

**Biosystematic Studies of Ceylonese Wasps, XVIII:  
The Species of *Trachepyrus* Kieffer (Hymenoptera: Bethyridae:  
Epyrinae)<sup>1</sup>**

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*Abstract.*—*Pristobethylus* Kieffer, 1905, and *Acanthepyrus* Kieffer, 1910, are new synonyms of *Trachepyrus* Kieffer, 1905. *Epyrus serricollis* Westwood, *Pristobethylus indicus* Muesebeck, *P. crenaticollis* Kieffer, *P. semiserratus* Kieffer and *Acanthepyrus ceresensis* Turner are new combinations in *Trachepyrus*, and *T. haemorrhoidalis* Kieffer is confirmed as a member of the genus. *Trachepyrus indicus* and *T. haemorrhoidalis* occur in Sri Lanka where they parasitize larvae of Tenebrionidae.

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A major problem with Kieffer's large works on bethylid classification (e.g., 1904–1906, 1914) is that he relied greatly on differences and did not give equal significance to similarities. Evans was obliged to synonymize some 20 of Kieffer's genus-level names in his studies of New World Bethyridae. The same pattern is beginning to emerge in the Old World bethylid fauna. During my revisionary study of the Ceylonese Bethyridae, I became aware that *Pristobethylus* Kieffer, 1905, and *Acanthepyrus* Kieffer, 1910, were synonymous. Later, while sorting the extensive bethylid collection made in Egypt by Priesner, I realized that *Trachepyrus* Kieffer, 1905 (*in* Kieffer and Marshall, 1904–1906), was the senior synonym of these three names.

These relationships were apparently sensed in part by two earlier workers on Bethyridae. Turner (1928) must have subconsciously recognized the close relationship of *Acanthepyrus* and *Pristobethylus*, for he described two species in the former genus, one of which was later transferred, correctly in the Kiefferian sense, to *Pristobethylus* by Benoit (1957). Earlier, Benoit (1952) suggested that *Acanthepyrus* and *Trachepyrus* were probably synonymous but did not make the synonymy and did not mention this surmise in the 1957 paper.

***Trachepyrus* Kieffer**

*Trachepyrus* Kieffer. 1905 (Jan): 107 (type-species, *Trachepyrus spinosipes* Kieffer, original designation and monotypic).

*Pristobethylus* Kieffer *in* Kieffer and Marshall, 1905 (Nov): 248 (type-species, *Epyrus serricollis* Westwood, original designation and monotypic). NEW SYNONYMY.

*Epyrus* subg. *Acanthepyrus* Kieffer, 1910: 103 (type-species, *Epyrus (Acanthepyrus) hildebrandti* Kieffer, monotypic). NEW SYNONYMY.

*Acanthepyrus* Kieffer, 1914: 401 (raised to generic rank).

<sup>1</sup>The preceding number in this series is "XVII: A revision of Sri Lankan and South Indian *Bembix* Latreille (Hymenoptera: Sphecoidea: Nyssonidae)" with J. van der Vecht, *Smithson. Contrib. Zool.*, 451:1–30, 36 figs., 1987.

*Trachepyrus* females are unusual among the Bethylidae in the structure of the mandible and antennal scape, and in the presence of a rake of stout bristles on the fore tarsus. The mandible (Figs. 11–13) in dorsal view is somewhat flattened, rounded at the apex, and has along the inner margin a strong inwardly directed tooth, beneath which are modified sensilla chaetica (Figs. 14–18). The upper surface of the scape (Figs. 5–7) is rather flattened and smooth, margined below by a row of close short setae and above by a row of more scattered setae. The fore tarsal rake (Figs. 1–3) consists of stout setae along the outer margin, three on the basitarsus and one each at the apices of the second and third segments.

The sensilla chaetica adjacent to the large tooth on the inner mandibular margin are greatly enlarged and bizarrely modified. Their shape and position suggest that they may have a fossorial function.

The stout setae of the fore tarsal rake obviously function in excavation of soil. Possession of a tarsal rake is rare in the bethylids, for so few genera have fossorial habits. *Disepyrus* Kieffer has such a rake (Fig. 4) but it is composed of much longer, more slender bristles than the short stout setae of *Trachepyrus*.

