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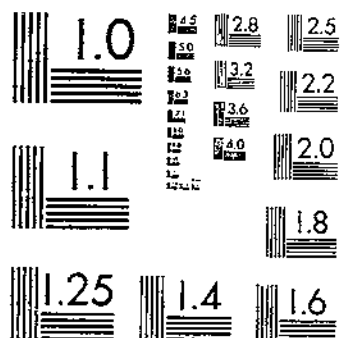
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THE GENUS TIPHIA OF THE INDIAN SUBCONTINENT

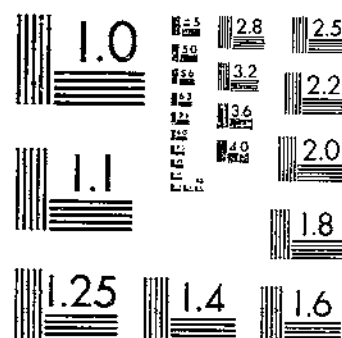
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# THE GENUS TIPHIA OF THE INDIAN SUBCONTINENT

Technical Bulletin No. 1509

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UNITED STATES DEPARTMENT OF AGRICULTURE

**THE GENUS TIPHIA  
OF THE  
INDIAN SUBCONTINENT**

**By Harry W. Allen**

**Technical Bulletin No. 1509**

**Agricultural Research Service  
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## THE GENUS *TIPHIA* OF THE INDIAN SUBCONTINENT

By HARRY W. ALLEN, *research fellow, Academy of Natural Sciences of Philadelphia*, and collaborator, *Systematic Entomology Laboratory, North-eastern Region, Agricultural Research Service*

The Indian subcontinent appears to be rich in species of *Tiphia*. During the long period of British dominance there, numerous species were described by Frederick Smith (1855-79), P. Magretti (1892), Peter Cameron (1897-1904), C. T. Bingham (1897-1906), C. G. Nurse (1903), and R. E. Turner (1908-11). These species were not represented by an adequate series of syntypes, and most of them were inaccurately defined.

Allen and Jaynes (1930)<sup>1</sup> described 42 species of Asiatic Tiphinae and included keys. Biological studies have been made of many of these species in their Asian habitat in connection with introducing suitable parasites of the Japanese beetle and other Asiatic beetles into the United States. Most of the species described were from eastern Asia and only five from India.

In 1966 I had an opportunity to study the types of Asiatic *Tiphia* described by European taxonomists and deposited in the collections of the British Museum of Natural History and Oxford University. They represent all the species of Indian *Tiphia* described from 1855 to 1911 except *T. lyrata* Magretti, which is in the collection of the Genoa museum. I (1969) have redescribed these types.

During the 1920's C. P. Clausen and L. B. Parker of the former U.S. Bureau of Entomology spent many months in India seeking Asiatic beetle parasites that might be desirable in the biological control of Asiatic scarabaeid beetles introduced into the United States. Several species of *Tiphia* were collected and their introduction was considered. Adequate series of pinned specimens of these species have been in the former Moorestown, N.J., laboratory<sup>2</sup> collection for many years.

<sup>1</sup> The year in italic after the authors' names indicates the reference in Literature Cited, p. 94.

<sup>2</sup> Now Beneficial Insects Research Laboratory, U.S. Department of Agriculture, Newark, Del.

These previously undescribed species are included in this bulletin. A collection of unidentified Tiphinae, chiefly from southern India, was received at the Moorestown laboratory from the Rijksmuseum at Leiden, Netherlands, and another collection from the Canadian Entomology Research Institute, Ottawa, Ontario, during the 1920's. Based on this material, 37 new species have been described in this bulletin.

Among the species I have studied from the Indian subcontinent, only one species outside the subgenus *Tiphia* has been found on this subcontinent. This is *assamensis* Allen and Jaynes of the subgenus *Jaynesia*. Except for *T. assamensis*, *capillata*, *pullivora*, and *matura* (Allen and Jaynes, 1930), none of the described species have been represented by a satisfactory series of syntypes, and most have been known only from single specimens or a single male and single female. Among the 37 new species described here, 3 are represented only by the holotype, 10 have less than 10 paratypes, and the others have 10 or more, totaling over 980 paratypes. This abundance of type material establishes the taxonomy of the Indian Tiphinae on a much broader base than has existed.

Many of the characters used in describing the species here are the same as I (1971, pp. 204-212) used previously.

For the loan of specimens I am indebted to M. Ivanachko, Canadian Entomology Research Institute [CERI], and J. van der Vecht and A. Willink, Rijksmuseum van Natuurlijke Historie [RNH], Leiden, Netherlands.

Holotypes, allotypes, and some paratypes from material in the collection at Moorestown [M] are deposited in the U.S. National Museum of Natural History [NMNH], Washington, D.C. Reference is made frequently in this bulletin to type material studied in 1966 at the British Museum of Natural History [BMNH], London, and at Oxford University [OU], Oxford, England.

The illustrations are by Mary H. Fuges, illustrator for the Academy of Natural Sciences, Philadelphia.

### Key to Males

- |  |   |
|--|---|
| 1. Fifth sternum without lateral denticle .....  | 2 |
| Fifth sternum with lateral denticle .....  | 6 |
| 2. Lateral extension of radial cell distinctly less than that of second cubital cell ..... | 3 |
| Lateral extension of radial cell exceeding that of second cubital cell .....               | 4 |



3. Dorsal propodeum coarsely and deeply rugose ---1. *canaliculata* Cameron  
Dorsal propodeum not deeply rugose -----2. *pulchaulkiae*, new species
4. Tergum 1 conspicuously elongated, 1.7 times as long as wide;  
preapical band not differentiated from dorsal punctures; upper  
front without interspaces as wide as ocellus ---3. *murreea*, new species  
Tergum 1 not conspicuously elongated; preapical band present --- 5
5. Upper front with impunctate interspaces as wide as ocellus-----  
-----4. *clavinerva* Cameron  
Upper front without impunctate interspaces as wide as ocellus---  
-----5. *dutti*, new species
6. Tergum 1 with anterior transverse carina ---6. *coimbatorea*, new species  
Tergum 1 without anterior transverse carina ----- 7
7. Tegula elongate, at least 1.5 times as long as middle width ----- 8  
Tegula at most only slightly elongated ----- 10
8. Legs black; mandible with prominent preapical denticle -----  
-----7. *oswini* Turner  
Two front pairs of legs except coxae castaneous to bright red;  
mandible without well-developed preapical denticle ----- 9
9. Tegula with fringes transparent; denticle of sternum 5 massive  
and broadly overhanging polished plaque -----8. *tegulita*, new species  
Tegula with fringes obscurely translucent; denticle of sternum 5  
not associated with polished plaque -----9. *tegelonga*, new species
10. Mandible with acutely pointed preapical cusp ----- 11  
Mandible without massive or acutely pointed preapical denticle --- 19
11. Abdomen with terga terminating in conspicuous rows of dark-  
orange bristles -----10. *aurata*, new species  
Abdomen without conspicuous rows of dark-orange bristles ----- 12
12. Radial cell distinctly less in lateral extension than second cubital  
cell ----- 13  
Radial cell equaling or exceeding second cubital cell in lateral  
extension ----- 14
13. With brush of dense hairs on sterna 6 and 5 -----11. *implicata* Cameron  
Without brush of dense hairs on sterna 6 and 5 -----  
-----2. *pulchaulkiae*, new species
14. Radial cell of forewing greatly exceeding second cubital cell in  
lateral extension ----- 15  
Radial cell of forewing at most only slightly exceeding second  
cubital cell in lateral extension ----- 18
15. Cheek wider than antennal fossa; head width 2.1 times least  
distance between eyes; tegula entirely yellow translucent; hind  
tibia entirely red without thin carina on inner face -----  
-----12. *capillata* Allen and Jaynes  
Cheek narrower than antennal fossa; head width not less than 2.3  
times least distance between eyes ----- 16
16. Front with fine, sparse punctures, interspaces wider than ocellus;  
dorsal propodeum not coarsely rugose -----13. *lotharae*, new species  
Front closely coarse punctate, without interspaces as wide as  
ocellus; dorsal propodeum coarsely rugose ----- 17
17. Lower front with long, thin median carina -----14. *incisa* Cameron  
Lower front without median carina -----15. *simlaensis* Cameron

18. Head and dorsal pronotum broadly shagreened; radial cell of forewing slightly exceeding second cubital cell in lateral extension; head width 2.1 to 2.2 times least distance between eyes ----- 16. *pullivora* Allen and Jaynes
- Head and dorsal pronotum not shagreened; radial cell of forewing equaling second cubital cell in lateral extension; head width 1.8 to 2.0 times least distance between eyes ----- 17. *nilgiria*, new species
19. Sixth sternum with tuft of fine, dense, brownish hairs ----- 20
- Sixth sternum with only short, sparse hairs ----- 22
20. Cheek masked with coarse white hairs; clypeus with conspicuous "mustache" of long bristly hairs ----- 18. *hirsuta* Smith
- Cheek and clypeus without unusually long, conspicuous hairs ----- 21
21. Head width 2.5 times least distance between eyes; radial cell only slightly exceeding second cubital in lateral extension; front without impunctate interspaces as wide as ocellus ----- 19. *latorea*, new species
- Head width 2.2 times least distance between eyes; radial cell greatly exceeding second cubital in lateral extension; upper front with one or two interspaces as wide as ocellus ----- 20. *nepalensis*, new species
22. Fifth sternum with orifice lying under uplifted edge of lateral denticle ----- 23
- Fifth sternum without orifice beneath edge of lateral denticle ----- 25
23. Sternal denticle on outside with flanking groove and sometimes outside that another bordering rounded ridge ----- 21. *milleri*, new species
- Sternal denticle on outside without flanking ridges or grooves ----- 24
24. Forewing with radial cell greatly exceeding second cubital cell in lateral extension ----- 22. *flavipalpis*, new species
- Forewing with radial cell slightly less than second cubital cell in lateral extension ----- 23. *orificia*, new species
25. Dorsal propodeum entirely and very deeply transverse rugose ----- 24. *madrassa*, new species
- Dorsal propodeum not coarsely or deeply rugose, usually partly smooth ----- 26
26. Lateral extension of radial cell distinctly less than that of second cubital cell ----- 25. *fuscinervis* Cameron
- Lateral extension of radial cell equaling or exceeding second cubital cell in lateral extension ----- 27
27. Cheek narrower than antennal fossa ----- 28
- Cheek as wide as or wider than antennal fossa ----- 30
28. Clypeal extension bidentate on front not wider than antennal fossa ----- 26. *ivanochkoi*, new species
- Clypeal extension bidentate on front exceeding width of antennal fossa ----- 29
29. Radial cell greatly exceeding second cubital cell ----- 27. *pecki*, new species
- Radial cell only slightly exceeding second cubital cell in lateral extension ----- 28. *dampara*, new species
30. Legs bright red ----- 29. *birganjue*, new species
- Legs black ----- 31

31. Dorsal pronotum without sharply defined transverse carina ..... 32  
 Dorsal pronotum with sharply defined transverse carina ..... 33
32. Radial cell greatly exceeding second cubital cell in lateral extension; first abdominal segment exceptionally elongate, 1.6 times as long as horizontal width ..... 30. *tibetana* Turner  
 Radial cell slightly exceeding second cubital cell in lateral extension; first abdominal segment not unusually elongate, 1.3 times as long as horizontal width ..... 31. *fletcheri*, new species
33. Front, except sometimes on median line, without impunctate areas that are nearly as wide as ocellus; transverse carina of dorsal pronotum buttressed with many long, strong cross ridges ..... 32. *nathani*, new species  
 Front with several impunctate areas as wide as or nearly as wide as ocellus; transverse carina of dorsal pronotum buttressed with only obscure cross ridges ..... 34
34. Hind tibia sharply carinate entire length of inner face ..... 33. *godavariac*, new species  
 Hind tibia not carinate on inner face ..... 34. *cinchonae*, new species

### Key to Females

1. Apex of tergum 1 with deep, tightly infolded incision (subgenus *Jaynesia*) ..... 35. *assamensis* Allen and Jaynes  
 Apex of tergum 1 without deep, tightly infolded incision (subgenus *Tiphia*) ..... 2
2. Hind basitarsus without groove on inner face ..... 3  
 Hind basitarsus with groove on inner face ..... 18
3. Dorsal propodeum with conspicuous longitudinal carina about midway between areola and lateral margin ..... 36. *shillonga*, new species  
 Dorsal propodeum without longitudinal carina between areola and lateral margin ..... 4
4. Tegula more than 1.5 times as long as middle width; areola with five longitudinal carinae ..... 5  
 Tegula at most only slightly longer than middle width, areola with three longitudinal carinae ..... 6
5. Medium-sized species with reddish-brown legs ..... 37. *quinque carinata* Cameron  
 Small species with bright-red legs ..... 38. *devalae*, new species
6. Lateral propodeum without any parallel rugulae on upper part; small species 4.5 to 6 mm long ..... 39. *s-tertia*, new species  
 Lateral propodeum with parallel rugulae on upper part; chiefly species longer than 7 mm ..... 7
7. Femur of hind leg entirely bright red ..... 8  
 Femur of hind leg black or dull brown at least on outer face ..... 10
8. Tibiae of middle and hind legs entirely bright red, strongly inflated ..... 40. *rufipes* Smith  
 Tibiae of middle and hind legs black; notaulices and anteromedian escarpment of scutum strongly connected ..... 9

9. Radial cell of forewing nearly closed with spur directed upward and inward toward costal margin; notaulices and anteromedian escarpment always strongly connected; punctate part of pygidium rough and almost rugose .....41. *scutensis*, new species
- Radial cell without spur or with one outwardly directed; notaulices and anteromedian escarpment often connected; lower disk of punctate part of pygidium smooth, polished .....32. *nathani*, new species
10. Tibiae of middle and hind legs bright red, inflated with arched upper margins .....12. *capillata* Allen and Jaynes
- Tibiae of middle and hind legs black, or at least not bright red ..... 11
11. Areola of dorsal propodeum with five high, thin, parallel carinae, intermediate two similar to others but shorter .....42. *lyrata* Magretti
- Areola of dorsal propodeum with only three longitudinal carinae. . . 12
12. Sternum 2 with anterior transverse carina; length 17 mm .....43. *rothneyi* Cameron
- Sternum 2 without anterior transverse carina; length 12 mm or less ..... 13
13. Dorsal pronotum without transverse carina complete over middle section ..... 14
- Dorsal pronotum with transverse carina complete over middle section ..... 16
14. Scutum with anteromedian escarpment and notaulices always strongly connected .....44. *katmanduae*, new species
- Scutum with its anteromedian escarpment and notaulices not connected ..... 15
15. Impunctate part of pygidium conspicuously and broadly shagreened .....45. *tuberculata* Cameron
- Impunctate part of pygidium not shagreened .....46. *lawrencei*, new species
16. Hind tibia carinate on inner face, its upper margin not arched .....34. *cinchonae*, new species
- Hind tibia without carina on inner face, its upper margin moderately arched ..... 17
17. Apex of radius of forewing with inwardly directed spur .....47. *petri* Turner
- Apex of radius without inwardly directed spur .....48. *nilgirensis*, new species
18. Tergum 1 with strong transverse carina .....49. *exakta* Nurse
- Tergum 1 without transverse carina ..... 19
19. Tegula at least 1.5 times as long as middle width ..... 20
- Tegula at most only slightly longer than middle width ..... 21
20. Length 12 mm; dorsal pronotum shagreened; hind tibia strongly arched on upper margin; punctate part of pygidium divided by impunctate vitta .....7. *oswini* Turner
- Length 5.5 to 9 mm; dorsal pronotum not shagreened; hind tibia not arched on upper margin; punctate part of pygidium not divided by impunctate vitta .....9. *tegelonga*, new species
21. Hind femur completely bright red ..... 22
- None of legs bright red, although in some species middle and hind legs are reddish at least on inner surface ..... 27

22. Femur of middle leg black ..... 50. *robusta* Cameron  
 Femur of middle leg red ..... 23
23. Upper front without impunctate interspaces as wide as ocellus ..... 24  
 Upper front with impunctate interspaces wider than ocellus ..... 25
24. Subtegular patch of microsetae wider than tegula .....  
 ..... 51. *davarae*, new species  
 Subtegular patch of microsetae narrower than tegula .....  
 ..... 52. *magretti* Cameron
25. Lateral pronotum with long, narrow groove across its disk .....  
 ..... 53. *khasiana* Cameron  
 Lateral pronotum without groove across its disk, or if present,  
 not long and narrow ..... 26
26. Hind basitarsus with deep, narrow groove, abdomen broadly  
 shagreened ..... 54. *rufofemorata* Smith  
 Hind basitarsus with short, shallow groove, easily overlooked;  
 abdomen polished, not shagreened ..... 55. *levipunctata* Allen and Jaynes
27. Lateral pronotum without well-developed groove across its disk .....  
 ..... 28  
 Lateral pronotum with well-developed groove or escarpment across  
 its middle disk ..... 32
28. Dorsal pronotum with complete transverse carina present as series  
 of short scallops; hind basitarsus with short, shallow groove .....  
 ..... 56. *curvinerva* Cameron  
 Dorsal pronotum with transverse carina at most restricted to  
 short distance at humeral angle ..... 29
29. Tergum 1 with patch of dense micropunctures on anterior slope;  
 preapical band without escarpment on anterior border .....  
 ..... 30. *tibetana* Turner  
 Tergum 1 without dense patch of micropunctures on anterior  
 slope; preapical band with faint, crooked escarpment on its  
 anterior border ..... 30
30. Propodeal areola short, not more than two times as long as apical  
 width; preapical band of tergum 1 with faint escarpment on  
 anterior border ..... 16. *pullivora* Allen and Jaynes  
 Propodeal areola elongate, more than  $2\frac{1}{2}$  times as long as apical  
 width; preapical band of tergum 1 without trace of escarpment  
 on anterior border ..... 31
31. Rugulae of lateral propodeum coarse and widely separated; middle  
 tarsi elongate and not inflated ..... 57. *millealta*, new species  
 Rugulae of lateral propodeum closely spaced; middle tibia inflated  
 on upper and outer surface ..... 58. *nepa*, new species
32. Pygidium strongly rugose to apex ..... 59. *chosensis* Allen  
 Pygidium on apical two-fifths or more smooth, not rugose or  
 punctate ..... 33
33. Lateral propodeum or upper part with fine or closely spaced  
 rugulae ..... 34  
 Lateral propodeum on upper part at least anteriorly with widely  
 spaced rugulae ..... 35
34. Pronotum with broad escarpment across its disk .....  
 ..... 60. *s-secunda*, new species  
 Pronotum with deep and narrow groove across its disk .....  
 ..... 61. *consueta* Smith

35. Groove on hind basitarsus shallow, short, vestigial .....	
.....62. <i>brevistigma</i> Allen and Jaynes	36
Groove on hind basitarsus well developed .....	
36. Upper part of front with impunctate interspaces as wide as ocellus .....	63. <i>clauseni</i> Allen and Jaynes
Upper part of front without impunctate interspaces as wide as ocellus .....	37
37. Vertex with obscure row of minute punctures on median line extending forward from posterior aspect .....	38
Vertex without obscure row of minute punctures on median line ..	39
38. Large species with conspicuously flavous forewing .....	
.....64. <i>s-quarta</i> , new species	
Medium-sized species with infumate forewing ....15. <i>simlaensis</i> Cameron	
39. Hind tibia with its sensorium abruptly sunk below surrounding surface .....	65. <i>s-senta</i> , new species
Hind tibia with sensorium flush with surrounding surface .....	66. <i>s-prima</i> , new species

## Species Descriptions

### 1. *Tiphia (Tiphia) canaliculata* Cameron

*Tiphia canaliculata* Cameron, 1902a: 87.

*Tiphia spinosa* Cameron, 1902b: 237; Allen and Jaynes, 1930: 100.

*Tiphia denticula* Cameron, 1904: 284.

*Tiphia (Tiphia) canaliculata* Cameron, Allen 1969: 383.

I (1969) redescribed in detail the lectoholotype in the British Museum. The species is known only in the male, which has a rather exceptional set of characters. In the redescription the abdomen is stated to be 1.3 times as long as wide, which is a moderate length for the males of Indian *Tiphia*. The type locality of *canaliculata*, *denticula*, and *spinosa* is Khasia.

**Male.**—Front densely punctate to level of lowest ocellus. Cheek as wide as antennal fossa. Dorsal pronotum with complete transverse carina buttressed by short ridges. Tegula without groove on outer margin. Radial cell of forewing distinctly less in lateral extension than second cubital cell, its apex sloped inwardly to costal margin. Dorsal propodeum outside areola exceptionally coarse reticulate. Fifth sternum without lateral denticle. Sixth sternum without median tuft of fine hairs.

**Length.**—13 mm.

### 2. *Tiphia (Tiphia) pulchaukiae*, new species

(Pl. I, 1-3)

This species is represented by a long series of males taken in a

Malaise trap at Katmandu by a Canadian expedition to Nepal in 1967. It is distinguished from most Indian species in having no well-developed denticle on sternum 5 and in possessing a short radial cell exceeded in lateral extension by the second cubital cell. It differs from *canaliculata* in not having a deeply sculptured dorsal propodeum.

**Holotype.**—♂, Pulchauki, Katmandu, Nepal, 6,800 ft, 21-VII-1967 [CERI].

**Male.**—Front broadly shagreened; punctures on upper third dispersed in second- or third-degree density, without interspaces as wide as ocellus; almost free of secondaries. Cheek as wide as antennal fossa; not masked with white hairs. Antenna black, slender, with first three joints 3.4 times as long as greatest width (average of two). Head width 2.1 times least distance between eyes (five measured were 2.1, 2.1, 2.1, 2.1, 2.2). Mandible with perceptible preapical denticle.

Dorsal pronotum with strong transverse carina and well-developed bordering sulcus but with only obscure buttressing ridges; punctures of medium size, evenly distributed, and of third-degree density. Lateral pronotum with very faint escarpment parallel to lower border; without punctures on upper disk. Mesopleuron with relatively small primary punctures, on outer disk separated by much more than their average diameter; secondaries almost absent. Legs black. Hind tibia on inner face often lacking ridge except apically near and around sensorium. Tegula (pl. I, 1) black opaque to margin, cockleshell shaped, without groove on outer margin; faintly but broadly shagreened. Forewing (pl. I, 2) moderately infumate; radial cell usually not quite equaling second cubital cell in lateral extension.

Dorsal propodeum beside areola obscurely coarse punctate, not deeply or coarsely rugose; areola rectangular, about twice as long as apical width. Lateral propodeum coarsely rugose. Posterior propodeum with obscure carina on basal half. Bristly hairs of abdomen short, of moderate size, and uniformly white. Tergum 1 about 1.3 times as long as wide (average of two measured); without anterior transverse carina; with well-defined preapical band not impressed and medially two to three punctures wide. All terga broad and conspicuously shagreened; punctures intermediate in size and uniform in size and distribution; no microscopic grooves over apices. Sternum 5 (pl. I, 3) with lateral denticle reduced to inconspicuous callosity without carinate edges. Sixth sternum with only sparse hairs medially.

**Length.**—6.1–10.1 mm.

**Female.**—Unknown.

**Paratypes.**—All males were taken in Nepal in 1967 and belong to the collection of the Canadian Entomology Research Institute. Paratypes have been distributed to the British Museum of Natural History, the U.S. National Museum of Natural History, and the collection at Moorestown, N.J. Collected at Pulchauki (at Katmandu): At 6,600 ft: 26, 14-21-VII; 12, 21-26-VII; 9, 1-14-VIII; 6, 7-14-VIII. At 6,699 ft: 49, 21-VII. At 7,300 ft: Six, 21-27-VII; four, 27-31-VII; five, 1-4-VIII; three, 1-14-VIII; two, 4-7-VIII; one, 7-14-VIII; three, 13-17-VIII. At 8,000 ft: One, 1-VII; one, 14-VIII. Collected at Godavari (at Katmandu): At 5,000 ft: One, 1-V; one, 27-30-VII; one, 3-7-VIII; one, 13-17-VIII; one, 15-VIII. At 6,000 ft: One, 20-22-VI; two, 11-20-VII; four, 14-VII; five, 17-VII; five, 17-20-VII; one, 20-22-VII; three, 23-26-VII; one, 27-30-VII; two, 1-3-VIII; two, 7-13-VIII; one, 13-17-VIII; two, 14-17-VIII. Collected at Bitganj: At 450 ft: Four, 12-19-IX.

### 3. *Tiphia* (*Tiphia*) *murreea*, new species

(Pl. I, 4-6)

*T. murreea* is grouped in the key with *clavinerva* and *canaliculata*, two other species that lack a denticle on the fifth sternum in the male. It is probably not closely related to either. It can be separated at once from *canaliculata* in which the lateral extension of the radial cell is distinctly less than that of the second cubital cell. It differs from *clavinerva* in lacking impunctate interspaces as wide as an ocellus on the upper front, in having a much more elongate first tergum, and in numerous other characters. The presence of a groove on the inside of the basitarsus in a male is most unusual.

**Holotype.**—♂, Murree, India, 7,500 ft, June 18 (Dutt) [NMNH].

**Male.**—Front not shagreened, beset almost to level of lowest ocellus with closely spaced mixture of moderate-sized primary punctures and large secondaries, latter much more numerous than primaries. Antennal flagellum long, slender, 1.8 times as long as head width. Head width 2.1 times least distance between ocelli (three measured were 2.1, 2.1, 2.1). Cheek about as wide as antennal fossa. Clypeal extension conspicuously produced on narrow front, strongly bidentate. Mandible without preapical denticle.

Dorsal pronotum with strong transverse carina, with bordering sulcus shallow, not scalariform; uniformly punctate with mixture of small, shallow primaries and secondaries. Lateral pronotum without groove across disk but with elongate strip of rugulae



along ventral border. Mesopleuron with very small primary punctures of third-degree density mixed with minute secondaries, which are many times more numerous than primaries. Legs black, slender. Hind tibia without carina on inner face; sensorium inconspicuous, slitlike. Hind basitarsus (pl. I, 6) with long, narrow, shallow groove on inner face. Tegula (pl. I, 5) darkly translucent, slightly longer than wide, without marginal grooves. Forewing with radial cell greatly exceeding second cubital cell in lateral extension, its apex bluntly truncate; sectors of second cubital cell in terms of inner sector (itob)<sup>3</sup> are 10:24:19:21 (average of two).

Propodeum with transverse carina between dorsal and posterior aspects usually incomplete laterally. Dorsal propodeum with area lateral to areola only faintly sculptured; areola slender, only slightly tapered, about  $2\frac{1}{2}$  times apical width. Lateral propodeum with relatively low, widely separated rugulae. Tergum 1 (pl. I, 4) unusually elongate, 1.7 times as long as wide, without anterior transverse carina; dorsal aspect coarse punctate, without distinct preapical band, but with intervals between punctures much less on apical fourth. Terga 3-5 not shagreened; uniformly set with coarse punctures not varying greatly in size. Sternum 5 without lateral denticle.

Length.—8.3-10.0 mm.

Female.—Unknown.

Paratypes.—16, same data as holotype; 1, Murree, India, 7,500 ft, 13/19—VIII-1917 (Dutt).

Three of the paratypes are deposited in the British Museum and three are retained in the Moorestown collection. The remainder are deposited in the U.S. National Museum. There are also two females taken at Murree at about the same time as the type and by the same collector. They may be this species, although there is no striking resemblance.

#### 4. *Tiphia* (*Tiphia*) *clavinerva* Cameron

*Tiphia clavinerva* Cameron, 1904: 281; Allen, 1969: 382.

P. Cameron stated that this species was in the James Rothney collection, but he failed to indicate how many specimens were in the type series or to designate a holotype. A specimen labeled "type" was lent me by Oxford University and is the basis of this

<sup>3</sup> Signifies order of traverse cell considered as a trapezoid, i.e., inner (i), top (t), outer (o), and bottom (b). The traverse is clockwise when the wing is to the right of the body and counterclockwise when it is to the left.

redescription. This specimen was designated a lectoholotype. The following descriptive notes are abstracted from the redescription (Allen, 1969).

*T. clavinerva* can be separated at once from all but a few Indian species by the absence of a denticle on the fifth sternum. It differs from *dutti* in having impunctate spaces on the front as wide as an ocellus and in lacking the strongly scalariform dorsal pronotal sulcus. I (1969) stated that it appears related to *cilicincta* Allen and Jaynes from eastern China.

