Pronotal disk with strong anterior ridge but lacking rugulae behind ridge, most punctures separated by the width of a puncture or more, posterior impunctate area half as wide as disk in middle and very narrow at side; tegula opaque, delicately shagreened, 1.3 times as long as wide; mesopleural disk with most punctures separated by twice or more the width of a puncture; marginal cell extending farther toward wing apex than second submarginal; inner surface of hind tibia without a median ridge or smooth streak; propodeal areola tricarinate, median carina complete, surface finely roughened, basal width 1.6 times apical width and 1.1 times length; surface adjacent to areola mostly transversely, delicately carinulate, submarginal carina lacking; posterior propodeal surface with a weak median ridge on lower half, the upper half smooth, lower half transversely delicately carinulate; lateral propodeal surface with delicate oblique rugulae posteriorly and anteriorly above, shagreened anteriorly below.

First abdominal segment slender, 1.3 times as long as wide; preapical impression of first tergum broad, shallow, mostly 2 punctures wide; posterolateral process of fifth sternum low, oblique, arcuate; sixth sternum without dense tuft of suberect setae.

PARATYPES.—CENTRAL PROVINCE. *Matale District*: 2♀, 1♂, Mousakande, Gammaduwa, 5–9 Nov 1929, G.M. Henry (Colombo). *Kandy District*: 6♀, 4♂, Kandy as follows: 1♀, Udawattakele Sanctuary, 8–11 Feb 1979, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, S. Siriwardane, T. Gunawardane (USNM); 1♀, Udawattakele Sanct., 14–20 Apr 1975, S. and P.B. Karunaratne (USNM); 1♀, Udawattakele Sanct., 25–27 Apr 1981, K.V. Krombein, T. Wijesinhe, L. Weera-

tunge (USNM); 1♂, Udawattakele Sanct., 26–30 Jul 1978, K.V. Krombein, T. Wijesinhe, V. Kulasekare, L. Jayawickrema (USNM); 1♂, Udawattakele Sanct., 1–3 Sep 1980, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, V. Gunawardane (USNM); 1♂, Udawattakele Sanct., 1800 ft, 21–22 Sep 1980, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, V. Gunawardane (USNM); 1♀, Udawattakele Sanct., 1800 ft, 23–25 Sep 1980, K.V. Krombein, P.B. Karunaratne, L. Jayawickrema, V. Gunawardane, P. Leanage (USNM); 1♂, Roseneath, 29 Sep 1953, F. Keiser (Basel); 2♀, Udawattakele Sanct., 600 m, 12–14 Oct 1980, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, V. Gunawardane (USNM). 1♂, Thawalammenne, 12–13 Mar 1981, K.V. Krombein, T. Wijesinhe, L. Weeratunge (USNM). 1♀, Adams Peak Trail, 4.5 mi W Maskeliya, 1690–1770 m, 21 Oct 1977, K.V. Krombein (USNM). *Nuwara Eliya District*: 3♀, 4♂, Ohiya as follows: 1♂, 6500 ft, 23 Apr 1928, G.M. Henry (Colombo); 1♀, Apr 1928, G.M. Henry (Colombo); 1♀, 3♂, Apr 1929, G.M. Henry (Colombo); 1♀, 5500 ft, 1 Jun 1976, K.V. Krombein, S. Karunaratne, D.W. Balasooriya (USNM). 1♀, 1♂, Elk Plains, G.M. Henry (Colombo) as follows: 1♀, 4 May 1938; 1♂, 23 Aug 1929. 18♀, 37♂, Nuwara Eliya as follows: 1♀, stream below Lover's Leap, 2 Apr 1978, M.D. Hubbard, T. Wijesinhe (USNM); 3♀, 3♂, 27–29 May 1975, D.H. Messersmith, G.L. Williams, P.B. Karunaratne (USNM); 1♂, One Tree Hill, 1900 m, 1 Jun 1953, F. Keiser (Basel); 8♀, 25♂, Galway Natural Reserve, 6200 ft, 10 Jun 1978, P.B. Karunaratne, V. Kulasekare, L. Jayawickrema (USNM); 2♀, 1♂, 25–26 Jul 1924, G.M. Henry (Colombo); 3♀, 7♂, Galway Nat. Res., 1790–1990 m, 22–23 Oct 1977, K.V. Krombein, T. Wijesinhe, M. Jayaweera, P.A. Panawatte (USNM); 1♀, 28 Sep–1 Oct 1973, Galway Nat. Res., K.V. Krombein, P.B. Karunaratne, P. Fernando (USNM). 2♀, Kanda-ela Reservoir, 5.6 mi SW Nuwara Eliya, 6200 ft as follows: 1♀, 10–21 Feb 1970, D.R. Davis, W.L. Rowe (USNM); 1♀, 1–5 Oct 1970, O.S. Flint, Jr., R.J. Faycik (USNM). 1♀, Hakgala, Jan 1906

(Colombo); 2♀, 4♂, Hakgala, G.M. Henry (Colombo) as follows: 1♂, 22 Mar 1924; 1♂, 17 Aug 1929; 1♂, 19 Aug 1929; 1♀, 22 Aug 1929; 1♀, 24 Aug 1929; 1♂, 26 Aug 1929. 14♀, 105♂, Hakgala Natural Reserve (USNM) as follows: 3♀, 5♂, 6–7 Feb 1979, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, S. Siriwardane, T. Gunawardane; 10♀, 80♂, 1650–1800 m, 23–25 Feb 1977, 1 pair in copula, K.V. Krombein, P.B. Karunaratne, P. Fernando, D.W. Balasooriya; 1♀, 18♂, 23–24 Apr 1981, K.V. Krombein, T. Wijesinhe, L. Weeraratunge; 2♂, 6000 ft, 6–8 Oct 1976, G.F. Hevel, R.E. Dietz IV, S. Karunaratne, D.W. Balasooriya. WESTERN PROVINCE. *Colombo District*: 1♀, Udahamulla, Sep 1926, G.M. Henry (Colombo). SARBAGAMUWA PROVINCE. *Kegalla District*: 2♀, Kitulgala (USNM) as follows: 1♀, Makande Mukalana, 3–4 Feb 1979, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, S. Siriwardane, T. Gunawardane; 1♀, Bandarakele, 17–18 Mar 1979, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, T. Gunawardane. UVA PROVINCE. *Badulla District*: 1♀, Badulla, 3000 ft, 14 Apr 1922, G.M. Henry (Colombo). Omitted from the type series are 1♀, Ceylon, #6091, Nietner (Berlin) because the abdomen is lacking, 1♀, Kitulgala (USNM) because the head is lacking, and 1♀, Yatiyantota, Kegalla Dist. (Colombo) because it is very moldy. Paratypes have been placed in the National Museums of Sri Lanka (Colombo) and British Museum (Natural History).

Female paratypes are 6.9–10.6 mm long. The density of punctation is variable, the most densely punctate specimens having the upper front with only two impunctate interspaces as wide as an ocellus and most punctures on upper front separated by less than the width of a puncture, the pronotal disk similarly punctate, and the mesopleural disk with many punctures separated at most by half the diameter of a puncture; the punctation of the preapical impression of the first abdominal tergum, however, is quite constant. Male paratypes are 4.5–7.6 mm long. The following differences are noteworthy: vestiture may be brown in older specimens or those from lower elevations; mid tibia may be reddish beneath; the

punctation is sometimes relatively denser; the inner surface of hind tibia may have a smooth median streak or ridge; and the first abdominal segment is 1.3–1.4 times as long as broad.

29. *Tiphia fennahi*, new species

Both sexes of *T. fennahi* resemble rather closely those of *T. dayi*, new species, the preceding species. Females of the present species are usually more closely punctate than those of *T. dayi*. The few females of the latter species with denser punctation on the head and thorax can be distinguished from those of *T. fennahi* by having the preapical band of punctures on first abdominal tergum 1 puncture wide across the middle rather than 2. Males are more easily distinguished, because those of *T. fennahi* have silvery, cinereous, or light-brown erect vestiture rather than black, and the first abdominal segment 1.1 times as long as broad rather than 1.3–1.4 times as in *T. dayi*. Furthermore, *T. fennahi* is common at low altitudes ranging upward to 2200 ft, whereas *T. dayi* is found from 2000 to 6200 ft. *Tiphia fennahi* occurs in both the Dry Zone and the Wet Zone, whereas *T. dayi* is restricted to the Wet Zone.

ETYMOLOGY.—The species is named for R.G. Fennah, Commonwealth Institute of Entomology (retired), London, collaborator on Ceylonese Delphacidae.

HOLOTYPE.—♀, Sri Lanka, Eastern Province, Amparai District, Ekgal Aru Sanctuary Jungle, 100 m, 19–22 Feb 1977, K.V. Krombein, P.B. Karunaratne, P. Fernando, D.W. Balasooriya (USNM Type 100278).

FEMALE.—Length 7.5 mm. Black, the following light red: mandible except extreme base and tip, mid and hind trochanters and femora, and narrow apices of tarsal segments. Vestiture white. Wings lightly infumated, stigma black, veins brown.

Head 1.8 times as wide as interocular distance at fore ocellus; clypeal lobe with apex slightly emarginate, lateral angles rounded, width 1.5 times diameter of antennal fossa; lower front without median ridge, subcontiguously punctate;

upper front with 2 impunctate interspaces about as wide as an ocellus, 2 rows of subcontiguous punctures along eye margin, punctures elsewhere separated by half or the diameter of a puncture.

Pronotal disk without an anterior ridge, majority of punctures subcontiguous but somewhat more separated toward side, posterior impunctate strip half as wide as disk along midline and a fifth as wide laterally; lateral pronotal surface with a weak oblique median groove, area above obliquely lineolate, area below very delicately obliquely rugulose; median escarpment of scutum present only in middle, not reaching notauli; tegula opaque, shining, 1.3 times as long as wide; subalar patch of mesopleuron as large as tegula, densely micropunctate and with a few larger punctures; anterior half of mesopleural disk with most punctures separated at most by width of a puncture; hind tibia not inflated, 2.9 times as long as wide, inner surface without a median ridge, sensorium not impressed; hind basitarsus with a median groove on inner surface about half as long as segment; propodeal areola tricarinate, median carina extending four-fifths toward apex, basal width 1.4 times apical width and 0.6 times length, surface adjacent to areola finely shagreened, submarginal ridge lacking; posterior propodeal surface with a short median ridge below, surface with dense small punctures; lateral propodeal surface with close oblique rugulae on upper and posterior areas, delicately shagreened on lower anterior area.

Preapical impression of first abdominal tergum shallow, 2 punctures wide across middle; pygidium contiguously punctate on basal half and with a large smooth median space posteriorly, apical half glossy and smooth.

ALLOTYPE.—♂, same label data as holotype.

MALE.—Length 5.1 mm. Black, the following light red: mandible except base and apex, flagellum beneath, tibiae beneath and tarsi except hind basitarsus infuscated. Vestiture cinereous, light brown on dorsum of thorax and abdomen. Wings very lightly infumated, stigma black, veins brown.

Head width 1.6 times interocular distance at

anterior ocellus; inner margin of mandible with a small preapical denticle; clypeal lobe with emarginate apex, lateral angles rounded, 1.6 times as wide as antennal fossa; lower front without median ridge, subcontiguously punctate; upper front with several interspaces wider than an ocellus, inner eye margin with 3 or 4 rows of contiguous to subcontiguous punctures, punctures elsewhere separated by half to more than the width of a puncture.

Pronotal disk with a strong anterior ridge but lacking short rugulae behind ridge, most discal punctures separated by no more than the diameter of a puncture, posterior impunctate area a third as wide as disk at midline, diminishing toward side until evanescent; lateral pronotal surface with a weak arcuate median groove, upper area delicately shagreened, lower area obliquely lineolate; tegula opaque, delicately shagreened, 1.3 times as wide as long; anterior half of mesopleural disk with most punctures separated by no more than the width of a puncture, scattered smaller punctures absent; marginal cell extending farther toward wing apex than second submarginal; inner surface of hind tibia without a median ridge or smooth strip; propodeal areola tricarinate, median carina extending almost to apex, basal width 1.6 times apical width and 1.1 times length, area adjacent to areola smooth posteriorly, delicately transversely lineolate anteriorly, submarginal groove lacking; posterior propodeal surface without median ridge, glossy and with scattered small punctures; lateral propodeal surface obliquely rugulose above, obliquely lineolate below.

First abdominal segment 1.1 times as long as broad; preapical impression of first tergum broad, shallow, 3 to 4 punctures wide; posterolateral process of fifth sternum low, arcuate, mostly transversely oriented; sixth sternum without tuft of dense suberect hair.

PARATYPES.—NORTHERN PROVINCE. *Mannar District*: 1♀, Cashew Corp., Ma Villu, 17–21 Feb 1979, in Malaise trap, K.V. Krombein, T. Wijesinhe, S. Siriwardane, L. Jayawickrema (USNM). EASTERN PROVINCE. 2♀, 2♂, same label data as

holo- and allotype (USNM); 2♂, same locality but 9–11 Mar 1979, K.V. Krombein, T. Wijesinhe, S. Siriwardane, L. Jayawickrema (USNM). CENTRAL PROVINCE. *Matale District*: 2♂, Mousakande, Gammaduwa, 5–9 Nov 1929, G.M. Henry (Colombo); 1♀, Kibissa Jungle, 0.5 mi W Sigiriya, 1–3 Mar 1979, K.V. Krombein, T. Wijesinhe, S. Siriwardane, L. Jayawickrema, V. Gunawardane (USNM). *Kandy District*: 2♂, Thawalamtenne, 2200 ft, 1 in Malaise trap, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, V. Gunawardane (USNM). 6♀, 20♂, Kandy as follows: 1♂, Udawattakele Sanctuary, 1600 ft, 18–21 Jan 1977, K.V. Krombein, P. Fernando, D.W. Balasooriya, V. Gunawardane (USNM); 1♂, Udawattakele Sanct., 8–11 Feb 1979, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, S. Siriwardane, T. Gunawardane (USNM); 1♂, Feb 1910, O.S. Wickwar (Colombo); 1♀, Udawattakele Sanct., 25–27 Apr 1981, K.V. Krombein, T. Wijesinhe, L. Weeratunge (USNM); 2♀, Udawattakele Sanct., 2100 ft, 5–15 Jul 1976, S. Karunaratne (USNM); 1♀, Udawattakele Sanct., 26–30 Jul 1978, K.V. Krombein, T. Wijesinhe, V. Kulasekare, L. Jayawickrema (USNM); 3♂, Udawattakele Sanct., 1800 ft, 1–3 Sep 1980, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, V. Gunawardane (USNM); 4♂, Udawattakele Sanct., 1800 ft, 21–22 Sep 1980, 3 in Malaise trap, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, V. Gunawardane (USNM); 1♀, 2♂, Udawattakele Sanct., 1800 ft, 23–25 Sep 1980, K.V. Krombein, P.B. Karunaratne, L. Jayawickrema, V. Gunawardane, P. Leanage (USNM); 1♀, 7♂, Udawattakele Sanct., 600 m, 12–14 Oct 1980, 3♂ in Malaise trap, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, V. Gunawardane (USNM); 1♂, Hantana, 23 Dec 1953, F. Keiser (Basel). WESTERN PROVINCE. *Colombo District*: 1♂, Labugama Reservoir, 400 ft, 2–3 Oct 1976, G.F. Hevel, R.E. Dietz IV, P.B. and S. Karunaratne, D.W. Balasooriya (USNM). SABARAGAMUWA PROVINCE. *Ratnapura District*: 4♀, 2♂, Gilimale, Induruwa Jungle (USNM) as follows: 1♀, 1♂, 7–8 Mar 1979, K.V. Krombein, P.B. Karunaratne, T.

Wijesinhe, S. Siriwardane, L. Jayawickrema; 3♀, 13–15 Mar 1979, K.V. Krombein, T. Wijesinhe, S. Siriwardane, L. Jayawickrema; 1♂, 26 Mar 1981, K.V. Krombein, T. Wijesinhe, L. Weeratunge. UVA PROVINCE. *Badulla District*: 1♀, Oodooerre, Demodera, 24–31 Dec 1935, G.M. Henry (Colombo). *Monaragala District*: 1♂, Inginnyagala, 1 Aug 1954 (Colombo). Paratypes have been deposited in the National Museums of Sri Lanka (Colombo) and British Museum (Natural History).

Female paratypes are 6.5–8.4 mm, and males are 4.4–7.4 mm long. Among the females the frontal and mesopleural punctation is occasionally closer than in the holotype, the head width is 1.7–1.8 times interocular distance at anterior ocellus, the tegula is 1.2–1.3 times as long as broad, the propodeal areola is 1.4–1.5 times as wide at base as at apex, and the basal width is 0.5–0.6 times the length. Among the males the fore and mid femora may be light red in part and the fore and mid tibiae entirely so. The punctation may also be denser than in the allotype, the head width is 1.6–1.7 times interocular distance at anterior ocellus, the tegula is 1.2–1.3 times as long as broad, and the basal width of the propodeal areola is 1.3–1.6 times apical width and 1.0–1.2 times the length.

30. *Tiphia wahisi*, new species

This small species is known only from a short series of males taken in a Malaise trap near Wilpattu National Park in the Dry Zone and from a single male from a Malaise trap at Deniyaya in the Wet Zone. The characters which distinguish it are the normal tegula, second submarginal cell extending almost as far toward apex of forewing as the marginal cell, the lack of a tuft of dense erect setae on the sixth abdominal sternum, the mostly longitudinally oriented posterolateral process of the fifth sternum, and the light-reddish tarsi and antennal flagellum beneath.

ETYMOLOGY.—I am pleased to name the species for Raymond Wahis, Chaudfontaine, Belgium, collaborator on Ceylonese Pepsinae.

HOLOTYPE.—♂, Sri Lanka, North Central Province, Anuradhapura District, Hunuwilagama near Wilpattu, 200 ft, in Malaise trap, 28 Oct-3 Nov 1976, G.F. Hevel, R.E. Dietz IV, S. Karunaratne, D.W. Balasooriya (USNM Type 100279).

MALE.—Length 5.0 mm. Black, the following light red: mandible except base and apex, scape and flagellum beneath, fore and mid tibiae and tarsi; tegula testaceous, transparent. Vestiture short, relatively sparse on abdomen, white. Wings clear, stigma black, veins light brown.

Head width 1.6 times interocular distance at anterior ocellus; inner margin of mandible without a preapical denticle; clypeal lobe relatively narrow, 1.4 times as wide as antennal fossa, margin subtruncate, lateral angles rounded; lower front without median ridge, with close contiguous punctures; upper front with small punctures mostly separated by at least twice the width of a puncture except along inner eye margin where they are closer, and with several impunctate interspaces wider than an ocellus.

Pronotal disk with a moderate anterior transverse ridge with short weak rugulae behind ridge, discal punctures small and separated by 1 to 2 times the width of a puncture, apical impunctate area a third as wide as disk at midline and a sixth as wide laterally; lateral pronotal disk without a median groove, upper area obliquely striolate, lower half with a few oblique rugulae; tegula glossy, smooth, 1.2 times as long as wide; mesopleural disk with small punctures separated by 1 to 2 times the width of a puncture and with a few interspersed minute punctures; hind tibia without median ridge on inner surface; propodeal areola tricarinate, median carina complete to apex, basal width twice the apical width and three-fourths the length, surface of areola weakly irregularly rugulose, area laterad of areola smooth posteriorly, closely transversely lineolate anteriorly, submarginal ridge lacking; posterior propodeal surface with a weak median ridge on lower half, surface weakly roughened; lateral propodeal surface with mostly longitudinal rugulae poste-

riorly and above, finely and closely lineolate anteriorly below.

First abdominal segment 1.2 times as long as broad; preapical impression shallow, mostly 2 punctures wide; posterolateral process of fifth sternum relatively high, slightly arcuate, mainly longitudinally oriented; sixth sternum without tuft of dense suberect hair.

FEMALE.—Unknown.

PARATYPES.—7♂, same label data as holotype (USNM). SOUTHERN PROVINCE. *Matale District*: 1♂, Deniyaya, near 1000 ft, 19-20 Oct 1976, in Malaise trap, G.F. Hevel, R.E. Dietz IV, S. Karunaratne, D.W. Balasooriya (USNM). Paratypes have been placed in the National Museums of Sri Lanka (Colombo) and British Museum (Natural History).

The paratypes are 4.9-6.1 mm long and are otherwise very similar to the holotype.

31. *Tiphia sabroskyi*, new species

This species is known from a short series of males mostly from localities in the Dry Zone. It is very similar to the male of *T. wittmeri*, new species, a taxon which occurs mostly in the Wet Zone and quite sparingly in the Dry Zone. The male of *T. sabroskyi* may be distinguished by the normal tegula that is transparent except for inner anterior area, the second submarginal cell of the forewing not extending so far toward the apex as the marginal cell, absence of entirely red legs, lack of a tuft of dense erect hair on sixth abdominal sternum, presence of short rugulae behind anterior pronotal ridge, a sinuous submarginal ridge on dorsal propodeal surface, and the extremely sparse oblique rugulae on upper section of lateral propodeal surface.

ETYMOLOGY.—The species is named for Curtis W. Sabrosky, Systematic Entomology Laboratory, U.S. Department of Agriculture (retired), who has furnished identifications of some dipterous prey of Ceylonese solitary wasps.

HOLOTYPE.—♂, Sri Lanka, Central Province, Kandy District, Hasalaka, 107 m, 16-19 Feb

1977, K.V. Krombein, P.B. Karunaratne, P. Fernando, D.W. Balasooriya (USNM Type 100280).

MALE.—Length 6.9 mm. Black, the following light red: mandible in middle, flagellum beneath, apex narrowly of all femora, fore and mid tibiae and tarsi, narrow apices of hind tibia and tarsal segments; tegula testaceous and transparent except inner anterior area opaque and dark. Vestiture white except apex of abdomen slightly yellowish. Wings clear, stigma black, veins light brown.

Head width 1.6 times interocular distance at anterior ocellus; mandible without preapical denticle on inner margin; clypeal lobe relatively narrow, 1.3 times as wide as antennal fossa, margin subtruncate, lateral angles rounded; lower front with contiguous small punctures, median ridge lacking; upper front with a narrow impunctate strip below anterior ocellus, punctures separated by 1 to 2 times the width of a puncture except several rows of contiguous punctures along eye margin, no impunctate interspaces as wide as an ocellus.

Pronotal ridge moderately high, margined posteriorly by short perpendicular carinae, discal punctures separated by half to the width of a puncture, closer laterally, posterior smooth area about a third as wide as disk at midline and becoming narrower laterally; lateral pronotal surface without median groove, smooth above, with oblique wrinkles below; tegula glossy, smooth, 1.1 times as long as broad; mesopleural disk with small punctures separated by half to the width of a puncture and with some interspersed minute punctures; hind tibia with a median ridge on inner surface; propodeal areola tricarinate, median carina complete, enclosed area smooth, basal width 1.6 times apical width and subequal to length; area laterad of areola mostly smooth with a few discal punctures and a relatively strong sinuous submarginal carina; posterior propodeal surface with a short median carina below, closely punctulate on a narrow median strip, and narrowly irregularly roughened laterally, the intervening area smooth; lateral propodeal surface with oblique rugulae on posterior and upper areas

sparser than normal, moderately shagreened anteriorly below.

First abdominal segment 1.1 times as long as broad; preapical impression of first tergum shallow, with rather large punctures 1 puncture wide across middle and 2 punctures wide laterally; posterolateral process of fifth sternum low, arcuate, mostly transversely oriented; sixth sternum without tuft of dense suberect hair.

FEMALE.—UNKNOWN.

PARATYPES.—EASTERN PROVINCE. *Trincomalee District*: 1♂, China Bay, 0–100 ft, in Malaise trap, 27–31 Jan 1977, K.V. Krombein, P. Fernando, D.W. Balasooriya, V. Gunawardane (USNM). WESTERN PROVINCE. *Colombo District*: 1♂, Gampaha Botanic Garden, 14 Jan 1977, K.V. Krombein, P. Fernando, D.W. Balasooriya, V. Gunawardane (USNM). UVA PROVINCE. *Badulla District*: 2♂, Bandarawela, 7 Apr 1931, G.M. Henry (Colombo); 1♂, Diyatalawa, Jun 1904 (Colombo). SOUTHERN PROVINCE. *Hambantota District*: 1♂, Katagamuwa, 7–11 Feb 1936, G.M. Henry (Colombo). A paratype has been deposited in the National Museums of Sri Lanka (Colombo).

Paratypes are 5.2–6.6 mm long. They are quite similar to the holotype in most details, but the mid tibia is sometimes infuscated on outer surface, the mandible may have a weak preapical denticle, the smooth area below fore ocellus may be lacking, and the margin of the clypeal lobe may be slightly emarginate.