Kieffer separated *Pristobethylus* from most Bethylidae because the pronotum of the type-species is margined anteriorly and laterally by a scalloped carina. Essentially, this carina is the only noteworthy difference between females of *Pristobethylus* and *Acanthepyrus*. The significance can be gauged by the fact that the lateral carina is complete in *serricollis*, *crenaticollis* (Kieffer) and *ceresensis* (Turner) but present on only the anterior half in *semiserratus* (Kieffer) and *indicus* (Muesebeck). The posterolateral angles of the head have a short scalloped carina in *serricollis*, *ceresensis* and *indicus*; this was not noted in the descriptions of *crenaticollis* and *semiserratus*. The fore-going species of *Pristobethylus* are all new combinations in *Trachepyrus*.

The radial vein is short in *Trachepyrus spinosipes* and the costal vein bears a row of extraordinarily long setae. These venational characters are subject to variation in species assigned originally to *Acanthepyrus* and *Pristobethylus* and do not warrant separation of *Trachepyrus* from the other two genera.

Treatment of these three assemblages of species as the *spinosipes*, *serricollis* and *hildebrandti* species-groups is consistent with the treatment of similar groups in *Holepyrus* and other genera of Epyrinae. The *hildebrandti* group is the most generalized and the *spinosipes* group the most specialized.

The *spinosipes* group is known from Algeria and Egypt. The other two groups are primarily Ethiopian but each has one species in the Indian subcontinent.

*Diagnosis*.—Small wasps, 2.5–6.2 mm long; body black, apex of abdomen and appendages sometimes red or brown. Head of female flattened, posterior margin straight to emarginate; female mandible (Figs. 11–18) somewhat flattened above, curved, apex bluntly rounded, inner margin with large subapical tooth and modified sensilla chaetica beneath and a smaller median tooth or two, male mandible relatively slender, with large apical tooth and three to four small teeth above it; clypeus narrow, with rounded median lobe and less prominent lateral lobes, ecarinate medially; antenna 13-segmented, arising from beneath frontal lobes, scrobes not carinate, female scape (Figs. 5–7) above somewhat flattened, mostly smooth, margined below by short stout setae and above by longer setae, male antenna relatively long, first and second flagellar segments subequal in length; malar space absent; female eye not prominent, not hairy, not extending close to vertex,

male eye more prominent. Pronotum longer than scutum, anterior and lateral margins of disk carinate or not, posterior submarginal groove lacking, collar depressed; scutum with distinct notauli and parapsidal furrows; scutellum with pair of separated pits at base; mesopleuron with small pit below hind wing and curved sulcus near lower margin; propodeal disk margined by a carina laterally and posteriorly and with several discal carinae; posterior propodeal surface with median carina on at least upper half; female fore femur somewhat to moderately broadened; female fore tarsus (Figs. 1–3) with rake of stout bristles, three on basal segment and one each at apices of second and third, male with weak tarsal rake; female mid tibia spinose on outer surface; tarsal claw with inner tooth (Figs. 8–10); female forewing (Figs. 25–27) with enlarged stigma, radial vein of variable length, basal vein meeting subcosta only slightly basad of stigma, transverse median vein sometimes with short stub. Abdomen somewhat depressed apically; male subgenital plate (Figs. 22–24) with apical margin rounded or lobate, base with a median stalk; aedeagus relatively broad, shorter than digitus, cuspis biramous, paramere relatively narrow, with or without long apical setae (Figs. 19–21).

*Behavior.*—Little was known previously as to the host preferences of species of *Trachepyrus*. When Kieffer described *haemorrhoidalis*, he noted that the unique type was captured while dragging a “chenille,” 8 mm long, on the sand of a dry stream bed. Considering our prey records discussed below, it is probable that this “caterpillar” was actually the larva of a tenebrionid beetle.

P. B. Karunaratne captured a female *haemorrhoidalis* at Palatupana Tank, 22 June 1978, dragging by its head end a slender paralyzed tenebrionid larva, 13.5 mm long, belonging to an unknown genus of Tenebrionidae.

We obtained three host records for *indicus* at Ma Villu near Kondachchi; all were slender larvae of a genus and species of Tentyriinae (Tenebrionidae). T. Wijesinha collected two females on 19 September 1979, each with a slender paralyzed larva, 11.5 and 15.2 mm long respectively. L. Jayawickrama collected a female on 18 September 1980 walking with a paralyzed larva, 6 mm long. She held the head end of the larva in her mouth and the posterior section of the host body was over her back.