**Lectoholotype.**—♂, Khasia, India.

**Male.**—Entire front shagreened. Cheek much narrower than antennal fossa. Head width 2.25 times least distance between eyes. Mandible with minute preapical denticle. Dorsum of pronotum with sharp-crested transverse carina, its bordering sulcus without cross ridges. Lateral pronotum with inconspicuous groove half way across middle disk. Mesopleuron with minute punctures everywhere much more numerous than primaries. Legs ranging from black on outside to dull reddish on inside of front and middle tibiae. Hind tibiae not ridged on inner face. Tegula 1.4 times as long as middle width, without groove on outer margin. Forewing with radial cell much exceeding second cubital cell in lateral extension; sectors of second cubital cell in terms of inner sector (itob) are 10:29:18:20. Lateral propodeum on upper part with many strong rugulae continued into caudal corner. Intermediate terga with shining, golden-brown hairs; apices without line of microscopic gouges over dorsal areas. Sternum 5 without lateral denticle. Sternum 6 with median vitta narrowed and carinate posteriorly; bordering hairs sparse, appressed.

**Length.**—9.5 mm.

**Female.**—Unknown.

### 5. *Tiphia* (*Tiphia*) *dutti*, new species

(Pl. II, 7-8)

This species is known only from the holotype male. *T. dutti* differs from *clavinerva* in not being conspicuously shagreened, in having no impunctate frontal interspaces as wide as an ocellus, in having strongly buttressed pronotal carina and a mesopleuron with only a few scattered secondary punctures. It is similar to and probably related to *cilicincta* Allen and Jaynes of eastern China. In *cilicincta* the head width is 2.55 times the least distance between the eyes, the pronotal sulcus is not scalariform, and the rows of bristles at the apices of the abdominal segments are much less prominent.

**Holotype.**—♂, Shillong, India, 5,000 ft, 27-Aug. to 3-Sept., 1926 (Dutt) [NMNH].

**Male.**—Front faintly shagreened except an area not much larger than ocellar triangle and in front of it with coarse, closely contiguous primary punctures; no secondaries; no impunctate interspaces as wide as ocellus. Head width 2.3 times least distance between eyes. Antennal flagellum stout, first three joints 2.7 times as long as wide. Cheek not masked; slightly narrower than antennal fossa. Apex of clypeal extension broad, obscurely bidentate. Mandible with small, acute preapical denticle.

Dorsal pronotum with strong transverse carina, bordered by deep, narrow sulcus, and buttressed its entire length by short, stout cross ridges; punctures medium sized and ranging from first- to third-degree density. Lateral pronotum with obscure, shallow, curved escarpment across its disk. Mesopleuron with primary punctures ranging from small and of third-degree density on outer disk to coarse first-degree density near prepectal ridge; secondaries minute and much less numerous than primaries. Legs with femora and tibiae dark reddish brown. Hind tibia with thin carina entire length of inner face. Tegula thickened, opaque, polished, without groove on outer margin. Forewing slightly infuscated; radial cell greatly exceeds second cubital cell in lateral extension; sectors of second cubital cell in terms of inner sector (itob) are 10:26:21:14 (average of two).

Dorsal propodeum strongly arched over transverse axis; deeply reticulate within areola and beside it for distance equal to about half its width; areola keystone shaped, its length  $1\frac{1}{2}$  and its base  $1\frac{1}{4}$  apical width. Lateral propodeum on upper part with anterior rugulae strong and very widely separated. First abdominal segment very short. Tergum 1 (pl. II, 7) with its anterior aspect abruptly declivous; dorsum with only fine, sparse punctures excepting in preapical band, which is far removed from apex, moderately escarped on anterior border, and which consists of small punctures, closely spaced, and varying from one to three punctures wide. Intermediate terga not shagreened, with punctures of medium size, and relatively uniform in size and distribution, terminating scarcely width of puncture from edges of terga. Abdomen (pl. II, 8) conspicuously bristly, the apices of terga with even rows of long dark-brown bristles. Fifth sternum without lateral denticle.

**Length.**—8.8 mm.

**Female.**—Unknown.

**6. *Tiphia (Tiphia) coimbatorea*, new species**

(Pl. II, 9)

This species is known only from the holotype specimen. It is distinguished from all other male *Tiphia* described to date by the presence of a well-developed transverse carina on the first tergum.

**Holotype.**—♂, Coimbatore, 1,400 ft, Madras State, India, April 1960 (P. Susai Nathan) [RNH].

**Male.**—Front not shagreened; with coarse punctures generally of first-degree density to level of ocellus except on long median vitta; secondaries almost absent. Head width two times least distance between eyes. Cheek not masked, slightly wider than antennal fossa. Mandible without preapical denticle.

Dorsal pronotum with strong transverse carina buttressed its entire length by many short ridges. Lateral pronotum without groove or escarpment across its middle disk. Mesopleuron on outer disk with a few widely spaced, medium-sized primary punctures and much more numerous secondaries. Metanotum with numerous coarse punctures. Legs black. Hind tibia without carinate inner face. Tegula not shagreened, obscurely translucent marginally, without marginal grooves, 1.3 times as long as middle width. Forewing with hyaline membrane; radial cell equal to second cubital cell in lateral extension; terminal section of radius sharply bent at middle; sectors of second cubital cell in terms of inner sector (itob) are 10:26:20:20 (average of two).

Dorsal propodeum with area lateral to areola obscurely coarse punctate on pattern of fine aciculations; areola with crooked transverse rugulae and concave sides, its base slightly wider than and its length slightly more than two times apical width. Lateral propodeum with many closely spaced rugulae, fading to aciculations in ventral corner. Tergum 1 (pl. II, 9) with sharp-crested transverse carina; dorsum with numerous coarse punctures among which preapical band is not differentiated. Abdominal terga not shagreened, rather coarse, irregularly and sparsely punctate; vestiture coarse, white, bristly. Sternum 5 with large, semierect lateral denticle. Sternum 6 densely set with fine, nearly erect hairs.

**Length.**—5.4 mm.

**Female.**—Unknown.

**7. *Tiphia (Tiphia) oswini* Turner**

*Tiphia oswini* Turner, 1911: 152; Allen and Jaynes, 1930: 102; Allen, 1969: 391.

I have seen four species of Asiatic *Tiphia* in which the tegula is much elongated. They are *longitegolata* Allen and Jaynes from

eastern China, *oswini* Turner from Ceylon, *tegulita*, new species, from Nepal, and *tegelonga*, new species, from Assam. In all but one species, males and females have been taken. In *longitegulata* males the buttressing ridges to the pronotal transverse carina are very long and stout; this character is not true of the other three species. In *oswini* all three pairs of legs are black, whereas in the other two species the first two pairs are red or castaneous.

The author of *oswini* described the female before the male and evidently intended that it should be the holotype. I redescribed the two specimens in the British Museum, both labeled "type," and designated the female as lectoholotype and the male as lectoallotype.

**Lectoholotype.**—♀, Pattipola, Ceylon (Wickwar) [BMNH].

**Female.**—Upper front with numerous interspaces wider than ocellus. Antennae black. Dorsal pronotum without transverse carina; punctate part medially narrower than impunctate apex and broadly shagreened. Lateral pronotum with several prominent rugulae across center. Scutum when viewed from in front with anteromedian escarpment and notaulices apparently connected. Mesopleuron with primary punctures small and separated by several times their average diameter; secondaries more numerous than primaries; subtegular patch of microsetae slightly narrower than tegula. Legs, including tarsi, black. Hind basitarsus with short, shallow groove. Tegula black, faintly shagreened at tip, with nearly parallel sides, 1.7 times as long as median width. Radius terminating in obscure outwardly directed spur. Dorsal propodeum having areola with straight, tapered sides, its length  $3\frac{1}{4}$  and its base  $1\frac{1}{2}$  times its apical width. Lateral propodeum with rugulae on upper part exceedingly fine and closely spaced, vaguely defined from lower part. Posterior propodeum with median carina complete to transverse carina. Tergum 1 with punctures of preapical band a single row, punctures separated by more than their average diameter. Pygidium punctate on basal half, punctate part separated by median vitta; apical half wrinkled near punctate part.

**Length.**—12 mm.

**Lectoallotype.**—♂, Pattipola, Ceylon (Wickwar) [BMNH].

**Male.**—Front with punctures of second-degree density on upper half in front of ocellar triangle. Cheek narrower than antennal fossa. Head width 2.4 times least distance between eyes. Antennal flagellum slender, flavous beneath, first three joints 3.4 times as long as wide. Mandible with prominent preapical cusp. Dorsal pronotum with strong transverse carina. Lateral pronotum with strong rugulae in ventral corner. Mesopleuron on outer disk with

small, numerous primary punctures separated by more than their average diameters; about an equal number of secondaries; subtegular patch of micropile slightly narrower than tegula. Legs including tarsi black. Tegula shaped as in female, 2.0 times as long as middle width, faintly shagreened apically. Forewing faintly flavous; lateral extension of radial cell far exceeds that of second cubital cell. Dorsal propodeum with areola length about two times and basal width  $1\frac{1}{8}$  times apical width. Tergum 1 without anterior transverse carina; preapical band diffuse, and in middle area two to three punctures wide, with punctures separated by at least their average diameter. Intermediate terga without trace of apical row of microscopic gouges over middle apices. Fifth sternum with obscure lateral denticle. Sixth sternum with parallel-sided vitta bordered by scattered hairs.

Length.—8 mm.

### 8. *Tiphia (Tiphia) tegulita*, new species

(Pl. II, 10-11)

This species from Nepal is known only in the male. It is one of the species in which the tegula is much longer than wide. The fringes of the tegula, sides, and rear are almost transparent, and the tooth on the fifth sternum is very large and overhangs a large polished orifice. The buttressing ridges of the dorsal pronotum are very short.

**Holotype.**—♂, Godavari, Katmandu, Nepal, 6,000 ft, 12-VIII-1967, Canadian Nepal Expedition [CERI].

**Male.**—Front completely shagreened, with only a few primary punctures and no secondaries on upper half; with impunctate interspaces much wider than ocellus. Cheek narrower than antennal fossa. Mandible without a preapical cusp. Antennal flagellum black, first three joints 3.8 times as long as wide. Head width 2.3 times least distance between eyes (four measured were 2.2, 2.3, 2.2, 2.4).

Dorsal pronotum with complete transverse carina bordered by shallow sulcus and a complete series of short buttressing ridges; punctures on disks separated by two or more times average diameter of punctures. Lateral pronotum with shallow, obscure discal escarpment paralleling lower margin. Mesopleuron on anterior slope with sparse, widely separated primary punctures, and secondaries more numerous than primaries. First two pairs of legs except their coxae bright yellowish red, hind legs black. Hind tibia not carinate on inner face. Tegula (pl. II, 11) with broad transparent outer and posterior margins, broadest near apex;

1.6 times as long as middle width. Forewing with membrane only slightly infumate; radial cell greatly exceeding second cubital cell in lateral extension; sectors of second cubital cell in terms of inner sector (itob) are 10:25:18:17. Metanotum on its dorsal disk with only minute punctures.

Dorsal propodeum outside areola not rugose; areola elongate, keystone shaped, its base  $1\frac{1}{4}$  and its length  $2\frac{1}{2}$  times apical width. Lateral propodeum not bulging at middle with many rugulae on upper part that are sharply limited at contact with lower aciculate part. First abdominal segment 1.8 times as long as horizontal width. First tergum without anterior transverse carina; dorsum outside preapical band almost free of primary punctures; preapical band medially depressed and consisting of broad band of widely separated punctures, at least two punctures wide. Abdominal terga 3-6 completely shagreened with small punctures of uniform size and distribution. Denticle of fifth sternum (pl. II, 10) polished, unusually large and massive, sharply raised from surface, and overhanging incision and polished plaque. Vestiture consisting of inconspicuous, bristly, somewhat yellowish hairs. Sixth sternum without tuft of dense, fine hairs.

Length.—4.5-6.5 mm.

Female.—Unknown.

Paratypes.—♂, all taken at Godavari, Katmandu, Nepal, in 1967 by the Canadian Nepal Expedition: One, July 16, 5,000 ft; one, Aug. 7-13, 6,000 ft; one, Aug. 13, 6,000 ft.

Paratypes were donated by the Canadian Entomology Research Institute to the Moorestown collection.

### 9. *Tiphia* (*Tiphia*) *tegelonga*, new species

(Pl. III, 13-14)

The male of *tegelonga* lacks the long, strong ridges buttressing the transverse carina of the pronotum found in *longitegulata* of eastern China. It differs from *oswini* in having no stout preapical cusp on the mandible and in its reddish legs. It differs from *tegulita* in not having nearly transparent fringes to the tegula and in having the upper and lower parts of the lateral propodeum poorly differentiated. The female has an extremely elongate tegula resembling that of the male, but in other respects I can find no similarities. The female has castaneous but not bright-red legs, the hind tibia is carinate on the inner face and not inflated, and the hind basitarsus has a very short, shallow groove.

Holotype.—♂, Shillong, Assam, India, 4,800 ft, 15-VI-1928 (L. B. Parker) [NMNH].

**Male.**—Front on middle of upper two-thirds not shagreened, without secondary punctures, sparsely punctate, with several interspaces wider than ocellus. Cheek narrower than antennal fossa. Antennal flagellum ferruginous above and below, first three joints 4.0 times as long as wide. Head width 2.2 times least distance between eyes (three measured were 2.2, 2.1, 2.3).

Dorsal pronotum with sharp-crested transverse carina bordered by obscure sulcus, which is crossed by many short, buttressing ridges; punctures of medium size and only few in number. Lateral pronotum with short, very poorly defined groove or escarpment across its disk. Mesopleuron on outer disk with small primary punctures separated by two to three times their average diameter and with almost no secondaries. Forelegs and middle legs principally castaneous; hind leg black except inner face of femur. Tegula (pl. III, 13) chiefly opaque black, with parallel sides, 1.7 times as long as middle width. Forewing with radial cell greatly exceeding second cubital cell in lateral extension; sectors of second cubital cell in terms of inner sector (itob) are 10:34:27:21.

Propodeum outside areola not rugose; areola elongate, keystone shaped, its base  $1\frac{1}{4}$  and its length  $2\frac{1}{4}$  apical width. Lateral propodeum in middle area with very fine rugulae of upper part not sharply separated from coarse aciculations of lower part. First tergum 1.1 times as long as horizontal width; preapical band of uniform width from side to side, about three to four punctures wide, anterior ones much coalesced, anterior border slightly impressed. Terga 3-6 entirely shagreened; punctures fine; vestiture short; sparse, brownish-yellow bristly hairs. Sternum 5 (pl. III, 14) with well-developed lateral denticle. Sternum 6 with only short, sparse bristly hairs.

**Length.**—5.3-6.4 mm.

**Allotype.**—Shillong, Assam, India, 5,500 ft, 2-VIII-1928 (L. B. Parker) [NMNH].

**Female.**—Front sparsely set with coarse punctures, with interspaces much wider than ocellus. Antennal flagellum reddish on undersurface. Mandible without preapical cusp.

Dorsal pronotum with vestigial transverse carina present on humeral third; punctures coarse, sparse, irregularly dispersed with discal interspaces much wider than ocellus. Lateral pronotum (in most specimens) with shallow, narrow groove on middle disk. Scutum with anteromedian escarpment and notaulices not connected. Mesopleuron on anterior slope with only few large punctures separated in most directions by more than average diameter except in region of prepectal ridge; secondary punctures almost absent; subtegular patch of microsetae with short hairs and much



narrower than tegula. At least middle leg excepting its coxa castaneous. Hind tibia not inflated; with carina of inner face extending to friction plate; sensorium flush with surrounding surface. Hind basitarsus with shallow, very short groove, scarcely as long as width of joint. Tegula not shagreened; darkly translucent only on apical third; 1.7 times as long as wide (average of two). Forewing with first section of radius not sharply bent, apex without appreciable spur.

Dorsal propodeum with carinae on each side of lateral groove equal in height and length; mitral-shaped cavity completely enclosed; areola with straight, slightly tapered sides, its base  $1\frac{1}{4}$  and its length three times apical width. Lateral propodeum at median bulge with ridges close, not distinctly separated from aciculations of posterior part. Posterior propodeum without median carina. Tergum 1 with numerous rather large shallow punctures on dorsal aspect; preapical band narrowed medially to single irregular row of moderate-sized punctures of irregular shape that are not impressed on either border. Pygidium punctate on basal half without well-defined emargination; impunctate apex wrinkled near punctate part, not shagreened.

Length.—5.8–8.5 mm.

Paratypes.—All from Shillong, Assam, India, collected in 1928 by L. B. Parker (Moorestown collection): Two ♂, 4,800 ft, 15–VI; one ♀, April, seven ♀, 24–VI, 5,000 ft; four ♀, 27–VI, 5,000 ft; four ♀, 2–VIII, 5,500 ft; two ♀, 3–IX; 8 ♀, 10–IX; three ♀, 11–IX; three ♀, 24–IX; two ♀, 27–IX; one ♀, 1–X; one ♀, 12–X.

Paratypes were donated to the U.S. National Museum and the British Museum from the Moorestown collection.

### 10. *Tiphia (Tiphia) aurata*, new species

(Pl. III, 12)

Although *T. aurata* has the characters used to identify the subgenus *Tiphia*, it is conspicuously different from any other species found in India. Its most conspicuous differences are the bright-orange bristles of the prothorax and abdomen, the anteromedian callosity of sternum 2, and the lateral carina of the pygidium. The open radial cell, which is also unusual in the male *Tiphia*, may be an individual aberration. The species is known only from the holotype specimen.

Holotype.—♂, Godavari, Katmandu, Nepal, 6,000 ft, 13–17–VIII–1967 [CERI].

**Male.**—Coarse punctures of uniform size and of first-degree density over whole front to level above lowest ocellus except for impunctate median vitta; secondaries absent. Cheek slightly narrower than antennal fossa. Clypeus broadly bidentate. Mandible with acutely pointed preapical denticle. Antennal flagellum long and slender, brownish black except for yellow spot on underside of first joint; first three joints 3.2 times as long as greatest width. Head width 2.2 times least distance between eyes. Mouth parts as in typical male *Tiphia*.

Dorsal pronotum uniformly short pilose with deep-orange bristles; transverse carina high, complete, and buttressed its entire length by strong, short cross ridges; punctures coarse and uniform in size, everywhere of first-degree density and contiguous except on small medioapical area; impunctate apex reddish, medially about one-fifth as wide as punctate part. Scutum with antero-median escarpment concealed or absent. Scutum, scutellum, and disk of metanotum all densely set with coarse punctures of approximately same size. Lateral pronotum with scattered punctures on its upper part, no rugulae in ventral corner, and an obscure, interrupted groove across disk best seen on right side. Mesopleuron uniformly set on whole of anterior face with medium-sized punctures of uniform size and of first-degree density; interspersed with numerous fine secondaries, which decrease in abundance as they approach ventral aspect; subtegular patch of dense micropunctures narrower than tegula. Legs black. Hind tibia on inside with high, thin carina extending its entire length except where interrupted by thin, lanceolate sensorium. Tegula not elongated, densely opaque to margin, broadly shagreened, with conspicuous cluster of punctures on outer anterior slope; without groove on outer margin. Forewing very dark wine colored, almost opaque; radius with band and rudimentary spur one-third distance from stigma to intercubitus; radial cell open at end (both wings) with terminal spurs closing half distance from intercubital cell to wing margin.

First abdominal segment 1.0 times as long as wide. First tergum without minute punctures on anterior aspect; with numerous coarse punctures broadly distributed; preapical band a broad belt of coarse, more or less coalesced punctures, at least five to six punctures wide, abruptly impressed on anterior border, and separated from apex medially by distance equal to diameters of three adjacent primaries. Terga 2-5 with coarse, conspicuous, orange-red bristly hairs concentrated in conspicuous belts at their apices. Pygidium with high lateral carina. Sternum 2 (pl. III, 12) with strong median anterior callosity. Sterna 2-5 with conspicu-

ous apical belts of orange-red bristles. Sternum 5 with strong lateral denticle. Sternum 6 without dense hairs medially.

Length.—11.4 mm.

Female.—Unknown.

### 11. *Tiphia (Tiphia) implicata* Cameron

*Tiphia implicata* Cameron, 1897: 50; Bingham, 1897: 57, 61; Allen and Jaynes, 1930: 99; Allen, 1969: 389.

This species has several characters that are not common among the *Tiphia* of the Indian region. Some of these are a mandible with a strong preapical denticle, a dorsal pronotum with only a low obscure transverse carina, a forewing with a radial cell distinctly less than the second cubital cell in lateral extension, a reticulate dorsal propodeum in which the areola is only faintly defined, and a sixth sternum having a distinct tuft of fine, matted hairs. I have seen only the lectoholotype specimen, which was redescribed in 1969.

**Lectoholotype.**—♂, "Mussouri," India, in Hope Department of Entomology, Oxford University.

**Male.**—Front, except small area in front of median ocellus, with fine, closely contiguous punctures, not mixed with secondaries. Antennal flagellum black. Cheek not masked with appressed hairs; as wide as antennal fossa. Mandible with strong preapical denticle.

Dorsal pronotum with low, obscure, transverse carina; punctate area with small primary punctures generally of first-degree density. Lateral pronotum without groove across its disk. Mesopleuron everywhere densely fine punctate, with very numerous secondaries grading in size up to sparse small primaries; with long, dense, erect hair. Legs black. Hind tibia on inside with high, naked carina; sensorium broader than major calcarium and three times as long as wide. Tegula black, without marginal grooves, 1.2 times as long as middle width. Forewing with radial cell distinctly less than second cubital cell in its lateral extension, terminating in conspicuous, outwardly directed spur; sectors of second cubital cell in terms of inner sector (itob) are 10:24:18:24.

Dorsal propodeum medially with pattern of strong reticulations upon which areola is only faintly defined; areola with carinae fine and tortuous, outer ones concave, base equaling apex, length about twice width. Lateral propodeum with many close fine rugulae. Posterior propodeum with narrow carina on lower two-fifths. First abdominal segment 1.3 times as long as horizontal width. First tergum without anterior transverse carina; its preapical band a ribbon of small, discrete punctures not impressed and

about three punctures wide. Terga 2-4 with apical row of microgouges. Terga 3-5 with fine, evenly distributed punctures, hairs white. Fifth sternum with small, lunate, lateral denticle. Transverse brush of long, matted hairs arises from sixth sternum and apex of fifth.

Length.—9 mm.

Female.—Unknown.

## 12. *Tiphia (Tiphia) capillata* Allen and Jaynes

(Pl. III, 15-16)

*Tiphia capillata* Allen and Jaynes, 1930: 47.

This species was taken in considerable numbers at Shillong, Assam, India, in 1927-28 by explorers of the U.S. Department of Agriculture seeking parasites to introduce against the Japanese beetle. It is redescribed here from paratypes in the collection at Moorestown.

The female has a minute but acute preapical cusp on the mandible, a complete transverse carina on the dorsal pronotum, translucent orange tegulae, hind and middle tibiae red but femora black, and no groove on the hind basitarsus. The male has a massive preapical denticle on the mandible, the cheek is slightly wider than an antennal fossa, the tibiae and tarsi of all three pairs of legs are bright red, the tegula is short and entirely reddish translucent, the radial cell of the forewing greatly exceeds the second cubital in lateral extension, and the fifth sternal tooth is very small.

**Holotype.**—♀, Shillong, India, Japanese beetle parasite No. 202, No. 41787, U.S. National Museum.

**Female.**—Front broadly but faintly shagreened, with median-sized punctures of first-degree density on lower third, on upper half principally of third degree without interspaces as wide as ocellus. Mandible with minute preapical denticle.

Dorsal pronotum with low, complete, transverse carina, its punctures more widely separated on lateral disks; impunctate apex almost entirely dull reddish. Lateral pronotum without transdiscal groove. Mesopleuron on its anterior slope with punctures ranging in size and density from small and well separated on outer disk to coarse and close first-degree density near prepectal ridge; subtegular patch of dense microsetae much wider than tegula. Scutum with anteromedian groove almost connected with notaulices. Legs with all tibiae bright red; middle and hind femora black. Hind tibia scarcely angular in cross section, its upper

margin moderately arched. Hind basitarsus not grooved. Tegula cockleshell shaped, thin, translucent, red, without marginal grooves. Forewing (pl. III, 16) faintly infumate; radius without terminal spur; stigma unusually large, one-sixth to one-seventh as large as first cubital cell and one-half as long as radial cell; radial cell short, 2.1 times as long as middle width. Metanotum densely punctate with medium-sized and minute punctures.

Dorsal propodeum with its lateral sulcus obsolete with inner of two parallel lateral carinae missing; mitral-shaped excavation shallow, not enclosed on mediad margin; areola keystone shaped, only slightly tapered, about  $2\frac{1}{4}$  times as long as apical width. Lateral propodeum on upper part with many fine and very closely spaced rugulae; lower part obscurely aciculate with only a few microsetae on lower border. Posterior propodeum without median carina. Tergum 1 with anterior aspect abruptly declivous; without anterior transverse carina; preapical band a single row of very fine, widely separated punctures and with a faint escarpment at some distance anterior to the row of punctures. Intermediate terga highly polished, with median-sized punctures, fairly uniform in size and distribution in concentrations before and behind sparsely punctate areas. Pygidium punctate on basal three-fifths, punctures in much of this area much enlarged and very widely separated; apex not shagreened or wrinkled.

**Length.**—8.4–9.4 mm.

**Allotype.**—♂, same data as holotype [NMNH].

**Male.**—Front entirely but faintly shagreened, with punctures thinning in places to third-degree density but without interspaces as wide as ocellus. Cheek slightly wider than antennal fossa; partially masked under white, bristly hairs. Mandible (pl. III, 15) with strong preapical denticle. Antennal flagellum red, stout, first three joints 2.5 times as long as wide (average of two). Head width 2.1 times least distance between eyes (two measured were 2.1, 2.1).

Dorsal pronotum with low, complete, transverse carina bordered by complete series of short, buttressing cross ridges; punctures of first-degree density over most of punctate area. Lateral pronotum without well-defined groove across middle disk; fine rugulae in ventral corner. Mesopleuron with primary punctures small, largely of third-degree density; secondaries poorly differentiated from primaries, sparse. Tibiae and tarsi of all three pairs of legs largely yellowish red. Tegulae entirely reddish translucent, cockleshell shaped, without groove on outer margin. Forewing with hyaline membrane; radial cell much exceeding second cubital cell in lateral extension; sectors of second cubital cell in terms of

inner sector (itob) are 10:22:17:14. Metanotus: 1 area with large, closely spaced primary punctures except on median broad conical projection.

Dorsal propodeum outside areola glossy and minutely sparse punctate; areola short keystone shaped, its base  $1\frac{1}{8}$  and its length  $1\frac{1}{4}$  apical width. Lateral propodeum with its rugulae widely separated. First abdominal segment short, 1.0 times as long as horizontal width; preapical band poorly defined, consisting of fine, shallow, widely separated punctures, about two to three wide and not abruptly impressed. Intermediate terga not shagreened, rather coarsely punctate, bristly hairs white. Fifth sternum with lateral denticle small, appressed. Sixth sternum without apical tuft of dense, fine hairs.

Length.—6-7 mm.

Remarks.—When originally described there were 2 female and 10 male paratypes with Japanese beetle parasite No. 202 and 1 unlabeled male deposited in the U.S. National Museum in addition to the type and allotype. One of each sex was also deposited at the Academy of Natural Sciences of Philadelphia and at the British Museum, and one each was retained in the collection at Moorestown. In addition there are in the Moorestown collection one female labeled "Shillong India," one female, Shillong, India, Japanese beetle parasite No. 402, and one male labeled Shillong, India, Japanese beetle parasite No. 202. The redescription is based on paratypes at Moorestown.

### 13. *Tiphia (Tiphia) lotharae*, new species

(Pl. III, 17-18)

Since this species possesses a small but distinct, acute, preapical cusp on the mandible, it runs in the key to the couplet with *capillata*. It is much darker with legs largely black, tegula black and opaque, with much narrower cheeks. Although taken from Nepal, the specimens collected so far are from low altitudes.

