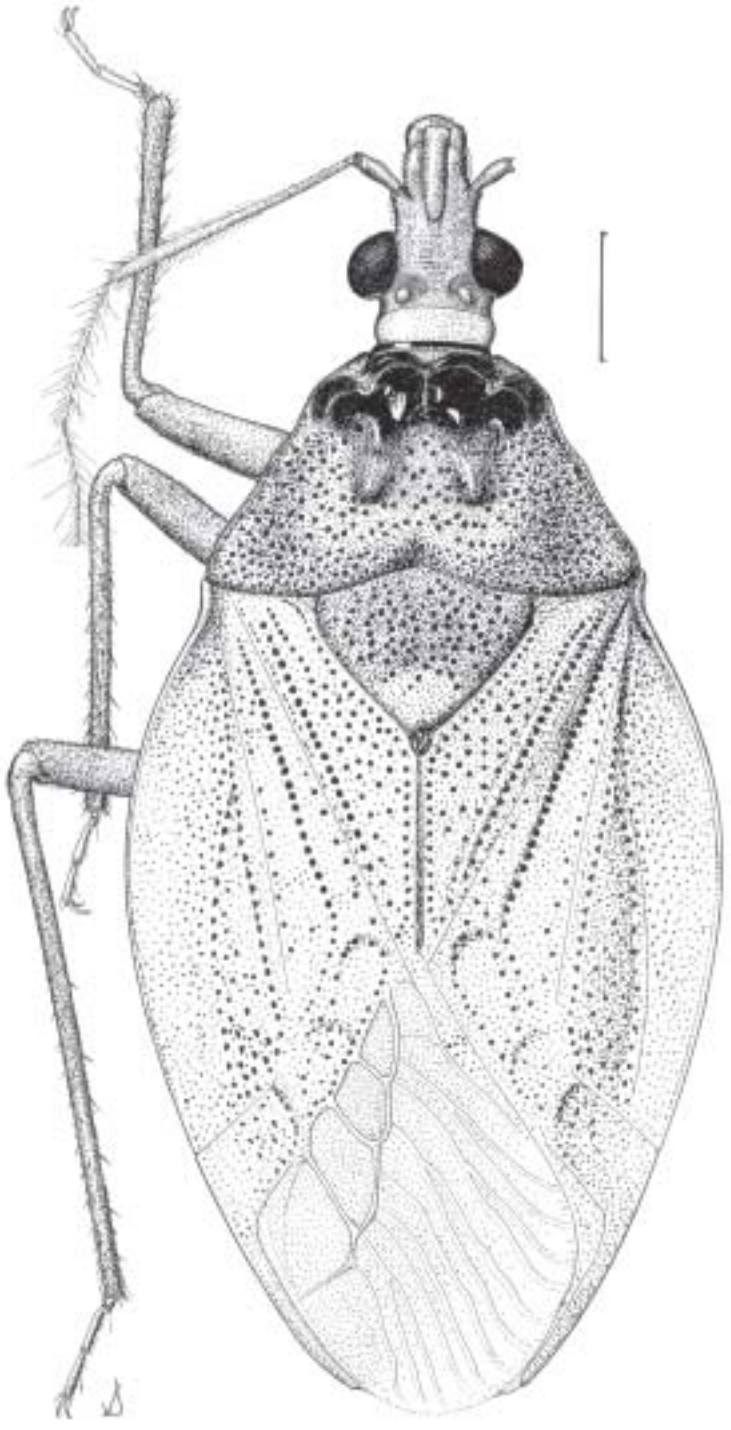

Costomedes gressitti gen. nov. & spec. nov., female paratype from Waris, New Guinea.
Bar represents 1 mm.

A taxonomic revision of the family Velocipedidae Bergroth, 1891 (Insecta: Heteroptera)

P.H. van Doesburg

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Key words: Insecta; Heteroptera; Velocipedidae; Oriental; Papuan; new genus; new species and subspecies; *Costomedes* gen. nov.; *Scotomedes* Stål; *Bloeteomedes* van Doesburg; distribution; keys.
The Indo-Papuan family Velocipedidae Bergroth, 1891 (Heteroptera) is revised; a new genus, 19 new species and four new subspecies are described. *Costomedes* gen. nov. (type species: *C. gressitti* spec. nov.) comprises 11 new species: *C. cheesmanae* from New Guinea, *C. fakfakensis* from New Guinea, *C. gazelle* from New Britain and Bismarck Archipelago, *C. gressitti* from New Guinea, *C. heissi* from Ceram, *C. hirsutus* from New Guinea, *C. karimui* from New Guinea (including one new subspecies: *C. karimui eliptamin* from New Guinea), *C. morobensis* from New Guinea, *C. sedlaceki* from New Guinea, *C. solomonensis* from the Solomon Islands and *C. toxopeusi* from New Guinea. The following eight new species are described in the genus *Scotomedes* Stål, 1873: *S. distanti* from Myanmar, *S. gedehensis* from Java, *S. lemoulti* from Vietnam, *S. maai* from South China (Fukien (Fujian)), *S. polis* from Philippines (Luzon), *S. rudolfi* from West Malaysia, *S. sumatrensis* from Indonesia (Sumatra), *S. thai* from Thailand and India (Sikkim). In addition three new subspecies are described: *S. alienus sikkimensis* from India (Sikkim), *S. ater confrater* from East Malaysia (Sabah, Borneo), and *S. priscus jacobsoni* from Indonesia (Sumatra). Lectotypes are designated for *Godefridus alienus* Distant, 1904, and for *Velocipeda prisca* Bergroth 1891, to promote stability of nomenclature. The type specimens of *Velocipeda minor* Breddin, 1903 and *Velocipeda biguttulata* Reuter, 1908 could not be located.

Contents

Introduction

The history of this family group begins rather late, undoubtedly because of the relative rarity of these insects. It was only in 1873 that Stål described the first representative, *Scotomedes ater*, a new species in a new genus (fig. 1), based on a female specimen from Sumatra in the collection of the Nationaal Natuurhistorisch Museum,

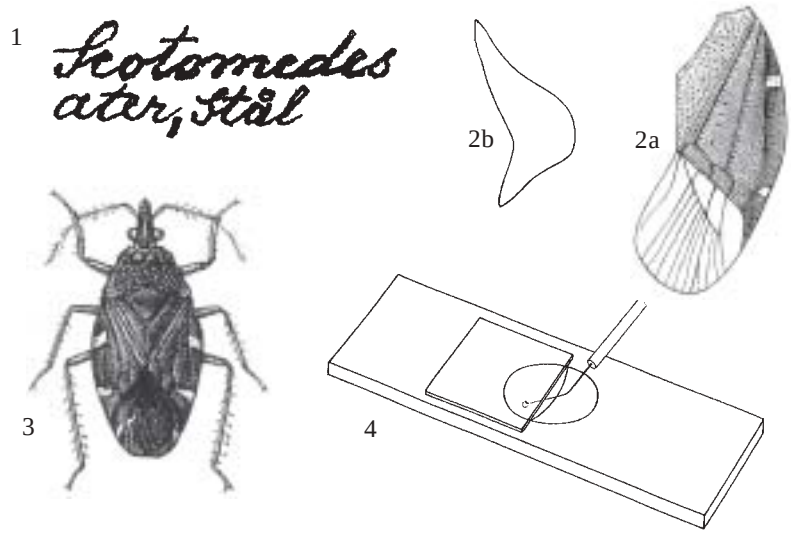


Fig. 1, *Scotomedes ater* Stål, 1891, enlarged facsimile of Stål's determination label (5 × 14 mm). Figs 2a, 2b, *Scotomedes priscus* (Bergroth, 1891). 2a, right fore wing; 2b, dorsal aspect of left paramere in situ (cf. fig. 117, p. 52). Fig. 3, *Scotomedes alienus* (Distant, 1904) habitus after Distant. Enlarged facsimiles of original figures: 2a-2b, from Bergroth, 1891; 3 from Distant, 1904. Fig. 4, a microcuvette to study and draw small objects through the compound microscope.

Leiden. He placed this genus at the end of the subfamily Coriscina (Nabinae) of the family Nabidae.

The next species known to science was *Velocipeda prisca*, described from Java by Bergroth in 1891. He figured the fore wing (fig. 2A) and the hook of a paramere (fig. 2B) naming it the *hamus copulatorius*. Apparently he overlooked Stål's paper and placed his species in the new subfamily Velocipedinae of the family Saldidae. As a result, in the catalogue of Lethierry & Severin (1896) the two genera were placed respectively in the Nabidae on p. 112 (*Scotomedes*) and in the Saldidae on p. 225 (*Velocipeda*). Twelve years later Breddin (1903: 248) added a third species, *Velocipeda minor* to his subfamily "*Velocipedini*". Furthermore, Distant (1904: 329) described and depicted a new bug from Burma as *Godefridus alienus* (fig. 3), and placed it in the Apiomerinae of the Reduviidae, overlooking earlier descriptions of related species, but placed it in *Velocipeda* in 1910. Reuter (1905) synonymized *Godefriedus* Distant, 1904 with *Velocipeda* Bergroth, 1891

Kirkaldy (1906: 149), in his "List of the genera of the pagiopodous Hemiptera-Heteroptera, ...", designated *Velocipeda prisca* Bergroth, 1891, as the type species of *Velocipeda* Bergroth, 1891, and placed the genus in the subfamily Velocipedinae of the family Acanthiidae Leach, 1815 (= Saldidae Amyot & Serville, 1843). Reuter (1908a: 91) described a fifth species: *Velocipeda biguttulata*, a female from eastern Sumatra. He assumed (1908b: 88, 1910: 58) that the families Nabidae and Velocipedidae are related and could have had the same origin, in view of the obvious resemblances in the female genitalia and the venation of the membrane. But he persisted in placing the

family in the Acanthiiformes (1910: 64). It is noteworthy in this context, that already in 1870 Schiødte stated (p. 233): "...the tube of the rostrum is in reality four-jointed in all Rhynchota; when they are sometimes said to have a rostrum of a less number of joints, this really only means that the basal joints are small, partly hidden by the projecting parts of the forehead and not counted".

But still Stål's *Scotomedes* had not yet associated with Bergroth's *Velocipeda*. This situation lasted till Blöte (1945: 323) studied the type specimen of Stål's *Scotomedes ater* and found that Reuter's *Velocipeda biguttulata* (cited by Blöte as *Velocipeda biguttula*) is a junior synonym of it. He argued in this well-documented article that *Scotomedes* is indeed related to the Nabidae, where Stål had placed it, and proposed to place the genus in a separate (new) subfamily Scotomedinae of the Nabidae. Cobben (1968, 1978), in his two monumental papers on 'Evolutionary trends in Heteroptera' emphasized the close relationship of the Velocipedidae with the Nabidae on account of the structures of their eggs and mouthparts.

Van Doesburg (1970: 247) maintaining the family-status Velocipedidae, described a new species after a female specimen from Borneo in a new genus as *Bloeteomedes borneensis* and later (1980a: 297) described the male of this species and a second new species in the same genus, *B. sarawakensis* also from Borneo.

Finally, Ren (2000: 289) described three new species from South China in *Scotomedes: S. doesburgi*, *S. guangxiensis* and *S. yunnanensis*.

In his monumental work on the Nabidae of the USSR, Kerzhner (1981: 82) treated *Boeteomedes* van Doesburg as a subgenus of *Scotomedes* Stål, 1873. He considered the Velocipedinae Bergroth, 1891, to be a subfamily of the Nabidae (sensu Kerzhner, 1981) and described several anatomical structures of this group. It is interesting to note that according to his opinion, the three basal membranal cells of the Velocipedinae are not homologous to similar cells in 'other' Nabidae because the veins forming the cells are alive, while those of most Nabidae are not (Kerzhner, 1981: 24). A cladistic analysis of the Cimicomorpha by Schuh & Štys (1991) shows the probability that the Velocipedidae splitted off much earlier in the history of the Hemiptera than the Nabidae. In this thorough study they even placed the family in an own superfamily: Velocipedoidea.

It is indeed beyond dispute that the Velocipedidae are in a way related to the Nabidae. But there are also great differences. For instance, Velocipedidae have a well-developed cuneus and a fully developed eighth abdominal segment (sternite) in the male. The Nabidae are predators by assault (raptorial) and the whole anterior part of the body, i.e. the mouthparts and fore and middle legs are accordingly highly differentiated while in Velocipedidae there are no traces of such adaptations. If they are predators indeed as often is assumed (discussed by Kerzhner (1981); considered by Cobben (1978), but Schuh & Štys (1991) "coded this character as unknown", they feed by sneak attack ("timid" contra "aggressive" behaviour, Cobben, 1978: 205). It is therefore more probable that the Velocipedidae did not split off from the Nabidae, but evolved from a still undifferentiated common ancestor of both families. It does not fit in the scope of this paper to discuss the phylogenetic position of the cimicomorphan families, but the author considers the Velocipedidae likely to be the sister-group of the Nabidae.

So far, ten species are described from the Oriental region (of which one is synonymized). Although rather rich material from the family is available in several

museums, especially in The Natural History Museum (London) and in the Bishop Museum (Honolulu) since 1939 and 1959, respectively, from the Papuan region no species were known before.

Material

This revision is based on a total of 429 specimens, consisting of 189 males and 240 females, received on loan from various museums (see List of depositories). Chiefly males are decisive for the fixation of the species. Especially from the western part of the distribution (the mainland of Asia and the Greater Sunda Islands), material is scanty (87 ♂♂, 76 ♀♀; except of one species with 52 ♂♂ and 43 ♀♀!). Since the biology of these insects is completely unknown, it is not possible to develop an effective mode of collecting. Most of the specimens, especially those from New Guinea, were caught in light traps and are, as a result, often covered by lepidopterous scales, while their setation is more or less wiped off. Velocipedidae are delicate creatures, which are easily damaged.

The species of the Velocipedidae are highly uniform in appearance, except for species in the genus *Bloeteomedes* which are markedly larger and a little different in appearance. The most reliable differences between the species are found in the male pygophore and parameres and in the female seventh sternite with the adjoining external genital plates. Important are also the length of the first antennal segment, the presence (or absence) and relative position of a large seta (macroseta) and relative length of the setal tuft on the apical part of the second antennal segment. The position of the antennal seta on the second antennal segment is expressed in a ratio: the distance between the seta and the base of the segment to the total length of the segment. This ratio ranges from 0.41 to 0.75. Pilosity of different body-parts and presence of yellow spots on the fore wings are also useful characters. The size is only in two cases characteristic: *Scotomedes minor* (Breddin) and *S. gedehensis* spec. nov. are markedly smaller than the other species.

The Velocipedidae are here divided into three genera: *Scotomedes, Boeteomedes* and *Costomedes*, the reasons are accounted for in the paragraph “Phylogeny”.

Methods

In order to study the male external genitalia, the abdomen is separated from the body and the pygophore and its paramere are studied first *in situ*, then after moistening the abdomen, the pygophore is disconnected and heated in KOH 10%, washed with water and transferred into glycerin 50%. The right paramere is now extracted, positioned in a slide cuvette filled with glycerin and examined through the microscope.

A slide cuvette (fig. 4) is made from a microscope cavity slide which cavity is half-way covered by a cover glass, as described by Grandjean (1949: 363, figs 3-5), but modified in such a respect, that the cover glass is sealed permanently to the flat part of the slide by aquarium silicone gel, so it cannot move during use, and the cuvette can be cleaned and used several times. The cavity is filled by means of a pipette with glycerin after which under a binocular dissection microscope, the specimen is put in and positioned with the aid of a bent micro-dissecting needle. This is made from an insect

pin size 000, or a 'Minutiennadel' or minuten pin, sealed into a handle. Then the object can be turned in a desired position and moved carefully to the narrow side part of the cavity to be fixed between the cavity bottom and the cover glass. Slides with cavities of different depths are useful to hold objects of different sizes

Finally, pygophore, paramere and sometimes also the rest of the abdomen, are stored in pure glycerin in a PVC microvial which is pinned underneath the specimen as described earlier by the present author (Doesburg, 1980b). To prevent mould, 1-2% phenoxy-aethanolum has been added to the glycerin.

Except for the fig. 140, which has been made by Mr W. Gertenaar, and the SEM photographs by Mrs I. Regtien, all other photographs and figures have been made by the author. The figures with the aid of a drawing tube on a Zeiss SR stereomicroscope and on a Wild M20 light microscope. Measurements were taken with an ocular micrometer tested for every magnification by an object micrometer (one mm in 100). Scale bars were added to the drawings by virtual projection on the drawing paper of the scale of the object micrometer, put in place of the object(-slide). For studying and drawing the hind wings, these were temporarily mounted in glycerin on a microscope slide. Illumination of the slides through a dark blue filter proved to improve greatly the visibility of the smaller veins, which often show a deficiency in contrast and colour. In describing the appendages, especially the wings, they are considered to be extended horizontally and laterally.

In the enumeration of the studied specimens, the altitudes, if given in feet, are converted into meters: 1 foot = 0.305 meter.

All measurements are given in millimetres. Used abbreviations of the measured parts, see "Abbreviations".

Maps presented in figs 225-227 are sketchy, compiled and redrawn by the author from several existing maps. The New Guinea map (fig. 227) is partly adapted from one in use at the Leiden Museum since decades and of which the origin is unknown (see Gressitt, 1982: 114, 115).

Abbreviations

In measurements: la = length of second antennal segment; lb = length of the specimen without the head, viz. between pronotal collar and tip of fore wings; lh = length of head between postocular rim and end of tylus; lp = length of pronotum measured in the median; lr = length of the third rostral segment; lt = length of hind tibia; lw = length of the fore wings; tl = total length of the specimen, from tip of labrum to end of membrane; wh = width of the head measrured over the eyes (diatone); wp = width of pronotum; ww = width of both fore wings in rest position.

Systematics
Family Velocipedidae Bergroth, 1891

Velocipedinae; Bergroth, 1891: 265; Carayon, 1970: 900 (classification; in Nabidae); Kerzhner, 1981: 9 f (in Nabidae).

Velocipedidae; Lethierry & Severin, 1896: 212 (catalogue); Velocipedidae (part) and Nabidae (part): 225; Reuter, 1910: 64, 1912: 10 f; Singh-Pruthi, 1925: 180 (male genitalia); Handlirsch, 1925: 1046; China, 1933: 189, 193 (classification); Miller, 1956: 8 (classification); 115 (description); 1971, (second

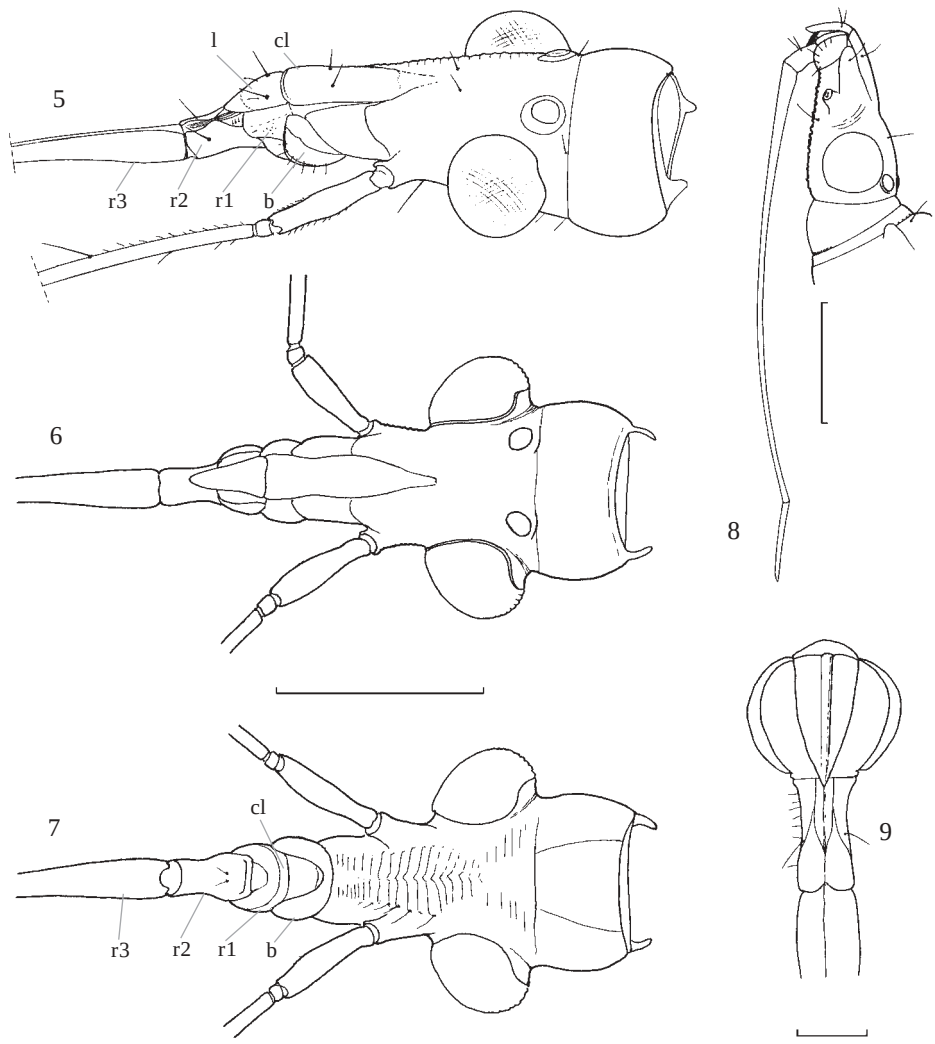
ed.): 12 (classific.), 70, 71, (egg), 139, (descr.), fig. 50; China & Miller, 1959: 12, 21; Scudder, 1959: 426 (female genitalia); Davis, 1961: 345 (wing venation); Cobben, 1969: 130 f (structure of egg); Cobben, 1978: 8, 51 f (structure of mouthparts); Schuh, 1986: 70 f (cladistics); Schuh & Štys, 1991: 302 f (in Velocipedoidea) (classification); Schuh & Slater, 1995: 161 (in Velocipedoidea); Ren, 2000.
Velocipedini; Breddin, 1903: 248.
Apiomerinae (part); Distant, 1904: 329 (in Reduviidae).
'Velocipedina'; Reuter, 1908b: 88.
Scotomedinae; Blöte, 1945: 323 (in Nabidae).
Scotomedinés; Carayon, 1950: 207 (in Nabidae).

Diagnosis.— Rather small (6-12.4 mm), somewhat flattened, oval to broadly oval, brown to blackish, mostly dull, often with a faint silvery-grey hue by a dense, almost submicroscopic sculpturing of the surface. Characteristic on pronotum, scutellum and fore wings except the membrane are numerous deep punctures usually surrounded by a blackish to blackish-brown (internal) halo; on the wings partly arranged in rows following the venation. Maximum width (over wings) at least half the length of body (including wings) without head. Head long, cone-shaped, porrect, with bulging eyes; ocelli present (not in the nymphs); antenna four-segmented, second longest with distal tuft of fine setae; rostrum very long, four segmented, but apparently three-segmented because of vestigial first segment; penultimate one longest; pronotum trapezoid, collar entire, well developed; fore wings with anterior part of exocorium expanded into broad embolium, a costal fracture separating cuneus from exocorium; membrane with four (three closed) basal cells and many longitudinal veins emanating from distal margins of cells; legs long and slender, of cursorial type, unarmed, except some small tubercles on middle femora in males of *Costomedes* gen. nov.; long and slender tibiae lacking fossulae spongiosae; tarsi three-jointed, first segment smallest, praetarsi with simple claws, parempodia (Cobben, 1968: 365) setiform. Metathorax with paired metasternal scent glands and orifices at both sides ("diastomien" type of Carayon, 1971) at the boundary between sternum and pleuron with discharge system and evaporatory area on metapleuron. Eighth abdominal segment of male well-developed, pygophore and parameres symmetrical; female external genital apparatus of laciniate type (Scudder, 1959: 426); = ovipositor-shaped type (Dupuis in Tuxen, 1970: 203)).

Head (figs 5-9).— Head long, strongly prognate, from postocular rim to apex more or less conically tapering, neck large, spherically inflated, glossy, light brown, often somewhat transparent; post-ocular region very short; eyes large, bulging, circular in lateral view; in dorsal view, width of eyes about 2/3 of interocular distance and 2/3 of anterior-posterior diameter of eyes; ocelli well-developed, situated at level of posterior margins of eyes, distance to eyes more or less diameter of ocellus; clypeus (cl) long, prominent, roundly keel-shaped, a little broadened towards apex; anteclypeus not separately visible; antenniferous tubercles well developed, situated laterally, in front of eyes, pointing somewhat downwards.

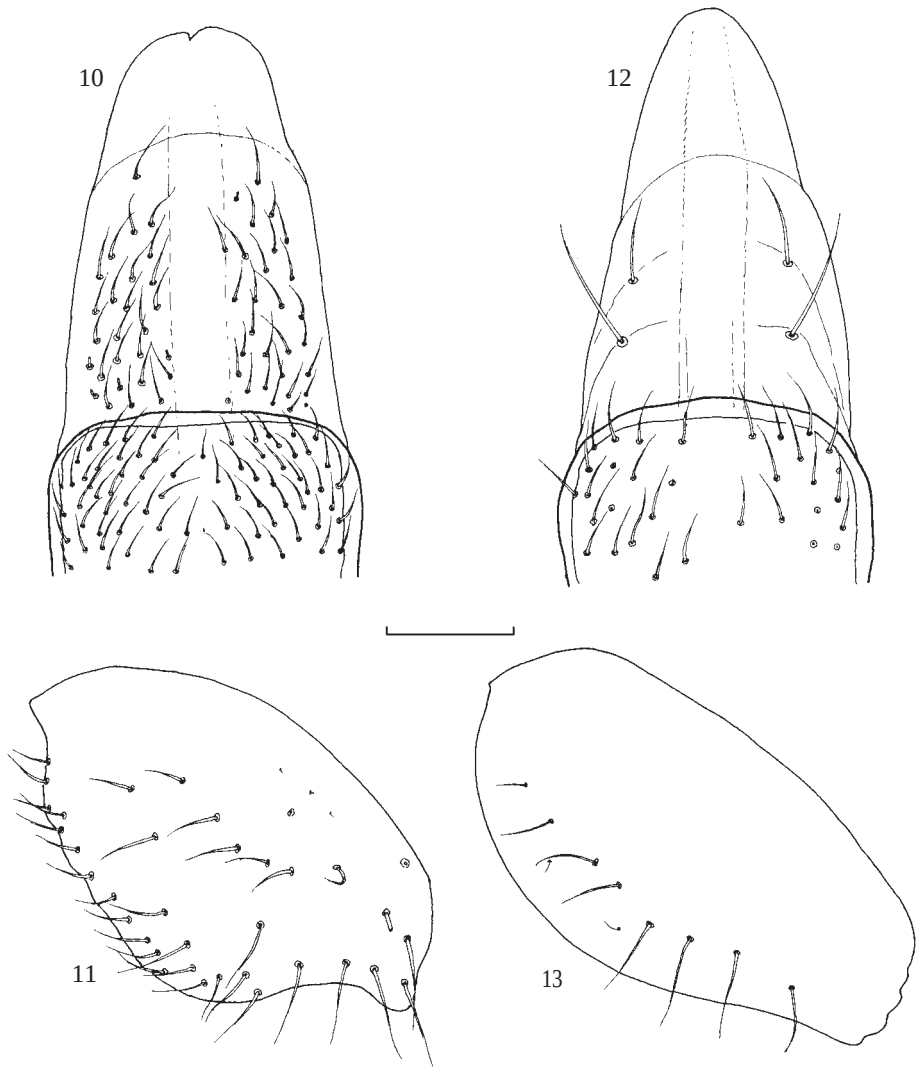
Labrum (l, figs 5, 6, 10, 12) elongate, tapering towards sharply rounded apex, surpassing first (partly hidden) rostral segment, more or less distinctly divided into posterior and anterior part, its apex sometimes a little truncate or even bifid.

Bucculae (b, figs 5, 7, 8, 11, 13) broad, oval, with small setae. Rostrum (labium) (fig. 8) long, thin, four-segmented (r1-r4), capable of pointing almost straight ahead. First segment (r1) very short, vestigial, broad, inflated, partly membraneous, dorsal part



Figs 5-9, head of Velocipedidae. 5, *Scotomedes alienus* (Distant, 1904), latero-dorsal aspect showing morphology and characteristic macrosetation; 6, 7, 9, *Costomedes gressitti* gen. nov. & spec. nov.; 6, 7, dorsal and ventral aspect respectively; 9, anterior aspect of head; 8, *Scotomedes ater* Stål, 1873, lateral aspect of head (left antenna omitted), to show shape of the rostrum; Bar of figs 5-8 represents 1 mm, that of fig. 9, 0.2 mm. Abbreviations: b, buccula; cl, clypeus; l, labrum; r1-r4, rostral segments 1-4; tr, sclerotized transverse ventral band of first rostral segment.

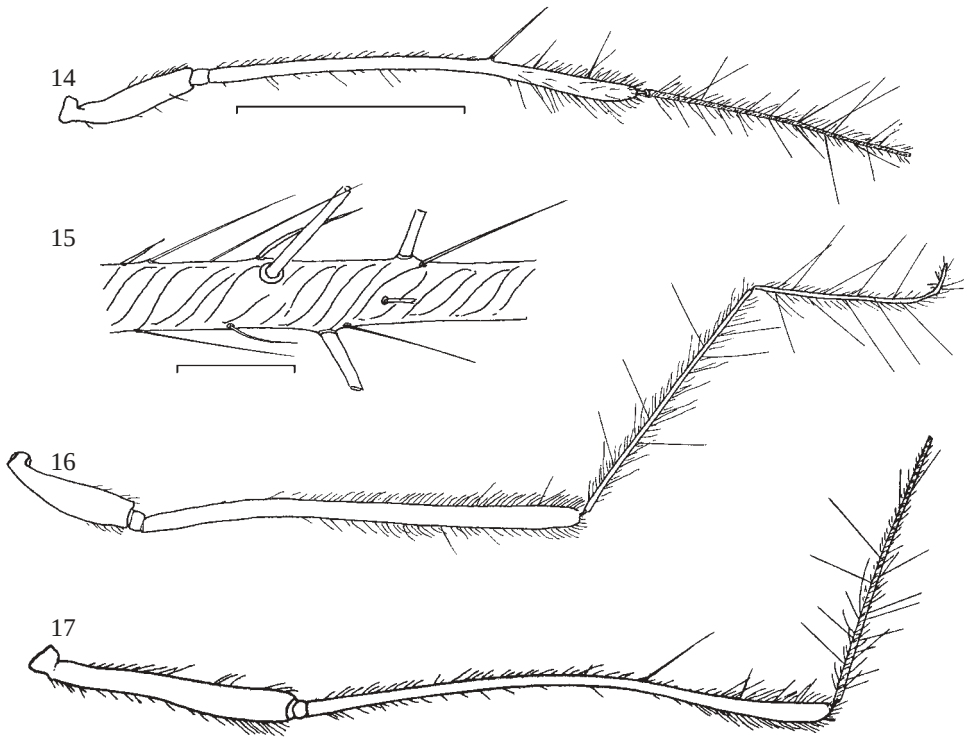
including stylets, covered by labrum, lateral parts proximally covered by the bucculae, leaving at each side a sclerotized latero-dorsal part exposed between antero-dorsal margin of bucculae and labrum; ventral part proximally with a narrow, somewhat sclerotized transverse band (tr, fig. 7), visible if the rostrum is pointed ahead, stretching the ventral membranous parts of the first and second rostral segments connecting



Figs 10-13, end of tylus and labrum, dorsal aspect and left buccula, lateral aspect. 10, 11, *Costomedes gressitti* gen. nov. & spec. nov.; 12, 13, *Scotomedes alienus* (Distant, 1904). Bar represents 0.1 mm.

bucculae with second rostral segment. With rostrum in rest position, labrum, sclerotized part of first rostral segment and bucculae form together one united front (fig. 9).

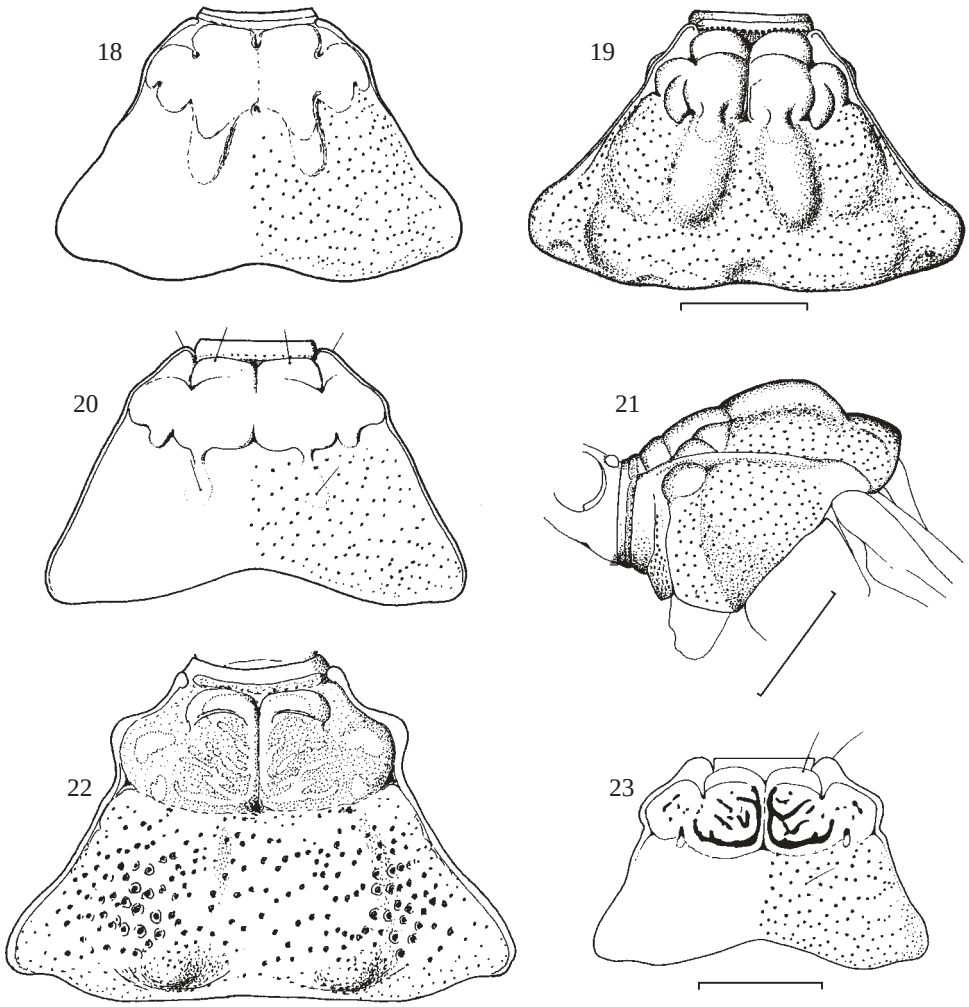
Second rostral segment (r2) short, a little narrowed in the middle part, width 2/3 of width of first, lateral margins from base towards end of segment gradually approaching each other dorsally and just before end closing the canal through which the stylets are running down and disappear from sight; near the base dorsally at both sides with a row of three very small, short setae. Third segment extremely long, weakly curved, basal



Figs 14-17, Antennae of Velocipedidae. 14, *Scotomedes lemoulti* spec. nov. (last segment missing); 15, idem, part of third segment enlarged showing "velocipediform structure" of Zrzavý (1990), bar represents 0.05 mm; 16, *Costomedes gressitti* gen. nov. & spec. nov.; 17, *Bloeteomedes sarawakensis* van Doesburg, 1980, last segment missing; Except for fig. 15, all figures are presented in the same scale. Bar represents 1 mm.