I watched *indicus* females in January 1979 hunting on the beach at Palatupana between the dunes and the high tide mark. The wasps crawled swiftly over the sand, occasionally taking short flights just above the surface. They examined the basal rosette of leaves of small prostrate plants. Their larval hosts were presumably on the roots of such plants. The stout spatulate setae of the fore tarsal rake would enable the wasp to dig readily through the friable soil to reach a host larva. However, I did not observe digging behavior by any of the wasps. The transport of host larvae noted above indicates that the host is probably interred in a burrow separate from the site where it was captured.

Behavioral data are unavailable for other species of *Trachepyrus*. Inasmuch as females of all species have similarly shaped mandibles and fore tarsal rake, I presume that they too have tenebrionid larvae as hosts for which they search in sand or other friable soil.

Collection data within Sri Lanka indicate that *haemorrhoidalis* is more widely distributed than *indicus*, occurring in both the Dry Zone and Wet Zone at altitudes of 10 to 700 m with an average annual rainfall not over 2400 mm. The latter species is restricted to sandy areas in the Dry Zone from sea level to 100 m with an average annual rainfall not exceeding 1100 mm.



### KEY TO *Trachepyrus* OF THE INDIAN SUBCONTINENT

- Pronotal disk not carinate anteriorly and laterally, surface with moderate sized punctures separated by 2–3X diameter of puncture; costa with short setae only (Fig. 25); head not carinate posterolaterally; female fore femur broader, 2.2X as long as wide; male legs except coxae light red; apex of paramere with several long setae, cuspis clavate at apex (Fig. 19) ..... *haemorrhoidalis* Kieffer
- Pronotal disk with scalloped carina anteriorly and on basal half of lateral margin, surface with only a few scattered moderate sized punctures; costa with longer setae interspersed among shorter (Fig. 26); head posterolaterally usually with short scalloped carina; female fore femur more slender, 2.4X as long as wide; male legs dark brown, tarsi lighter; apex of paramere with only short setae, cuspis slender (Fig. 20) ..... *indicus* (Muesebeck)