Subfamily MYZININAE

This group is represented in Sri Lanka by five species of *Mesa* Saussure and two species of *Hylomesa* Krombein. One new species of *Mesa* and one new species of *Hylomesa* are known only from Sri Lanka; a second new *Mesa* occurs also in South India. The remaining four species were all described earlier, the three species of *Mesa* occurring in India also, and the one species of *Hylomesa* occurring through India and Southeast Asia to the Philippines.

Mesa was proposed as a genus by Saussure; later authors treated it as a subgenus of *Plesia* or

Elis. Later Krombein (1937) re-elevated *Mesa* to generic rank. *Myzine dimidiata* Guérin, *M. petiolata* Smith, and *M. claripennis* Bingham are all transferred to the genus *Mesa* for the first time and are listed as new combinations therein.

Females of the four smaller species of *Mesa* (*karunaratnei*, new species, *flavipennis*, new species, *petiolata*, and *claripennis*) are similar in most details of coloration, vestiture and sculpture, as are the males of the same species. To conserve space I have described only *M. karunaratnei* in detail. Descriptions of the other three species are limited to

a listing of the characters in which each differs from *M. karunaratnei*.

Hosts of the Ceylonese *Mesa* are unknown but are presumed to be larvae of scarabaeid beetles in the soil, because the legs of the female *Mesa* are strongly modified for fossorial use. *Hylomesa longiceps* (Turner) has been bred in India from the larva of a cerambycid beetle dwelling in timber. Presumably the new *Hylomesa* parasitizes such larvae also, because all specimens were captured while flying around dead standing or fallen tree trunks.

Key to Ceylonese Species of Myzininae

1. Head red, rest of body black, without pale markings; anterior surface of mesopleuron concave; head of female quadrate as viewed from above, mandible with subapical tooth; male hind coxa carinate along inner margin above. *Hylomesa* Krombein 2
- Head entirely black in female, with some yellow or white markings in male; anterior surface of mesopleuron flat; head of female transverse as viewed from above [Figure 6], mandible without subapical tooth; male hind coxa not carinate above along inner margin. *Mesa* Saussure . . . 3
2. Pronotum and first abdominal tergum each with a strong transverse ridge anteriorly in both sexes; larger species, ♀, 15–25 mm long, ♂, 12–17 mm; front of female mostly contiguously to subcontiguously punctate, vertex with subcontiguous punctures immediately behind ocelli, mostly impunctate posteriorly; inferior margin of hind femur of female obtusely angulate toward apex; second to sixth abdominal sterna of male with scattered suberect discal setae; genitalia [Figure 39] 37. *Hylomesa longiceps* (Turner)
- Pronotum and first abdominal tergum not ridged anteriorly, except male with ridge on first tergum; smaller species, ♀, 13 mm long, ♂, 9.7–13 mm; upper half of front of female with widely separated punctures, vertex with very few scattered punctures behind ocelli; inferior margin of hind femur of female right-angled near apex; second to fifth abdominal sterna of male with scattered suberect discal setae, sixth with a patch of dense suberect longer hair on posterior two-thirds; genitalia [Figure 40] 38. *Hylomesa anomala*, new species
3. MALES 4
- FEMALES 8
4. Larger, 14–17 mm; apical two-thirds of forewing infumated, basal third clear; abdomen entirely black as is thorax except for testaceous posterior margin of pronotum; genitalia [Figure 10], inner surface of cuspis with a mixture of long, flattened setae and shorter capitate setae 32. *Mesa dimidiata* (Guérin)

- Smaller, 8–14 mm; wings clear; thorax and abdomen with pale yellow or whitish markings 5
5. Antenna shorter, flagellum somewhat clavate toward apex, terminal segments proportionately shorter and reddish beneath; forecoxa yellow entirely or in part; front and propodeal dorsum coarsely pitted; genitalia [Figure 11], inner surface of both cuspis and gonostyle with highly modified, flattened setae, gonostyle also with row of very stout thorns at edge of setose portion 35. *Mesa claripennis* (Bingham)
- Antenna longer, flagellum slender, terminal segments proportionately longer and not reddened beneath 6
6. Apical half of seventh tergum rounded, pygidial area lacking; forecoxa yellow beneath; front coarsely pitted; genitalia [Figure 14], inner surface of cuspis with comparatively sparse, very slightly flattened setae 33. *Mesa karunaratnei*, new species
- Apical half of seventh tergum with a pygidium consisting of a median ridge on either side of which is a narrow, grooved punctate area margined laterally by another ridge; inner surface of cuspis with comparatively denser setae 7
7. Forecoxa yellow; front and propodeal dorsum with separated punctures; genitalia [Figure 13], cuspis on apical third with very long, curled, inwardly directed setae, basal two-thirds with dense, slightly flattened setae 34. *Mesa flavipennis*, new species
- Forecoxa black; front and propodeal dorsum coarsely pitted; genitalia [Figure 12], cuspis on apical third without such setae, elsewhere with sparser, strongly flattened setae 36. *Mesa petiolata* (Smith)
8. Larger, 16–19 mm long; wings very dark; abdominal segments 2–4 red 32. *Mesa dimidiata* (Guérin)
- Smaller, not over 11 mm long; wings usually yellowish, infuscated only in *M. petiolata*; abdomen usually entirely black 9
9. Forewing infuscated on apical two-thirds, strongly yellow on basal third, veins light brown on apical two-thirds; punctures on pronotal disk elongate, tending to be confluent in longitudinal rows toward side; apex of clypeal lobe subtruncate, weakly tridentate; posterior surface of propodeum with coarser punctures 36. *Mesa petiolata* (Smith)
- Wings weakly to strongly yellowish, veins yellow or amber; pronotal punctures round, separated; posterior surface of propodeum with smaller punctures 10
10. Wings weakly yellowish, veins amber; clypeal lobe with apex broadly rounded; pronotal dorsum rather uniformly punctate, without a narrow, smooth strip along midline 35. *Mesa claripennis* (Bingham)
- Wings strongly yellow as are veins; clypeal lobe subtruncate, very weakly tridentate; pronotal dorsum more sparsely punctate toward midline and with a narrow smooth strip there 11
11. Scutum between parapsidal furrows virtually impunctate; scutellum with very scattered, fine punctures; abdominal terga uniformly dark; narrow

- apical margin of pygidium weakly or not at all shagreened
 33. *Mesa karunaratnei*, new species
 Scutum between parapsidal furrows with a few scattered punctures;
 scutellum with comparatively denser, somewhat larger punctures; api-
 ces of second to fifth abdominal terga usually narrowly reddish; narrow
 apical margin of pygidium more strongly shagreened
 34. *Mesa flavipennis*, new species

32. *Mesa dimidiata* (Guérin), new combination

Figure 10

Myzine dimidiata Guérin, 1837:584, 585 [♂; Bombay; type in Muséum National d'Histoire Naturelle (Paris)].—Bingham, 1897:68, 69.—Dalla Torre, 1897:123.—Maxwell-Lefroy, 1909:193 [records mating of *M. dimidiata* Guérin and *M. madraspatana* Smith].

Methoca [sic] *Orientalis* Smith, 1855:66 [♂; Northern India; type in British Museum (Natural History)].—Dalla Torre, 1897:3.

Myzine Madraspatana Smith, 1855:72 [♀; Madras; type in British Museum (Natural History)].—Bingham, 1897:65, 66.—Dalla Torre, 1897:124.

Myzine violaceipennis Cameron, 1897:21, 23 [♂; Poona, Bombay; type in Oxford University Museum].

Plesia (*Mesa*) *madraspatana* (Smith).—Turner, 1908a:507, 508 [synonymizes this and *M. violaceipennis* Cameron].

Plesia (*Mesa*) *dimidiata* (Guérin).—Turner, 1908a:508 [synonymizes this and *M. orientalis*].

Elis (*Mesa*) *dimidiata* (Guérin).—Turner, 1912:715 [synonymizes under this *M. orientalis* Smith, *M. madraspatana* Smith, and *M. violaceipennis* Cameron; all of India except northwest].

The synonymy noted above was established by Turner (1908a, 1912) and was confirmed by Maxwell-Lefroy (1909), who mentioned that Dutt had collected a pair in copula.

In addition to being the largest Ceylonese *Mesa*, it differs at once from other species in the female having the abdomen red on basal segments instead of being entirely black and in the male having most of the forewing dark, the abdomen black without yellow bands, and the pronotal disk margined anteriorly by a strong ridge. It is rather rare in Sri Lanka and appears to be restricted to Dry Zone areas below 2000 feet.

FEMALE.—Length 16–19 mm, forewing 12–13 mm. Black, apex of first abdominal segment and all of second through fourth segments red. Wings strongly infumated except base of hind wing.

Erect vestiture sparse and light red.

Apex of median lobe of clypeus evenly rounded, basal two-thirds with a low keel; front with coarse contiguous punctures and a shallow median groove on lower half; ocelli in a low triangle, posterior pair margined behind by a row of deep contiguous punctures; postocellar distance 0.67 times ocellocular distance and 0.56 times ocellocipital distance; vertexal punctures coarse but more separated than on front.

Pronotal disk with coarse punctures confluent in longitudinal rows, lateral surface with smaller separated punctures anteriorly and longitudinal rugulae posteriorly; center of scutum with a few scattered pits, laterally with closer, smaller punctures; scutellar disk with confluent pits; mesopleural disk with large contiguous pits; dorsal surface of propodeum with a narrow cuneate depression bearing close transverse rugulae, adjacent to this finely and closely punctate and smooth closer to sides; lateral surface with close oblique rugae; posterior surface with scattered moderately large punctures except laterally where they are contiguous.

Pygidium closely longitudinally striate except for narrow shagreened strip on apical eighth.

MALE.—Length 14–17 mm, forewing 8–11 mm. Black, the following cream: basal two-thirds of mandible, transverse bar on clypeal lobe, apex of antennal tubercles, base of tegula, and upper surface of foretibia and tarsus; posterior margin of pronotum testaceous. Apical two-thirds of forewing and apical third of hind wing strongly infumated. Erect vestiture whitish to cinereous, short on abdomen, longer on head and thorax.

Median lobe of clypeus gently emarginate at apex, lateral tooth small, rounded; front coarsely, contiguously punctate; ocelli in a low triangle,

posterior pair margined behind by a row of shallow punctures, postocellar distance subequal to ocellocular distance and 0.62 times ocelloccipital distance; vertex with small punctures separated by at least the diameter of a puncture.

Pronotal disk margined anteriorly by a transverse ridge, behind this with moderate, subcontiguous punctures, laterally with longitudinal rugae on lower half which extend upward on anterior part, remainder of surface with scattered small punctures; scutum mostly with scattered punctures a bit larger than on pronotal disk; scutellar disk with coarser contiguous to subcontiguous punctures; mesopleural disk with contiguous punctures of same size as scutellar disk; dorsal surface of propodeum with contiguous smaller punctures except for a smooth area on each side behind spiracle; lateral surface with a narrow area of contiguous punctures above, elsewhere with oblique rugae; posterior surface with contiguous smaller punctures than on dorsal surface.

Petiole of first abdominal segment stout, short, only a third as long as the enlarged posterior section; pygidial area of seventh tergum flat, ovoid, central ridge higher than lateral carinae, surface between these with a row of punctures, apex truncate; genitalia (Figure 10).

SPECIMENS EXAMINED.—NORTHERN PROVINCE. *Vavuniya District*: 1♀, Mankulam, Dec, Wickwar (Colombo); 1♀, Nedunkerni, Nov, Wickwar (Colombo); 1♂, Mamadu, Apr (Colombo). *Mannar District*: 1♂, 0.5 mi NE Kokmotte, Wilpattu Natl. Park, 15–16 Feb, in Malaise trap, Krombein et al. (USNM); 1♀, Kondachchi, Ma Villu, 11–12 Apr, Krombein et al. (USNM).

NORTH CENTRAL PROVINCE. *Anuradhapura District*: 1♀, 1♂, Horawupotana, 8 and 14 Oct, Henry (Colombo); 1♂, Pannika Wila, Wilpattu Natl. Park, in Malaise trap, 1 Nov, Krombein et al. (USNM); 1♂, Hunuwilagama near Wilpattu, 200 ft, in Malaise trap, 28 Oct–3 Nov, Hevel et al. (USNM). *Polonnaruwa District*: 1♂, Pimburettawa, 13 mi S of Mannampitiya, 1850 ft, 9–12 Nov, Flint (USNM); 1♀, Habarana, Oct (Colombo).

UVA PROVINCE. *Monaragala District*: 1♀, 1♂, Okkampitiya, 1–10 Dec, Karunaratne (Ottawa).

SOUTHERN PROVINCE. *Hambantota District*: 1♀, Suriyawewa Road, Sep (Colombo).

MISCELLANEOUS. 1♀, 1♂, no locality labels (Colombo).

33. *Mesa karunaratnei*, new species

FIGURE 14

The male of this species is unique among Ceylonese Myzininae in that the seventh tergum does not have a flattened pygidial area but has the dorsum slightly convex. The female has the forewing and veins strongly yellow as does *M. flavipennis*, new species. It is distinguished from that species by the sparse punctation of the front and virtually impunctate scutum.

The majority of the type series was captured in the garden of the Colombo Museum by P.B. Karunaratne, former curator in entomology, between 7:30 and 9:00 A.M. Females were crawling on the ground, and the males were flying low over the ground searching for females. Three males were collected while attempting to mate with newly emerged females on the ground. Two other males attempted to mate on the ground with a newly emerged female and male of *Tiphia hirsuta* Smith.

ETYMOLOGY.—I am pleased to name the species for P.B. Karunaratne, collector of most of the specimens and my companion during many collecting trips in his country.

HOLOTYPE.—♀, Sri Lanka, Western Province, Colombo District, Museum Gardens, Colombo, 50 ft, 2 Jul 1977, P.B. Karunaratne (USNM Type 100281).

FEMALE.—Length 10.5 mm, forewing 6.2 mm. Black, mandible except tip and tegula dark red. Forewing membrane and veins strongly yellow, hind wing clear with testaceous veins. Erect vestiture glittering white, slightly tinged with yellowish on head.

Apex of clypeal lobe subtruncate, very weakly tridentate, angled along midline at base, but not keeled; lower half of front with weak median groove and moderate-sized punctures separated

by distances varying from half to the full diameter of a puncture, upper half of front smooth except for a few subcontiguous punctures adjacent to eye; ocelli in a low triangle, ocellocular distance 0.9 times postocellar distance and 0.8 times ocelloccipital distance, hind ocelli not margined by a posterior groove or row of punctures; vertex with punctures separated by 1 or more times the diameter of a puncture.

Pronotal disk with punctures a bit larger than on front, median fourth with very scattered punctures, laterally the punctures separated by about half the diameter of a puncture; sides of pronotum mostly closely, obliquely rugulose, closely punctate only on a narrow strip adjacent to dorsum; scutum virtually impunctate, with only a very few scattered small punctures; scutellum with small punctures separated by twice or more the diameter of a puncture; mesopleural disk with punctures about same size as on pronotum, some subcontiguous but many separated by half the diameter of a puncture; dorsal surface of propodeum with a narrow shallow median groove which is slightly wider anteriorly than posteriorly, adjacent to this with fine close shallow punctures; lateral surface with close, slightly oblique rugulae; posterior surface with irregularly placed, somewhat larger punctures than dorsum.

Narrow apical margin of pygidium smooth, not shagreened.

ALLOTYPE.—♂, same label data as holotype (USNM). This male was attempting to mate with the holotype; both specimens bear code number 7277 D.

MALE.—Length 12.3 mm, forewing 7.2 mm. Black, abdomen with faint blue reflections, the following lemon yellow: palpi, mandible except apex, clypeus, frontal tubercles, band on posterior half (middle) to third (side) of dorsal surface of pronotum and anterior angle of lateral surface, tegula, apex of mesosternum, narrow bands at apices of first to sixth abdominal terga, anterior margins of second to sixth bi-emarginate, tiny posterolateral spots on second to fifth sterna, fore and mid coxae beneath, apical half of forefemur, apical third of mid femur, apical sixth of hind

femur, fore and mid tibiae externally, basal two-thirds of hind tibia, and all tarsi except apical segment. Wings clear, veins medium brown, stigma darker. Erect vestiture silvery, relatively dense but not long on head and thorax, shorter and sparser on abdominal dorsum; abdominal sternum with suberect short, relatively sparse setae.

Median lobe of clypeus gently emarginate at apex, lateral teeth small, rounded, and separated from each other by the diameter of first flagellar segment; front contiguously and finely pitted except for small smooth area in front of fore ocellus; ocelli in a low triangle, postocellar distance 1.1 times the ocellocular distance and 0.8 times the ocelloccipital distance, hind ocelli not margined by a punctate groove; vertex with punctures behind ocelli separated by about the diameter of a puncture and by about half the diameter of a puncture laterally; flagellum long and filiform, segments not noticeably widened toward apex.

Pronotal disk without anterior ridge, surface with small punctures which are contiguous anteriorly and separated by about half the diameter of a puncture on posterior half; lateral surface with subcontiguous small punctures and very short rugae posteriorly adjacent to smooth posterior margin; scutum and scutellar disk with small punctures separated by about half the diameter of a puncture; mesopleural disk with coarser, deeper, subcontiguous punctures except posteriorly where they are fine, close, and shallow; propodeum with small contiguous punctures.

Petiole of first abdominal segment half as long as nodose section of first tergum, the latter with small punctures mostly separated by about the diameter of a puncture; second to fifth terga with smaller punctures separated by 2 or more times the diameter of a puncture; sixth tergum with some interspersed larger punctures; seventh tergum with dorsum evenly convex, without ridges or grooves, apex narrowly emarginate; genitalia of paratype (Figure 14).

PARATYPES.—8♀, 7♂, same label data as holotype (USNM); 2♂, Colombo, 30 Sep 1924, at light, and 5 Oct 1938, G.M. Henry (Colombo);

1♂, Colombo, 6 Sep 1966, P.B. Karunaratne (Ottawa). NORTH WESTERN PROVINCE. *Puttalam District*: 2♂, Deduru Oya, 5 Mar 1958, R.L.A. Perera (Lawrence). MISCELLANEOUS. 1♂, Ceylon, Nietner (Berlin). Paratypes of both sexes have been deposited in the National Museums of Sri Lanka (Colombo) and British Museum (Natural History). Male paratypes are in the Zoologisches Museum (Berlin), University of Kansas, and Canadian National Collection.

Female paratypes are 10.0–10.6 mm long and differ very little from the holotype; some specimens have the narrow apical rim of the pygidium delicately shagreened. Male paratypes are 9.6–13.0 mm long and agree with the allotype in all important details. The yellow spots on abdominal sterna are smaller in a few specimens and entirely lacking in one male which also has narrow bands on the terga.

34. *Mesa flavipennis*, new species

FIGURE 13

The females of *M. flavipennis* and *M. karunaratnei*, new species, are unique among the Ceylonese species in having the forewing strongly yellowish and with yellow veins. The female of *M. flavipennis* differs from *M. karunaratnei* in being comparatively more densely punctate especially on upper front, scutum, and scutellum and in having the apices of the second to fourth or fifth abdominal terga narrowly reddened. The males of *M. flavipennis*, *M. karunaratnei*, and *M. petiolata* (Smith) have long, filiform antennal flagella; *M. flavipennis* is readily distinguished from the latter two species by having the front with separated punctures instead of being contiguously pitted.

The type series was captured in several Dry Zone localities at altitudes not over 500 ft and on both the east and west coasts. Several males have been collected also in South India.

ETYMOLOGY.—The specific name is from the Latin *flavus* (yellow) plus *penna* (feather), in allusion to the strongly yellowish forewings of the female.

HOLOTYPE.—♀, Sri Lanka, Southern Province, Hambantota District, Palatupana, 3–6 Feb 1975, K.V. Krombein, P.B. Karunaratne, P. Fernando, E.G. Dabrera (USNM Type 100282).

FEMALE.—Length 9.4 mm, forewing 5.5 mm. Black, mandible except apex, tegula, apices of tarsal segments and narrow apical bands on second to fifth abdominal segments dark red. Forewing membrane and veins strongly yellow, hind wing clear with testaceous veins. Erect vestiture glittering white.

Other details as noted for *M. karunaratnei* except as follows.

Frontal groove not well developed, its location marked by a row of subcontiguous punctures, upper half of front with punctures medially and laterally so that there are only 2 relatively small smooth areas; postocellar distance 0.8 times ocellular distance and 0.7 times ocelloccipital distance; vertex laterally with some punctures separated by half the diameter of a puncture.

Pronotal disk with only a narrow median impunctate strip; scutum more closely but very sparsely punctate; scutellum with many of punctures separated by not much more than the diameter of a puncture.

Narrow apical margin of pygidium strongly shagreened.

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

MALE.—Length 11.5 mm, forewing 6.2 mm. Coloration, vestiture, and other details as noted for *M. karunaratnei* except as follows.

Erect vestiture on abdominal dorsum denser.

Front with subcontiguous punctures; postocellar distance 0.9 times ocelloccipital distance; most punctures on vertex separated by half the diameter of a puncture.

Petiole of first abdominal segment 0.6 times as long as nodose posterior section of first tergum; second to fifth terga with smaller punctures mostly separated by about the diameter of a puncture; pygidial area of seventh tergum flattened, ovoid, central ridge higher than lateral carinae, surface between these with a row of

punctures, apex not emarginate; genitalia of paratype (Figure 13).

PARATYPES.—6♀, 8♂, same label data as holotype (USNM); 4♀, same label data as holotype but 10–12 Aug 1972, K.V. Krombein, P.B. Karunaratne (USNM); 1♀, same label data as holotype but 28 Sep 1977, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, M. Jayaweera (USNM); 4♂, Palatupana tank, 15 m, 29 Mar–2 Apr 1981, in Malaise trap, K.V. Krombein, T. Wijesinhe, L. Weeratunge (USNM); 1♀, Palatupana tank, 15–50 ft, 18–20 Jan 1979, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, S. Siriwardane, T. Gunawardane (USNM). UVA PROVINCE. *Monaragala District*: 1♂, Inginiyagala, 30 Aug 1953, F. Keiser (Basel). EASTERN PROVINCE. *Batticaloa District*: 5♂, Maduru Oya, Punani, 500 ft, 9–14 Jun 1969, P.B. Karunaratne (Ottawa). NORTHERN PROVINCE. *Mannar District*: 2♂, 0.5 mi NE of Kokmotte Bungalow, Wilpattu Natl. Park, 21–25 May 1976, K.V. Krombein, P.B. and S. Karunaratne, D.W. Balasooriya (USNM). SOUTH INDIA. *Kurumbagaram*: 3♂, Karikal Terr., Dec 1952, P.S. Nathan (Corvallis). *Tranquebar*: 2♂, Dec 1952, P.S. Nathan (Corvallis). Paratypes of both sexes have been deposited in the National Museums of Sri Lanka (Colombo) and British Museum (Natural History), and male paratypes are in the Canadian National Collection, the Natural History Museum in Basel, and the Oregon State University Collection, Corvallis.

Female paratypes are 7.8–10.4 mm long and are very similar in most details to the holotype except that three have only a narrow polished streak rather than a median groove on dorsum of propodeum, and four lack the narrow reddened apices on the abdominal segments. Male paratypes are 8.0–12.3 mm long and agree in all important details with the allotype. The pale markings on five specimens are ivory rather than yellow, and the smallest specimen from near Kokmotte Bungalow is more sparsely punctate, noticeably so on the head.

35. *Mesa claripennis* (Bingham), new combination

FIGURES 5, 6, 11

- Myzine claripennis* Bingham, 1897:68 [♀; Burma, Tenasserim; type in British Museum (Natural History)].—Nurse, 1902:82 [♀, differentiated from *M. hortata* Nurse in key].
Myzine hortata Nurse, 1902:81, fig. 6 [♀; Deesa; location of type unknown but probably unlabeled as type in British Museum (Natural History)].
Plesia (Mesa) hortata (Nurse).—Turner, 1908a:512 [♀; Deesa and Pusa, Bengal].
Elis (Mesa) claripennis (Bingham).—Turner, 1912:718 [♀, ♂; Burma, Ceylon, Bengal, Deesa; synonymizes this and *M. hortata* Nurse and describes ♂].

I have examined Bingham's type of *M. claripennis* and find that it agrees in all essential details with the Ceylonese population described below. The Nurse collection is in the British Museum (Natural History), but there is no specimen bearing a label "*M. hortata*." Nurse's description agrees with *M. claripennis*, and I accept Turner's synonymy of *M. hortata* under *M. claripennis*. M.C. Day believes that Nurse may have removed the label from his type when Turner made the synonymy in 1912 and that an unidentified specimen from Deesa, 9–01, may be the actual type. I have a female of *M. claripennis* in my collection from Deesa, 11–01, sent to me in exchange many years ago by R.E. Turner. Turner sent it and two males also from Deesa identified as *M. petiolata* (Smith), but both sexes agree with his (1912) key characters for *M. claripennis*. The two males belong to two species, and neither agrees in genitalia with either *M. claripennis* or *M. petiolata*. One male of *M. claripennis* in the National Museums of Sri Lanka (Colombo) was identified by Turner as *M. petiolata*, and another was identified by him as the probable male of *M. ceylonica*.