**Holotype.**—♂, Lothar near Birganj, Nepal, 450 ft, 30-VIII-5-IX-1967, Malaise trap No. 30, Canadian Nepal Expedition [CERI].

**Male.**—Front broadly shagreened; punctures of first-degree density on lower third and in band of uniform width along inner eye orbits; elsewhere only sparsely punctate with several interspaces wider than ocellus. Cheek (pl. III, 17) not masked under dense hairs, much narrower than antennal fossa. Mandible with

strong preapical denticle. Antennal flagellum with first three joints three times as long as wide. Head width 2.5 times least distance between eyes (five measured were 2.5, 2.5, 2.5, 2.5, 2.5).

Dorsal pronotum with strong, complete, transverse carina, which lacks buttressing cross ridges; punctures fine, rather uniformly dispersed, and in most places separated by several times average puncture diameter. Lateral pronotum with shallow, narrow groove across its middle disk. Mesopleuron broadly shagreened on anterior slope, uniformly set with medium-sized primary punctures, which are usually separated by distances considerably greater than their average diameter; secondaries almost lacking; subtegular patch of dense microsetae narrower than tegula. Legs black, sometimes with articulations and inner faces marked with red. Inner face of hind tibia with sensorial area polished; longitudinal carina very sharp and high, continued to friction plate. Tegula thick, opaque, without groove on outer margin, only obscurely shagreened. Forewing (pl. III, 18) slightly infumated; radial cell greatly exceeding second cubital cell in lateral extension; sectors of second cubital cell in terms of inner sector (itob) are 10:25:20:16 (average of two). Metanotum with its disk densely coarse punctate.

Dorsal propodeum outside areola only shallowly sculptured; posterior transverse carina only moderately high; areola keystone shaped only slightly longer than basal width. Lateral propodeum with strong rugulae, and excepting a small, poorly defined area, continued to caudal corner. Posterior propodeum without median carina. First segment of abdomen short, 1.1 times as long as wide. Tergum 1 without anterior transverse carina; preapical band slightly impressed on lateral anterior margin, of closely spaced punctures medially about one puncture wide. Terga with medium-sized punctures of uniform size and distribution; laterally with microscopic apical grooves, which are not continued over middle. Fifth sternum usually with very faint ridge in customary position of lateral denticle. Sternum 6 with only sparse, short hairs on each side of median vitta.

Length.—6.2–7.3 mm.

Female.—Unknown.

Paratypes.—All taken at Lothar near Birganj, Nepal, at 450 ft in 1967 by the Canadian Nepal Expedition and loaned for study by the Canadian Entomology Research Institute: 12, 30–VIII–5–IX; 1, 1–5–IX; 1, 5–12–IX; 1, 12–14–IX.

Paratype specimens were donated by the Canadian Entomology Research Institute to the collection at Moorestown.

#### 14. *Tiphia* (*Tiphia*) *incisa* Cameron

*Tiphia incisa* Cameron, 1897: 49; Bingham, 1897: 57, 60; Allen and Jaynes, 1930: 102.

*Tiphia* (*Tiphia*) *incisa* Cameron, Allen, 1969: 388.

The type series of *incisa* is limited to the lectoholotype male from "Mussouri," presumably in northern India. It appears to be similar in most respects to *simlaensis*, which is represented in the Moorestown collection by a long series of both sexes of *matura* now considered synonymous. In my study of the type of *incisa* at Oxford University it appeared to be an especially slender species. In my redescription this slenderness was expressed in measurements of the length of the first abdominal segment and the hind femur. *T. matura* is certainly not a slender species, yet I find the length of its first abdominal segment and of the hind femur not to be appreciably less than that given for *incisa*. The type of *incisa* on the middle of the lower front has a thin carina, which is absent from the Moorestown series of *matura*.

**Lectoholotype.**—♂, "Mussouri," India, in Hope Department of Entomology, Oxford University.

**Male.**—Front, tegula, and all abdominal terga conspicuously shagreened. Front with long, thin carina on lower half; with punctures contiguous on lower half, without any interspaces as wide as ocellus. Cheek not wider than antennal fossa, without masking hairs. Antennal flagellum 1.6 times head width. Mandible with strong preapical denticle. Head width 2.3 times least distance between eyes.

Dorsal pronotum with complete transverse carina. Lateral pronotum with short, deep groove on middle of disk. Mesopleuron on outer disk with large punctures not quite of first-degree density, and minute punctures that are not as numerous as primaries; subtegular patch of dense microsetae narrower than tegula. Legs black, slender, hind femur 3.3 times as long as wide. Hind tibia sharply carinate on inner face. Tegula piceous, cockle-shell shaped, with obscure groove on outer margin not reaching outer apical angle. Forewing with radial cell greatly exceeding second cubital cell in lateral extension.

Dorsum of propodeum broadly reticulate. First abdominal segment 1.3 times as long as horizontal width. Tergum 1 without anterior transverse carina; preapical band a ribbon of contiguous or coalesced punctures abruptly impressed on anterior border and about three punctures wide. Intermediate terga with fine, shallow punctures uniformly distributed; hairs sparse, upright, white.



Fifth sternum with small, lunate, lateral denticle, transversely aligned.

Length.—9.5 mm.

Female.—Unknown.

### 15. *Tiphia* (*Tiphia*) *simlaensis* Cameron

(Pl. IV, 19-20)

*Tiphia simlaensis* Cameron, 1904: 287.

*Tiphia matura* Allen and Jaynes, 1930: 81. New synonymy.

*Tiphia* (*Tiphia*) *simlaensis* Cameron, Allen, 1969: 409.

P. Cameron's description of this species is based on material in the Rothney collection from the Khasia Hills, Assam, and from Simla, India. The Khasia Hills are several hundred miles from Simla. The type at Oxford University bears two labels: One "Simla/India" and the other "Tiphia/simlaensis/Cam Type/Khasia," and raises the question as to whether the type locality is Simla or the Khasia Hills. I can find no substantial difference between *simlaensis* and *matura* from the Khasia Hills. Both have the median frontal row of minute bristles possessed by only a few species. The type female and allotype of *matura* are in the U.S. National Museum (catalog No. 41801).

The following descriptive notes are based on my redescription of the female of *simlaensis*, and a redescription of the male is based on a paratype of *matura* in the collection at Moorestown.

The female, in addition to the unusual median line of minute vertical punctures, has black legs, a grooved hind basitarsus, and coarse, widely separated rugulae on the upper part of the lateral propodeum. The male has a cheek narrower than an antennal fossa, strongly cusped mandibles, a strongly rugose dorsal propodeum, a radial cell that greatly exceeds the second cubital cell in lateral extension, and a strong denticle on sternum 5.

**Holotype.**—♀, Simla or Khasia, India [OU].

**Female.**—Vertex with obscure median row of micropunctures extending forward part of or all the way to ocellar triangle. Front broadly shagreened; with deep punctures of first-degree density everywhere to level of anterior ocellus. Mandible occasionally with small preapical cusp.

Dorsal pronotum without transverse carina; punctate part with coarse punctures largely of first-degree density without interspaces as wide as ocellus. Lateral pronotum with strong, straight escarpment across middle disk, frequently intercepted on upper side by short ridges. Mesopleuron broadly shagreened; its outer

and anterior aspect uniformly set with large primary punctures and lesser number of large secondaries, principally of first-degree density; subalar patch of microsetae as wide as tegula, its setae relatively short. Legs, including tarsi, black. Hind tibia with upper margin straight and parallel to lower; inner face carinate; sensorium flush with surrounding surface. Hind basitarsus with long narrow groove. Tegula only slightly longer than middle width; blackish brown, not shagreened, without groove on outer margin. Forewing heavily infumate; radial cell without inwardly directed spur on first section or apical spur. Metanotum densely coarse punctate.

Dorsal propodeum with lateral sulcus well defined and bordered on each side by nearly equal carinae; mitral-shaped depression completely enclosed; areola slightly wider basally than at apex, scarcely two times as long as apical width, its outer carina not bordered with grooves. Lateral propodeum on upper part with massive, widely separated rugulae; lower part with dense microsetae on posterior half. Posterior propodeum with flattened carina on lower half or more. Tergum 1 with preapical band medially one irregular row wide, punctures coarse and separated by less than average puncture diameter; band not abruptly impressed on either border. Transverse sulcus of tergum 2 with short, strong ridges, regular in size and spacing, and in complete series from side to side. Pygidium closely punctate on basal half with small emargination; apex near punctate part wrinkled and obscurely shagreened.

Length.—8.5–11 mm.

Male.—Front on lower two-thirds with coarse contiguous punctures mixed with a few large secondaries; on upper front only slightly less densely arranged, with no interspaces nearly as wide as ocellus. Cheek not masked with white hairs; narrower than antennal fossa. Antennal flagellum, black, slender, first three joints 2.8 times as long as wide. Head width 2.4 times least distance between eyes (five measured were 2.3, 2.4, 2.5, 2.4, 2.5). Mandible (pl. IV, 19).

Dorsal pronotum with complete transverse carina buttressed its entire length by short ridges; punctate part with punctures coarse, uniformly distributed, and barely of first-degree density. Lateral pronotum with strong escarpment across its disk, bordering groove interrupted by several short rugulae. Mesopleuron on anterior slope with primary punctures coarse and generally of first-degree density, interspersed with a few large secondaries; subalar patch of microsetae narrower than tegula. Metanotum closely punctate. Legs including tarsi black. Hind tibia not in-

flated; inner face with elongate median carina terminating in reddish ellipsoidal sensorial area, in which sensorium is poorly defined. Tegula black, not shagreened, 1.2 times as long as middle width, without groove on outer margin. Forewing (pl. IV, 20) with membrane nearly hyaline; radial cell greatly exceeding second cubital cell in lateral extension, its apex frequently sharply bent near middle. Sectors of second cubital cell in terms of inner sector (itob) are 10:25:19:19.

Dorsal propodeum outside areola completely, strongly, and irregularly reticulate; transverse carina very high and broad; transverse sulcus deep; lateral sulcus bordered on each side by carina, inner one continuous with inner margin of mitral-shaped excavation, which is deep and completely outlined; areola keystone shaped,  $1\frac{1}{4}$  to  $1\frac{1}{2}$  times as long as apical width. Lateral propodeum with strong, widely separated rugulae. Tergum 1 with preapical band bordered anteriorly by a strong escarpment, medially band consists of fine, obscure sculpturing, posteriorly of band of coarse punctures, one to two punctures wide. Terga with hairs sparse and white; without line of apical microscopic gouges over middle. Sternum 5 with large, appressed lateral denticle. Sternum 6 with only short, sparse hairs on each side of vitta.

Length.—8.2–10.3 mm.

Remarks.—The type and allotype of *matura* are in the U.S. National Museum. In addition, 39 female and 16 male paratypes are scattered in several collections. Since the description of *matura* in 1930, L. B. Parker has identified 184 females and 58 males for the Moorestown collection.

### 16. *Tiphia* (*Tiphia*) *pullivora* Allen and Jaynes

*Tiphia pullivora* Allen and Jaynes, 1930: 83.

I have redescribed this species from a paratype female, two paratype males, and numerous identified specimens of both sexes in the collection at Moorestown. *T. pullivora* was once considered as a possible introduction against the Japanese beetle. It was imported in the cocoon stage and adults were reared at Moorestown.

The female has a grooved hind basitarsus, none of the legs are bright red, the lateral pronotum is without a well-defined groove, the hind basitarsus has a long, narrow groove. The male has a broadly shagreened front with interspaces wider than an ocellus, the mandible has a strong preapical cusp, the radial cell at most only slightly exceeds the second cubital in lateral extension, and the fifth sternum has a small appressed denticle.

**Holotype.**—♀, No. 41802, U.S. National Museum, from Shillong, India, Japanese Beetle Experiment No. 302-0.

**Female.**—Front punctures moderately coarse, on lower third of first-degree density, thinning to sparse third-degree density in region below ocellar triangle, with several interspaces as wide as ocellus. Cheek not masked with hairs. Mandible usually without preapical cusp. Antennal flagellum reddish brown to black; first three segments 2.3 times as long as wide.

Dorsal pronotum with transverse carina at humeral angle; punctures coarse, abundant, of first-degree density only in small areas. Lateral pronotum smooth without groove across disk or parallel rugulae in ventral corner. Scutum with anteromedian escarpment and notaulices not connected. Mesopleuron on anterior aspect with moderate-sized punctures barely attaining first-degree density; secondaries minute, not usually abundant; subtegular patch of microsetae scarcely as wide as tegula. Disk of metanotum with moderate number of small primary punctures. Femora and tibiae of last two pairs of legs dark red on inner faces. Hind tibia ridged on inner face with upper and lower margins not arched; sensorium flush with surrounding surfaces. Hind basitarsus with short, narrow groove. Tegula cockleshell shaped, reddish, and translucent, not shagreened, without groove on outer margin. Forewing slightly infumated; stigma usually separated more than its length from basal vein; radius without backward directed spur on first section or terminal spur.

Dorsal propodeum arched on both transverse and longitudinal axes; lateral groove narrow and poorly defined, its inner carina obscure; areola frequently short, often much less than twice as long as apical width. Lateral propodeum with many closely spaced rugulae often becoming evanescent caudally. Posterior propodeum without median carina. Tergum 1 usually with preapical band abruptly impressed on anterior border, of moderate-sized, well-separated punctures, one row wide. Intermediate terga with wide impunctate areas between punctate bands. Pygidium fine close punctate on basal two-thirds, lower punctures invading reddish area; with well-defined emargination; impunctate apex not shagreened.

**Length.**—5.8–7.5 mm.

**Allotype.**—♂, U.S. National Museum No. 41802, Shillong, India, Japanese Beetle Parasite Experiment No. 302-0.

**Male.**—Front broadly shagreened; punctures of first-degree density on lower third, thinning to sparse third-degree density in area below ocellar triangle, with several interspaces wider than ocellus; no secondaries on upper half. Cheek not masked with

white hairs; not narrower than antennal fossa. Mandible with strong preapical denticle. Antennal flagellum brown; first three joints 2.2 times as long as greatest width (average of two). Head width 2.1 times least distance between eyes (four measured were 2.1, 2.2, 2.1, 2.2).

Dorsal pronotum broadly shagreened, with complete, high, transverse carina bordered by narrow sulcus; sulcus traversed by numerous short cross ridges except on middle third; punctures numerous, relatively small, of uniform third-degree density. Lateral pronotum flat, without significant sculpturing. Mesopleuron with medium-sized punctures largely of first-degree density mixed with minute secondaries that are more numerous than primaries. Legs vary from red, particularly on inner surfaces, to entirely black. Hind tibia on inside with long, strong carina. Tegula cockleshell shaped, not translucent, not shagreened, without groove on outer margin. Forewing hyaline; radial cell equaling or slightly exceeding second cubital cell in lateral extension, apical section with sharp bend at its middle; sectors of second cubital cell in terms of inner sector (itob) are 10:29:21:19.

Dorsal propodeum with area outside areola smooth; mitral-shaped pit unusually deep; areola keystone shaped, not more than  $1\frac{1}{2}$  times as long as apical width. Lateral propodeum with rugulae very weak, fading out completely on posterior half where they are replaced by fine aciculations. First abdominal segment 1.1 times as long as horizontal width. Tergum 1 without anterior transverse carina; preapical band abruptly impressed on part of anterior border, consisting of small primary punctures, well separated but in irregular array, about two to three punctures wide. Terga 3-6 completely shagreened, with small shallow punctures evenly distributed and yellowish-white bristly hairs of usual size. Sternum 5 with small, appressed lateral denticle. Sternum 6 with only sparse, short hairs.

Length.—4.7-6 mm.

Remarks.—There is in the Moorestown collection, in addition to a paratype female and 2 paratype males, 118 females and 146 males identified by L. B. Parker. In this lot there is considerable variation in the degree of redness of the legs.

### 17. *Tiphia* (*Tiphia*) *nilgiria*, new species

(Pl. IV, 21-22)

In several species of Indian *Tiphia* the male possesses well-developed, preapical, mandibular denticles. Among these, *nilgiria*

most closely resembles *simlaensis*. In *nilgiria* there are much wider interspaces on the upper front and the head width is 1.8 to 2.0 times the least distance between the eyes. *T. simlaensis* is closely punctate on the front to level of the lowest ocellus and the ratio of head width to least distance between eyes averaged 2.4 for five specimens measured.

**Holotype.**—♂, Nilgiri Hills, India, 5,600 ft, 25-VI-1928 (L. B. Parker) [NMNH].

**Male.**—Front not shagreened; punctures of first-degree density on lower two-thirds, much sparser on upper third where interspaces are almost as wide as ocellus; almost without secondaries. Head width 1.9 times least distance between eyes (five measured were 2.0, 2.0, 1.9, 1.9, 1.8). Cheek wider than antennal fossa. Mandible with strong preapical denticle (pl. IV, 21).

Dorsal pronotum with transverse carina complete, high, but without well-developed buttressing ridges. Lateral pronotum with anterior process sharp and high its entire length; a faint narrow groove or escarpment usually present on middle disk. Mesopleuron on outer disk with coarse punctures somewhat irregularly distributed, with numerous interspaces less than average puncture diameter; minute punctures less numerous than primaries. Disk of metanotum with only sparse minute punctures. Legs black. Hind tibia on inner face with carina, which is strong apically and surrounds sensorium but fades away toward friction plate. Tegula reddish to yellow translucent on margins with groove continued about outer apical angle. Forewing (pl. IV, 22) with radial cell equal to second cubital cell in lateral extension; sectors of second cubital cell in terms of inner sector (itob) are 10:22:19:26 (average of two).

Dorsal propodeum lateral to areola faintly rugulose; areola slightly tapered, about twice as long as apical width. Lateral propodeum with numerous strong, widely spaced rugulae, uniformly developed to caudal corner. Posterior propodeum sometimes with partial, narrow median carina. Tergum 1 without anterior transverse carina; dorsally outside preapical band with only fine, scattered punctures; preapical band of punctures irregular in size and spacing, not impressed, without bordering escarpment, and about three punctures wide. Terga 3-6 with fine punctures, regularly spaced. Terga 3-4 with microscopic apical grooves over middle. Sternum 5 with elevated lunate denticle having conspicuous overhang on inner edge.

**Length.**—5.4-7.3 mm.

**Female.**—Unknown.

**Paratypes.**—31, same data as holotype [M].

Paratypes have been deposited in the U.S. National Museum, British Museum, and Rijksmuseum.

### 13. *Tiphia* (*Tiphia*) *hirsuta* Smith

*Tiphia hirsuta* Smith, 1855: 83; Bingham, 1897: 58, 63.

*Tiphia tarsata* Cameron, 1897: 44.

*Tiphia clypealis* Cameron, 1897: 47.

*Tiphia* (*Tiphia*) *hirsuta* Smith, Allen, 1969: 393. New synonymy.

F. Smith did not specify whether he had one or more specimens before him when he described this species. There is a single male specimen in the British Museum marked "Type," which I (1969) have designated the lectoholotype. Smith stated that the species was taken in northern India. I have examined the type of *clypealis* in the British Museum, a male in poor condition, and the type of *tarsata* in the Hope Department of Entomology, Oxford University.

I redescribed in 1969 this peculiarly marked species from the holotype male in the British Museum. In addition to a very few specimens from northern India ("Masuri" and "Mussouri") previously studied, I have recently identified a fine series of 10 males taken in Simra, Nepal, at 600 ft in a Malaise trap on August 23 to 28, 1967, by a Canadian expedition in Nepal. These all have the highly characteristic orange clypeus, the translucent orange band on the apex of the pronotum, the thin translucent tegula of *hirsuta*, as well as the conspicuous masking hairs of the cheek and clypeus. They also have on the sixth sternum a tuft of fine short hairs not present in most species but easily overlooked because the hairs are so short.

The following descriptive notes are of the holotype specimen.

**Lectoholotype.**—♂, "Type" 56/43, *hirsuta*, Smith [BMNH].

**Male.**—Lower front and cheek masked with coarse white hairs; front with deep, closely contiguous punctures extending almost to vertex except for small area in front of ocellar triangle. First three joints of flagellum 2.7 times as long as wide. Clypeus with its median extension obscurely bidentate, its margin broadly light orange under conspicuous "mustache" of coarse white hairs. Mandible without preapical denticle.

Dorsal pronotum with complete transverse carina not buttressed with series of cross ridges; punctate part closely set with large primary punctures of first-degree density; impunctate apex a yellow translucent ribbon. Mesopleuron on outer disk closely set with large primary punctures and a few large secondaries; a patch

of dense appressed micropile covers most of upper half. Femora and tibiae of middle and hind legs black at least on outside. Hind tibia with sensorial area usually black, sensorium much elongated almost threadlike; inner face carinate only about sensorium. Forewing with radial cell equaling or only slightly exceeding second cubital cell in lateral extension; sectors of second cubital cell in terms of inner sector are 10:28:19:26.

Dorsal propodeum not reticulate on area lateral to areola; areola keystone shaped, its base  $1\frac{1}{4}$  and its length more than twice its apical width. Lateral propodeum with rugulae on upper part sharply defined its entire length and moderately numerous. Tergum 1 without anterior transverse carina; preapical band not abruptly impressed, narrow, very close to apex, medially one to two punctures wide. Intermediate terga uniformly set with punctures, all about the same size; with apical row of minute gouges over dorsum. Fifth sternum with strong lateral denticle uplifted on inner face and oriented almost parallel to longitudinal axis. Sternum 5 with brush of fine, dense hairs.

**Length.**—7.6–11.0 mm.

**Remarks.**—The size range of the Nepalese specimens, 7.6–9.5 mm, is less than the 11-mm length of the north Indian holotype and there are other minor differences. Despite this I consider them conspecific with *hirsuta*.

Canadian Nepal Expedition near Simra, Adhabhar, Nepal, 600 ft, in Malaise trap: 10, 23–28–VIII–1967; 1, 23–26–VIII–1967.

### 19. *Tiphia (Tiphia) batorea*, new species

Among three species from the Indian subcontinent that have in the male a conspicuous tuft of fine dense hairs on the sixth sternum, *batorea* is distinguished by having bright-orange legs. It does not have the shagreened front or the prominent preapical denticle of the mandible that are present in the specimens of *pullivora* having red legs.

**Holotype.**—♂, Coimbatore, 1,400 ft, Madras State, India, May 1960 (P. Susai Nathan) [RNH].

**Male.**—Front not shagreened; punctures of close first-degree density on lower half, thinning to second- and third-degree density above, without interspaces as wide as ocellus, secondaries numerous on lower half. Head width 2.5 times least distance between eyes (three measured were 2.6, 2.6, 2.3). Cheek much narrower than antennal fossa. Mandible without acutely pointed preapical denticle.



Dorsal pronotum with high transverse carina, buttressed near humeral angle with several obscure cross ridges; primary punctures small and widely spaced; secondaries minute and much more numerous than primaries.

Lateral pronotum with broad escarpment across its disk. Mesopleuron on its outer disk with its primary punctures separated in some directions by less than their average diameter, interspersed with minute punctures, which are more numerous than primaries except on ventral aspect. Metanotal disk without coarse punctures. Legs with tibiae and tarsi bright red. Tegula almost completely amber translucent, without shagreening or marginal grooves, 1.2 times as long as middle width. Forewing nearly hyaline; radial cell equaling or slightly exceeding second cubital cell in lateral extension; radius with sharp bend in apical section. Sectors of second cubital cell in respect to inner sector (itob) are 10:20:18:16 (average of two).

Dorsal propodeum with area lateral to areola relatively smooth; areola with its base about  $1\frac{1}{2}$  and its length two times apical width. Lateral propodeum with rugulae strong and present into apical corner. Tergum 1 not elongate; transverse carina not present; preapical band only obscurely developed and consisting of single row of very small punctures widely separated from tergal apex and without trace of bordering escarpment. Lateral denticle on sternum 5 is a strong, elongated, crescent-shaped ridge. Hairs on middle of sixth sternum denser and longer than on other sterna.

Length.—4.4–5.2 mm.

Female.—Unknown.

Paratypes.—Two, same data as holotype [RNH].

One of the two paratypes has been donated by the Rijksmuseum to the U.S. National Museum.

## 20. *Tiphia* (*Tiphia*) *nepalensis*, new species

The males of *nepalensis* are distinctively marked by the rather coarse, golden-brown, bristly hairs of the abdomen and particularly by the conspicuous brush of dense yellowish hairs on the sixth sternum. *T. batorea* has a somewhat less conspicuous brush of hairs, but in other respects it differs from *nepalensis* in having a higher ratio of head width to least distance between eyes and a radial cell that scarcely exceeds the second cubital cell in lateral extension.

Holotype.—♂, Pulchauki, Katmandu, Nepal, 6,600 ft, 14–21–VII–1967 [CERI].

**Male.**—Front not broadly shagreened; with punctures of first-degree density on lower half, mixed with secondaries on lower third; upper half with punctures of third-degree density, one or two interspaces as wide as ocellus. Cheek without dense white hairs; narrower than antennal fossa. Mandible without preapical cusp. Antennal flagellum with first three joints 4.2 times as long as wide. Head width 2.2 times least distance between eyes (five measured were 2.2, 2.2, 2.1, 2.3, 2.2).

Dorsal pronotum with high, complete, transverse carina; bordering sulcus crossed by numerous short, relatively indistinct, buttressing ridges; punctures fine, chiefly of third-degree density. Lateral pronotum with short, straight, narrow groove on its middle disk. Mesopleuron on anterior aspect with fine punctures ranging from first- to third-degree density and interspersed with scattered minute secondaries. Legs black, with inner faces of first two pairs shading to orange. Hind leg on inside usually with nearly naked ridge, which is not sharply carinate. Tegula opaque, with small yellow mark anterolaterally; cockleshell shaped without shagreening or groove on outer margin. Forewing moderately infumated; radial cell greatly exceeding second cubital cell in lateral extension; sectors of second cubital cell in terms of inner sector (itob) are 10:21:24:19 (average of two).

Dorsal propodeum outside areola only moderately sculptured; areola elongate, its base  $1\frac{1}{4}$  times and its length more than three times its apical width. Lateral propodeum on upper part rugose to caudal margin with about 20 strong rugulae. First abdominal segment 1.4 times as long as wide; preapical band a mixture of large and small punctures, not impressed, and over middle about two punctures wide. Terga 3-7 entirely shagreened, punctures of uniform size and spacing; without microscopic apical grooves. Sternum 5 with massive, elongate, lateral denticle laterally oriented. Sternum 6 rufous apically, with conspicuous brush of erect brownish hairs bordering median vitta.

**Length.**—6.5-7.8 mm.

**Female.**—Unknown.

**Paratypes.**—The following paratypes were collected at Pulchauri, Katmandu, at different altitudes and dates: One, 6,000 ft, 13-VII; five, 6,600 ft, 21-17-VII; one, 6,600 ft, 13-17-VII; five, 6,000 ft, 14-21-VII. The following were taken at Godavari, Katmandu, at different altitudes and dates: One, 5,000 ft, 16-VII; two, 6,000 ft, 14-VII; one, 6,000 ft, 17-VII; one, 6,000 ft, 20-22-VII; one, 6,600 ft, 24-VII.

The holotype male and 18 paratypes were obtained by the Canadian Nepal Expedition of 1967 in Nepal. Paratypes have been

donated by the Canadian Entomology Research Institute to the U.S. National Museum and the Moorestown collection.

## 21. *Tiphia* (*Tiphia*) *milleri*, new species

(Pl. IV, 23)

This is a small species known only in the male. It has an elongate first abdominal segment and a radial cell greatly exceeding the second cubital cell in lateral extension. However, its most distinctive feature is the complicated denticle of the fifth sternum, which has two ridges separated by a rounded hollow.

**Holotype.**—♂, Pulchauki, Katmandu, Nepal, 6,000 ft "Mal. Tr., Can. Exp.," 13-11-VIII-1967 [CERI].

**Male.**—Underside of antenna, palpi, and most of first two pairs of legs orange red.

Front entirely shagreened; lowest third but not along eye orbits with punctures of first-degree density, without secondary punctures; upper front with several interspaces wider than ocellus. Cheek not masked with white hairs, about as wide as antennal fossa. Mandible without acutely pointed preapical denticle. First three joints of antennal flagellum 3.0 times as long as wide. Head width 2.2 times least distance between eyes (five measured were 2.2, 2.1, 2.2, 2.2, 2.1).