### *Trachepyrus haemorrhoidalis* Kieffer

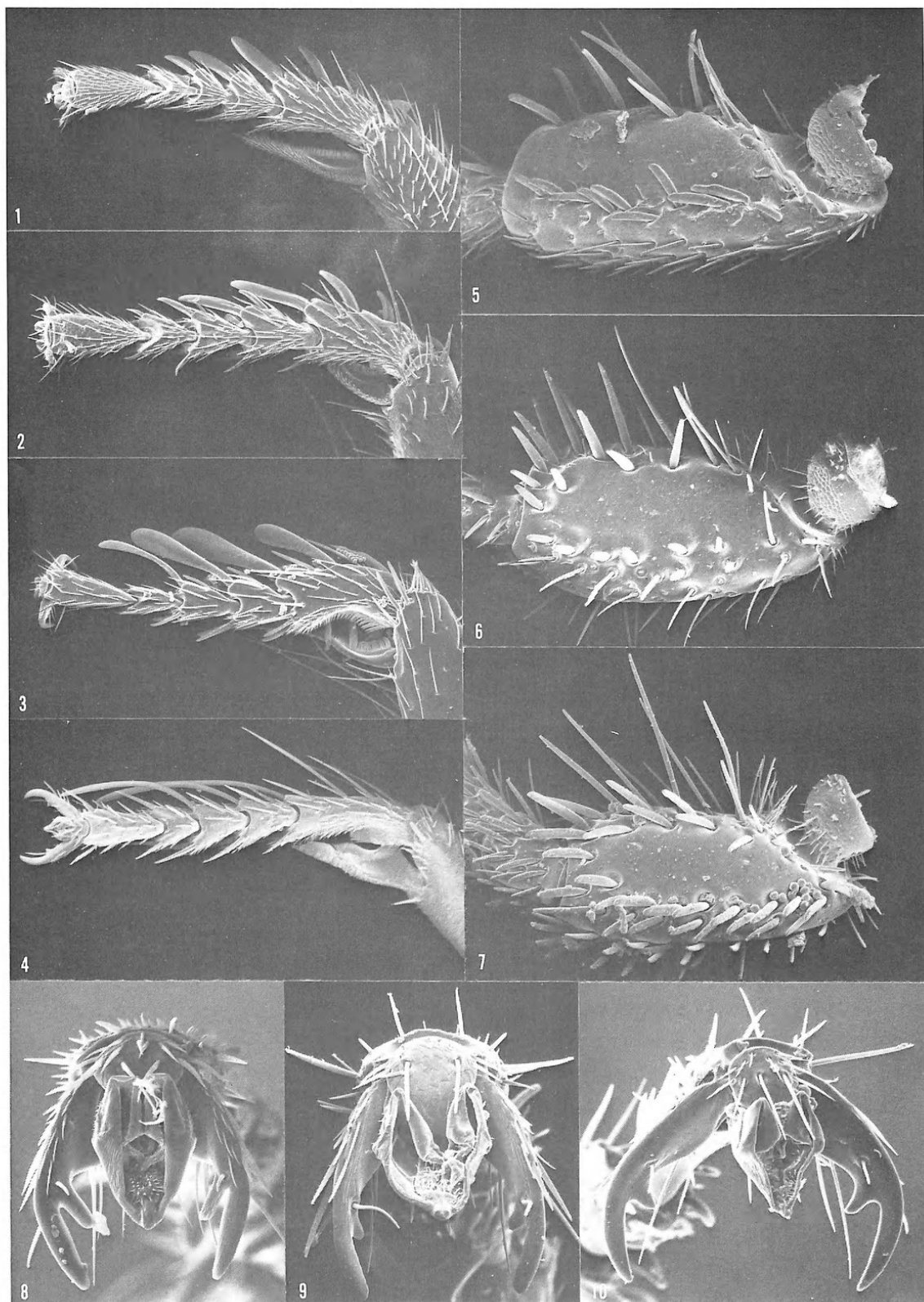
Figures 1, 5, 8, 11, 14, 19, 22, 25

*Trachepyrus haemorrhoidalis* Kieffer, 1911: 230–231 (♀; Karachi, Pakistan, E. Comber; holotype in British Museum (Natural History)).

*Acanthepyrus haemorrhoidalis* Kieffer, 1914: 404.—Kurian, 1954: 275.

*Female*.—Length 4.7–5.8 mm. Black, mandible, scape, flagellum beneath, tegula, fore and mid femora and all tibiae occasionally, tarsi, and last two or three abdominal segments red; wings slightly infumated, stigma medium brown, veins lighter. Head with length 0.86X width, not carinate posterolaterally, posterior margin slightly incurved; large tooth on inner margin of mandible subapical in position (Fig. 11); four modified sensilla chaetica beneath subapical tooth (Fig. 14); front delicately alutaceous, scarcely impressed anteriorly in middle, moderately punctate, those anteriorly separated by half a puncture diameter, becoming sparser posteriorly and separated by twice or more a puncture diameter, least interocular distance 0.7X head width and 1.5–1.6X eye length; ocelli small, front angle 90°, posterior ocelli separated by half a diameter from posterior margin of head, ocellocular distance 1.4–1.5X width of ocellar triangle. Thoracic dorsum delicately alutaceous, propodeal disk glossy; pronotal disk without marginal carinae, punctures of moderate size, separated by half a puncture's width along anterior margin, dispersed by two or more puncture widths elsewhere; scutum with a few small punctures in middle; median length of propodeal disk 0.6X width, enclosed median area twice as wide at base as at apex, quinquecarinate, median and lateral carinae stronger, reaching discal apex, intermediate carinae weaker and sometimes not reaching apex, surface between carinae with transverse carinules; median carina on upper three-fourths of posterior surface; fore femur relatively broad, 2.2X as long as wide; costa with short setae only (Fig. 25); transverse median vein with stub.

*Male*.—Length 4.4–4.8 mm. Coloration as in female except abdomen black and legs except coxae light red. Head with length 0.9X width, posterior margin slightly incurved, not carinate posterolaterally; front glossy, moderately punctate, closely so anteriorly, punctures separated by once or twice diameter of puncture posteriorly, least interocular distance 0.55X head width and subequal to eye length; ocellocular distance 1.1X width of ocellar triangle. Thorax shining; pronotal disk without