Mesa claripennis is almost as widely distributed in Sri Lanka as *M. petiolata*. Like that species it occurs from sea level to at least 2100 ft and in both Wet and Dry Zone areas, although it is much more abundant in the Dry Zone. It also is widely distributed in the rest of the Indian subcontinent (I have seen specimens from Coimbatore and Kodaikanal in South India as well as

from Deesa), and it has been recorded from Pusa in Bengal, Burma, and Tenasserim. Dates of collection in Colombo suggest that the species may breed throughout the year.

Mesa claripennis is unique among Ceylonese males in that the antennal flagellum is reddish beneath, relatively shorter, and with the segments toward apex becoming gradually broader so that the flagellum has a slightly clavate appearance. The female is the only species with the wings weakly yellowish and with the median lobe of the clypeal margin broadly rounded instead of being subtruncate and weakly tridentate.

FEMALE (Figure 6).—Length 8–10.5 mm, forewing 6.2–7.0 mm. Black, mandible except base and apex and tegula at apex reddish, apices of tarsal segments brownish. Forewing membrane slightly yellowish, hind wing clear, veins amber. Erect vestiture glittering white, slightly tinged with yellowish on head.

Other details as noted for *M. karunaratnei*, new species, except as follows.

Apex of clypeal lobe gently rounded; upper half of front with most punctures separated by once to twice the diameter of a puncture; postocellar distance 0.6 times ocellocular distance and 0.5 times ocelloccipital distance; hind ocelli margined behind by a row of punctures but not grooved; punctures on vertex separated by the diameter of a puncture or less.

Pronotal disk with punctures as small as on front, separated by about half or more the diameter of a puncture; side of pronotum on lower half obliquely striate or the striae evanescent; scutum with a few more scattered punctures.

MALE (Figure 5).—Length 7.5–12.0 mm, forewing 5.1–6.7 mm. Coloration, vestiture, and other details as in *M. karunaratnei* except as follows.

Color occasionally creamy; flagellum light red beneath except basal segment or two; clypeus with a pair of small, transverse subbasal spots, bands on abdominal terga narrower, spots on sterna sometimes lacking, forecoxa occasionally black at base or entirely black, mid and hind femur occasionally all black, and apical half of

hind tibia black. Suberect vestiture on abdomen relatively denser.

Median lobe of clypeus more shallowly emarginate, lateral angles broadly rounded not dentate; postocellar distance 0.6 times the ocellocular and postocellar distances; hind ocelli occasionally margined behind by a very shallow punctate groove; punctures on vertex separated by half the diameter of a puncture; flagellum shorter, segments on apical half becoming slightly wider toward apex so that flagellum appears somewhat clavate.

Lateral surface of pronotum with close, small punctures, rugae lacking except where punctures tend to be contiguous in short rows; propodeal dorsum closely pitted.

Petiole of first abdominal segment 0.6 times as long as nodose section of first tergum; most small punctures of second to fifth terga separated by about 1.5 times the diameter of a puncture; pygidial area of seventh tergum flattened, ovoid, median ridge higher and broader than lateral ridges, surface between them with a row of punctures, apex slightly emarginate; genitalia (Figure 11).

SPECIMENS EXAMINED.—NORTHERN PROVINCE. *Mannar district*: 7♀, 2♂, 0.5 mi NE Kokmotte bungalow, Wilpattu Natl. Pk., 4♀ in Malaise trap, 15–16 Feb, 21–25 May, Krombein et al. (USNM); 3♂, Ma Villu, Cashew Corp. bung. 17–21 Feb, Krombein et al. (USNM); 4♀, 4♂, Silavathurai, Kondachchi, 23–27 Jan, 4♀, 1♂ in Malaise trap, Karunaratne et al. (USNM); 1♀, Marichchukkadi, 26 Jan, Karunaratne et al. (USNM); 1♀, Olaitthoduvai, 10 mi NW Mannar, 0–50 ft, 4–5 Nov, Hevel et al. (USNM).

NORTH CENTRAL PROVINCE. *Anuradhapura District*: 1♀, Ritigala Natural Reserve, dry meadow, 8 mi NW Habarana, 8 Feb, Brinck et al. (Lund).

EASTERN PROVINCE. *Trincomalee District*: 4♂, Trincomalee, China Bay Ridge bung., 0–100 ft, 1 in Malaise trap, 13–17 May, 8–11 Oct, Krombein et al. (USNM); 1♂, Paraiyalankulam, 15 May, Krombein et al. (USNM). *Batticaloa District*: 2♂, Maduru Oya, Punani, 500 ft, 9–14 Jun, Karunaratne (Ottawa).

CENTRAL PROVINCE. *Matale District*: 1♀, Dam-bulla, 24 Oct, Krombein et al. (USNM). *Kandy District*: 3♀, 25♂, Kandy, Udawattakele Sanctuary, 2100 ft, 9–13 Feb, 16–31 Aug, 1–17 Sep, 1♂ in Malaise trap, Karunaratne, Krombein et al. (USNM); 2♂, Peradeniya, 1700 ft, 13 Oct, Flint et al. (USNM).

NORTH WESTERN PROVINCE. *Puttalam District*: 1♀, Kali Villu, Wilpattu Natl. Pk., 12–14 Jun, Messersmith et al. (USNM).

WESTERN PROVINCE. *Colombo District*: 16♀, 97♂, Colombo (includes Colpetty, Museum Garden), 4, 15, 28–31 Jan, 8–14, 20 Feb, 6 Mar, 11, 23, 24–28 Apr, May, 17 Jun, 7 Jul, 25 Aug, Sep, 4, 10–20, 29–30 Oct, 29 Nov, Gunawardane, Halstead, Henry, Karunaratne, Krombein et al., Perera, Siriwardane, Wickwar, Wijesinhe (USNM, Colombo, Lawrence, London, San Francisco); 2♂, Gampaha Botanic Garden, 14 Jan, 27 Sep, Krombein et al. (USNM); 1♀, Ratmalana, near airport, 50 ft, 6 Jun, Krombein et al. (USNM); 2♂, Kothuwala, 4 Oct, Karunaratne (Ottawa).

SABARAGAMUWA PROVINCE. *Ratnapura District*: 1♀, Uggalkaltota, Irrigation bung., 350 ft, 31 Jan–8 Feb, Davis et al. (USNM).

SOUTHERN PROVINCE. *Matara District*: 1♀, Weligama, Dec (Colombo). *Hambantota District*: 18♀, 11♂, Palatupana (includes tank and dunes near W.L.N.P.S. bung.), sea level to 50 ft, 18–21 Jan, 3–6 Feb, 8–10 Mar, 29 Mar–2 Apr, 22–25 Nov, 3♂ in Malaise trap, Flint et al., Krombein et al. (USNM).

MISCELLANEOUS. 6♂, Ceylon, Nietner (Berlin).

36. *Mesa petiolata* (Smith), new combination

FIGURE 12

Myzine petiolata Smith, 1855:72 [♂; India; two syntypes in Oxford University Museum].—Bingham, 1897:70 [Barrackpore, Bengal].—Dalla Torre, 1897:125.

Myzine ceylonica Cameron, 1900:18, 19 [♀; Trincomalee, Ceylon: type in British Museum (Natural History)].

Plesia (Mesa) petiolata (Smith).—Turner, 1908a:512 [synonymizes this and *M. ceylonica* based on pair taken in copula at Pusa, Bengal].

Plesia petiolata (Smith).—Turner, 1911:152 [♀, ♂; Colombo, Ceylon].

Elis (Mesa) petiolata (Smith).—Turner:1912:717, 718 [♀, ♂; Bengal, Bombay, Ceylon].

Smith's syntype series in Oxford University consists of two males, each bearing a hand-written label "Ind." The genitalia are identical with specimens from Sri Lanka and South India except that the dorsal edge of the cuspis is a bit more strongly curved. The punctuation of front and dorsum of propodeum, conformation of antenna, and coloration of forecoxa are similar except that one syntype has the apex of forecoxa with a tiny yellow spot. One syntype has a larger creamy area on forefemur than any other specimens; the other syntype has an apical band on the second tergum divided into three spots, and that on the sixth tergum is absent on the sides. I have selected as the lectotype the larger specimen (11 mm) with greater extent of creamy markings. Its genitalia were split to facilitate examination of the internal surface.

I have examined the type of *M. ceylonica* Cameron and, based on Ceylonese material, I agree with Turner's association of sexes in this species.

Both sexes of *M. petiolata* are easily distinguished from the other Ceylonese species of *Mesa*. The dark wings of the female separate it from all but the larger *M. dimidiata* (Guérin), which differs in having several of the abdominal segments red; also the punctures on dorsal surface of pronotum and posterior surface of propodeum are coarser and closer in *M. petiolata*. The males of *M. petiolata* and *M. dimidiata* are the only Ceylonese *Mesa* with black forecoxae; the larger size, infumated wings, and black abdomen readily separate the latter from the former species.

Mesa petiolata is widely distributed in Sri Lanka from sea level to at least 2100 ft and in both Dry and Wet Zone areas, although it is much more common in the Dry Zone. It occurs also in India. I have seen specimens from Karikal in Pondichery State, and Walayar Forests in Kerala State and Coimbatore, and it has been recorded from Pusa, Bombay, and Barrackpore. Dates of collection in Colombo suggest that the species may breed throughout the year.

FEMALE.—Length 7.8–10.2 mm, forewing 5.0–

6.5 mm. Black, mandible except apex and tegula dark red. Forewing strongly yellow and with yellow veins on basal third, apical two-thirds strongly infuscated and with brown veins, hind wing clear on basal half, slightly infumated on apical half. Erect vestiture glittering white, slightly tinged with yellow on head.

Other details as noted for *M. karunaratnei*, new species, except as follows.

Median third of upper half of front smooth, the third adjacent to eye subcontiguously punctate; postocellar distance 0.8 times the ocellocular distance and 0.6 times the ocellocipital distance; vertexal punctation denser, some punctures separated by half the diameter of a puncture, others more separated.

Pronotal disk with punctures somewhat larger and tending to be confluent in longitudinal rows, the central rows separated by about the diameter of a puncture, rows on sides by half the diameter of a puncture; scutum smooth anteriorly in middle, laterally and posteriorly with a few punctures separated by about the diameter of a puncture; scutellum with punctures in middle separated by the diameter of a puncture, laterally by half the diameter of a puncture; mesopleural disk with punctures separated by half the diameter of a puncture.

Narrow apical margin of pygidium shagreened.

MALE (Figure 12).—Length 10.0–14.0 mm, forewing 6.0–8.0 mm. Coloration, vestiture, and other details as noted for *M. karunaratnei* except as follows.

Pale markings creamy, base of clypeus black, lateral surface of pronotum not spotted, bands on abdominal terga narrower, that on first sometimes separated on midline, that on sixth occasionally separated into 3 spots, some spots on sterna occasionally lacking, coxae all black as is hind femur, fore and mid femora pale at extreme apex, and only basal third of hind tibia pale. Erect vestiture on abdominal dorsum denser.

Apical emargination of clypeal lobe a bit deeper, the teeth more prominent, separated from each other by 0.8 times the diameter of first flagellar segment; postocellar distance 0.8 times

both ocellocular and ocellocipital distances, hind ocelli margined behind by a shallow depression; punctures on vertex separated by half the diameter of a puncture.

Propodeal dorsum finely, irregularly and closely rugulose-reticulate, lateral and posterior surfaces more delicately so.

Petiole of first abdominal segment 0.4 times as long as nodose section of first tergum; second to fifth terga with small punctures separated by about the diameter of a puncture; pygidial area of seventh tergum flattened, ovoid, central ridge higher than lateral carinae, surface between these with a row of punctures, apex not emarginate; genitalia (Figure 12).

SPECIMENS EXAMINED.—NORTHERN PROVINCE. *Vavuniya District*: 3♂, Parayanalankulam, irrigation canal, 25 mi NW Medawachchiya, 100 ft, 20–25 Mar, Davis et al. (USNM). *Mannar District*: 4♂, 0.5 mi NE Kokmotte bung., Wilpattu Natl. Pk., 22–23 Jan, 21–25 May, 5–8 Oct, 1♂ in Malaise trap, Krombein et al. (USNM).

NORTH CENTRAL PROVINCE. *Anuradhapura District*: 1♂, Anuradhapura, 29–30 Apr, Perera (Lawrence); 1♀, Maradan Maduwa, Wilpattu Natl. Pk., 23 mi W Anuradhapura, 2 Feb, Brinck et al. (Lund); 1♂, Padaviya, Irrigation bung., 180 ft, 27 Feb–9 Mar, Davis et al. (USNM); 1♀, Kekirawa, 26 Jan, Henry (Colombo); 38♂, Hunuwilagama, near Wilpattu Natl. Pk., 200 ft, in Malaise trap, 28 Oct–3 Nov, Hevel et al. (USNM).

EASTERN PROVINCE. *Trincomalee District*: 1♂, Trincomalee, China Bay Ridge bung., 0–30 m, 8–11 Oct, Krombein et al. (USNM); 1♀, Kanniyai, 15 m, 10 Oct, Krombein et al. (USNM). *Batticaloa District*: 2♂, Maduru Oya, Punani, 500 ft, 9–14 Jun, Karunaratne (Ottawa); 1♂, Pullumalai, 11 Mar (Colombo).

CENTRAL PROVINCE. *Kandy District*: 2♂, Kandy (includes Peak View Motel, Udawattakele Sanctuary), 1800–2100 ft, 15–24 Jan, 16–31 Aug, Davis et al., Karunaratne (USNM).

NORTH WESTERN PROVINCE. *Kurunegala District*: 2♀, 1♂, Kurunegala (includes near Elephant Rock, Badegamuwa Jungle), 27 Jan, 20 Sep, Krombein et al. (USNM).

WESTERN PROVINCE. *Colombo District*: 4♀, 41♂, Colombo (includes Colpetty, Museum Garden), 30 Mar, 3 Apr, 15 May, 30 Jun, 2 and 3 Jul, 11 Aug, 10–20 Oct, 2, 6, 26 Nov, Halstead, Henry, Karunaratne, Perera (USNM, Colombo, Lawrence, London, San Francisco); 1♀, Gampaha Botanic Garden, 8 Nov, Krombein et al. (USNM); 1♀, 2♂, Ratmalana, near airport, 50 ft, 6 Jun, Krombein et al. (USNM); 2♀, 2♂, Labugama Reservoir, 11 Jul, Krombein et al. (USNM); 2♂, Kalatuwawa, in Malaise trap, 10–12 Aug, Huang et al. (USNM); 1♂, Laxapathiya, 15 mi S Colombo, 15–30 Jan, Perera (Lawrence).

SABARAGAMUWA PROVINCE. *Ratnapura District*: 6♀, 9♂, Gilimale, Induruwa Jungle, 8♂ in Malaise trap, 5–7 Feb, 7–8 Mar, 16–19 Apr, 19–22 Jun, Krombein et al. (USNM); 1♀, Panamure, 500 ft, 15–21 Oct, Flint et al. (USNM); 1♀, Uggalkal-tota, Irrigation bung., 350 ft, 31 Jan–8 Feb, Davis et al. (USNM); 1♂, Belihuloya Rest House, 9 Apr, in Malaise trap, Hubbard et al. (USNM).

UVA PROVINCE. *Monaragala District*: 1♂, Inginiyagala, 1 Nov, Keiser (Basel); 1♀, Mau Aru, 10 mi E Uda Walawe, 24–26 Sep, in Malaise trap, Krombein et al. (USNM); 1♀, 1♂, Angunakolapelessa, 27–28 Mar, 30 Sep–1 Oct, 1♀ in Malaise trap, Krombein et al. (USNM).

SOUTHERN PROVINCE. *Galle District*: 1♂, Hini-duma, 20–28 Feb, Perera (Lawrence). *Hambantota District*: 1♂, Ranna, 16 Jul, Henry (Colombo); 1♀, 3♂, Palatupana (includes tank and W.L.N.P.S. bung.), 3♂ in Malaise trap, 18–20 Jan, 3 Feb, Krombein et al. (USNM).

MISCELLANEOUS. 1♀, Ceylon, Nietner (Berlin).

37. *Hylomesa longiceps* (Turner)

FIGURE 39

Plesia tricolor (Smith).—Magretti, 1892:258, 259 [in part, misidentified ♂ from Burma].—Turner, 1908a:408 [misidentified ♀ from Assam].

Myzine tricolor (Smith).—Bingham 1897:66 [misidentified ♀ from Assam].

Elis (Mesa) tricolor (Smith).—Turner, 1912:720 [in part, misidentified ♀ from Assam and W India].

Elis (Mesa) tricolor longiceps Turner, 1918:87 [♀, Dibrughur,

Assam; type in British Museum].—Rohwer, 1921:90 [♀, ♂; Philippines].

Mesa tricolor longiceps (Turner).—Guiglia, 1965:315 [♀, Ceylon].—Baltazar, 1966:207 [Philippines].

Hylomesa longiceps (Turner).—Krombein, 1968:12–15, fig. 1, pl. 1: fig. 1 [♀, ♂; Ceylon, India, Assam, Burma, Malaysia, Philippines].

This handsome species is readily distinguished from its only Ceylonese congener, *H. anomala*, new species, by the characters listed in the foregoing key. All species of the genus are collected rather uncommonly, and I suspect that this is due to their being primarily arboreal creatures. Presumably they prefer to parasitize beetle prey in dead standing timber rather than in wood on the ground.

Hylomesa longiceps is noteworthy in that it is the most widely distributed species of the genus with records of capture in Sri Lanka, India, Assam, Burma, Malaysia, and the Philippines. Within Sri Lanka it occurs both in the Dry Zone forests and in areas of moderate rainfall.

It is also the only *Hylomesa* for which we have any information on host preferences. Turner (1912) stated that T.R. Bell “informed me that he bred this species from the larva of a longicorn beetle.” This statement is at variance with the label data on the only female *H. longiceps* bearing a Bell label: “in dead wood with longicorn larvae 14–1–07.”

FEMALE.—Length 15–23, forewing 10–16 mm. Black, head except apex of mandible and hypostomal area and occasionally the ocellar triangle, varying from light to dark red; scape, pedicel, and from 1 to 4 of basal flagellar segments also red; abdomen occasionally with metallic blue reflections; forewing entirely infumated or with basal area lighter in some specimens, the darkened area with violaceous reflections.

Head elongate, from above with length (apex of antennal insertions to occiput) subequal (0.94–1.0) to width across eyes; in larger specimens the sides of head are somewhat rounded out behind eyes so that eyes are not so protuberant as in smaller specimens; clypeal keel weak, present only on basal half or two-thirds, clypeal margin with

median teeth weak, slightly separated; median frontal sulcus extending halfway to anterior ocellus; front with punctures moderate in size and contiguous or almost so; vertex with more scattered punctures on anterior third and almost impunctate on posterior two-thirds; ocellular distance 2.17–2.43 times the postocellar distance and 0.42–0.44 times the ocelloccipital distance; anterior ocellus closer to apices of antennal tubercles than to occiput; head beneath with rounded posterolateral angles; distance between occipital and hypostomal carinae subequal to length of hypostomal area.

Anterior margin of pronotal disk strongly ridged, anterior half with coarse, confluent to subconfluent punctures arranged in longitudinal rows; scutum with subconfluent, coarse punctures except posteriorly somewhat more crowded; scutellum with punctures separated by half or more the diameter of a puncture but more crowded posteriorly; inferior margin of hind femur obtusely angulate near apex; apex of hind tibia on inner surface without heavy, flattened, short setae; punctures small on areas adjacent to cuneate space on propodeum, the disk posteriorly and laterally with larger, subconfluent pits; posterior surface of propodeum with mostly confluent or subconfluent pits.

Disk of first tergum strongly ridged anteriorly; last tergum shagreened on apical fourth.

MALE.—Length 12–17 mm, forewing 7–12 mm. Color as in female except that venter of head occasionally is all black and as many as 6 flagellar segments may be red.

Clypeal keel strong, present on basal two-thirds or three-fourths; median lobe of clypeus with a shallow emargination separating the 2 well-developed teeth; distance from apex of frontal platform to occiput 0.85–0.87 times the width across eyes; front with mostly contiguous to subcontiguous pits; vertex with smaller, more scattered punctures; ocellular distance 1.9–2.8 times the postocellar distance and 0.59–0.71 times the ocelloccipital distance; occipital carina weak or evanescent dorsally; median flagellar segments 1.4–1.5 times as long as wide.

Pronotal disk anteriorly with a strong ridge, behind that with weak to strong punctures, sometimes rather scattered, sometimes arranged almost contiguously in a few transverse rows; scutum and scutellum with coarse, shallow, contiguous to subcontiguous pits; mesopleural disk with very coarse, contiguous to scattered pits; metapleuron usually without ridges above but occasionally with a few weak ridges; propodeal dorsum irregularly rugulose, the narrow median channel with a few transverse rugae, the posterior margin strongly ridged; lateral surface with a few strong rugae anteriorly, the rest of surface with coarse contiguous pits or irregularly rugulose; posterior surface varying from contiguously pitted to irregularly rugulose.

First tergum with strong transverse ridge anteriorly, the disk with scattered large punctures; sterna 3–5 with short, erect, relatively dense vestiture, but not velvety on sterna 5 and 6; genitalia (Figure 39) with gonostyle and cuspis broad, inner surface of each densely setose, digitus also broad and densely setose.

SPECIMENS EXAMINED.—NORTHERN PROVINCE. *Vavuniya District*: 1♂, Mamadu, Apr (Colombo).

EASTERN PROVINCE. *Amparai District*: 1♀, Ekgal Aru Reservoir Jungle, 100 m, 11 Mar, Wijesinhe (USNM).

CENTRAL PROVINCE. *Kandy District*: 1♀, Kandy, 20 Nov, Keiser (Basel).

UVA PROVINCE. *Monaragala District*: 1♂, Inginiyagala, 31 Aug, Keiser (Basel).

MISCELLANEOUS. 1♀, 1♂, no label (Colombo); 1♂, Ceylon, Nietner (Berlin); 1♀, Ceylon (Budapest).

38. *Hylomesa anomala*, new species

FIGURE 40

This small species shares with *H. ugandensis* (Turner) the distinction of having the only females of the genus in which both the dorsum of the pronotum and of the first abdominal tergum lack a transverse anterior ridge. It differs from *H. ugandensis* in having the posterior fourth of the

sixth tergum shagreened rather than polished, in having the mesopleural disk strongly produced in middle, and in having the anterior half of dorsal surface of pronotum coarsely and contiguously punctate in longitudinal rows.

The male of *H. anomala* lacks an anterior ridge on the pronotum but has a well-developed transverse ridge at base of disk of first abdominal tergum. It shares with *H. dimidiaticornis* (Bingham) the distinction of being the only *Hylomesa* male with specialized dense vestiture on any of the abdominal sterna. This is present on the fifth and sixth sterna in *H. dimidiaticornis* but on only the sixth in *H. anomala*.

The three males were captured while flying around a standing dead trunk in a wooded ravine through which a small stream flowed. The single female was taken while flying around a fallen dead trunk in a similar area about a kilometer away.

HOLOTYPE.—♂, Sri Lanka, Kandy District, Thawalammenne, 8 Sep 1980, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, V. Gunawardane (USNM Type 100283).

MALE.—Length 9.7 mm, forewing 6.8 mm. Black, head except tip of mandible, ocellar triangle, hypostomal area, and last eight flagellar segments light red, abdomen with faint blue reflections; basal third of forewing clear, apical two-thirds infuscated and with blue reflections.

Clypeal keel strong, present on basal three-fifths, median lobe of clypeus with a narrow shallow emargination separating the 2 weak teeth; distance from apex of frontal platform to occiput 0.93 times the width across eyes; front with mostly contiguous to subcontiguous pits; vertex with quite scattered, smaller punctures; ocellular distance 1.5 times the postocellar distance and 0.8 times the ocelloccipital distance; occipital carina complete; median flagellar segments 1.3–1.4 times as long as wide.

Pronotal disk not ridged anteriorly, the anterior half with elongate pits arranged more or less in transverse rows, posterior half with scattered small punctures; scutum and scutellum with coarse, shallow contiguous to subcontiguous pits;

mesopleuron with coarse to larger subcontiguous pits; metapleuron with coarse, relatively close longitudinal ridges; propodeal dorsum with a narrow depressed median channel laterad of which are irregular pits, apex with strong transverse ridge; lateral surface anteriorly with ridges continuing from metapleuron, posteriorly with subcontiguous pits; posterior propodeal surface with smaller, closer pits.

First tergum with strong transverse ridge anteriorly, behind this the disk with scattered large to small punctures; sterna 3–5 with scattered small punctures which are more concentrated anteriorly and bearing short suberect hair; sternum 6 with a patch of dense longer suberect setae on posterior two-thirds extending almost to sides; genitalia (Figure 40) with gonostyle more slender, most of inner surface bare except for a row of close long setae near dorsal edge, cuspis narrower and densely setose on inner surface, digitus extremely slender and with very few setae on inner surface.