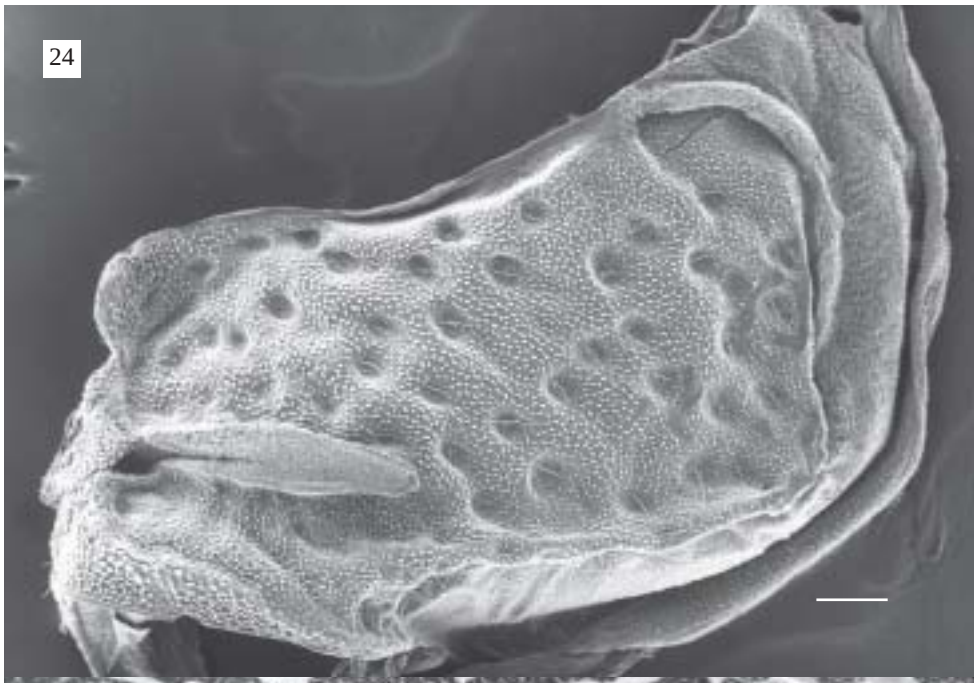
part as wide as second segment, remainder very slender, 1/3 of width of its base, fourth segment short, as wide as end of third, in rest position at least reaching mesothoracic coxae.

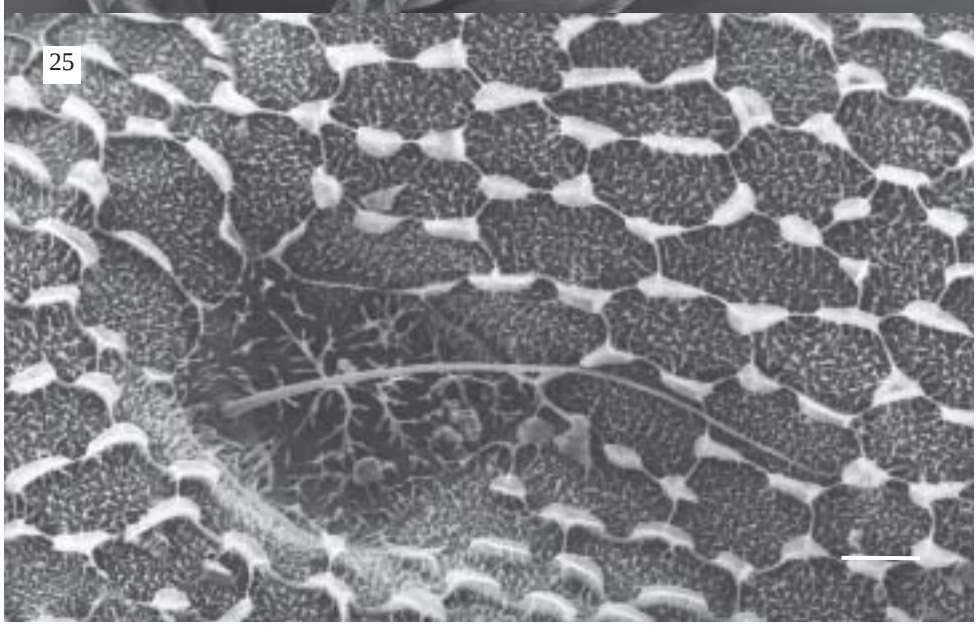
Antenna (figs 14-17) four-segmented, first segment short; between first and second segment one finds a small ring, named prepedicellite (Zrzavý, 1990: 196, figs 4c, 11); second segment longest, third shorter than second, fourth shorter than third; second segment: dorsal side of proximal part with short decumbent setae, ventrally remotely set with somewhat longer, erect setae, distal part (1/4-3/5) covered with a loose tuft of longer, fine setae, usually intermingled with a few longer erect fine setae; proximally of the tuft, a conspicuous dorsal erect seta in *Scotomedes* Stål, 1873 (fig. 14), and *Bloeteomedes* van Doesburg, 1970 (fig. 17), not in (adult) specimens of *Costomedes* gen. nov. (fig. 16); last two segments very thin and flexible by a spiral-like structure of the wall (fig. 15), "Velocipediform structure" of Zrzavý, 1990: 201) and set with silky pile, remotely intermingled with very long fine, erect white setae. Upper side of head finely setose, underside more or less strongly transversely wrinkled and longitudinally keeled; two macrosetae (gular setae) always present.



Figs 18-23, Pronotum. 18, *Costomedes gressitti*, gen. nov. & spec. nov.; 19, 21, *Costomedes hirsutus* gen. nov. & spec. nov., dorsal and lateral aspect; 20, *Scotomedes ater* Stål; 22, *Bloeteomedes borneensis* van Doesburg, 1970, holotype; 23, *Scotomedes minor* (Breddin, 1903). All figures are presented in the same scale. Bar represents 1.0 mm.

Thorax.— Pronotum (figs 18-23) trapezoid, dorsally convex, divided into two parts (lobes) by a weakly developed transverse furrow connecting a row of five deep pits; lateral margins ridged and anteriorly more or less bisinuately broadened, forming small, rounded anterior corners; collar short but well developed, entire, dorso-lateral at both side near anterior corners, with a small protuberance (blunt tooth), between these, dorsally along basal margin with a regular row of about 12 very small shiny granules, each with a fine seta on top. Anterior part of pronotum with two crescent-





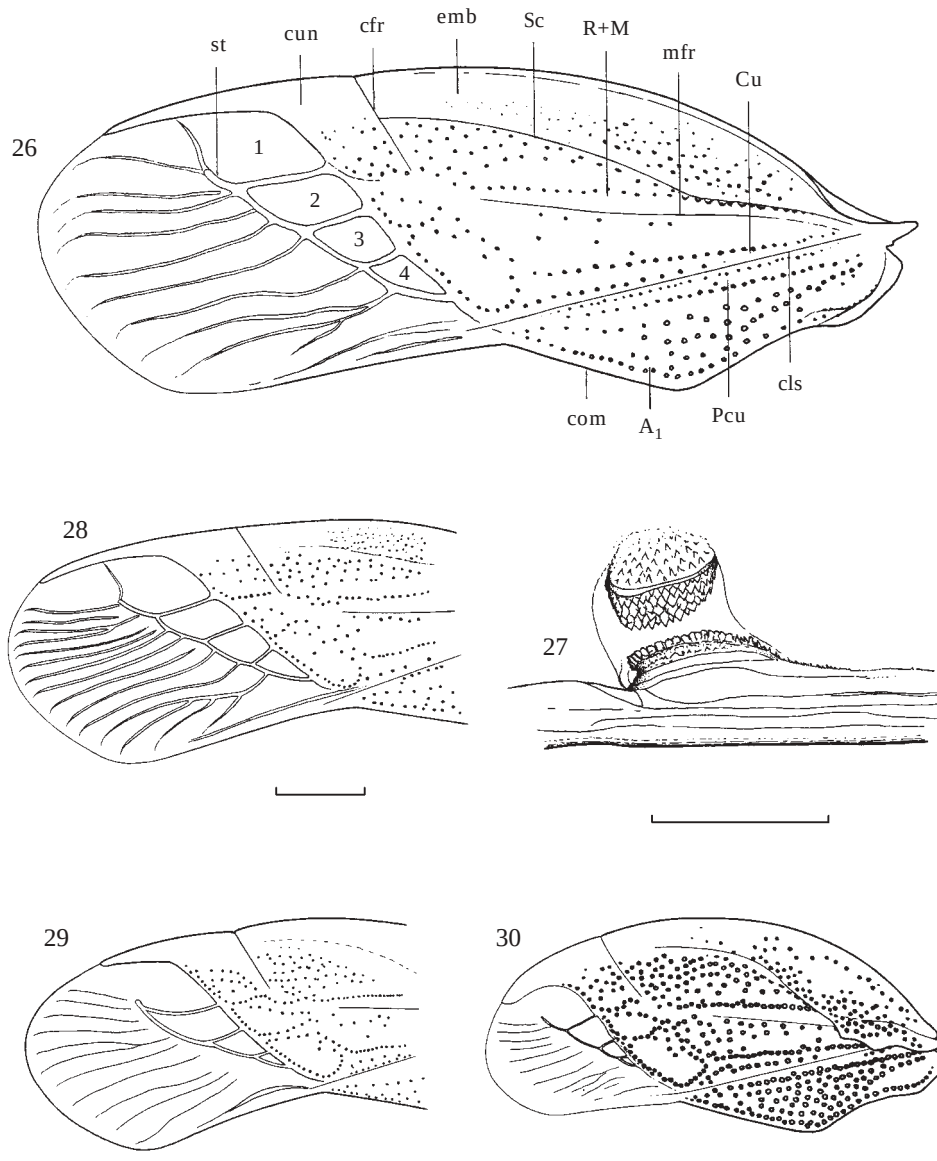
Figs 24-25, *Costomedes gressitti* gen. nov. & spec. nov. 24, left metapleura showing the scent gland orifice, outflow "dispenser", the numerous pits, and the evaporative area, covering almost the entire surface of the metapleura. Bar represents 0.1 mm; 25, detail from the same metapleura showing one of the pits holding a seta and surrounded by the evaporative composite texture: a dense microscopic basal setation (microtrichia) superimposed by a coarser reticulation. Bar represents 0.01 mm. (SEM photographs).

shaped frontal calli, two large submesial central calli and two smaller lateral calli; between frontal and lateral calli a deep pit; lateral calli protrude ventrally of lateral ridge at pleural sides of prothorax (pleural calli); between central and lateral calli a small callosal posterior continuation onto posterior part of pronotum, the sub-lateral calli; pronotal calli not sharply separated from each other; central calli form more or less continuations caudad (carinae) into two submedial lobal calli on posterior part of pronotum, in *Costomedes* gen. nov. distinctly enlarged (figs 18, 19, 21), in *Bloeteomedes* not developed (fig. 22), in *Scotomedes* often hardly visible (figs 20, 23); besides, in *Bloeteomedes* two other low calli are present near posterior border; pronotal calli often shining black, central calli in several species provided with a dull coating, sometimes leaving exposed a more or less specific shining black irregular pattern (figs 22, 23) or provided with an irregular dull pattern following the shallow oblique grooves in the surface of the calli; posterior part of pronotum trapezoid, punctate, posterior margin mesially more or less deeply emarginate.

Prosternum and thoracic pleurae usually dull black; posterior margin of prosternum in central part anteriorly recurved, posteriorly prolonged as a short mesial keel between the contiguous procoxae; procoxal cavities posteriorly widely open, mesially united, laterally giving ample access to the space underneath the posterior lobe of the pronotum which roofs like a carapace over the mesonotum; mesosternum smooth, metasternum less sclerotized, yellowish brown, posteriorly truncately lobed between coxae, mesially with a fine keel; pro- and mesopleurae rather coarsely punctate, each puncture with an overhanging seta anteriorly on the rim. Surface of metapleura (figs 24, 25) uneven by some grooves and large pits, out of each a very fine long seta (trichobothrium) arises. Unlike the pro- and mesopleurae, entire metapleura is densely covered by microscopic prominent sculpturing superimposed by a network of mushroom like protuberances or “Pilzchen” (Remold, 1962: 673) “flakes” (Johansson & Bråten, 1970: 259), “processus mycoïdes” (Carayon, 1971: 760) (diameter ca 0.01 mm, but in *Bloeteomedes* ca 0.02 mm). The direct function of the composite microsculpture (fig. 25) is usually considered to promote the spreading and evaporation of the scent fluid, produced by the metathoracic scent glands, but other functions are suggested (Remold, ibid. and later authors). The whole area is called evaporatorium (Froeschner, 1960) or evaporatory area.

The scent fluid is ejected through a small external opening, the orifice, near the ventral border of each metapleuron, and is distributed over the evaporatorium through a canal and an outlet system called the ostiolar peritreme (fig. 24). The orifice is more or less covered by a lobiform caudad projection (operculum) of the anterior border of the canal base. From the orifice the canal runs laterad as a fine groove onto a digitate or feebly fusiform or clavate postero-laterally directed rod like structure, a derivation of the ostiolar peritreme, on which the groove continues on the “upper” surface almost to the end (*Scotomedes*), or is only short and deviates somewhat posteriorly (*Costomedes*). The said rod like structure is proximally partially merged in the surface of the metapleuron, leaving its apex more or less free; obviously, this structure is not a “spout”, as no opening can be seen at the apex. The function of the rod like structure can best be characterized as a conductor and “dispenser” of the scent fluid to be dispersed over the evaporatorium, or perhaps to be squirted abroad.

Wings.— Fore wing (figs 2a, 26-30), first described and figured by Bergroth (1891:



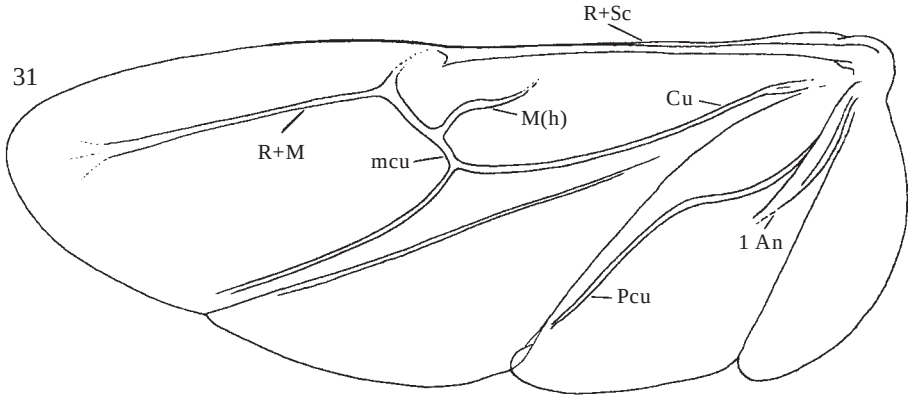
Figs 26-30, fore wings. 26, 27, *Costomedes gressitti* gen. nov. & spec. nov. 26, left fore wing, dorsal aspect; 27, holding structure of right wing-to-wing coupling device; 28, 29, distal parts of left fore wings of *Costomedes solomonensis* gen. nov. & spec. nov. and *Scotomedes polis* spec. nov. respectively, to show differences in lengths of cuneus and "stub"; 30, *Scotomedes minor* (Breddin) underside of right fore wing showing hypocostal area and reduction of the membrane, drawn from a wing mounted and cleared in glycerin showing the internal structure of the punctures. Bar represents 1 mm, except that of fig. 27, 0.1 mm. Abbreviations: A1: first anal vein; cfr: cuneal fracture; cls: claval suture; com: claval commissural edge; Cu: cubitus; cun: cuneus; emb: embolium; mfr: medial fracture; R+M: radius + media; Pcu: postcubitus; Sc: subcosta; st: stub; 1-4: first to fourth membranal cells.

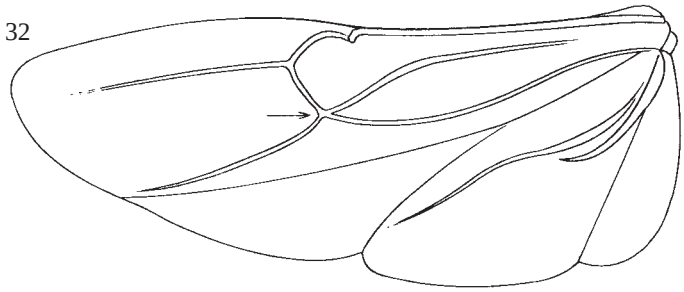
264, fig. 1), discussed by Kerzhner (1981: 21-23, figs 24, 28). Description (fig. 26): exocorium with embolium (emb) considerably enlarged anteriorly, in rest position giving the habitus of the specimen its oval appearance; hypocostal lamina broad, connecting exactly the lateral margins of the mesothorax, metathorax and abdominal segments 2-6, closing laterally the thoracic and abdominal tergal space; well visible are the claval suture (cls), the medial fracture or corial cleft (mfr) and the costal or cuneal fracture (cfr), the latter separating a large cuneus (cun) from the exocorium. Schuh & Štys (1991: 302, fig. 6D) mentioned for the Velocipedidae "a very long costal fracture", and wrongly depicted in their figure 6D the costal fracture being continuous with the medial fracture, also reproduced in fig. 49-1D by Schuh & Slater, 1996: 162). In fact, in dried (brittle!) specimens the medial and the costal fractures are sometimes united by a secondary crack between them. The cuneus is distally prolonged along the costal margin and the length of this prolongation is of taxonomical interest. In *Costomedes* gen. nov. (fig. 28) this length is more than twice the length of the corial fracture and is markedly longer than in *Scotomedes* (fig. 29), in which it is less than twice this length. Another criterion to distinguish between *Scotomedes* and *Costomedes* is formed by the ratio between the length of the cuneus against the width of the wing which is roughly 0.8, respectively 1.0.

Venation of fore wing (fig. 26), although for a great deal obscure, is characteristic for the family especially those of the membrane (see also Kerzhner, 1981: 21f, fig. 24); on the corium only the course of subcosta (Sc), R+M, cubitus (Cu) and postcubitus (Pcu) slightly visible, as well as two anal and two discal cells. Also characteristic for the family is the pattern of black dots, actually blackish rimmed punctures, on posterior part of pronotum, scutellum, corium and hypocostal area of fore wings; on corium mostly arranged in rows, apparently following the course of the veins; each vein anteriorly closely accompanied by a dens row of blackish-rimmed small pits (punctures); a row along anterior side of claval commissure (com) may indicate the course of anal vein (A1); rows respectively posterior and anterior of claval suture follow the postcubitus (Pcu) and cubitus (Cu); the row anterior of the medial fracture indicates the R+M; a row also along distal margin of corium. Each pit (fig. 25a) is accompanied by a more or less overhanging seta situated on frontal rim of the pit; these setae are further quoted as the general setation of the posterior part of the pronotum, scutellum and fore wings; it seems that an extremely fine seta is born from the inside of each puncture. The surface of the corium is mat due to a dense surface sculpturing of very short microtrichia, longer around anterior rim of the pits

Membrane along its proximal border with four short basal cells (1-4) formed by living veins, from which the most distal one ends blind, forming a "stub" (st) (Kerzhner, 1981: 22, fig. 28), leaving the first (anterior-most) cell (1) open. In van Doesburg (1970: 249 fig. 1; *Bloeteomedes borneensis*) this cell is wrongly presented as more or less closed, but see corrected fig. 140A in this paper. In *Costomedes* gen. nov. ("*S. ater*"; Kerzhner, 1981: 23), the first cell often seems to be more or less closed by a faint vein, which, however, is only a superficial fold of the integument. From distal borders of these four cells, 10 to 12 longitudinal "dead" veins are fanning out over surface of membrane. A tendency to brachyptery, affecting mainly the membrane, is found in *Scotomedes minor* (Breddin, 1903) (fig. 30) and also in *Costomedes morobensis* gen. nov. & spec. nov.

A wing-to-wing coupling mechanism is well developed and present by a small


31
R+Sc
Cu
M(h)
R+M
mcu
1 An
Pcu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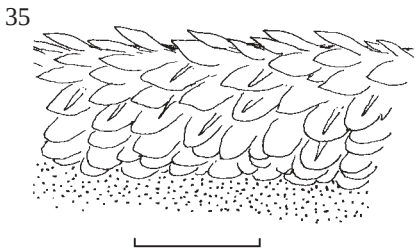
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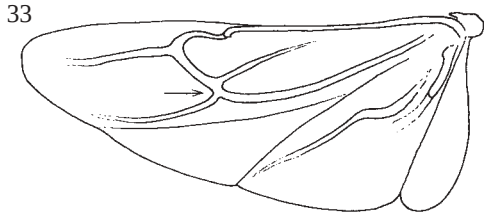
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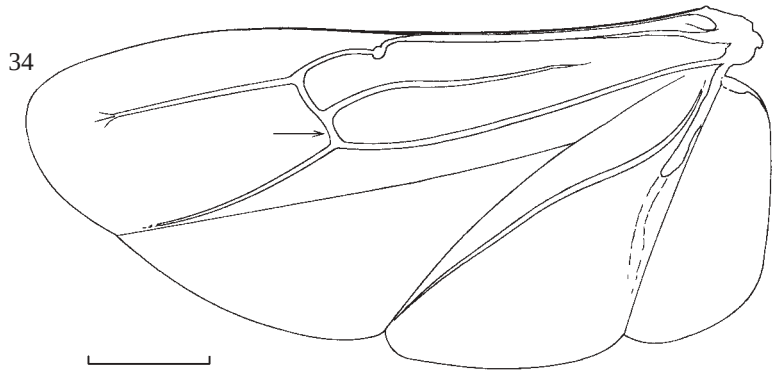
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claw-like structure (fig. 27) underneath the claval tip of fore wing, and the dorsally thickened and recurved costal margin of hind wing (fig. 35). cf. Teodoro (1922) and Ségui (1959: 152, fig. 67). In spreading the wings horizontally, the claw of the fore wing catches the costal rim of the hind wing and while the fore wing turns to its lateral-most position, it pulls the hind wing with them (demonstrated *in vitro*). During this movement, the hook is sliding for some distance along the rim of the hind wing towards a more distal position. So the coupling with the hind wing is not restricted to a distinct spot on the costal margin of the hind wing (Kerzhner, 1981: 22, fig. 27; 25).

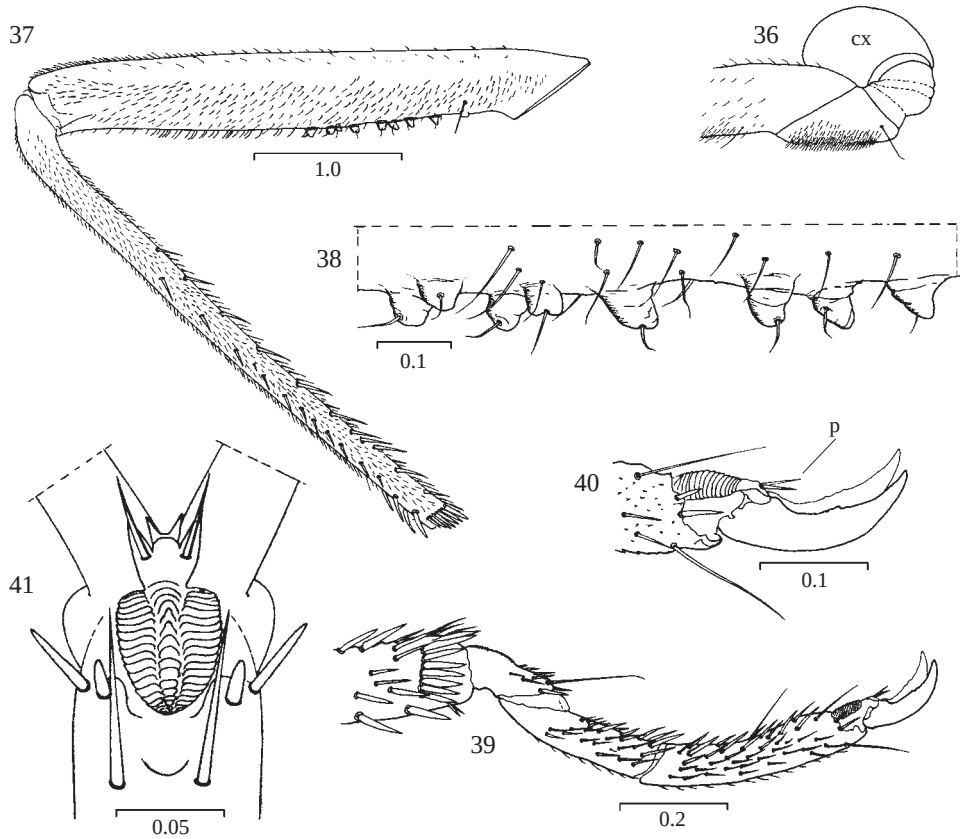
Hind wing (figs 31-35) first described by Bergroth (1891: 264) and reviewed by Davis (1961: 345, *Scotomedes alienus* (Distant), fig. 29, wrongly attributed to *Scotomedes ater* Stål in the caption), by Kerzhner (1981: 25), and by Schuh & Štys (1991: 339). The length of cross vein m-cu, although somewhat variable, is reasonably characteristic at generic level: *Bloeteomedes* and *Costomedes* have a well developed cross vein m-cu (see figs 31 and 34, respectively), as in Prostemmatinae and Nabinae, described and figured by Davis (1961: 348, figs 32 and 33, respectively), while in *Scotomedes* (figs 32, 33 and Davis' fig. 29) this vein is usually absent or rudimental. M has largely lost connection with the wing base and its course as a 'hamus' in the basal cell is somewhat different in *Scotomedes* from that of *Costomedes*. In *Scotomedes* it is usually shorter and its course is first narrowly along R+Sc and turns off halfway to the connection with Cu or rudiment of cross vein (figs 32, 33 and Davis' fig. 29), while in *Costomedes* gen. nov. (fig. 34) as well as in *Bloeteomedes* (fig. 31), M runs almost midways through the cell and ends into the middle of the cross vein R-Cu. The section of the costal margin with which the wing-to-wing coupling is achieved is found distally from the turn-off point of the radius and is somewhat dorsally thickened, recurved and densely covered with flat scales (fig. 35).

Legs (figs 36-41).— long and slender, all of same appearance and apart from the normal setation, unarmed, except the middle femora of males of *Costomedes* which ventrally are armed with a row of small pustules (figs 37, 38).

Coxae, trochanters and femora fairly shining; trochanters of hind leg more or less setose posteriorly, in the males of *Scotomedes* arranged into a longitudinal tuft (fig. 36). Fore femur slightly thicker with dullish streak on anterior side, bases of the small setae arranged in a longitudinal row dorsally on the femur often forming 5-6 very small, more or less distinct protuberances. Fore tibia slightly enlarged towards the end, bearing a small tibial comb; tibiae on upper side dull. Tarsi (fig. 39) very slender, all 3-jointed, first segment short, apical one longest; fore tarsus as long as hind tarsus or a slightly longer, middle tarsus distinctly shorter than hind tarsus. Praetarsi (fig. 40) simple, without aroliae or pulvilli, top of unguitractor plate (fig. 41) with two setiform parempodia; claws (ungues) simple.

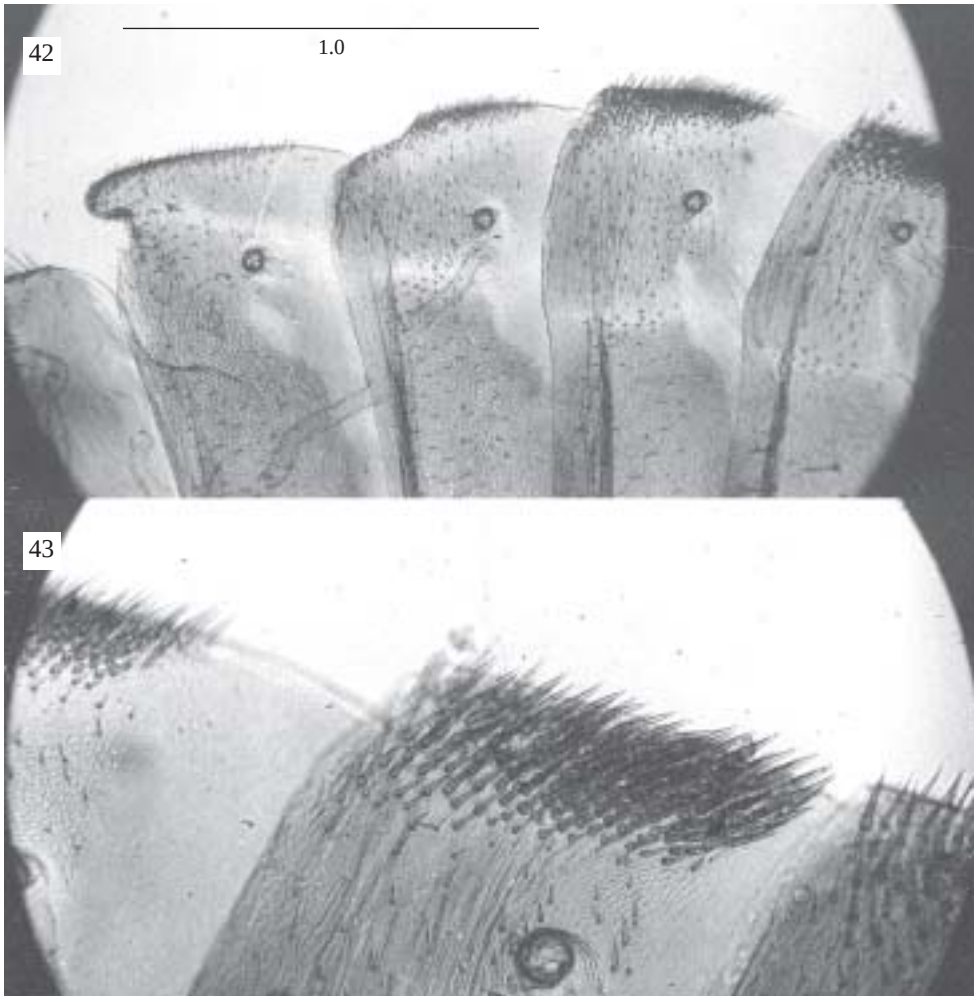
Abdomen.— Shape of abdomen (fig. 53) more or less broadly oval; pregenital part

◀ Figs 31-35, hind wings. 31, *Bloeteomedes borneensis* van Doesburg, 1970, holotype; 32, *Scotomedes alienus* (Distant, 1904); 33, *Scotomedes minor* (Breddin, 1903); 34, 35, *Costomedes gressitti* gen. nov. & spec. nov.; 34, left hind wing; 35, detail of recurved anterior margin of 34, serving as the male part of the wing-to-wing coupling device. Wings are presented at the same scale: bar represents 1 mm, except bar of fig. 29 which gives 0.01 mm. Abbreviations: 1An: first anal vein; Cu: cubitus; h: hamus (medius); m-cu: medius-cubital crossvein; M: medius; Pcu: postcubitus; R: radius; Sc: subcosta.



Figs 36-41, legs. 36, *Scotomedes alienus sikkimensis* subspec. nov., male, base of right hind leg showing setation of trochanter; 37-40, *Costomedes gressitti* gen. nov. & spec. nov., male, right middle leg; 37, femur and tibia, anterior aspect; 38, row of pustules on femur, anterior aspect; 39, tarsus; 40, pretarsus and ungues; 41, end of pretarsus showing the unguitractor plate bearing the two setiform parempodia. Bar of figs 36 and 37 represents 1 mm; of figs 38 and 40, 0.1 mm; of fig. 39, 0.2 mm and of fig. 41, 0.05 mm. Abbreviations: cx: coxa; p: parempodia.