Dorsal pronotum with high, complete, transverse carina, buttressed from side to side with regular series of short ridges; punctures extremely sparse, middle area with only six to eight very small ones. Lateral pronotum with its disk flat, with no well-defined discal groove but with rugulae in ventral corner. Mesopleuron on anterior slope with small punctures usually separated by more than their average diameter and only an occasional secondary puncture. Hind leg black; sensorium not elongate; without ridge or naked stripe on inner face. Tegula cockleshell shaped, thin, orange, translucent, without groove on outer margin. Forewing with radial cell greatly exceeding second cubital in lateral extension; sectors of second cubital cell in terms of inner sector are (itob) 10:31:20:20.

Dorsal propodeum outside areola smooth; areola rectangular or nearly so, more than twice as long as wide. Lateral propodeum on upper part with only fine, poorly defined rugulae. Posterior propodeum with narrow median carina on apical third. First abdominal segment 1.7 times as long as wide; dorsum with small, sparse, widely scattered punctures; preapical band of rather poorly defined punctures irregularly distributed, not impressed, at least two

punctures wide. Intermediate terga broadly shagreened, with very fine, uniformly distributed punctures. Fifth sternum (pl. IV, 23) with denticle assembly consisting of a long, sharp, longitudinally oriented ridge extending to posterior border, flanked on outside by shallow groove and outside that by short rounded ridge.

**Length.**—4.6–6.1 mm.

**Female.**—Unknown.

**Paratypes.**—All collected by the Canadian Expedition to Nepal in 1967. From Pulchauki, Katmandu, Nepal: One, 6,600 ft, 14–22–VII; five, 6,600 ft, 21–VII; one, 6,800 ft, 21–VII; one, 8,000 ft, 31–VII; one, 8,000 ft, 7–VIII. From Godavari, Katmandu, Nepal: One, 6,000 ft, 20–22–VII; one, 6,000 ft, 12–VIII.

The Canadian Entomology Research Institute has donated three paratypes to the Moorestown collection.

## 22. *Tiphia (Tiphia) flavipalpis*, new species

This species, known only in the male, is represented by the type and a long series of paratypes in the Canadian Entomology Research Institute. It was taken at relatively high altitudes in Nepal. It is distinguished from most Indian species by the possession of a rounded orifice lying under the uplifted inner edge of the denticle of the fifth sternum. From *orificia* it differs in having a radial cell that greatly exceeds the second cubital cell in lateral extension.

**Holotype.**—♂, Pulchauki, Katmandu, Nepal, 6,800 ft, 21–VII–1967 [CERI].

**Male.**—Front not broadly shagreened; punctures on lower half of close first-degree density without secondaries; on upper half generally of third- or second-degree density, without interspaces as wide as ocellus; narrow median carina on lower half to two-fifths. Cheek slightly narrower than antennal fossa, without dense white hairs. Mandible without well-defined preapical cusp. First three joints of antennal flagellum 3.0 times as long as greatest width. Palpi filiform and entirely orange yellow. Head width 2.2 times least distance between eyes (five measured were 2.2, 2.2, 2.2, 2.3, 2.3).

Dorsal pronotum with high, complete, transverse carina buttressed its entire length by short ridges; punctures moderate sized, generally separated in one or more directions by interspaces greater than their average diameter. Lateral pronotum finely aciculate, without discal groove, escarpment or punctures. Mesopleuron on entire anterior aspect with small punctures interspersed with minute punctures that are more numerous than

primaries. Metanotum with only minute punctures. Legs black, inner faces of forefemur and foretibia and sometimes middle tibia streaked with orange; hind tibia with a large clavate sensorium in an orange setting, inner face without ridge. Tegula piceous, cockleshell shaped, without groove on outer margin, not shagreened. Forewing slightly infumate; radial cell greatly exceeds second cubital cell in lateral extension; sectors of second cubital cell in terms of inner sector (itob) are 10:26:18:20.

Dorsal propodeum reticulate in area cephalad of large pits bordering high transverse carina; areola only slightly tapered and more than twice as long as apical width. Lateral propodeum on upper part with rugulae continued into ventral corner, everywhere well defined and 20 or more in number. First abdominal segment moderately elongate, 1.4 times as long as horizontal width. Tergum 1 without anterior transverse carina; preapical band of small punctures, not abruptly impressed, narrowed medially to one to two punctures wide. Terga 3-6 broadly shagreened, punctures small and evenly dispersed; no microgrooves over apices. Fifth sternum with massive denticle raised on one margin and longitudinally oriented with rounded orifice under elevated edge. Sixth sternum with only sparse hairs.

Length.—6.2-8.1 mm.

Female.—Unknown.

Paratypes.—All are in the collection of the Canadian Entomology Research Institute and were taken in Nepal in the Canadian Nepal Expedition in 1967. From Pulchauki, Katmandu: 1, 6,600 ft, 7-14-VII; 2, 6,600 ft, 14-21-VII; 2, 6,000 ft, 21-27-VII; 22, 6,800 ft, 21-VII; 3, 7,300 ft, 21-27-VII; 3, 7,300 ft, 1-4-VIII; 3, 7,300 ft, 4-7-VIII. From Godavari, Katmandu: One, 5,000 ft, 27-30-VII; two, 5,000 ft, 3-7-VIII; four, 6,000 ft, 14-VII; one, 6,000 ft, 7-14-VII; three, 6,000 ft, 14-17-VII; seven, 6,000 ft, 17-20-VII; one, 6,000 ft, 20-VII; one, 6,000 ft, 20-22-VII; four, 6,000 ft, 23-26-VII; one, 6,000 ft, 27-30-VII; one, 6,000 ft, 1-3-VIII; one, 6,000 ft, 12-VIII; one, 6,000 ft, 7-13-VIII.

Paratypes were donated by the Canadian Entomology Research Institute to the U.S. National Museum and the Moorestown collection.

### 23. *Tiphia* (*Tiphia*) *orificia*, new species

(Pl. IV, 24-25)

This species appears closely related to *sternodentata* described from a single male from Keikido, Korea (Allen and Jaynes, 1930, p. 36). The holotype of *sternodentata* was lent me by the U.S.

National Museum for comparison with the type series of *orificia*. These two species are indeed very close in all the usual diagnostic characters. *T. orificia* has a conspicuously blackish forewing in contrast to the nearly hyaline forewing of *sternodentata*. However, the most significant structural difference occurs at the terminus of tergum 1. In *orificia* this segment terminates in an upturned and sharply carinate ridge, whereas in *sternodentata* this area is normally rounded.

**Holotype.**—♂, Shillong, Assam, India, 4,800 ft, 15-VI-1928 (L. B. Parker) [NMNH].

**Male.**—Front not shagreened; with coarse, closely contiguous punctures on lower half and also on much of upper front without interspaces as wide as ocellus. Cheek wider than antennal fossa. Mandible without preapical denticle. Antennal flagellum slender, first three joints 4.0 times as long as wide. Head width 1.9 times least distance between eyes (four measured were 1.9, 1.9, 1.9, 2.0).

Dorsal pronotum with high transverse carina irregularly buttressed with short cross ridges; transverse sulcus obsolete; punctures coarse and uniform in size and distribution, of first-degree density. Lateral pronotum without groove across disk. Mesopleuron partly masked under long white hairs, with small primary punctures usually separated in at least one direction by less than average primary puncture diameter; secondaries minute and except on ventral face much more numerous than primaries. Legs black. Hind tibia at most obscurely carinate on inner face; sensorium an elongate reddish oval. Hind basitarsus almost cylindrical, about four times as long as middle width. Tegula black, opaque, not shagreened, without grooves on outer margin. Forewing conspicuously infumate; radial cell usually equaling but not exceeding second cubital cell in lateral extension. Sectors of second cubital cell in terms of inner sector (itob) are 10:29:21:29 (average of two).

Dorsal propodeum with area outside areola smooth; mitral-shaped enclosure deep and completely enclosed; areola rounded at apex, its length two times and its base  $1\frac{1}{4}$  times apical width. Lateral propodeum with relatively strong rugulae, moderately numerous, and continued into caudal corner. First abdominal segment scarcely 1.1 times as long as horizontal width. Tergum 1 (pl. IV, 24) without anterior transverse carina; preapical band in shallow depression and consisting of closely spaced punctures, irregular in size, and about three punctures wide; terminus elevated into sharp-crested, smoothly encircling, and very conspicuous carina. Intermediate terga not shagreened, terminal punctures almost touching abruptly raised apices of segments;

hairs yellowish. Sternum 5 (pl. IV, 25) with large, conspicuously elevated, lateral denticle overhanging slitlike orifice, which is bordered mesad by polished lip. Fourth sternum sometimes with small lateral denticle overhanging oval pit.

**Length.**—9.8–12.4 mm.

**Female.**—Unknown.

**Paratypes.**—All were taken at Shillong, Assam, India, and presently are in the collection at Moorestown: 5, same data as holotype; 5, 4,800 ft, 29–VI–1928 (L. B. Parker); 14, 5,000 ft, various dates from 16–V to 27–VI–1928 (L. B. Parker); 8, 5,000 ft, June 1920 (Fletcher); 3, June 1920 (Fletcher); 4, 23–VI–1918 (A. G. R.); 1, 13–VI–1918 (A. G. R.).

Paratypes were donated to the collections of the U.S. National Museum and the British Museum.

## 24. *Tiphia (Tiphia) madrasa*, new species

(Pl. V, 26)

This species with the unusual rugose dorsal propodeum has been described from specimens in the Rijksmuseum. The holotype and three paratypes are all from the Anamalai Hills in Madras State.

**Holotype.**—♂, Anamalai, Madras, India, V–1963 (P. Susai Nathan) [RNH].

**Male.**—Head, dorsal thorax, and abdomen almost entirely and very finely shagreened.

Front with coarse punctures of first-degree density except on upper median area slightly larger than ocellar triangle, where they are of second- or third-degree density without interspaces as wide as ocellus; secondaries lacking. Head with 2.3 times least distance between eyes (four measured were 2.2, 2.4, 2.4, 2.3). Cheek narrower than antennal fossa. Mandible without preapical denticle.

Dorsal pronotum with sharp-crested carina; bordering sulcus shallow with only obscure, scattered cross ridges; punctures small, uniformly distributed, and chiefly of third-degree density. Lateral pronotum with parallel rugulae, which are intercepted by escarpment that parallels posterior border. Mesopleuron on anterior aspect with small primary punctures largely of third-degree density; secondaries minute and more numerous than primaries only on upper anterior part. Legs black. Hind tibia with thin ridge continued to basal friction plate; sensorial area slightly expanded. Basitarsus slightly clavate, about eight times as long as middle width. Tegula black, broadly shagreened, 1.2 times as long as middle width, with fine groove close to outer margin, and

another close to apical margin. Forewing with radial cell greatly exceeding second cubital cell in lateral extension, unusually slender, 3.3 times as long as wide. Sectors of second cubital cell in terms of inner sector (itob) are 10:31:19:23 (average of two).

Dorsal propodeum (pl. V, 26) including areola very coarsely rugose, rugae transversely oriented; areola with base and length each only slightly longer than apical width. Lateral propodeum with upper part entirely rugose with strong, straight rugae; lower part also rugulose, with weaker rugulae. First abdominal segment not more than 1.1 times as long as horizontal width. First tergum with many coarse punctures on anterior face and dorsal aspect; without anterior transverse carina; preapical band abruptly depressed on outer upper margin, about three punctures wide, those on anterolateral area much coalesced. Terga 3-5 with small punctures uniformly distributed; without microscopic incised line over middle apices. Fifth sternum with small, crescent-shaped, lateral denticle, appressed and laterally oriented. Sixth sternum without tuft of dense, fine hairs.

**Length.**—8.7-10.9 mm.

**Female.**—Unknown.

**Paratypes.**—Kadamparai, Anamalai Hills, Madras, India (P. Susai Nathan): Two in May 1963; one in June 1963 [RNH].

One paratype was donated by the Rijkmuseum to the U.S. National Museum.

## 25. *Tiphia (Tiphia) fuscinervis* Cameron

*Tiphia fuscinervis* Cameron, 1897: 48; Bingham, 1897: 58, 63; Allen and Jaynes, 1930: 99.

*Tiphia fulvohirta* Cameron, 1898: 17.

*Tiphia (Tiphia) fuscinervis* Cameron, Allen, 1969: 395. New synonymy.

Cameron was not clear in his description either as to the sex or to the type locality of this species. C. T. Bingham, who redescribed it shortly after the original description, stated that the type is a male from "Mussooree," India. In 1969 I reported on the examination of the types of *fuscinervis* and *fulvohirta* at Oxford University. Only the types have been seen.

**Lectoholotype.**—"Missouri," India [OU].

**Male.**—Front with contiguous punctures on lower half, thinning above but without interspaces as wide as ocellus. Cheek wider than an antennal fossa; not concealed under white hairs. Head width 2.0 times least distance between eyes. Antennal flagellum dull reddish, first three joints 3.0 times as long as wide. Clypeus with median extension bidentate on apex narrower than clypeo-antennal distance. Mandible without preapical denticle.



Dorsal pronotum with complete, sharp-crested carina bordered by sulcus, which is crossed by many short cross ridges; punctate area with coarse, deep punctures generally of first-degree density; impunctate apex scarcely wider than largest adjacent punctures. Lateral pronotum with several rugulae in ventral corner; middle disk crossed by broad, crescent-shaped groove intersected by several cross ridges. Mesopleuron on outer disk with coarse, deep punctures of first-degree density and on upper half with moderate-sized secondaries that are about as numerous as primaries; subtegular patch of micropunctures about as wide as tegula. Metanotum entirely coarse punctate. Legs, except foretarsus and middle tarsus, largely black. Tegula cockleshell shaped, without groove on outer margin. Forewing with membrane hyaline; lateral extension of radial cell distinctly less than that of second cubital cell; radius with abrupt bend one-sixth distance to intercubital; sectors of second cubital cell in terms of inner sector are (itob) 10:24:20:21.

Dorsal propodeum lateral to areola aciculate to shallowly reticulate; areola with high, thin carinae that are moderately convergent and slightly concave, base  $1\frac{1}{4}$  and length  $1\frac{3}{4}$  times apex. Lateral propodeum with many coarse, closely spaced rugulae, sharply defined from lower aciculate part. Tergum 1 with anterior slope abruptly declivous, without median patch of dense micropunctures; without transverse carina; dorsum globose with several of its punctures exceptionally large; preapical band absent but there is apically a band of discrete punctures that narrows at middle to about two punctures wide. Tergum 2 with punctures on its disk much larger and sparser than on following terga. Terga 3-6 and apex of tergum 2 with dense contiguous punctures, quite uniform in size and distribution and each bearing a short, erect, yellowish-brown hair; punctate to less than a puncture diameter of apices. Fifth sternum with broad, appressed lateral denticle. Sixth sternum with rounded vitta bordered only by sparse, inconspicuous hairs.

Length.—8 mm.

Female.—Unknown.

## 26. *Tiphia* (*Tiphia*) *ivanochkoi*, new species

*T. ivanochkoi* is distinguished from other Indian species known to me by the extremely narrow bidentate clypeal extension, which is narrower than an antennal fossa. Other distinguishing characters are the very narrow cheeks, the sparsely punctate upper front, the somewhat elongate first abdominal segment, and the

much elongated radial cell. The holotype and all the paratype specimens were taken by the Canadian Nepal Expedition in 1967.

**Holotype.**—Pulchauki, Katmandu, Nepal, 6,600 ft, 21-24-VII-1967 [CERI].

**Male.**—Front faintly shagreened; punctures on lower third of close first-degree density, without secondaries; upper front with interspaces as wide as ocellus. Cheek much narrower than antennal fossa. Clypeus much longer than antennal base line; its extension very narrow, not wider than antennal fossa. Mandible without well-developed preapical denticle. First three joints of antennal flagellum 2.9 times as long as wide. Head width 2.6 times least distance between eyes (five measured were 2.5, 2.5, 2.5, 2.7, 2.7).

Dorsal pronotum with strong transverse carina buttressed by very weak, irregularly spaced cross ridges; punctures relatively small and separated in most directions by distances greater than average puncture diameter. Lateral pronotum with crescent-shaped escarpment flanked by obscure irregular gouges. Mesopleuron on anterior slope with secondaries much less numerous than primaries. Femur of middle leg bright red, hind leg black; hind tibia with inner face not carinate, its sensorial area red, convex. Tegula cockleshell shaped without groove on anterior margin, obscurely shagreened. Forewing with radial cell greatly exceeding second cubital cell in lateral extension. Sectors of second cubital cell in terms of inner sector (itob) are 10:21:24:19 (average of two). Metanotum evenly set with small primary punctures.

Dorsal propodeum outside areola only moderately sculptured; areola hourglass to keystone shaped in outline, about two times as long as wide. Lateral propodeum with rugulae widely separated but faint in some areas. First tergum 1.3 times as long as wide (average of three); preapical band of large and small punctures, not impressed, and over middle about two punctures wide. Terga 3-6 entirely shagreened, punctures of uniform size and spacing; without microscopic apical grooves. Sternum 5 with massive, elongate, lateral denticle laterally oriented. Sternum 6 with only short, sparse hairs.

**Length.**—6.5-7.8 mm.

**Female.**—Unknown.

**Paratypes.**—All taken by the 1967 Canadian Nepal Expedition of the Canadian Entomology Research Institute. Paratypes were presented by this institute to the U.S. National Museum and the Moorestown collection. From Pulchauki, Katmandu, Nepal: 1,

6,000 ft, 1-14-VIII; 14, 6,000 ft, 14-21-VII; 7, 6,600 ft, 21-27-VII; 1, 6,600 ft, 1-14-VIII; 2, 6,600 ft, 4-7-VIII. From Godavari, Katmandu, Nepal: One, 5,000 ft, 23-28-VII; two, 6,000 ft, 24-VII; two, 6,000 ft, 27-30-VII; two, 6,000 ft, 7-13-VIII; one, 6,000 ft, 13-17-VIII.

In the Godavari specimens the middle femur is not red and the points of the clypeal extension appear a little more widely separated.

### 27. *Tiphia (Tiphia) pecki*, new species

(Pl. VI, 37-38)

*T. pecki* lacks many of the characters of other male *Tiphia*. It has no transverse carina on tergum 1, no prominent mandibular cusp, and no fine hairy brush on the sixth sternum. The species differs from *dampara* in having an upper front with several interspaces as wide as an ocellus. It is represented by a very long series taken by the Canadian Nepal Expedition in 1967.

**Holotype.**—♂, Pulchauki, Katmandu, Nepal, 6,800 ft, 21-VII-1967 [CERI].

**Male.**—Front broadly shagreened; punctures of close first-degree density on lower half and along eye orbits, generally of second-degree density medially on upper half without interspaces as wide as ocellus. Cheek slightly narrower than antennal fossa. Mandible without well-developed preapical cusp. First three joints of antennal flagellum 3.6 times as long as wide. Head outline (pl. VI, 37). Head width 2.3 times least distance between eyes (five measured were 2.3, 2.3, 2.3, 2.2, 2.3).

Dorsal pronotum with high, complete, transverse carina buttressed by numerous, rather indistinct, cross ridges; punctures small, regularly distributed, and separated by more than their average diameter. Lateral pronotum with strong crescent-shaped escarpment bordered by irregular series of gouges. Legs black. Hind tibia on inside with narrow sensorium and sometimes with narrow carina extending half or more distance to its base. Tegula cockleshell shaped, without groove on outer margin, broadly shagreened. Forewing (pl. VI, 38) with radial cell greatly exceeding second cubital cell in lateral extension; sectors of second cubital cell in terms of inner sector (itob) are 10:27:19:21.

Dorsal propodeum outside areola with transverse rugulae bordering areola diminishing to faint reticulations anterolaterally and fine aciculations elsewhere; areola keystone shaped or with concave sides, with base  $1\frac{1}{4}$  times and length two times apical

width. Lateral propodeum with rugulae on upper part continued into lateral corner, moderately strong, and about 20 in number. Posterior propodeum usually with narrow carina on apical two-thirds. Tergum 1 is 1.4 times as long as wide; without anterior transverse carina; preapical band not impressed, mixture of coalesced and discrete punctures about three wide over middle. Terga 2-6 entirely shagreened; punctures small, uniform in size and spacing, generally separated by more than their average diameter; no microgroove over apices. Sternum 5 with lateral denticle a polished, transversely oriented ridge. Sternum 6 with only short, sparse, appressed hairs on each side of median vitta.

Length.—6.5-10.5 mm.

Female.—Unknown.

**Paratypes.**—All were taken in Katmandu, Nepal, in 1967 and belong to the collection of the Canadian Entomology Research Institute. Paratypes have been distributed to the British Museum, the U.S. National Museum, and retained in the collection at Moorestown. Collected at Pulchauki: At 6,600 ft: Four, 14-21-VII; one, 21-27-VII; one, 4-7-VIII; one, 13-17-VII. At 6,800 ft: 17, 21-VII. At 7,300 ft: One, 21-27-VII; one, 27-31-VII; two, 1-4-VIII; two, 4-7-VIII. At 8,000 ft: One, 14-21-VII; two, 21-27-VII; five, 31-VII; three, 7-14-VIII; four, 13-17-VIII. Collected at Godavari: At 5,000 ft: One, 15-VII; one, 21-VII; one, 23-VII; one, 27-30-VII; six, 3-7 VIII; one, 12-VIII. At 6,000 ft: 3, 14-VII; 1, 14-17-VII; 2, 17-VII; 10, 17-20-VII; 1, 18-VII; 5, 20-22-VII; 9, 23-26-VII; 3, 27-30-VII; 2, 30-VII; 4, 1-3-VIII; 4, 3-VIII; 4, 7-13-VIII; 11, 12-VIII; 1, 13-VIII; 6, 13-17-VIII.

## 28. *Tiphia (Tiphia) dampara*, new species

(Pl. V, 27-28)

This species is distinguished from others in southern India by the conspicuously shagreened front in which no interspaces are as wide as an ocellus, the very narrow cheek, the absence of an acutely pointed preapical denticle on the mandible, and the relatively small, obscure, lateral denticle of the fifth sternum.

**Holotype.**—♂, Nilgiri Hills, India, 5,600 ft, 25-VI-1928 (L. B. Parker) [NMNH].

**Male.**—Front conspicuously shagreened; punctures medially on upper third of third- or second-degree density, with no interspaces as wide as ocellus. Antennal flagellum black, with first three joints 2.7 times as long as wide. Head outline (pl. V, 27). Head with 2.5 times least distance between eyes (three measured

were 2.4, 2.6, 2.5). Cheek narrower than antennal fossa. Cheek and clypeus not masked with coarse bristly hairs. Mandible without acute-pointed mandibles.

Dorsal pronotum with high, sharp-crested, transverse carina, obscurely buttressed with short, weak ridges at humeral angle. Lateral pronotum with strong, crescent-shaped escarpment across middle disk, intercepted on upper side by several short ridges in echelon. Mesopleuron broadly shagreened; on outer disk with small primary punctures usually separated in some directions by less than average puncture diameter; secondaries almost absent. Legs black. Hind tibia on inner face not carinate; sensorium papillate. Tegula opaque black, faintly shagreened, without marginal grooves. Forewing (pl. V, 28) faintly infusate; radius with sharp bend in terminal section; radial cell in its lateral extension moderately exceeding that of second cubital cell; sectors of second cubital cell in terms of inner sector (itob) are 10:26:21:17 (average of two). Metanotum uniformly coarse punctate.

Dorsal propodeum outside areola with shallow reticulum merging with faint aciculations; areola short keystone shaped, its base only slightly less than its length. Lateral propodeum on upper part with numerous coarse rugulae sometimes continuous into anal corner. First abdominal segment 1.1 times as long as horizontal width. Tergum 1 without anterior transverse carina; preapical band consists of close irregular punctures, irregularly spaced, about two wide at middle, and without marginal escarpments. Intermediate terga without microscopic apical grooves over dorsum; bristly hairs white, relatively inconspicuous. Sternum 5 with obscure lateral denticle. Sternum 6 with only short, sparse hairs.

Length.—5.8–8.2 mm.

Female.—Unknown.

Paratypes.—18, same data as holotype [M]; 3, Kadamparai, Anamalai Hills, 3,500 ft, May 1963, southern India (P. Susai Nathan) [RNH]; 2, Cinchona, Anamalai Hills, 3,500 ft, southern India (1 in May 1960, 1 in April 1964) [RNH].

### 29. *Tiphia* (*Tiphia*) *birganjae*, new species

The most unusual feature of this species is the bright-red legs, not often found in males of Indian *Tiphia*. Other features are the wide cheeks, lack of mandibular cusps, strongly buttressed transverse carina of the dorsal pronotum, relatively short radial cell, and strong fifth sternal denticle.

Holotype.—♂, Lothar near Birganj, Nepal, 450 ft, 12–14–IX–1967, Malaise trap No. 30, Canadian Nepal Expedition [CERI].

**Male.**—Front sometimes broadly shagreened, without impunctate interspaces as wide as ocellus; punctures on upper half of second- or third-degree density. Cheek as wide as antennal fossa. Mandible usually without well-developed preapical denticle. Head width 2.2 times least distance between eyes (five measured were 2.2, 2.1, 2.2, 2.2, 2.2). Antennal flagellum fulvous beneath, relatively short and stout, first three joints 2.8 times as long as wide.

Dorsal pronotum with high, complete, transverse carina, uniformly buttressed from side to side with complete series of short, strong cross ridges; punctures of medium size and relatively uniform in size and distribution. Lateral pronotum without well-developed discal groove or escarpment across its disk. Mesopleuron with medium-sized primary punctures ranging from first-degree density near prepectus to second-degree density on outer disk; secondaries more numerous than primaries except on ventral aspect. Legs, except coxae, bright orange red. Hind tibia without well-differentiated sensorium or ridge on inner face. Tegula only slightly longer than middle width, its margin translucent, without groove on outer margin or shagreening. Forewing slightly infumate; radial cell only slightly exceeding second cubital cell in lateral extension, apical section usually sharply bent near middle; sectors of second cubital cell in terms of inner sector (itob) are 10:24:18:17. Metanotal disk closely set with coarse primary punctures.

Dorsal propodeum outside areola not strongly sculptured; areola keystone shaped, only slightly longer than basal width, its carinae and propodeal transverse carina high and strong. Lateral propodeum with strong rugulae continued without weakening to caudal boundary. First abdominal segment short, 1.1 times as long as wide. Tergum 1 without anterior transverse carina; preapical band not impressed and consisting of fine, well-separated punctures, at middle one or two punctures wide. Intermediate terga with fine punctures relatively uniform in size and distribution; without microscopic apical groove or series of gouges. Fifth sternum with obscure, appressed lateral denticle. Sternum 6 without median tuft of dense fine hairs.

**Length.**—5.5–7.4 mm.

**Female.**—Unknown.

**Paratypes.**—All were collected by the Canadian Nepal Expedition to Nepal in 1967. They were all collected at Lothar near Birganj at 450 ft: 1, 29-VIII-5-IX; 7, 30-VIII-5-IX; 3, 1-4-IX; 1, 1-5-IX; 1, 5-7-IX; 3, 5-12-IX; 10, 12-14-IX; 2, 17-IX.

Paratypes were donated by the Canadian Entomology Research Institute to the U.S. National Museum and the collection at Moorestown.

### 30. *Tiphia (Tiphia) tibetana* Turner

*Tiphia tibetana* Turner, 1908: 121; Allen and Jaynes, 1930: 100.

*Tiphia (Tiphia) tibetana* Turner, Allen, 1969: 386.

Since the type series of males and females were presumably taken at the same time and place, it is presumed that the sexes have been correctly associated. As I (1969) explained, since R. E. Turner did not designate holotype and allotype, lectotypes were named at that time.

The male is distinguished by having no transverse carina on the dorsal pronotum, an elongate first abdominal segment, and a propodeum that deviates from the usual boxlike structure by having the dorsal and posterior aspects on the same curved contour.

**Lectoholotype.**—♂, Gyangtse, 13,000 ft, June 1904, H. J. Walton, Tibet Expedition 1905-172 [BMNH].

**Male.**—Front anterior to ocellar triangle with area in which punctures are of third-degree density, elsewhere of first-degree density; no minute puncture on upper half. Cheek wider than antennal fossa. Head width 1.9 times least distance between eyes. Antennal flagellum black, slender, first three joints 2.7 times as long as greatest width. Mandible without preapical cusp.