ALLOTYPE.—♀, same label data as holotype except 740–760 m, 16–18 Sep 1977, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, M. Jayaweera (USNM).

FEMALE.—Length 13 mm, forewing 9 mm. Black, head except apex of mandible, hypostomal area, and flagellum light red, abdomen with weak, metallic blue reflections; basal third of forewing lightly infuscated, apical two-thirds infuscated and with bronze to blue reflections.

Head elongate, width across eyes equal to length from antennal insertions to occiput, sides parallel behind eyes; clypeal keel weak, present only on basal two-thirds; clypeal margin with median teeth weak, slightly separated; median frontal sulcus extending halfway to anterior ocellus; lower half of front with punctures somewhat more separated than in *H. longiceps*, upper half of front with widely separated punctures; vertex with very few scattered punctures behind ocelli, virtually impunctate elsewhere; ocellular distance 2.2 times postocellar distance and 0.58 times ocelloccipital distance; anterior ocellus slightly closer to antennal tubercles than to occi-

put; head beneath with rounded posterolateral angles; distance between occipital and hypostomal carinae subequal to length of hypostoma.

Anterior margin of pronotal disk not ridged, anterior two-thirds with coarse, confluent punctures arranged in longitudinal rows, the rows becoming more separated at sides, posterior third with scattered small punctures; scutum with coarse punctures, separated anteriorly by about the diameter of a puncture and contiguous posteriorly; scutellum with more separated punctures; mesopleural disk produced anteriorly in middle beyond concave anterior face of sclerite, discal punctures separated by about half the diameter of a puncture but more crowded posteriorly; inferior surface of hind femur sharply right-angled near apex; apex of hind tibia on inner surface without heavy, flattened short setae; small close punctures on dorsal surface of propodeum adjacent to median cuneate space, larger and more scattered elsewhere and contiguous along hind margin; posterior surface of propodeum with confluent to subconfluent pits.

Disk of first tergum not ridged anteriorly; last tergum shagreened on apical fourth.

PARATYPES.—2♂, same label data as holotype (USNM). One paratype has been placed in the National Museums of Sri Lanka (Colombo).

The paratypes are 11.2 and 13.0 mm long and agree in all essential details with the holotype.

Subfamily METHOCHINAE

This peculiar subfamily with highly modified, wingless, antlike females and slender, winged males is represented in Sri Lanka by *Karlissa* Krombein with a single species, typical *Methocha* Latreille with three species, and *Methocha* subgenus *Dryinopsis* Brues with four species. Most species are known at present only from Sri Lanka, but *M. (M.) litoralis*, new species, occurs also on the east coast of South India.

So far as known all species of *Methocha* parasitize the larvae of cicindelid beetles dwelling in perpendicular burrows in the ground. Adlerz (1903, 1905) was the first to observe that the

female *Methocha* approaches the entrance to the tiger beetle burrow, allows the beetle larva to clasp its mandibles around the constricted part of her thorax, and then paralyzes the larva by stinging it in the neck. Subsequently, the larva is dragged to the bottom of the burrow, and the wasp deposits an egg on the venter of the abdomen. The wasp then plugs the cell and fills the top part of the burrow with soil.

The host of *Karlissa* is unknown, but almost certainly it is the larva of one of the arboreal cicindelids which dwell in cavities in twigs and branches. The single known female of *Karlissa* was crawling on the trunk of a tree nearly a meter above the ground; an adult flightless cicindelid, *Tricondyla coriacea* Chevrolat, was captured elsewhere on the same tree. Shelford (1905, 1907) described the larva and its burrow of *Neocollyris emarginata* (Dejean), another arboreal cicindelid from Java. He surmised that the adult female *Neocollyris* oviposited through the woody outer tissue of the coffee twig into the central pith. When the egg hatched, the young larva excavated a burrow in the pith with an opening to the outside through the woody tissue. The mouth of the burrow was countersunk, and Shelford opined that the lower surface of the *Neocollyris* head completely plugged the burrow with its mandibles protruding into the countersunk area. Several taxa of *Neocollyris* occur in Sri Lanka. If the burrows of all genera of arboreal cicindelids are of similar construction, this may account for the remarkable mandibular development of female *Karlissa* (cf. Figures 22, 25). The two teeth at the apex of each mandible could be applied to the anterior margin of the cicindelid head in such a way that the head could be pried upward, thus exposing the beetle's neck to the wasp's sting.

Most of the *Methocha* males were captured in Malaise traps and were observed very infrequently around foliage or on the ground. We noted males entering traps as early as 6 A.M. at China Bay, Trincomalee, and one was attracted to an ultra-violet light trap. Some males entered traps later on cooler, windier days. Females were found crawling on the ground, usually in the

vicinity of tiger beetle burrows. We noted mating or attempted mating three times by *M. litoralis* in the intertidal zone at Pesalai beach between 9:30 A.M. and noon.

Females were active during the day in partially or wholly shaded areas, but activity was severely limited in sparsely vegetated areas subject to intense sunlight. An exception to this was where the ground was damp, as in the intertidal habitat of *M. litoralis*. One damana (small open, sparsely vegetated area) across the Moderagam Aru near Kokmotte Bungalow, Wilpattu National Park, was inhabited by a small population of *M. (M.) heveli*, new species. On 24 May 1976 we reached the damana at 7:40 A.M. and captured two females on the bare ground at 7:45 and 7:55 A.M.; the ground by then was apparently too hot for further activity. Late in the afternoon females were again active, and we collected four females between 5:20 and 6:20 P.M. On the next day we reached the damana at 6:30 A.M. and collected five females between 6:35 and 7:11 A.M. We may have collected all of the adult females by that time, for we found none active between 5:10 and 6:25 P.M. We set small Malaise traps among shrubbery on the periphery of the damana but did not collect any males.

We followed *Methocha* females for lengthy periods at several locations but were unable to obtain a great deal of information. Our most successful observations were made at Pannika Villu, Wilpattu National Park, on the sand near the edge of the large villu (pond) on 1 November 1977. At 8:15 A.M., P.B. Karunaratne noted a small female of *M. (Dryinopsis) taprobane*, new species (11177 A; my code number, signifying month, day, and year), struggling with a tiger beetle larva at the burrow entrance of the latter. It appeared that the tiger beetle had grasped the wasp which allowed itself to be pulled into the burrow. The wasp came out almost immediately. It then walked around the burrow vicinity for more than five minutes. It went into the burrow at 8:16 A.M. and finally emerged at 8:37 A.M. Then it began to take in a grain of sand at a time. After several such trips we captured the wasp and

excavated the burrow. The diameter of the perpendicular burrow was 2 mm at the entrance, and it narrowed to 1 mm farther down. At a depth of 42 mm there was a narrow, lump of dry sand. The entire burrow length was 78 mm, and the beetle larva was at the bottom with its head upward. It had a small egg on the venter of the abdomen opposite the dorsal hump. The egg was covered with a few grains of dry sand. The sand in which the burrow was excavated was very damp immediately below the surface. We put the larva in a cell in damp sand in a pill box for rearing. The wasp larva matured and spun an ovoid cocoon of delicate silk 5.5 mm long. Sand grains and chitinous parts of the host larva adhered to the outer surface of the cocoon. The adult wasp escaped when it eclosed but was probably a female.

At Ekgal Aru Reservoir on 22 February 1977, P.B. Karunaratne observed another small female *M. (D.) taprobane* (22277 A) on the sunny hard-packed earth of the drive near the Wildlife Department Circuit Bungalow. The wasp was plugging the burrow of a cicindelid larva and had filled the burrow to within 2 mm of the surface when we captured it. The plug was 5 mm thick of compacted earth. The next 45 mm of the burrow was empty, then there was a soft compacted thin plug directly on top of the head of cicindelid larva. The larva was in a nearly vertical cell at the bottom at a depth of 55 mm. We could find no egg on the larva, and it could not have been dislodged, because the excavation was made very carefully. We placed the beetle larva in a tin ointment box in damp soil, but no parasite developed.

We made a few observations on a small number of *M. (M.) ubiquita*, new species, females at Thawalamtenne on 18 February 1977. This was a flat area at mile post 30 on the Kandy-Mahiyangana Road. The locality had very low vegetation consisting mostly of grasses and prostrate broader leaved plants with occasional shrubs. The *Methocha* could not have been a very effective parasite, judged from the relatively small number of females compared with the numerous cicindelid

burrows. At 10:12 A.M., I watched a female *M. ubiquita* (21877 A) on a bare spot in the meadow. In a minute it came to a spot that may have marked the plugged burrow of a small cicindelid larva. She began to burrow vertically, removing small grains of soil or sand 1–2 mm from entrance. In three minutes the burrow went downward the length of her body. She continued to back out of the burrow, sometimes pushing the soil behind her with her hind legs, sometimes carrying a grain or two out in her mandibles. This excavation went on till 10:25 A.M. At 10:38 A.M., I probed the burrow with a grass stem to a depth of $\frac{3}{4}$ inches, but there was no reaction. We dug the burrow at 10:45 A.M. and found the *Methocha* about an inch below the surface with a plug of soil above her, and she was still digging. We did not find a beetle larva when we excavated deeper.

P.B. Karunaratne followed another *M. ubiquita* female (21877 B) for an hour-and-a-quarter. At about 10:45 A.M. she entered a large cicindelid burrow but was scared off by the larva in about half a minute. We dug up the burrow and found the beetle larva at a depth of 10 cm in rather heavy loam soil. There was no wasp egg on it.

At 1 P.M., D.W. Balasooriya found another *M. ubiquita* female (21877 C) digging as recorded above for 21877 A. She abandoned the burrow in a few minutes and started searching elsewhere. The burrow was only 2.5 cm long, and there was no sign of a beetle larva. This digging activity by 21877 A and C is certainly very puzzling, for there was no sign of a beetle larva in either case.

Several of the *M. ubiquita* females captured at

Thawalammenne had lost part of or all of their antennae. Quite likely these may have been amputated by a cicindelid larva when the *Methocha* probed the burrow.

Specific hosts are unknown for any of the Ceylonese Methochinae, but it is most unlikely that any of them are host specific. I believe that methochine females are highly opportunistic and will prey successfully upon any species of ground-dwelling or arboreal tiger beetle, provided that the host larva is neither too small nor too large. During my field work we collected Cicindelidae at every locality where they occurred. This enables me to suggest putative hosts for Ceylonese Methochinae as follows:

- M. (M.) litoralis*, new species—*Cicindela biramosa* Fabricius, *C. distinguenda* Dejean, *C. sumatrensis* Herbst
M. (M.) heveli, new species—*Cicindela cancellata* Dejean, *C. ceylonensis ceylonensis* W. Horn, *C. c. diversa* W. Horn, *C. haemorrhoidalis* Wiedemann, *C. sexpunctata* Fabricius, *C. sumatrensis*
M. (M.) ubiquita, new species—*C. biramosa*, *C. cancellata*, *C. catena* Fabricius, *C. ceylonensis diversa*, *C. discrepans* Walker, *C. distinguenda*, *C. dormeri* W. Horn, *C. haemorrhoidalis*, *C. labioaenea* W. Horn, *C. sexpunctata* Fabricius, *C. sumatrensis*, *C. undulata* Dejean, *Prothyma paradoxa* W. Horn
M. (D.) laprobane, new species—*C. cancellata*, *C. c. ceylonensis*, *C. c. diversa*, *C. discrepans*, *C. distinguenda*, *C. dormeri*, *C. haemorrhoidalis*, *C. labioaenea*, *C. lacunosa* Putzeys, *C. sexpunctata*, *C. sumatrensis*, *C. undulata*, *P. paradoxa*
M. (D.) kandyensis, new species—*C. cancellata*, *C. c. diversa*, *C. discrepans*, *C. distinguenda*, *C. dormeri*, *C. labioaenea*, *C. lacunosa*
M. (D.) ceylonica, new species—*C. biramosa*, *C. cancellata*, *C. c. diversa*, *C. discrepans*, *C. distinguenda*, *C. dormeri*, *C. labioaenea*, *C. lacunosa*
M. (D.) anomala, new species—*C. cancellata*, *C. c. diversa*, *C. discrepans*, *C. distinguenda*, *C. dormeri*, *C. labioaenea*, *C. lacunosa*
Karlissa rugosa—*Tricondyla coriacea* Chevrolat, ?*Neocollyris* species.

Key to Ceylonese Species of Methochinae

(Females of *Methocha (Dryinopsis) kandyensis*, new species, and *M. (D.) anomala*, new species, are unknown)

1. FEMALES: Wingless and antlike in appearance; antenna 12-segmented and not arising from beneath frontal tubercle; tibial spur formula 1–1–1 2
 MALES: Winged, slender, elongate forms; antenna 13-segmented and arising from beneath frontal tubercle; tibial spur formula 1–2–2 ... 7

2. Scutum and scutellum fused into a rounded node [Figure 26]; clypeus [Figure 25] with lateral lobe greatly produced, separated from median lobe by a deep, narrow emargination; mandible concave on inner surface and with 2 equal teeth at apex 46. **Karlissa rugosa** (Cameron)
- Scutum and scutellum not fused into a rounded node [Figures 17, 20]; clypeus [Figures 16, 19] with lateral lobe poorly or not at all developed; mandible not concave on inner surface, near apex with a small subapical tooth 3
3. Ocelli arranged in an acute triangle; head strongly narrowed behind eyes [Figure 18], width 2.2–2.7 times narrowest interocular distance; viewed from above the front flat to slightly concave; scutum flat, in profile depressed beneath levels of pronotum and scutellum [Figure 20]; thorax entirely black 4
- Ocelli arranged in an obtuse triangle; head not so strongly narrowed behind eyes [Figure 15], width 1.6–2.1 times narrowest interocular distance; viewed from above the front slightly to moderately protuberant above antennae; scutum rounded in profile, not depressed below pronotum and scutellum [Figure 17]; thorax mostly red 5
4. Vestiture silvery to cinereous; basal flagellar segments, legs and 2 last abdominal segments light brown; head 2.2–2.4 times as wide as least interocular distance; postocellar line 1.3 times lateral ocellar line and 0.7 times ocellocular distance 42. **Methocha (Dryinopsis) taprobane**, new species
- Erect vestiture on dorsum of head, thorax, and first 2 abdominal terga black, remaining vestiture silvery; body predominantly black, apical half of flagellum and tarsi dark brown, sixth tergum and fifth and sixth sternum chestnut; head 2.7 times as wide as least interocular distance; postocellar line 2.0 times lateral ocellar line and 1.1 times ocellocular distance 44. **Methocha (Dryinopsis) ceylonica**, new species
5. Front comparatively broader and less densely punctate [Figure 22], head 1.6–1.7 times as wide as narrowest part of front, more strongly protuberant above antennae [Figure 21], most punctures separated by 3 or more times diameter of a puncture; pronotal disk evenly convex, without a median groove; mesosternal tubercles before mid coxae strong, acute, separated by a U-shaped emargination, area before tubercles with a shallow median fovea 39. **Methocha (Methocha) litoralis**, new species
- Front comparatively narrower and more densely punctate, head 1.7–2.1 times as wide as narrowest part of front, most of punctures separated by no more than width of a puncture; pronotal disk with a median longitudinal groove; mesosternal processes before mid coxae varying from low obtuse teeth separated by a broad, shallow emargination to evanescent transverse ridges 6
6. Head 1.7–1.8 times as wide as narrowest part of front; front less densely

- punctate, with several impunctate interspaces larger than anterior ocellus, most punctures separated from each other by diameter of a puncture, and more strongly swollen above antennae; erect vestiture of thoracic dorsum white to cinereous, punctation sparser, majority of punctures separated by more than diameter of a puncture
- 40. *Methocha (Methocha) heveli*, new species
- Head 2.0–2.1 times as wide as narrowest part of front; front more densely punctate [Figure 16], rarely with an impunctate interspace as wide as anterior ocellus, most punctures separated by half the diameter of a puncture or less, and only slightly convex above antennae [Figure 15]; erect vestiture of thoracic dorsum brown to black, punctation relatively denser, ranging from subcontiguous to a condition where a number of punctures are separated by diameter of a puncture, except scutellum which is occasionally very sparsely punctate
- 41. *Methocha (Methocha) ubiquita*, new species
7. Flagellar segments strongly flattened, shorter, first flagellar segment as long as wide, second through fifth each more than half as wide as long [Figure 27]; pronotum elongate, median length of dorsum 0.8 times that of scutum; metasternum at apex with a pair of ligulate, narrowly separated processes, each overlying inner ventral angle of hind coxa; posterior surface of propodeum abruptly declivous from dorsal surface which has a strong transverse carina at apex; genitalia [Figure 36], paramere slender, dorsal and ventral margins tapering gradually to apex 46. *Karlissa rugosa* (Cameron)
- Flagellar segments not so flattened, longer, first flagellar segment 1.5 or more times as long as wide, succeeding segments twice or more times as long as wide; pronotum shorter, median length of dorsum not more than half the length of scutum; metasternum not so armed at apex, at most with a pair of small tubercles; dorsal surface of propodeum rounding gradually into posterior surface, not separated from it by a strong transverse carina; genitalia [Figures 33–35, 37, 38], paramere stouter, ventral margin rounded out or emarginate in middle 8
8. Mesopleuron with a median ovate, impressed, densely haired fossa; ocelli in an obtuse triangle; malar space usually well developed, more or less quadrate; hypostomal carina with a strong tooth anteriorly behind mandible; parapsides and notauli present, the latter short; genitalia [Figures 33–35], ventral margin of paramere deeply emarginate in middle 9
- Mesopleuron without such an impressed area; ocelli in an acute triangle; malar space very short, linear; hypostomal carina low, not toothed; parapsides present, notauli absent; genitalia [Figures 37, 38], ventral margin of paramere rounded out in middle 11
9. Clypeal process broad [Figure 32], margin deeply emarginate in middle; mandible very massive; malar space as wide as basal flagellar segments;

- thoracic punctation sparser and quite delicate, mesopleuron above fossa with small punctures mostly separated by diameter of a puncture or more; tibiae and tarsi dark; genitalia [Figure 35], aedeagus broadened toward apex 39. ***Methocha (Methocha) litoralis***, new species
- Clypeal process narrower [Figures 30, 31], margin in middle truncate or narrowly rounded; mandible much more slender; malar space narrower, much shorter than width of basal flagellar segments; thoracic punctation denser and frequently coarser, area above mesopleural fossa with punctures separated by half the diameter of a puncture or less; base of mid and hind tibiae and all tarsi except apical segment pale 10
10. Clypeal process beaklike in profile [Figure 30], viewed from in front with sides converging toward rounded apex; punctures of scutum and mesopleuron coarser and subconfluent; genitalia [Figure 33] with aedeagus only slightly broadened toward apex 41. ***Methocha (Methocha) ubiquita***, new species
- Clypeal process blunt in profile [Figure 31], not beaklike, viewed from in front with apex beveled, margin truncate; punctures of scutum and mesopleuron smaller, many of them separated by half the diameter of a puncture; genitalia [Figure 34] with aedeagus broadened toward apex 40. ***Methocha (Methocha) heveli***, new species
11. Ocelli in a large, flat triangle, ocellocular line 1.1–1.5 times postocellar line; lateral area of dorsal surface of propodeum not shagreened, usually two transverse rugulae at apex of dorsal surface; cuspis of genitalia blunt, not digitate [Figure 38] 12
- Ocelli in a small, acute triangle, ocellocular line 2.1–2.5 times postocellar line; lateral area of dorsal surface of propodeum strongly shagreened, apex of dorsal surface without transverse rugulae; cuspis of genitalia slender, digitate [Figure 37] 13
12. Legs mostly light red, femora rarely light brown; clypeal process narrower, in profile beaklike [Figure 28]; hind margin of pronotal disk narrowly brown 42. ***Methocha (Dryinopsis) taprobane***, new species
- Legs dark except basal fourth of mid and hind tibiae, and tarsi except apical segment testaceous; clypeal process broader, in profile blunt not beaklike [Figure 29]; hind margin of pronotal disk more broadly testaceous 43. ***Methocha (Dryinopsis) kandyensis***, new species
13. Legs dark brown, tarsi sometimes lighter brown; ocellocular distance 2.1 times postocellar distance; punctures of mesopleural disk small, mostly separated by half the diameter of a puncture 44. ***Methocha (Dryinopsis) ceylonica***, new species
- Legs light red, tarsi occasionally brown; ocellocular distance 2.5 times postocellar distance; punctures of mesopleural disk fine, mostly separated by 2 to 3 times diameter of a puncture 45. ***Methocha (Dryinopsis) anomala***, new species

39. *Methocha (Methocha) litoralis*, new species

FIGURES 32, 35

This distinctive species is known from two males and a long series of females taken at a single locality on the northwest coast of Sri Lanka on a narrow spit of land leading to Adams Bridge, the chain of small islets separating Sri Lanka and India. All Ceylonese specimens were taken in the intertidal zone of a sandy beach among stranded seaweed. The species is also known from a single female from Karikal, South India, a small city on the east coast 200 km north of the type-locality. Putative host larvae belonging to three taxa of Cicindelidae are listed in the discussion under "Subfamily Methochinae."

Both sexes are distinguished from the other Ceylonese species of the typical subgenus by the much sparser and more delicate punctation; the male also has a more massive mandible and broader malar space, and the female has a pair of strong, acute mesosternal tubercles before the mid coxae instead of a pair of low obtuse teeth or transverse ridges.

ETYMOLOGY.—The specific name is from the Latin *litoralis* (of the seashore), an allusion to this restricted habitat.

HOLOTYPE.—♂, Sri Lanka, Northern Province, Mannar District, Pesalai beach, 23 Jan 1978, P.B. Karunaratne, 12378 A, taken in copula with paratype ♀ (USNM Type 100284).

MALE.—Length 9.5 mm, forewing 5.5 mm. Black, mandible except base and tip and tegula except base light red, tarsi dark brown. Vestiture glittering white, relatively dense and erect on head and thorax, sparser and subappressed on abdomen. Forewing slightly infumated, hind wing clear, stigma and veins brown.

Head (Figure 32, drawn from paratype) width 1.5 times height from apex of clypeus to posterior ocelli, mandible massive; malar space as broad as flagellar segment; interocular distance at anterior ocellus 1.1 times least interocular distance; clypeal process broad, suberect, the apex deeply emarginate; lateral hypostomal tooth in profile acute, slender, median tubercle strong; front with

small confluent punctures; ocellocular line 1.3 times postocellar line; second flagellar segment as long as third, 1.2 times as long as first.

Pronotal disk with anterior ridge, surface behind with tiny punctures separated anteriorly by 2 or more times the diameter of a puncture, posteriorly and laterally by a puncture's width; scutum with small punctures separated anteriorly and laterally by half the diameter of a puncture, in middle smooth except along midline; scutellar disk with small punctures separated by width of a puncture except smooth anteriorly in middle; mesopleuron above median fossa with small punctures mostly separated by the diameter of a puncture or more, above groove confluent punctate, and posteriorly the punctures separated by half the diameter of a puncture; propodeum without median ridge, finely rugulosoreticulate except lower half of lateral surface obliquely rugulose.

Abdomen with fine scattered punctures, apices of segments with a row of closer punctures; genitalia (Figure 35).

ALLOTYPE.—♀, same locality but 19 Feb 1979, K.V. Krombein, T. Wijesinhe, S. Siriwardane, T. Gunawardane (USNM).

FEMALE.—Length 6.3 mm. Black, the following red: mandible, scape, pedicel and first 3 flagellar segments, thorax and first abdominal segment except narrow apical margin of tergum; tarsi brownish. Vestiture on head, thorax, and abdomen sparse, erect, glittering white except dark on front.

Head width 1.6 times least interocular distance; clypeus with a low convex swelling in middle; malar space distinct, anterior mandibular condyle separated from eye by a distance equal to width of pedicel; viewed from above, the front biprotuberant above antennae; front with small punctures separated by 3 or more times the diameter of a puncture except on protuberance and along eyes where they are separated by 1 to 2 times the diameter of a puncture; postocellar line 1.7 times lateral ocellular line and 0.7 times ocellocular distance.

Pronotum 0.7 times head width and 1.2 times

propodeal width, the disk without median furrow and with scattered small punctures mostly separated by 2 or more times the diameter of a puncture; disk of scutum 1.3 times as wide as long, with very few slightly larger punctures; scutellar disk 0.8 times as wide as long, with scattered small punctures; posterior half of mesopleuron more weakly obliquely rugulose than in *M. ubiquita*, new species, and *M. heveli*, new species; mesosternum with a pair of strong acute teeth in front of mid coxae, the median depression separating teeth narrowed posteriorly; propodeum virtually impunctate.

Abdominal terga with more scattered fine punctures than in *M. ubiquita* and *M. heveli*.