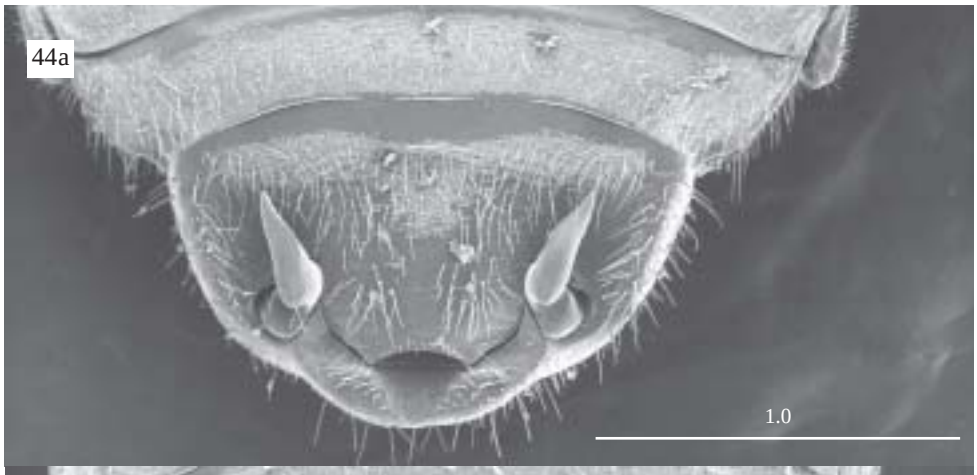
with free segments and lateral connexiva (Torre-Bueno, 1989: 165); tergites without well-separated dorsal laterotergites, both sides usually curved-up. Medial sutures of ventral laterotergites in male only vaguely visible as a light band, in the female ventral laterotergites fully fused with sterna, except in the eighth segment; spiracles all ventral on the supposed ventral laterotergites, except in the seventh segment of the male where the laterotergites are very narrow and the spiracles situated mesially of them on the sternal plate. (Type II (not I!) of Sweet, 1981: 46). Fossettes parastigmatiques (Carayon, 1950) absent. second (first visible) sternite medially largely membraneous, lateral parts sclerotized, triangular, bearing the first pair of spiracles; second sternite apparently fused with third along common boundary; central part (0.6) of anterior margin of third sternite narrowly turned-up, forming together with the posterior margin of the second

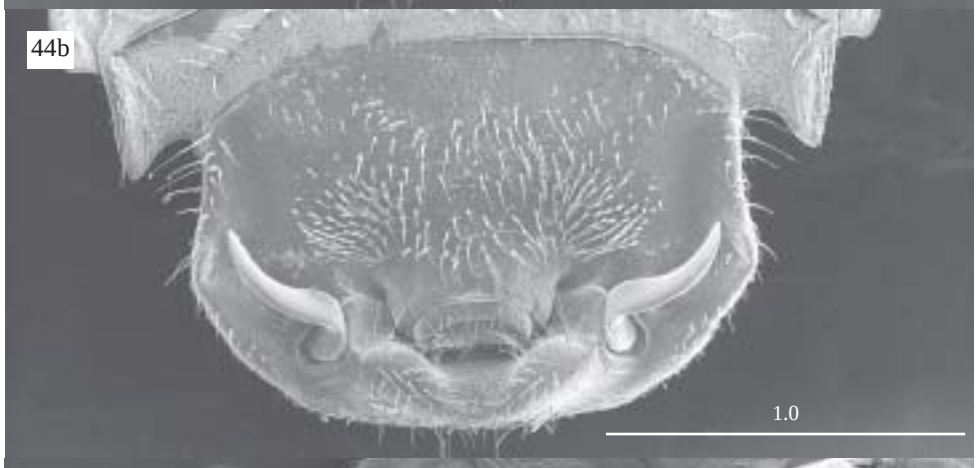


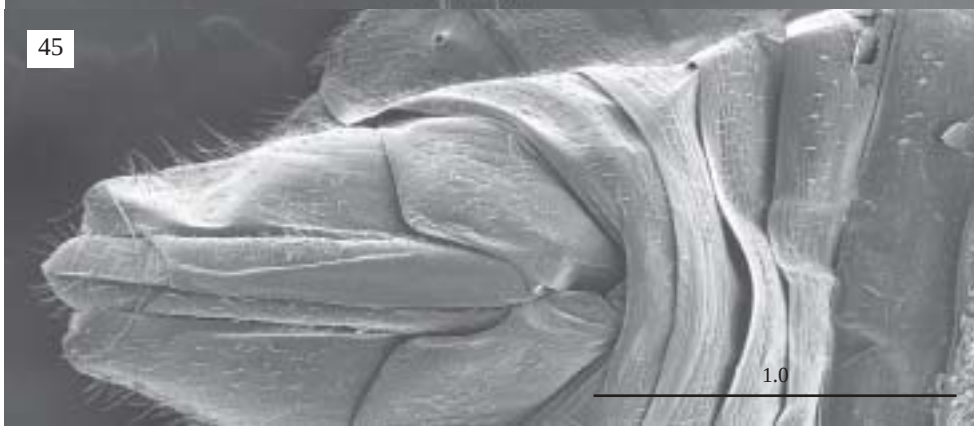
Figs 42-43, *Scotomedes polis* spec. nov., male, abdomen, showing dense setation of laterotergites 4 (partly)-7; 43, detail of 42 (photomicrographs). Bar of 42 represents 0.5 mm.

a narrow, more or less sclerotized groove; eighth segment in the male fully developed and exposed; in the males of *Scotomedes* the lateral margins of sternites 4-7 more or less shining and with a longitudinal streak of thickly set, short, subadpressed setae (figs 42, 43) and the posterior corners of seventh laterotergites posteriorly lobed, of eighth simple (fig. 44a, 53, etc.). In the males of *Costomedes* gen. nov. the lateral margins of the sternites 4-7 are simply setose and the posterior corners of the eighth laterotergites more or less sharply lobed posteriorly (figs 44b, etc.); sternites 3-8 in male and 3-7 in female each with two more or less conspicuous fine short erect setae (trichobothriae?; q.v. Schuh & Štys, 1991: 337) near midline beyond middle of sternites: mid-ventral setae (figs 46, 83).

Pygophore.— Male abdominal segment IX or pygophore (genital capsule) in dorsal





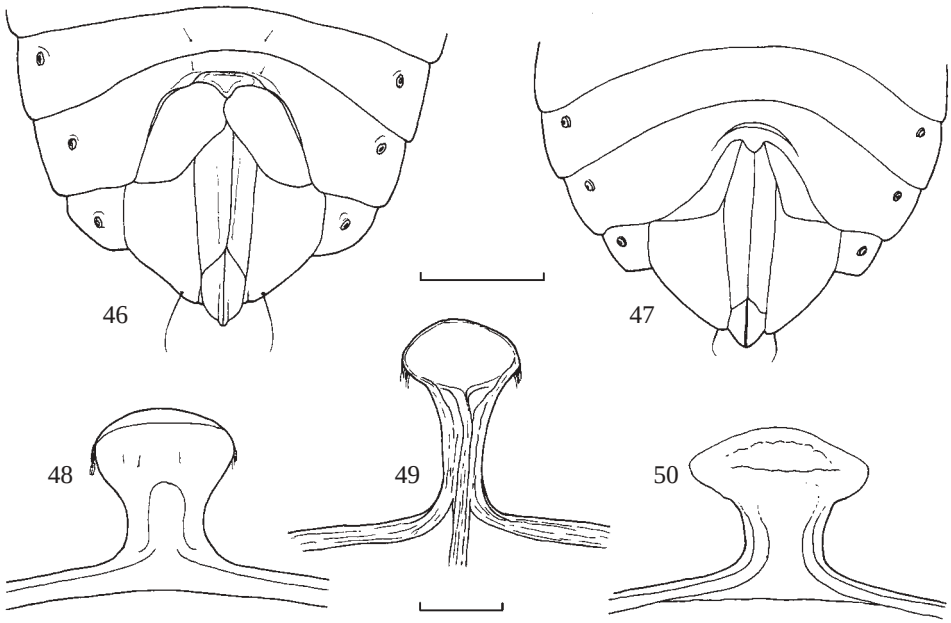


Figs 44a, 44b, end of male abdomen, dorsal aspect, showing pygophore with parameres in situ; 44a, *Scotomedes minor* (Breddin, 1903); 44b, *Costomedes gressitti* gen. nov. & spec. nov. Fig. 45, posterior part of female abdomen. *Scotomedes minor* (Breddin, 1903), ventral aspect (compare with fig. 103! p. 48). Bar represents 1.0 mm. (SEM photographs).

view posteriorly rounded (*Scotomedes*, figs 44a, 53, 54) or more or less square (*Costomedes*, figs 44b, 154, 160, etc.); genital chamber or pygophoral cup widely open dorsally, lateral margins raised dorsad, especially posteriorly, forming lateral walls; posteroventral margin (anatomically) raised dorsad to a posterior wall (topographically); anteriorly, the bottom of the chamber (diaphragm) gradually passes into the dorsal surface of anterior part of pygophore; between the posterior wall and each lateral wall is a dip (d) close to insertion of neighbouring paramere; the three walls enclose the genital chamber in which proctiger (reduced tenth segment) bearing the anus comes out. The usually short parameres (figs 44a, 44b, 54, 57, etc.), are situated sublaterally each 'rooted' in the pygophore through the foramen parameri (fp), an opening at both sides in the bottom (diaphragm) of the genital chamber with a short, curved part, the basis parameri (bp) ("head" in Kerzhner, 1981: 37), to which the muscles are attached; the exposed part could usually be distinguished into a shaft or shank (sh) and a more or less hook-like apical spur (sp); in some species a posterior lobe opposing the spur (e.g., *Scotomedes polis* spec. nov., fig. 108, pl), or a dorsal protuberance at the end of the shaft is present (e.g. *Costomedes fakfakensis* gen. nov. & spec. nov., fig. 163); In *Scotomedes*, between basal part and shaft a more or less flattened, rounded subbasal process or lateral extension (le, figs 57, 108) which, in rest position of the paramere, fits in the foramen parameri, closing it like an operculum.

Female.— Female genital armature (figs 45, 46, 47) of laciniate type (Scudder, 1959: 426; Dupuis, 1970: 201), much resembling that of Nabidae and Anthocoridae. Posterior margin of seventh sternite more or less deeply excavated to lodge the genital sclerites, medially with a posteriorly directed more or less triangular or rounded small squama, also known as ovivalvula or subgenital plate, often more or less covered by a secondary transverse fold; anterior margin of seventh sternite (covered by the sixth sternite) medially with the anteriorly directed genital apophysis ((figs 48-50; Kerzhner, 1981: 40); eighth laterotergites bear the gonocoxites VIII (or first gonocoxites), from which only the exposed, visible part of the sclerites are considered. They are large in *Scotomedes* (figs 45, 46, 67, etc.), mesially broadened, usually close together, often touching or even overlapping each other medially over bases of gonocoxites IX or second gonocoxites; In *Bloeteomedes* (fig. 148) these plates very narrow, especially laterally; in *Costomedes* gen. nov. (figs 45, 47, 158, etc.), gonocoxites VIII small, somewhat triangular, never touching each other, leaving bases of gonocoxites IX exposed; eighth laterotergites small, more or less triangular, bearing the last pair of spiracles, lateral margins slightly convex to more or less produced outwardly; mesal margins of gonocoxites IX in rest position narrowly overlapping each other along greater part of their length, hiding the underlying gonapophyses VIII and IX, the ovipositor proper (cf. Dupuis, 1970: 205, fig. 240). Between the apices of the gonoplacs and the posterior margin of the ninth tergite, is the retractable proctiger.

Secondary sexual characters.— As described above, sexual secondary characters were found in males of *Scotomedes* being a setal tuft on the hind trochanters and a longitudinal streak of thickly set, short, subadpressed setae on shining lateral margins of sternites 4-7; posterior corners of seventh abdominal segment lobed, of eighth not. In males of *Costomedes* a longitudinal irregular row of small pustules is found on underside of the middle femora; posterior corners of eighth abdominal segment (often of seventh as well) strongly lobed.



Figs 46-47, end of female abdomen, ventral aspect. 46, *Scotomedes alienus* (Distant, 1904); 47, *Costomedes gressitti* gen. nov. & spec. nov. Bar represents 1 mm. Figs 48-50, female genital apophyses. 48, *Scotomedes minor* (Breddin, 1903); 49, *Bloeteomedes borneensis* v.Doesburg, 1970, (cf fig. 148!); 50, *Costomedes gressitti* gen. nov. & spec. nov. Bar represents 0.1 mm.

Key to genera of the family Velocipedidae

1. Second antennal segment dorsally with a conspicuous large seta, its apex yellowish (figs 14, 17), cuneus short (figs 29, 30); (west of Wallacea) 2
- Second antennal segment without such a seta (fig. 16), unicoloured brown, cuneus long (figs 26, 28); (east of Wallacea, and Ceram) ..... ***Costomedes*** gen. nov.
2. First antennal segment long, half as long as second segment, well surpassing apex of head (figs 17, 140, 141); (Borneo) ..... ***Bloeteomedes*** van Doesburg, 1970
- First antennal segment short, one third as long as second segment, not or hardly surpassing apex of head; (Oriental, including Borneo) ..... ***Scotomedes*** Stål, 1873

Genus *Scotomedes* Stål, 1873

Scotomedes Stål, 1873: 111; Reuter, 1910: 73, 81 (in Nabidae); China & Myers, 1929: 109; Blöte, 1945: 323. Scudder, 1959: 426; van Doesburg, 1970: 247; Kerzhner, 1981: 8 ff. Type species: *Scotomedes ater* Stål, 1873: 114 (by monotypy).

Velocipeda Bergroth, 1891: 263, fig. 1, 265, fig. 2; Kirkaldy, 1906: 149 (first extensive description of the genus). Type species: *Velocipeda prisca* Bergroth, 1891 (by monotypy).

Godefridus Distant, 1904: 328; Kirkaldy, 1906: 149 (synonymized with *Velocipeda* Bergroth, 1891). Type species: *Godefridus alienus* Distant, 1904: 329, fig. 213.

Diagnosis.— First antennal segment short, second with a conspicuous seta, pronotum with macrosetae, cuneus short, hind wings without m-cu cross vein, male middle femora unarmed; male pygophore gradually rounded posteriorly, paramere with a subbasal process, gonocoxites VIII large.

Description.— First antennal segment not or hardly surpassing tylus, not longer than one third of the second segment; proximal part of second segment glossy, sparingly setose, with a conspicuous large seta dorsally (fig. 14), distal part a little swollen, yellowish and densely setose; labrum glabrous, with only some setae at each side (fig. 12); bucculae largely glabrous with a sub-marginal row of some setae (fig. 13); macrosetation of head in principle as in figs 5, 8. Wrinkles of underside coarse, producing irregular indentations in the keel.

Pronotum (figs 20, 23) with one macroseta on anterior corners, on frontal calli and often on lobal calli; free margin of collar with a fringe of very fine setae along almost the entire ventral half; sub-lateral calli very small, lobal calli hardly developed, posterior margin of pronotum more or less excavated medially; metathorax: basal lobe of the metapleural scent gland ostiole short, club-shaped dispenser rather slim, longitudinally grooved over almost its entirely length; fore wings (figs 29, 30) with cuneal apex relatively short, reaching about halfway of membrane, its free (costal) margin less than two times length of cuneal fracture; first cell of membrane not closed, blind vein ("stub") very short; hind wings without or with rudimental m-cu cross vein, hamus almost reaching or at least pointing to costal margin. Posterior trochanters in the male posteriorly fringed with a dense row of short, fine setae (fig. 36), middle femora in the male not armed.

Abdomen.— Second abdominal sternite with antero-mesal margins against hind coxae simple, not crested; anterior groove of third abdominal sternite fine, not sclerotized or darkened, almost smooth; mid-ventral setae well-developed; in the male lateral margins of ventral laterotergites 4-7 glossy and thickly set with very short, semi-adpressed, anterolaterally directed setae (figs 42, 43); end of abdomen (figs 44a, 53, etc.): hind corners of seventh sternite more or less posteriorly extended into a lobe, those of the eighth sternite posteriorly simply rounded; genital capsule in dorsal view posteriorly almost semicircularly rounded, spurs of parameres in rest position, situated sublaterally, parameres with a subbasal process.

In the female (figs 45, 46) lateral margins of ventral laterotergites only sparsely set with fine setae; posterior margin of seventh sternite medially deeply excavated; genital apophysis of seventh sternite short and broad; gonocoxites VIII broad, mesially usually close together, touching or even overlapping each other; lateral margin of eighth laterotergite only slightly convex; mesal margin of right gonocoxite IX usually lying over the left one.

The egg of *Scotomedes alienus* Distant is described and its outline depicted by Miller (1956, 1971: 70, 71, fig. 12/27); the egg of *Scotomedes minor* (Breddin) described and figured (partly) by Cobben (1968: 130, 131, fig. 139).

Key to the species of *Scotomedes* Stål, 1873

1. Length of body less than 9 mm 2
- Length of body more than 9 mm 4

2. Length of body 6.5-7 mm; subbrachypterous 3
- Total length of body about 8 mm, paramere thick-set (figs 139 e, f); (S. China) .... **S. *yunnanensis*** Ren, 2000
3. Lateral margin of pronotum strongly sinuate (fig. 96); hook of paramere short (fig. 100); Indonesia: Java) ..... **S. *minor*** (Breddin, 1903
- Lateral margin of pronotum less sinuate, hook of paramere long (fig. 80); (Indonesia: Java) ..... ***S. gedehensis*** spec. nov.
4. Costal area with only one yellow marking distally, macroseta on second antennal segment situated just before middle (0.42-0.48) of segment; (*S. ater* Stål, 1873 s.l.) 5
- Costal area of each fore wing with two yellow markings; position of macroseta variable 6
5. Posterior part of pronotum brown, paler than anterior dark part, anterior part scattered with long setae; spur of paramere less slender; (Indonesia (Sumatra), Malaysia (Peninsula)) ..... ***S. ater ater*** Stål, 1873
- Posterior part of pronotum as dark as anterior part, anterior part only indistinctly set with small setae, spur of paramere more slender (fig. 68); (Malaysia (Borneo: Sarawak, Sabah)) ..... ***S. ater confrater*** subspec. nov.
6. Macroseta of second antennal segment situated at middle of segment 7
- Macroseta of second antennal segment situated beyond middle of segment 8
7. Anterior part of pronotum with erect setae (but sometimes more or less rubbed off); lateral extension of paramere of normal shape; gonocoxites VIII of ♀ gradually rounded, not touching each other (fig. 115); squama small, (Indonesia: Java (nominal subspec.), Sumatra [= *S. priscus jacobsoni* subspec. nov.) .... ***S. priscus*** (Bergroth, 1891)
- Anterior part of pronotum with decumbent, curled setae; paramere thickly built, with a strongly developed lateral extension (fig. 108); gonocoxites VIII of ♀ more produced, widely apart (fig. 109); squama large; (Philippines: Luzon) .... ***S. polis*** spec. nov.
8. Macroseta of second antennal segment situated far (about two thirds of segment) beyond middle; middle of pronotal calli matt; pronotal setae on anterior calli and corners conspicuous 9
- Macroseta of second antennal segment situated somewhat beyond middle of segment (0.56-0.6); surface of middle of pronotal calli and pronotal setae on anterior calli and corners variable 12
9. Body brown; length of body 9-9.8 mm; paramere of ♂ with a long, curved hook (fig. 88) 10
- Body black; length of body about 10.5 mm; paramere of ♂ with an almost straight hook 11
10. Hook of paramere with rounded apex; posterior margin of pygophore straight; squama of ♀ hidden; (Vietnam: Lâm Dông) ..... ***S. lemoulti*** spec. nov.
- Hook of paramere long, curved and sharply pointed; posterior margin of pygophore dorsally convex; squama of ♀ visible; (China: Yunnan) .... ***S. doesburgi*** Ren, 2000
11. Posterior part of head and anterior part of pronotum with many longer erect setae; squama of ♀ rounded; (China: Guangxi, Vietnam: Lao Cai) .... ***S. guangxiensis*** Ren, 2000 (♀)

- Posterior part of head and anterior part of pronotum with short and curled down setae; squama of ♀ not visible; (Malaysia: Peninsula) ..... ***S. rudolfi*** spec. nov.

12. Paramere of ♂ short (figs 57, 94); pronotal setae variable 13
- Paramere of ♂ long or with long hook (figs 72, 131, 137), pronotal setae on anterior corner and anterior calli long 15

13. Paramere very short, thick-set (fig. 94); (China: Fujian) ..... ***S. maai*** spec. nov.
- Paramere more slender (fig. 57); (*S. alienus* Distant, 1904 s.l.) 14

14. Anterior and middle pronotal calli matt; (Myanmar, China: Yunnan) ..... ***S. alienus alienus*** (Distant, 1904)
- Anterior and middle pronotal calli shining black; (India, Bhutan) ..... ***S. alienus sikkimensis*** subspec. nov.

15. Paramere long and with very short hook (fig. 131); (Indonesia: Sumatra) ..... ***S. sumatrensis*** spec. nov.
- Paramere shorter and with long, slender hook 16

16. Anterior part of pronotum dull; (Thailand) ..... ***S. thai*** spec. nov.
- Anterior part of pronotum shining black; (Myanmar) ..... ***S. distanti*** spec. nov.

Note.— Male of *S. guangxiensis* Ren, 2000, from China is very near S. *distanti*; it has its upper side black, see text for additional notes.

Scotomedes alienus alienus (Distant, 1904)
(figs 51-59)

Godefridus alienus Distant, 1904: 329, fig. 213.

Velocipeda aliena; Kirkaldy, 1906: 149, wrongly synonymized with *V. prisca* Bergroth; Reuter, 1908a: 90; Distant, 1910 (= *prisca* Kirkaldy, nec Bergroth).

Scotomedes alienus; Blöte, 1945: 324; Jeannel, 1951: 1762, fig. 1549 B (*S. aliena*); Miller, 1956: 58, 59, fig. 8#27 (egg), 115, 117, fig. 39 (habitus); Scudder, 1959: 426; Davis, 1961: 345 (wing venation); Cobben, 1968: 130 (egg), 1978: 8, 51, f. (mouthparts); Kerzhner, 1981: 15 f., figs 1, 4, 24, 28, 41, 42, 52-55, 71, 74, 97, 98b1, 98b2.

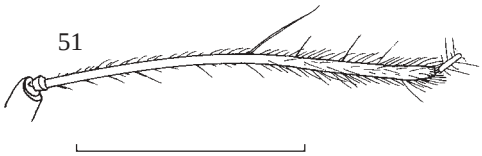
Scotomedes ater; Davis, 1961: 349 (nec Stål, 1873).

Material.— Lectotype of *Godefridus alienus* Distant, 1904 (here designated), ♀ (BMNH), Carin Chebà, [**Burma** (**Myanmar**)], 900-1100 m, 5.xii.[18]88, L. Fea, Type (round red-rimmed label), *Godefridus alienus* Dist. (Distant's own handwriting). Paralectotypes, 8 ♂♂, 7 ♀♀: 1 ♂ without head (BMNH), same data as lectotype; 1 ♀ (MCSN, pronotum and head missing), same data as lectotype, #268 *Godefridus alienus* Dist. (Distant's own handwriting); 2 ♂, 1 ♀ (MRAC), 1 ♂ (RMNH), 1 ♀ (NHMW) prisca det. Montandon, same data as lectotype; 2 ♂♂ (MNHN), same data as lectotype / Museum Paris A.L. Montandon / *Velocipeda prisca* Bergr. Montandon det. 1897 / *Scotomedes alienus* (Distant) ♂, G. Schmitz det.1974; 1 ♂, 2 ♀♀ (ZMAS), same data, *Velocipeda aliena* Oshanin det.; 1 ♀ (ZMAS), Carin Chebà, 500-1000 m, xii.[18]87, L. Fea; 1 ♀ (ZMAS), Carin Chebà, 500-1000 m, xii.1887, L. Fea, 1 ♂ (ZMAS), Carin Chebà, 900-1100 m, 5.xii.[18]88, L. Fea.

Perhaps belonging to the same species, two badly preserved female specimens: 1 ♀ (BMNH), 9.v.[19]18; 1 ♀ (BMNH), Khasia Hills (Assam, E. India), BM 96-135; 1 ♂ (TMNH), Luxi (Luhsi, Mangshi) Yunnan, China, 1200 m, 18.v.1955, (personal communication from Dr Ren Shu-shi, Nankai University, China).

Habitus.— Overall colour brown to dark brown, matt except head, antennae and legs.

Head.— Dorsal side of head dark brown, pilosity short, white, decumbent, not dense; ventral side blackish, setae long, erect, remotely set; rostrum and antennae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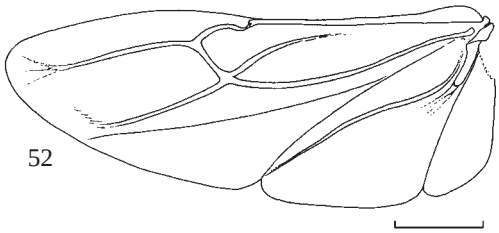
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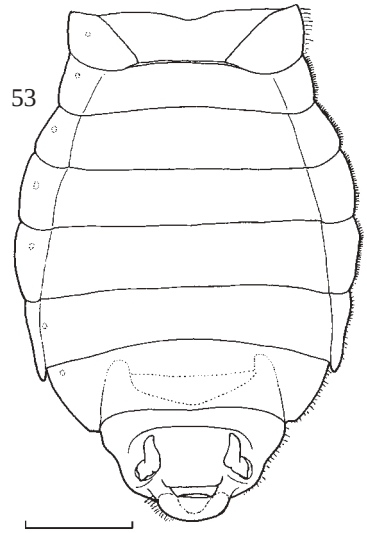
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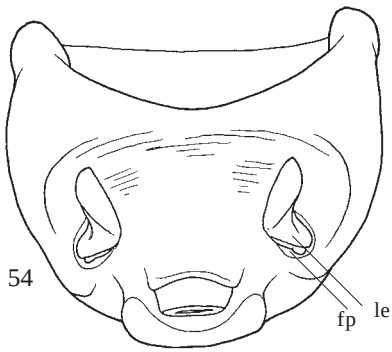
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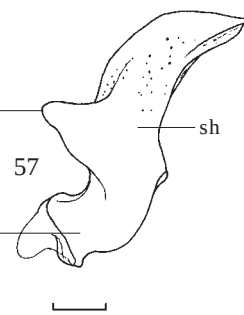
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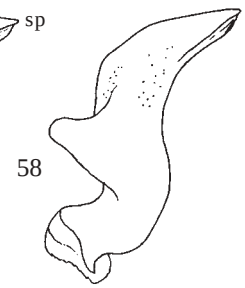
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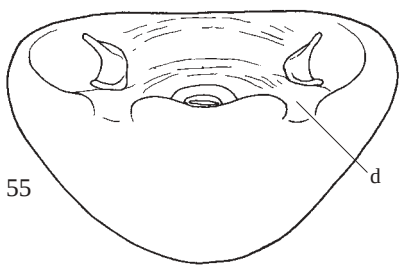
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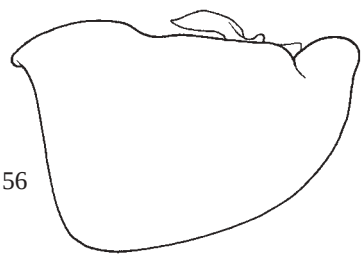
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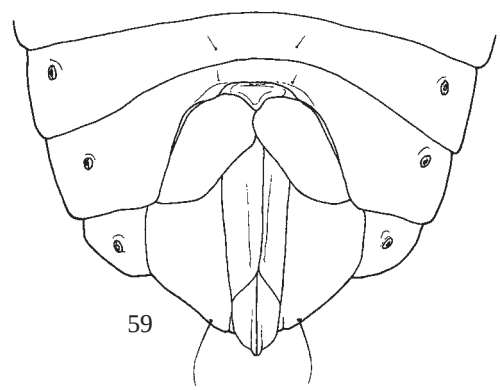
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yellowish brown; second antennal segment (fig. 51) with macroseta situated a short distance beyond the middle (ratio 0.56-0.60), distal third of segment somewhat lighter to yellow in colour and denser setose with yellowish pile; last two antennal segments yellowish white; ocelli rather small, diameter about as long as distance to eyes.

Thorax.— Anterior part of pronotum including neck, blackish-brown, with a pattern of a greyish-white matt patina on central calli (nominal form), anterior auriculate corners each with an anteriorly directed stout seta of about 0.15 mm, setae on anterior calli long, 0.25 mm; posterior part brown; ventral side mainly blackish, only epicoxal lobes and stink gland structures brown, meso and meta sternum yellowish brown; fore wings brown, clavi darker, along costa with two yellowish white spots, one before (three seventh) middle of exocorium, the other against cuneal cleft; a third small spot on membrane, just beyond tip of cuneus; m-cu cross vein of hind wing (fig. 52) absent; setae on anterior part of pronotum and scutellum 0.08-0.1 mm, on fore wings hypocostal area 0.08 mm. Legs brown, tip of tibiae and tarsi, especially of the fore legs, yellowish.

Abdomen.— Upper side of abdomen (fig. 53) red, posterior half of tergites yellowish white; ventral side of abdomen brown.

Male (figs 53-57).— Posterior corner of seventh paratergite with a small lobe-like caudad extension; posterior corners of eighth tergites with very small blunt posterior projection; genital capsule (figs 54-56) rather short, almost semicircular posteriorly in dorsal view; lateral walls of genital chamber low, posterior wall higher, rounded, thickened laterally and slightly extended posteriorly, dorsal margin in posterior view slightly concave; Paramere (figs 57) each with very short basal part, a bluntly pointed, latero-caudad projection, and the short shaft gradually twisted into a somewhat horizontally flattened, blunt spur, in rest position pointing anteriorly, and slightly inclined laterad ("NNW" and "NNE").

Female (fig. 59).— Posterior margin of seventh sternite mesially deeply and broadly emarginate, sublaterally thickened and medially lifted-up above the exposed posteriorly pointing triangular tooth (squama), sublateral posterior margin roundly extended posteriorly; lateral margins of eighth laterotergites flatly rounded. Gonocoxites VIII large, usually overlapping each other medially.

Measurements.— Male from Carin Chebà, tl, 9.3; lb, 7.8; lw, 6.3; ww, 4.0; lh, 1.32; wh, 1.28; lp, 1.65; wp, 3.0; la, 1.75; lr, 2.85; lt, 4.1.

Distribution.— Myanmar (Burma); China (Yunnan, S. China) altitudes 500-1000, 900-1100, and 1200 m, mean roughly 1000m.

Notes.— Distant's type series of *Godefridus alienus* from "Burma, Karennee (Fea)", all to be regarded as syntypes, appears to consist of two species, evidently originating

◀ Figs 51-59, *Scotomedes alienus* (Distant, 1904). 52-57, subspec. *alienus*, ♂ from Carin Chebà; 51, 58, 59, *Scotomedes alienus sikkimensis* subspec. nov.; 51, right antenna, second segment; 52, left hind wing; 53, dorsal aspect of male abdomen, left side: ventral spiracles simmering through, right side: dense setation on laterotergites 3-6 typical for males of *Scotomedes*; 54-56, pygophore, dorsal, caudal and left lateral aspect respectively; 57, 58, right paramere, lateral aspect; 59, female from Sikkim, end of abdomen, ventral aspect. Bars represent 1 mm, except bar of the parameres, which represents 0.1 mm. Abbreviations: bp: basis parameri; d: dip in wall; le: lateral extension ("operculum"); fp: foramen parameri; sh: shaft; sp: spur.

from different altitudes: 900-1100 m, and 1200-1400 m. The chosen lectotype is from the lower altitude and also conspecific with the specimen from which Kerzhner (1981) described and figured the male genitalia as "*Scotomedes alienus* Dist." in his study (p. 36, figs 52-55).

The series of *Godefridus alienus* Distant, 1904, from Carin Chebà collected by Fea was sent to the Genoa Museum and labelled there accordingly (personal communication by Dr Raineri, Genova). Obviously part of the material was sent to Distant for identification and specimens were sent back to Genoa, teste an original identification label in Distant's handwriting on one of the Genoa specimens. Carin (Careni, Karennee) Chebà and Ghecù are situated more than 100 km NNE from Toungoo in Myanmar (Burma); the collector is Leonardo Fea (Fea, 1897, Carin Chebà is mentioned on p. 391, Rincoti on p. 603).

Leonardo Fea (for his biography see Gestro, 1904), born in Torino 24.vii.1852, deceased 27.iv.1903, was an explorer who sent his collections mainly to the museum in Genoa, but also sold duplicates abroad (Horn & Kahle, 1935: "Dupla vereinzelt."). And: Horn & Kahle, 1937, p. 398: "Der bekannteste Fall aus den letzten 50 Jahren sind die Verkäufe der Fea'schen Dubletten aus Birma, welche das Genueser Museum um 1893 angeboten hat." This could explain how specimens got also in the museums of Paris, St. Petersburg and Tervueren.

Dr Ren Shu-zhi (Department of Biology, Nankai University, Tianjin, China) mentioned a male from Luxi, Yunnan Prov., now seriously mutilated (personal communication). He studied the specimen and made drawings of the antenna and paramere, here reproduced by courtesy of Dr Ren (figs 60, 61). Although the top of the depicted paramere is somewhat less sharply pointed than those of the specimens from Burma, it seems that the specimen is conspecific.

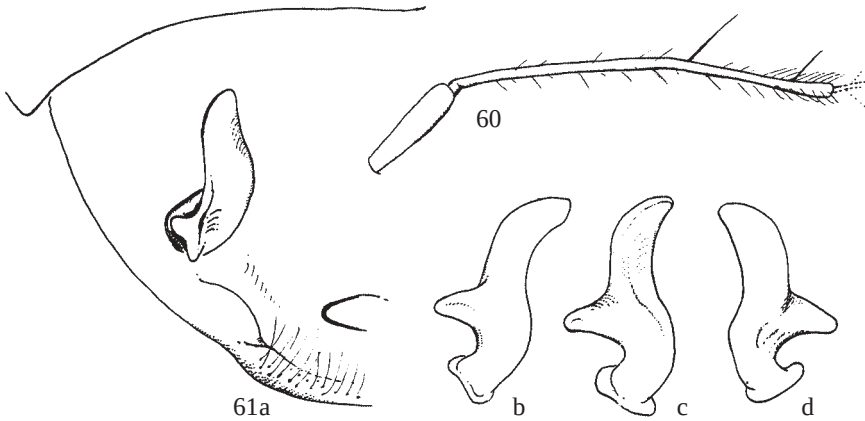
Scotomedes alienus sikkimensis subspec. nov.
(figs 51, 58, 59)

Material.— Holotype, ♂ (BMNH), [**India**], Sikkim, Gopaldhara, Rungbong Vall., H. Stevens / Brit. Mus. 1922-307 / P.H. v. Doesburg Jr. det. 1979. Paratypes: 38 ♂♂, 27 ♀♀, 2 immatures (BMNH), 4 ♂♂, 4 ♀♀ (RMNH), same data as holotype; 1 ♀ (MNHN), Museum Paris Bhoutan [**Bhutan**], Maria Basti, [collection] R. Oberthur [Oberthür] 1897 / *Scotomedes alienus* (Distant)? ♀, G. Schmitz det.1974/; 1 ♂ (ZMAN), India Darjeeling [Darjiling], Kleiweg de Zwaan; 1 ♀ (CEH), India, W. Bengalen, Kalimpong [Kalimpang], 1400 m, 6.iv.1999, E. Heiss.

Different from the nominal form by the shining black(ish) anterior part of the pronotum, the less broadened lateral margins and narrower auriculate anterior corners of the anterior part of the pronotum; and setae on anterior corners and anterior and lobal calli insignificant or absent. second antennal segment more unicolorous light brown, seta (0.3 mm) a little less beyond middle (0.53-0.58) of segment. Setation of fore wings obvious but shorter (0.06 mm) than in nominate form. Posterior margin of pygophore straight in posterior view. The subspecies is found in a higher altitude.

Measurements.— Holotype, tl, 9.7; lb, 8.45; lw, 6.9; ww, 4.9; lh, 1.3; wh, 1.35; lp, 1.75; wp, 3.4; la, 1.75; lr, 3.05; lt, 4.35.

Distribution.— India (Rungbong Valley near Gopaldhara, Sikkim; West Bengalen, Darjiling and Kalimpang, 1400 m) and Bhutan.



Figs 60-61, *Scotomedes alienus* (Distant, 1904), ♂ from from Luxi, Yunnan, China. 60, antenna, segments 1 and 2; 61a, left half of pygophore with paramere in situ; 61b-d, paramere in several aspects (figs 60, 61a-d, from Dr Ren Shu-zhi, personal communication).

Etymology.— The subspecies is named after the origin of the holotype: Sikkim.

Notes.— The large series of this subspecies of *S. alienus* in the BM is labelled: Sikkim Gopaldhara Rungbong Valley, H. Stevens / Brit. Mus. 1922- 307.