Dorsal pronotum without anterior transverse carina. Lateral pronotum without rugulae, punctures, or groove across disk. Mesopleuron on outer disk with primary punctures of coarse first-degree density; with widely scattered secondaries; subtegular patch of microsetae not present. Legs black. Hind tibia on inside without ridge or naked streak; sensorium minute, obscure. Tegula black, polished, slightly longer than middle width. Forewing with radial cell greatly exceeding second cubital cell in lateral extension; sectors of second cubital cell in terms of inner sector are (itob) 10:20:17:17.

Dorsal propodeum and posterior propodeum are on same general contour, on which areola and transverse carina are only faintly defined; areola rectangular and less than twice as long as wide. Lateral propodeum on upper part with fine, widely separated rugulae. First abdominal segment much elongated, 1.6 times as long as horizontal width. Tergum 1 with preapical band in shallow depression, at middle one to two punctures wide. Intermediate terga without apical rows of minute gouges or micro-

scopic groove over middle. Fifth sternum with lateral denticle a strong, transverse, lunate ridge. Sixth sternum without tuft of fine, dense hairs on each side of median vitta.

**Length.**—8–9 mm.

**Lectoallotype.**—♀, same data as holotype.

**Female.**—Front on upper half with several interspaces as wide as ocellus. Antennal flagellum blackish. Mandible without preapical cusp.

Dorsal pronotum without transverse carina; punctate part with interspaces laterally which are wider than ocellus. Lateral pronotum with faint rugulae in ventral corner, no groove across middle disk. Scutum with anteromedian escarpment and notaulices not connected. Mesopleuron sparsely punctate, with secondary punctures and less numerous primaries in rows of second-degree density; subalar patch of microsetae absent. Metanotum with outer disk almost impunctate. Legs blackish. Hind tibia with upper margin not arched; inner face without median ridge; sensorium flush with surrounding surface, two to three times as long as wide. Hind basitarsus with deep groove. Tegula cockleshell shaped, black, polished, without groove on outer margin. Forewing with radius bent, and having rudimentary spur in its first section one-third distance to intercubitus; terminating in outwardly directed spur; radial cell 3.1 times as long as wide.

Areola of dorsal propodeum subrectangular with concave sides, twice as long as basal width. Lateral propodeum with rugulae strong and widely separated. First abdominal segment 0.95 times as long as horizontal width. Tergum 1 with large, densely setulose area on anterior aspect. Pygidium with basal half punctate with ellipsoid punctures, without median emargination; apex highly polished, wrinkled near punctate part.

**Length.**—11 mm.

**Remarks.**—In addition to the type and allotype, there are in the British Museum three paratype females and one paratype male with the same data as the type. I have examined all of these and confirm the identifications.

### 31. *Tiphia* (*Tiphia*) *fletcheri*, new species

(Pl. V, 29)

*T. fletcheri* can be immediately distinguished from species it is associated with in the key and from nearly all male Indian *Tiphia* by the thin carina on the lower half of the middle front and the absence of a sharp-crested carina on the dorsal pronotum.



**Holotype.**—♂, Catacumund, India, 7,400 ft, Dec. 24-31, 1913 (Fletcher) [NMNH].

**Male.**—Front broadly and conspicuously shagreened; lower half with punctures closely contiguous, with no minute secondaries, thinning to second- or third-degree density in area near lowest ocellus but without interspaces as wide as ocellus; on lower three-fifths with narrow median carina. Antennal flagellum entirely black; first three segments 3.5 times as long as wide (average of two). Head outline (pl. V, 29). Head width 1.8 times least distance between eyes (five measured were 1.8, 1.9, 1.8, 1.8, 1.9). Cheek wider than antennal fossa. Mandible without preapical denticle.

Dorsal pronotum without anterior transverse carina; punctures shallow and uniformly distributed. Lateral pronotum flat and broadly minute aciculate, without escarpment or groove across disk. Mesopleuron on anterior aspect with fine punctures ranging from first-degree density near prepectal suture to third-degree density on outer disk; secondaries minute and sparse. Legs entirely black. Hind tibia on inner face not carinate but with naked strip on apical half; sensorium not distinguishable. Forewing with radial cell slightly exceeding second cubital cell in lateral extension, apex of radial cell sharply bent at middle; sectors of second cubital cell in terms of inner sector (itob) are 10:23:19:21 (average of two). Metanotum with numerous fine punctures, almost no coarse ones.

Dorsal propodeum beside areola smooth; areola elongate, slightly tapered, almost three times as long as apical width. Lateral propodeum with numerous rugulae whose spacing is intermediate between close and widely spaced; lower part entirely coarsely aciculate. Posterior propodeum without median carina. First abdominal segment 1.3 times as long as horizontal width. Tergum 1 slightly elongated, 1.2 times as long as wide; without anterior transverse carina; preapical band not sharply impressed, of coarse contiguous punctures two to three punctures wide and without escarpment on anterior border. Intermediate terga with very fine, shallow punctures of nearly uniform size and distribution, surface not conspicuously shagreened; bristly hair inconspicuous, yellowish white. Lateral denticle on sternum 5 low and crescent shaped. Sternum 6 with only short, sparse, bristly hairs.

**Length.**—7.2-7.8 mm.

**Female.**—Unknown.

**Paratypes.**—Nine ♂, same data as holotype [M].

I donated the holotype and paratypes to the U.S. National Museum and a paratype to the British Museum.

32. *Tiphia (Tiphia) nathani*, new species

(Pl. V, 30-31)

In the male, *nathani* differs from *fuscinervis* in having its radial cell greatly exceeding the second cubital cell in lateral extension. The female is considerably larger than *rufipes* and the bright red of the legs is limited to the hind femur. The male differs from *simlaensis* in the ratio of head width to least distance between eyes (three *simlaensis* measured were, respectively, 2.4, 2.4, 2.5), in wing color, and in lack of heavy sculpturing on the lateral disks of the dorsal propodeum. The sexes are probably correctly associated because of the occurrence of eight females and a large series of males taken at the same place and time. The long terminal spur of the cubitus is somewhat unusual and similar in both males and females. Paratype specimens were distributed in the collections at Moorestown, the British Museum, and the U.S. National Museum.

**Holotype.**—♂, Kadamparai, 3,500 ft, Anamalai Hills, Madras State, India, May 1963 (P. Susai Nathan) [RNH].

**Male.**—Front only faintly shagreened with coarse punctures of first-degree density on its entire area; secondaries lacking. Cheek not masked with white hairs; wider than antennal fossa. Clypeal extension bidentate on front greatly exceeding diameter of antennal fossa. Antennal flagellum black. Mandible (pl. V, 30) without acutely pointed preapical denticle. Head width 2.0 times least distance between eyes (five measured were 1.9, 2.1, 2.1, 1.9, 2.0).

Dorsal pronotum with high transverse carina, buttressed its entire length with short, strong cross ridges; punctures coarse, almost everywhere of close first-degree density. Lateral pronotum usually with obscure groove or series of gouges across discal area. Legs black. Hind tibia with carina on inner face usually absent; sensorium small, yellowish, ovoid. Tegula broadly shagreened, without groove on outer margin. Forewing densely infumate; radial cell moderately exceeding second cubital cell in lateral extension; first section of radius with angular bend one-third distance to intercubitus; terminal section sharply bent near middle; sectors of second cubital cell in terms of inner sector are 10:26:19:20. Dorsum of metanotum uniformly coarse punctate with trace of median carina.

Dorsal propodeum lateral to areola only faintly shagreened; lateral sulcus well developed with strong inner carina; areola with nearly straight, slightly convergent sides, about  $1\frac{1}{2}$  times as long as apical width. Lateral propodeum usually with strong rugulae, moderately well spaced, and continued into ventral corner. First

abdominal segment not elongated. Tergum 1 (pl. V, 31) without transverse carina; preapical band broad, punctures shallow, coalesced anteriorly where they are bordered by faint transverse escarpment. Intermediate terga only faintly shagreened; without microscopic grained lines at apices; hairs relatively inconspicuous, white. Fifth sternum with appressed, broadly triangular, lateral denticle. Sixth sternum with only short, sparse hairs.

**Length.**—7.8–10.4 mm.

**Allotype.**—♀, same data as holotype [RNH].

**Female.**—Front with coarse punctures closely contiguous on lower third, irregularly spaced above without interspaces as wide as ocellus. Antennal flagellum black, slender, nearly filiform, all segments longer than wide, first three segments 3.9 times as long as greatest width (average of two).

Dorsal pronotum with low carina present on lateral third; punctures coarse, deep, uniformly distributed, of first-degree density, its impunctate apex black to obscurely piceous. Lateral pronotum without rugulae in ventral corner; sometimes with obscure series of shallow gouges across middle disk. Mesopleuron on anterior slope with moderate-sized primary punctures, usually of third-degree density except near upper prepectal suture, and a few large secondaries; subtegular area of dense microsetae wider than tegula, hairs elongate. Scutum with notaulices and antero-median escarpment strongly connected. Legs black, except hind femur, which is bright red, and middle femur, which is sometimes mahogany brown. Hind and middle tibia much inflated and arched on upper margin, without strong carina on inner face. Hind basitarsus without groove, unusually small, its mass an estimated tenth of that of tibia. Tegula cockleshell shaped, without trace of shagreening or groove on outer margin. Forewing darkly infumated; radius with sharp bend one-fourth distance to intercubitus, without terminal spur; radial cell 3.9 times as long as greatest width (average of two); stigma usually separated by more than its length from basal vein. Metanotum densely set with large punctures.

Dorsal propodeum on lateral disk without strong sculpturing; mitral-shaped enclosure about spiracle open on inner apical margin; areola rectangular except for slight broadening near base, two to three times as long as wide. Lateral propodeum on upper part with very fine, closely spaced rugulae. Posterior aspect of propodeum without median carina. Tergum 1 without anterior transverse carina; preapical band with punctures on anterior border coalesced as in male but without bordering escarpment.

*Pygidium punctate* on basal three-fourths, with small punctures basally but apically with large, shallow, widely separated ones; impunctate apex polished, not wrinkled.

**Length.**—10.9–14.8 mm.

**Paratypes.**—90 ♂, 10 ♀, same data as holotype [RNH]; 1 ♀, Devala, 3,200 ft, Nilgiri Hills, southern India, May 1961 (P. Susai Nathan) [RNH]; 1 ♀, Cinchona, 3,500 ft, Anamalai Hills, southern India, May 1964 (P. Susai Nathan) [RNH].

Paratypes were donated by the Rijksmuseum to the U.S. National Museum and the Moorestown collection.

### 33. *Tiphia (Tiphia) godavariae*, new species

This species, known only in the male, is distinguished by the conspicuous, golden, bristly hairs of the abdomen, the elevated, narrow carina of the hind tibia, the shagreened, elongate tegula, and the apical section of the radial cell, which is never sharply angulate at its middle.

**Holotype.**—♂, Godavari, Katmandu, Nepal, 6,000 ft, 23–26–VII–1967 [CERJ].

**Male.**—Front not shagreened; with coarse punctures of first-degree density on lower half and along inner eye orbits, medially with interspaces as wide as ocellus. Cheek almost as wide as antennal fossa. Mandible without preapical cusp. Antennal flagellum entirely brownish black, slenderly elongate, first three segments 2.8 times as long as wide (average of two). Head width 2.2 times least distance between eyes (five measured were 2.1, 2.1, 2.2, 2.2, 2.2).

Dorsal pronotum with strong, complete, transverse carina bordered by narrow sulcus, which is spanned over its entire length by a series of short but regular cross ridges; punctures of median size, relatively uniform in size and distribution. Lateral pronotum flat, usually without significant sculpturing. Mesopleuron on anterior slope with moderate-sized primary punctures intermixed with minute secondaries, which are everywhere more numerous than primaries. Legs black. Hind tibiae on inner face with strong carina. Tegula elongated, 1.3 times as long as middle width, thick, opaque to margins, broadly shagreened, without groove on outer margin. Forewing moderately infumate; radial cell greatly exceeding second cubital cell in lateral extension; last section of radial cell sharply bent at middle; sectors of second cubital cell in terms of inner sector (itob) are 10:34:22:24.

Dorsal propodeum with posterior transverse carina only moderately high; area beside areola only shallowly sculptured; areola

usually only slightly tapered and almost twice as long as basal width. Lateral propodeum with strong rugulae developed into caudal corner. Posterior propodeum without median carina. First abdominal segment short, 1.1 times as long as wide; dorsum with moderate-sized primaries broadly dispersed; preapical band abruptly depressed on anterior border, of discrete, medium-sized punctures usually three wide. Abdomen set with conspicuous, coarse, golden-brown, bristly hairs, those of sternum 3 being as long as punctate part of succeeding sternum. Sternum 5 with laterally oriented lateral denticle having polished ridgelike apex. Sternum 6 without median tuft of fine hairs.

**Length.**—5.0–9.8 mm.

**Female.**—Unknown.

**Paratypes.**—All collected by the Canadian Nepal Expedition to Nepal in 1967. From Godavari, Katmandu, at 5,000 ft: Three, 16–VII; one, 20–VII; one, 20–23–VII; seven, 23–VII; one, 27–VII; seven, 27–30–VII; one, 7–14–VIII; four, 12–VIII. From Godavari, Katmandu, at 6,000 ft: 3, 14–21–VII; 2, 17–20–VII; 8, 20–22–VII; 10, 23–26–VII; 6, 30–VII; 1, 1–3–VIII; 8, 3–VIII; 1, 7–13–VIII; 2, 12–VIII; 1, 13–17–VIII. From Pulchauki, Katmandu, at 6,000 ft: Three, 24–VII.

Paratypes from the Canadian Entomology Research Institute were given to the Moorestown collection and the U.S. National Museum.

### 34. *Tiphia (Tiphia) cinchonae*, new species

This species is based on the male. The female is associated on the basis of being collected at the same time and place. In both sexes exceptional characters are lacking. In the male of *cinchonae* there is no well-developed mandibular cusp, the denticle of the fifth sternum and the abdominal vestiture are inconspicuous, the radial cell much exceeds the second cubital cell in lateral extension, and the cheek is as wide as an antennal fossa. The presence of microscopic apical grooves over the middle of the abdominal terga is relatively uncommon in the Indian *Tiphia*. In the female the hind basitarsus is not grooved, the legs are all black, a complete transverse carina is on the dorsal pronotum, and a conspicuous narrow groove is across the disk of the lateral pronotum.

**Holotype.**—♂, Cinchona, Anamalai Hills, southern India, 3,500 ft, May 1964 (P. Susai Nathan) [RNH].

**Male.**—Front with punctures of first-degree density on lower half and along eyes but much more sparse on upper middle area where there are several interspaces nearly as wide as ocellus.

Width of head 2.1 times least distance between eyes (three measured were 2.1, 2.2, 2.1). Cheek about as wide as antennal fossa. Mandible without preapical denticle. Compound eyes light brown and faintly mottled or iridescent.

Dorsal pronotum with high, sharp carina not buttressed with short ridges. Lateral pronotum with obscure groove extending part way across middle disk. Mesopleuron on anterior face with small primary punctures, generally of third-degree density, and secondaries everywhere more numerous than primaries; subtegular patch of microsetae sparse and narrower than tegula. Metanotum broadly minute punctate. Legs black. Hind tibia on inner face with lanceolate sensorium but lacking carina. Tegula as broad as long, without shagreening, with groove at some distance from margin that usually fades on anterior, outer margin. Forewing almost hyaline; first section of radius usually without sharp bend; terminal section not sharply bent near middle; radial cell greatly exceeding second cubital cell in lateral extension. Sectors of second cubital cell in terms of inner sector are (itob) 10:24:17:19 (average of two).

Dorsal propodeum usually with very fine, transverse rugulae converging from origin in side of areola; areola tapered with concave sides and complete median carina, which is not expanded basally in broad triangle, nearly twice as long as apical width. Lateral propodeum with strong rugulae continued to posterior apex. First abdominal segment short, 1.0 times as long as horizontal width. Tergum 1 without transverse carina; anterior dorsum almost impunctate; preapical band of fine irregular-spaced punctures; not impressed, laterally about four punctures wide, but only one puncture wide medially. Terga 3-5 shagreened with small punctures evenly dispersed and of relatively uniform size; apices with microscopic line of gouges continued over dorsum. Sternum 5 with lateral denticle a crescent-shaped ridge longitudinally oriented. Sternum 6 with only sparse, inconspicuous hairs.

**Length.**—6.1-7.0 mm.

**Allotype.**—♀, same data as holotype [RNH].

**Female.**—Front with punctures ranging from close first-degree density on lower third to second- or third-degree density medially below ocellar triangle, without interspaces wider than ocellus. All segments of antennae longer than wide; length of first three segments of flagellum 3.6 times greatest width.

Dorsal pronotum with complete, low, transverse carina. Lateral pronotum with anterior process moderately carinate to ventral corner; with conspicuous narrow groove across middle disk. Scu-

tum with anteromedian escarpment and notaulices not connected.

Mesopleuron faintly shagreened; on anterior slope with punctures coarse and generally of first-degree density, secondaries absent; dense microsetae of subtegular area very small with short hairs and restricted to area narrower than tegula. Legs black. Hind tibia on inner face moderately carinate, its upper margin not arched; sensorium gray, narrowly clavate. Hind basitarsus not grooved. Tegula only slightly longer than middle width, not shagreened, with castaneous fringe and narrow groove at some distance from margin, which becomes obsolescent anteriorly. Forewing moderately infumate; stigma separated by distance equal to its length from basal vein; radius without terminal spur. Metanotum with only very small punctures.

Areola of dorsal propodeum slightly tapered with slightly sigmoid sides; its length nearly three times apical width. Lateral propodeum with rugulae on upper part closely spaced. Posterior aspect of propodeum without median carina. Tergum 1 with preapical band not impressed except near rudimentary escarpment at sides, and consists of wide band of punctures coalesced at places and tapering from several wide at sides to about two wide medially. Intermediate terga with punctures small to medium and fairly uniformly distributed. Pygidium with close, elongated punctures on basal three-fifths, with small median emargination; apical part not shagreened or wrinkled.

Length.—6.4–8.4 mm.

Paratypes.—6 ♂, 4 ♀, same data as holotype [RNH]; 3 ♀, same locality as holotype (2 in May 1960, 1 in May 1962) (P. Susai Nathan) [RNH]; 10 ♂, 1 ♀, Devala, Nilgiri Hills, 3,200 ft, southern India, Oct. 1960 (P. Susai Nathan) [RNH]; 1 ♂, Nilgiri Hills, southern India, 3,200 ft, Oct. 1960 (P. Susai Nathan) [CERI].

Paratypes from the Rijksmuseum were donated to the U.S. National Museum and the Moorestown collection.

### 35. *Tiphia* (*Jaynesia*) *assamensis* Allen and Jaynes

*Tiphia assamensis* Allen and Jaynes, 1930: 26.

This is the only species of the subgenus *Jaynesia* yet found on the Indian subcontinent. The female is immediately distinguished from species of the subgenus *Tiphia* by the deeply overlapped incision near the apex of the first abdominal tergum. It was originally described from the type and a few females collected by C. P. Clausen at Shillong, India, in May 1927. No other material

has been seen. The following descriptive notes are based on the specimens in the collection at Moorestown.

**Holotype.**—♀, Shillong, India, May 1927, Clausen No. 2056 [NMNH].

**Female.**—Vertex with line of minute punctures on median line. Front with large, deep primary punctures largely of second-degree density without interspaces as wide as ocellus. Antennal flagellum black.

Dorsal pronotum with complete, sharp-crested transverse carina; punctures elongate, deep, coarse, of uniform first-degree density. Lateral pronotum with faint groove across middle disk. Mesopleuron on outer disk with coarse punctures irregularly distributed, without secondary punctures; patch of microsetae not wider than tegula. Metanotum with median callosity and dense, very coarse punctures. Legs black. Hind and middle tibiae short, inflated, with strongly arched upper margins. Hind basitarsus without groove. Forewing hyaline; radial cell without sharp bend in first section, at apex with long outwardly directed apical spur.

Dorsal propodeum with lateral sulcus well defined between inner and outer carinae; mitral-shaped enclosure shallow, poorly defined; area lateral to areola smooth; areola hastate in outline, its lateral carinae sigmoid and convergent, median carina half length of areola. Lateral propodeum with very many fine and closely spaced rugulae. Posterior propodeum with median carina on lower half. Tergum 1 without preapical band of punctures; apex with deeply overlapped incision, plainly apparent only laterally. Terga 3–5 with dense punctures uncommonly uniform in size and distribution; terga 3 and 4 with apical row of micro-punctures or interrupted groove.

**Length.**—5–10 mm.

**Male.**—Unknown.

### 36. *Tiphia (Tiphia) skillonga*, new species

(Pl. VI, 32-33)

This is a large species known only in the female. It is distinguished from nearly all other Indian *Tiphia* by the possession of a long, conspicuous carina on the dorsal propodeum about midway between the areola and the sides. In this species the hind basitarsus lacks a groove, and the middle and hind femora are bright red. The hind femur has an exceptionally thin, high carina on its inner face. The holotype and several paratype specimens have been deposited by the Moorestown laboratory in the U.S. National Museum.



It appears that *compressa*, which F. Smith described from "China," is a close relative of *shillonga*. Both species have the unusual longitudinal carina of the dorsal propodeum that lies midway between the areola and the lateral margin, and both have the coarse, widely separated rugae on the lateral pronotum. Furthermore, about a third of the type series of *shillonga* have rudimentary carinae in the areola lying between the middle and the lateral enclosing carinae. However, all specimens of *shillonga* in the type series have bright-red middle and hind femora, whereas in *compressa* these joints are blackish to dull red. In all the specimens of *compressa* examined there is a short, shallow groove on the hind basitarsus, whereas this feature appears on none of the type series of *shillonga*.

**Holotype.**—♀, Khasia Hills, Shillong, Assam, India, 5,000 ft, Aug.-Oct. 1919 (Fletcher) [NMNH].

**Female.**—Front with very coarse punctures, contiguous on lower third, of second-degree density around lowest ocellus, but without interspaces as wide as ocellus. Ocelli separated by less than their average diameter. First three joints of antenna 2.8 times as long as wide.

Transverse carina of dorsal pronotum present only short distance at humeral angle; punctures very coarse, uniformly distributed, of first-degree density; impunctate apex as wide as punctate part. Lateral pronotum usually with narrow, interrupted groove across its disk. Scutum with anteromedian escarpment and notaulices not connected. Mesopleuron on its anterior face with moderate-sized punctures of uniform size, largely of first- or second-degree density; with only an occasional secondary puncture; patch of dense microsetae as wide as tegula. Legs with middle and hind femora bright red, forefemur and hind tibia castaneous on inner face, other leg joints black; hind tibia very strongly carinate on inner face; upper margin not arched. Hind basitarsus not grooved. Tegula not elongated, castaneous and slightly translucent on margins, without shagreening or marginal grooves. Forewing (pl. VI, 33) strongly infumate; stigma small, separated by more than its length from basal vein; first section of radius usually with rudimentary, backwardly directed spur; radius without terminal spur.

Dorsal propodeum (pl. VI, 32) with lateral sulcus bordered by two similar carinae; carina also encloses shallow mitral-shaped depression; midway between sides and areola there is a long, thin, curved carina extending almost to transverse carina; areola with sigmoid sides and truncate apex, length about three times

apical width. Lateral propodeum with very high, widely separated rugae. Posterior propodeum usually with complete median carina. Tergum 1 with preapical band a single row of medium-sized punctures, not impressed, and separated by about an average puncture diameter. Pygidium closely punctate on basal three-fifths, with a small emargination; impunctate apex not shagreened.

**Length.**—14.3–15.0 mm.

**Male.**—Unknown.

**Paratypes.**—Three, Shillong, India, 5,000 ft, Aug. 27–Sept. 3, 1926 (Dutt) [M]; one, Shillong, India, 5,000 ft, Oct. 1916 (Fletcher) [M]; three, Shillong, Assam, India, Sept. 1928 (L. B. Parker) [M]; four, Shillong, Assam, India, Nov. 11, 1928 (L. B. Parker) [M]; seven, Shillong, Assam, India “Fall *Tiphia* sp. A” [M].

Holotype and paratypes were donated from the Moorestown collection to the U.S. National Museum.

### 37. *Tiphia* (*Tiphia*) *quinquecarinata* Cameron

*Tiphia quinquecarinata* Cameron, 1904: 288; Turner, 1908: 124.

*Tiphia* (*Tiphia*) *quinquecarinata* Cameron, Allen, 1969: 398.

The characters that distinguish this species from most others are the much elongated tegula and the five distinct carinae of the propodeal areola. I have seen three Indian specimens in which the legs are bright red and the preapical band of tergum 1 medially is a single row of punctures not abruptly impressed. These specimens are much smaller than the type of *quinquecarinata*, ranging from 6 to 7.5 mm long. They have been described as a separate species.

**Lectotype.**—♀, the specimen at Oxford bears the following labels: “Type/5-carinata/Cam. Type/Khasia” [OU].

**Female.**—On lower half and along eyes with punctures of first-degree density, on upper front medially with interspaces as wide as ocellus. Antennal flagellum dull red.

Dorsal pronotum very convex with transverse carina far down in front and not complete. Side of pronotum with distinct groove across middle disk. Scutum with anteromedian escarpment and notaulices strongly connected. Mesopleuron with subalar patch of dense micropunctures narrower than tegula. Metanotum with only a few minute punctures on its disk. Legs reddish brown (not bright red). Hind tibia angular in cross section but without well-developed carina on inner face, upper margin not arched. Tegula red, with translucent edges, 1.75 times as long as middle width. Forewing slightly infusate, membrane densely and closely setu-

lose; radius without sharp bend in its first section or apical spur.

Dorsal propodeum with five thin longitudinal carinae on its areola, intermediate two not quite attaining apex. Lateral propodeum on upper part with many fine, closely spaced rugulae. Tergum 1 without anterior transverse carina; preapical band two to three punctures wide, abruptly impressed on caudal border, punctures coalesced or very closely spaced. Pygidium sparsely punctate on less than basal half, with small emargination; apex polished, not wrinkled or shagreened.

Length.—11 mm.

Male.—Unknown.

### 38. *Tiphia* (*Tiphia*) *devalae*, new species

This species, described from one female from the Nilgiri Hills and two paratype females from Assam, is closely related to *quinquecarinata*. It is considerably smaller with bright-red legs. In *quinquecarinata* the legs are reddish brown. Both species have the five-carinate areola, exceptionally elongate tegulae, and the absence of a grooved hind basitarsus.

Holotype.—♀, Devala, 3,200 ft, Nilgiri Hills, southern India, Oct. 1960 (P. Susai Nathan) [RNH].

Female.—Front on upper half or more not shagreened, with punctures of third- or second-degree density with several interspaces wider than ocellus. Dorsal pronotum with transverse carina traceable over all but very narrow median gap; medially impunctate apex wider than punctate part, translucent. Lateral pronotum smooth without groove across its disk. Mesopleuron on anterior slope with punctures ranging from first- to third-degree density; secondaries absent; subtegular patch of dense, very short microsetae narrower than tegula. Scutum with anteromedian escarpment and notaulices strongly joined (this area concealed in holotype). Legs with coxae, femora, and tibiae of all three pairs bright red. Hind tibia not inflated; without carina on inner face. Hind basitarsus not grooved. Tegula with brown convex base and flattened, transparent apex, longer on inner margin, 1.8 times as long as middle width. Forewing with hyaline membrane; stigma separated by slightly more than its length from basal vein; radius without sharp bend in its first section or apical spur.

Dorsal propodeum with areola elongate keystone shaped, its length slightly less than three times apical width; with five carinae, Nos. 2 and 4 not quite attaining apex of areola. Lateral propodeum with very many closely spaced rugulae, particularly on posterior part. Posterior propodeum without median carina.

Tergum 1 with preapical band of coarse, shallow punctures, about one puncture wide at middle. Pygidium punctate on basal two-fifths with broad emargination; impunctate apex not shagreened, broadly translucent.

**Length.**—6.0–7.5 mm.

**Male.**—Unknown.

**Paratypes.**—Shillong, Assam, India: One, 4,800 ft, 20–VI–28 (L. B. Parker); one, 5,000 ft, 24–VI–1928 (L. B. Parker).

Both paratypes were in the collection at Moorestown, labeled "new species No. 6." One has been donated to the U.S. National Museum.