PARATYPES.—4♀, same data as holotype, 1 taken in copula with holotype and bearing code 12378 A (USNM); 1♂, 14♀, same data as allotype (USNM); 1♂, 1♀, same locality as holotype but 9 Apr 1981, in copula, K.V. Krombein (USNM). SOUTH INDIA. 1♀, Karikal, 1 Jun 1932, P.S. Nathan (London). A pair of paratypes has been deposited in the National Museums of Sri Lanka (Colombo), and a female paratype has been placed in the British Museum (Natural History) and in Oxford University.

The paratype males are 9.9–10.0 mm long and agree in all essential details with the holotype except that the interocular distance at anterior ocellus is 1.2 times the least interocular distance, and the ocellocular line is 1.2 times the postocellar line. Female paratypes are 4.2 to 6.7 mm long, agree very well with the allotype in coloration, the punctation and sculpture is weaker in the smallest specimens, and the head width is 1.6–1.7 times the least interocular distance.

40. *Methocha (Methocha) heveli*, new species

FIGURES 31, 34

This species is known from both sexes from several localities in the Dry Zone. So far as known, it does not occur also in India, but there is a dearth of specimens from that country, so it may be collected eventually. Putative host larvae in-

clude some six taxa of Cicindelidae as listed in the discussion under the subfamily heading.

Methocha heveli is intermediate between *M. litoralis*, new species, and *M. ubiquita*, new species, in the comparative density of punctation. The genitalia and the blunt clypeal process with beveled apex distinguish the male from its congeners. The female has the apical mesosternal processes developed as blunt teeth or transverse ridges as in *M. ubiquita*, rather than acute teeth as in *M. litoralis*; it differs from *M. ubiquita* in the comparatively wider front, which is more strongly protuberant above the antennae and has several impunctate interspaces wider than the anterior ocellus.

ETYMOLOGY.—It is named for Gary F. Hevel, one of the Smithsonian Insect Project team leaders, who found the only two males in a Malaise trap.

HOLOTYPE.—♂, Sri Lanka, North Central Province, Anuradhapura District, Hunuwilagama near Wilpattu Natl. Park, 200 ft, in Malaise trap, 28 Oct–3 Nov 1976, G.F. Hevel, R.E. Dietz IV, S. Karunaratne, D.W. Balasooriya (USNM Type 100285).

MALE.—Length 8.0 mm, forewing 4.8 mm. Black, mandible red except base and apex; the following testaceous: narrow apical margin of pronotal disk, tegula except base, basal fourth of mid and hind tibiae, tarsi except apical segment. Vestiture glittering white, relatively dense and erect on head and thorax, sparser and subappressed on abdomen. Wings clear, stigma dark brown, veins testaceous.

Head (Figure 31, drawn from paratype) width 1.6 times height from apex of clypeus to posterior ocelli, interocular distance at anterior ocellus 1.2 times least interocular distance; mandible more slender; malar space much narrower than width of flagellum; clypeal process narrow, apex beveled, margin truncate, in profile blunt, not beak-like; lateral hypostomal tooth blunt, median tubercle weak; front with small confluent punctures; ocellocular line 1.3 times postocellar line; second flagellar segment as long as third, 1.3 times as long as first.

Pronotal disk with anterior ridge, surface behind this with tiny punctures separated anteriorly by twice the diameter of a puncture, laterally and posteriorly by the width of a puncture; scutum with small punctures separated anteriorly and laterally by half the width of a puncture, in middle by about the diameter of a puncture; scutellar disk with punctures separated by half their diameter except smooth anteriorly in middle; mesopleuron above median fossa with small punctures separated by half their diameter, above groove confluent punctate and posteriorly the punctures smaller and separated by more than their diameter; propodeum coarsely ruguloreticulate on dorsum, posteriorly with median ridge and more finely ruguloreticulate, laterally with fine ruguloreticulations on upper half and oblique rugulae on lower half. Abdomen with fine scattered punctures, apices of segments with a row of closer punctures; genitalia (Figure 34).

ALLOTYPE.—♀, Sri Lanka, Northern Province, Mannar District, 0.5 mi NE of Kokmotte Bungalow, Wilpattu Natl. Park, 21–25 May 1976, K.V. Krombein, P.B. and S. Karunaratne, D.W. Balasooriya (USNM).

FEMALE.—Length 7.4 mm. Black, the following red: mandible, antenna except last 2 segments, dorsum of thorax and propodeum, side of pronotum, upper half of lateral surface of propodeum, apical two-thirds of first abdominal segment except narrow apex of tergum, tibiae, and tarsi. Vestiture denser and somewhat longer than in *M. litoralis*, cinereous on front, glittering white on rest of body.

Head width 1.8 times least interocular distance; convex swelling on middle of clypeus stronger than in *M. litoralis*; malar space narrow, at anterior mandibular condyle half as wide as width of pedicel; viewed from above the front bituberant above antennae, though less so than in *M. litoralis*; front with larger punctures than in *M. litoralis*, many separated by half of or the diameter of a puncture, but with several impunctate interspaces larger than anterior ocellus; postocellar line 2.3 times lateral ocellar line and 0.3 times ocellular distance.

Pronotum 0.7 times as wide as head and 1.2 times propodeal width, the disk with a median furrow and with small punctures mostly separated by the diameter of a puncture or a bit less; disk of scutum 1.2 times as wide as long and with small subcontiguous punctures; scutellar disk 0.8 times as wide as long and with small punctures separated by diameter of a puncture except for a median impunctate area anteriorly; posterior half of mesopleuron with coarser oblique rugulae than in *M. litoralis*; mesosternum posteriorly with a small round fovea in front of a pair of low blunt teeth in front of mid coxae; dorsal and posterior surfaces of propodeum with small punctures separated by about the diameter of a puncture.

Abdominal terga with closer fine punctures than in *M. litoralis*, separated by 1 to several times the diameter of a puncture.

PARATYPES.—1♂, 15♀, all Sri Lanka and all (USNM) except where noted as follows. 1♂, same data as holotype; 1♀, same data as allotype. WESTERN PROVINCE. *Colombo District*: 2♀, Hendela, 30 Jul 1980, T. Wijesinhe. UVA PROVINCE. *Monoragala District*: 2♀, Angunakolapelessa, 16 mi E of Uda Walawe, 2 and 7 Feb 1975, K.V. Krombein, P.B. Karunaratne, P. Fernando, E.G. Dabrera. SOUTHERN PROVINCE. *Hambantota District*: 1♀, 6 Feb 1909, T.B. Fletcher (London). A pair of paratypes has been deposited in the National Museums of Sri Lanka (Colombo), and a female paratype in the British Museum (Natural History).

The male paratype is 7.5 mm long and agrees in essential details with the holotype. Female paratypes range from 3.5 to 7.3 mm in length, are similar in coloration to the allotype, smaller specimens are more sparsely punctate and more delicately sculptured, and the posterior mesosternal teeth are occasionally reduced to transverse ridges.

41. *Methocha (Methocha) ubiquita*, new species

FIGURES 7, 8, 15–17, 30, 33

This is the most widely distributed species of typical *Methocha* in Sri Lanka, where it occurs in

both the Dry Zone and Wet Zone and at altitudes up to some 2000 ft. It is not known to occur in India, but intensive collecting in South India may demonstrate its presence there. Putative host larvae include some 13 taxa of Cicindelidae as listed in the discussion under "Subfamily Methochinae."

The male is the most densely punctate of the species of typical *Methocha* and has a distinctive beaklike clypeal process. The female also is the most densely punctate of that sex, has dark vestiture on the thoracic dorsum instead of white to cinereous, and has a comparatively narrower front.

ETYMOLOGY.—Its specific name is derived from the Latin *ubique* (everywhere), in allusion to its wide distribution in Sri Lanka.

HOLOTYPE.—♂, Sri Lanka, Eastern Province, Trincomalee District, Trincomalee, China Bay Ridge Bungalow, 0–100 ft, 16–17 May 1976, in Malaise trap, K.V. Krombein, P.B. and S. Karunaratne, D.W. Balasooriya (USNM Type 100286).

MALE (Figure 7).—Length 8.0 mm, forewing 5.2 mm. Black, apical half of mandible except teeth red; the following testaceous: narrow apical margin of pronotal disk, tegula except base, basal fourth of mid and hind tibiae, tarsi except apical segment. Vestiture glittering white, relatively dense and erect on head and thorax, sparser and subappressed on abdomen. Wings clear, stigma dark brown, veins light brown.

Head (Figure 30, drawn from paratype) width 1.5 times height from apex of clypeus to posterior ocelli, interocular distance at anterior ocellus 1.2 times least interocular distance; mandible more slender; malar space much narrower than width of flagellum; clypeal process narrow, sides converging toward rounded apex, in profile beaklike; lateral hypostomal tooth blunt, median tubercle very weak; front with small confluent punctures; ocellocular line 1.3 times postocellar line; second flagellar segment as long as third, 1.3 times as long as first.

Pronotal disk with anterior ridge, surface behind this with tiny punctures separated by half

the diameter of a puncture laterally and by the diameter of a puncture in middle area; scutum with small subconfluent punctures except laterally where they are more separated; scutellar disk damaged by pinhole, in paratypes with small punctures, separated on lateral third by half the diameter of a puncture, the middle very sparsely punctate; mesopleuron with small, mostly confluent punctures except posteriorly where they are separated by half or more the diameter of a puncture; propodeum with median ridge better developed on posterior surface than on dorsal, the latter with coarse rugulosoreticulations becoming finer toward side, posterior and lateral surfaces with rugulosoreticulations of fine mesh except lower half of lateral surface with oblique rugulae.

Abdomen with fine punctures, somewhat closer than in other species, apices of segments with a row of closer punctures; genitalia (Figure 33, of paratype).

ALLOTYPE.—♀, Sri Lanka, Central Province, Kandy District, Thawalamtenne, 740–760 m, 18 Feb 1977, P.B. Karunaratne, code 21877 B (USNM).

FEMALE (Figure 8).—Length 5.3 mm. Black, the following red: mandible, antenna except last 2 segments, thorax and propodeum except mesopleuron mostly black, first abdominal segment except narrowly at base and apex, and coxae, trochanters, and femora beneath. Erect vestiture on front, dorsum of thorax, propodeum and abdomen black to dark brown, white elsewhere, longer and denser than in *M. litoralis*, new species.

Head width 2.0 times least interocular distance (Figure 16); convex swelling on middle of clypeus stronger than in *M. litoralis*; malar space absent, mandibular condyles touching lower edge of eye; viewed from above, the front only slightly protuberant above antennae (Figure 15); front with larger punctures than in *M. litoralis*, mostly separated by the diameter of a puncture or less and with scarcely any interspaces as wide as anterior ocellus; postocellar line 1.8 times lateral ocellar line and 0.8 times ocellocular distance.

Pronotum 0.6 times as wide as head and 1.2 times as wide as propodeum, the disk with a

median furrow and with small punctures mostly separated by half the diameter of a puncture; disk of scutum as wide as long and with small subcontiguous punctures; scutellar disk 0.6 times as wide as long and with small punctures separated by half the diameter of a puncture except for a small smooth area anteriorly; posterior half of mesopleuron with coarser oblique rugulae than in *M. litoralis*; mesosternum with a pair of narrowly separated low ridges in front of mid coxae; dorsal and posterior surfaces of propodeum with small punctures separated by distances varying from the diameter of a puncture to half that distance.

Abdominal terga with fine punctures which are denser than in *M. heveli*.

PARATYPES.—41♂, 17♀, all Sri Lanka and all (USNM) except where noted otherwise. NORTH-EASTERN PROVINCE. *Mannar District*: 1♂ Cashew Corp., Ma Villu, 17–21 Feb 1979, in Malaise trap, K.V. Krombein, T. Wijesinhe, S. Siriwardane, T. Gunawardane; 2♂, 0.5 mi NE of Kokmotte Bungalow, Wilpattu Natl. Park, 22–25 May 1976, in Malaise trap, K.V. Krombein, P.B. and S. Karunaratne, D.W. Balasooriya. NORTH CENTRAL PROVINCE. *Anuradhapura District*: 10♂, Padaviya, irrigation bungalow or tank, 180 ft, 2♂, 27 Feb–9 Mar 1970, D.R. Davis, W.H. Rowe; 4♂, 12–22 Mar 1976, in Malaise trap, P.B. and S. Karunaratne; 4♂, 18 May 1976, in Malaise trap, K.V. Krombein, P.B. and S. Karunaratne, D.W. Balasooriya. 2♂, 1♀, Padaviya archeological site; 1♀, 20 May 1976, S. Karunaratne; 1♂, 21 May 1976, in Malaise trap, K.V. Krombein, P.B. and S. Karunaratne, D.W. Balasooriya; 1♂, 11–14 Oct 1977, in Malaise trap, K.V. Krombein, P.B. Karunaratne, P. Fernando, T. Wijesinhe, M. Jayaweera. 1♂, Occapu Kallu, Wilpattu Natl. Park, 150 ft, 18 Mar 1970, D.R. Davis, W.H. Rowe. EASTERN PROVINCE. *Trincomalee District*: 1♀, Tennamaravadi, 18 May 1976, K.V. Krombein, P.B. and S. Karunaratne, D.W. Balasooriya. 24♂, Trincomalee, China Bay Ridge Bungalow, in Malaise trap; 11♂, 13–17 and 16–17 May 1976, 0–100 ft, same collectors as holotypes; 8♂, 8–11 Nov 1977, 0–30 m, K.V. Krombein, P.B. Karunaratne, P. Fernando, T. Wijesinhe, M. Jay-

aweera; 1♂, 24–25 Jul 1978, in Malaise trap, K.V. Krombein, T. Wijesinhe, V. Kulasekare, L. Jayawickrema; 4♂, 26 Feb 1979, 25–50 ft, in Malaise trap, K.V. Krombein, T. Wijesinhe, S. Siriwardane, L. Jayawickrema, T. Gunawardane. *Amparai District*: 1♂, 4♀, Ekgal Aru; 1♂ Reservoir Jungle, 10 Jun 1976, in Malaise trap, K.V. Krombein, P.B. and S. Karunaratne; 2♀, same jungle but 100 m, 19–22 Feb 1977, K.V. Krombein, P.B. Karunaratne, P. Fernando, D.W. Balasooriya; 2♀, Ekgal Aru tank, 22–23 Feb 1977, same collectors. CENTRAL PROVINCE. *Matale District*: 1♂, Kibissa, 0.5 mi W of Sigiriya, jungle, 28 Jun–4 Jul 1978, in Malaise trap, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, V. Kulasekare. *Kandy District*: 1♂, Kandy, Udawattakele Sanctuary, 13 Oct 1980, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, V. Gunawardane; 2♀, Thawalammenne, 740–760 m, 21 Aug 77, K.V. Krombein, D.W. Balasooriya. NORTH WESTERN PROVINCE. *Puttalam District*: 1♂, Pannika Villu, 20 m, 31 Oct–2 Nov 1977, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, M. Jayaweera. WESTERN PROVINCE. *Colombo District*: 5♀, Colombo, 2 on 11 Sep 23, 2 on 1 Nov 26, 1 on 3 Dec 28, G.M. Henry (Colombo). SABARAGAMUWA PROVINCE. *Ratnapura District*: 2♀, 1♂, Gilimale, Induruwa Jungle, 1♀ on 17 Jun 76, K.V. Krombein, P.B. and S. Karunaratne; 1♀ on 5 Feb 77, K.V. Krombein; 1♂ on 7–8 Mar 79, in Malaise trap, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, S. Siriwardane, L. Jayawickrema. 1♂, Sinharaja forest, 600 ft, 5 Aug 73, in Malaise trap, G. Ekis. UVA PROVINCE. *Monaragala District*: 1♂, Wellawaya, Nov 11, O.S. Wickwar (London). 1♂, Uda Walawe, 300 ft, in Malaise trap in thorn scrub forest, 1 Aug 73, G. Ekis. 12♀, 19♂, Angunakolapelessa, 16 mi E of Uda Walawe; ♀, 7 Feb 1975, K.V. Krombein, P.B. Karunaratne, P. Fernando, E.G. Dabrera; 1♂, in Malaise trap, 17–19 Jun 78, K.V. Krombein, T. Wijesinhe, L. Jayawickrema, V. Kulasekare; 17♂, 21–23 Jan 79, in Malaise trap, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, S. Siriwardane, T. Gunawardane (USNM); 11♀, 1♂, 8–9 Oct 80, ♂ in Malaise trap, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, L. Jayawick-

rema, V. Gunawardane. SOUTHERN PROVINCE. *Galle District*: 1♂, Kanneliya section, Sinharaja Jungle, 13–16 Jul 1978, in Malaise trap, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, N. Karunaratne; 1♂, same locality but 2–5 Oct 1980, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, V. Gunawardane. *Hambantota District*: 1♀, Palatupana, 3–6 Feb 75, K.V. Krombein, P.B. Karunaratne, P. Fernando, E.G. Dabrera; 1♂, Palatupana tank, 10–16 m, in Malaise trap, 6–7 Nov 1980, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, V. Gunawardane; 6♀, same locality but 29 Mar–2 Apr 1981, K.V. Krombein, T. Wijesinhe, L. Weeratunge. A pair of paratypes has been placed in the National Museums of Sri Lanka (Colombo) and British Museum (Natural History). A male from Northern Province, Jaffna Dist., Elephant Pass, 2 Jan 23, G.M. Henry (Colombo) is not included in the type series because it lacks an abdomen.

Male paratypes are 4.5–10.8 mm long. In some specimens the normally dark parts of tibiae may be light brown. The clypeal process is occasionally heavier, and the median ridge on propodeum may be lacking dorsally, posteriorly, or both. The smallest specimens are comparatively more delicately sculptured and more sparsely punctate. Female paratypes are 4.0–6.0 mm long, and the coloration is rather uniform except that the propodeum rarely is brownish and there may be a reduced amount of red on the abdomen. Punctuation and sculpture are also variable, smaller specimens being comparatively more sparsely punctate and with more delicate sculpture, and the largest specimen from Padaviya having subcontiguous punctures on front, pronotum, and scutum. Three specimens (Gilimale, Padaviya, Thawalammenne) have the mesopleural rugulae finer and closer than in the rest of the series.

42. *Methocha (Dryinopsis) taprobane*, new species

FIGURES 18–20, 28, 38

This rather widely distributed species is the most common species of the subgenus *Dryinopsis*.

It occurs in both the Dry Zone and the Wet Zone but only in areas of moderate rainfall in the latter zone and at altitudes ranging near sea level to 2100 ft. Putative host larvae include some 13 taxa of Cicindelidae as listed in the discussion under the subfamily heading. This section also includes notes on the behavior of two females of *M. (D.) taprobane* and the larvae which they parasitized.

The male has light-red legs and small, relatively dense punctation on the mesopleuron; however, three of the 11 males have the mesopleuron more sparsely punctate, approaching the condition in *M. (D.) anomala*, new species, which also has light-red legs. Males of these two *Dryinopsis* may be separated by the genitalia (cf. Figures 37, 38), by the ratio of ocellular to postocellar distance (1.5 and 2.5 respectively), and by the lack of shagreening on the lateral area of dorsal surface of the propodeum in the present species.

Females of *Dryinopsis* are much more uncommon than those of typical *Methocha*. I am unable to distinguish significant differences among the seven available females in color, vestiture, punctation, and body proportions, and I believe that they are conspecific. The females are from five localities; males were collected at three of these (Ma Villu, Parayanalankulam, Pannika Villu), no males whatever at a fourth (Pooneryn), and one male of *M. (D.) anomala* at the fifth (Ekgal Aru); however, at the latter locality the two females were taken near the Circuit Bungalow, whereas the single male was collected a mile distant in the Sanctuary Jungle. The occurrence of two species at Ekgal Aru is of no significance, for all four species of male *Dryinopsis* have been collected in Udawattakele Sanctuary, Kandy. Females of *M. taprobane* and *M. ceylonica*, new species, are readily separated by the characters in the preceding key.

ETYMOLOGY.—The specific name is the Roman name for ancient Lanka.

HOLOTYPE.—♂, North Western Province, Puttalam District, Pannika Villu, Wilpattu Natl. Park, 20 m, 31 Oct–2 Nov 1977, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, M. Jayaweera (USNM Type 100287).

MALE.—Length 6.8 mm, forewing 5.2 mm. Black, the following light red: mandible except narrowly at base and legs except fore and hind coxae and mid coxa above; palpi and tegula testaceous. Vestiture glittering white, relatively dense, short and suberect on head and thorax, sparser and subappressed on abdomen. Wings clear, stigma dark brown, veins lighter brown.

Head (Figure 28, drawn from paratype) width 1.3 times height from apex of clypeus to posterior ocellus, interocular distance at anterior ocellus 1.2 times least interocular distance; malar space evanescent; clypeal process narrow, sides converging toward rounded apex, in profile beaklike; ocellocular line 1.5 times postocellar line; second and third flagellar segments subequal and 1.4 times first segment.

Pronotal disk without a strong anterior ridge, this area with a few fine transverse carinae behind which are fine punctures separated by the diameter of a puncture; scutum with small confluent punctures except anterior area between parapsides where they are separated by half the diameter of a puncture; scutellar disk with small punctures separated by half the diameter of a puncture, declivous lateral areas with smaller confluent punctures; mesopleuron with a continuous crenulate groove above and anteriorly, disk with fine punctures, mostly separated by twice the diameter of a puncture; propodeum without median ridge, dorsal surface rounding gradually into posterior, dorsal surface with irregular longitudinal rugulae and 2 transverse rugulae at apex, posterior surface with small rugulose reticulations, lateral surface with a few coarse oblique rugulae on anterior half and fine rugulose reticulations on posterior.

Abdominal dorsum with fine punctures separated by one-and-a-half times to twice the diameter of a puncture; genitalia (Figure 38, of a paratype).

ALLOTYPE.—♀, Northern Province, Vavuniya District, Parayanalankulam, 22 Nov 1969, K.V. Krombein (USNM).

FEMALE.—Length 4.8 mm. Black, glossy, the following light red: palpi, mandible, apical half

of clypeal lobe, antenna except last 4 segments, last 2 abdominal segments, legs except outer surface of coxae, trochanters; femora and tibiae brownish. Vestiture sparse, white to cinereous, erect on head, thorax, and first abdominal tergum, that on second through fifth terga subdecumbent, the setae on middle third of each segment directed obliquely inward toward midline, the setae on outer third directed posteriorly.

Head viewed from above (Figure 18), strongly narrowed behind eyes, ocelli in an acute triangle, and front slightly concave in middle, not protuberant; viewed from in front (Figure 19) the head 2.3 times as wide as narrowest part of front; apical margin of clypeal lobe slightly emarginate; impressed supraclypeal area smooth, flat, higher than wide; antennal flagellum noticeably clavate toward apex; interocular distance at posterior ocelli 1.7 times least interocular distance; lower part of front impunctate except for a narrow strip of small punctures along eye margin, upper part of front with small punctures mostly separated by 2 or more times diameter of a puncture; post-ocellar line 1.3 times lateral ocellar line and 0.7 times ocellocular distance; vertex with sparser punctation.

Thorax in profile (Figure 20) with scutum depressed below level of pronotum and concave, scutellum gently convex; pronotum 0.6 times as wide as head and 1.2 times propodeal width, disk convex, not furrowed, and with a few scattered fine punctures; scutum virtually impunctate; scutellum sparsely and finely punctate but more densely than pronotum; mesopleuron with fine scattered punctures on anterior half, posterior half smooth; mesosternum without posterior teeth or ridges; dorsum of propodeum with small punctures separated by about twice the diameter of a puncture.

Abdomen with fine scattered, piliferous punctures on posterior two-thirds of second through fifth terga, anterior third smooth.

PARATYPES.—9♂, 6♀, all Sri Lanka and (USNM) as follows. NORTHERN PROVINCE. *Jaffna District*: 1♀, 13 mi S of Pooneryn, ~100 ft, 7 Nov 1976, S. Karunaratne. *Vavuniya District*: 1♂, Par-

ayanalankulam irrigation canal, 100 ft, 20–25 Mar 1970, D.R. Davis, W.H. Rowe. *Mannar District*: 1♂, Cashew Corporation, Ma Villu, Malaise trap, 17–21 Feb 1979, K.V. Krombein, T. Wijesinhe, S. Siriwardane, T. Gunawardane; 1♂, 0.5 mi NW of Kokmotte Bungalow, Wilpattu Natl. Park, at black light, 15–16 Feb 1979, K.V. Krombein, T. Wijesinhe, S. Siriwardane, T. Gunawardane. NORTH WESTERN PROVINCE. 2♀, same data as holotype but 1 Nov 1979, 1 bearing code number 11177 A, P.B. Karunaratne. EASTERN PROVINCE. *Amparai District*: 2♀, Ekgal Aru tank, Circuit Bungalow, 22 and 23 Feb 1977, K.V. Krombein, P.B. Karunaratne, 1 bearing code number 22277 A. CENTRAL PROVINCE. *Kandy District*: 2♂, Hasalaka Circuit Bungalow, 500 ft, 30 Mar–9 Apr 1971, P. and P. Spangler, et al., in Malaise trap, and 22–25 Nov 1970, O.S. Flint, Jr., et al.; 1♂, Kandy, Udawattakele Sanctuary, 2100 ft, 20–27 Sep 1976, S. Karunaratne. WESTERN PROVINCE. *Colombo District*: 2♂, Labugama, 400 ft, in Malaise trap, 24 Aug 1973, G. Ekis, et al. SABARAGAMUWA PROVINCE. *Ratnapura District*: 1♂, Panamure, 500 ft, 15–21 Nov 1970, O.S. Flint, Jr., et al. SOUTHERN PROVINCE. *Monoragala District*: 5♂, Angunakolaplessa, 100 m, 21–23 Jan 1979, in Malaise trap, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, S. Siriwardane, T. Gunawardane. *Hambantota District*: 3♂, Palatupana tank, 15–50 ft, 18–20 Jan 1979, in Malaise trap, K.V. Krombein, P.B. Karunaratne, T. Wijesinhe, S. Siriwardane, T. Gunawardane; 1♀, same locality as preceding but 29 Mar 1981, K.V. Krombein, T. Wijesinhe, L. Weeratunge.