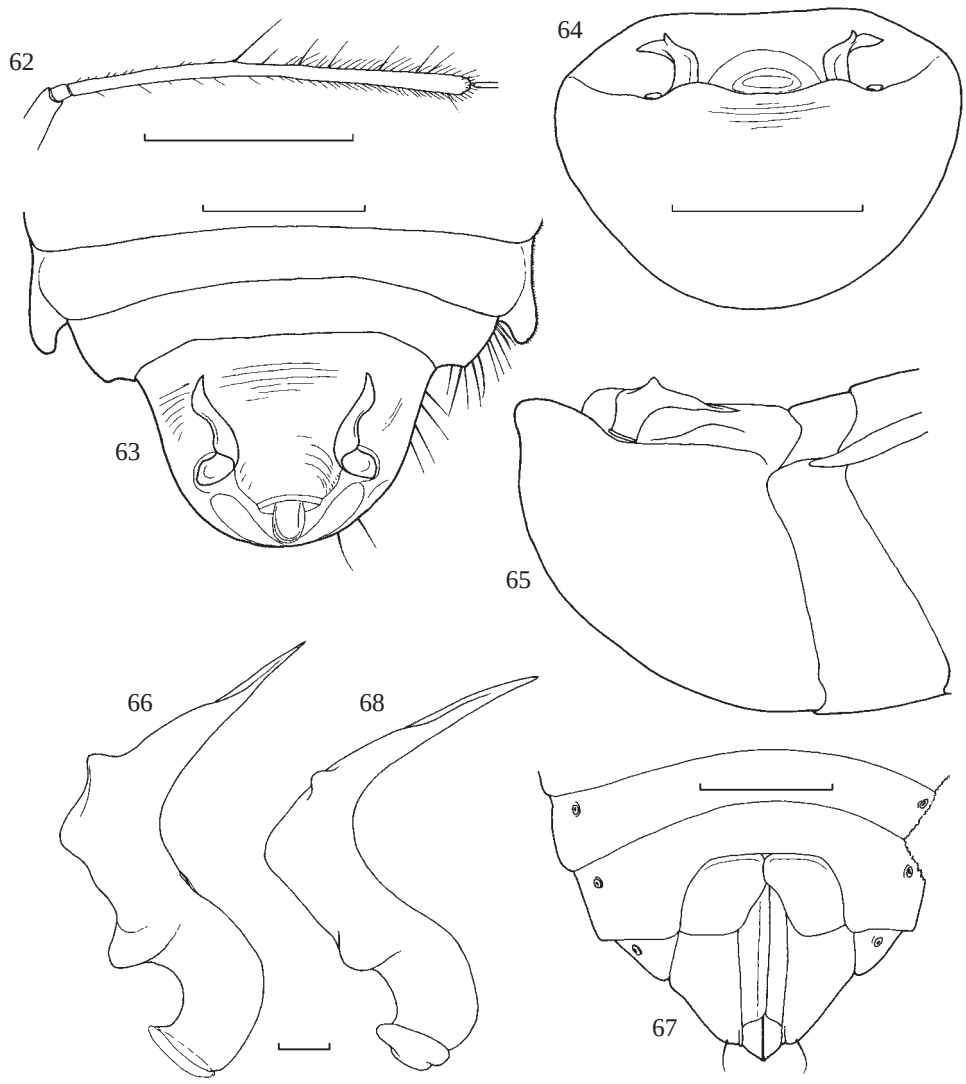
Horn en Kahle (1936) mention about Stevens: "Stevens, John Crace, (-ca. 1860), Grösste Auktions-Firma auf entomologischem Gebiet (London). Firma gegründet 1760 von Patterson; J.C. Stevens trat erst 1831 in sie ein! Sein Nachfolger war Henry Stevens (-1926)."

It is not likely that Henry Stevens collected the series himself, but that he bought the specimens from a local collector and sold them to the BM. This is also the opinion of Mr M. Webb (BMNH; personal communication), who kindly investigated the original records of registration [Brit. Mus. 1922-307] but found no further particulars about the true collector of the specimens.

Scotomedes ater ater Stål, 1873
(figs 62-67)

Scotomedes ater Stål, 1873: 114.
Scotomedes ater; Lethierry & Severin, 1896: 212. Blöte, 1945: 321.
Velocipeda biguttulata Reuter, 1908a: 91.
Velocipeda biguttula (lapsus for *biguttulata*); Blöte, 1945: 321.

Material.— Holotype, ♀ (RMNH), Muller, [**Indonesia**], Sumatra [S. Müller, Padang] / Holotypus (printed on blue paper, added by Blöte), *Scotomedes ater* Stål (hand-written by Stål?); 1 ♀ (CEH), Sumatra, Prov. Riau, Bukit [Mts] Tigapulu, NP Camp Granit, ca. 10 km SW Seberida, 350-500 m, 00º46'S-102º25'E, 17-20.vii.2001, R. Gerstmeier; 1 ♂ (QMBA), [**Malaysia**], Malay Peninsula, Templer Park, 152-350 m, via Kuala Lumpur, 15.i.1976, G.B. & S.R. Monteith; 1 ♂ (BPBM), Malaya, Kepong [Kepong Cubitt Forest Village nr Kuala Lumpur], 130-300 m, 13-21.iii.1966, M.V. light trap, J. & M. Sedlacek; 1 ♀ (BPBM), Malay Peninsula, SE Pahang, Rompin Mining C. Railway Track, 6 km, 1.iv.1961, K.J. Kuncheria;



Figs 62-68, *Scotomedes ater* Stål, 1873. 62-67, male from Malaysia; 62, right antenna, second segment; 63, 65, end of abdomen, dorsal and right lateral aspect respectively; 64, pygophore, caudal aspect; 66, right paramere, lateral aspect; 67, ♀, holotype, end of abdomen, ventral aspect; 68, *Scotomedes ater confrater* subspec. nov., holotype, ♂ from Borneo, right paramere, lateral aspect. Bar of parameres represents 0.1 mm; other bars, 1.0 mm.

1 ♂ (CEH), Malaysia, W Perak, 30 km SE of IPOH, 900 m, Cameron Highlands, Ringlet, 26-31.iii.2000, P. Cechovsky (very dark specimen).

Head.— Dorsum of head black to blackish-brown, ventral side black; setation scattered, ivory, on dorsal surface very short, decumbent to adpressed, those of ventral

side erect, much longer (0.12-0.14 mm); neck, tylus, bucculae, labrum, rostrum and antennae light brown; distal half of second antennal segment, and segments 3 and 4, yellowish and denser setose; macroseta of second antennal segment situated just before middle of segment (fig. 62), ratio 0.41 (mean of five antennae). Rostrum reaching third coxae; ocelli large, diameter greater (0.12 mm) than distance to eyes.

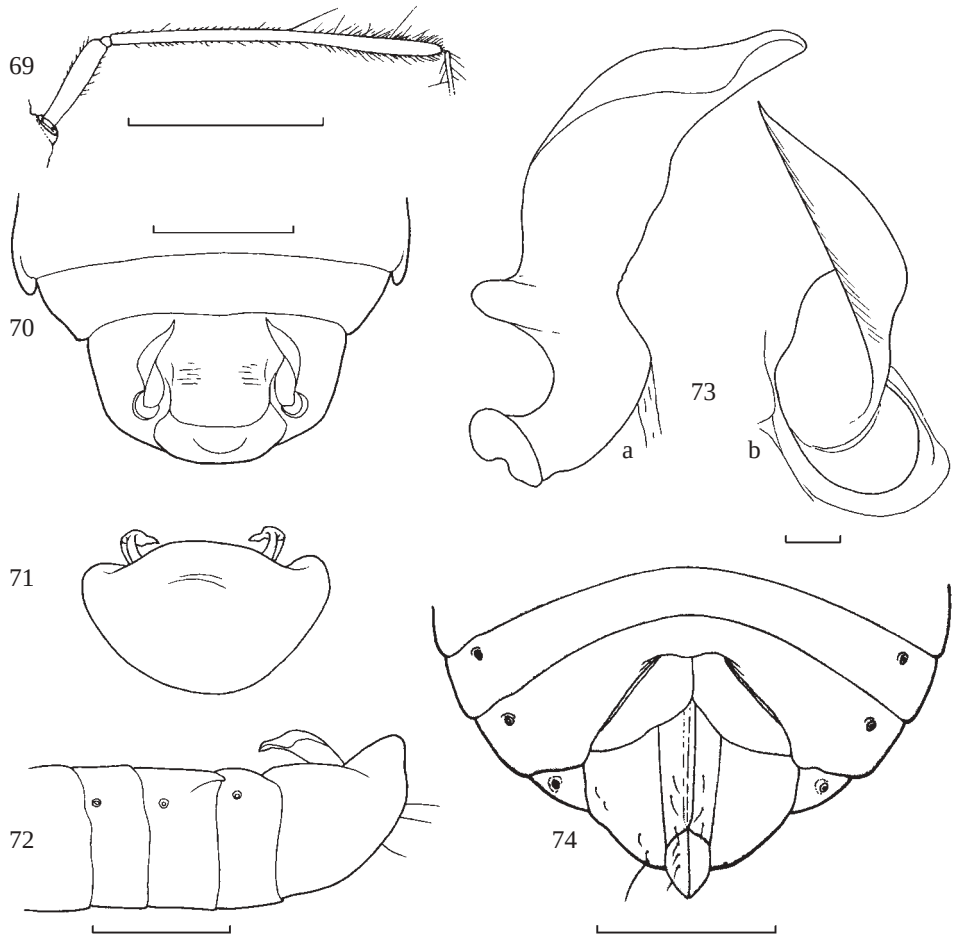
Thorax.— Prothorax dull black, collar and anterior part of pronotum, shiny; the latter with scattered erect setae; posterior part of pronotum dark brown; prosternum with some long silky setae; meso and meta sternal parts, coxae and legs brown, pleural parts dull black, but postero-mesial corner of metasternum, central part of metasternal gland orifices and operculum, brown; mesosternum with yellow silky setae; scutellum dark brown, proximally more blackish. Fore wings light brown, dull, with a yellow marking on exocorium near costal margin; clavus darker, proximal parts of corium bare, distal parts with very short setae; hypocostal area brown to blackish towards thoracic pleurae, setae slightly longer; hind wing with short m-cu cross vein.

Abdomen.— Tergites light brown, posterior half of tergites four to eight whitish dull, rest, including dorsum of genital capsule, glossy; ventral side of abdomen dark brown, dullish, remotely set with short, semi-erect setae; lateral margins of second to seventh laterotergites fringed with very short, erect setae; posterior angles of seventh laterotergites lobe-like produced caudad; lateral margins of eighth laterotergites evenly rounded, fringed with a series of long, erect setae; genital capsule (figs 63-65) conically rounded in dorsal view, lateral walls very low, straight; dorsal surface of capsule between parameres inflated; posterior wall high, rounded and slightly produced caudad, dorsal rim slightly concave as seen from behind; paramere (fig. 66) with curved base, a laterally directed, flat proximal lobe, and a long, flat and somewhat twisted, hook-like sharp spur; horizontal part of spur, in rest almost frontally directed; Female holotype (fig. 67): posterior margin of seventh sternite mesially deeply and broadly emarginate, sub-laterally strongly extended posteriorly, central part thickened and slightly lifted-up with regard to gonocoxites VIII behind, squama hidden, not visible (see under subspec.); gonocoxites VIII basally broad, mesially contiguous to each other (0.2-0.3 mm), and rather long, finely chagrinate, posterior margin straight; lateral margins of the eighth laterotergites almost straight; semi-decumbent setae on genital sclerites and last sternites longer (0.05-0.06 mm) than the more adpressed on anterior sternites (0.04 mm).

Measurements.— Holotype ♀: lw, 7.8; ww, 4.45; lt, 5.0. The male specimen from Malay Peninsula: tl, 10,2; lb, 9.0; lw, 7.17; ww, 4.7; lh, 1.4; wh, 1.35; lp, 2.0; wp, 3.5; la, 2.0; lr, 3.75; lt, 5.0; lengths of antennal segments: I: 0.7, II: 2.0, III: 1.45, IV: 1.1.

Distribution.— Indonesia (Sumatra), Malaysia (Malay Peninsula: altitude 150-900 m).

Notes.— The female holotype specimen in the Nationaal Natuurhistorisch Museum at Leiden is badly mutilated; missing are its head, prothorax and the tarsi of the hind legs. The posterior part of the abdomen is separately glued to a carton point, attached underneath the pinned specimen. The collector of the specimen, Solomon Müller (1804-1863), was a member of the “Natuurkundige Commissie”, a committee with the aim to promote the collecting of natural history objects in The Netherlands East Indies. Müller stayed there from 1825 till 1837 and collected in Sumatra near Padang during 1833-1835 (Fransen, Holthuis & Adema, 1997: 266).



Figs 69-74, *Scotomedes distanti* spec. nov. 69-73, holotype, ♂; 70, 72, end of abdomen, dorsal and left lateral aspect respectively; 71, pygophore, caudal view; 73a, 73b, right paramere; 73a, right lateral aspect; 73b, in situ, dorsal aspect; 74, female paratype, end of abdomen, ventral view. Bar of paramere represents 0.1 mm; other bars 1.0 mm.

All specimens have several phoretic small white Acari (Astigmata) scattered on the body.

Scotomedes ater confrater subspec. nov.
(fig. 68)

Material.— Holotype, ♂ (RMNH), [**Malaysia**], N. Borneo, **Sabah**, Kg. Sapulut, Sg. Sapulut, ML, 4º42'N-116º29'E, 4.v.1987/a, J. Huisman. Paratypes: 1 ♀ (BMNH), **Sarawak**, Gunung Mulu, Nat. Park / Site 8. February Camp 1, Mulu, 150 m. # 385470 / mixed dipt. for. [*Dipterocarpus* forest], MV-mainly canopy / J.D. Holloway, RGS Mulu exped., B.M. 1978-206; 1 ♂ (NSMT), Borneo, Sabah, Bundu Tuhan, 27.xii.1982, Sjinji Nagai, 1 ♀ (NSMT), East Malaysia, Sabah, Telupid, 80 km East of Ranau, 800 m, 6.xii.1979, Sjinji Nagai; 1 ♂, 1 ♀ (CEH), 1 ♀ (RMNH), Sabah W. Route Ranau-Tambunan, ii.2000, Snizek.

Probably belonging to the same species (NSMT): 1 nymph IV, Borneo, Sabah, Kinabalu Nat. Park, 30.iii.1981, K. Sugiyama.

Slightly larger (11 mm), overall colour much darker than in *ater* s.str., specimens from Ranau-Tambunan are black; antennal seta more towards middle of segment, ratio, 0.44 (mean of 12 measurements, ranging from 0.43-0.46); lengths of rostrum, measured on third segment, a little longer than in the nominal form (3.9 against 3.7); postero-ventral margin of pygophore almost straight in posterior view; paramere (fig. 68) much resembling that of nominal form but a little more slender, dorsal tooth of spur smaller. Female genital characters as in nominal holotype specimen; squama very small, situated a little anterior of margin, just visible inside through the somewhat receding sclerites, as a pentagonal, dorsally directed tooth (0.08 mm).

Measurements.— Holotype ♂, tl, 11.0; lb, 9.22; lw, 7.42; ww, 4.5; lh, 1.45; wh, 1.35; lp, 2.0; wp, 3.5; la, 2.05; lr, 3.7; lt, 4.9. Female paratype, tl, 10.9; lb, 9.22; lw, 7.8; ww, 4.7; lh, 1.5; wh, 1.4; lp, 1.9; wp, 3.5; la, 2.1; lr, -; lt, 5.0.

Distribution.— Malaysia (Borneo: Sabah, Sarawak). Altitude: 150-800 m.

Etymology.— The subspecific name *confrater* (brother) accents the close relationship with the nominal species.

Notes.— The dissected abdomen of the holotype specimen #2469 is glued to a card and the separated pygophore and paramere stored in glycerin in a PVC microvial, both pinned underneath the specimen. Scattered on the body of the holotype are at least one hundred small (0.14 mm) white Acari (deutonymphs of Astigmata). A deutonymph of an Uropodina (diameter: 1 mm) from the abdomen is additionally glued to the card.

Velocipeda biguttulata Reuter, 1908, is considered to be a synonym of *Scotomedes ater* Stål, 1873. The female holotype of *V. biguttulata* was not seen by the present author; it originates from Indonesia (Sumatra): "Sumatra orientalis (Soekaranda [Sukaranda], Jänner 1894)" and was collected by Dr W.L.H. Dohrn. The holotype was preserved in the Museum für Naturkunde at Stettin. The zoological collections of this museum went to the Zoological Institute & Museum, Warszawa, Poland, where, however, the type specimen could not be traced. (A. Slipinsky, 1998 and J.A. Lis, 2001, *in litteris*). Wolfgang Ludwig Heinrich Dohrn (1838-1913), was the son of the coleopterist Carl August Dohrn (1806-1892) and brother of the well-known hemipterist Anton Dohrn (1840-1909). He collected in Sumatra for the Museum für Naturkunde in Stettin (see Horn & Kahle, 1935: 59).

Scotomedes distanti spec. nov.
(figs 69-75)

Material.— Holotype ♂ (MCSN), Carin Ghecù (Burma, now **Myanmar**), 1300-1400 m, ii-iii.1888, L. Fea. Paratypes: 1 ♂ (RMNH), 1 ♀ (MCSN) same data as holotype; 1 ♀ (MCSN), 1 ♂, 1 ♀ (BMNH), Carin Asciuii Chebà, 1200-1300 m, i.[18]88, L. Fea.

Head.— Upper side of head brown, setae small, white, decumbent; ventral side blackish, setation longer, suberect; rostrum light brown, reaching metacoxae; antennae (fig. 69) brown, distal 1/3 of second segment yellow, situation of seta not far beyond middle of segment, ratio about 0.53; ocelli normal, diameter as long as distance to eyes.

Thorax.— Pronotum upper side matt, blackish-brown; lateral margins black, lateral ridge and its anterior extension well developed, anterior calli semi-polished, middle calli with shiny lines, anterior part sparsely set with erect, rather long setae (0.08 mm); anterior calli and pronotal corners, each with a long stiff, anteriorly directed seta (0.25 and 0.16 mm respectively); scutellum almost black. Fore wings dark brown, clavi blackish, costal margin with two yellow markings and a smaller one on membrane at end of cuneus; setae on medius 0.04-0.05 mm, on exocorium, 0.03-0.04 mm; hypocostal area black, setose; hind wings with a very short m-cu cross vein. Ventral side of thorax black, metasternal scent gland outlet black with a small central brown spot; legs brown, tarsi yellow. Abdomen upper side red, anterior margins of tergites pale; ventral side brown, posterior margins of the sternites darkened.

Male (figs 69-73).— Sides of sternites 4-6 with a lateral border of closely set short stiff setae; seventh tergite at both sides remotely set with short blackish setae, its posterior corners short, lingulately produced (figs 70, 72); eighth tergite sub-laterally extensively set with short, blackish setae; pygophore in situ in dorsal aspect semicircular. Posterior wall high, a little posteriorly produced, its dorsal margin convex as seen from behind (fig. 71); place between and anterior of parameres densely setose with long silky, postero-inwardly directed setae; paramere (figs 73a, b) with a short strongly curved base, a well developed lateral projection ("operculum") and a long, twisted, undifferentiated shaft and hook together, in situ bent medially.

Female (fig. 74).— Posterior margins of abdominal sternites and genital sclerites blackish; posterior margin of seventh sternite deeply emarginate, but central part of the margin faintly curved backwards, concealing the underlying squama; gonocoxites VIII long, considerably overlapping each other centrally; lateral margin of laterotergite VIII feebly convex, spiracle situated on small swelling.

Measurements.— Holotype, ♂, tl, 9.6; lb, 8.3; lw, 7.0; ww, 4.35; lh, 1.35; wh, 1.25; lp, 1.65; wp, 3.1; la, 1.7; lr, 3.0; lt, 4.0.

Distribution.— Myanmar (Burma), Karennee, 1300-1400 m. Altitude: 1200-1400 m.

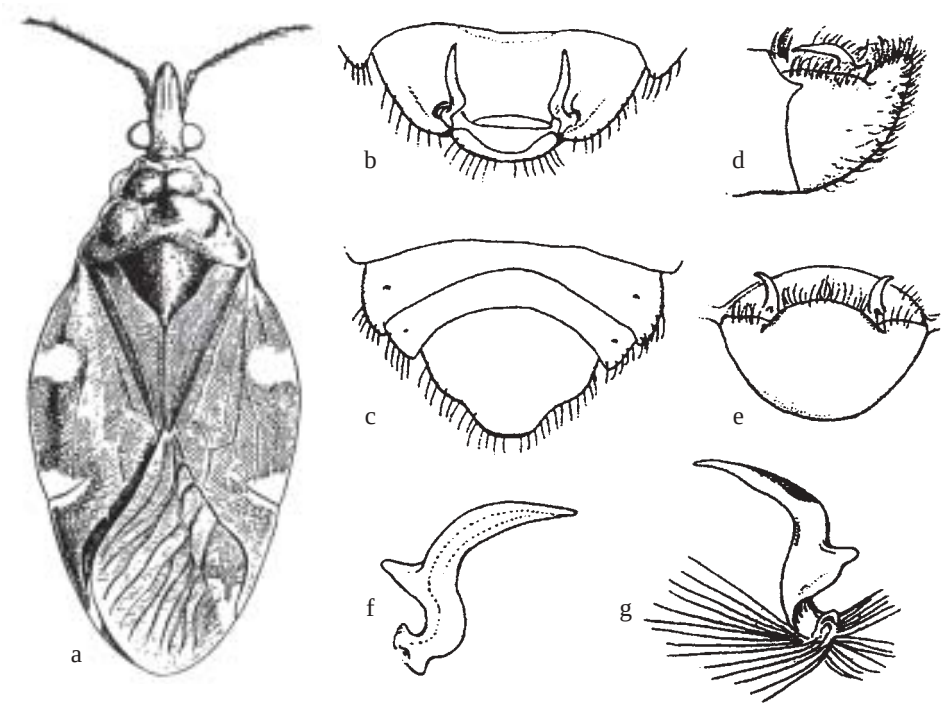
Etymology.— The species is named after the well-known hemipterist William Lucas Distant (1845-1922) who made important contributions to entomology notwithstanding some deviate systematic interpretations, which gave rise to criticism and sharp responses, especially by O.M. Reuter. His important Hemiptera collection including many types, went to the Natural History Museum of London.

Notes.— Distant's type series of *Godefridus alienus* from "Burma, Karennee (Fea)" consist of two species, evidently originating from different altitudes This species looks very like *S. alienus* (Distant, 1904), but upper side is somewhat darker, parameres different; collected in the same region (Carennee) but obviously a species of a greater altitude. (see notes under *S. alienus*, p. 29).

Scotomedes doesburgi Ren, 2000
(figs 75 a-g)

Scotomedes doesburgi Ren, 2000: 27, figs 1-9.
Scotomedes alienus; Hsiao, 1964: 287, fig. 10.

The holotype, a male (TMNH, not seen by the present author, type locality: Si'mao County, **China**, Yunnan Prov., 1200 m, 13.iv.1955, Rishkowskiej) was misidentified by



Figs 75 a-g. *Scotomedes doesburgi* Ren, 2000. 75a, habitus (from Hsiao, 1964: 287, fig. 10); 75 b-e, end of abdomen and pygophore dorsal, ventral, lateral and caudal view resp. 75 f-g, right paramere in lateral and central view resp. (figs 75 b-g, from Ren, 2000: 27).

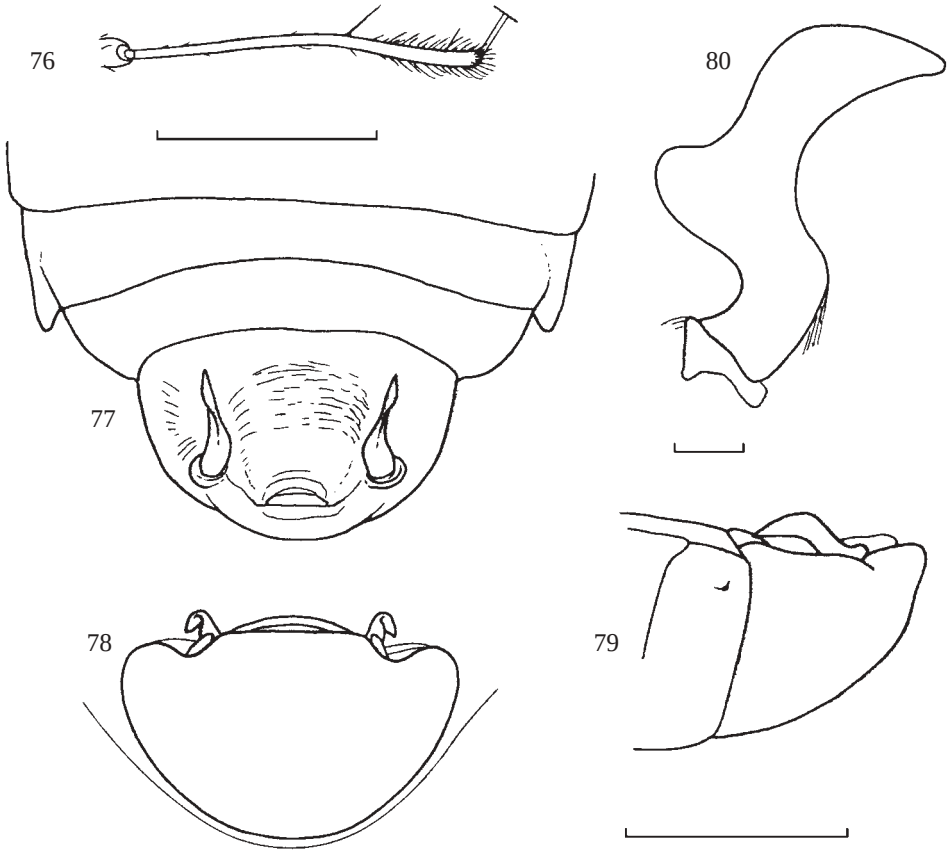
Hsiao as *Scotomedes alienus* (Distant). This species is similar to *Scotomedes lemoulti* spec. nov. and *Scotomedes thai* spec. nov., but differs by the convex posterior margin of the pygophore (figs 75 b-e) and the longer, sharp and curved hook of the paramere (figs 75 f-g). The female is unknown.

Distribution.— China (Yunnan).

Note.— The specimen was originally described (in Chinese) and figured by Hsiao (1964). The figure is here reproduced as fig. 75a; it was depicted 6.6 × full-size and without legs. The drawing is by Dr Ren.

Scotomedes gedehensis spec. nov.
(figs 76-80)

Material.— Holotype, ♂ (RMNH), [**Indonesia**], W Java, [Mts] Gede-Pangrango Nat. P., way to Cibeureum Wf [falls], 1500-1620 m, [Rudolf] Schuh, 2-3.viii.1994, *Scotomedes minor*, Yu. Popov det. 1995. Paratypes: 1 ♂ (MNHN), Java Mont Gedeh, J.B. Ledru, [ex-collection] R. Oberthur [Oberthür] 1898; 1 ♂ (RMNH), 1 ♂ (NHMW), W Java, Telaga Patengan, 1400 m, 2 km SE Rancabali (40 km SSW Bandung, nr Mt Patuha, 2434 m), [Rudolf] Schuh, 6.viii.1994. 1 ♂ (NSMT), Jawa Barat, Mt Gede, Cibeureum, 1600 m, 16.vii.1977, Shinji Nagai.



Figs 76-80, *Scotomedes gedehensis* spec. nov., paratype, ♂ from Gedeh-Pangrango National Park. 76, right antenna, second segment, posterior view; 77, 78, end of abdomen, dorsal and left lateral view respectively; 79, pygophore, caudal view; 80, right paramere, lateral view. Bar of paramere is 0.1 mm; other bars represent 1.0 mm.

Habitus.— Small species, very similar to *S. minor* Breddin.

Holotype.— Head: upper side dark to blackish-brown, under side black, neck towards its base yellowish; bucculae and base of labrum brown, rostrum and antennae light brown. Ratio of antennal segments: 5:15:10:9; second antennal segment (fig. 76) rather long, thin and somewhat curved, antennal seta rather far beyond middle of segment (0.56-0.60), distal 0.3 yellow and setose, proximal part almost bare. Ocelli small, their diameter smaller than distance to compound eyes.

Thorax black, except dark brown posterior half of pronotum and scutellum, entirely matt, medial half of anterior calli glossy, central calli of anterior half with irregular fine glossy lines; collar shining black; lateral margin of pronotum finely ridged, its anterior part only moderately sinuate. Medio-posterior part of metapleura including operculum of scent gland orifice yellow, scent fluid dispenser brown with some

blackish longitudinal vittae. Legs dark to light brown, tarsi yellowish; setal fringe at posterior margin of hind trochanters insignificant. Fore wings somewhat shortened (subbrachypterous) as in *minor*.

Pronotum and scutellum richly set with long (0.15 mm), erect setae; The 'standard' setae on anterior corner of pronotum, on anterior calli and on lobal calli very long (0.25-0.35 mm). setation on fore wings 0.6 mm.

Abdomen including pygophore brown, sides of sternites lighter, extreme lateral margins of the sternites partly black; lateral margins of sternites 4-6 each with a narrow band of densely set short setae; abdominal tergites with some red; sides of tergites 2, 8, and dorsal surface of pygophore with loose tufts of very fine, long, silky setae; pygophore in dorsal aspect (fig. 77) semicircular, lateral walls moderately developed, posterior wall (fig. 77, 78) inflated, somewhat posteriorly produced, its dorsal surface in caudal aspect (fig. 79) almost straight; parameres (fig. 80) s-shaped, hook laterally flattened, lateral extension ("operculum") large. Female unknown.

Measurements.— tl, 6.9; lb, 5.6; lw, 4.2; ww, 3.6; lh, 1.25; wh, 1.12; lp, 1.3; wp, 2.2; la, 1.25; lr, 1.0; lt, 3.1.

Distribution.— Indonesia (West Java, Preanger, Gedeh-Pangrango Mountains). Altitude: 1400-2434 m.

Etymology.— The name *gedehensis* refers to the type locality, Mount Gedeh on Java

Notes.— A small species, reminding of *Scotomedes minor* but somewhat slimmer in appearance, macropterous or slightly brachypterous; to distinguish from *S. minor* by the longer second antennal segment, the much less pronounced sinuation of the anterior part of the lateral margin of the pronotum, and the differently formed parameres. The three specimens collected by Dr Schuh are somewhat darker in colour, and the second antennal segments are a little shorter than the other specimens while the fore wings are slightly brachypterous like in *S. minor*. The specimens are covered with a layer of dirt, exactly as in *S. minor*, unquestionably in connection with their way of life, which, however, is unknown.

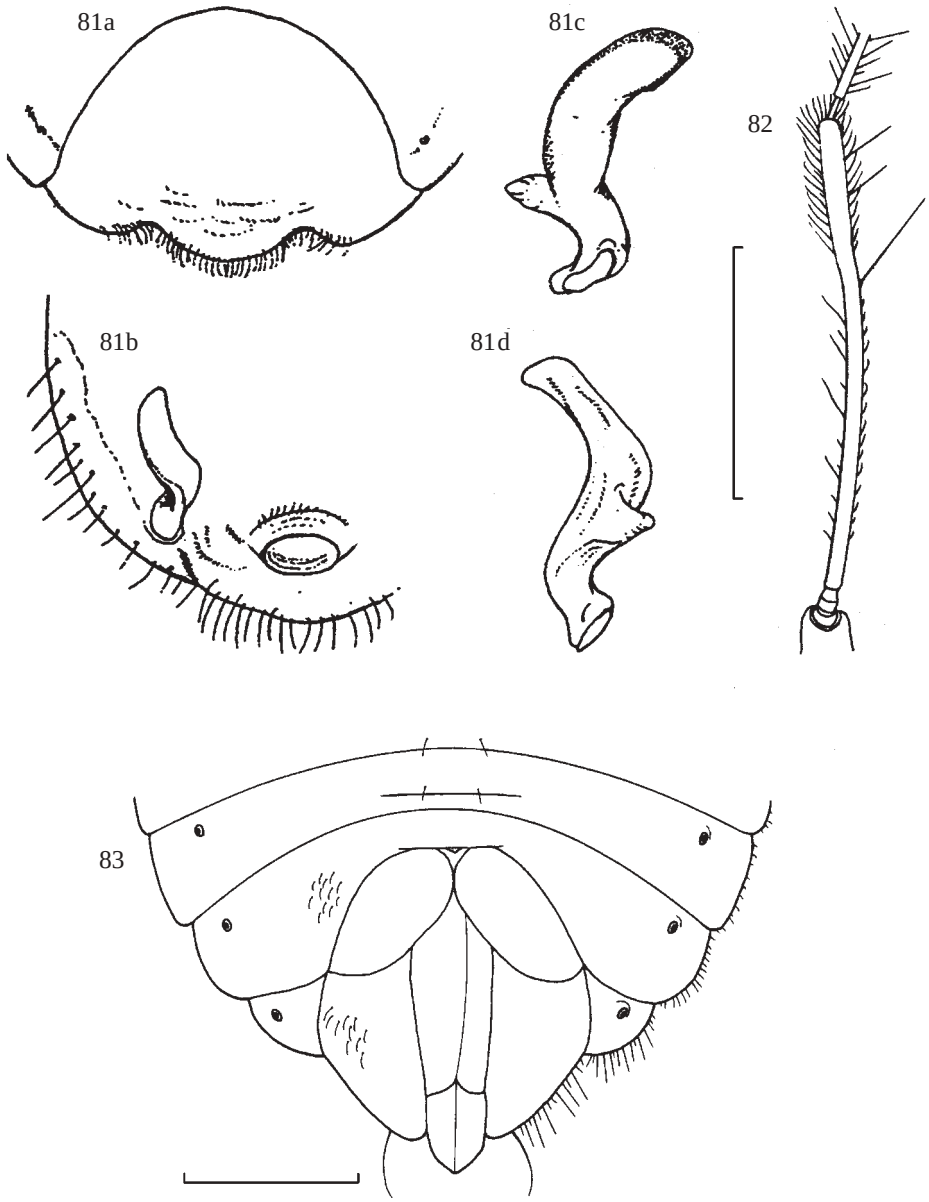
Scotomedes guangxiensis Ren, 2000
(figs 81-83)

Scotomedes guangxiensis Ren, 2000: 28, figs 10-14.

The holotype is a male (TMNH, not seen by the present author, type locality: Na'po County, **China**, Guangxi Prov., 1440 m, (23º24'N, 105º51'E), 5.iv.1998, Wu Chunsheng) close to *S. distanti* spec. nov., but according to Ren's description *S. guangxiensis* is larger (11.1 mm) and black, it has the apical margin of the cup undulate, the hook of the paramere not twisted (fig. 81 c, d), the stand is in situ different. The female unknown, but the female from North Vietnam may belong here.

A female specimen (♀ (NSMT), N. Vietnam, Deo Qui Ho, 1750 m, Sapa [Sa Pa, 22º56'N-103º48'E], Lao Cai Prov., 3.x.1995, M. Tomokuni) may be the female of this species.