### 39. *Tiphia (Tiphia) s-tertia*, new species

This is another interesting species of *Tiphia* discovered at Shillong, Assam, in 1928. It is exceptionally small for a female, and there are no parallel rugulae on the upper part of the lateral propodeum as with practically all other species known to me. The paratypes consist of 24 specimens, of which representatives are being deposited in the collections of the U.S. National Museum and the British Museum.

**Holotype.**—♀, Shillong, Assam, India, 3–IX–1928 (L. B. Parker) [NMNH].

**Female.**—Front not shagreened; on upper part with its small punctures exceptionally sparse third-degree density with many interspaces much wider than ocellus. Antennal flagellum rufous, robust, first three joints 2.1 times as long as greatest width of third (average of three measured).

Dorsal pronotum with vestige of transverse carina at humeral angle; punctures coarse, generally of second- or third-degree density. Lateral pronotum uniformly aciculate, without groove across middle disk. Mesopleuron on outer disk with a few rather large punctures separated in most directions by distances greater than their average diameter; secondaries almost absent; subalar patch of dense, very short microsetae narrower than tegula. Middle and hind legs almost completely dull reddish. Hind femur with inner face slightly angular in cross section, only slightly arched on upper margin; sensorium broad, red, flush with surrounding area. Hind basitarsus without groove. Tegula slightly longer than wide, entirely reddish translucent, without marginal grooves. Forewing with its stigma separated by distance equal to its length from basal vein; radius with outwardly directed spur at its apex.

Dorsal propodeum with innermost of usual two parallel lateral

carinae completely lacking; areola with straight sides and truncate apex, base  $1\frac{1}{8}$  and length  $3\frac{1}{2}$  times apical width. Lateral propodeum uniformly and finely reticulate without usual rugulae on upper part. Posterior propodeum without median carina on more than basal half. Tergum 1 with shallow, widely dispersed punctures on dorsal disk; preapical band of very irregular and shallow punctures, which are more or less coalesced and sometimes bordered anteriorly by faint crooked escarpment. Intermediate terga with punctures fine, of uniform size and dispersion. Pygidium on basal three-fifths with well-separated, nearly round punctures, and poorly defined median emargination; impunctate apex polished, not wrinkled or shagreened.

**Length.**—4.3–5.5 mm.

**Male.**—Unknown.

**Paratypes.**—13, same data as holotype [M]; 11, Shillong, Assam, India, 3-IX-1928 (L. B. Parker) [M].

#### 40. *Tiphia (Tiphia) rufipes* Smith

*Tiphia rufipes* Smith, 1855: 83; Magretti, 1892: 249; Bingham, 1897: 58, 61; Turner, 1908: 119; Allen and Jaynes, 1930: 100.

*Tiphia (Tiphia) rufipes* Allen, 1969: 396.

In 1930 A. B. Gahan examined the type in the British Museum and found it ran in Allen and Jaynes key to *capillata* but differed in having all the femora bright red and a pygidium nearly devoid of shagreening. In *capillata* the femora are not bright red and the pygidium is shagreened. In 1969 I designated the specimen in the British Museum labeled "Type" "56/43" "*rufipes*/Type Sm." but having no type number as the lectoholotype, because among the older describers of the Tiphinae, the term "type" was used in the sense of cotype. The lectotype is recorded as having been collected by J. S. Baly in northern India. It differs from *levipunctata*, also a small species occurring in northern India, in having inflated hind tibia not possessed by the latter species.

**Lectotype.**—♀, northern India, J. S. Baly [BMNH].

**Female.**—Front with most of its punctures of second- and third-degree density, on upper half with several interspaces as wide as ocellus. Antenna slender; flagellum entirely light reddish, its first three joints 3.8 times as long as wide. Clypeus broadly translucent reddish.

Dorsal pronotum with transverse carina present only at humeral angle; punctures of punctate part of uniform first-degree density except on lateral disks; impunctate margin thin, reddish. Lateral pronotum aciculate, with interrupted groove across middle

of disk. Mesopleuron on outer disk with coarse punctures separated by more than their average diameter. Metanotum with its disk closely coarse punctate. All femora, tibiae, and tarsi light reddish. Hind tibia conspicuously inflated, its upper margin strongly arched, its inner face not carinate; sensorium not visible. Hind basitarsus without groove. Tegula yellow, translucent, as broad as long, without marginal grooves. Forewing with exceptionally large stigma, half as long as radial cell; radius with outwardly directed terminal spur.

Areola of dorsal propodeum with its sides convex, its length about  $2\frac{1}{4}$  and its base  $1\frac{1}{4}$  times its apical width. Tergum I broadly polished impunctate anterior to preapical band without anterior transverse carina; preapical band in middle an irregular row of punctures about one puncture wide, punctures separated by about their average diameter. Pygidium coarsely elongate punctate on basal half, coarse primaries mixed with secondaries, punctures sparse on apex of punctate part without well-marked emargination; apical part not shagreened or wrinkled.

Length.—6 mm.

Male.—Unknown.

#### 41. *Tiphia* (*Tiphia*) *scutensis*, new species

(Pl. VI, 34-36)

This species is closely related to *totopunctata* Allen and Jaynes described from the female from Suwan, Korea. Both species are characterized by a pygidium punctate almost to its apex, a partially closed apical cell of the forewing terminating in a spur directed inwardly toward costal margin, and in having the antero-median escarpment of the scutum always strongly extended laterally as far as the notaulices. *T. scutensis* is much larger than *totopunctata*. It has a bright-red hind femur not present in *totopunctata* and the discal punctures of the pygidium are not as widely dispersed. In *totopunctata* there is no marked curvature of the tarsi as in *scutensis*. In *scutensis* there are no conspicuous callosities in the lateral angles of the posterior propodeum as in *totopunctata*.

**Holotype.**—♀, Shillong, Assam, India, 4,800 ft, 29-VI-1928 (L. B. Parker) [NMNH].

**Female.**—Front with punctures generally of first-degree density to level of lowest ocellus except for impunctate median vitta; without secondaries. Antennal flagellum dark brown, long, and slender, first three joints 3.7 times as long as their greatest width (average of three measured).

Dorsal pronotum with transverse carina present except on middle third; punctures of close, uniformly first-degree density. Lateral pronotum without rugulae in ventral corner or groove across middle disk. Scutum (pl. VI, 34) uniformly coarse punctate with coarse primaries of close first-degree density; anteromedian escarpment extends laterally beyond ends of notaulices. Mesopleuron on outer disk with small primary punctures separated in most directions by much more than their average diameter; minute secondaries are more numerous than primaries; subtegular patch of conspicuous appressed microsetae wider than tegula. Legs with hind coxa and femur entirely bright red, middle femur reddish brown; hind tibia black with inner faces of calcaria and sensorium bright reddish; somewhat inflated, without carina on inner face and upper margin moderately arched. Hind basitarsus slenderly elongate, slightly bowed, without groove. Tegula slightly longer than wide, without shagreening or marginal grooves. Forewing (pl. VI, 35) strongly infumate; stigma small, separated by slightly more than its length from basal vein; radial cell slenderly elongate, 4.5 times as long as wide, usually partly enclosed by inwardly sloped spur; cubital mark frequently present. Disk of metanotum coarsely and closely punctate.

Dorsal propodeum with inner of usual two lateral carinae not present; areola with sigmoid sides, constricted at base and sometimes at apex. Lateral propodeum on upper part with very many closely spaced rugulae; lower part with nonmasking microsetae on posterior half. Posterior propodeum without median carina; lateral angles without conspicuous callosity. Tergum 1 with sparse, extremely fine punctures on dorsal aspect; preapical band over middle usually widely dispersed and poorly defined. Pygidium (pl. VI, 36) rather uniformly rugose punctate on basal three-fourths, punctate area very finely shagreened.

Length.—16.8–18.6 mm.

Male.—Unknown.

Paratypes.—Seven, collected by L. B. Parker at same locality as holotype; three, 4,800 ft, 29–VI–1928; three, 4,800 ft, 20–VI–1928; one, 5,000 ft, 24–VI–1928 [M].

Paratypes have been deposited in the U.S. National Museum and the British Museum.

#### 42. *Tiphia* (*Tiphia*) *lyrata* Magretti

*Tiphia lyrata* Magretti, 1892: 252; Bingham, 1897: 57; Allen and Jaynes, 1930: 46.

I have not been able to examine the type from Burma in Genoa,

Italy. However, the specimen was compared for me with specimens from Kiangsu Province, China, many years ago by L. Masi, who considered them conspecific. I can find no substantial difference between females taken in India and those from eastern China I described in 1930. I have attempted to get the loan of the type through Delfa Guiglia at the Genoa museum, but I am informed that such loans are not permissible. The following description is of a female belonging to the Leiden museum and taken at Cinchona, Anamalai Hills, southern India, May 1960, by P. Susai Nathan.

**Type.**—♀, Burma, in Museo Civico di Storia Naturale, Genova, Italy.

**Female.**—Front with coarse, round punctures of first-degree density on lower half and along inner eye orbits; with one or two interspaces on upper front as wide as ocellus. Antennal flagellum black. Mandible without preapical denticle.

Dorsal pronotum with low but complete transverse carina; punctures coarse and uniform in size and distribution. Lateral pronotum with narrow conspicuous groove across middle disk. Scutum with anteromedian escarpment and notaulices connected. Metanotum with only a few scattered minute punctures on its disk. Mesopleuron on anterior slope with primary punctures small and generally of third-degree density; secondaries almost absent; subtegular patch of long-haired microsetae as wide as tegula. Legs black. Hind tibia slightly arched on upper and lower margins, not carinate on inner face; sensorium small, nearly circular, and flush with surrounding surface. Hind basitarsus without groove, massive, estimated a fourth as massive as tibia. Tegula darkly piceous, not shagreened, scarcely longer than wide, without groove on outer margin. Forewing with membrane moderately infumated; stigma separated by more than its length from basal vein; radial cell with apical spur directed inwardly toward costal margin (both wings).

Dorsal propodeum with its areola an elongate keystone shape, with five carinae of equal thickness, Nos. 2 and 4 not quite reaching apex of enclosed area. Lateral propodeum with many closely spaced rugulae continued into caudal corner. Posterior propodeum without median carina. Tergum 1 with fine, widely spaced punctures spread over dorsal aspect; preapical band of very fine, widely separated punctures, about two wide medially, nowhere abruptly impressed. Pygidium punctate on basal three-



fifths, without well-marked emargination; impunctate apex near punctate part wrinkled and obscurely shagreened.

Length.—9 mm.

Male.—Unknown.

### 43. *Tiphia (Tiphia) rothneyi* Cameron

*Tiphia rothneyi* Cameron, 1903: 324; Turner, 1908: 121.

*Tiphia (Tiphia) rothneyi* Cameron, Allen, 1969: 401.

I redescribed the type female lent by the Hope Department of Entomology, Oxford University. To me it seems much more closely related to *tuberculata*, but the transverse carina on sternum 2, noted in *rothneyi*, is most unusual for *Tiphia* not only for Asia but for any area I have studied.

Lectotype.—♀, "Tiphia/rothneyi/Cam Type/Khasia" [OU].

Female.—Front with extremely coarse punctures, in plaques or rows; generally of first-degree density without interspaces as wide as ocellus. Antennal flagellum black.

Dorsal pronotum with strong transverse carina except for narrow median gap; dimpled punctures of first-degree density but not contiguous. Lateral pronotum exceptionally flat and smooth without ventral rugulae or groove across disk. Scutum with anteromedian escarpment and notaulices not connected. Disk of mesopleuron sparsely punctate with scattered small primaries separated by five or six times their diameter, and about equal number of minute secondaries; subtegular patch of microsetae about as wide as tegula. Legs black. Hind tibia not inflated, upper margin nearly straight; sensorium extremely inconspicuous, narrower than major calcarium and about two times as long as wide without naked surrounding area. Hind basitarsus without longitudinal groove. Tegula black, cockleshell shaped, 1.2 times as long as middle width, without marginal grooves. Forewing with membrane densely infumate; radius without apical spur; radial cell 4.2 times as long as wide.

Dorsal propodeum with straight-sided areola, its base  $1\frac{1}{8}$  and its length about three times apical width. Lateral propodeum with extremely fine, closely spaced rugulae. Posterior propodeum without median carina. Tergum 1 abruptly declivous, 0.92 times as long as horizontal width, without patch of micropunctures on anterior aspect, or transverse carina; preapical band irregular, one to two punctures wide, punctures small and widely separated, apex medially several puncture diameters from preapical band. Sternum 2 with well-developed, anterior transverse carina. Pygi-

dium with erect, black, bristly hairs on punctate part, which slightly exceeds impunctate apex in length and has a broad emargination; impunctate apex on upper part wrinkled and very faintly shagreened.

Length.—17 mm.

Male.—Unknown.

#### 44. *Tiphia* (*Tiphia*) *katmanduae*, new species

This new species is described from an adequate series of females taken by the Canadian Nepal Expedition in 1967 at Godavari and Pulchauki. The female has black legs, lacks a groove in the hind basitarsus, and does not have inflated tibiae or unusual carinae. The notaulices and the anteromedian escarpment are always strongly connected, the tegulae are bright red, the wings yellowish with long hairs, and the punctures on the pygidium are usually small and widely separated.

**Holotype.**—♀, Godavari, Katmandu, Nepal, 6,000 ft, 23–26–VII–1967 [CERI].

**Female.**—Front with coarse punctures thinning to second- or third-degree density on upper two-thirds with several interspaces wider than ocellus. Mandible without preapical denticle. Antennal flagellum rufous on underface.

Dorsal pronotum with faint trace of anterior transverse carina. Lateral pronotum with anterior process very low and rounded, even anteriorly; disk without punctures or strong rugulae, frequently with shallow median groove. Mesopleuron on anterior face with sparse small to medium-sized punctures separated in all directions by distances as great as or greater than average puncture diameter; subtegular patch of dense micropunctures slightly narrower than tegula, hairs very short. Scutum with anteromedian escarpment strongly connected with notaulices. Metanotum without punctures on outer disk. Legs black with fulvous areas at articulations. Hind tibia not inflated, more or less carinate, sensorium not sunken. Hind basitarsus without groove. Tegula completely reddish translucent, not shagreened, and without groove on outer margin. Forewing yellowish brown, its hairs relatively long and coarse; radius without well-defined spur.

Dorsal propodeum with inner of two lateral carinae and lateral sulcus obsolete; mitral-shaped enclosure shallow, poorly defined, without carina bordering inner edge; areola with its base  $1\frac{1}{2}$  and its length three times apical width. Lateral propodeum with very fine, closely spaced rugulae. Posterior propodeum frequently with faint, narrow carina on lower half. First abdominal segment

1.0 times its horizontal width. First tergum with a preapical band of coarse punctures, closely spaced, and of nearly uniform size, about two wide over middle and not abruptly impressed. Pygidium on basal half punctate, punctures usually small and widely separated; with very small emargination; impunctate apex transversely sharply defined, translucent, obscurely shagreened.

**Length.**—5.5–6.9 mm.

**Male.**—Unknown.

**Paratypes.**—Godavari, Katmandu, Nepal, 6,000 ft: One, 14–VII; one, 20–22–VII; one, 27–30–VII; one, 30–VII; three, 1–3–VIII; one, 3–VIII; two, 7–13–VIII; two, 13–17–VIII. Pulchauki, Katmandu, Nepal, at 6,600 ft: Two, 21–27–VII; four, 7–14–VIII. From Pulchauki, Katmandu, Nepal, at 8,000 ft: One, 31–VII.

All the paratypes were collected by the Canadian Nepal Expedition in 1967 and belong to the Canadian Entomology Research Institute. Representative paratypes have been presented to the U.S. National Museum and the collection at Moorestown.

#### 45. *Tiphia* (*Tiphia*) *tuberculata* Cameron

*Tiphia tuberculata* Cameron, 1904: 285.

*Tiphia* (*Tiphia*) *tuberculata* Cameron, Allen, 1969: 400.

In 1969 I designated the single female in the Rothney collection at Oxford University as the lectotype. This appears to represent an Indian species without highly specialized characters, and it is not closely related to other known species. It belongs to those species that have black legs and no groove on the hind basitarsus. On the front there are impunctate interspaces wider than an ocellus and the tegulae are short and translucent. The male is not known.

**Lectotype.**—♀, "Tiphia/tuberculata/Cam Type/Khasia" [OU].

**Female.**—Front with punctures on upper half sparse, with several interspaces as wide as ocellus. Antennal flagellum black above, reddish below.

Dorsal pronotum without transverse carina. Lateral pronotum without rugulae in ventral corner or distinct groove across disk. Scutum with anteromedian escarpment and notaulices not connected. Mesopleuron completely shagreened; punctures on outer disk of first-degree density without interspersed minute punctures; subtegular patch of microsetae as wide as tegula. Legs except foretibia, black. Hind tibia with upper and lower margins straight and nearly parallel; inner face not carinate; sensorium red, flattened, broadly spatulate. Hind basitarsus without groove.

Tegula completely translucent red, cockleshell shaped, 1.1 times as long as middle width. Forewing with faintly infumate membrane; stigma small, radius with obscure, outwardly directed spur at its apex.

Areola of dorsal propodeum almost rectangular,  $3\frac{1}{2}$  times as long as apical width. Lateral propodeum with rugulae fine and closely spaced. Posterior propodeum with thin median carina complete to transverse carina. Tergum 1 without dense micro-punctures on anterior slope; without anterior transverse carina; preapical band an irregular belt of punctures two to three wide, punctures well separated. Intermediate terga with apices reddish translucent; hairs sparse and yellowish white. Pygidium with elongated punctures on basal half and a short median emargination; impunctate part conspicuously shagreened except at its apex.

Length.—9 mm.

Male.—Unknown.

#### 46. *Tiphia* (*Tiphia*) *lawrencei*, new species

This species is named in honor of L. B. Parker, who has probably collected *Tiphia* more intensively in India than any other worker. This description is based on a small series of females collected in the Nilgiri Hills, southern India, by Parker in the spring of 1928. Although it has few outstanding characters, it does not seem very closely related to any other described species of *Tiphia*. There are several impunctate interspaces on the front wider than an ocellus, the legs are all black, and the hind basitarsus is not grooved.

**Holotype.**—♀, Nilgiri Hills, India, 5,600 ft, 25-VI-1928 (L. B. Parker) [NMNH].

**Female.**—Front sparsely punctate on much of upper half with several impunctate interspaces much wider than ocellus. Antennal flagellum chiefly black. Mandible without preapical denticle.

Dorsal pronotum with transverse carina lacking over middle third; punctures relatively sparse, especially on lateral area. Lateral pronotum with its disk flat, relatively free of rugulae or punctures; with shallow, obscure groove across its disk. Scutum with anteromedian groove and notaulices not connected. Mesopleuron on anterior slope with moderate numbers of coarse punctures usually separated in one or more directions by more than their average diameter, interspersed with large secondaries, which are as numerous as primaries; subtegular patch of microsetae scarcely as wide as tegula. Legs black. Hind tibia not arched on upper margin, moderately carinate on inner face; with sensorium

flush with surrounding area, both black. Hind basitarsus without groove; massive in respect to size of tibia. Tegula slightly longer than wide, usually castaneous, and slightly translucent, with crease on outer margin ending in incurved hook. Forewing slightly infuscate; stigma small and separated by less than its length from basal vein; apex of radius without distinct terminal spur. Metanotum with only scattered minute punctures.

Dorsal propodeum relatively smooth; innermost of two lateral carinae faintly developed; areola almost rectangular, about  $2\frac{1}{2}$  times as long as wide. Lateral propodeum with fine rugulae on upper part, those on anterior third widely separated. Posterior propodeum usually without median carina. Tergum 1 medially with small patch of minute punctures; median dorsum without coarse punctures; preapical band dispersed, poorly defined, medially of very fine punctures about two punctures wide, not impressed and without bordering escarpment. Pygidium punctate on basal half with moderate emargination; impunctate apex polished, nowhere shagreened.

**Length.**—6.5–7.8 mm.

**Male.**—Unknown.

**Paratypes.**—Six, same data as holotype [M].

Holotype and paratypes deposited in the U.S. National Museum.

#### 47. *Tiphia (Tiphia) petri* Turner

*Tiphia brevipennis* Cameron, 1900: 17 (preoccupied).

*Tiphia petri* Turner, 1908: 128.

*Tiphia (Tiphia) petri* Turner, Allen, 1969: 399.

This species is represented by the holotype female in the British Museum and was collected in Bengal. It does not appear to have any very unusual characters, unless the *Paratiphia*-like spur of the first section of the radius in one wing of the type should be repeated in most of the representatives. Points helpful in classifying it are the black legs, the lack of a groove on the hind basitarsus, the backward-directed spur on the first section of the radius, and the complete transverse carina of the dorsal pronotum.

**Holotype.**—♀, "Bengal," British Museum type No. 15-1148 [BMNH].

**Female.**—Front with punctures on upper half generally of second-degree density. Antennal flagellum black above.

Dorsal pronotum with well-developed transverse carina; punctures of first-degree density except on lateral disk where they are of second degree. Lateral pronotum with weak rugulae in ventral corner; a shallow, narrow groove across middle disk.

Scutum with anteromedian escarpment and notaulices strongly connected. Metanotum with only small sparse punctures on its disk. Legs black. Hind tibia without ridge on inner face; with upper margin moderately arched. Hind basitarsus without groove. Tegula black at articulation, ranging to yellow translucent at margins; without groove on outer margin. Forewing with large stigma; radius on its first section with *Paratiphia*-like spur (strong on one wing, vestigial on other); with backward-directed spur issuing just before apex of second cubital cell; radial cell 3.1 times as long as wide.

Dorsal propodeum without unusual carinae; areola sharply tapered with high lateral carinae, base nearly two times and length four times apical width. Lateral propodeum with rugulae very numerous and closely spaced. Tergum 1 without transverse carina; preapical band preceded by nearly impunctate area and consisting at middle of two irregular rows of punctures. Pygidium elongate punctate on basal half with broad, conspicuous, basal emargination; impunctate apex smooth, polished.

**Length.**—11 mm.

**Male.**—Unknown.

#### 48. *Tiphia (Tiphia) nilgirensis*, new species

(Pl. VI, 39)

*T. nilgirensis* is associated in the key with *petri*, from which it differs in not having a forwardly directed terminal spur to the radii of the forewing. It belongs to a small group in which the females have no groove on the hind basitarsus and black legs. Other unusual features are the exceptionally large stigma, a sixth as large as the first cubital cell, coarse punctures on the metanotum, and complete carina on the dorsal pronotum.

**Holotype.**—♀, Devala, Nilgiri Hills, 3,200 ft, southern India, Sept. 1960 (P. Susai Nathan) [RNH].

**Female.**—Front broadly shagreened, with punctures on upper part of second- or third-degree density, with one or two interspaces almost as wide as ocellus. First three segments of antennal flagellum 3.4 times as long as greatest width. Mandible without preapical cusp.

Dorsal pronotum with low, complete, transverse carina; punctures coarse, uniform in size and nearly so in distribution, generally of first-degree density. Lateral pronotum without groove or escarpment across its middle disk. Scutum with anteromedian escarpment and notaulices connected. Mesopleuron on outer disk with medium-sized punctures usually separated in some direction

by less than their average diameter; without secondaries; subtegular patch of dense, short-haired microsetae, not as wide as tegula. Legs black. Middle and hind tibiae conspicuously inflated, arched on upper margin and not carinate on inner face, several times as massive as hind basitarsus. Hind basitarsus without groove. Tegula thin, only slightly longer than middle width, reddish translucent, without groove on outer margin. Forewing (pl. VI, 39) moderately infuscate; stigma exceptionally large, one-sixth area of first cubital cell; radius without terminal spur; radial cell relatively small, 2.6 times as long as wide. Metanotum bipunctate, with some coarse punctures.

Dorsal propodeum with areola slightly tapered, about  $2\frac{1}{2}$  times as long as apical width. Lateral propodeum intermediate between finely, close rugose and with coarse, widely spaced rugulae. Tergum without anterior transverse carina; preapical band irregular and from one to several punctures wide, laterally bordered anteriorly by faint escarpment. Pygidium irregularly punctate on basal three-fifths, very sparsely so in middle; impunctate apex polished, devoid of shagreening.

Length.—7.0 mm.

Male.—Unknown.

Paratype.—One, Coimbatore, 1,400 ft, Madras State, India, Nov. 1960 (P. Susai Nathan) [RNH].

In the paratype the punctures on the disk of the pygidium are definitely coarser than in the holotype.

#### 49. *Tiphia* (*Tiphia*) *exacta* Nurse

*Tiphia exacta* Nurse, 1903: 400.

*Tiphia* (*Tiphia*) *exacta* Nurse, Allen, 1969: 402.

This species was described from a single female from Kashmir. It differs from other Indian species in having a transverse carina on the first tergum of the abdomen. I redescribed it in detail in 1969.

Holotype.—♀, Kashmir, 5,000–6,000 ft, May 1, "type No. Hym. 15.1155" [BMNH].

Female.—Front with punctures of third-degree density on part of lower half and nearly all upper half, with interspaces up to two or more times ocellar width. Antennal flagellum dull reddish.

Dorsal pronotum with transverse carina present only at humeral angle; punctures sparse and separated in one or more directions by interspaces much greater than their average diameter. Lateral pronotum with very deep, strong rugae in ventral half, middle ones bordering groove across disk. Scutum with anteromedian

escarpment vestigial; without median concentration of punctures. Mesopleuron on outer disk with coarse punctures of first- or second-degree density; subalar patch of microsetae inconspicuous. Metanotum with its disk impunctate. Legs, including tarsi, black. Hind tibia scarcely larger than basitarsus, dorsal margin not arched, inner face not carinate; sensorium black, depressed, twice as long as wide. Hind basitarsus with long, deep, narrow groove. Tegula cockleshell shaped, with translucent edges, without groove on outer margin. Forewing with unusually large stigma; radius with long, outwardly directed spur; radial cell to tip of spur 2.7 times as long as wide.

Dorsal propodeum with most unusual sculpturing; anterior three-fourths lateral to areola with parallel transverse rugulae terminating in irregular longitudinal ruga; transverse apical carina very high; areola with sides tapering apically and abruptly constricted at base and apex. Lateral propodeum with very sparse, strong, widely separated rugae. Posterior propodeum with upper part very coarsely reticulate. Tergum 1 with strong transverse carina; preapical band a single row of medium-sized punctures separated by about their average diameter. Pygidium with punctures on basal half that are sparse and elongate, with narrow median emargination; impunctate apex shagreened to its tip and concentrically wrinkled apically.

Length.—9 mm.

Male.—Unknown.

### 50. *Tiphia (Tiphia) robusta* Cameron

*Tiphia robusta* Cameron, 1904: 283; Allen and Jaynes, 1930: 96.

*Tiphia (Tiphia) robusta* Allen, 1969: 404.

There is no statement in the original description as to whether P. Cameron had one or more specimens before him. In 1969 I redescribed a specimen marked "type" and designated it the lectotype. This specimen is a large female from the Khasia Hills, Assam, with black wings and bright-red hind femur. Other outstanding characters are the large area of coarse contiguous punctures on the upper front, the complete transverse carina of the dorsal pronotum, the hind basitarsus with a long, narrow groove, the coarse black hairs on the sixth tergum, and the rugose base of the pygidium. A. B. Gahan in 1930 examined a female from Burma in the British Museum identified as *robusta*, which had very dark wings and black, thick apical bristles. It appears to be this species.



**Lectotype.**—♀, from Rothney collection labeled "Tiphia/robusta/Type Cam./Khasia" [OU].

**Female.**—Front to above level of lowest ocellus with coarse contiguous punctures, except for irregular median vitta about as wide as ocellus. Antennal flagellum black; first three joints 3.0 times as long as greatest width.

Dorsal pronotum with strong, complete transverse carina. Lateral pronotum without rugulae, a narrow groove across disk. Scutum with strong anteromedian escarpment nearly connected with notaulices. Mesopleuron on outer disk with coarse primary punctures of second- or third-degree density and large secondaries that are much less numerous than primaries; subtegular patch of dense microsetae about as wide as tegula. Legs black except hind femur, which is bright red. Hind tibia not inflated or arched on upper margin, with strong carina on inner face. Hind basitarsus with deep, narrow groove. Tegula 1.2 times as long as middle width, opaquely piceous, not shagreened, without groove on outer margin. Forewing conspicuously dark infumate; stigma small; radius with short outwardly directed spur (one wing only); radial cell 4.1 times as long as wide.