Figures 1–10. *Trachepyris* and *Disepyris* females. 1–4. Fore tarsus: 1, *T. haemorrhoidalis* Kieffer (X45); 2, *T. indicus* (Muesebeck) (X84); 3, *T. spinosipes* Kieffer (X67); 4, *D. rufipes* Kieffer (X73). 5–7. Scape: 5, *T. haemorrhoidalis* (X134); 6, *T. indicus* (X101); 7, *T. spinosipes* (X134). 8–10. Claws: 8, *T. haemorrhoidalis* (X224); 9, *T. indicus* (X280); 10, *T. spinosipes* (X280).



anterior and lateral carinae; median length of propodeal disk 0.6X width, enclosed median area quinquecarinate, lateral carinae converging strongly toward apex, none of carinae reaching apex; costa and subcosta with short setae only; transverse median vein with stub. Genitalia and subgenital plate (Figs. 19, 22); apex of paramere with several long setae; cuspis clavate at apex.

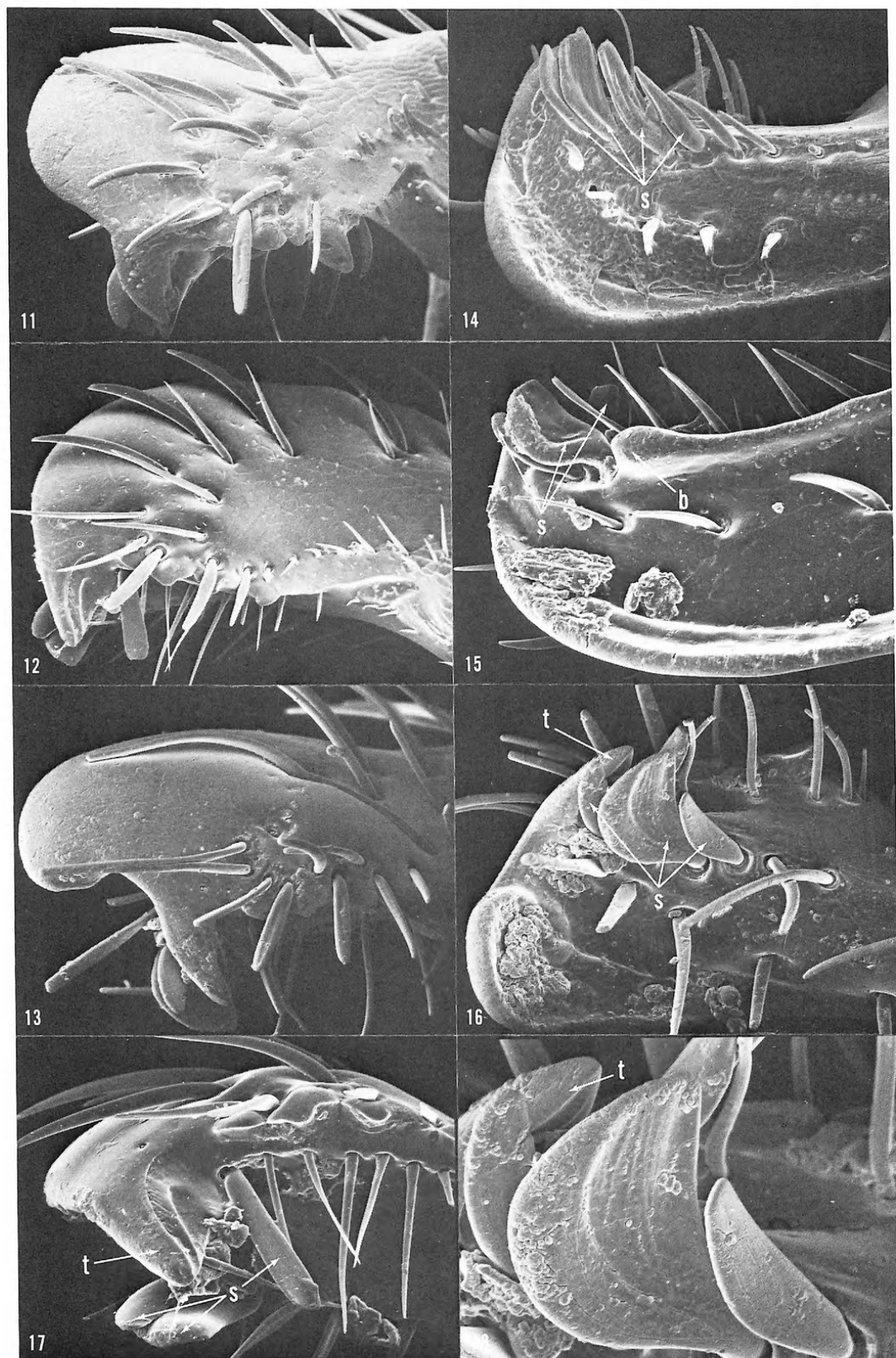
*Specimens examined*.—SRI LANKA. NORTHERN PROVINCE. Mannar District: 0.5 mi NE Kokmotte Bungalow, Wilpattu Natl. Pk., 21–25 May 1976, ♂; Ma Villu, Kondachchi, 16–19 Sep 1980, ♂. NORTH CENTRAL PROVINCE. Anuradhapura District: Padaviya, Irrigation Bungalow or Antiquities Site, 180 ft, 2–8 Nov 1970, ♂; 18, 21 May 1976, 1 in Malaise trap, 2♂; 20–23 July 1978, Malaise trap, ♀. CENTRAL PROVINCE. Kandy District: Udawattakele Sanctuary, Kandy, 2100 ft, 16–31 Aug and 1–17 Sep 1976, 2♀. WESTERN PROVINCE. Colombo District: Colombo Museum Gardens, 50 ft, 23, 28 Mar and 13–15 Apr 1977, ♀, 2♂. SABARAGAMUWA PROVINCE. Ratnapura District: Panamure, 500 ft, 15–21 Oct 1970, 2♀. UVA PROVINCE. Badulla District: Ulhitiya Oya, 15 mi NNE Mahiyangana, Malaise trap, 5–6 Sep 1980, 3♂. Monaragala District: Angunakolapelessa, Malaise trap, 8–9 Oct 1980, ♂. SOUTHERN PROVINCE. Hambantota District: Palatupana Tank, 10–20 m, 27–29 Sep 1977 and 22 June 1978, 2♀.