Habitus.— Almost totally black, end of second antennal segment and spots on fore wings ochraceus;



Figs 81-83, *Scotomedes guangxiensis* Ren. 81 a-d, holotype ♂, a, b, pygophore in ventral and dorsal view resp.; c, d, paramere in different positions. 82, 83, female specimen, supposed to belong to this species. 82, right antenna, second segment, anterior aspect; 83, end of abdomen, ventral aspect. Bars represent 1.0 mm. (fig. 81 a-d, from Ren, 2000).

Head.— Black (inclusive eyes), towards rostrum, mandibular plates, maxillary plates and bucculae dark brown, rostrum brown. First antennal segment brown, second segment (fig. 82) short (1.75 mm), somewhat curved, black with apical third somewhat swollen, yellowish ochraceus, setation longer than diameter of segment, seta long (0.4 mm) on two thirds from base (ratio 0.65); third and fourth segments smoky tinged. Upper side of head with short, yellow, curled-down setae, medially of eyes some longer together; a long erect seta near inner-anterior corner of each ocellus, and three such setae at each side of occiput behind ocelli and eyes; setation of ventral side longer than of upper side, semi-erect. Ocelli large (0.12), diameter greater than distance to eye.

Thorax.— Pronotal collar shiny, its base narrowly matt; anterior part of pronotum semi-matt, ornamented with a pattern of shining black fine lines and dots; anterior corners and frontal calli each with a long, erect seta; general setation of upper side, especially of anterior part, long. Legs blackish, coxae, trochanters and base of femora brown to blackish-brown, apices of tibiae and tarsi brown. Fore wings black, each with two yellowish ochraceus spots along costal margin and one beyond the tip of the cuneus; setation rather long, brownish. Ventral side of thorax black, metasternal scent gland spout apically somewhat club-shaped.

Abdomen.— Abdomen dark brown, ventral side towards anterior corners lighter; end of abdomen, ventral aspect (fig. 83): seventh sternite posteriorly deeply and broadly emarginate, its posterior margin medially thin, straight, sub-laterally swollen, posterior corners rounded; squama just visible as a small triangle, gonocoxites VIII broad, rounded and touching each other in the median. Last sternites at sides remotely and coarsely setose, lateral margins of eighth and ninth laterotergites evenly rounded and markedly fringed with long and short setae.

Measurements.— tl, 10.5; lb, 9.0; lw, 7.1; ww, 4.9; lh, 1.45; wh, 1.4; lp, 2.0; wp, 3.4; la, 1.75; lr, 3.25; lt, 4.4.

Distribution.— China (Guangxi), ?Vietnam (Lao Cai, NE slope of Fan Si Pan Mt.). The female was collected at an altitude of 1750 m.

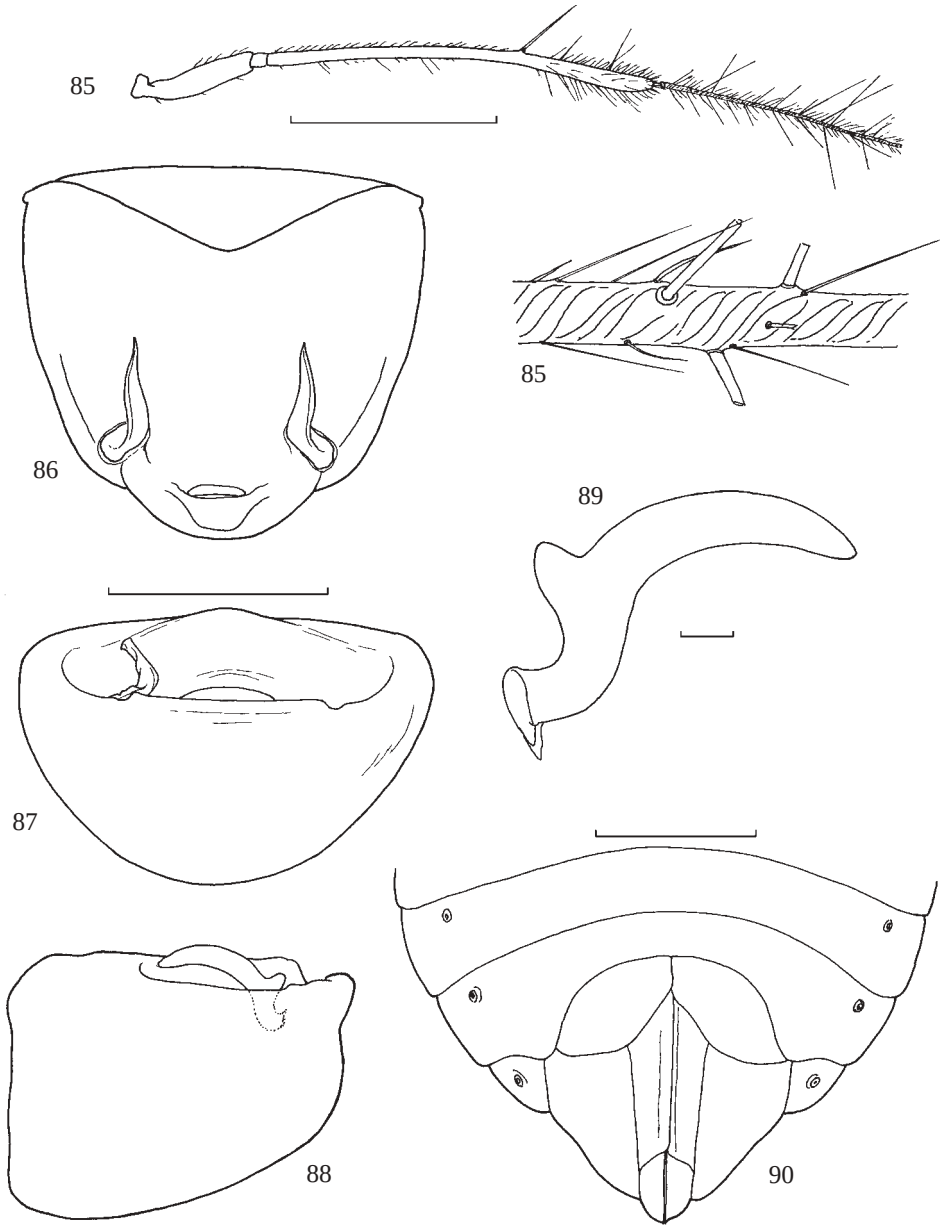
Scotomedes lemoulti spec. nov.
(figs 84-90)

Material.— Holotype, ♂ (RMNH), Indo-China [**Vietnam**], Datat [?Dalat = Da Lat, 11º52'S-108º24,5'E], 23.iii.1924, E. Le Moult. Paratype, 1 ♀ (RMNH), same data as holotype;

Habitus.— Small species (9.5 mm).

Head.— Upper side of head dark brown, densely set with small adpressed light setae, several long, erect setae on vertex behind eyes; ocelli small, about 3/5 of distance to eyes; ventral side of head, including sides anterior of eyes, blackish, setae semi-erect, remotely set; rostrum light brown; antennae brown, second segment (fig. 84) slightly curved beyond middle, apical 1/3 yellow and denser yellowish setose, antennal macroseta small, far beyond middle of segment situated (ratio 0.64-67). "Velocipediform structure" of Zrzavý, 1990: 201) of the last two segments is here shown in fig. 85.

Thorax.— Pronotum and scutellum very dark brown, dull, but collar, mesal parts of anterior calli and irregular markings on rest of anterior part of pronotum, shining;



Figs 84-90, *Scotomedes lemoulti* spec. nov. 84-89, holotype, ♂; 84, right antenna, first three segments, posterior aspect; 85, part of third segment strongly enlarged showing "Velocipediform structure"; 86-88, pygophore, dorsal, caudal and left lateral aspect respectively; 89, right paramere, lateral aspect. 90, paratype, ♀, end of abdomen, ventral aspect. Bars of 85 and 89 represent 0.1 mm; other bars 1.0 mm.

prosternum and thoracic pleurae dull blackish; fore wings light brown, clavus darker, yellow subcostal markings small: proximal markings not attending costal margin, distal markings not surpassing cuneal cleft, membranal spots well marked, almost white; legs brown, tips of tibiae and tarsi lighter; pronotum, anterior part of scutellum and clavus of fore wings, richly setose with long setae (0.25 mm); rest of fore wing with similar setae (0.15 mm) along basal part of R+M; micropile on rest of corium about two times diameter of black punctures; m-cu cross vein on hind wing reduced in holotype, wanting in paratype.

Abdomen.— Upper side of abdomen reddish brown, shining, posterior parts of tergites dull, tinged with white; ventral side brown, finely shagreened; ninth segment of male (figs 86-88) with lateral walls moderately developed; hind wall smoothly rounded and extended posteriorly, laterally ending at both sides above a small pit in exterior surface of capsule, at posterior ends of lateral walls; dorsal margin of hind wall almost straight in posterior view; parameres (fig. 89) with basal process and long, curved, sideways flattened hook. Female (fig. 90). Posterior margin of seventh sternite simple, slightly thickened, not elevated; genital apophysis short, knob shaped; central tooth small, triangular, not visible; free lateral margins of eighth laterotergites flatly rounded.

Measurements.— Holotype ♂, tl, 9.3; lb, 7.8; lw, 6.4; ww, 4.35; lh, 1.3; wh, 1.25; lp, 1.75; wp, 2.95; la, 1.85; ls, 0.36; lr, 3.1; lt, 4.2. Paratype, tl, 9.6; lb, 8.2; lw, 6.4; ww, 4.35; lh, 1.35; wh, 1.3; lp, 1.7; wp, 3.1; la, 1.7; lr, 3.05; lt, 3.8.

Distribution.— Vietnam (Lâm Dông). Altitude of collection site probably 1000-2000 m.

Etymology.— The species is named in honour of the late entomologist Dr Eugène Henri Le Moult (1882-1965), who was a famous Lepidoptera collector and insect dealer in Paris.

Notes.— The male holotype is pinned through the left clavus (which is missing) and its upper surface has obviously been cleaned from dirt, at the cost of loosing most of the setation, especially of pronotum and scutellum. The specimen is missing from left antenna segment IV, from right antenna segments III and IV, four tarsi and left hind leg; abdomen was removed, genital capsule dissected and placed with the rest of the abdomen in a microvial underneath the specimen. The female paratype still bears the original dirt on its upper surface.

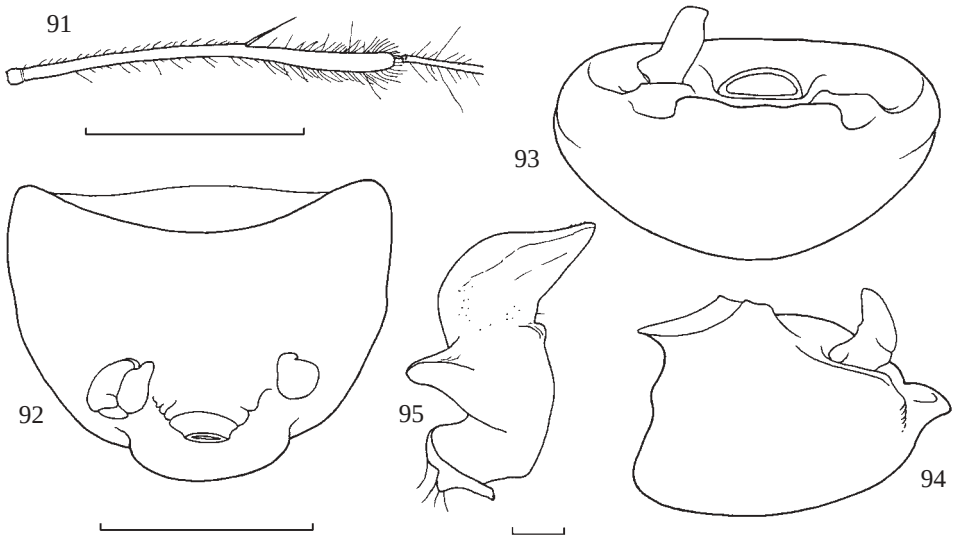
Scotomedes maai spec. nov.
(figs 91-95)

Material.— Holotype, ♂ (BPBM), South **China**, Fukien [Fujian], Chungan, Bohea Hill, 31.iv.1938, T.C. Maa.

Habitus.— A large species, resembling *Scotomedes alienus* (Distant, 1904).

Head.— Upper side dark brown, with small decumbent silvery setae, ventral side with longer, erect setae; rostrum and antennae light brown, distal third of second segment, and rest of antennae lighter and longer setose; macroseta on second segment (fig. 91) situated beyond middle of segment (ratio 0.60).

Thorax.— Anterior part of pronotum blackish-brown and shiny, posterior part dark brown, scutellum blackish-brown, prosternum and thoracic pleurae black, meso-



Figs 91-95, *Scotomedes maai* spec. nov., holotype, ♂. 91, right antenna, second segment, posterior aspect; 92-94, pygophore, dorsal, caudal and left lateral aspect respectively; 95, right paramere, lateral aspect, bar is 0.1 mm; other bars represent 1.0 mm.

and metasterum and scent gland orifices brown; fore wings brown, clavus darker, membrane lighter, each wing with three yellowish white markings along anterior margin; hind wing with m-cu cross vein very short; pile on pronotum, scutellum and wings short, prosternum with some erect, silvery setae, mesosternum with many of such setae.

Abdomen.— Upper side of abdomen red but posterior halves of tergites II-VI yellowish white, seventh tergite almost entirely so; ventral side brown, lateral margins of laterotergites densely fringed with short yellow setae; caudad processes of posterior corners of seventh tergite, small; genital capsule (figs 92-94) semicircular in dorsal view, with posterior margin evenly rounded, raised, and firmly produced caudad (fig. 92, 94); dorsal margin of posterior wall almost straight as seen from behind (fig. 93), postero-ventral margin of capsule sinuous in profile (fig. 94); parameres (fig. 95) very short, thick-set, with well developed lateral lobe and short, tapering, obliquely directed spur.

Measurements.— tl, 10.4; lb, 8.7; lw, 6.8; ww, 4.5; lh, 1.3; wh, 1.3; lp, 1.9; wp, 3.2; la, 1.8; ls, 0.35; lr, 3.0; lt, 4.0. Female unknown.

Distribution.— S. China. The altitude is unknown.

Etymology.— The species is named, in honour of the late Prof. Dr T.C. Maa (1910-1992), a passionate scholar and collector of insects (Lin, 1992).

Note.— The specimen, pinned through the scutellum is missing from left antenna the segments 2-4, from right 4, left posterior and right middle tarsi, and right posterior femur. The dissected pygophore is stored in glycerin in a microvial pinned underneath.

Scotomedes minor (Breddin, 1903)
(figs 45, 96-103)

Velocipeda minor Breddin, 1903: 248.
Velocipeda minor; Reuter, 1908a: 90.
Scotomedes minor; Blöte, 1945: 324; Cobben, 1968: 130, ♀(egg).

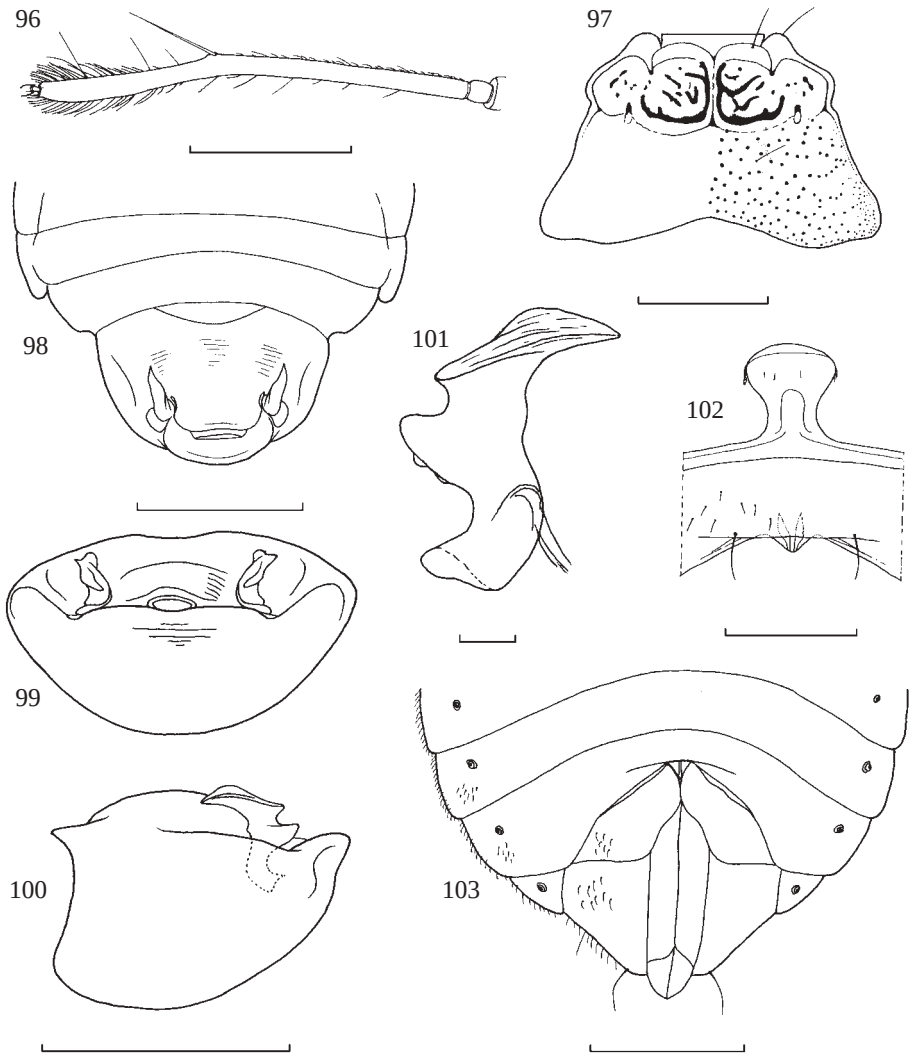
Material.— Holotype, ♀ (DEI, not seen), [**Indonesia**], Java. 5 ♂♂, 8 ♀♀, 1? (RMNH), 1 ♂, 1 ♀ (USNM), W-Java, Preanger, G. Tangkoeban Prahoe [Tankuban Prahu], 4000-5000 voet (1220-1525 m), F.C. Drescher, various data: 2 ♀♀, i.1933; 1 ♀, viii.1936; 5 ♂♂, 3 ♀♀, ix.1936; 1 ♀, x.1936; 1 ♀, 1 ?, 1 nymph-IV, i.1937 / FCD S91 / Museum Leiden, *Scotomedes minor* Bredd., det. H.C. Blöte; 1 ♀ (ZMAN), 24.iii.1930, Dr D. Mac Gillavry, "*Velocipeda* spec.?, det. M. Gill. [19]31"; 1 ♂ (QMBA), Java, [Mt] Tankuban Prahu, via Bandung, 12.xii.1975, G.B. & S.R. Monteith; 4 ♀♀ (USNM), 1 ♀ (RMNH), Indonesia, W Java, Lembang [S-side of Mt Tankuban Prahu, 1247 m., 6º48'S-107º36'E], vii-1991, K. Snyder.

Habitus.— Smallest species, body 6.5-7 mm (brachypterous) brown, upper side more or less glossy (usually concealed by a layer of disguising dirt), except for anterior part of pronotum partially, tip of scutellum, costal area and membrane of fore wings, dull; posterior part of pronotum, scutellum and fore wings rather densely and coarsely punctured.

Head.— Upper side of head densely set with numerous small curved white setae giving head a somewhat rough appearance; second antennal segment (fig. 96) slightly curved, light brown, but terminal 3/10 part yellowish-white and densely setose; antennal macroseta situated beyond middle (ratio about 0.62); last two segments light brown to yellowish-white; ratio of antennal segments I-IV: 1:2.8:1.6:1.6; rostrum light brown, reaching posterior coxae. Ocelli small, diameter 0.06 mm, 0.12 mm from eye.

Thorax.— Anterior part of pronotum (fig. 97) blackish-brown; marginal ridge, considerably laterally extended and sinuate, dorsally recurved, forming a sulcus and ending anteriorly in a small rounded projection near collar, the anterior corner; anterior calli shiny, central calli and sides dullish leaving glossy oblique markings on central calli; posterior part dark brown. Scutellum very dark brown with strongly inflated posterior part; pronotum and scutellum richly set with long erect dark setae; anterior corners, anterior calli and lobal calli each with a longer seta. Fore wings somewhat brachypterous (fig. 30), brown, each with a large yellowish costal marking, a smaller marking at top of embolium, a less determined spot on membrane and a small spot at membranal basal corner; hind wings of the brachypterous form with reduced but distinct veins (fig. 33). Sides and ventral side of thorax mainly blackish, metapleural orifical peritremes of scent glands light brown; legs light brown, glossy with very fine shagreened longitudinal streaks at ventral side, upper side of tibiae, and tarsi dull.

Abdomen.— Sternites brown, dullish by microscopic surface sculpturing, with numerous rather short decumbent yellow setae; in the male lateral margins of sternites 4-6 extensively covered with fine, short, antero-lateral directed setae; tergites light brown, posterior half to three fourth whitish dull. Genital capsule of the male (figs 98-100) almost semicircular in dorsal view, dorsal surface set with many long, fine silky setae, posterior wall broad, inflated, somewhat protruding caudad and evenly rounded (fig. 98), in posterior view (fig. 99) almost straight or slightly rounded; paramere (fig. 101) with large proximal lobe, a small posterior lobe, and an obliquely and upwardly directed, sharply pointed spur. Female: abdomen broad, in flat position



Figs 96-103, *Scotomedes minor* (Breddin, 1903). 96, right antenna, second segment, frontal aspect; 97, pronotum of female specimen, showing pattern on calli; 98, end of male abdomen, dorsal aspect; 99, 100, pygophore, caudal and left lateral aspect, respectively; 101, right paramere, lateral aspect; 102, female, apophysis of seventh sternite; 103, end of female abdomen, ventral aspect. Bars of 101 and 102 represent 0.1 mm; other bars 1.0 mm.

almost circular in shape (fig. 103); posterior margin of seventh sternite mesially deeply and broadly excavated, raised with regard to genital sclerites behind, and with transverse fold over triangular small squama; Apophysis as in fig. 102. Gonocoxites VIII broad, touching each other medially, lateral margins of eighth laterotergites flatly rounded. Ripe ovarian eggs studied and depicted by Cobben (1968: 130, 131, figs 140, 265).

Measurements (in mm).— male: tl 6.5; lb, 5.4; lw, 4.2; ww 3.45; lh, 1.1; wh, 1.15; lp, 1.3; wp, 2.4; la, 1.25; lr, 2.3; lt, 2.9. Antennal segments (#2486, ♂ of QMBA): I, 0.43, II, 1.27, III, 0.68, IV ± id., ratio: 1:2.9:1.6:1.6.

Distribution.— West Java. Only known from the Mt Tankuban Prahu West Java, at an altitude of 1200-1500 m.

Notes.— According to Dr E. Groll (Eberswalde) Breddin's type specimen of *Velocipeda minor* could not be found, although Breddin's collection went in 1910 to the Deutsches Entomologisches Institut, Berlin-Dahlem (Horn & Kahle, 1935: 29) which is now in Eberswalde. So I could not check the identity of the specimens which I consider to belong to *S. minor*. However, Breddin described the anterior sinuate part of the lateral margin of the pronotum as "mit einer sehr deutlichen, gerundet-lappenförmigen Verbreitung", which is characteristic for this species indeed.

This species is closely related to *S. gedehensis* spec. nov., but is to distinguish from this species by the broader fore wings, the broader anterior sinuate part of the lateral margin of the pronotum, and the differently shaped parameres.

Scotomedes polis spec. nov.
(figs 104-109)

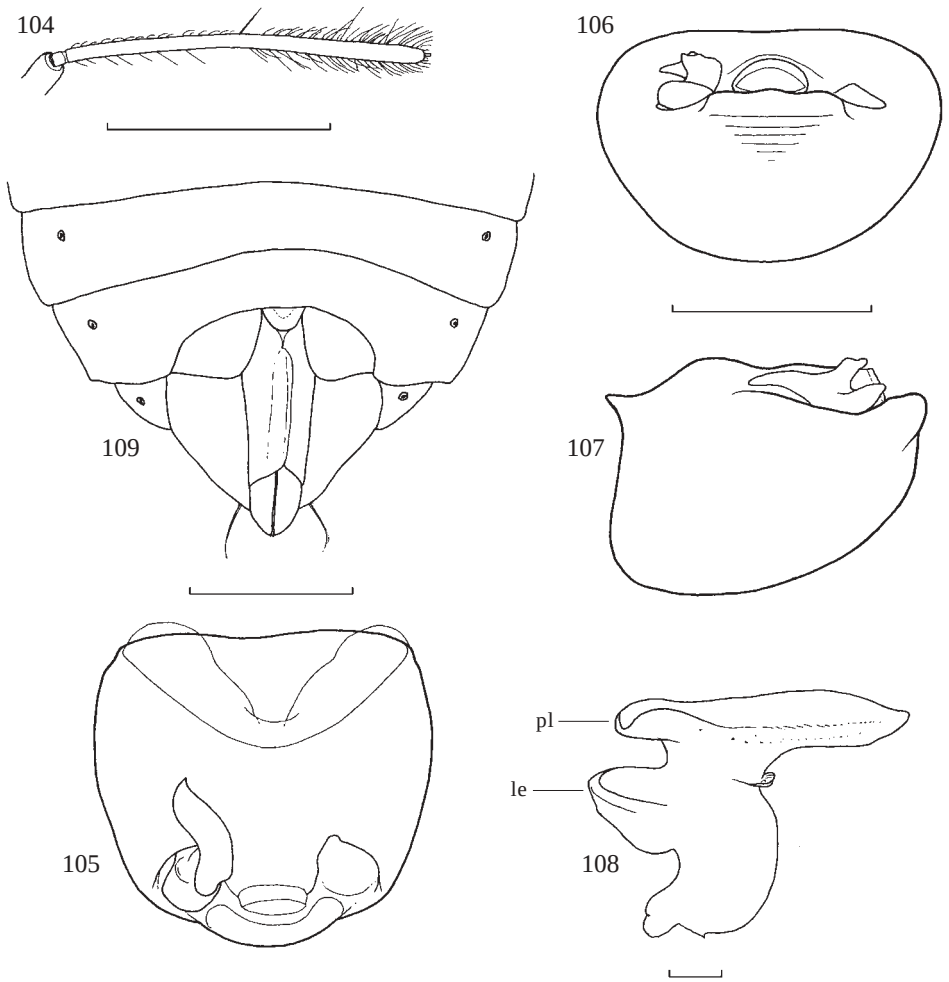
Material.— Holotype, ♂ (BMNH), **Philippines**, North Luzon, Mt Polis, 732 m, ii.[19]17, G. Böttcher. Paratypes: 1 ♂ (RMNH) and 1 ♀ (BMNH), same data as the holotype; 1 ♀ (NSMT), Philippines, N. Luzon, Baguio, Bueguet Prov., 1450 m, 9.vii.1985, M. Sakai.

Habitus.— Small, dark brown species with yellow markings on exocorium.

Head.— Upper side dark brown with silvery curved semi-adpressed setae, ventral side blackish, with long and erect silvery setae; antennae proximally brown, from middle of second segment on, yellow and denser setose; macroseta on second segment (fig. 104) short (0.14 mm), situated at about middle of segment, ratio 0.45-0.50; rostrum relatively long, almost surpassing mesocoxae; ocelli small, diameter shorter than distance to eyes.

Thorax.— Pronotum and scutellum dark brown, pile rather short, curled down; Prosternum, meso- and metapleurae dull black, pile on prosternum and metasternum long, erect; corium and membrane brown, with a yellow spot on exocorium adjoining costal border at one third from wing base to cuneal cleft, a second spot, well marked in female but almost absent in male specimens, at corial tip against cuneal cleft, and a third on membrane near tip of cuneus; pile on fore wings short, decumbent; hind wing with m-cu cross vein wanting in holotype, short in paratype.

Abdomen.— Tergites of abdomen red with yellow posterior margins, seventh and eighth tergites and genital capsule dorsally with erect silky setae, lateral margins of ventral laterotergites fringed with short setae (figs 42, 43); sternites reddish brown, mid-ventral setae long, 0.19-0.2 mm; posterior corners of seventh sternite each with small, caudad, nipple-like processus. Genital capsule of male (figs 105-107) brown, lateral wall shallow, profile of postero-ventral margin rounded (fig. 107), posterior wall higher, roundly produced caudad (fig. 105), dorsal rim of wall almost straight as seen from behind (fig. 106); parameres (fig. 108) shiny blackish-brown, thick-set, with large proximal lobe, an almost equally developed posterior lobe and flattened, straight apical spur.



Figs 104-109, *Scotomedes polis* spec. nov. 104, paratype, ♂, left antenna, second segment, frontal aspect; 105-108, holotype, ♂. 105-107, pygophore, dorsal, caudal and left lateral aspect respectively; 108, right paramere, lateral aspect. 109, paratype, ♀, end of abdomen, ventral aspect. Bar of paramere represents 0.1 mm; other bars 1.0 mm. Abbreviations: le: lateral extension; pl: posterior lobe.

Female (fig. 109).— Seventh sternite posteriorly evenly excavated, posterior margin along excavation minutely thickened, posterior angles rather sharp; central tooth (squama) exposed, broader than long, its posterior margin rounded and somewhat turned-up, resting over swollen bases of gonocoxites IX; gonocoxites VIII short, broad, rounded, wide apart; laterotergites IX slightly inflated.

Measurements.— Holotype ♂, tl, 7.8; lb, 7.0; lw, 5.75; ww, 3.8; lh, 1.3; wh, 1.17; lp, 1.5; wp, 2.9; la, 1.65; ls, 0.14; lr, 2.95; lt, 3.7; female paratype, tl, 9.6; lb, 7.9; lw, 6.3; ww, 4.0; lh, 1.1; wh, 1.2; lp, 1.6; wp, 2.95; la, 1.65; lr, 3.1; lt, 3.8.

Distribution.— Philippines (Luzon, Mt Polis). One paratype from 1450 m altitude.

Etymology.— The name of the species refers to the Mount Polis where the holotype was collected.

Notes.— The holotype, now glued to a carton point was seriously damaged by the original pin which was inserted through the right claval suture, separating the rest of the right fore wing and the hind wing from the specimen, both are lost; from the remaining specimen three tarsi are missing. The abdomen and dissected male appendages are preserved in glycerin in a microvial pinned underneath the specimen. I failed to find a mountain named Polis, even not in the Gazetteer of the Philippine Islands (1953, suppl. 1972), only Polis Pass, which maybe the collecting locality of the three specimens. The female specimen from Baguio deposited in the Tokyo Museum is very dark in colour.

Scotomedes priscus priscus (Bergroth, 1891)
(figs 110-115)

Velocipeda prisca Bergroth, 1891: 265, fig. 2.
Velocipeda prisca; Lethierry & Severin, 1896: 225; Breddin, 1903: 248; Kirkaldy, 1906: 149, (incorrectly synonymized with *S. alienus* Distant, 1904); Reuter, 1908a: 90.
Scotomedes prisca; Blöte, 1945: 324.
Scotomedes priscus; Kerzhner, 1988: 12.

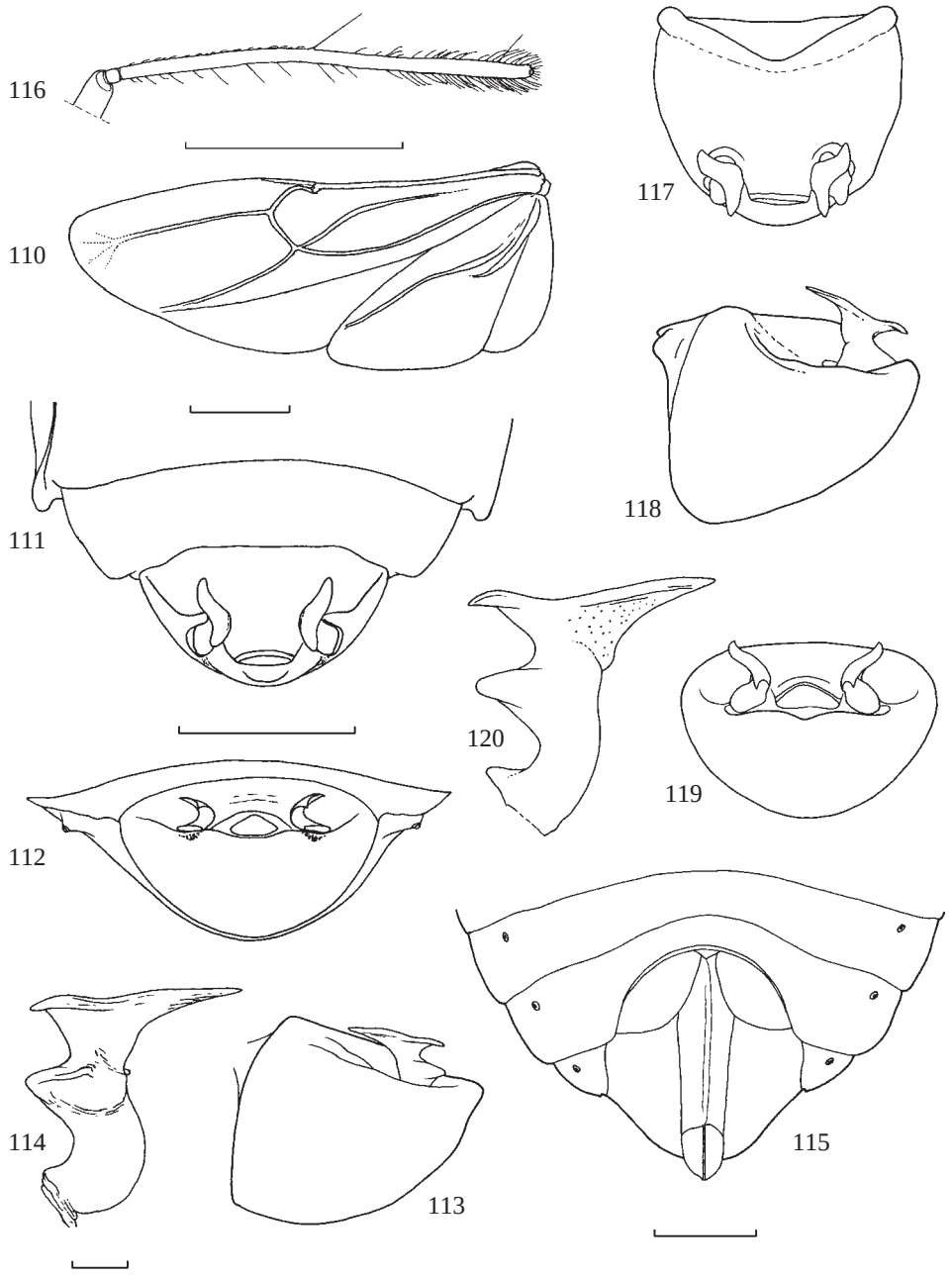
Material.— From the five male specimens (syntypes, MZHF) mentioned and described by Bergroth (1891: 265) only one specimen remained intact and is here designated lectotype of *Velocipeda prisca* Bergroth 1891, and labelled accordingly; the labels read: Java [**Indonesia**] / *Velocipeda prisca* Bergr. Typ. / Mus. Zool. H:fors Spec. typ. No.12398 *Velocipeda prisca* Bergr. / Lectotype designated by P.H. van Doesburg, 1997 / *Scotomedes priscus* (Bergroth, 1891) (Lectotype) P.H. van Doesburg det. 1981/ Mus. Zool. Helsinki Loan No. HE 1813/. The lectotype is fairly complete, only both antennae are partly mutilated: on the right side remain two, on the left only one segment. 1 ♂ (LEW), [East] Java, Blawan, Idjen [Mts], H. Lucht; 1 ♂ (BPBM), a partly disintegrated specimen, head lost, 2 nymphs (BPBM), Bali, Dadjan Danu, 28.iii.1965, J. Winkler; 1 ♀ (CEH), Indonesia, Bali, Gg [Gunung, Mt] Catur, Bergwald [mountain forest], env. Bratansee [Danau (lake) Bratan], 1500 m, 26.xi.1999, E. Heiss.