Male paratypes are 5.5–7.8 mm long and agree well in coloration with the holotype except that the femora are brownish in one specimen. There is some variation in density of punctation which is particularly noticeable on the mesopleuron. In a few specimens many of the discal punctures are separated by three or four times the diameter of a puncture, and in a few specimens these punctures are a bit larger, and many are separated by the diameter of a puncture.

Female paratypes are 3.5–4.6 mm long and are similar in coloration to the allotype, except in

several specimens the outer surface of the legs is darker brown as is the lower half of clypeal lobe. The head width is 2.2–2.4 times as wide as narrowest part of front, and the interocular distance at posterior ocelli is 1.5–1.6 times the least interocular distance.

43. *Methocha (Dryinopsis) kandyensis*, new species

FIGURE 29

This species of the Hill Country, known only from two males from Kandy and nearby Peradeniya, is the most easily recognized of the Ceylonese *Dryinopsis* males. The coloration of the legs is unique in that the basal fourth of mid and hind tibiae, and tarsi except apical segment, are testaceous as in *Methocha (M.) ubiquita*, new species, rather than having legs mostly light red as in *M. (D.) taprobane*, new species, and *M. (D.) anomala*, new species, or mostly black or dark brown as in *M. (D.) ceylonica*, new species. Surprisingly, the genitalia are so similar to those of *M. (D.) taprobane* that the two species cannot be discriminated on that basis. Putative host larvae include some seven taxa of Cicindelidae as noted in the discussion under “Subfamily Methochinae.”

ETYMOLOGY.—The specific name is based on Kandy, capital of the last native kingdom.

HOLOTYPE.—♂, Sri Lanka, Central Province, Kandy District, Peradeniya Botanical Garden, Jan 1971, Piyadasa and Somapala (USNM Type 100288).

MALE.—Length 7.3 mm, forewing 5.2 mm. Black, the following testaceous: palpi, middle third of mandible, narrow hind margin of pronotum, tegula, basal fourth of mid and hind tibiae, and all tarsi except apical segment; tip of mandible light red. Vestiture glittering white, relatively dense, short and suberect on head and thorax, sparser and subappressed on abdomen. Wings clear, stigma dark brown, veins lighter brown.

Head (Figure 29, drawn from paratype) width 1.3 times height from apex of clypeus to posterior

ocellus, interocular distance at anterior ocellus 1.2 times least interocular distance; malar space evanescent; clypeal process broader than in *M. (D.) taprobane*, in profile blunter, heavier, not beaklike; ocellocular line 1.1 times postocellar line; second and third flagellar segments subequal in length and 1.2 times as long as first.

Pronotal disk without a strong anterior ridge, this area with a few fine transverse carinae behind which are fine punctures separated by the diameter of a puncture; scutum with small punctures, on median third anteriorly separated by half the width of a puncture, laterad of this and to parapsidal furrow the punctures confluent in transverse rows, area laterad of parapsidal furrow as on median section; scutellar disk with small punctures separated by half the diameter of a puncture, declivous lateral areas with smaller confluent punctures; mesopleuron with continuous crenulate groove above and anteriorly, disk with punctures slightly larger than in *M. (D.) taprobane*, mostly separated by 1 to 2 times the diameter of a puncture; propodeum without a median ridge, dorsal surface rounding gradually into posterior, dorsal surface with several median longitudinal rugulae, area laterad of these with small rugulose reticulations, posteriorly with larger rugulose reticulations, posterior surface finely and irregularly rugulose, lateral surface with a few coarse oblique rugulae on anterior half and very fine rugulose reticulations on posterior half.

Abdominal dorsum with fine punctures separated by one-and-a-half times to twice the diameter of a puncture; genitalia indistinguishable from those of *M. (D.) taprobane* (Figure 38).

FEMALE.—Unknown.

PARATYPE.—1♂, same data as holotype but Kandy, Udawattakele Sanctuary, 1800 ft, in Malaise trap, 13–14 Aug 1973, G. Ekis et al. (USNM). The paratype is deposited in the National Museums of Sri Lanka (Colombo).

It is 8.1 mm long and is very similar in all details to the holotype except that there are two relatively strong transverse rugulae separating the dorsal and posterior surfaces of the propodeum.

44. *Methocha (Dryinopsis) ceylonica*, new species

FIGURE 37

This species, known only from two localities, is known from four males and one female. It occurs at Trincomalee in the Dry Zone and at Kandy in the Wet Zone with moderate rainfall, so we may expect it to have a relatively wide distribution in the country. Like *M. (D.) kandyensis*, new species, the male is very readily recognized by the coloration of the legs which are almost entirely dark in this species. The genitalia are indistinguishable from those of *M. (D.) anomala*, new species, which has almost entirely light-red legs. The comparatively greater postocellar distance and greater length of the third flagellar segment as compared to the first also distinguish this species from *M. (D.) taprobane*, new species, and *M. (D.) kandyensis*.

The sex association in *M. ceylonica* is based on having collected a male in a Malaise trap, 22 Sep 1980, on the topmost ridge in Udawattakele Sanctuary and the capture of a female on the ground, 14 Oct 1980, just a few meters from where the Malaise trap had been set. The dark brown tarsi of both sexes also suggest that this association is correct. The female is easily separated from that of *M. taprobane* by the characters cited in the foregoing key.

Putative host larvae include some eight taxa of Cicindelidae as listed in the discussion under "Subfamily Methochinae."

ETYMOLOGY.—The specific name is based on one of the former names for its homeland.

HOLOTYPE.—♂, Sri Lanka, Central Province, Kandy District, Kandy, Udawattakele Sanctuary, 1800 ft, 3–5 Jun 1976, K.V. Krombein, P.B. and S. Karunaratne, D.W. Balasooriya (USNM Type 100289).

MALE.—Length 9.7 mm, forewing 7.2 mm. Black, apical half of mandible, except apex, and tegula dark red, palpi testaceous, fore and mid legs dark brown, the foretarsus lighter brown. Vestiture glittering white, relatively dense, short and suberect on head and thorax, sparser and

subappressed on abdomen. Wings clear, stigma dark brown, veins lighter brown.

Head width 1.4 times the height from apex of clypeus to anterior ocellus, interocular distance at anterior ocellus 1.3 times least interocular distance; malar space evanescent; clypeal process broad as in *M. (D.) kandyensis*, in profile beaklike but stouter than in *M. (D.) taprobane*; punctation of front as figured for those 2 species; ocellular line 2.1 times the postocellar line; third flagellar segment 1.1 times as long as second, 1.6 times as long as first.

Pronotal disk without an anterior ridge, this area with a few transverse carinae behind which are fine punctures mostly separated by the diameter of a puncture; scutum with small punctures, anteriorly on middle of disk separated by half the diameter of a puncture, laterad of this to parapsidal furrows with closer punctures, some of which are confluent transversely, area laterad of parapsidal furrow with more separated punctures; scutellar disk with small punctures separated by half the diameter of a puncture, declivous lateral areas with smaller confluent punctures; mesopleuron with continuous crenulate groove anteriorly and above, surface of disk with small punctures mostly separated by half the diameter of a puncture; propodeum without a median ridge, dorsal surface rounding gradually into posterior, the juncture without transverse rugulae, middle of dorsal surface with a few radiating rugulae, laterad of these the surface shagreened and with small rugulose reticulations, posterior surface with small rugulose reticulations becoming weaker toward apex, lateral surface with close oblique rugulae on basal half, posterior half with fine rugulose reticulations arranged in oblique rows.

Abdominal dorsum with fine puncture; separated by one-and-a-half times to twice the diameter of a puncture; genitalia (Figure 37).

ALLOTYPE.—♀, same locality as holotype, but 14 Oct 1980, K.V. Krombein (USNM).

FEMALE.—Length 5.0 mm. Black, glossy; mandible red near tip; palpi testaceous; apical half of flagellum and tarsi dark brown; sixth tergum and

fifth and sixth sterna chestnut. Vestiture sparse, erect and black on top of head, thoracic dorsum and first 2 terga, silvery and suberect on face and third through fifth terga, the setae on those terga directed posteriorly.

Head strongly narrowed behind eyes, ocelli in an acute triangle, and front slightly concave in middle; head 2.7 times as wide as narrowest part of front; apical margin of clypeal lobe slightly emarginate; impressed supraclypeal area smooth, flat, higher than wide; antennal flagellum clavate toward apex; interocular distance at posterior ocelli 1.5 times least interocular distance; lower front with small punctures with a narrow strip of fine punctures adjacent to eye, mostly separated by about the diameter of a puncture; postocellar line 2.0 times lateral ocellar line and 1.1 times ocellular distance; vertex sparsely punctate.

Pronotum 0.6 times as wide as head and 1.2 times propodeal width, disk convex and with scattered fine punctures; scutum and scutellum with more scattered punctures than either pronotum or propodeum; mesopleuron with very scattered punctures.

Abdominal terga with more scattered punctures than in *M. taprobane*, anterior third of third through fifth terga impunctate.

PARATYPES.—1♂, same locality as holotype but 13–14 Jul 1973, in Malaise trap, G. Ekis et al. (USNM); 1♂, same locality as holotype but 22 Sep 1980, in Malaise trap, K.V. Krombein; P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, V. Gunawardane (USNM). EASTERN PROVINCE. *Trincomalee District*: 1♂, Trincomalee, China Bay, 0–100 ft, 27–31 Jan 1977, K.V. Krombein, P. Fernando, D.W. Balasooriya, V. Gunawardane (USNM). One paratype has been deposited in the National Museums of Sri Lanka (Colombo).

The paratypes are 8.0–8.4 mm long and are very much like the holotype except that the tarsi are lighter brown in two specimens.

45. *Methocha (Dryinopsis) anomala*, new species

This species and *M. (D.) ceylonica*, new species, differ from the other two Ceylonese males of the

subgenus in having the ocelli closer together so that the ocellular distance is twice or more the postocellar distance instead of being 1.5 times or less. These two species also differ in having the lateral area of the dorsal propodeal surface strongly shagreened and in having the cuspis of the genitalia digitate rather than blunt (cf. Figures 37, 38). The almost entirely light-red legs of *M. (D.) anomala* separate it at once from *M. (D.) ceylonica* which has almost entirely dark-brown legs.

Methocha anomala occurs in both the Dry Zone and Wet Zone, in areas ranging from light to heavy rainfall. Putative host larvae include some eight taxa of Cicindelidae as noted in the discussion under "Subfamily Methochinae."

ETYMOLOGY.—The specific name is based on the Greek *anomalos* (strange).

HOLOTYPE.—♂, Sri Lanka, Eastern Province, Amparai District, Ekgal Aru Sanctuary Jungle, 100 m, in Malaise trap, 19–22 Feb 1977, K.V. Krombein, P.B. Karunaratne, P. Fernando, D.W. Balasooriya (USNM Type 100290).

MALE.—Length 8.5 mm, forewing 6.2 mm. Black, palpi testaceous, the following light red: mandible except extreme base, tegula and legs. Vestiture glittering white, relatively dense, short and suberect on head and thorax, sparser and subappressed on abdomen. Wings clear, stigma dark brown, veins light brown.

Head width 1.4 times height from apex of clypeus to fore ocellus, interocular distance at anterior ocellus 1.3 times the least interocular distance; malar space evanescent; clypeal process narrow, in profile beaklike; punctuation of front as in *M. taprobane*, new species (Figure 28), ocellular line 2.5 times postocellar line; second and third flagellar segments subequal, 1.5 times as long as first.

Pronotal disk without anterior ridge, this area with a few transverse carinae behind which are fine punctures mostly separated by diameter of a puncture; scutum with small punctures, on raised median area these separated by half the diameter of a puncture, laterally and posteriorly the punctures subcontiguous except narrow areas laterad

of parapsidal furrow with sparser finer punctures; scutellar disk with small punctures separated by half the diameter of a puncture, declivous lateral areas with smaller confluent punctures; mesopleuron with continuous crenulate groove above and anteriorly, disk with fine punctures mostly separated by 2 to 3 times the diameter of a puncture; propodeum without median ridge, dorsal and posterior surfaces rounding gradually into each other and not separated by transverse rugulae, central area with coarse, irregular rugulose reticulations, lateral area strongly shagreened and with fine rugulose reticulations laterally and posteriorly, posterior surface with small rugulose reticulations becoming weaker toward apex, lateral surface with close oblique rugulae on anterior half, and fine rugulose reticulations tending to be in oblique rows on posterior half.

Abdominal dorsum with fine punctures separated by one-and-a-half times to twice the diameter of a puncture; genitalia indistinguishable from those of *M. (D.) ceylonica* (Figure 37).

FEMALE.—UNKNOWN.

PARATYPES.—CENTRAL PROVINCE. *Kandy District*: 1♂, Hasalaka Irrigation Bungalow, 5 mi NW of Mahiyangana, in Malaise trap, 30 Mar–9 Apr 1971, P. and P. Spangler, et al. (USNM); 1♂, same data but Kandy, Udawattakele Sanctuary, 2100 ft, 20–30 Jul 1976, S. Karunaratne (USNM). SABARAGAMUWA PROVINCE. *Ratnapura District*: 1♂, Sinharaja Jungle, 10 Sep 1979, P.B. Karunaratne, T. Wijesinhe, L. Jayawickrema, R. Subasinhe (USNM). SOUTHERN PROVINCE. *Galle District*: 1♂, Kanneliya section of Sinharaja Jungle, in Malaise trap, 13–16 Jul 1978, K.V. Krombein, P.B. and N. Karunaratne, T. Wijesinhe, L. Jayawickrema (USNM). A paratype has been placed in the National Museums of Sri Lanka (Colombo). A male from Kandy, Jul 1910, O.S. Wickwar (London), is not included in the type series because it lacks a head.

The male paratypes are 8.0–8.5 mm long and agree well in all details except that the tarsi of the Udawattakele and Kanneliya specimens are brown.

Genus *Karlissa* Krombein

Karlissa Krombein, 1979:428 [type-species: *Methoca* [sic] *rugosa* Cameron, by original designation].

The species on which this unusual genus is based has been known for more than eight decades only from the unique male type of *M. rugosa* Cameron from Ceylon. I recognized that it constituted a new genus of Methochinae when I studied the type in 1965. In proposing the genus *Karlissa*, I suggested that its rarity might be due to its leading an arboreal existence and that it might parasitize larvae of arboreal tiger beetles dwelling in borings in twigs and branches.

I searched unsuccessfully in Sri Lanka for *Karlissa* during 11 trips from 1969 to 1980. Finally, on my twelfth trip in 1981, a serendipitous event occurred leading to the capture of the second male. I had been collecting small Hymenoptera and Coleoptera in leaf litter on the downslope of the bund at Palatupana tank. This is on the xeric southeast coast of the Dry Zone and is a locality where I had collected during eight previous trips. At 0915 bladder pressure from a diuretic caused me to move 10 meters away beneath a ranawara tree. Just as I completed this urgent elimination, I noted a male *Karlissa* clinging to a low plant. Several minutes earlier or later and I might have missed it. Two days later we captured the first known female *Karlissa* crawling on a trunk of an adjacent ranawara, as well as an adult flightless cicindelid, *Tricondyla coriacea* Chevrolat, its putative host.

A generic diagnosis of the male was published in 1979, and the following diagnosis is presented for the female.

FEMALE.—Head (Figures 24, 25): maxillary palpus 6-segmented, labial palpus 4-segmented; mandible stout, concave on inner surface, apex with 2 equal teeth (Figure 25b); apical margin of clypeus deeply and narrowly emarginate between median lobe and the greatly produced lateral lobes; apex of labrum with a narrow lateral process extending beyond margin of median clypeal lobe; front with a pair of acute tubercles above

antennal insertions; ocelli in an equilateral triangle; antenna as in *Methocha* subgenus *Methocha*.

Thorax (Figure 26): scutum, scutellum, and mesopleuron completely fused, sutures absent that separate these sclerites in *Methocha* subgenus *Methocha*; mesosternum with a small median fovea but without median carina, margined posteriorly by a weak carina before mid coxae; tibial calcaria 1–1–1; outer surface of mid and hind tibiae with a single preapical spine.

Abdomen as in *Methocha*.

46. *Karlissa rugosa* (Cameron)

FIGURES 24–27, 36

Methoca [sic] *rugosa* Cameron, 1897:52, 53, pl. 4: fig. 11 [♂; Ceylon; type in Oxford University Museum].—Bingham, 1897:54 [♂; redescription of type].

Poecilotiphia (?) *rugosa* (Cameron).—Turner, 1908b:131 [tentative generic assignment].

Methocha rugosa Cameron.—Krombein, 1968:3 [confirmed as Methochinae].

Karlissa rugosa (Cameron).—Krombein, 1979:431–433, figs. 1, 2.

This rare species was known only from the unique holotype male until I captured a pair in the Dry Zone in 1981. The type bears two labels, a small square with a pencilled “11” probably referring to the figure accompanying the description and Cameron’s label “*Methoca/rugosa*/Cam.Type.” Cameron cited no collector and stated in his original description that the specimen came from Ceylon. His 1897 paper described a number of new Hymenoptera mostly from India, but it included 22 species from Ceylon. Ten of these were cited as being from Trincomali (Yerbury), six as Ceylon (Yerbury), and five as Ceylon (Rothney); the sixteenth, *M. rugosa*, presumably was collected by either Yerbury or Rothney.

My male was a teneral specimen clinging to a plant beneath a ranawara tree (*Cassia auriculata* Linnaeus, Leguminosae). It fell to the ground, and I picked it up. If my theory is correct that *Karlissa* preys upon larvae of arboreal flightless cicindelids breeding in borings in twigs or branches, then this male presumably fell onto the

plant from a branch overhead. We found the female two days later crawling downward on a trunk of another ranawara about a meter above the ground and a few meters from where the male had been captured. Earlier on this latter date I collected an adult flightless cicindelid, *Tricondyla coriacea* Chevrolat, on the same tree; it is the putative host of *Karlissa*.

The holotype is in reasonably good condition except that most of the flagellar segments are missing (note Cameron's figure) as well as the terminal segment of left foretarsus, left mid and hind tibiae and tarsi, and the right foretarsus except for the basal segment. Some vestiture, especially upon eyes, has been abraded, probably the result of the specimen having been preserved in formalin or some other liquid preservative when collected.

MALE.—Length 11–15 mm, forewing 8–9 mm. Black, glossy; mandible, scape, fore trochanter, femur and tibia darker red than palpi, antennal pedicel and first 4 flagellar segments which are lighter red; fifth flagellar segment infuscated at apex above; apex of pronotum narrowly reddened in type as are outer and hind margins of tegula in both specimens. Forewing hyaline to basal vein, the apical half infuscate; apical third of hind wing infuscate. Vestiture on front relatively dense, subappressed and golden, that on thorax sparse, suberect and glittering white; discal vestiture on abdomen sparse, suberect and white except apices of segments with a single row of subappressed black setae; setae on eyes short, relatively dense.

Head in frontal view with punctation and vestiture as figured (Figure 27); clypeal keel very compressed; first 8 flagellar segments relatively shorter and broader than in other male methochines; malar space very narrow; ocelli normal in size, arranged in a low triangle, the lateral ocellar distance two-thirds the postocellar distance and half the ocellocular distance; no groove behind posterior ocelli; the vertex and upper temples with relatively scattered punctures; lower temples and genae closely punctate; head behind hypostomal area transversely rugose.

Pronotum along midline 0.8 times as long as scutum, median length two-thirds the anterior width, the latter about 0.7 times as wide as width at tegulae, disk anteriorly with strong ridge extending onto sides, anterior two-thirds of disk and sides with close transverse rugae which become oblique posteriorly on side, posterior third of dorsum smooth with scattered small punctures, the pronotal dorsum sloping gradually upward to level of scutum; scutum somewhat irregularly, transversely rugose between parapsides which extend entire length of scutum, area between parapsides and tegulae pitted; scutellum as long as scutum, a median, coarsely pitted triangular area raised above the abruptly declivous smooth sides, the short posterior section also abruptly declivous and with close, relatively small punctures; post-scutellum lying below the plane of the scutum-scutellum, anteriorly on median half with a narrow, deep depression, posteriorly in middle with small, close pits, laterally declivous and with a few oblique rugulae; mesopleuron anteriorly and above with a strong continuous ridge, upper two-thirds and posterior third coarsely pitted, more or less longitudinally on upper two-thirds, a deeply impressed, narrow, longitudinal, densely haired fossa on median third below the upper pitted area; mesosternum slightly concave along midline and with a deep, narrow apical fossa, a few short, transverse rugulae anteriorly, punctate and pitted elsewhere, at apex with short, strong transverse carina before each mid coxa; metapleuron longitudinally rugulose; metasternum at apex with a pair of narrowly separated, short ligulate processes, each overlying the inner ventral angle of hind coxa; dorsum of propodeum flat, lower than postscutellum, a median triangular areola formed by 2 strong rugulae nearly joined at base and diverging toward apex, area within areola with a few irregularly transverse rugulae, horizontal area laterad of areola with coarse rugulae forming irregular pits, the horizontal surface posteriorly with a strong, erect ruga; lateral surface of propodeum with strong, relatively close, oblique, somewhat irregular rugulae; posterior surface of propodeum abruptly declivous, with about 12

rugulae radiating outwardly from below, the median rugula the strongest.

Declivous anterior area of first abdominal tergum smooth, anterior half of dorsal surface irregularly, longitudinally rugulose, the remainder smooth except for an apical row of small punctures and laterally with larger punctures becoming more crowded at side; second through sixth terga each with a deep, curved, subbasal groove bearing close, short, longitudinal rugulae, these terga each with apical row of small punctures, smooth medially, and laterally with larger punctures becoming denser toward sides; seventh tergum rounded and with scattered larger punctures, pygidial area absent; first sternum anteriorly with strong transverse ridge from which extends a median ridge becoming gradually weaker and ending about three-fourths the length of segment, the surface elsewhere with coarse, close pits becoming more separated toward apex; second sternum with large, subcontiguous punctures and an apical row of close small ones; third through sixth sterna each with a deep, curved, subbasal groove, wider than those on terga, and each with close, short, longitudinal rugulae, each of these sterna with an apical row of close, small punctures, elsewhere with scattered, larger punctures which are denser anteriorly and laterally; seventh sternum with closer larger punctures, slightly notched apically in middle, punctate at base and with a lateral carina extending two-thirds the distance to apex; genitalia (Figure 36).

FEMALE.—Length 5.7 mm. Black, glossy, the following chestnut: palpi, mandible, scape, pedicel, first 5 flagellar segments, apices of coxae, and trochanters. Vestiture glittering white, erect, moderately long and sparse.

Head (Figures 24, 25) width 2.3 times least interocular distance; clypeus without a median swelling, apical margin deeply and narrowly emarginate between the median lobe and the strongly produced lateral lobe; front with a pair of acute tubercles above antennal insertions; ocelli in an equilateral triangle, postocellar distance half the ocellocular distance; front and vertex with small, scattered punctures.

Thorax in profile (Figure 26); pronotum half as wide as head and 1.2 times propodeal width, the disk convex and with scattered minute punctures; scutum and scutellum fused, rounded in profile, surface with scattered minute punctures; mesopleuron smooth with minute scattered punctures; propodeum similarly punctate.

Abdomen with denser though still quite separated small punctures.