Dorsal propodeum with areola four times as long as and its base  $1\frac{1}{2}$  times apical width, sides sigmoid, incurved near middle and at apex. Lateral propodeum on upper part with very many closely spaced rugulae. Posterior propodeum with median carina on lower two-thirds. Tergum 1 without anterior transverse carina; pre-apical band a single irregular row of coarse punctures separated on average by less than puncture diameter, and at middle three puncture diameters from apex. Abdominal bristles dirty white anteriorly, becoming progressively darker toward rear, and conspicuously coarse black on tergum 6. Pygidium rugose, not punctate on basal three-fifths, without emargination, nonrugose apex with longitudinal wrinkles near rugose part, and concentric wrinkles near apex, without shagreening.

**Length.**—15 mm.

**Male.**—Unknown.

### 51. *Tiphia* (*Tiphia*) *davarae*, new species

This species is based on a large number of females taken in Malaise traps by the Canadian Nepal Expedition in 1967. The specimens all have a grooved basitarsus and bright-red midfemur and hind femur. In general, the front is without interspaces wider than an ocellus, the subtegular patch of microsetae is rather wide, the groove on the lateral pronotum is not elongate or well defined,

and the lower hind part of the lateral propodeum is densely short microsetulose. This species tends to vary toward the type of *rufofemorata*.

**Holotype.**—♀, Godavari, Katmandu, Nepal, 6,000 ft, 21-30-1967 [CERI].

**Female.**—Upper front punctures irregularly distributed, of second- or third-degree density without interspaces wider than ocellus. Antennal flagellum slender, black; first three joints 3.4 times as long as greatest width. Mandible without preapical cusp.

Dorsal pronotum with transverse carina for short distance at humeral angle; punctures of medium size fairly uniformly distributed. Lateral pronotum usually with short, straight, narrow groove on middle disk. Scutum with anteromedian escarpment and notaulices usually connected. Mesopleuron broadly shagreened; on anterior slope with small primary punctures ranging in density from first to third degree; secondaries less numerous than primaries; subtegular patch of microsetae with very short bristles, patch wider than tegula. Metanotum with only minute punctures. Middle and hind femora bright red, other leg surfaces black. Hind tibia with upper margin not arched; inner face carinate; sensorium not sunk below level of surrounding surface. Hind basitarsus grooved. Tegula polished, cockleshell shaped, piceous, without groove on outer margin. Forewing with its membrane slightly infumate; radius without terminal spur; stigma of average size.

Dorsal propodeum without lateral groove, inner of two lateral carinae not present; mitral-shaped enclosure elongate, shallow, poorly defined on inside; areola nearly rectangular, about three times as long as apical width. Lateral propodeum with rugulae on anterior half usually well separated; lower sides on posterior half densely set with short bristly microsetae. Tergum 1 on dorsal area with its punctures very small and widely separated; preapical band in middle an irregular row one to two punctures wide, punctures separated by less than average puncture diameter and not impressed. Pygidium finely and closely punctate on basal half, with small emargination; impunctate apex scarcely wrinkled or shagreened.

**Length.**—6.5-11.0 mm.

**Male.**—Unknown.

**Paratypes.**—At Godavari, Katmandu, Nepal, 5,000 ft: One, 15-VII; one, 27-30-VII; one, 23-28-VII; one, 3-7-VIII; three, 12-VIII. At Godavari, Katmandu, Nepal, 6,000 ft: Two, 14-VII; two, 14-17-VII; two, 17-VII; five, 17-20-VII; nine, 20-22-VII; three, 23-26-VII; one, 25-VII; two, 27-30-VII; one, 30-VII;

nine, 3-VIII; three, 1-3-VIII; seven, 7-13-VIII; four, 13-17-VIII.

Paratypes were donated by the Canadian Entomology Research Institute to the Moorestown collection and the U.S. National Museum.

## 52. *Tiphia (Tiphia) magrettii* Cameron

*Tiphia magrettii* Cameron, 1897: 45.

*Tiphia (Tiphia) magrettii* Cameron, Allen, 1969: 406.

P. Cameron does not define the type other than to state that the species was described from "Missouri," from a specimen (or specimens) collected by G. A. J. Rothney. In 1939 I examined a female specimen from the Rothney collection and designated it the lectotype. The abdomen was missing from this specimen. Cameron gives its length as 10 mm.

*T. magrettii* belongs to a group of several Indian species in which the femora of both middle and hind legs are bright red and the hind basitarsus is grooved. It is distinguished by having a front with no interspaces as wide as an ocellus and a subalar patch of microsetae narrower than the tegula.

**Lectotype.**—♀, labeled "*Tiphia/magrettii/Cam Type*" [OU].

**Female.**—Front with punctures on upper half of second-degree density without interspaces wider than ocellus. Antennal flagellum rufous beneath. Mandible with small preapical denticle.

Dorsal pronotum without transverse carina; punctate part with moderate-sized punctures, irregularly distributed, with several interspaces wider than ocellus. Lateral pronotum with irregular, fine rugulae in ventral corner and shallow, narrow groove across its disk. Scutum with its anterior escarpment not connected with notaulices. Mesopleuron on outer disk with medium-sized punctures largely of second-degree density; subtegular patch of microsetae narrower than tegula. Legs black except middle and hind femora, which are bright red. Hind tibia not inflated; inner face carinate; sensorium narrowly triangular, three times as long as wide. Hind basitarsus grooved. Tegula dull red, cockleshell shaped, polished, without groove on outer margin. Forewing with membrane moderately infumate; radius with obscure spur before apex of second cubital cell directed forward toward costal margin; radial cell 2.8 times as long as wide.

Areola of dorsal propodeum with slightly concave sides, its base equal to and its length 2.6 times apical width. Lateral propodeum on upper part with moderate numbers of widely spaced rugulae; lower part polished, not aciculate, with numerous minute setulae

plainly visible. Posterior propodeum with median carina on lower three-fourths.

Length.—10 mm.

Male.—Unknown.

### 53. *Tiphia (Tiphia) khasiana* Cameron

*Tiphia khasiana* Cameron, 1902a: 86; Allen and Jaynes, 1930: 101.

*Tiphia (Tiphia) khasiana* Cameron, Allen, 1969: 405.

P. Cameron stated that the type from the Khasia Hills, Assam, is in the collection of G. A. J. Rothney, but he did not state that his description was based on one or more specimens. In 1969 I redescribed a specimen lent by the Hope Department of Entomology, Oxford University, and labeled "*Tiphia/khasiana*/Cam/Type *khasiana*," which was designated the lectotype. This species seems to be closely related to *pigmentata* Allen and Jaynes from eastern China, but it is not likely to prove conspecific.

*T. khasiana* is one of the small group of Indian *Tiphia* with a grooved hind basitarsus and bright-red femora of the middle and hind legs. It is known only in the female. Interspaces on the upper front are wider than an ocellus, and the lateral pronotum has a long, narrow groove across its disk.

Lectotype.—♀, labeled "*Tiphia khasiana* Cam." in Cameron's handwriting [OU].

Female.—Front on upper half with punctures generally of second-degree density, with several interspaces as wide as ocellus. Antennal flagellum black.

Dorsal pronotum without transverse carina. Lateral pronotum with rugulae in ventral corner and long, narrow groove across middle disk. Scutum with anteromedian escarpment and notaulices not connected. Mesopleuron on outer disk with medium-sized punctures that are principally of second- or first-degree density; subtegular patch of dense micropunctures as broad as tegula. Metanotum with numerous primary punctures on its disk. Middle and hind femora entirely bright red, other leg areas largely or entirely black. Hind tibia with upper and lower margins straight and nearly parallel; inner face sharply carinate. Hind basitarsus with deep, longitudinal groove. Tegula reddish brown, polished; without groove on outer margin; 1.1 times as long as middle width. Forewing with lightly flavous membrane; radius with short, anteriorly directed apical spur.

Dorsal propodeum with areola almost rectangular, length about  $2\frac{1}{2}$  times apical width. Lateral propodeum on upper half with very many closely spaced rugulae. Posterior propodeum with

obscure median carina on lower three-fourths. Tergum 1 without anterior transverse carina; preapical band over middle a regular row of punctures, one row wide, punctures separated by more than average puncture diameter. Pygidium coarsely punctate on basal half, punctures apically are elongated and very coarse with broad median emargination; apical half polished and obscurely wrinkled.

Length.—10 mm.

Male.—Unknown.

#### 54. *Tiphia (Tiphia) rufofemorata* Smith

*Tiphia rufofemorata* Smith, 1855: 83; Bingham, 1897: 57, 58; Bingham, 1906: 36; Turner, 1909: 482.

*Tiphia cassiope* Cameron, 1897: 40; Bingham, 1897: 57, 59.

*Tiphia (Tiphia) rufofemorata* Smith, Allen, 1969: 410.

F. Smith based his original description on a female stated to have been collected by J. S. Baly in northern India. I redescribed the species in 1969 from a female in the British Museum having the following information on its labels: "Type" "56-43" "rufofemorata/Type/Hym./15.1146." P. Cameron described *cassiope* from a female specimen or specimens collected by G. A. J. Rothney from "Missouri." In 1967 I examined a female from the Rothney collection at Oxford University labeled "*Tiphia/cassiope/Cam. type*." I consider this to be conspecific with *rufofemorata*.

Of the several Indian species having bright-red femora of the last four legs and a grooved basitarsus, *rufofemorata* is distinguished by having interspaces on the upper front wider than an ocellus, no long narrow groove on the lateral pronotum, and a basitarsal groove, which is long and narrow.

Holotype.—♀, "Type Hym. 15.1146" [BMNH].

Female.—Front with punctures of second- or third-degree density on upper three-fourths, with many interspaces wider than ocellus. Antennal flagellum slender, reddish ventrally.

Dorsal pronotum without trace of transverse carina; punctate part with small punctures of third-degree density on lateral disks. Scutum with anteromedian escarpment and notaulices not quite connected. Mesopleuron on outer disk with coarse primary punctures of second-degree density; secondaries much less numerous than primaries; subalar patch of microsetae about as wide as tegula. Metanotum with only two large punctures on its disk. Legs with coxae and femora of middle and hind legs bright red, elsewhere blackish. Hind tibia with straight upper margin and carina on inner face; sensorium not visibly differentiated from

surrounding dark surface. Hind basitarsus with deep, narrow groove. Tegula piceous, 1.1 times as long as middle width, without groove on outer margin. Forewing with its membrane slightly infumate; radius without terminal spur; radial cell 2.7 times as long as wide.

Dorsal propodeum with areola slightly tapered, its length almost four times and its base  $1\frac{1}{8}$  times apical width. Posterior propodeum with flattened carina on lower three-fourths. Tergum 1 without anterior transverse carina; dorsum with sparse, very small punctures; preapical band not abruptly impressed; over middle an irregular row of small punctures, one to two wide. Terga 3-5 entirely fine shagreened. Pygidium fine punctate on basal three-fifths with well-defined emargination; apical part smoothly polished, without shagreening or wrinkles.

Length.—11 mm.

Male.—Unknown.

### 55. *Tiphia (Tiphia) levipunctata* Allen and Jaynes

*Tiphia levipunctata* Allen and Jaynes, 1930: 50.

This species was described from the same general area as *rufipes* and is also a small species with red legs. However, there are significant differences. *T. levipunctata* has a hind tibia that is not inflated, the metanotum has only minute punctures, the stigma of the forewing is not greatly enlarged, and the apical band of the first tergum is abruptly impressed on an irregular line anterior to the punctures. *T. rufipes* has an inflated hind tibia and a metanotum with coarse punctures, the stigma of the forewing is greatly enlarged, and the preapical band is not impressed on its anterior border. The holotype and one paratype were reared at Moorestown from cocoons imported from India.

**Holotype.**—♀, Shillong, India, insectary reared, 302-0 U.S. National Museum type No. 41788.

**Female.**—Front on upper half very sparsely punctate with primary and secondary punctures; several interspaces wider than ocellus. Antennal flagellum reddish, first three joints 2.7 times as long as wide.

Dorsal pronotum with very low transverse carina, sometimes complete over middle; anterior half sparsely punctate with mixture of coarse and minute punctures; impunctate apex yellowish translucent. Lateral pronotum with faint groove across its disk. Mesopleuron with small punctures separated by several times their average diameter; subtegular patch of relatively long, appressed microsetae as wide as tegula. Scutum with antero-

median escarpment and notaulices not connected. Metanotum with only scattered minute punctures on its disk. Legs with trochanters, femora, and tibiae of last two pairs bright red. Hind tibiae not inflated, not carinate on inner face; sensorium concolorous, flush with surrounding area. Hind basitarsus massive, estimated third as massive as tibia; with short shallow groove, easily overlooked. Tegula not longer than wide, thin, red, translucent. Forewing with hyaline membrane; stigma of normal size, separated by its length from basal vein; radius without terminal spur.

Dorsal propodeum with lateral groove narrow, its inner carina weak, as is also inner enclosing carina of mitral-shaped enclosure; areola elongate keystone shaped, its base  $1\frac{1}{2}$  and its length three times apical width. Lateral propodeum with rugulae on upper part intermediate between widely and closely spaced. Tergum 1 without anterior transverse carina; preapical band poorly defined, of very small punctures irregularly spaced and one to two wide, on anterior border with faint crooked escarpment. Terga 3-5 with broad, impunctate terminal bands that are darkly translucent. Pygidium rather finely punctate on basal half with large emargination.

Length.—5.4-6.2 mm.

Male.—Unknown.

Paratype.—One in Moorestown collection from same lot as holotype.

Remarks.—Also in the Moorestown collection are two females labeled "Shillong, India, Japanese Beetle Parasite Exp. 402," apparently also reared from imported cocoons as were the type and paratype.

### 56. *Tiphia* (*Tiphia*) *curvinerva* Cameron

*Tiphia curvinerva* Cameron, 1902b: 238; Turner, 1908: 120; Allen and Jaynes (*curvinerva*), 1930: 99.

*Tiphia* (*Tiphia*) *curvinerva* Cameron, Allen, 1969: 412.

This species is among the several represented by females having black legs, a groove on the hind basitarsus, and no well-defined groove or escarpment across the disk of the lateral pronotum. The groove on the basitarsus is notably short and shallow, and a transverse carina on the dorsal pronotum is represented by a more or less irregular series of scallops. The species is represented only by the holotype.

Holotype.—♀, "BM Type Hym. 15.1150" [BMNH].

Female.—Front with punctures of second-degree density on upper half, with two interspaces wider than ocellus.

Dorsal pronotum with transverse carina scalloped but plainly complete over dorsum. Lateral pronotum flat, without rugulae in ventral corner, with obscure row of shallow gouges terminating at center of disk. Scutum with anteromedian escarpment and notaulices not connected. Mesopleuron on outer disk with large primary punctures separated by much more than their average diameter and secondaries scarcely more numerous than primaries; subtegular patch of inconspicuous microsetae about as wide as tegula. Metanotum with only three primary punctures on outer disk. Legs entirely black. Hind tibia elongate, not inflated; inner face strongly carinate; sensorium flush with surrounding area, only slightly longer than wide. Hind basitarsus with short, shallow groove. Tegula dark-reddish translucent, polished, without groove on outer margin, 1.1 times as long as middle width. Forewing with very small stigma; radius with trace of apical spur; radial cell 3.7 times as long as wide.

Dorsal propodeum with its areola rectangular, about three times as long as wide. Lateral propodeum with some strong, widely separated rugulae. Posterior propodeum with complete median carina. Tergum 1 without anterior transverse carina; preapical band of coarse primary punctures separated by less than their average diameter, in middle one to two punctures wide. Punctate part of pygidium without emargination; impunctate part shagreened laterally but smooth medially.

Length.—12 mm.

Male.—Unknown.

### 57. *Tiphia (Tiphia) millealta*, new species

*T. millealta* is known only in the female. It is associated in the key with *nepa*, but it is more slender and much blacker. Aside from the very dark forewings, it can be distinguished from *nepa* by the much coarser and more widely separated rugulae of the lateral propodeum, and the outline of the middle tibia is not inflated.

The species has been described from the holotype female and 18 paratypes, all taken at Godavari, Katmandu, Nepal, by the Canadian Nepal Expedition in 1967. The Canadian Entomology Research Institute has donated paratype specimens to the Moorestown collection.

**Holotype.**—♀, Godavari, Katmandu, Nepal, 6,000 ft, 1-3-VIII-1967, Canadian Nepal Expedition [CERI].

**Female.**—Front with coarse punctures of first-degree density on lower third thinning progressively above to third-degree density



without interspaces wider than ocellus. Mandible without preapical denticle. Antennal flagellum black, greatest width of first three joints 2.7 times their length.

Dorsal pronotum with low transverse carina present except on median third; punctures of assorted sizes, more closely grouped medially and in transverse band where they are of first-degree density. Lateral pronotum without a well-defined groove across middle disk; with several fine rugulae in ventral corner. Mesopleuron with principal punctures on outer disk relatively small and of third-degree density, ranging to large and of first-degree density near prepectus; secondaries almost absent. Scutum with anteromedian escarpment not connected with notaulices. Disk of scutellum with only minute punctures. Legs black. Tibia of middle leg not inflated, its upper and lower margins not arched. Hind tibia strongly ridged on inner face. Hind basitarsus with deep groove. Tegula scarcely longer than wide; thick and opaque, black almost to margin, not shagreened; without groove on outer margin. Hind wing with membrane very darkly infumate; radius without apical spur.

Dorsal propodeum without coarse sculpturing; lateral groove obsolete, inner carina absent; mitral-shaped cavity about spiracle very shallow with no enclosing carina on inside. Lateral propodeum with high, strong, widely separated rugulae. Posterior propodeum usually without median carina. Tergum 1 without patch of dense secondaries on its anterior slope, preapical band essentially a single row of small, widely separated punctures not abruptly impressed on either border. Pygidium punctate on basal half with broad emargination; impunctate apex piceous, scarcely wrinkled or shagreened.

Length.—8.5–10.9 mm.

Male.—Unknown.

Paratypes.—From Godavari, Katmandu, Nepal, 5,000 ft: One, 16–VII–1967; one, 20–23–VII–1967; two, 23–VII–1967; one, 27–VII–1967; two, 27–30–VII–1967; one, 8–VIII–1967. From Godavari, Katmandu, Nepal, 6,000 ft: Two, 1–3–VIII–1967; two, 3–VIII–1967; two, 7–13–VIII–1967; two, 13–17–VIII–1967; one, 17–VIII–1967; one, 17–20–VIII–1967.

Paratypes donated by the Canadian Entomology Research Institute to the U.S. National Museum and the Moorestown collection.

### 58. *Tiphia (Tiphia) nepa*, new species

*T. nepa* is one of a rather large group of species in which the legs are all black and the hind basitarsus prominently grooved.

It is coupled in the key with *pullivora*, from which it differs in having a much longer areola and no trace of an escarpment bordering the front edge of the preapical band of tergum 1.

**Holotype.**—♀, Godavari, Katmandu, Nepal, 6,000 ft, 3-VIII-1967 [CERI].

**Female.**—Front with relatively small punctures generally of second- or third-degree density and only slightly more widely separated on middle upper two-thirds where usually there are one or two interspaces as wide as ocellus. Antennal flagellum black, first three segments 3.0 times as long as greatest thickness.

Dorsal pronotum with transverse carina distinctly present only at humeral angle; punctures relatively small, of assorted sizes, and more closely spaced medially and in transverse row anterior to impunctate apex. Lateral pronotum with weak rugulae in ventral corner and no well-developed groove or escarpment across middle disk. Scutum with anteromedian escarpment and notaulices not connected. Disk of metanotum with only minute punctures. Mesopleuron on most of anterior face with medium-sized punctures separated by slightly less than their average diameter; secondaries sparse; subtegular patch of dense microsetae scarcely as wide as tegula. Legs black. Tibia of middle leg substantially inflated with its anterior face, upper and lower margins convex. Hind tibia strongly carinate on inner face. Hind basitarsus with deep groove. Tegula black and opaque to margins; only slightly longer than broad, not shagreened, without groove on outer margin. Forewing moderately infumated; radius without terminal stump.

Dorsal propodeum beside areola smooth except for scattered minute punctures; lateral groove obsolete, its inner bordering carina missing; cavity about spiracle shallow, its inner carina usually lacking; areola very long and slightly tapered, about three times as long as apical width. Lateral propodeum with rugulae on upper part extremely fine and very numerous especially on posterior half. Posterior propodeum sometimes with obscure flattened carina on lower half. First tergum broadly set with very fine, widely separated punctures; anterior face without patch of micro-punctures; preapical band a single row of small, widely separated punctures and not abruptly impressed. Pygidium punctate on basal half with small emargination; impunctate half not shagreened, wrinkled at juncture with punctate part.

**Length.**—10.0–13.3 mm.

**Male.**—Not known.

**Paratypes.**—From Godavari, Katmandu, Nepal, 5,000 ft: One,

27-30-VII-1967; two, 12-VIII-1967. From Godavari, Katmandu, Nepal, 6,000 ft: Four, 17-VII-1967; one, 17-20-VII-1967; one, 23-26-VII-1967; one, 30-VII-1967; five, 1-3-VIII-1967; one, 7-13-VIII-1967; three, 13-17-VIII-1967. From Pulchauki, Katmandu, Nepal, 6,600 ft: One, 21-27-VII-1967; two, 1-14-VIII-1967. From Gulubhanjyang pastures near Katmandu, Nepal, 7,500-8,500 ft: One, 2-VII-1967.

The paratypes are all from the collection of the Canadian Entomology Research Institute. Several were donated to the Moorestown collection.

### 59. *Tiphia (Tiphia) chosensis* Allen

*Tiphia bicarinata* Cameron, Allen and Jaynes, 1930: 66 (misidentified); Clausen, Jaynes, and Gardner, 1932: 43 (misidentified).

*Tiphia (Tiphia) chosensis* Allen, 1969: 359.

This species was recently described from a holotype female and an allotype collected by T. R. Gardner at "Suigen," Korea, in 1926 and from 30 females and 35 male paratypes in the collection at Moorestown. Type specimens and paratypes have been deposited in the U.S. National Museum and paratypes in other collections. The Moorestown material was long misidentified as *bicarinata* Cameron.

I have identified one female from Cinchona, Anamalai Hills, southern India, collected in April 1964 by P. Susai Nathan [RNH] as this species. It has the very thin median carina at the apex of the sixth sternum found in the Korean type series but not found in the holotype of *bicarinata*. The female can be distinguished at once from all other Indian species by a pygidium, which is closely rugose to its apex.

### 60. *Tiphia (Tiphia) s-secunda*, new species

This species belongs to a group of several species, based on the female, in which there are no bright-red legs but in which there is a grooved hind basitarsus and an escarpment or groove across the disk of the lateral pronotum.

It differs from *consueta* in having impunctate interspaces on the upper front as wide as an ocellus, the escarpment of the lateral pronotum is irregular and not an unbroken narrow groove, and there is no visible escarpment anterior to the preapical band on tergum 1.

**Holotype.**—♀, Shillong, Assam, India, 27-IX-1928 (L. B. Parker) [NMNH].

**Female.**—Vertex without row of microscopic punctures on median line. Front not shagreened; punctures of first-degree density on lower half, thinning out medially on upper half to second- and third-degree density often with one or two interspaces as wide as ocellus. Antennal flagellum robust, first three segments 2.3 times as long as greatest width (average of three measured). Mandible without preapical denticle.

Dorsal pronotum without trace of transverse carina; punctures moderately coarse and nearly uniform in size and distribution, generally of first-degree density. Lateral pronotum with obscure rugulae in ventral corner, and an equally obscure, crooked, interrupted groove across its disk. Scutum with anterior escarpment and notaulices not connected. Mesopleuron on anterior slope with medium-sized punctures usually separated in one or more directions by less than average diameter; without secondaries; subalar patch of very short microsetae about as wide as tegula. Legs with femora and tibiae ranging from black to dull red (but not bright clear red). Hind tibia with upper margin not arched, almost parallel with lower margin; inner face with strong carina; sensorium flush with surrounding area, broadly ovate. Hind basitarsus with short, well-defined groove. Tegula reddish brown, not translucent, slightly longer than wide, not shagreened or with groove on outer margin. Forewing with small stigma separated by more than its length from basal vein; radius with outwardly directed terminal spur, and sometimes with inwardly directed spur on its first section; radial cell 3.3 times as long as wide. Metanotum usually with numerous well-separated primary punctures on its disk.

Dorsal propodeum with only one of usual two parallel lateral carinae present; areola subrectangular with slightly concave sides, carinae bordered by fine grooves, length about  $2\frac{1}{2}$  times apical width. Lateral propodeum on upper part with rugulae weak but not closely spaced anteriorly. Posterior propodeum with median carina when present not extending above lower half. Tergum 1 without patch of minute punctures on anterior face; dorsal aspect broadly set with coarse punctures; preapical band of well-separated punctures in irregular band one to two punctures wide, without trace of escarpment on anterior border. Tergum 2 with transverse row of short ridges obsolete over middle third. Pygidium on basal half with closely set punctures, without median emargination; impunctate apex closely wrinkled and obscurely shagreened.

**Length.**—9.0 mm.

**Male.**—Unknown.

**Paratypes.**—17, same data as holotype. At Shillong, Assam, India (L. B. Parker), all collected in 1928: Four, 3-IX; six, 10-IX; seven, 11-IX; one, 24-IX; seven, 1-X; three, 12-X; one, 15-XI [M].

The holotype and several paratypes were donated from the Moorestown collection to the U.S. National Museum.

### 61. *Tiphia (Tiphia) consueta* Smith

*Tiphia consueta* Smith, 1879: 184; Bingham, 1897: 61; Bingham, 1906: 36; Allen and Jaynes, 1930: 101.

*Tiphia (Tiphia) consueta* Smith, Allen, 1969: 408.

This is one of several similar species in which the female has black legs, the hind basitarsus is grooved, and the groove across the disk of the lateral pronotum is narrow and uniform. This species differs from *simlaensis* in having lighter colored wings and a vertex and front less strongly shagreened. The dorsal pronotum is less densely punctate and the punctures are coarser.

Since F. Smith did not designate whether he described from one or more specimens, the single specimen in the British Museum marked "Type" has been designated lectotype.

**Lectotype.**—♀, Ceylon [BMNH].

**Female.**—Front with punctures of coarse first-degree density to lowest ocellus.

Dorsal pronotum without transverse carina; punctures medially of coarse first-degree density. Lateral pronotum without rugulae in ventral corner; with deep, narrow groove across disk. Scutum with anteromedian escarpment and notaulices not connected. Mesopleuron shagreened, with coarse, deep punctures of first-degree density everywhere on outer disk; subtegular patch of microsetae as wide as tegula. Metanotum with its disk broadly coarse punctate. Legs, including tarsi, black. Hind tibia only slightly arched; with high carina on inner face; sensorium flush with surrounding surface, small. Hind basitarsus massive, with short, shallow groove not half length of joint. Tegula black, with reddish edges, cockleshell shaped, without groove on outer margin. Forewing with radius having sharp bend in its first section and no apical spur; radial cell 3.3 times as long as wide.

Areola of dorsal propodeum with sinuous sides; transverse carina bordered by regular series of pits. Lateral propodeum with very many closely spaced rugulae. Tergum 1 without transverse carina; preapical band is bordered anteriorly by irregular escarpment, band a single irregular row of punctures separated by slightly less than their average diameter. Pygidium closely rugose

punctate on upper three-fifths, without median emargination, impunctate apex wrinkled and obscurely shagreened near punctate part.

Length.—9 mm.

Male.—Unknown.

## 62. *Tiphia (Tiphia) brevistigma* Allen and Jaynes

*Tiphia brevistigma* Allen and Jaynes, 1930: 65.

Since the original description is somewhat inadequate, I have redescribed from the holotype female lent me by the U.S. National Museum. No other specimens have been identified. The male is not known.

The species has no outstanding set of characters. In the key it is grouped with *s-prima*, *s-sexta*, and *s-quarta*. Among these only *s-quarta* has a short, shallow basitarsal groove. *T. brevistigma* is much smaller and the metanotum differs conspicuously in not being dorsally coarse punctate.