Habitus.— Total length of body 9.5-11 mm, overall colour dark to light brown.

Head.— Upper surface dark brown, rather densely set with short, white, decumbent setae, ventral side blackish-brown, labrum, rostrum and antennae light brown, apical two fifths of second antennal segment (fig. 116, as in *S. p. jacobsoni* subspec. nov.) yellowish, with a tuft of longer light setae, macroseta of second antennal segment situated at middle of segment, ratio 0.46-0.49; last two segments yellowish white.

Thorax.— Anterior part of pronotum dark brown, shining, with irregular dull stripes, scattered with erect short pile; posterior part dull brown; scutellum dark brown, posterior inflated part lighter; prosternum, thoracic pleurae and adjacent part of hypocostal area of fore wings, blackish, prosternum and metasternum with some short setae; fore wings brown with two yellowish white spots along costal margin and one on membrane near tip of the cuneus; setae on fore wings rather short (0.03-0.05 mm.), hardly longer to longer (on exocorium) than diameter of blackish rimmed punctures; m-cu cross vein in hind wing (fig. 110) wanting; legs brown, tibiae somewhat lighter, especially towards end, tarsi yellowish.

Abdomen.— Colour of abdominal sternites brown, glossy, short setose, lateral



Figs 110-120, *Scotomedes priscus* (Bergroth, 1891). 110, left hind wing of syntype. 111-114, ♂ from Java. 111, end of abdomen, dorsal aspect; 112, 113, pygophore, caudal and left lateral aspect respectively; 114, right paramere, lateral aspect. 115, ♀ from Java, end of abdomen, ventral aspect. 116-120, *Scotomedes priscus jacobsoni* subspec. nov. 116, left antenna, second segment, anterior aspect; 117-120, corresponding parts of the subspecies. Bars of figs 114 and 120 represent 0.1 mm; other bars represent 1.0 mm.

margins bare; tergites reddish brown, posterior half of segments whitish dull; posterior corners of tergite seven with small posteriorly directed lobes (fig. 111); genital capsule (figs 111-113) almost semicircular in dorsal view, its width not more than two fifth of total width of segment; lateral margins posteriorly slightly raised forming a low lateral wall (fig. 113), posterior wall higher, hardly produced caudad, mesially narrowed and dorsal margin shallowly emarginate as seen from behind (fig. 112); parameres (fig. 114) in rest almost anteriorly directed (fig. 111) with a rather short shaft, a well developed proximal lobe, a sharp, flat, posterior lobe and a long, dorsally flattened, sharp spur.

Female (fig. 115).— Posterior margin of seventh sternite deeply and roundly emarginate; edge of emargination slightly thickened; lateral margins of eighth laterotergites shallowly rounded; gonocoxites VIII with evenly rounded free margins central tooth small, visible.

Measurements.— ♂ lectotype: tl, 9.4; ww, 4.3; wp, 3.0; wh, 1.27. ♂ from Java, Idjen Mts: tl, 9.5; lb, 7.7; lw, 6.3; ww, 4.1; lh, 1.3; wh, 1.28; lp, 1.7; wp, 3.0; la, 1.6; lt, 4.0.

Distribution.— Java, Bali. Altitude: Blawan is over 1000 m, the specimen from Bali is from 1500 m.

Notes.— Concerning the type series of Bergroth's V. *prisca*, Dr M. Meinander stated (*in litteris*, 1970) that "The other four specimens of the type series are not in our museum but somewhere else". Bergroth in his paper states that the specimens came from the "Tenggir-Gebirgen (Tengger Mountains) in Ost-[East] Java" and were collected by H. Fruhstorfer. The most visited place is Tosari, at 1770 m altitude. Another (female) specimen with same data is mentioned by Breddin (1903) being in his collection (now in Eberswalde, not seen). From the other paralectotype specimens only four fore wings remained in the Helsinki Museum [rest lost by anthrenes?], glued to a card, and provided with the same locality label as the lectotype.

Scotomedes priscus jacobsoni subspec. nov.
(figs 116-120)

Holotype, ♂ (RMNH), [**Indonesia**], Sumatra, Air Njuruk, Dempu, 1400 m, viii.1916, E. Jacobson. Paratype, ♀ (BMNH), W. Sumatra, Lebong Tandai, 1067 m., 1923, Mr. Lanangia[?], C.J. Brooks Coll.No. 15216, B.M. 1936-681; 1 ♀ (NSMT), N. Sumatra, Brastagi [Berastagi], 27.iv-4.v.1988, A. Saito.

The Sumatran specimens are somewhat larger than the specimens of the nominal subspecies; head, anterior part of pronotum and scutellum are darker, the ratio of antennal seta is 0.47; the setae on the corium are shorter, the setae on the ventral side of the head, on the prosternum and on the metasternum are longer and the posterior lobe of the paramere somewhat larger and slightly bent dorsad (fig. 120).

Female.— As in nominal subspecies, fig. 115.

Measurements.— Holotype ♂: tl, 10.24; lb, 8.7; lw, 6.9; ww, 4.2; lh, 1.35; wh, 1.32; lp, 1.75; wp, 3.15; la, 1.9; lr, 3.5; lt, 4.6. ♀ paratype from Lebong Tandai, tl, 10.9; lb, 9.0; lw, 7.7; ww, 4.9; lh, 1.65; lp, 2.05; wp, 3.4; la, 1.9; lr, 3.7.

Distribution.— Indonesia (Sumatra). Altitude: 1067-1400 m. Berastagi is situated over 1000 m altitude.

Etymology.— The subspecies is named after Dr h.c. Richard Edward Jacobson (1870-1944), a merchant at Semarang (Java) and a gifted naturalist and collector of insects in Java, Sumatra and Simaloer Islands (de Meijere, 1946).

Note.— The holotype of the subspecies is missing three joints of the right antenna, two of the left one, and the right fore tarsus, the prothorax is glued to the rest of the body. The paratype specimen is damaged by the pin through the right clavus separating thr right fore wing (glued underneath), and is missing parts of the antennae, two legs and a tibia.

Scotomedes rudolfi spec. nov.
(figs 121-126)

Material.— Holotype, ♂ (RMNH), **Malaysia**, Pahang, Cameron Highlands, Tanah Rata Umg., Gn [Gunong; = Mount] Jasar, 1300 m, 25.ii.1997, Schuh & Long. Paratype, ♀ (CEH), [W] Malaysia, Perak, Gg [Gunong] Besar, 1700 m, 11-19.iii.1998, P. Cechovsky.

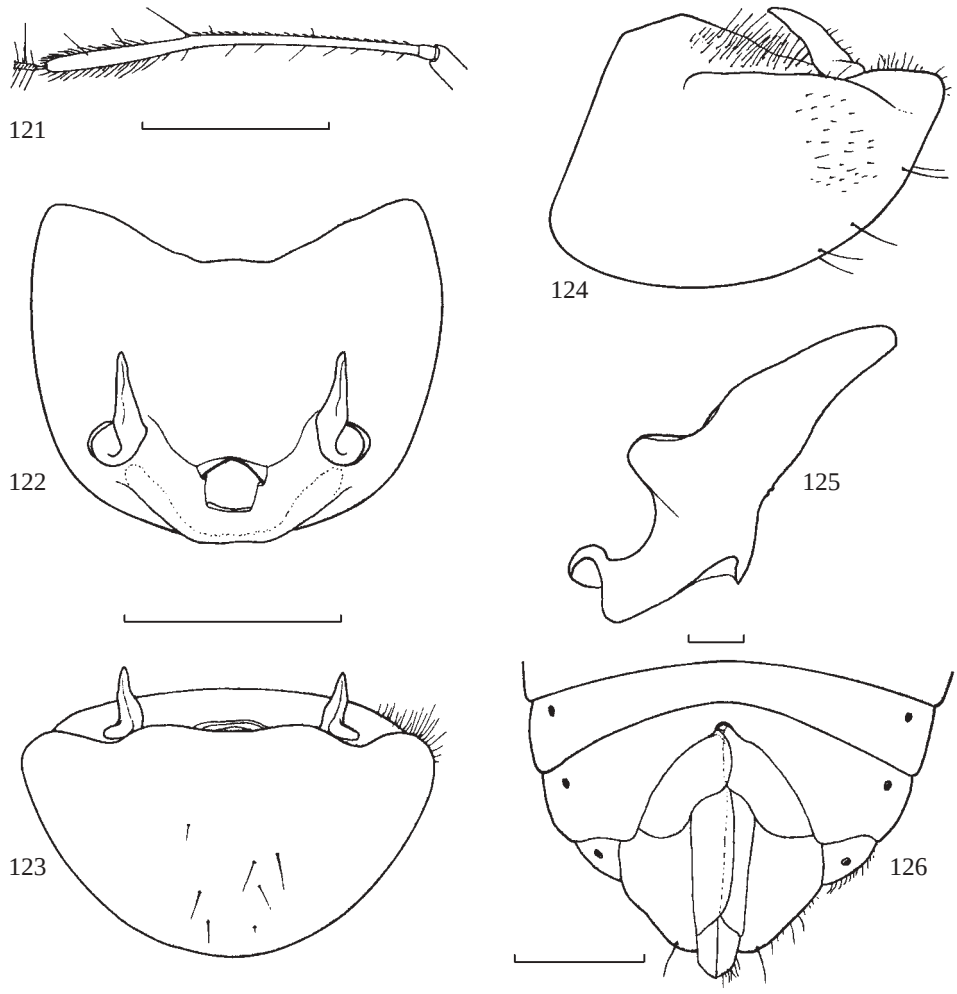
Habitus.— Blackish-brown (holotype) to black (paratype), legs brown, length of body 10.4-10.7 mm, with three yellow markings on each fore wing.

Head.— Setation of upper side of head short, decumbent, yellowish-brown, setation of underside scanty; gular setae present. Ocelli rather small, their diameter smaller than distance to eyes (5:7). Antennae blackish-brown, basal two thirds of first segment brown, second segment (fig. 121) long, 2 mm, apical third yellowish brown, set with abundant golden setation, macroseta (0.13 mm) situated well beyond middle of segment, ratio 0.64-0.67; last segments dark brown. Rostrum just attaining metacoxae;

Thorax.— Anterior part of pronotum matt with fine shiny lines; macro setation well present; general setation short but anterior part between the calli with some longer curled setae; macrosetae on anterior corner 0.08 mm), anterior calli (0.12 mm) and on somewhat developed lobal calli (0.1 mm); posterior part and scutellum densely punctured; fore wings each with three yellow dots along costal margin, a round one about midway exocorium, a second, triangular, against the apical corner of the exocorium, and a small one at the end of the cuneus; length of cuneus about 1.8 times cuneal (costal) fracture; setation of surface well present, short, 0.03-0.06 mm. Mesosternum and scent gland peritreme black; legs brown, tarsi yellow, femora towards knees a little blackened.

Abdomen.— Sternites brown, spiracular peristomes light; male, posterior produced corners of seventh laterotergites short and rounded; pygophore (figs 122-124) broad, rounded behind, posterior wall moderately produced posteriorly, its dorsal margin in posterior view only slightly concave; dorsal surface of pygophore anterior of parameres, set with very long, fine, erect setae; parameres (fig. 125) *in situ* directed straight forwards (fig. 122), hook almost straight, apically flattened, lateral extension near base, well developed. posterior margin of hind trochanters strongly setose and lateral margins of sternites 3-7 densely set with short stiff brown setae (secondary sexual characters).

Female paratype (fig. 126).— Posterior margin of seventh sternite mesially sharply emarginate and curved-up over squama for only a short distance, laterally with transverse folds and its posterior margin finely margined, sublaterally somewhat posteriorly lobed; gonocoxites VIII basally very broad, membranous, rounded, covering squama for greater part and largely overlapping each other right over left, which is also the case in the gonocoxites IX; lateral margins of the eighth laterotergites only



Figs 121-126, *Scotomedes rudolfi* spec. nov. 121, right antenna, second segment; 122-125, holotype, ♂. 122-124, pygophore in dorsal, caudal and left lateral aspect respectively; 125, right paramere, lateral aspect; 126, female paratype, end of abdomen, ventral aspect. Bar of paramere represents 0.1 mm; other bars, 1.0 mm.

slightly curved; gonocoxites IX shining, medially overlapping and forming an indistinct longitudinal keel.

Measurements.— Holotype: tl, 10.7; lb, 9.2; lw, 7.2; ww, 5.1; lh, 1.4; wh, 1.4; lp, 1.95; wp, 3.6; la, 2.0; lr, 3.3; lt, 4.6. Paratye, ♀, tl, 10.4; lb, 8.7; lw, 7.0; ww, 4.45; lh, 1.4; wh, 1.35; lp, 2.1; wp, 3.45; la, 1.85; lr, 3.65; lt, 4.48.

Distribution.— Malaysia (Cameron Highlands). Altitude is 1300–1700 m.

Etymology.— It is a pleasure to dedicate this species to Mr Rudolf Schuh in Wien, who collected this specimen, as well as specimens of *Scotomedes gedehensis* spec. nov.

Notes.— Larger and much darker than *Scotomedes thai* spec. nov., the general setation is much shorter; the pygophore reminds most that of *S. thai*, but posterior wall is less pronounced, side wall in profile not concave and hook of parameres much shorter. Body of holotype, including corial parts of the fore wings and excluding surface of metasternal evaporatorium, with a silvery-greyish hue.

According to Mr P. Cechovsky (Dr E. Heiss, *in litteris*): "Fundort 'Gg. Besar' liegt in den Cameron Highlands, Höhe 1600 m, Regenwald".

Scotomedes sumatrensis spec. nov.
(figs 127-132)

Material.— Holotype, ♂ (USNM), [**Indonesia**], Marang Sumatra, G. Gianelli, / "*Velocipeda prisca* Bergr., det. A.L. Montand. [Montandon]." / "*Scotomedes ater* Stål, det. R.I. Sailer".

Habitus.— Slightly larger than *S. prisca*, length of body 10.4 mm, maximum width 4.5 mm.

Head.— Dorsal surface and sides anterior of eyes, brown, with short, decumbent white setae; ventral side blackish, setae longer, semi-erect; rostrum and antenna brown, second antennal segment (fig. 127) with macroseta beyond middle of segment (ratio 0.59), apical third part light brown and denser setose with longer semi-erect setae;

Thorax.— Anterior part of pronotum mesially dark brown, shiny, sides blackish, dull; posterior part brown, dull, lobal calli rather prominent; side margins well developed, especially anteriorly; scutellum blackish-brown; prosternum, thoracic pleurae and anterior part of corial hypocostal area, black; fore wings and legs brown; three spots along costal area of each fore wing, yellowish; m-cu cross vein not visible; end of tibiae and tarsi yellowish brown; Anterior part of pronotum scattered with long (0.12 mm) yellow pile, pilosity of fore wings relatively long, near base about 0.12 mm, distally 0.07 mm;

Abdomen.— Sternites brown and semi-glossy, posterior corners of seventh laterotergites with a lobe-like caudad extension (fig. 128); pygophore (figs 128-130) posteriorly almost semicircular in dorsal view, lateral walls almost wanting, posterior wall well developed, thick, rounded and slightly projecting caudad; parameres (figs 131, 132) with extremely short, curved basal part, a laterad flattened lateral lobe, a flattened stem, and a bent apical part with short mesad spur; Female unknown.

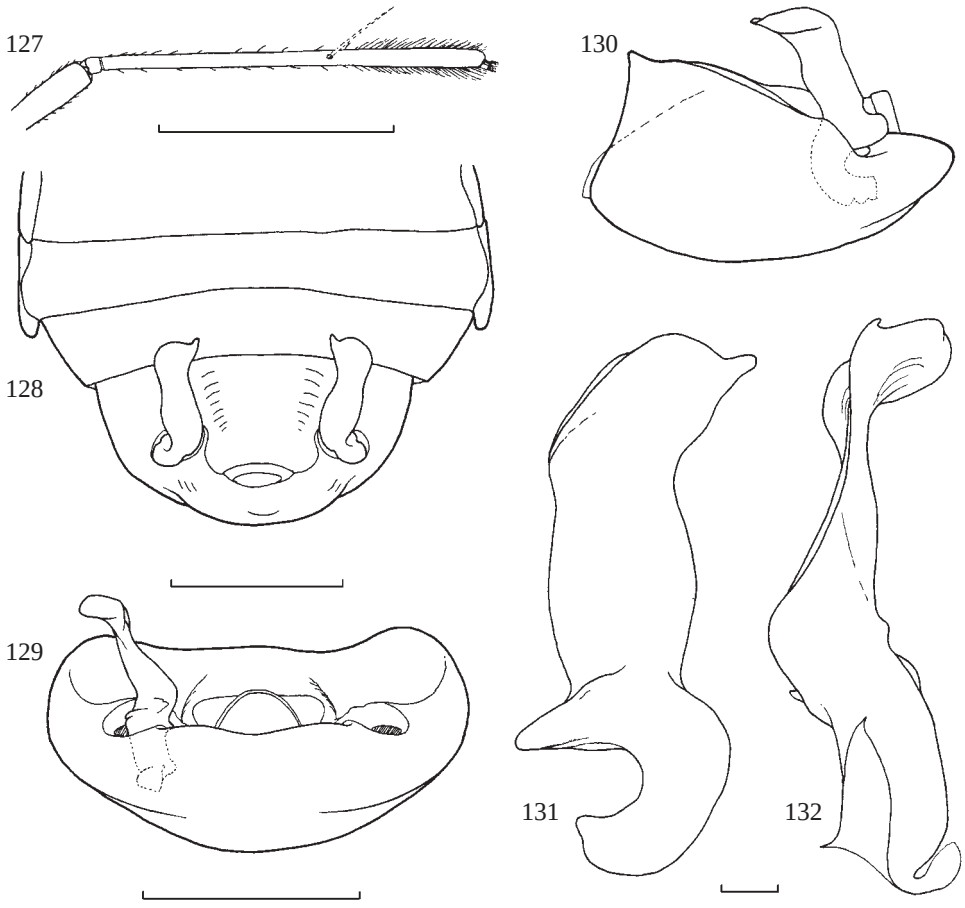
Measurements.— Holotype, tl, 10.4; lb, 8.2; lw, 6.94; ww, 4.5; lh, 1.3; wh, 1.35; lp, 1.8; wp, 3.2; la, 1.27; lr, 2.85; lt, 4.0.

Distribution.— Indonesia (Sumatra). Marang is situated near the coast at an altitude of less than 50 m.

Etymology.— The name of this species refers to the island of Sumatra where the species was collected.

Note.— This species is, apart from the genital characters, easily distinguished from *S. ater* Stål by the three yellow spots at both sides along the costal margin of the fore wing, and from *S. priscus* (Bergroth) by the antennal macrosetae being inserted far beyond the middle of the second segment.

The holotype specimen lacks from left antenna the segment 2-4, of right antenna 3-4, tarsi from right middle and left hind legs, and apical part of the fore wings.



Figs 127-132, *Scotomedes sumatrensis* spec. nov., ♂, holotype. 127, right antenna, second segment, dorsal aspect, macroseta lost; 128, end of abdomen, dorsal aspect, parameres in situ; 129, 130, pygophore, caudal and left lateral aspect respectively, right paramere removed, left paramere moved; 131, 132, right paramere, lateral and posterior aspect respectively. Bar of parameres represents 0.1 mm; other bars 1.0 mm.

Scotomedes thai spec. nov.
(figs 133-138)

Material.— Holotype, ♂ (BPBM), **Thailand**, 50 km W of Tak, 900 m, 7-8.iv.1966, J., J.H. & M. Sedlacek. Paratype, ♀ (ZMUC), Thailand, Doi Suthep-Pui Natn. Park, Doi Pui road, 1000 m, 23-26.x.1979, [N. Møller Andersen] Zool. Mus. Copenhagen exped.

Habitus.— In appearance very similar *S. alienus* (Distant), but the setae on the body are longer, and the male parameres has a quite different shape.

Head.— Upper side dark brown, pile long, decumbent, ventral side and sides in

front of eyes, black to blackish-brown, with long, sub-erect setae; first antennal segment yellowish-brown, second segment (fig. 133) brown, towards apical quarter yellowish, third and base of fourth dark, remainder white; macroseta of second segment situated well beyond middle (ratio holotype 0.59, paratype 0.60) of segment; rostrum light brown, reaching mesocoxae.

Thorax.— Anterior part of pronotum including collar, shiny blackish-brown, with a haze of an irregular dullish pattern on central and lateral calli, posterior part brown, dull; scutellum blackish-brown, dull; ventral side mainly black; pronotum, scutellum, prosternum, metasternum, basal parts of fore wings inclusive hypocostal area richly set with long, erect setae (0.12-0.15 mm); setae on rest of fore wings about twice diameter of blackish stipples, or about 0.08 mm; fore wings each with two yellow spots along costa, and a smaller one on membrane near tip of cuneus; m-cu cross vein of hind wing short.

Abdomen.— Tergites red, shiny, posterior half of each segment dull yellow; posterior corners of seventh laterotergites well produced caudad (fig. 134); sternites brown, dullish; lateral wall of male genital capsule (figs 135, 136) very low, posterior wall much higher, rounded and considerably produced posteriorly, inducing slightly sinuous profile of posterior surface of capsule (fig. 136); dorsal rim of posterior wall almost straight as seen from behind (fig. 135); paramere (fig. 137) with a well developed lateral lobe and a long, almost straight, tapering spur at an obtuse angle to shaft and pointing forwards in rest position (fig. 134).

Female (fig. 138).— Posterior margin of seventh sternite deeply, semicircularly emarginate, in central part lifted from surface, forming a transverse furrow (as seen from behind) over hardly visible squama; gonocoxites VIII very broad, rounded and overlapping each other medially; lateral margins of eighth laterotergites flatly rounded.

Measurements.— Holotype ♂, tl, 10.25; lb, 8.7; lw, 6.9; ww, 4.6; lh, 1.4; wh, 1.35; lp, 1.85; wp, 3.25; la, 1.95; lr, 3.2; lt, 4.4; paratype, tl, 9.6; lb, 8.7; lw, 6.9; ww, 4.6; lh, 1.45; wh, 1.35; lp, 1.75; wp, 3.25; la, 1.85; lr, 3.25; lt, 4.3.

Distribution.— Thailand. Altitudes are given as 900 and 1000 m.

Etymology.— The name *thai* refers to Thai, a native or inhabitant of Thailand, the country where the species was collected.

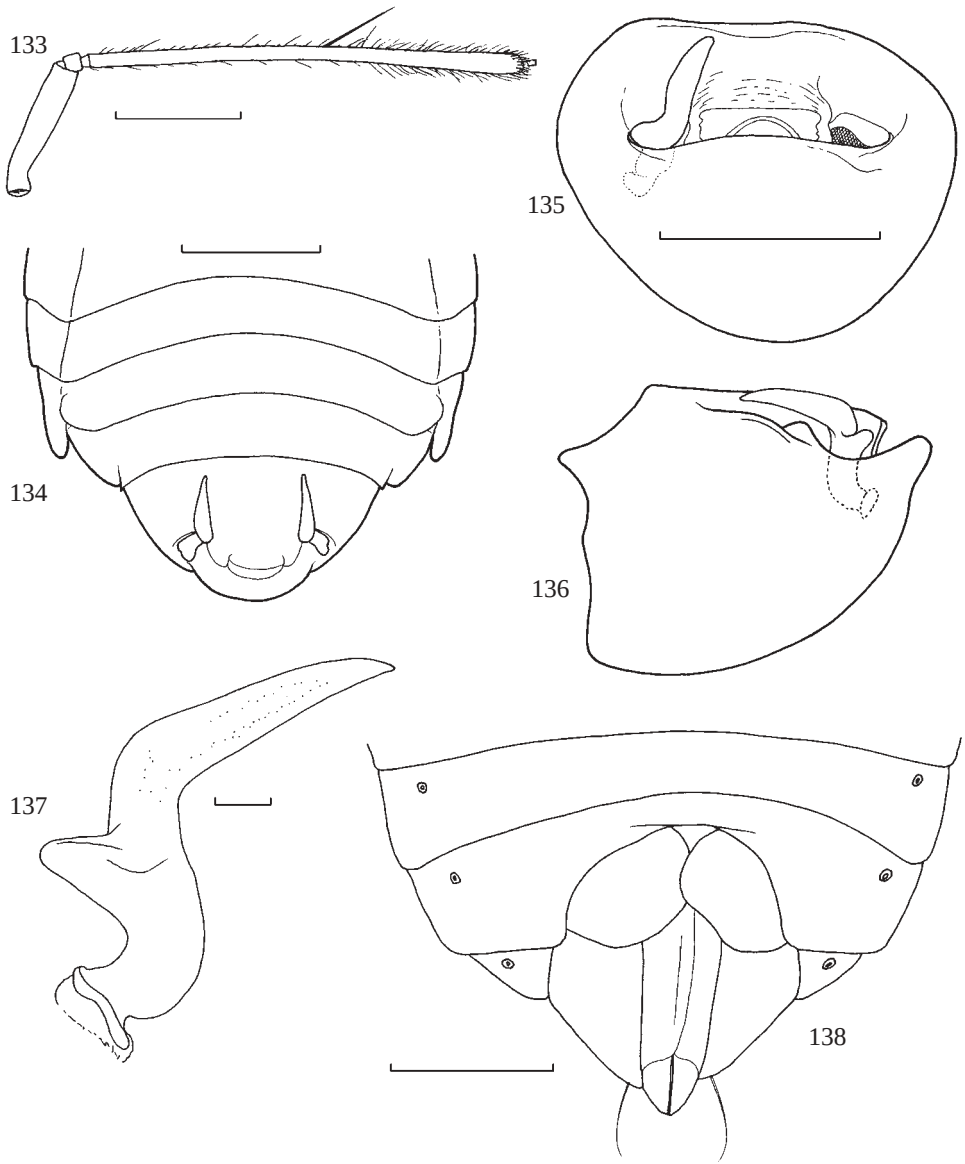
Note.— The holotype specimen is missing its right antenna, two segments of the left antenna, and the abdomen (including the pygophore) is stored in glycerin in a PVC microvial pinned underneath the specimen.

Scotomedes yunnanensis Ren, 2000
(figs 139 a-f)

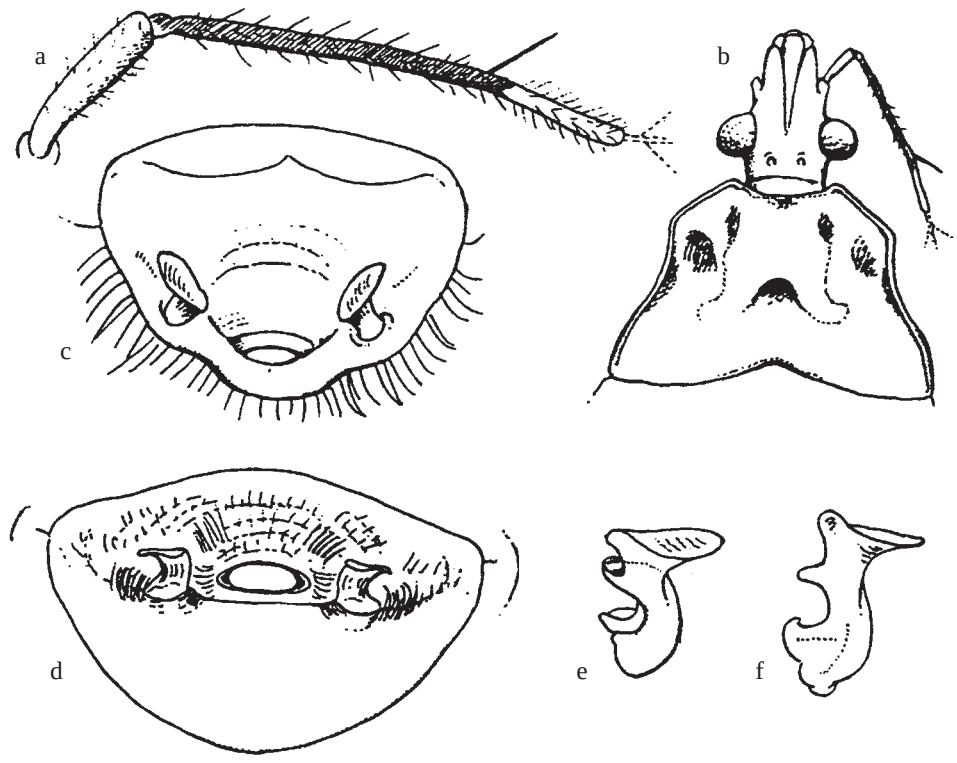
Scotomedes yunnanensis Ren, 2000: 29, figs 15-22.

The holotype is a male (TMNH, not seen by the present author), type locality: Ying'jiang County, 1300 m, Yunnan Prov., **China** (24º41'N-97º56'E), 13.iv.1980, Song Si-mei) somewhat similar to *S. maai* spec. nov. However, according to Ren's illustrations (here reproduced as figs 139 a-f), the antennal seta is much more distally (0.70-0.73) situated, the shape of the paramere is different and the posterior margin of the pygophore is straight. The female is unknown.

Distribution.— China (Yunnan).



Figs 133-138, *Scotomedes thai* spec. nov. 133-137, holotype, ♂. 133, right antenna, first and second segment, seen from behind; 132, end of abdomen, dorsal aspect; 135, 136, pygophore, caudal and left lateral aspect respectively; 137, right paramere, lateral aspect. 138, paratype, ♀, end of abdomen, ventral aspect. Bar of paramere represents 0.1 mm; other bars 1.0 mm.



Figs 139 a-f, *Scotomedes yunnanensis* Ren, 2000, holotype ♂. a, right antenna; b, pronotum and head, dorsal view; c, d, pygophore, in dorsal and caudal view resp.; e, f, right paramere, lateral view, different positions (from Ren, 2000).

Genus *Bloeteomedes* van Doesburg, 1970

Bloeteomedes van Doesburg, 1970: 247-248, figs 1, 2; 1980a: 297, figs 1, 5-8. Type species: *Bloeteomedes borneensis* van Doesburg, 1970.
Scotomedes (*Bloeteomedes*); Kerzhner, 1981: 82; Schuh & Štys, 1991: 302.

Short diagnosis.— First antennal segment long, second with a large seta, parameres small, sickle shaped, gonocoxites VIII small, narrow.

Species of this genus are distinguished from *Scotomedes* Stål, 1873, by the shape of the body which is more oblong-oval, the longer head, the absence of the gular keel, the long first antennal segments; the lateral margin of the pronotum extended at the lateral callus, the possession of two conspicuous protuberances (posterior calli) near the posterior margin of the pronotum, which margin is only slightly concave mesially; the surface of the pronotum is evenly set with deep punctures, but posterior part of the posterior calli fine and densely punctate; the basal lobe of the metathoracic scent gland apparatus large, laterally extended and rounded; the fore wing with greatest

width of exocorium proximal of centre giving the species its different habitus (fig. 140); the presence of a well-developed cross vein M-cu in the hind wing, simply-built hind corners of the seventh and eighth abdominal segments in the male, and the very simply-built, sickle-shaped parameres lacking a lateral extension. In the female, the genital apophysis is long, stalked, the visible part of the gonocoxite VIII is short and very broad, its width more than three times it length. Macrosetal pattern of the body is complete as in *Scotomedes*.

Distribution.— Borneo (Indonesia (Kalimantan), Sarawak).

Key to the species of *Bloeteomedes* van Doesburg, 1970

1. Length of body 12-13 mm; lateral margins of pronotum slightly extended laterally (fig. 141), hook of ♂ paramere broad (fig. 147) .... ***B. borneensis*** van Doesburg, 1970
- Length of body 11.5 mm; lateral margin of anterior part of pronotum well extended laterally (fig. 143), hook of ♂ paramere narrow (fig. 151) ..... ***B. sarawakensis*** van Doesburg, 1980

Bloeteomedes borneensis van Doesburg, 1970 (figs 31, 49, 140-142, 145-148)

Bloeteomedes borneensis van Doesburg, 1970: 247, figs 1, 2; 1980a: 297, figs 1, 5-8.
Scotomedes (*Bloeteomedes*) *borneensis*; Kerzhner, 1981: 21, ♀.
Scotomedes borneensis; Schuh & Slater, 1996: 162, Fig. 49.1 A, B.

Material.— Holotype, ♀ (RMNH), [**Indonesia**: **Kalimantan**], Borneo, Nanga Raoen [Nangaraun], Upper Kapoeas [Kapuas] River [± 0ʃ 38íN-113ʃ 11íE], iii.1894, Dutch Scientific Expedition to Central Borneo 1893-94, J. Büttikofer; 1 ♂ (BMNH), [**Malaysia**], Sarawak, foot of Mt Dulit [3º21'N 114º11'E], junction of rivers Tinjes & Lejok, 7.ix.1932, old secondary forest, on bark of felled tree, Oxford Univ. Exped., B.M. Hobby & A.W. Moore, B.M. 1933-254.

Habitus.— Overall light brown.

Head long and slender, shining, sparsely punctate, richly set with long, curled, yellowish-white setae, those on ventral side shorter; ventral side transversely wrinkled, without a median keel; ocelli small (diameter 0.14 mm), distance to eye 0.18 mm. first antennal segment well surpassing apex of head, its length almost half the length of the second segment, set with long decumbent setae; second segment (fig. 142) long, 2.2 times length of first segment, brown, slightly curved, apically somewhat recurved, set with very small decumbent setae, but apical fifth white and much longer white setose; antennal macroseta far beyond middle of segment (ratio: ♂, 0.71; ♀, 0.73); bucculae almost bare, with some small setae ventrally and some in the middle near the border; clypeus, labrum, exposed parts of the first rostral segment and second rostral segment dorsally, with long curled setae; ventral side of the second segment set with short setae; Rostrum just reaching metasternum.