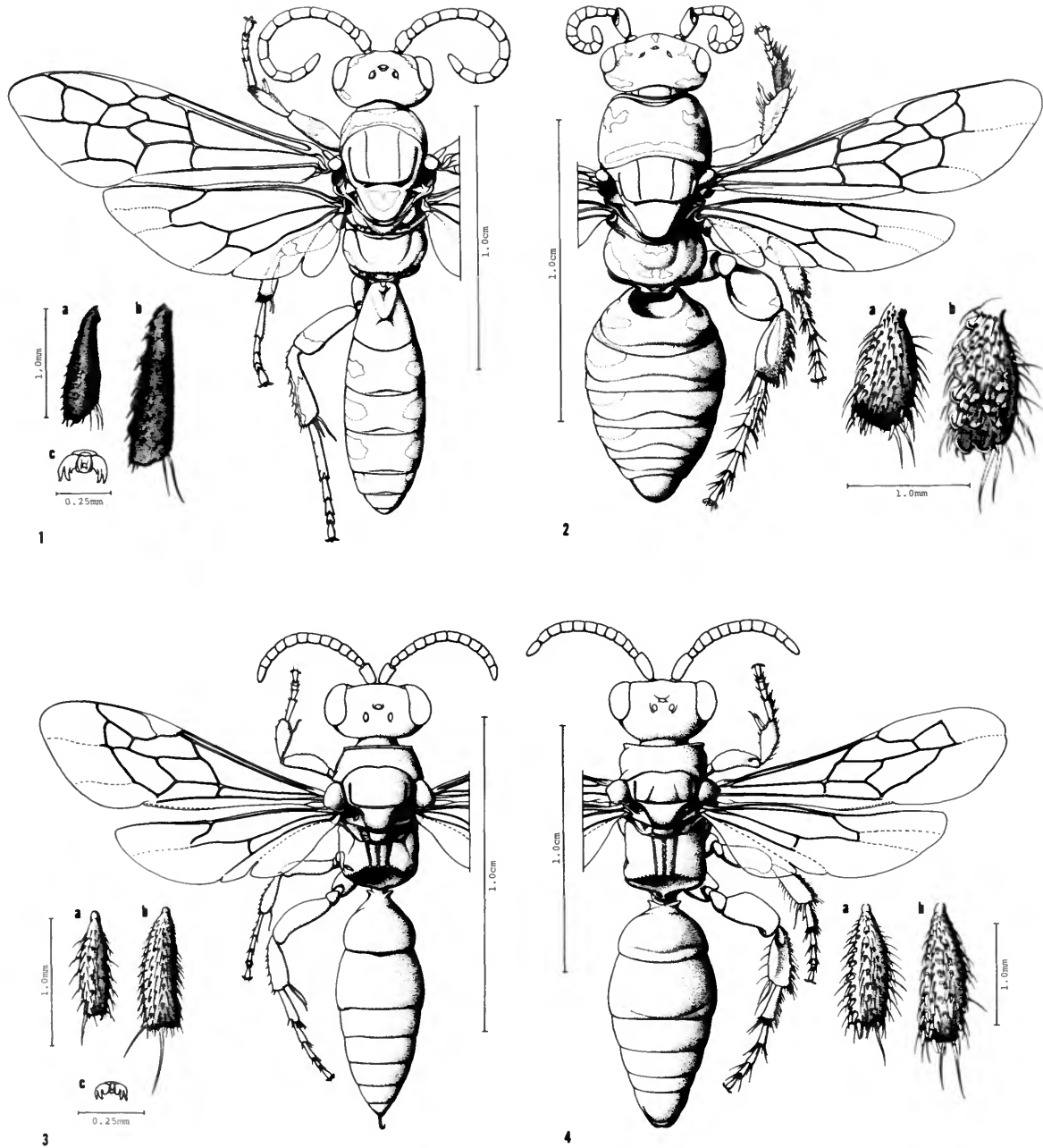
SPECIMENS EXAMINED.—SOUTHERN PROVINCE. *Hambantota District*: 1♂, Palatupana tank, 10–20 m, 31 Mar 1981, K.V. Krombein (USNM); 1♀, same locality but 2 Apr 1981, K.V. Krombein and T. Wijesinhe (USNM).

MISCELLANEOUS. 1♂, no locality label but stated to be from Ceylon in original description (Oxford).

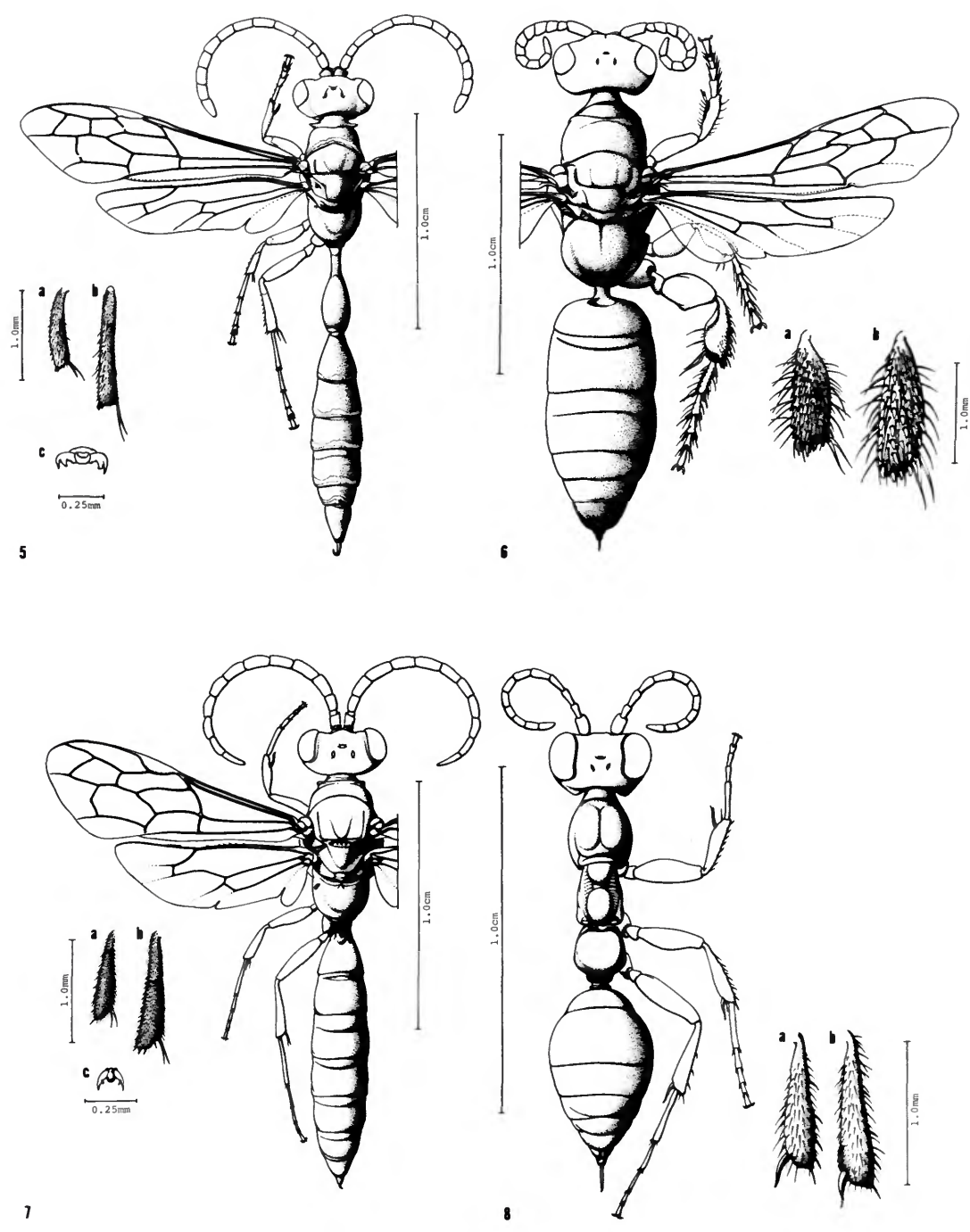
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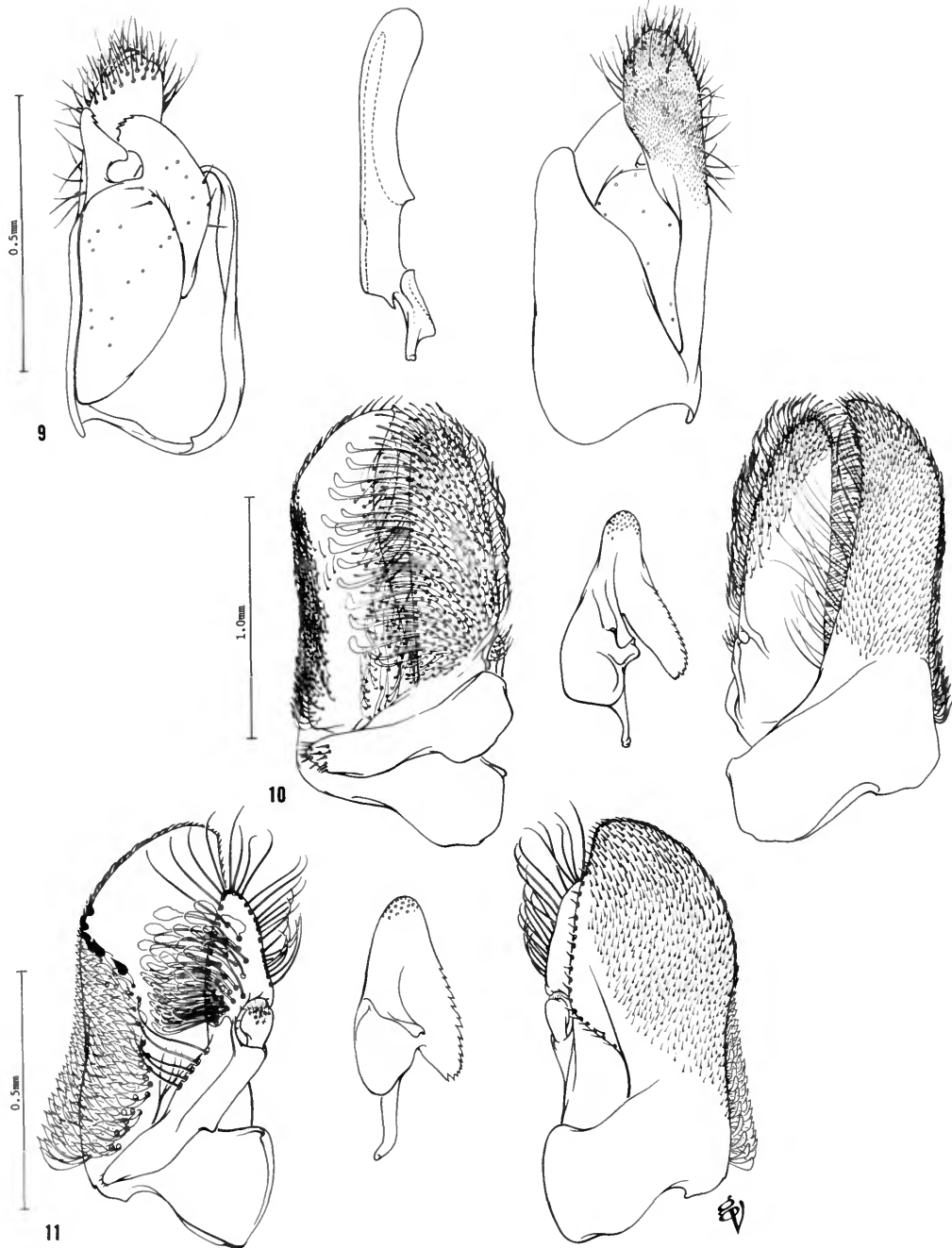
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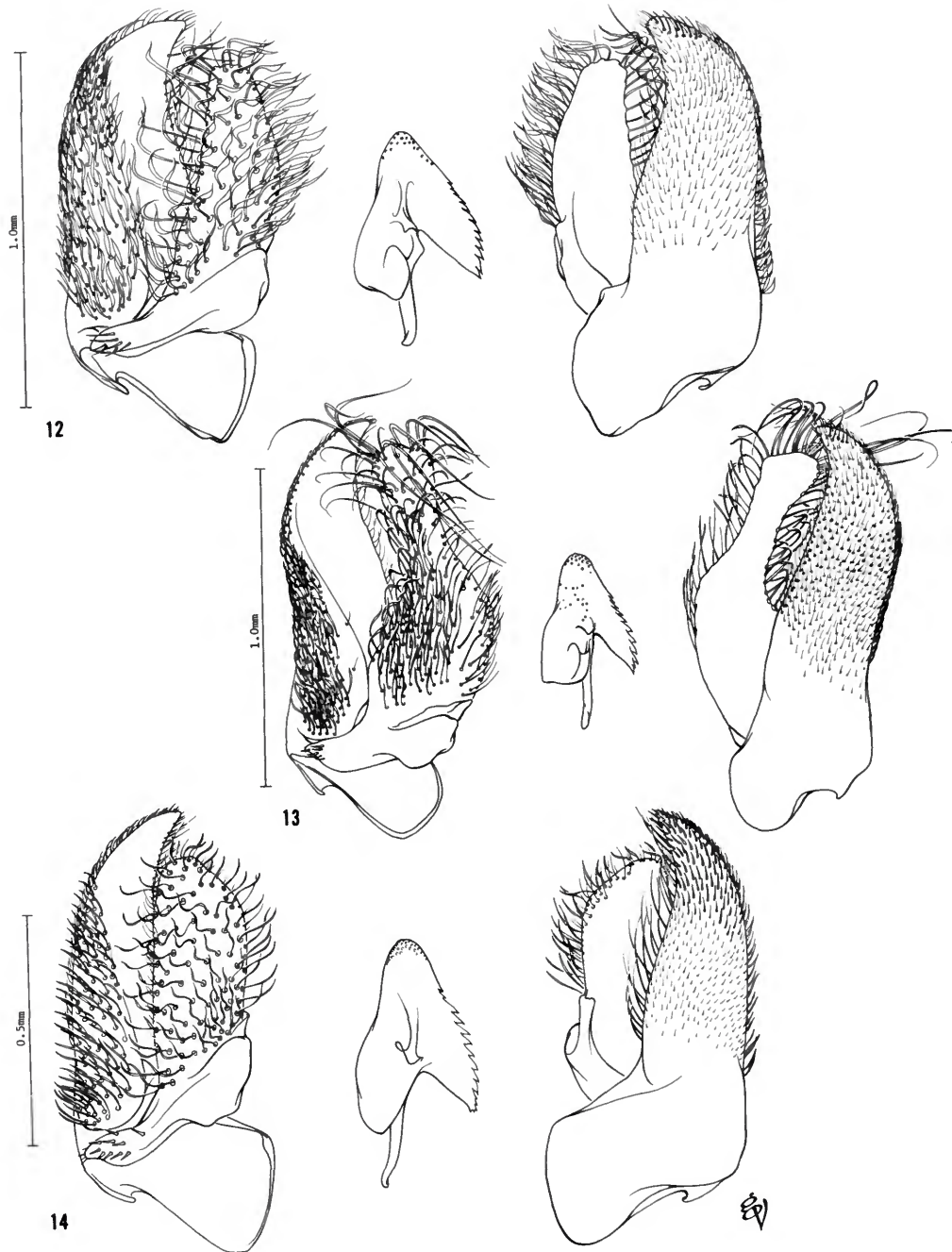
FIGURES 1-4.—Dorsal aspect; external surface of mid tibia (a); external surface of hind tibia (b); tarsal claw (c). *Anthobosca ceylonica*, new species: 1, male; 2, female. *Tiphia consueta* Smith: 3, male; 4, female.



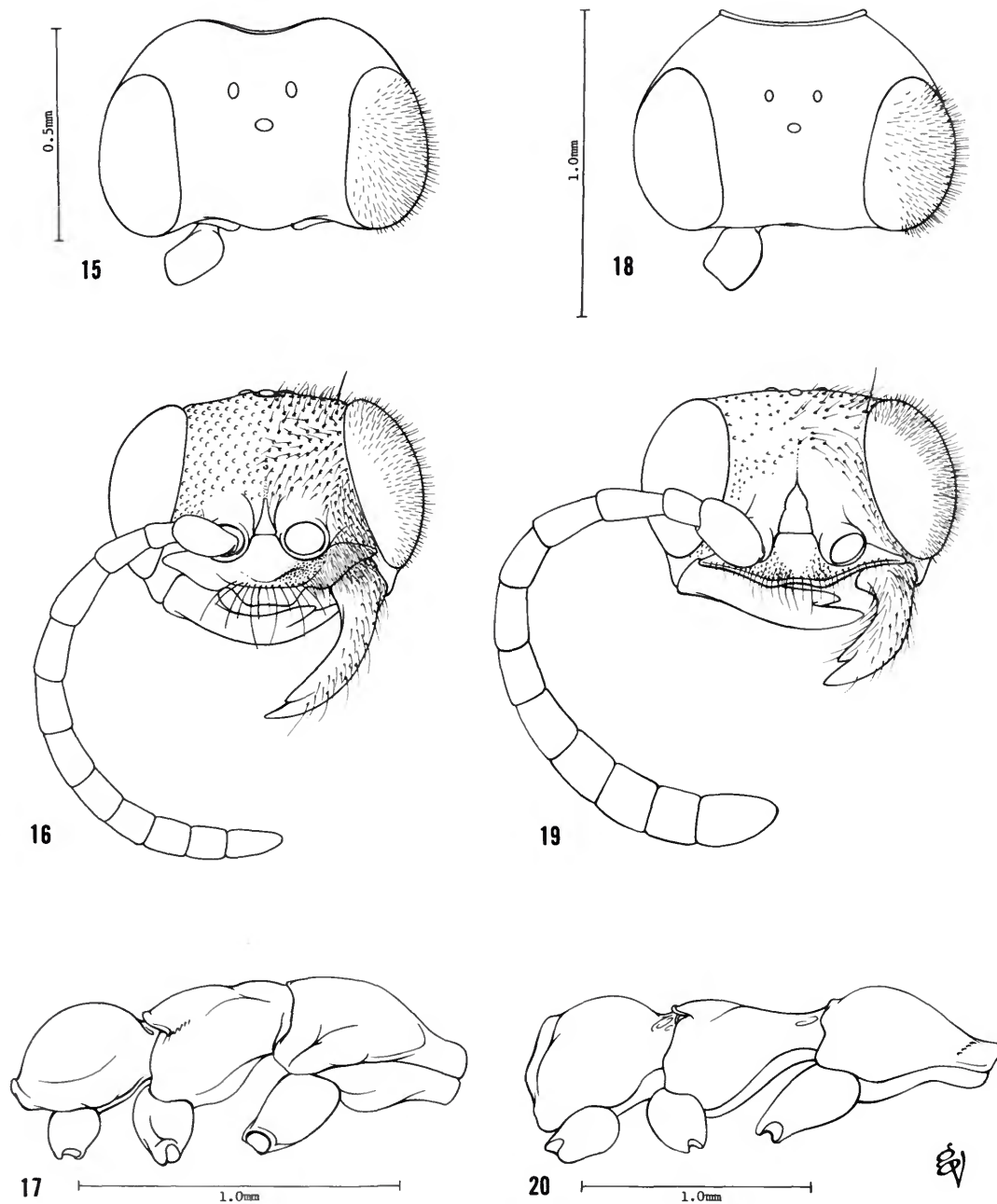
FIGURES 5-8.—Dorsal aspect; external surface of mid tibia (a); external surface of hind tibia (b); tarsal claw (c). *Mesa claripennis* (Bingham): 5, male; 6, female. *Methocha (Methocha) ubiquita*, new species: 7, male; 8, female.



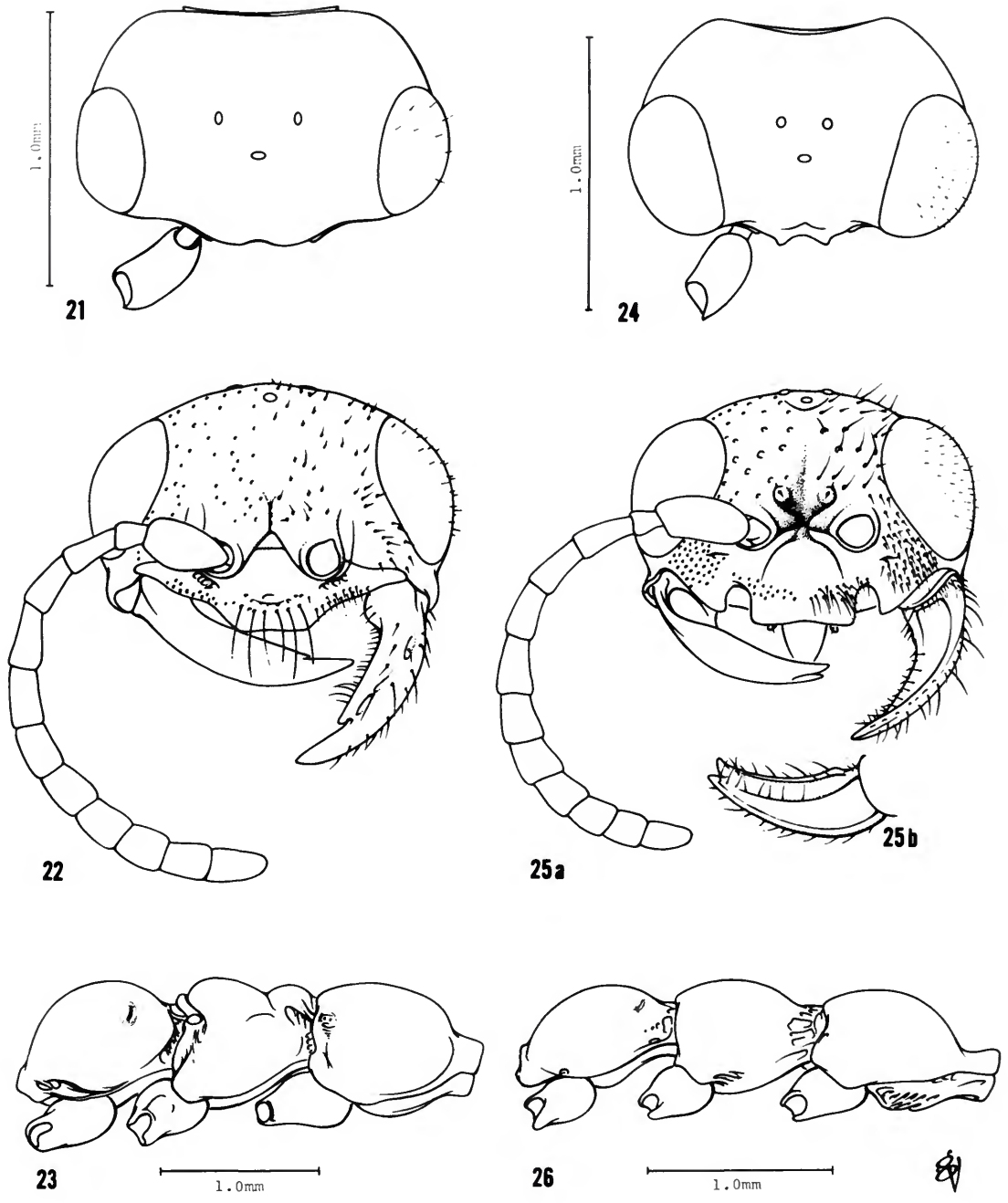
FIGURES 9-11.—Male genitalia, internal aspect (left), profile of aedeagus (center), external aspect (right): 9, *Anthobosca ceylonica*, new species; 10, *Mesa dimidiata* (Guérin); 11, *Mesa claripennis* (Bingham).