**Holotype.**—♀, Shillong, India, U.S. National Museum No. 4794.

**Female.**—Vertex without median line of minute punctures. Front with coarse punctures of first-degree density on lower third, above of second- or third-degree density with one of two interspaces about as wide as ocellus. First three joints of antennal flagellum 3.2 times as long as wide.

Dorsal pronotum without transverse carina. Lateral pronotum with narrow groove across middle disk. Mesopleuron on anterior slope with medium-sized primary punctures and few large secondaries; subtegular patch of dense microsetae wider than tegula. Legs black. Hind tibia with carinate inner face lobately expanded about obscure tear-shaped sensorium. Hind basitarsus with short, very shallow groove on inner face, vestigial and easily overlooked. Tegula marginally castaneous, not shagreened, without marginal grooves. Forewing with exceptionally small, short stigma; radius arises from apex of stigma and has no terminal spur. Metanotum almost impunctate on dorsal aspect.

Dorsal propodeum with its areola slightly tapered and slightly more than three times as long as apical width. Lateral propodeum with low, thin, widely separated rugulae becoming evanescent posteriorly. Posterior propodeum without median carina. Tergum 1 short, with only fine, widely separated punctures on dorsal aspect; preapical band consisting of single nearly straight row of punctures, not impressed, and separated by about width of punctures. Pygidium punctate on basal half, punctate part with

broad emargination; impunctate apex not wrinkled or shagreened.

**Length.**—7.8 mm.

**Male.**—Unknown.

### 63. *Tiphia (Tiphia) clauseni* Allen and Jaynes

*Tiphia clauseni* Allen and Jaynes, 1930: 89.

This species is only known in the female. It was originally described from the type and four paratypes from the same lot as the type. The following descriptive notes are based on a paratype at the Moorestown laboratory and numerous identified specimens. The female has black legs, a grooved hind basitarsus, a well-developed groove across the disk of the lateral pronotum, and impunctate interspaces on the front as wide as an ocellus.

**Holotype.**—♀, Cherrapunji, Assam, India, April 1926 (Clausen), U.S. National Museum No. 41805.

**Female.**—Vertex without minute punctures on posterior aspect or in narrow median row. Front with one or more interspaces on upper half as wide as ocellus. Mandible without preapical cusp. Antennal flagellum reddish on ventral aspect; short and robust, first three segments 2.6 times as long as wide (average of two).

Dorsal pronotum with transverse carina lacking on median one-third; punctures of medium size and uniformly distributed except on lateral disk. Lateral pronotum with strong, narrow, elongate escarpment sometimes interrupted above by a few short ridges. Mesopleuron on outer disk with punctures separated in most places by distances exceeding their average diameter; subtegular patch of microsetae narrower than tegula, setae short and inconspicuous. Scutum with anteromedian escarpment and notaulices not connected. Metanotum with very small primary punctures located chiefly on posterior aspect. Legs black to dark reddish brown. Hind tibia not inflated; inner face perceptibly ridged; sensorial area a large reddish spot, with sensorium not sunk below surrounding surface. Hind basitarsus with groove about half length of joint. Tegula almost entirely dark reddish translucent, about as wide as long, without shagreening or groove on outer margin. Forewing faintly infumate; radius usually without sharp bend in first section or an apical spur.

Lateral groove on dorsal propodeum narrow, with inner carina obsolete; areola rectangular, about three times as long as apical width. Lateral propodeum with moderate number of rugulae not closely spaced; lower part almost bare of microsetae. Posterior

propodeum with complete median carina. Tergum 1 with preapical band narrowed medially to one row wide, at sides on anterior border with short, crooked escarpment weakly developed. Pygidium finely punctate on basal half, with broad emargination; impunctate apex without wrinkles or shagreening.

Length.—8–9.2 mm.

Male.—Unknown.

Remarks.—In the Moorestown collection in addition to the paratype specimen there are 25 females from Shillong, Assam, India, determined by L. B. Parker.

#### 64. *Tiphia* (*Tiphia*) *s-quarta*, new species

This species belongs to a group of several species in which the legs are all black, the hind basitarsus is grooved, and a well-defined groove or escarpment is on the lateral pronotum. In the key to females it is closely associated with *brevistigma*, and, like it, has a poorly defined, almost vestigial basitarsal groove. However, *s-quarta* is much larger and the metanotum is coarsely punctate. It also possesses in most specimens a patch of dense micro-punctures on the posterior slope of the vertex and a thin median line of minute punctures, both absent from *brevistigma*.

Holotype.—♀, Shillong, Assam, India, 27-IX-1928 (L. B. Parker) [NMNH].

Female.—Vertex with occipital carina far down on neck; minute punctures present as thin median row and also as dense patches on posterior aspect. Front with coarse, deep, primary punctures, largely of first-degree density, without interspaces as wide as ocellus.

Dorsal pronotum without anterior transverse carina. Lateral pronotum with patch of rugulae in ventral corner; escarpment, intercepted by short rugulae in echelon, extending across middle disk. Mesopleuron on outer disk with small primary punctures separated in most directions by at least two times their average diameter and with large secondaries much less numerous than primaries; subtegular patch of dense microsetae as wide as tegula. Scutum with anteromedian escarpment and notaulices not connected. Legs black. Hind tibia nearly straight on upper margin, inner face strongly carinate with large sensorium not sunk below surrounding surface, more than one-fourth width of joint, belt of dense hairs narrower than distance separating it from upper margin. Tegula cockleshell shaped, without shagreening or groove on outer margin. Forewing flavous; stigma separated by more than its length from basal vein; radial cell with stump of out-



wardly directed spur. Disk of metanotum with coarse punctures unevenly distributed.

Dorsal propodeum within areola and for some distance on either side finely roughened; innermost of two lateral carinae obsolete; areola nearly rectangular with slightly sinuous sides, two to  $2\frac{1}{2}$  times as long as wide. Lateral propodeum with rugulae intermediate between coarse and widely spaced and those closely spaced. Posterior propodeum with slender carina on lower half. Tergum 1 with diffuse and poorly defined median stripe or minute punctures on anterior aspect between more coarsely punctate areas; preapical band of coarse, contiguous punctures not bordered by escarpment and converging from three wide on sides to one wide medially. Punctures of intermediate terga in middle separated from membranous apices by about five times width of largest punctures. Pygidium closely elongate punctate on basal two thirds, with large emargination; apex not wrinkled or shagreened.

**Length.**—13.6–16.6 mm.

**Male.**—Unknown.

**Paratypes.**—Five, all Shillong, Assam, India, collected by L. B. Parker: One, same data as holotype; one, collected 1–X–1928; one, 3–IX–1928; two, without dates; all in the Moorestown collection.

The holotype and two paratypes were donated to the U.S. National Museum from the Moorestown collection.

### 65. *Tiphia* (*Tiphia*) *s-sexta*, new species

The character most clearly distinguishing this species from numerous other females of the Indian *Tiphia* is the round, conspicuously sunken sensorium of the hind tibia. L. B. Parker called this species "No. 15."

**Holotype.**—♀, Shillong, Assam, India, 13–IV–1927 (L. B. Parker) [NMNH].

**Female.**—Vertex without row of minute punctures on median line, though sometimes with scattered secondaries in median area; occipital carina not visible from above. Front on upper half with punctures chiefly of second-degree density, without interspaces wider than ocellus. Flagellum of antenna stout, first three joints 2.7 times as long as greatest width (average of two measured). Clypeal extension with its margin narrow in lateral extension and strongly bidentate.

Dorsal pronotum without transverse carina; punctures coarse, fairly uniform in size and spacing, chiefly of first-degree density.

Lateral pronotum with escarpment on disk a coarse, broad series of irregular gouges, above which there is usually a pattern of aciculations and scattered coarse punctures. Mesopleuron with a few large punctures irregularly distributed and a few large secondaries; patch of microsetae narrower than tegula. Scutum with anteromedian escarpment and notaulices not connected. Metanotum with many coarse punctures concentrated on lateral or posterior aspects. Legs black. Hind tibia obscurely carinate on inner face; upper margin moderately arched; sensorium reddish, more or less circular, and sunk abruptly below level of surrounding area. Hind basitarsus with very broad groove. Tegula cockleshell shaped, largely reddish translucent, without marginal grooves. Forewing flavous; stigma small, separated by about its length from basal vein; radius originating from truncate apex of stigma and sometimes terminating in rudimentary outwardly directed stump.

Dorsal propodeum very finely, closely, and shallowly close punctate; inner of two lateral carinae obscurely present; areola almost rectangular, three to four times as long as apical width, lateral carinae without bordering grooves. Lateral propodeum with rugulae intermediate between close and widely spaced, continued to apex of posterior angle. Posterior propodeum with narrow carina on lower half or less. Tergum 1 without median patch of micro-punctures on anterior slope; without anterior transverse carina; dorsum with numerous coarse punctures; preapical band of coarse, closely spaced, round punctures two to three punctures wide without trace of an escarpment. Intermediate terga with apical punctures at middle separated from apices by at least six times diameter of larger punctures; impunctate areas between puncture concentrations almost absent. Pygidium closely and coarsely punctate on basal three-fifths without median emargination; impunctate apex wrinkled and faintly shagreened near punctate part.

**Length.**—9.1–9.8 mm.

**Male.**—Unknown.

**Paratypes.**—Four, same data as holotype [M]; one, Shillong, India, 6,000 ft, V-1928 (L. B. Parker) [M]; one, Shillong, India (L. B. Parker) [M].

Holotype and one paratype from the Moorestown collection were deposited in the U.S. National Museum.

### 66. *Tiphia (Tiphia) s-prima*, new species

This species is described from a series that includes the type and seven paratype females. All were obtained from Shillong, Assam.

This is a moderately large species in which the basitarsus is grooved and the legs are all black. It differs from *s-quarta*, with which it is coupled in the key, as having, when viewed vertically, an occipital carina not far down on the neck, with minute punctures on the vertex few or lacking.

**Holotype.**—♀, Shillong, India, 4-V-1928, 6,000 ft (L. B. Parker) [NMNH].

**Female.**—Vertex with occipital carina broadly visible from above; without micropunctures in thin median line or clustered on posterior slope. Front without interspaces as wide as ocellus. Antennal flagellum slender, with first three joints 2.8 times as long as widest of three.

Dorsal pronotum without trace of anterior transverse carina; punctures large and of nearly uniform size and distribution. Lateral pronotum with ventral angle obscurely rugulose; a short distance above rugulae a faint, narrow, crooked escarpment interrupted at frequent intervals. Scutum with median cluster of coarse, contiguous punctures not mixed with secondaries; antero-median escarpment and notaulices not connected. Mesopleuron shagreened, its outer disk with small primary punctures separated in most directions by more than average puncture diameter; about an equal number of coarse secondaries. Metanotum bipunctate; with only a few primary punctures. Legs black. Hind tibia with upper margin straight and almost parallel with lower margin; inner face vaguely carinate; sensorium nearly oval, about one-fourth width of joint. Hind basitarsus with deep, narrow groove. Tegula cockleshell shaped, without groove on outer margin. Forewing flavous; stigma separated by less than its length from basal vein; radius in some specimens terminating in rudimentary outward-directed stump.

Dorsal propodeum with two lateral carinae of about equal development; miter-shaped enclosure obscurely complete; areola rectangular, about three times as long as wide. Lateral propodeum with rugulae of upper part strong and not closely spaced. Posterior propodeum with median carina present on lower half, but not complete to transverse carina. Tergum 1 with preapical band of closely spaced more or less coalesced punctures, in middle about two punctures wide and with obscure escarpment on lateral thirds. Pygidium closely punctate on basal half with broad median emargination; impunctate apex wrinkled near punctate part, highly polished, without shagreening.

**Length.**—12.6–13.6 mm.

**Male.**—Unknown.

**Paratypes.**—Two, Shillong, Assam, India, 6,000 ft, 20-IV-1928 (L. B. Parker) [M]; one, Shillong, India, 5,000 ft, 15-VI-1928 (L. B. Parker) [M]; five, Shillong, Assam, India, 13-IV-1927 (L. B. Parker) [M].

The holotype and paratypes were donated to the U.S. National Museum from the Moorestown collection.

### 67. *Tiphia (Tiphia) auripennis* Bingham

*Tiphia auripennis* Bingham, 1897: 64; Turner, 1908: 120; Allen and Jaynes, 1930: 99.

*Tiphia (Tiphia) auripennis* Allen, 1969: 413.

I find the status of this species uncertain. C. T. Bingham did not state whether it was described from one or more specimens. The type locality is Sylhet, Assam, India. In October 1967 I received descriptive notes from I. H. H. Yarrow on the only specimen of *auripennis* in the British Museum, a "cotype" female from Sylhet, taken in August 1891 by S. E. Brody. He found this specimen to differ slightly from *curvinerva* in the following respects: In *auripennis* the entirely smooth median part of the anterior transverse groove of tergum 2 occupies half of the width of the tergum compared to about one-fourth in *curvinerva*. In *auripennis* the lateral groove of the dorsal propodeum is bordered inwardly by an elevated carina, which is not present in *curvinerva*.

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USDA TECHNICAL BULLETINS

UPDATA

THE GENUS TIPHIA OF THE INDIAN SUBCONTINENT

ALLEN, H. W.

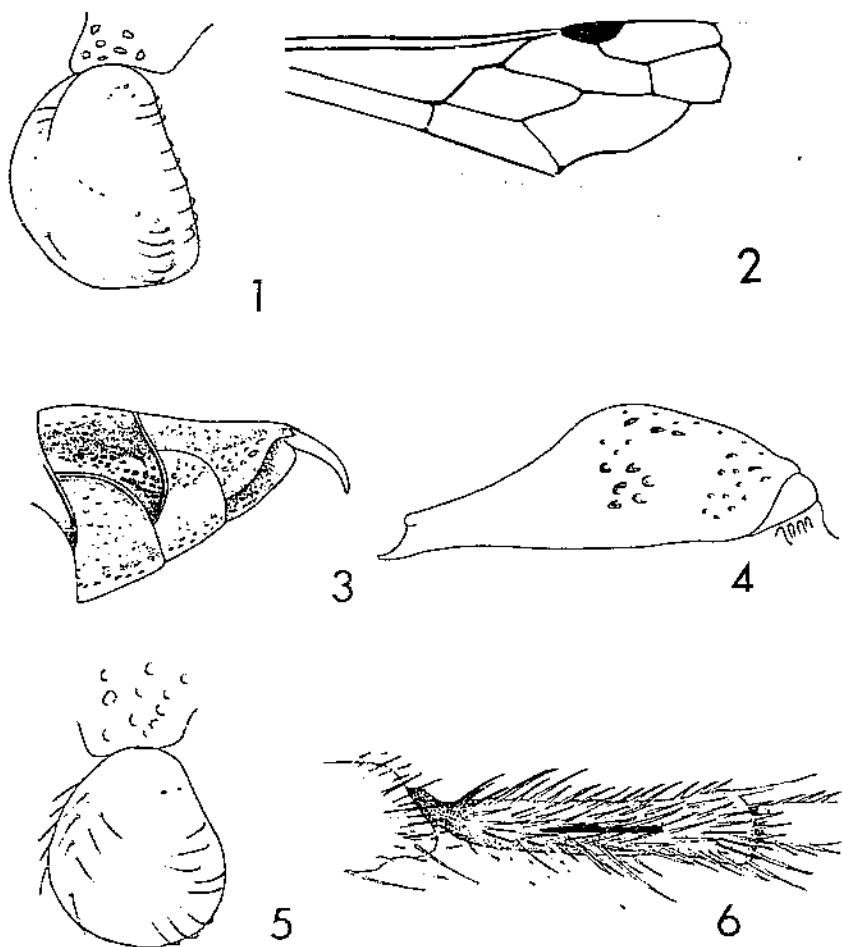
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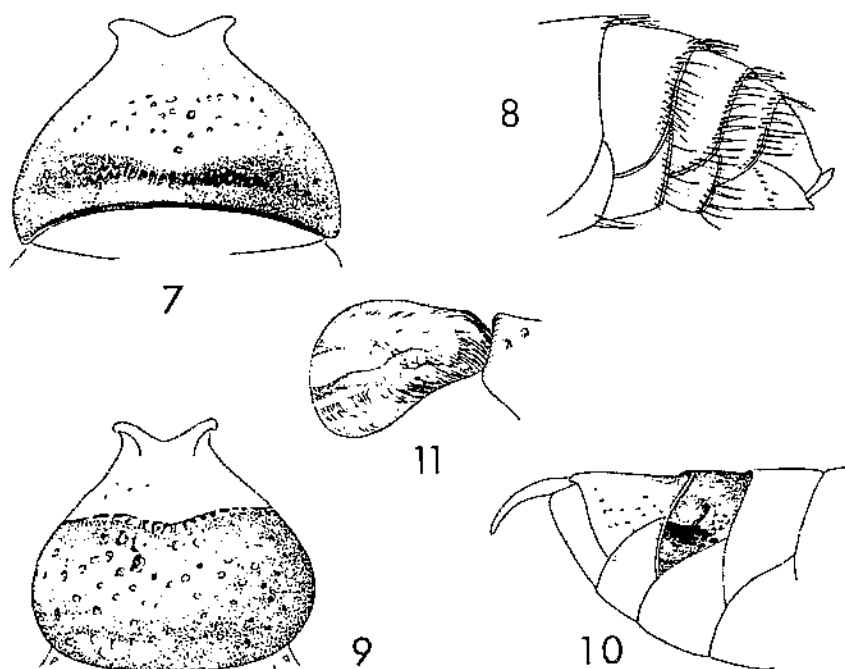
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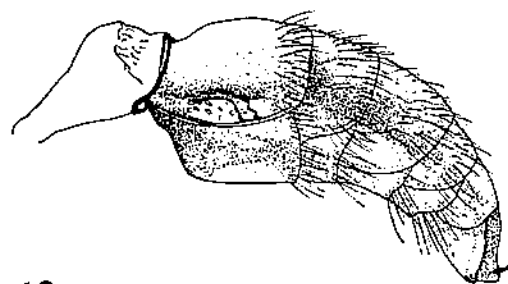


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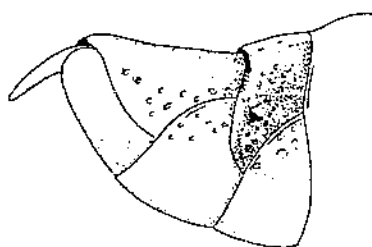
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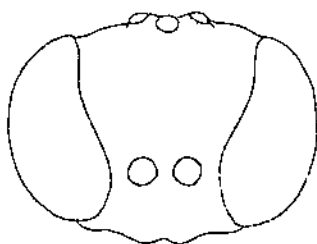
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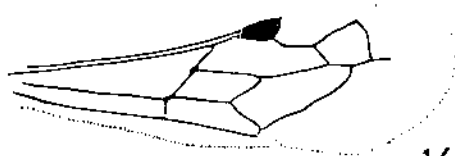
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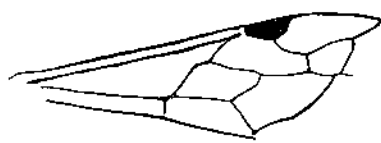
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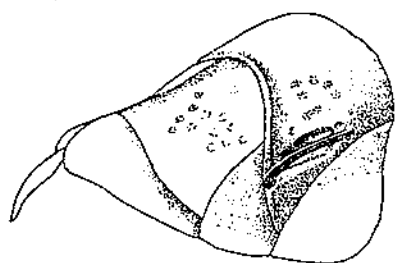


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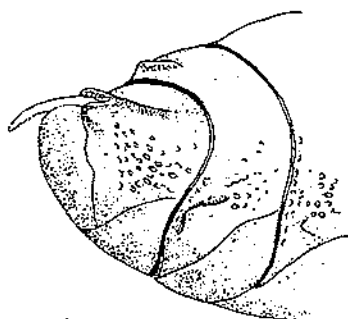
Male of *Tiphia aurata*, new species, from Godavari, Katmandu, Nepal: 12, Anterior median callosity on sternum 2. Male of *Tiphia tegelunga*, new species, from Shillong, Assam, India: 13, Left tegula; 14, abdomen showing lateral denticle on sternum 5. Male of *Tiphia capillata* Allen and Jaynes from Shillong, Assam, India: 15, Mandible with preapical denticle. Female of *T. capillata* from Shillong, India: 16, Enlarged stigma. Male of *Tiphia lotharar*, new species, from Lothar, near Birganj, Nepal: 17, Head outline; 18, forewing.



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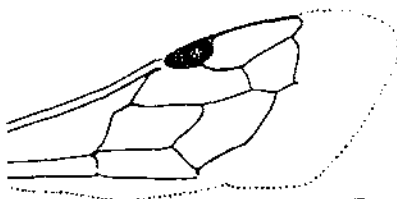
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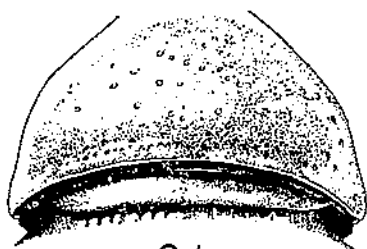
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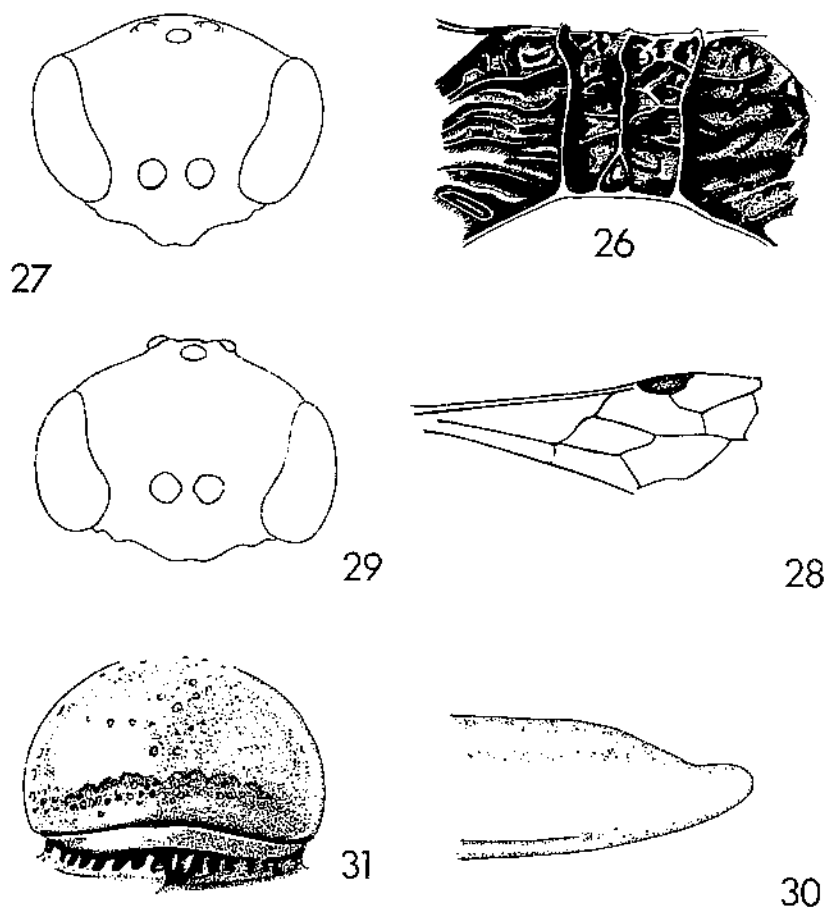


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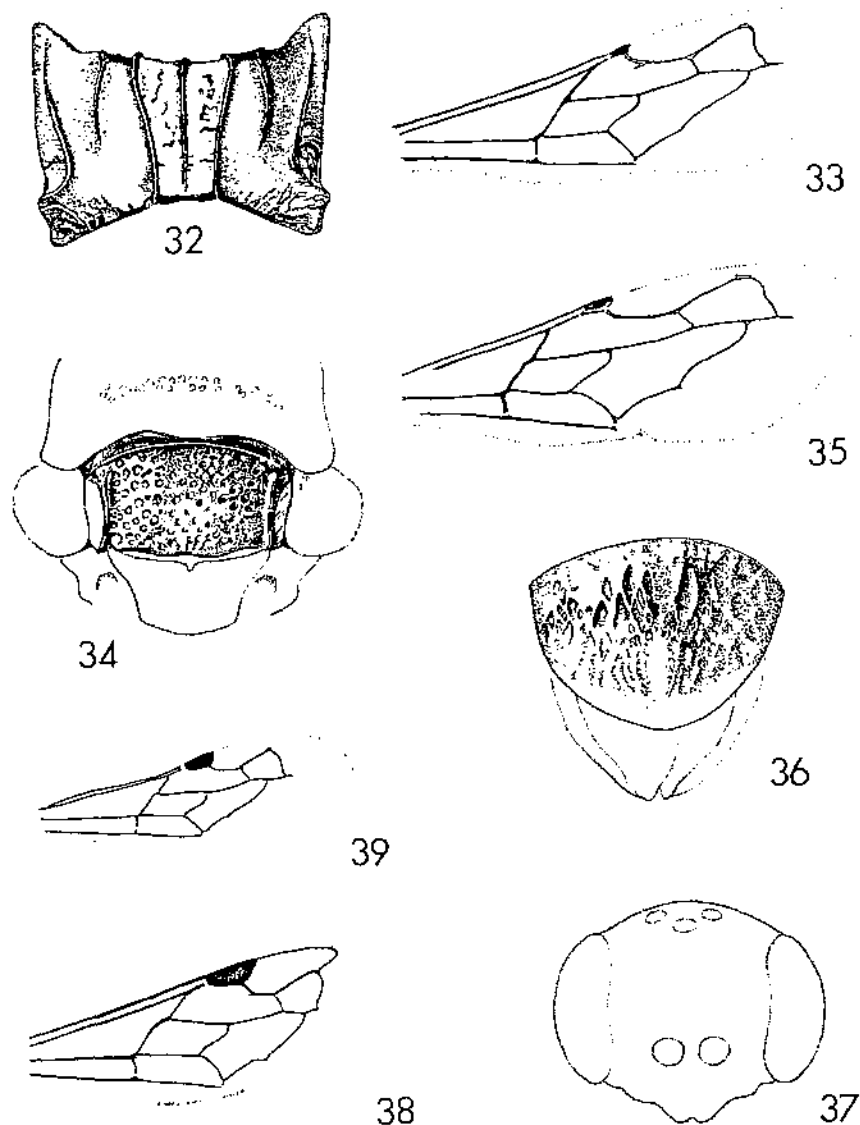


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Male of *Tiphia simlaensis* Cameron from Shillong, Assam, India: 19, Mandible showing preapical denticle; 20, forewing. Male of *Tiphia nilgiria*, new species, from Nilgiri Hills, India: 21, Mandible showing preapical denticle; 22, forewing. Male of *Tiphia milleri*, new species, from Pulchaurki, Katmandu, Nepal: 23, Abdomen showing lateral denticle of fifth sternum. Male of *Tiphia orificia*, new species, from Shillong, Assam, India: 24, Tergum 1 showing uptilted apical edge; 25, abdomen showing lateral denticle on sternum 5.



Male of *Tiphia madrasa*, new species, from Anamalai Hills, Madras State, India: 26, Deeply rugose dorsal propodeum. Male of *Tiphia dampara*, new species, from Nilgiri Hills, India: 27, Outline of head; 28, forewing. Male of *Tiphia fletcheri*, new species, from Catakumund, India: 29, Outline of head. Male of *Tiphia nathani*, new species, from Anamalai Hills, southern India: 30, Tip of mandible; 31, tergum 1 not upturned apically.



Female of *Tiphia shillonga*, new species, from Shillong, Assam, India: 32, Dorsal propodeum showing longitudinal carinae; 33, forewing. Female of *Tiphia scutensis*, new species, from Shillong, Assam, India: 34, Scutum showing elongated anteromedian escarpment extending laterally beyond ends of notaulices; 35, forewing; 36, pygidium sparsely rugose punctate to near tip. Male of *Tiphia pecki*, new species, from Pulchauki, Katmandu, Nepal: 37, Outline of head; 38, forewing. Female of *Tiphia nilgirensis*, new species, from Coimbatore, Madras State, India: 39, Forewing showing enlarged stigma.

**END**