Thorax.— Pronotum (figs 22, 141): collar shining black, its free margin without setae; anterior pronotal lobe dark brown, shining, except for irregular pattern of dull lines on dorsal calli, sparsely punctate; anterior pronotal corner and lateral ridge at lateral callus produced; posterior lobe dull brown, anteriorly darker, set with deep, blackish punctures, those on posterior calli fine and densely arranged; lateral margin

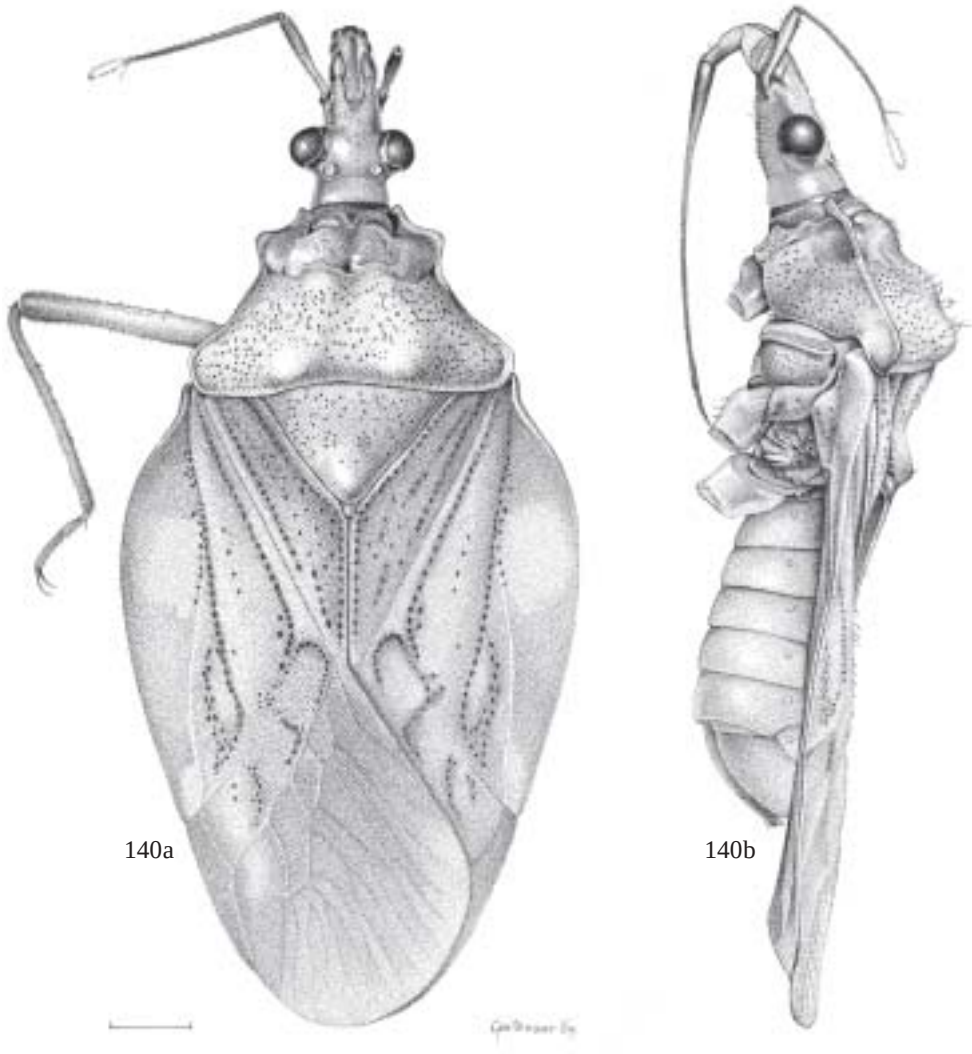


Fig. 140, *Bloeteomedes borneensis* van Doesburg, 1970, holotype, ♀, dorsal and lateral aspect respectively (from van Doesburg, 1970). Bar represents 1.0 mm. Drawings by Mr W. Gertenaar (RMNH).

slightly concave, posterior margin medially shallowly excavated; posterior corners rounded with upturned ridges. Scutellum saddle-shaped with rounded top, dull reddish brown with black punctures. Pronotum and scutellum set with long, curved, yellowish-white setae. Fore wings long, in rest position amply surpassing end of abdomen, deeply sulcate along proximal part of media (fig. 140a), dullish light brown, with dense rows of deep, black punctures, exocorium along border with a yellow patch and one near its apex; exocorium and cuneus remotely provided with fine, inconspicuous punctures; setae on corium long (0.3 mm), silky, slightly curved, on

clavus short (0.06 mm); Membrane a little darker than corium, opaque, cell 1 open, top of cell 2 ending in a small stub. Hind wings (fig. 31) with a well-developed M-cu cross vein and a short, obliquely running hamus (M). Prosternum and propleurae blackish, dull, median carina between procoxae, epicoxal lobes and postero-lateral corners brown; lateral callus shining, glabrous; epicoxal lobes and posterior parts of propleurae, except the postero-lateral corners, deeply punctate; mesosternum brown, shining, set with long, yellowish setae; mesopleurae black, dull, with deep punctures, anteriorly carinate; posterior flange dull brown, remotely set with deep punctures; metasternum dull, reddish brown, with long yellowish setae, posterior border emarginate, median caudate projection obtusely sulcate; metapleurae medially blackish-brown, surface microgranulous textured between deep punctures; ostiolar peritremes reddish brown, medially fused, covering ligula large, yellowish brown. Legs light brown, shining, tarsi lighter, claws long, simple.

Abdomen.— Ventral side reddish brown, rather dull, set with short, curved setae, spiracles whitish bordered, mid-ventral setae obsolete; In the male, posterior corners of last two pregenital segments simply rounded, without projections; Pygophore (figs 145, 146) posteriorly rounded, postero-ventral margin slightly produced caudate, and turned-up, bisinuate and slightly excavate medially as seen from behind; paramere (fig. 147) short, sickle-shaped, apical hook broad, flattened and finely punctate. Female (fig. 148, holotype), seventh sternite long, posterior margin only slightly excavate, with a small triangular ovivalvula; genital apophysis long (fig. 49); lateral margin of eighth laterotergite slightly convex; gonocoxites VIII narrow; gonocoxites IX and gonostyli long. Macrosetal pattern of the body complete as in *Scotomedes*.

Measurements.— Holotype, ♀, tl, 12.4; lb, 10.5; lw, 8.3; ww, 5.9; lh, 1.85; wh, 1.6; lp, 2.4; wp, 4.1; la1 1.15; la2, 2.5; lr, 4.3.

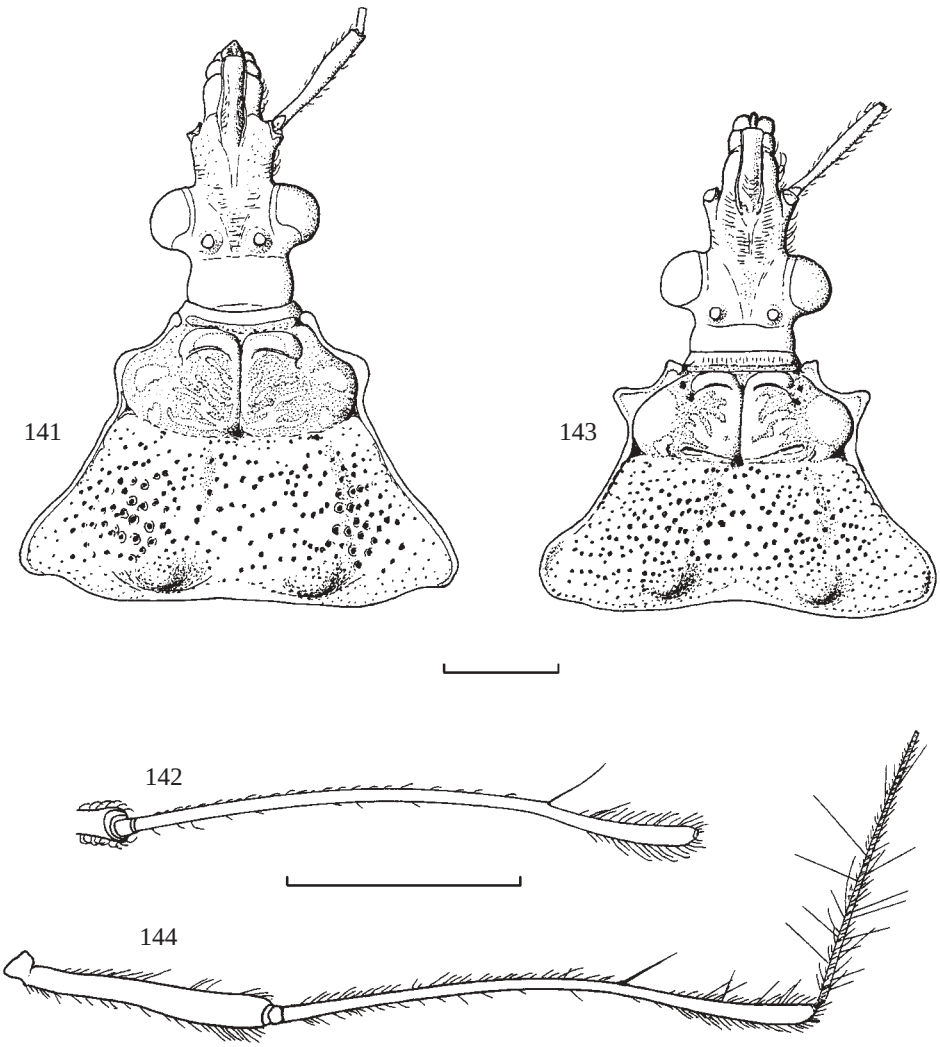
Distribution.— Indonesia (Central Borneo [Kalimantan]). Altitude unknown.

Notes.— The holotype has been collected by Dr J. Büttikofer, who joined the Dutch Scientific Expedition to Central Borneo 1893-94, better known as the Molengraaff-Nieuwenhuis Expedition, for the RMNH. He collected “from March 10th to the beginning of May” around the “Poenan-Grotto” at 784 m above sea level, as a “hunting station” on the slopes of the Liang Koeboeng [Kubung] Range, about 12 km SE of Nanga Raoen. This is in all probability the place where the holotype was collected. The base camp was at Nanga Raoen, a Dyak (Dayak) settlement on the left bank of the Sungai Mandai, a tributary of the Kapuas River, at the foot of the Müller Mountains (Molengraaff, 1900; Büttikofer, 1897). The Sarawak specimen (Hobby, 1940) has been collected at “Mt. Dulit: secondary forest in the vicinity of the base camp at the foot of the range, *i.e.* on this side where the River Tinjar received the R. Lejok on its left bank (altitude less than 325 ft.)”.

Bloeteomedes sarawakensis van Doesburg, 1980
(figs 143, 144, 149-151)

Bloeteomedes sarawakensis van Doesburg, 1980a: 297, figs 2-4, 9-11.

Material.— Holotype, ♂ (BMNH), [**Malaysia**], Borneo, **Sarawak**, Mt Marud [Murud, 4º28’N-114º20’E], Kalabit Epd., Dr E. Mjoberg [Mjøberg], Brit. Mus. 1924-333. Paratype, ♂ (BMNH), same data as holotype.



Figs 141-144, *Bloeteomedes* van Doesburg, 1970. 141, 142, *Bloeteomedes borneensis* van Doesburg, 1970, ♂ from Sarawak. 141, head and pronotum, dorsal aspect; 142, left antenna, second segment, anterior aspect. 143, 144, *Bloeteomedes sarawakensis* van Doesburg, 1980. 143, head and pronotum of holotype, ♂, dorsal aspect; 142, left antenna of paratype, ♂ anterior aspect, last segment missing. Bars represent 1.0 mm; (141, 143, 144, from van Doesburg, 1980).

Closely related to the former species and differs as follows. smaller and darker body, the light patches on the fore wing are more conspicuous; thesetose unpigmented apical part of the second antennal segment (fig. 144) occupying about 0.23 of its length; the antennal macroseta situated on ratio 0.75 (holotype) and 0.76 (paratype) from its base; pronotum (fig. 143) dark brown, pronotal calli and collar almost black, shining; the dull pattern on the calli much more restricted in favour of the shiny background;

the lateral margins deeper excavate and the margins more extended in the anterior corners and at the lateral calli; the posterior part of pronotum, the scutellum and the clavi of the fore wing dark brown and much more densely punctate; the postcubitus between two punctured claval sutures reddish; the remainder of the hemelytra lighter brown with whitish markings on the costal area; the legs are brown, the knees darker and the coxae reddish; the pygophore (figs 149, 150) smaller, less produced posteriorly, its postero-ventral margin in caudal aspect almost straight; and the paramere much smaller and more slender (fig. 151).

Female.— Unknown.

Measurements.— Holotype, ♂, tl, 11.5; ww, 5.35; wh, 1,5; lp, 2.3; wp, 3.5; la, 2.2.

Distribution.— Malaysia (Sarawak, Borneo). Date and altitude not mentioned.

Genus *Costomedes* gen. nov.

Type species.— *Costomedes gressitti* spec. nov.

Short diagnosis.— first antennal segment short, second without a large seta, pronotum without macrosetae, cuneus prolonged distally, hind wings with a m-cu cross vein, middle femora of male armed, posterior corners of male abdominal segment VIII lobed, pygophore broad, parameres without a basal extension, female gonocoxites VIII small.

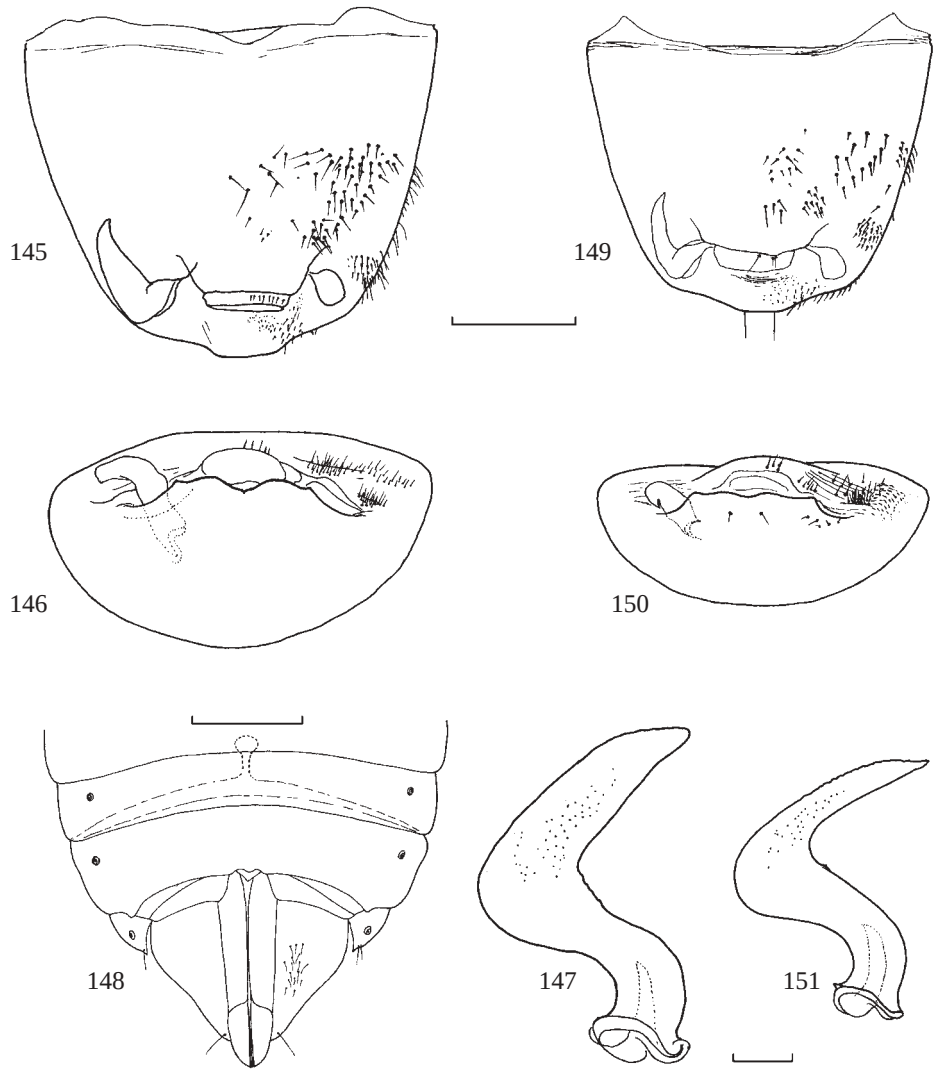
First antennal segment short, without macrosetae, second antennal segment unicolorous brown, without a conspicuous macroseta, distal part setose (fig. 16); bucculae (fig. 11) with many fine setae, especially along free apical margin and ventral side; basal half of labrum (fig. 10) finely setose; first rostral segment with a longitudinal setose streak at both side of labrum, second segment with two dorsal small macrosetae and with fine setae at sides and ventral side; head with one pair of macrosetae on gula, and sometimes one small pair on maxillary plates.

Pronotum (figs 18, 19, 21).— Anterior margin of pronotal collar ventrally with only a few small setae; dorsal surface strongly convex, without macrosetae; lateral margins only moderately developed, sub-lateral calli large, lobal calli somewhat united anteriorly with central calli, strongly inflated, its surface smooth and devoid of the normal punctures; mesosternum fully sclerotized, usually finely setose, especially anteriorly; mesopleura anterior of middle coxa with an oblique short row of about seven very short erect stiff setae; basal lobe of metathoracic scent gland ostiole (fig. 24) small, dispenser moderately club-shaped, groove short, often deviating posteriorly from longitudinal direction.

Fore wing.— Exocorium without proximal costal yellow spot; cuneus (figs 26, 28) narrowly extended far distally along membrane, length of its free (costal) margin about two-and-a-half times length of cuneal fracture; first cell of membrane sometimes seemingly closed by a vague vein, but 'live' vein ending blind as in *Scotomedes* ('stud' of Kerzhner, 1981: 22, figs 24, 28), but is longer than in *Scotomedes*. In *Costomedes gressitti* and *gazelle* this length is moderate (± 0.2 mm, fig. 26) but in the other species of this genus much longer (±0.3-0.4 mm, fig. 28).

Hind wing.— The m-cu cross vein well-developed; M runs almost midways through the cell (fig. 34).

Legs.— Mainly as in *Scotomedes*, but trochanters of hind legs bare (except for the large seta near base, present on all trochanters) or almost so in *Costomedes solomonensis*



Figs 145-151, *Bloeteomedes* van Doesburg, 1970. 145-148, *Bloeteomedes borneensis* van Doesburg, 1970. 145-147, ♂. 145, 146, pygophore, dorsal and caudal aspect respectively, right paramere removed; 147, paramere, lateral aspect. 148, holotype, ♀, end of abdomen, ventral aspect, genital apophysis shown; 149-151, *Bloeteomedes sarawakensis* van Doesburg, 1980, holotype, ♂. 149, 150, pygophore, dorsal and caudal aspect respectively, right paramere removed; 151, right paramere, lateral aspect. Bar of the parameres represents 0.1 mm; other bars 1.0 mm; (from van Doesburg, 1980, except fig. 148).

gen. nov. & spec. nov.; in males, ventral side of middle femora with a more or less irregular, longitudinal row of about six small black pustules, each fit with an eccentrically inserted short seta (figs 37, 38).

Abdomen.— Antero-mesial margins of lateral parts of second sternite crested

against the hind coxae, anterior groove of third sternite strongly sclerotized, black, inside finely sculptured like a zipper; mid-ventral setae shorter than in *Scotomedes*: on otherwise almost bare third sternite, mid-ventral setae minute and hardly visible, very small in the fourth and gradually longer in the following sternites; second laterotergite setose at antero-lateral corner; lateral margins of sternites 3-7 in both sexes only sparsely setose. In the male (figs 44B, 153, etc.), laterotergites of seventh segment often with insignificant backwards extended posterior corners, but in eighth segment these posterior corners always conspicuously toothed or lobe-like extended, setose. Genital capsule broadened posteriorly, anteriorly pointing spurs of parameres of more lateral position, parameres without a basal extension. In the female, posterior margin of seventh sternite more or less broadly excavated medially, genital apophysis short and broad (fig. 50); gonocoxites VIII slender-triangular, mesially widely separated; suture of gonocoxites IX usually left over right; Species from the Papuan region.

Etymology.— The generic name is an anagram of the generic name *Scotomedes*; gender: masculine.

Key to species of the genus *Costomedes* nov.

1. Setose apical part of second antennal segment about half times its length or longer; anterior calli of pronotum entirely shiny 2
- Setose part of second antennal segment much shorter, at most its apical 0.4; at least anterior half of anterior pronotal calli dull 5
2. Setose part of second antennal segment about 0.7 times its length (fig. 16, 172); (Indonesia (Papua), Papua New Guinea (mainland)) ..... ***C. gressitti*** spec. nov.
- Setose part of second antennal segment about half of its length (figs 152, 159, 165) 3
3. Lateral wall of male genital capsule simply rounded dorsally (fig. 169); in female squama sharply tipped and eighth laterotergites inflated (fig. 171); (New Britain) ... . ***C. gazelle*** spec. nov.
- Lateral wall of capsule angularly produced dorsad (fig. 212); in female squama flatly rounded posteriorly; eighth laterotergites not inflated (fig. 214) 4
4. Body brown; head matt; posterior margin of seventh sternite mesially flattened, squama sinuate; (Solomon Isles) ..... ***C. solomonensis*** spec. nov.
- Body blackish; head glossy; posterior margin of seventh sternite mesially raised, squama lingulate (fig. 180) (Indonesia (Moluccas: Ceram)) ..... ***C. heissi*** spec. nov.
5. Fore wing slightly reduced; bases of tibiae yellow; (Papua New Guinea) .... ***C. morobensis*** spec. nov.
- Fore wing of normal size; bases of tibiae brown 6
6. Central pronotal calli decorated with matt capricious pattern; setation of head well developed; setose part of second antennal segment covers not more than a quarter of length of segment; (Papua New Guinea) ..... ***C. hirsutus*** spec. nov.
- Matt pattern wanting or rudimental; setosity of head and second antennal segment variable 7
7. Setation of second antennal segment occupies about two fifths of length (fig. 201), dorsal side of pygophore with two protuberances (fig. 202); (Papua New Guinea, Indonesia (Papua)) ..... ***C. sedlaceki*** spec. nov.

- Setose part not more that one third of second antennal segment 8
8. Male 9
- Female 12
9. Pygophore with a small tooth on each lateral margin 10
- Pygophore without such teeth 11
10. Paramere with a large dorsal protuberance (fig. 163); Indonesia (Papua)) ..... ***C. fakfakensis*** spec. nov.
- Protuberance of paramere low (fig. 219); (Indonesia (Papua)) ..... ***C. toxopeusi*** spec. nov.
11. Posterior corners of eighth laterotergites broadly extended (fig. 153); posterior margin of pygophore convex (fig. 155); (Papua New Guinea) ..... ***C. cheesmanae*** spec. nov.
- Extensions of eighth laterotergites sharp (fig. 188, 190); posterior margin of pygophore sinuate, mesally concave (fig. 189, 192); (Papua New Guinea) ..... ***C. karimui*** spec. nov.
12. Central part of seventh sternite broadly raised (fig. 158); (Papua New Guinea) ..... ***C. cheesmanae*** spec. nov.
- Central part narrowly raised (fig. 220); (Indonesia (Papua)) .. ***C. toxopeusi*** spec. nov.

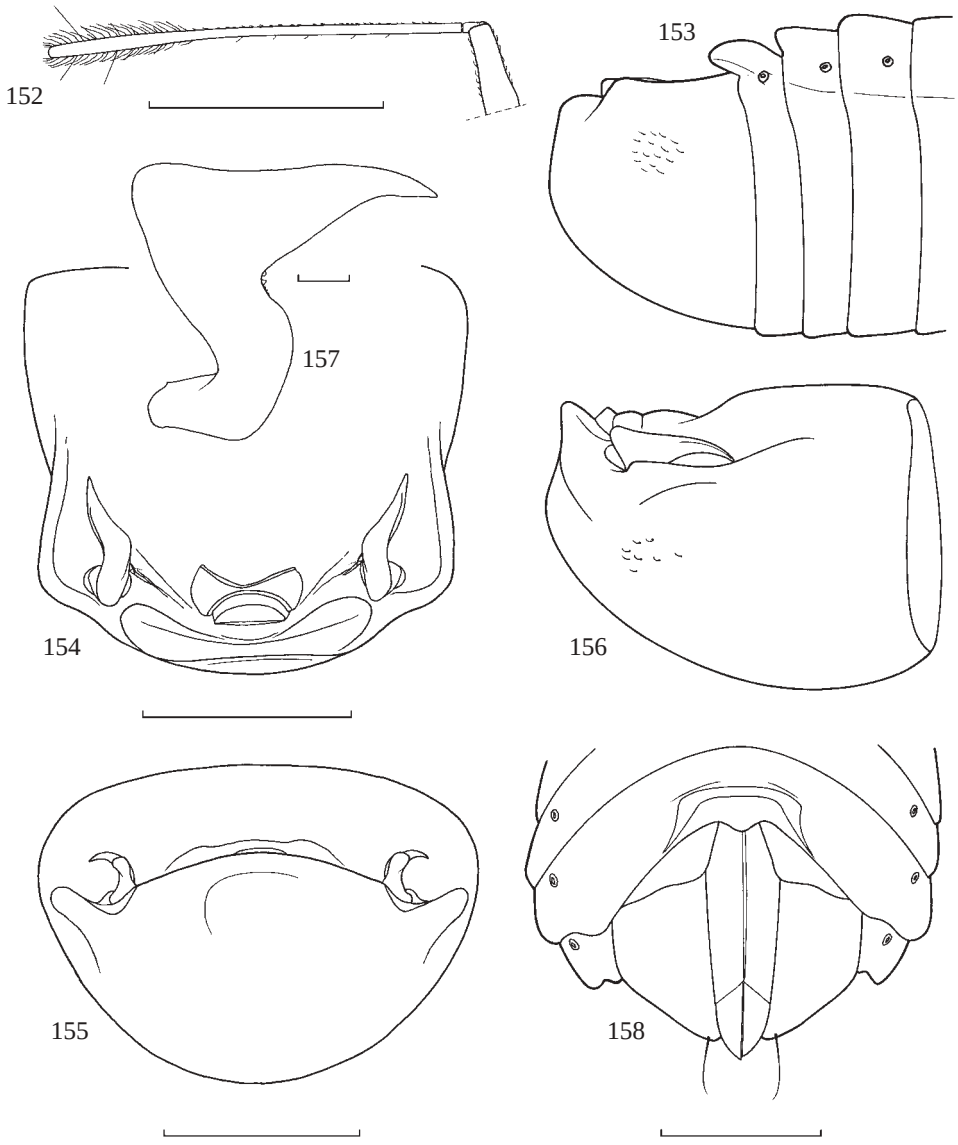
Costomedes cheesmanae spec. nov.
(figs 152-158)

Material.— Holotype, ♂ (BPBM), [**Papua New Guinea**], New Guinea: (NE), Wau, Morobe Distr., 1150 m, 12.ix.1961, J. Sedlacek, #2495. Paratypes (3 ♂♂, 6 ♀♀): 1 ♂ (BPBM), 1 ♂ (RMNH), same locality and date as holotype; 1 ♂ (BPBM), same locality, 1200 m, 13.viii.1961, J. Sedlacek; 1 ♀ (BMNH), Papua N. G., Kokoda, 400 m, viii.1933, L.E. Cheesman, B.M.1933-427; 1 ♀ (RMNH), same data but B.M.1934-321: 1 ♀ (BPBM), Popondetta, 25 m, v.1966, light trap, Shanahan-Lippert, 1 ♀ (BPBM), Kokoda, 28-29.iii.1956, L.J. Gressitt; 1 ♀ (BPBM), Louisiade Archipelago, Yela I: Mt Rossel, 730-760 m, 18-19.iii.1979, MV light, B.H. & W.C. Gagne, Bishop Museum Acc. #1980.2; 1 ♀ (AMNH), Sudest Is [Tagula I], Mt Riu, 250-350 m, No.10, 27.viii.1956, Fifth Archbold Exped. to New Guinea, L.J. Brass, *Scotomedes* spec. Wygodzinsky det.

Head.— Upper side of head, brown, densely set with short, decumbent, light yellow setae; ventral side black, same kind of pile, but somewhat longer; antennae and rostrum brown, second antennal segment (fig. 152) slightly curved, setose tuft covers its distal third.

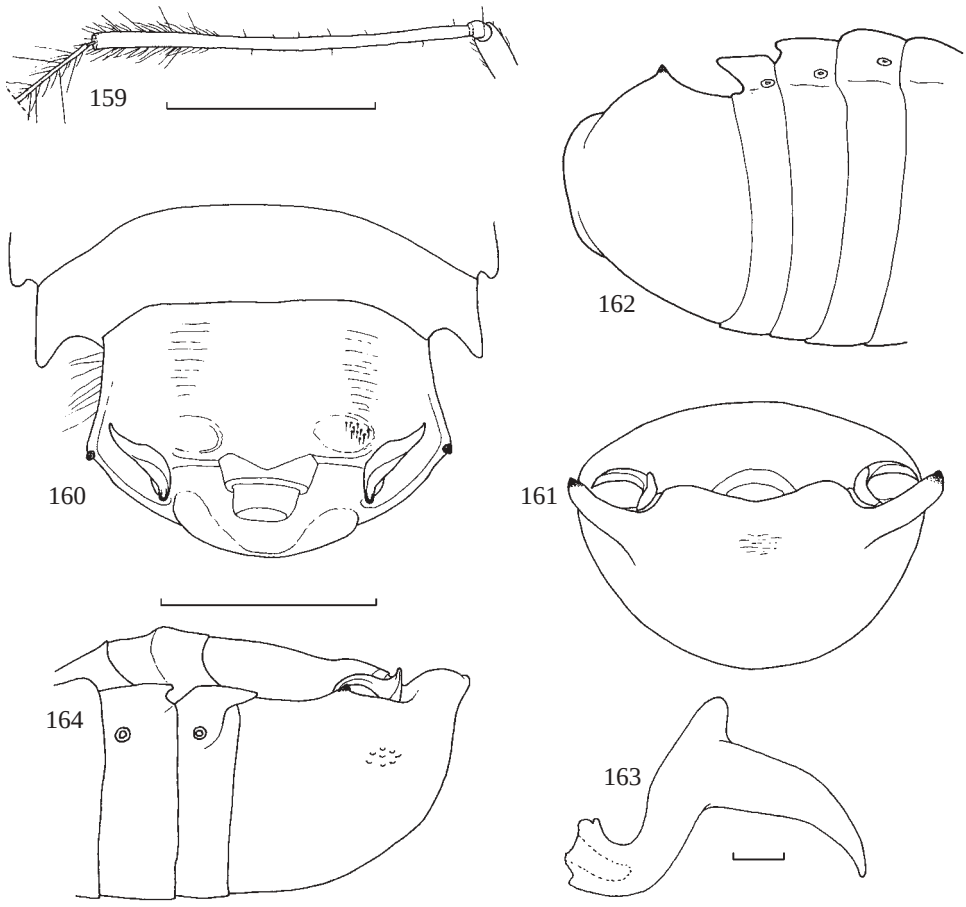
Thorax.— Anterior part of pronotum shining black except anterior calli, posterior part of collar, greyish dull; posterior part of pronotum black, but posterior calli and area posterior of it, blackish-brown; scutellum black, posterior tip reddish brown; fore wings brown, endocorium and clavus darker, rusty coloured, tip of exocoriun and extreme tip of cuneus, yellow, setae on punctures extremely short; ventral side of thorax and adjacent part of hypocostal area of fore wings, black; metapleural scent gland apparatus rather short, mainly brownish; legs brown, tibiae towards apex, and tarsi lighter.

Abdomen.— Upper side of tergites 2-8 yellowish brown, dull, basal parts shining; ventral side including genital capsule dark chestnut, dullish, setation rather long and dens; posterior corners of seventh laterotergite (fig. 153) short lingulate, those of eighth segment strongly, almost hook like extended and bent laterad; dorsal side of



Figs 152-158, *Costomedes cheesmanae* gen. nov. & spec. nov. 152, paratype, ♀, left antenna, second segment. 153-157, holotype, ♂. 154-156, pygophore, in dorsal, caudal and right lateral aspect respectively; 153, end of abdomen, right ventro-lateral aspect; 157, right paramere, lateral aspect. 158, paratype, ♀ from Kokoda, end of abdomen, ventral aspect. Bar of paramere represents 0.1 mm; other bars 1.0 mm.

pygophore (figs 154-156) brown, shining; wall of lateral margin low, posteriorly somewhat swollen and bent outwards; posterior wall high, gradually rounded dorsally in posterior view; parameres (fig. 157) each with a short curved stem, and a broadly based, tapering spur.



Figs 159-164, *Costomedes fakfakensis* gen. nov. & spec. nov., holotype, ♂. 159, left antenna, posterior view; 160, 162, 164, end of abdomen, dorsal, right latero-ventral,and left lateral aspect respectively; 161, pygophore, caudal aspect; 163, right paramere, lateral aspect. Bar of paramere represents 0.1 mm; other bars 1.0 mm.

Female (fig. 158).— Seventh sternite posteriorly deeply emarginate, mesially highly and broadly raised, sublaterally broadened, lateral margins posteriorly somewhat roundly extended; squama broad and rounded posteriorly; eighth laterotergites well extended mesio-caudad.

Measurements.— Holotype, ♂: tl, 10.75; lb, 9.2; lw, 7.0; ww, 4.7; lh, 1.45; wh, 1.35; lp, 2.25; wp, 3.5; la, 1.8; lr, 3.5; lt, 4.3;

Distribution.— Papua New Guinea, in lowland till average altitudes; Louisiade Archipelago. Altitudes range from 250 to 1200 m.

Etymology.— This species is named in honour of the most remarkable late Miss Lucy Evelyn Cheesman, O.B.E., F.R.E.S. (1881-1969), entomologist, who made several solitary expeditions in the Papuan-Pacific region and collected numerous insects for the British Museum (Natural History) (Smith, 1969).

Notes.— The holotype specimen, #2495, is missing two antennal segments at both sides, the right fore leg, the left fore tarsus and the left hind tibia, while the fore wings are damaged apically.

Costomedes fakfakensis spec. nov.
(figs 159-164)

Material.— Holotype, ♂ (BPBM), [**Indonesia: Papua**], New Guinea: Neth., Vogelkop, Fak Fak, S. coast of Bomberai, 100-700 m, 9.vi.1959 / Light trap, J.L. Gressitt. Paratype: 1 ♂ (RMNH), same data as holotype.