***Trachepyrus indicus* (Muesebeck), NEW COMBINATION**

Figures 2, 6, 9, 12, 15, 17, 20, 23, 26

*Pristobethylus indicus* Muesebeck, 1934: 233–225, Fig. 1 (♀; Chowghat, Malabar, India, K. P. A. Menon; holotype in U. S. National Museum).—Kurian, 1954: 273.

*Female*.—Length 4.0–6.2 mm. Black, mandible, scape, flagellum beneath, tegula, occasionally fore and mid femora and all tibiae, tarsi, and last one to three abdominal segments red, basal segments of legs usually brown; wings slightly infumated, stigma dark brown, veins much lighter. Head with median length 0.78–0.92X width, posterolaterally usually with short scalloped carina, posterior margin strongly emarginate; large tooth on inner margin of mandible apical in position (Fig. 12), with a broad cutting edge dorsally (Fig. 17); two modified sensilla chaetica beneath apical tooth, third modified sensillum chaeticum displaced to base of apical tooth (Fig. 17) by rounded boss along inner margin (Fig. 15); front delicately alutaceous, with short median groove anteriorly, moderately punctate, punctures anteriorly separated by half a puncture diameter, becoming much sparser on rest of lower half of front and virtually absent on upper half; least interocular distance 0.7X head width and 1.5–1.8X eye length; ocelli small, front angle about 135°, posterior ocelli separated by half a diameter from posterior margin of head, ocellocular distance 1.0–1.1X width of ocellar triangle. Thoracic dorsum delicately alutaceous, propodeum glossy; pronotal disk with scalloped carina anteriorly, extending half distance to apex laterally, with widely dispersed punctures of moderate size; scutum with only a few small punctures posteriorly in middle; median length of propodeal disk 0.6–0.7X width, enclosed median area quinquecarinate, only median carina reaching discal apex, sides converging strongly toward apex, area between carinae with irregular transverse carinules; median carina on upper half of posterior surface; fore femur 2.4X as long as wide; costa with longer setae interspersed among shorter (Fig. 26); transverse median vein with short stub.



Figures 11–18. *Trachepyrus* female mandibles. 11–13. Apical half, dorsal: 11, *haemorrhoidalis* Kieffer (X236); 12, *indicus* (Muesebeck) (X201); 13, *spinosipes* Kieffer (X372). 14–16. Apical half, ventral: 14, *haemorrhoidalis* (X236); 15, *indicus* (X248); 16, *spinosipes* (X395). 17. Apical half, oblique, *indicus* (X378). 18. Modified sensilla chaetica, ventral, *spinosipes* (X944). (t=tooth, s=modified sensilla chaetica; b=mandibular boss.)