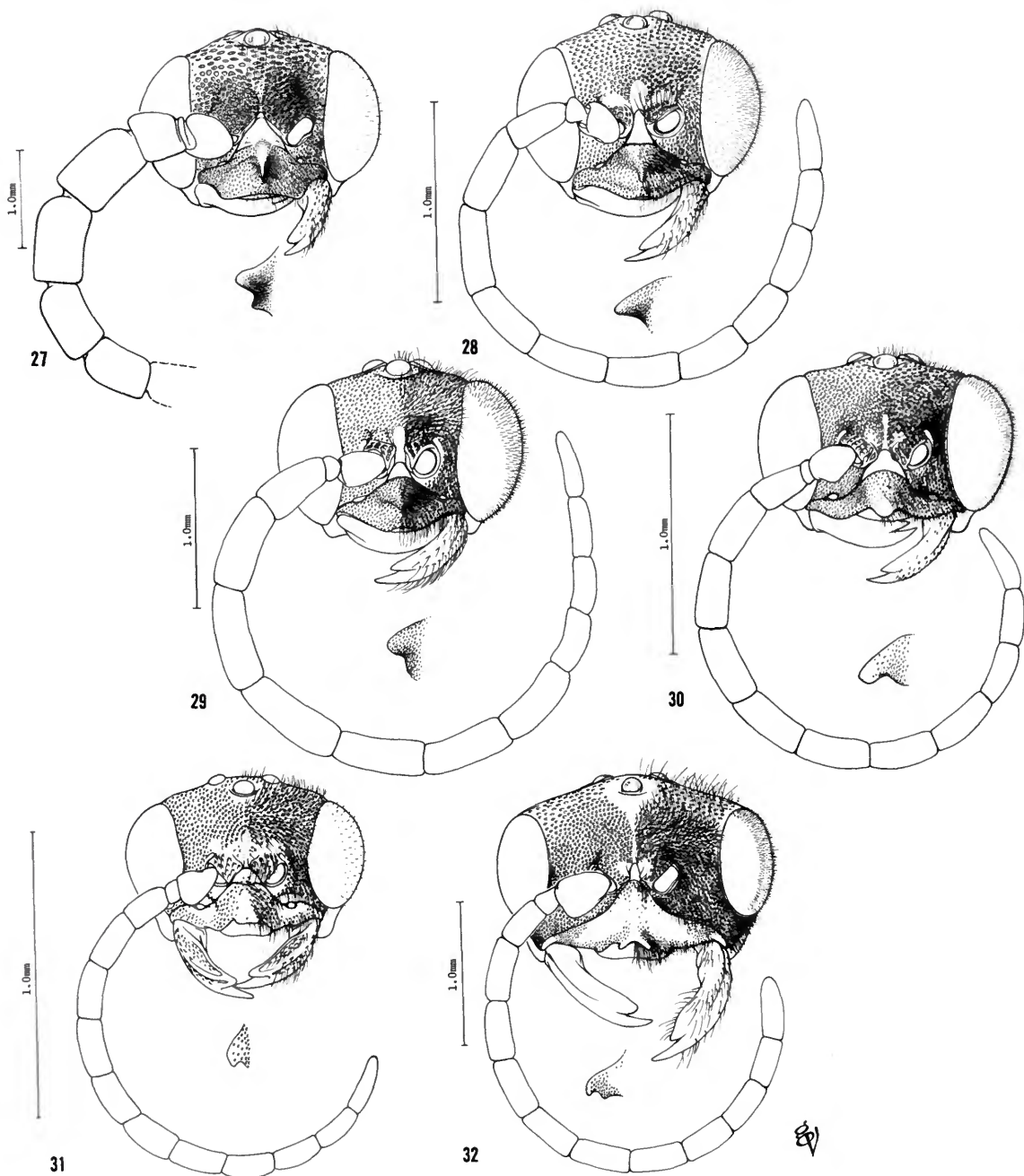
FIGURES 12-14.—Male genitalia, internal aspect (left), profile of aedeagus (center), external aspect (right): 12, *Mesa petiolata* (Smith); 13, *Mesa flavipennis*, new species; 14, *Mesa karunaratnei*, new species.



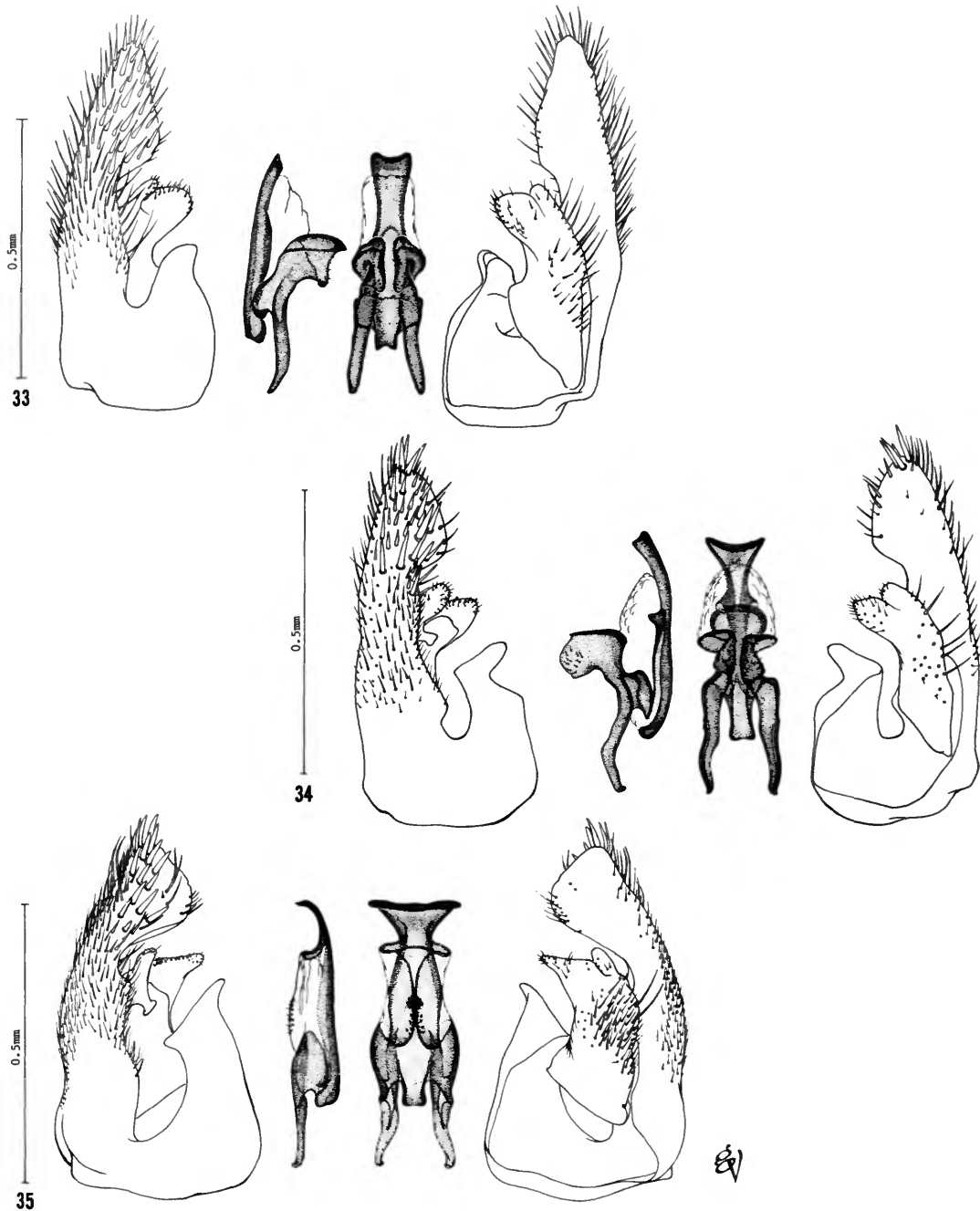
FIGURES 15-20.—Dorsal aspect of ♀ head (top), frontal view of ♀ head (center), lateral aspect of ♀ thorax (bottom): 15-17, *Methocha (Methocha) ubiquita*, new species (scale for 16 same as 15); 18-20, *Methocha (Dryinopsis) taprobane*, new species (scale for 19 same as 18).



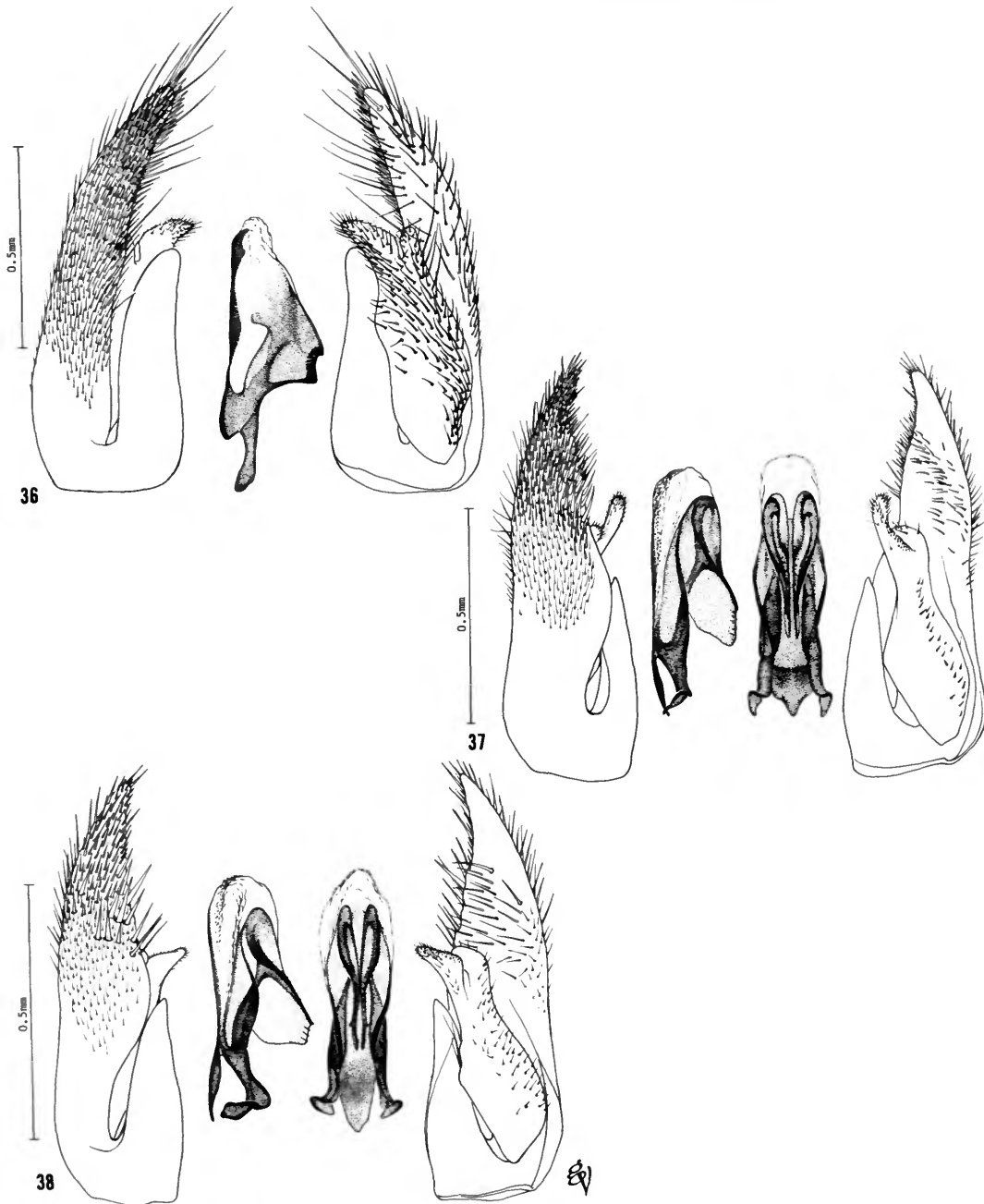
FIGURES 21-26.—Dorsal aspect of ♀ head (top), frontal view of ♀ head (center), lateral aspect of ♀ thorax (bottom): 21-23, *Methocha (Methocha) litoralis*, new species (scale for 22 same as 21); 24-26, *Karlissa rugosa* (Cameron) (25b, inner surface of mandible; scale for 25 same as 24).



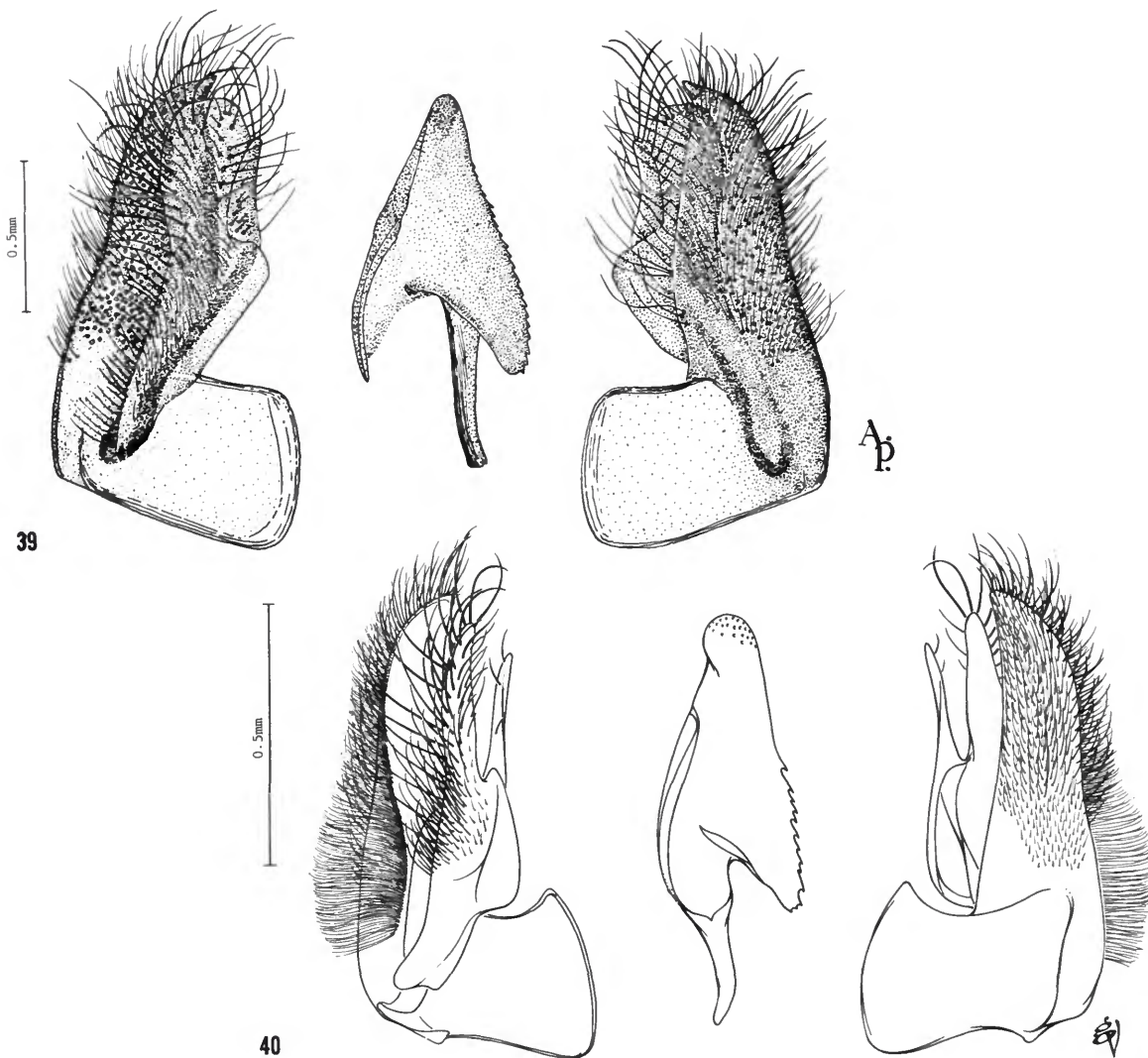
FIGURES 27-32.—Frontal aspect of ♂ head: 27, *Karlissa rugosa* (Cameron); 28, *Methocha (Dryinopsis) taprobane*, new species; 29, *Methocha (Dryinopsis) kandyensis*, new species; 30, *Methocha (Methocha) ubiquita*, new species; 31, *Methocha (Methocha) heveli*, new species; 32, *Methocha (Methocha) litoralis*, new species. (Insets are lateral aspects of clypeal processes.)



FIGURES 33-35.—Male genitalia, external aspect (left), profile of aedeagus (left center), ventral aspect of aedeagus (right center), internal aspect (right): 33, *Methocha (Methocha) ubiquita*, new species; 34, *Methocha (Methocha) heveli*, new species; 35, *Methocha (Methocha) litoralis*, new species.

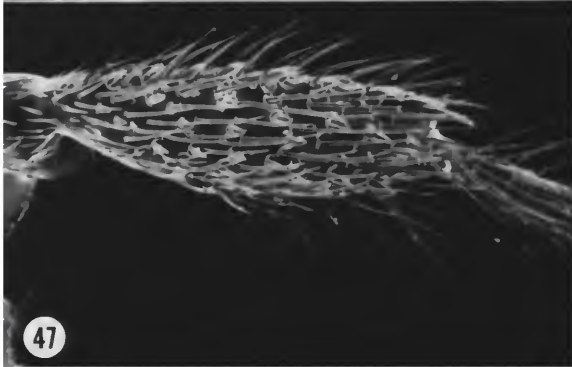
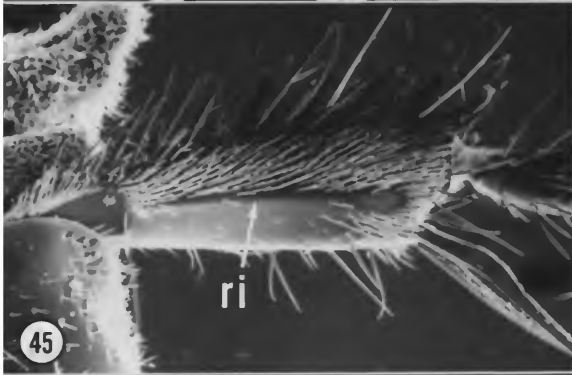


FIGURES 36-38.—Male genitalia, external aspect (left), profile of aedeagus (center, Figure 36; left center, Figures 37, 38), ventral aspect (right center, Figures 37, 38), internal aspect (right): 36, *Karlissa rugosa* (Cameron); 37, *Methocha (Dryinopsis) ceylonica*, new species; 38, *Methocha (Dryinopsis) taprobane*, new species.

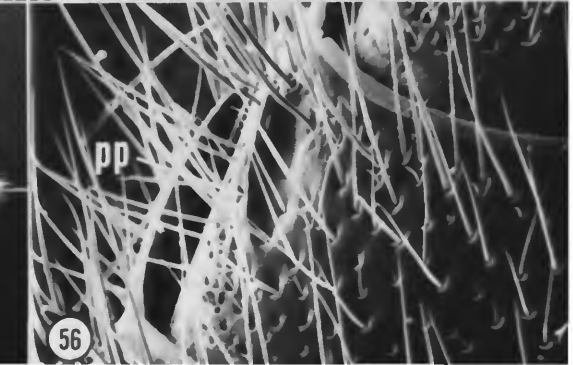
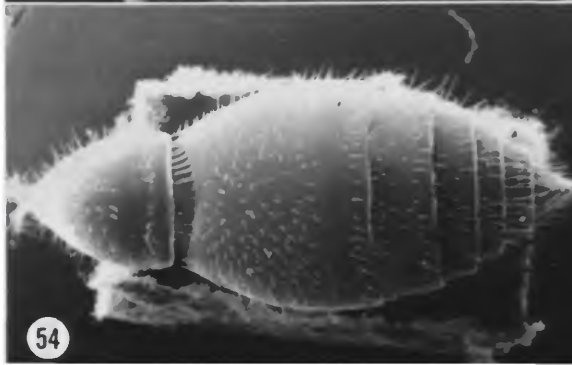
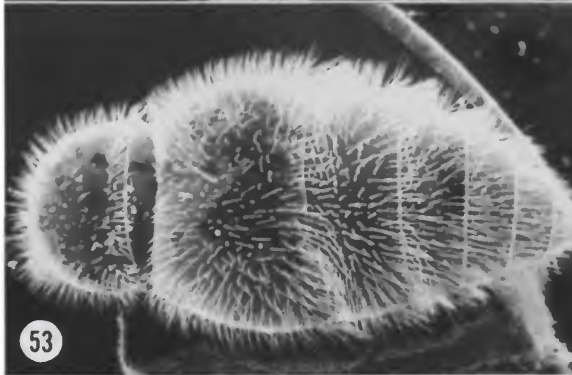
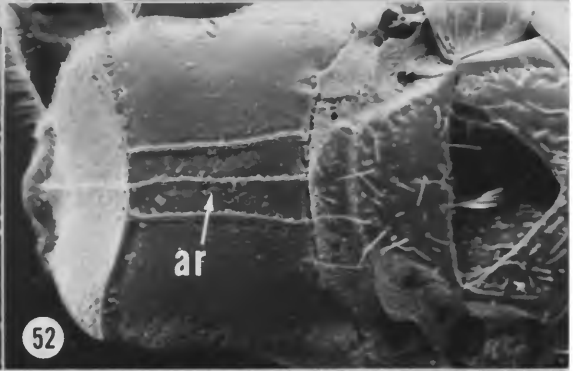
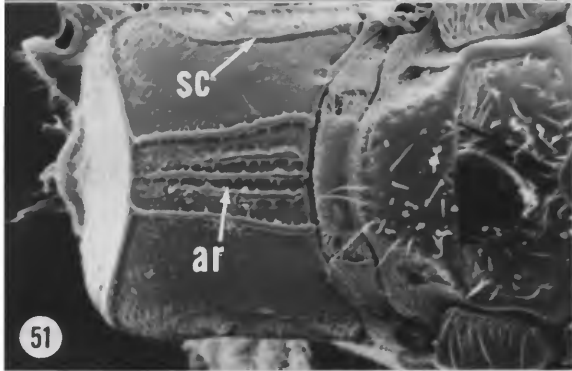
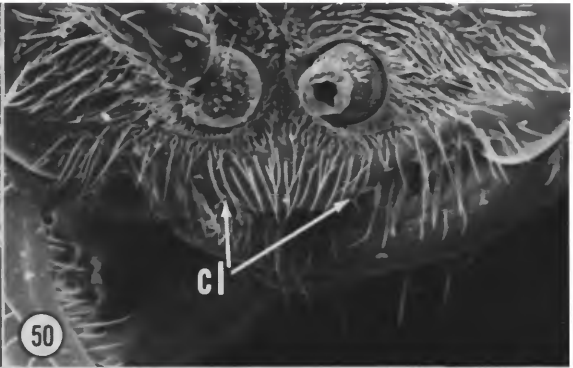
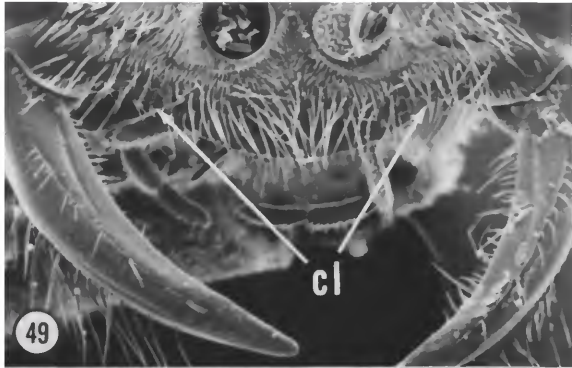


FIGURES 39, 40.—Male genitalia, internal aspect (left), profile of aedeagus (center), external aspect (right): 39, *Hylomesa longiceps* (Turner); 40, *Hylomesa anomala*, new species.

FIGURES 41-48.—*Tiphia* species: 41, *T. consueta* Smith, ♀, part of thoracic dorsum with wings removed showing normal tegula (te), × 90; 42, *T. oswini* Turner, ♂, part of thoracic dorsum with wings removed showing elongate tegula (te), × 70; 43, *T. hirashimai*, new species, ♀, inner surface of hind basitarsus showing groove (gr), × 60; 44, *T. decrescens* Walker, ♀, inner surface of hind basitarsus showing absence of groove, × 100; 45, *T. hirashimai*, new species, ♀, inner surface of hind tibia showing ridge (ri), × 40; 46, *T. decrescens* Walker, ♀, inner surface of hind tibia showing lack of ridge, × 75; 47, *T. hirashimai*, new species, ♀, outer surface of hind tibia showing normal, more slender tibia, × 35; 48, *T. decrescens* Walker, ♀, outer surface of hind tibia showing inflated tibia, × 75.



FIGURES 49–56.—*Tiphia* species: 49, *T. hirashimai*, new species, ♀, lower face showing broadly rounded clypeal lobe (cl), × 40; 50, *T. decrescens* Walker, ♀, lower face showing normal narrow clypeal lobe (cl), × 75; 51, *T. decrescens* Walker, ♀, part of thoracic dorsum with wings removed showing quinquecarinate propodeal areola (ar) and submarginal carina (sc), × 40; 52, *T. consueta* Smith, ♀, part of thoracic dorsum with wings removed showing normal tricarinate propodeal areola (ar) and lack of submarginal carina, × 35; 53, *T. hirsuta* Smith, ♂, abdominal dorsum showing abnormally hirsute condition, × 20; 54, *T. oswini* Turner, ♂, abdominal dorsum showing normal vestiture, × 25; 55, *T. pulawskii*, new species, ♂, lateral part of fifth abdominal sternum showing posterolateral process (pp) with adjacent depressed but not invaginated area, × 200; 56, *T. hirsuta* Smith, ♂, lateral part of fifth abdominal sternum showing posterolateral process (pp) lying over an invaginated depression, × 100.



FIGURES 57-64.—Males of *Tiphia* species: 57, *T. decrescens* Walker, lateral aspect of abdominal apex showing dense tuft (tu) of suberect hair on sixth sternum, $\times 80$; 58, *T. nilgirensis* Allen, lateral aspect of abdominal apex showing absence of dense tuft of suberect hair on sixth sternum, $\times 85$; 59, *T. hirashimai*, new species, lower face showing strong subapical denticle (de) on mandible, $\times 55$; 60, *T. wittmeri*, new species, lower face showing weak subapical denticle (de) on mandible, $\times 75$; 61, *T. consueta* Smith, lower face showing absence of subapical denticle on mandible, $\times 55$; 62, *T. nilgirensis* Allen, lower face showing well-developed preapical denticle (de) on mandible, $\times 65$; 63, *T. decrescens* Walker, lower face, $\times 70$; 64, *T. hirsuta* Smith, lower face showing abnormally dense vestiture, $\times 45$.



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