*Male*.—Length 2.5–4.5 mm. Coloration similar to female except abdomen entirely black, legs and antennae rarely light red. Head with median length 0.8X width, posterolaterally rounded or slightly irregular from a few punctures, posterior margin not so deeply emarginate as in female; front glossy, with scattered small punctures, somewhat more sparsely so on posterior half; least interocular distance 0.64–0.68X head width and 1.3–1.5X eye length; ocellocular distance 1.1–1.2X width of ocellar triangle. Thorax shining; pronotal disk with scalloped carina anteriorly and laterally halfway to apex, weaker than in female; median length of propodeal disk 0.7–0.8X width, enclosed median area tri- or quinquecarinate, only median carina reaching apex, lateral carinae converging strongly toward apex, area with irregular transverse carinules; costa with longer setae interspersed among shorter; transverse median vein without stub. Genitalia and subgenital plate (Figs. 20, 23); apex of paramere with short setae; cuspis slender.

*Specimens examined*.—SRI LANKA. NORTHERN PROVINCE. Mannar District: Ma Villu, Kondachchi, 19 Sep 1979, 2♀, 2♂; 16–19 Sep 1980, ♀, ♂; 11–12 Apr 1981, ♂. UVA PROVINCE. Badulla District: Ulhitiya Oya, 15 mi NNE Mahiyangana, on or in leaf litter on sand, 5–6 Sep 1980, ♂. Monaragala District: Mau Aru, 10 mi E of Uda Walawe, 100 m, 24–26 Sep 1977, ♀. SOUTHERN PROVINCE. Hambantota, 10 ft, 28 Oct 1970, 2♀. Palatupana, near Wildlife and Nature Protection Society Bungalow, 0–50 ft, 8–10 Mar 1972, 2♀, 2♂; 20–22 June 1978, Malaise trap, ♀; 18–21 Jan 1979, 5♀.

INDIA. KERALA, Chowghat, Malabar, 29 May 1931, caught on sand, ♀ (holotype). MADRAS. Karikal, Tanjore, 17 Aug 1951, 2♀.

### *Trachepyrus spinosipes* Kieffer

Figures 3, 7, 10, 13, 16, 18, 21, 24, 27

*Trachepyrus spinosipes* Kieffer, 1905: 107.—Kieffer in Kieffer and Marshall, 1906: 413 (♀; Algeria: Ismailia, Ain Sefra; type series in Paris Museum).—Kieffer, 1914: 406.

I have examined a series of 18 females and a single male from 10 localities in Egypt. A description is withheld for a revisionary study of Egyptian Bethylinidae.

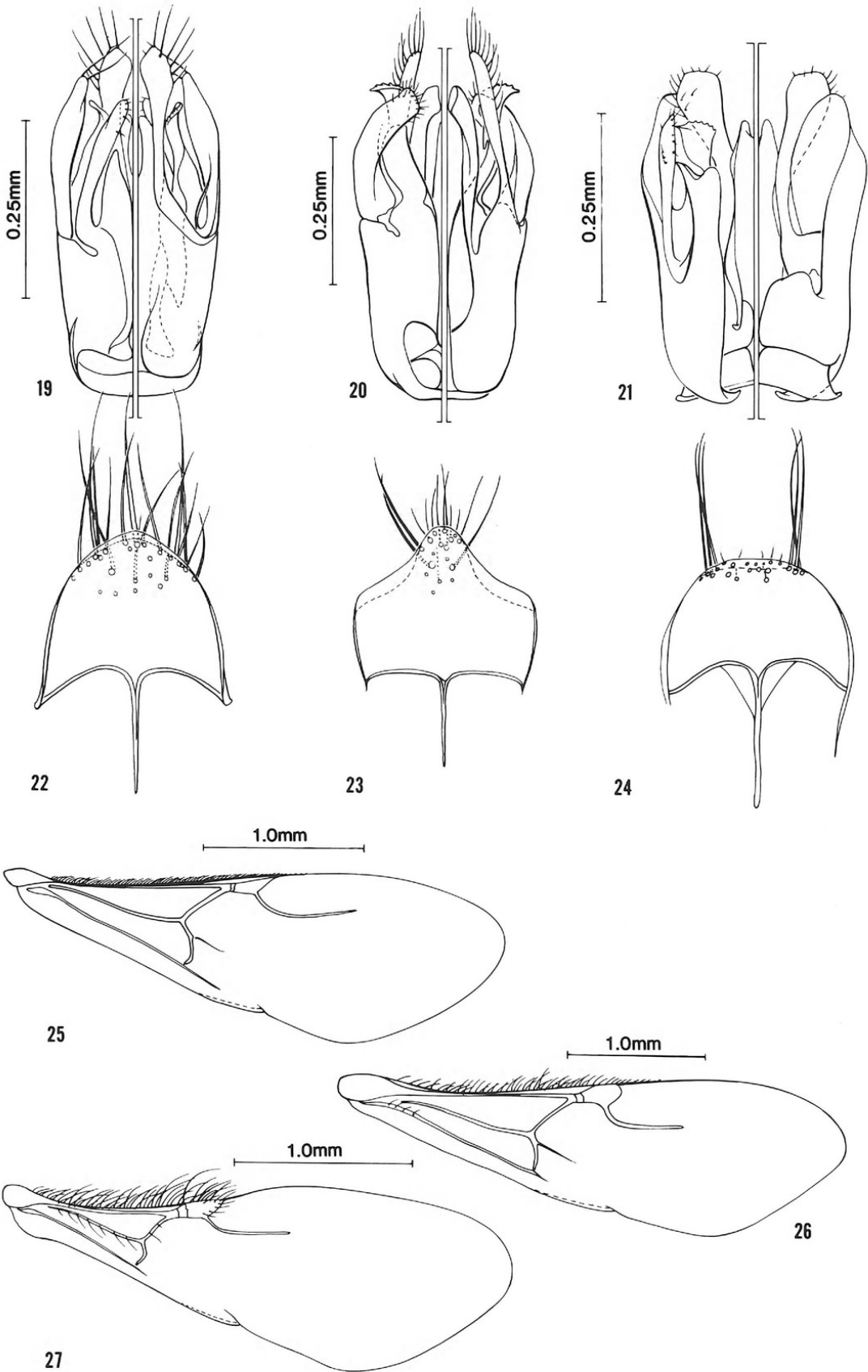
### ACKNOWLEDGMENTS

I am pleased to dedicate this paper to E. Gorton Linsley, an occasional wayfarer in entomological areas other than biosystematics of bees and long-horned beetles. Gort is a dedicated naturalist, always interested in elucidating the complex, sometimes arcane relationships between his solitary bees and their nest associates. His detailed pioneer work with J. W. MacSwain (1957) on the interactions of *Stylops pacifica* Bohart with its ground-nesting host bee *Andrena complexa* Viereck afforded valuable insights a few years later in my observations on the trap-nested solitary eumenid, *Euodynerus foraminatus apopkensis* (Robertson), and its stylopoid parasite, *Pseudoxenos hookeri* (Pierce).

I am grateful to P. B. Karunaratne, T. Wijesinhe and L. Jayawickrama, technicians with the Smithsonian's Ceylon Insect Project, for their assistance in the field and for the host records they obtained.

I thank T. J. Spilman and J. R. Dogger, Systematic Entomology Laboratory, U. S. Department of Agriculture, for identifying the tenebrionid larvae. M. C. Day,





Figures 19–27. *Trachepyrus* species. 19–21. Male genitalia, ventral at left, dorsal at right: 19, *haemorrhoidalis* Kieffer; 20, *indicus* (Muesebeck); 21, *spinosipes* Kieffer. 22–24. Male subgenital plate, ventral: 22, *haemorrhoidalis*; 23, *indicus*; 24, *spinosipes*. 25–27. Female right forewing: 25, *haemorrhoidalis*; 26, *indicus*; 27, *spinosipes*.

British Museum (Natural History), and C. O'Toole, Oxford University, furnished helpful information on the types of *haemorrhoidalis* and *serricollis* respectively. I am indebted to my friend and mentor for many years, Carl F. W. Muesebeck, for his thorough review of the manuscript.

The line drawings are by George L. Venable, Department of Entomology, Smithsonian Institution (SI). Beth Norden (SI) made the painstaking preparations of specimens for the scanning electron microscope and assisted in the photography; Susan G. Braden (SI) made the micrographs.

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