Head.— Colour brown, upper side clothed with short silvery decumbent setae, ventral side blackish, set with somewhat longer decumbent setae, without suberect setae; antennae and rostrum light brown, second antennal segment (fig. 159) slightly curved, and setose along apical fourth part;

Thorax.— anterior part of pronotum blackish-brown, shiny, but anterior calli dull; posterior part dark reddish brown; ventral side mainly black, including adjacent parts of hypocostal area of fore wings; metepisternal scent gland evaporatorium mainly brown; fore wings reddish brown with a yellow spot in corner between costa and cuneal fracture, and a smaller one on membrane at tip of cuneus; setae on wing surface very short; legs brown, tibiae lighter, tips of tibiae and tarsi yellowish;

Abdomen.— Upper side of tergites yellowish brown, dull, ventral side brown, rather shiny; posterior corner of seventh (latero-)tergites each with a small caudad extension, those of eighth longer, tapering (figs 160, 162, 164); genital capsule (figs 160-162, 164) upper side light brown, shiny, ventral side dark brown, dull, with many short, decumbent setae; lateral wall of capsular cavity, sub-posteriorly provided with a sharp dorsal tooth; posterior wall not very broad, extended caudad and evenly rounded, rather deeply excavated dorsally; profile of posterior surface of capsule sinuous (fig. 161); parameres (fig. 163) with a short stem, a large dorsal protuberance, and an almost perpendicularly attached hooked spur, which *in situ* is pointing antero-laterally.

Female.— Unknown.

Measurements.— Holotype, ♂: tl, 9.2; lb, 7.7; lw, 6.2; ww, 4.5; lh, 1.35; wh, 1.25; lp, 1.95; wp, 3.1; la-I, 0.7, la-II, 1.85, la-III, 1.4, la-IV, 1.1; lr, 3.4; lt, 4.2.

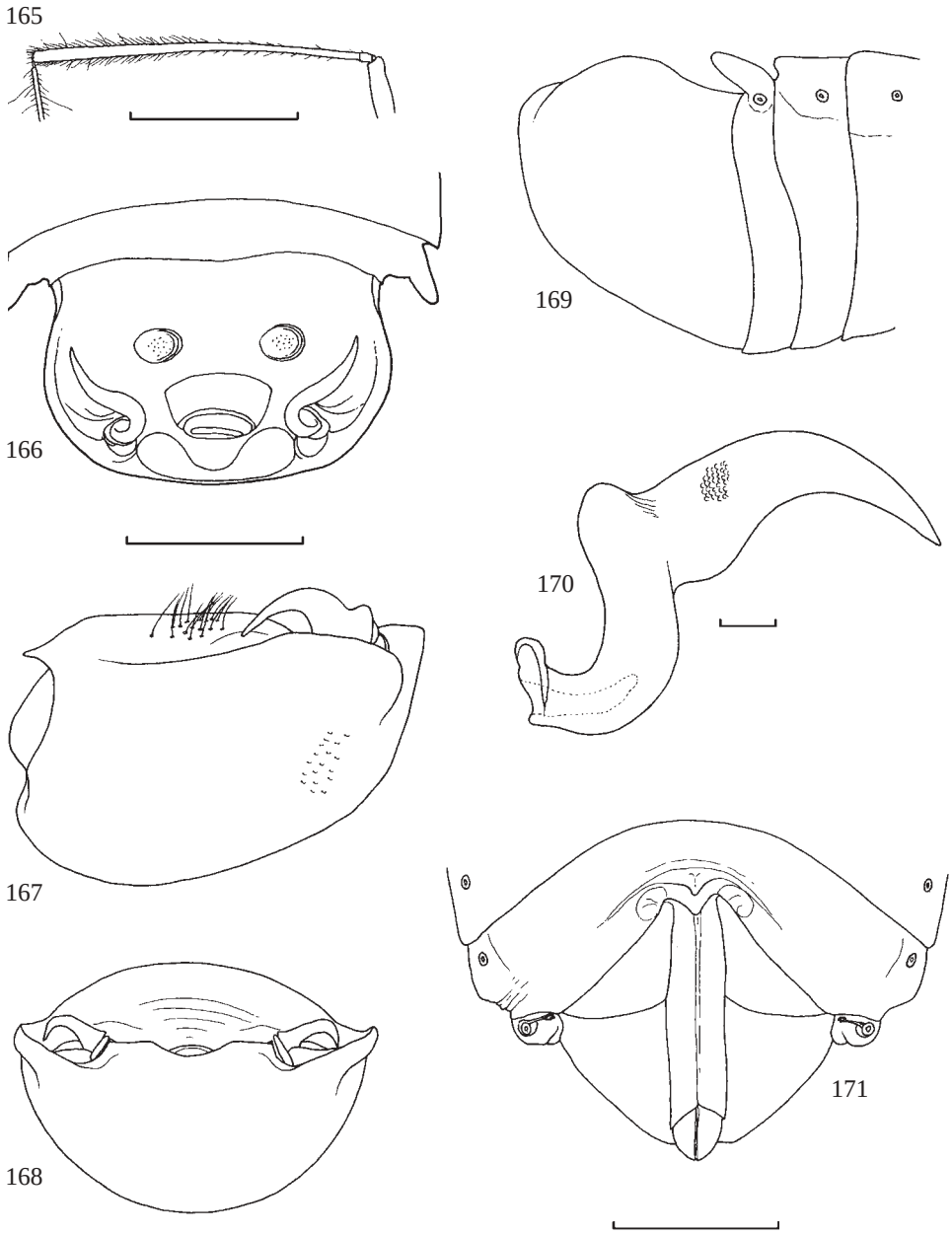
Distribution.— Indonesia (Papua). Altitude 100-700 m.

Etymology.— The name *fakfakensis* is derived from the type locality, Fakfak in western New Guinea.

Note.— The abdomen and pygophore of the pinned holotype has been dissected and preserved in glycerin in a PVC microvial attached underneath the specimen, which for the rest is perfect.

Costomedes gazelle spec. nov.
(figs 165-171)

Material.— Holotype, ♂ (BPBM), Bismarck Archipelago, **New Britain**, Gazelle Pen., Mt Sinewit, 900 m, Malaise Trap, 5-9.xi.1962, J. Sedlacek / #2503. Paratypes (1 ♂, 16 ♀♀): 1 ♀ (BPBM), same data as holotype. 1 ♂, 1 ♀ (RMNH), same data as holotype; 1 ♀ (BPBM), idem, but 900 m, 14-16.xi.1962; 7 ♀♀ (ANIC), 2 ♀♀ (RMNH), same data as holotype, but 1067 m, 26.vi-17.ix.1963, W.W. Brandt; 1 ♀ (BPBM), New Britain, Silanga, Nakanai Mts, 150 m, 22-23.vii.1956, E.J. Ford, Jr; 2 ♀♀ (BPBM), 1 ♀ (RMNH), Umboi Island, 1 km N Awelkom, 600 m, light trap, 21-28.ii.1967, G.A. Samuelson.



Figs 165-171, *Costomedes gazelle* gen. nov. & spec. nov. 165, paratype, ♀, left antenna. 166-170, paratype, ♂. 166, end of abdomen, dorsal aspect; 167, 168, pygophore in left lateral and caudal aspect respectively; 170, right paramere in lateral aspect. 169, holotype, ♂, end of abdomen, right ventro-lateral aspect. 171, paratype, ♀, end of abdomen, ventral aspect. Bar of paramere represents 0.1 mm; other bars 1.0 mm.

Habitus.— Dull blackish species.

Head.— Colour blackish-brown, antennae and rostrum dark brown; pile on second antennal segment (fig. 165) covering apical half of the segment; apical three fourth of the last antennal segment yellowish white; upper side of head covered with short, ventral side with longer yellowish brown decumbent setae. Rostrum long, about 4.2 mm, ocelli large, their diameter greater than distance to eyes.

Thorax.— Basic parts black, dull, but anterior part of collar and calli of anterior part of the pronotum shining; legs dark brown, end of tarsi yellowish; fore wing dark brown, toward tip gradually lighter, without any trace of yellow spots; prosternum almost bare, mesosternum only anteriorly with short setae, metasternum with very fine silky setae; scent fluid dispenser rather short, fusiform.

Abdomen.— Tergites in male shiny brown, but posterior margins broadly dirty white dull banded; sternites, including genital capsule, dark brown, dullish, with very short (0.02-0.03 mm.), decumbent setae; posterior margins of sternites seven and eight narrowly yellowish; posterior corners (figs 166, 169) of seventh laterotergite hardly extended posteriorly, those of eighth sternite well extended, long and slender; lateral margins of genital capsule (figs 166-169) roundly dorso-laterad extended; raised part of postero-ventral margin (posterior wall) slightly retreated anteriorly, moderately broad, thick but in central part narrowed and shallowly emarginate dorsally as seen from behind (fig. 168); dorsal surface of capsule (fig. 166) shiny, set with long, erect, golden setae, anterior of each paramere with a very shallow denser setose prominence; parameres (fig. 170) with a long, flattened, sickle-shaped spur and a dorsal rounded protuberance; posterior surface of pygophore convex, not sinuate (fig. 169).

Female (fig. 171).— Hind margin of seventh sternite sunken mesially, margin itself deeply emarginate, with a posteriorly directed central flat tooth; anterior of margin a bisinuate furrow, following line of margin; eighth laterotergites rounded laterally, surface inflated posteriorly of spiracle; a small ridge running mesad from spiracle, ending in a granule.

Measurements.— Holotype, ♂: tl, 11.0; lb, 9.1; lw, 7.3; ww, 4.4; lh, 1.5; wh, 1.25; lp, 2.15; wp, 3.1; la, 2.0; lr, 4.2; lt, 4.5.

Distribution.— Papua New Guinea-Bismarck Archipelago: New Britain, Umboi Island. Altitudes, 150–1067 m.

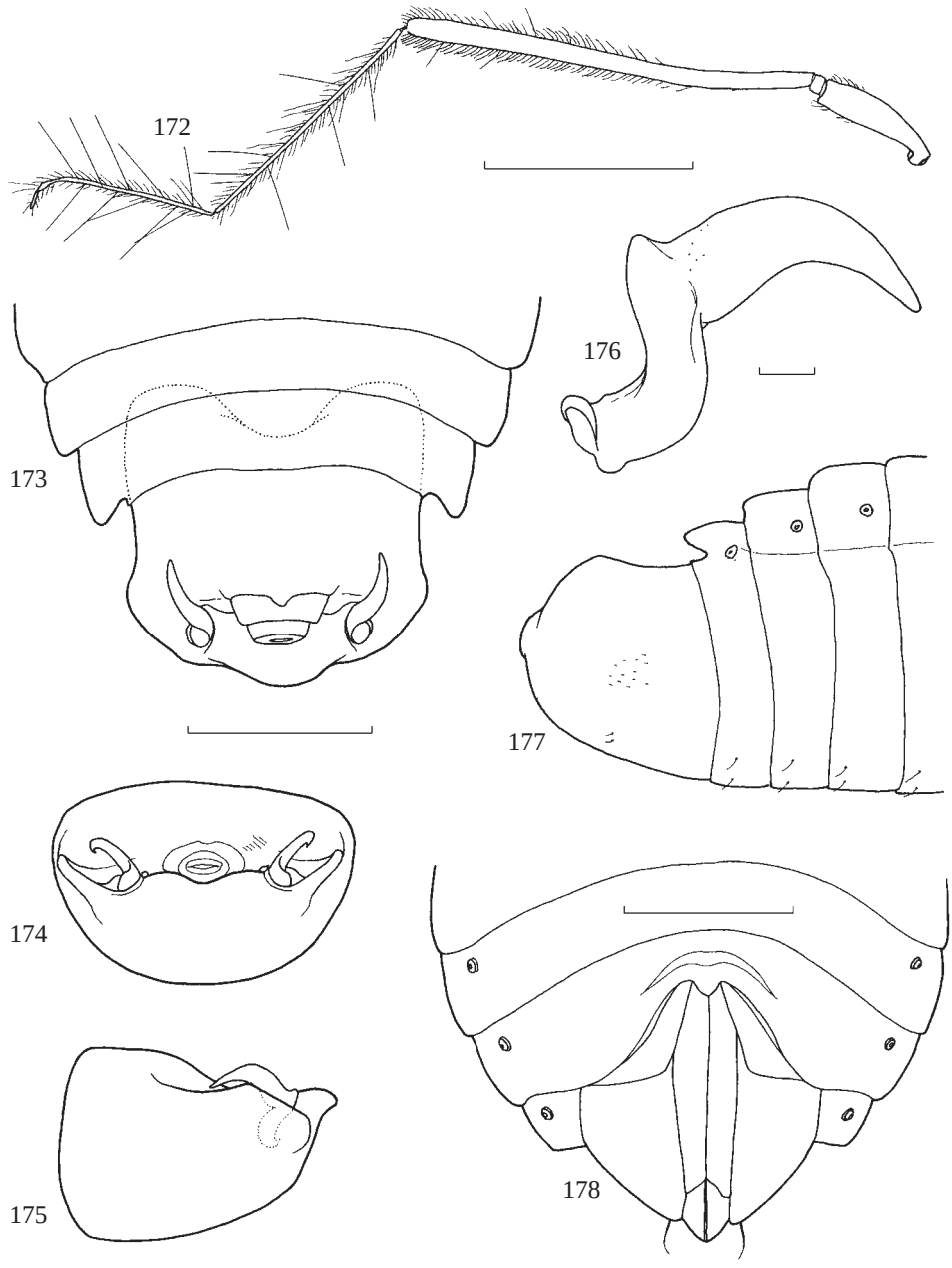
Etymology.— The species is named after the Gazelle Peninsula of New Britain, which is the type locality.

Note.— The holotype, #2503, is lacking some antennal segments, three tarsi and the right hind tibia. The removed abdomen, set with 15 Uropodina (diameter: 0.3-0.4 mm) is glued on a card underneath the specimen.

Costomedes gressitti spec. nov.
(frontispiece, figs 172-178)

Scotomedes ater; Kerzhner, 1981: 17ff (New Guinea).

Material.— Holotype, ♂ (RMNH), [**Indonesia**: **Papua**], New Guinea, Neth. Ind.-American New Guinea Exped. [L.J. Toxopeus], Bernhard Camp, 50 m, 27.x.1938, J. Olthof. Paratypes (61 ♂♂, 99 ♀♀): 3 ♀♀ (RMNH), same data as holotype; 1 ♀ (BMNH) N. Dutch New Guinea, Waigeu Island, Camp Nok., 833 m, iv.1938, L.E. Cheesman, B.M.1938-593; 1 ♂ (BPBM), New Guinea, Japen I., SSE Sumberbaba,



Figs 172-178, *Costomedes gressitti* gen. nov. & spec. nov., 172, paratype, ♂ from Waris, left antenna seen from behind. 173-176, holotype, ♂. 173, end of abdomen, dorsal aspect; 174, 175, pygophore, caudal and left lateral aspect respectively; 176, right paramere, lateral aspect. 177, paratype, ♂ from Kokoda, end of abdomen, ventro-lateral aspect. 178, paratype, ♀, end of abdomen, ventral aspect. Bar of paramere represents 0.1 mm; other bars 1.0 mm.

Dawai R, 20.x.1962, jungle, light trap, H. Holtmann; 2 ♂♂, 7 ♀♀ (BMNH), 1 ♂, 1 ♀ (RMNH), New Guinea, Humboldt Bay Dist., Bewani Mts, 400 m, vii.1937, W. Stüber; 3 ♀♀ (BMNH), 1 ♀ (RMNH), idem, ix.1937 Humboldt Bay, B.M.1938-177; 2 ♀♀ (BMNH), 1 ♀ (RMNH), Dutch E Indes, W. Stuber [W. Stüber, New Guinea, Hollandia and environs], B.M.1948-408; 1 ♀ (BMNH); New Guinea, Humboldt Bay Dist., 1937, W. Stüber, B.M. 1938-177; 2 ♂♂, 1 ♀ (BMNH), New Guinea, Cyclops Mts, Sabron Camp 1, 400 m, 15.v.1936, L.E. Cheesman; 2 ♂♂, 4 ♀♀ (BMNH), 1 ♂, 2 ♀♀ (RMNH), idem, Camp 2, 670 m, vii.1936, B.M.1936-271; 1 ♂ (BPBM), New Guinea, Sentani, 90 m, 17.vi.1959, / TMP-30, Ex ABUG[?]/, T.C. Maa; 1 ♂ (BPBM), SW New Guinea, Cyclops Mts, W Sentani, 80 m, at light, 22-27.vi.1959, T.C. Maa; 1 ♀ (ZMAN), Indonesia, Irian Jaya, Cyclops Mts, Sentani 300 m, at light, 12.x.1993, A.J. de Boer, c.s.; 1 ♀ (BMNH), New Guinea, Mt Nomo, S of Mt Bougainville, 235 m, ii.1936, L.E. Cheesman, B.M.1936-271; 1 ♂, 1 ♀ (BPBM), New Guinea, Oransbari, N Geelvink Bay, ± 3 m, 15.ii.1963, light trap, R. Straatman; 1 ♂, 2 ♀♀ (BPBM), 1 ♀ (RMNH), New Guinea, Sentani, SW Cyclops Mts, 100 m, M.V. light trap, 15.vi.1959, Gressitt & Maa; 2 ♂♂, 2 ♀♀ (BPBM), New Guinea, Sentani, 80 m, 22.vi.1959, M.V. light trap, Gressitt & Maa; 2 ♂♂, 2 ♀♀ (BPBM), 1 ♀ (RMNH), same data, but 90 m; 5 ♂♂, 5 ♀♀ (BPBM), 1 ♂, 1 ♀ (RMNH), New Guinea, W Sentani, Cyclops Mts, 50-100 m, light trap, 22-24.vi.1959, Maa & Gressitt; 1 ♂ (BPBM), same data but 150-250 m, 25.vi.1959; 3 ♂♂ (BPBM), New Guinea, Waris, 450-500 m, 1-2.viii.1959, T.C. Maa; 8 ♂♂, 5 ♀♀ (BPBM), 2 ♂♂, 2 ♀♀ (RMNH), idem, 1-7.viii.1959; 1 ♂, 1 ♀ (BPBM), idem, 8-15.viii.1959; 1 ♂ (ZMAN), New Guinea, Boven Digoel, 150 km str-up fr Tanah Merah, viii-ix.1929, W.G.N. v.d. Sleen; 1 ♂, 3 last instar nymphs (ZMAN), New Guinea, Boven Digoel area, 400 km N of Merauke, 1926, A. Kalthofen; 2 ♂♂, 2 ♀♀ (BPBM), New Guinea, Sarmi, W to Hollandia, 18.vii.1959, M.V. light trap, T.C. Maa; 2 ♂♂, 3 ♀♀ (BPBM), 1 ♂, 1 ♀ (RMNH), New Guinea, Hol Maffen [Holmafin], 22 km E of Sarmi, 18.vii.1959, T.C. Maa; 1 ♂ (BPBM), New Guinea, River Tor (mouth), 4 km E of Hol Maffen [Holmafin], M.V. light trap, 1.vi.1959, T.C. Maa; 2 ♀♀ (BPBM), 1 ♀ (RMNH), idem, but 2.vii.1959, at light; 1 ♂ (BPBM), New Guinea, Bodem, 11 km SE of Oerberfaren, 7-17.vii.1959, T.C. Maa; 2 ♀♀ (USNM), New Guinea, Wasian, 1939, R.G. Wind, "*Scotomedes ater* Stål, det. Harris 1975", H.M. Harris Coll. 1975; [**Papua New Guinea**], 2 ♀♀ (SAMA), Krisa, Vanimo, iv.1939, L.E. Cheesman; 3 ♀♀ (BPBM) 1 ♀ (RMNH), New Guinea, Torricelli Mts, Mokai Vill., 750 m, 8-15.xii.1958, W.W. Brandt, 1 ♂ (BPBM), idem, 16-31.xii.1958; 1 ♂, 4 ♀♀ (BPBM), 1 ♀ (RMNH), New Guinea, Lae, Malaise trap, 18-24.i.1962, J. Sedlacek; 2 ♀♀ (BPBM), New Guinea, Lae, Singuawa R, 30 m, 6º45'S, 147º10'E, Pri. forest, light trap, 15.iv.1966, Wilkes; 2 ♀♀ (BPBM), New Guinea, Bismarck Range, Simbai, 1660 m, 3º44'S, 144º80'E, light trap, 26.v.1966, J.L. Gressitt; 1 ♂, 5 ♀♀ (BPBM), 1 ♂, 2 ♀♀ (RMNH), New Guinea, Popondetta, 25 m, Light Trap, v.1966, Shanahan-Lippert; 3 ♂♂, 7 ♀♀ (BPBM), 1 ♂, 2 ♀♀ (RMNH), idem, but vi.1966; 1 ♀ (BPBM), New Guinea, Popondetta, 60 m, 1-4.ix.1963, light trap, J. Sedlacek; 4 ♂♂, 2 ♀♀ (BMNH), 1 ♂, 1 ♀ (RMNH), Papua N. G., Kokoda, 400 m, vi-ix.1933, L.E. Cheesman, B.M.1934-321 & 427; 1 ♀ (BPBM), New Guinea, Kokoda, 400 m, light trap, J. Sedlacek, 15-20.xi.1965; 1 ♂ (BPBM), New Guinea, Finisterre Range, Saidor, Gabumi Vill., 24-30.vi.1958, W.W. Brandt; 1 ♀ (AMNH), New Guinea, Seventh Archbold New Guinea Exped., Morobe Distr., Huon Peninsula, Masba Creek Camp, 7-12.v.1964, H.M. van Deusen; 1 ♀ (AMSA), Papua N. G., Northern Div., Mt Lamington Distr., i-ii.1929, C.T. McNamara.

Head.— Upper side of head usually blackish-brown, anterior of eyes a little lighter, covered with short decumbent setae; ventral side blackish, setation longer and more sub-erect; antennae and rostrum brown, apical 0.75 of second segment lighter, last segments light brown, but apical 0.75 of last one, colourless; second antennal segment (fig. 172) lightly curved at proximal two fifths; distal setose part longer than half length of segment; ocelli large, its diameter greater than distance to margin of eye.

Thorax.— Anterior part of pronotum (fig. 18) including collar, shiny black, posterior part dark brown; scutellum blackish-brown, posterior inflated corner medially more or less reddish brown; ventral side of thorax black; corial part of fore wings dark brown, at most with a rudiment of a yellow spot at top of exocorium against cuneal

cleft; membrane a little lighter; setation of corial part of fore wings extremely short; legs brown, tarsi yellowish.

Abdomen.— Tergites brown, shining, basal segments with narrow distal dull bands, gradually broader in posterior pregenital segments; sternites dullish, brown, with short setation; in the male posterior corners of seventh laterotergite simply rounded, those of eighth laterotergite posteriorly extended, lingulate (figs 173, 177); lateral margin of genital capsule (fig. 173) extended laterally forming a somewhat pointed curvature; posterior wall of genital cavity roundly extended caudad, its dorsal margin sinuous as seen from behind (fig. 174); posterior surface of capsule sinuous in profile (fig. 175); parameres (fig. 176) each with a short, curved shaft, a rounded dorsal protuberance, and a fairly long, curved, antero-laterally directed spur.

Female (fig. 178).— Central part of seventh sternite flat, with delicate transverse grooves, more or less parallel to emarginate posterior margin, apophysis short (fig. 50), central tooth (squama) large and rounded posteriorly; posterior margins thickened; lateral margins of eighth paratergites a little angularly extended postero-laterally; gonocoxites VIII long and slender.

Measurements.— Holotype, ♂: tl, 9.7; lb, 8.2; lw, 6.4; ww, 4.4; lh, 1.4; wh, 1.25; lp, 2.0; wp, 3.2; la, 2.0; lr, 3.8; lt, 4.5.

Distribution.— Indonesia (Papua and including Japen and Waigeu Island), Papua New Guinea. The vertical distribution ranges from 3 to 833 m with a mean of 252 m, if we ignore the exeptional altitude of 1661 m (Simbai); otherwise, it should be 310 m.

Etymology.— The species is named in honour of the late Dr Judson Linsley Gressitt (1914-1982) for his excellent contributions to the knowledge of the Indo-Australian and Pacific zoology, especially on entomology and biogeography (Radovsky, 1983).

Notes.— The holotype specimen is lacking left three and right two antennal segments and three tarsi. Tarsomedina are scattered over its body and two large Uropodina (diameter: 0.8-0.9 mm) are attached to the pronotum and the right hind femur.

Apparently *Costomedes gressitti* is the most common species in New Guinea, mainly inhabiting the lower parts of the island; however, two females are (wrongly?) labelled: Simbai, Bismarck Range, 1660 m, light trap. Specimens from Popondetta are much darker: black with dark brown appendages and abdomen; last antennal segments and tarsi light brown. The Bernhard Camp of The Netherlands Indian-American New Guinea Expedition was situated on a dead arm of the Idenburg river with dense virgin jungle, locally swampy, traversed by many creeks. Rattan Camp, in a dense jungle (virgin forest) with many Rattan-palms (*Calamus* species), on a ridge sloping into the Araucaria river. (Toxopeus, 1940: 279; Archbold, c.s., 1942: 231f).

The two mentioned specimens from Wasian, New Guinea (USNM), determined as *Scotomedes ater* Stål by H.M. Harris in 1975, are almost certainly the specimens also quoted by Davis (1961: 349, fig. 29) and Kerzhner (1981: 17, 23, ff) under *S. ater* Stål. The specimens are lacking macrochaetae on pronotum and the anterior membranal cell is closed.

Costomedes heissi spec. nov.
(figs 179, 180)

Material.— Holotype, ♀ (CEH), Maluku, Seram [**Indonesia**, Moluccas, **Ceram**], Solea 12 km SE Wahai, 17.i-6.ii.1979, J. Horák. Paratypes: 4 ♀♀ (CEH), 1 ♀ (RMNH), same data as holotype.

Habitus (female).— Black species, with a very small yellow spot on top of exocorium against the cuneal fracture, one at the end of the cuneus and an indistinct brown vitta at the base of the membrane near tip of clypeus; in some specimens with a brownish-black hue along the costal margin of the fore wings.

Head upper side including eyes shining brownish-black, surface with short decumbent curled beige setae, ocelli large, diameter greater than distance to eye; underside medially matt, setation scattered, semi erect; second antennal segment (fig. 179) blackish-brown, setose over a little more than apical half, third segment dark, last segment for 0.8 apically yellow. Rostrum long, reaching posterior margin of metasternum.

Thorax.— Collar and pronotal calli including sublateral calli shining black, glossy area extended posteriorly far onto the lobal calli; lateral margin little developed, anteriorly barely broadened, corners receding. Posterior part of pronotum and corial part of fore wings shimmering semi matt. Pronotum and scutellum bare, punctation strong, setation of fore wings extremely short; first cell of membrane closed by a "dead" vein born from a short stub.

Abdomen.— Ventral aspect of apex of abdomen: fig. 180. Ventral trichobothria extremely small, only visible on sternites 5 and 6; posterior margin of seventh sternite deeply concave, medially membraneous with a tongue-like posterior extension on the bases of the gonocoxites IX; margins laterally of the concavity swollen; anterior of the membraneous part, the sternite is somewhat accolade-like raised; lateral margin of eighth laterotergites shallowly rounded;

Measurements.— Holotype: tl, 9.6; lb, 8.2; lw, 6.4; ww, 4.35; lh, 1.4; wh, 1.35; lp, 2.15; wp, 3.5; la, 1.7; lr, 4.0; lt, 4.0.

Total lengths of the six specimens; 9.2, 10.2, 10.0, 9.6, 9.35, 9.6, mean: 9.66.

Male.— Unknown.

Distribution.— Indonesia (Isle of Ceram, Moluccas).

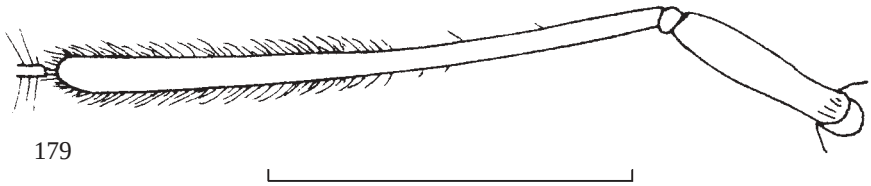
Etymology.— The species is dedicated to Professor Dipl.-Ing. Dr Ernst Heiss for his generous help in obtaining material for this study.

Notes.— This species is closely related to *Costomedes gressitti* gen. nov. & spec. nov., but is black, more shiny, the ocelli are larger, the pronotum is more deeply punctate, the seventh sternite is medially much more lifted, the margins laterally of the concavity are swollen; the sclerites, especially the ninth laterotergites, are more or less shiny.

The specimens of this species were found "als Beifang zu Aradiden" by Dr Heiss in a collection of Aradidae (Heteroptera) from Ceram. About the habitat, he stated *in litteris*: "Aber alles spricht dafuer, dass auch diese Tiere im Habitat der Aradiden gefunden wurden - so wie ich es selbst in Bali beobachtet hatte. Wie erinnerlich, waren diese Scotomedes auf der Unterseite von verpilzten Ästen oder Baumteilen, welche nicht am Boden ganz aufgelegen sind, doch genügend Verbindung dazu hatten, um feucht zu bleiben".

Costomedes hirsutus spec. nov.
(figs 181-186)

Material.— Holotype, ♂ (BPBM), [**Papua New Guinea**], New Guinea, Wau, Morobe Distr., 1200 m, 5.v.1963, J. Sedlacek. Paratypes (6 ♂♂, 5 ♀♀): 1 ♀ (BPBM), same data as holotype, but 2.iv.1969; 3 ♂♂ (BPBM), 1 ♂ (RMNH), same data as holotype, but 1300 m, 14.viii.1961; 1200 m, 31.viii.1961; and 1050



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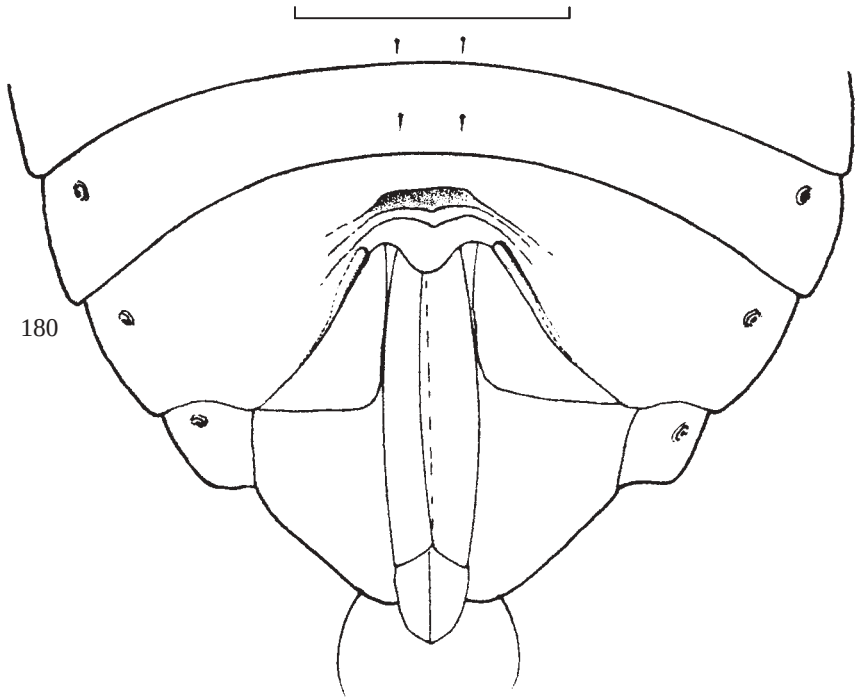

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Figs 179, 180, *Costomedes heissi* spec. nov., holotype, ♀. 179, left antenna, first and second segment, ventral aspect; 180, end of abdomen, ventral aspect of genital sclerites. Bars represent 1.0 mm.

m, 2.x.1961; 1 ♂ (BPBM), NE New Guinea, Wau, 1200 m, 1.iv.1965, J. Sedlacek; 1 ♀ (BPBM), Wau, Big Wau Ck., 1200 m, xii.1963, P. Shanahan (head missing); 1 ♀ (QMBA), Wau, Morobe dist., 3-4.ii.1966, G. Monteith; 1 ♀ (NSMT), Wau Ecol. Inst., Wau, 1000 m, 6.ix.1971, S. Asahina / *Scotomedes* sp., det. H. Hasegawa, 1972 / Syoziro Asahina, Collection NSMT; 1 ♀ (NSMT) Papua New Guinea, Wau, Morobe prov., 30.i-2.ii.1985, H. Kurahashi; 1 ♂ (BMNH), New Guinea, Madang District, Finisterre Mts, Damanti, 1065 m, 2-11.x.1964, Stn. No. 30, M.E. Bacchus, B.M.1965-120 (teneral specimen).

Head.— Upper side dark brown, thickly set with long yellowish, semi-adpressed curly setae; ventral side almost black, with longer, yellowish semi-erect setae; antennae and rostrum brown, pile of second antennal segment (fig. 181) short, covering only one fourth of length of segment.

Thorax.— Anterior part of pronotum black, shining, but basal half of collar, anterior

calli and remaining calli partly, covered with irregular dull, dark grey patches; posterior part dark brown, dull; fore wing dark brown with a yellow spot at tip of exocorium, and one at end of cuneus; punctures, especially on fore wings fairly dense, provided with a short seta each; legs brown, tarsi yellowish.

Abdomen.— Upper side light brown, tergites III-VIII with broad dull bands (exposed parts); ventral side of abdomen dark brown, with short yellowish white decumbent setae, pairs of mid-ventral setae present on III-VII.

Male.— Posterior corners of seventh abdominal latero-tergites (figs 182, 185) rather sharp and only feebly posteriorly extended, those of eighth sternite strongly stylet-like extended; lateral margin (wall) of genital capsule posteriorly angularly elevated and bent outwardly, angle showing a tendency to form a point dorsally; postero-ventral margin of capsule rather broad, almost 0.6 of width of capsule, roundly extended caudad, its dorsal margin gently sinuous in posterior view (fig. 183); dorsal surface of genital cavity shining, with a setose low prominence at each side of proctiger, and anteriorly of parameres; these (fig. 184) with short, curved stem, gradually passing into a hook-like spur.

Female (fig. 186).— Seventh sternite rather long, posterior margin medially deeply excavated and broadly raised, reddish; central tooth very shallowly rounded posteriorly; eighth laterotergites posteriorly roundly produced; gonocoxites VIII small, slender.

Measurements.— Holotype ♂: tl, 9.9; lb, 8.4; lw, 6.4; ww, 4.7; lh, 1.4; wh, 1.3; lp, 2.1; wp, 3.45; la, 1.95; lr, 3.35; lt, 4.5.

Distribution.— Papua New Guinea. Altitude: 1000–1300 m.

Etymology.— The name *hirsutus* refers to the marked setation on head, fore wings and genital capsule.

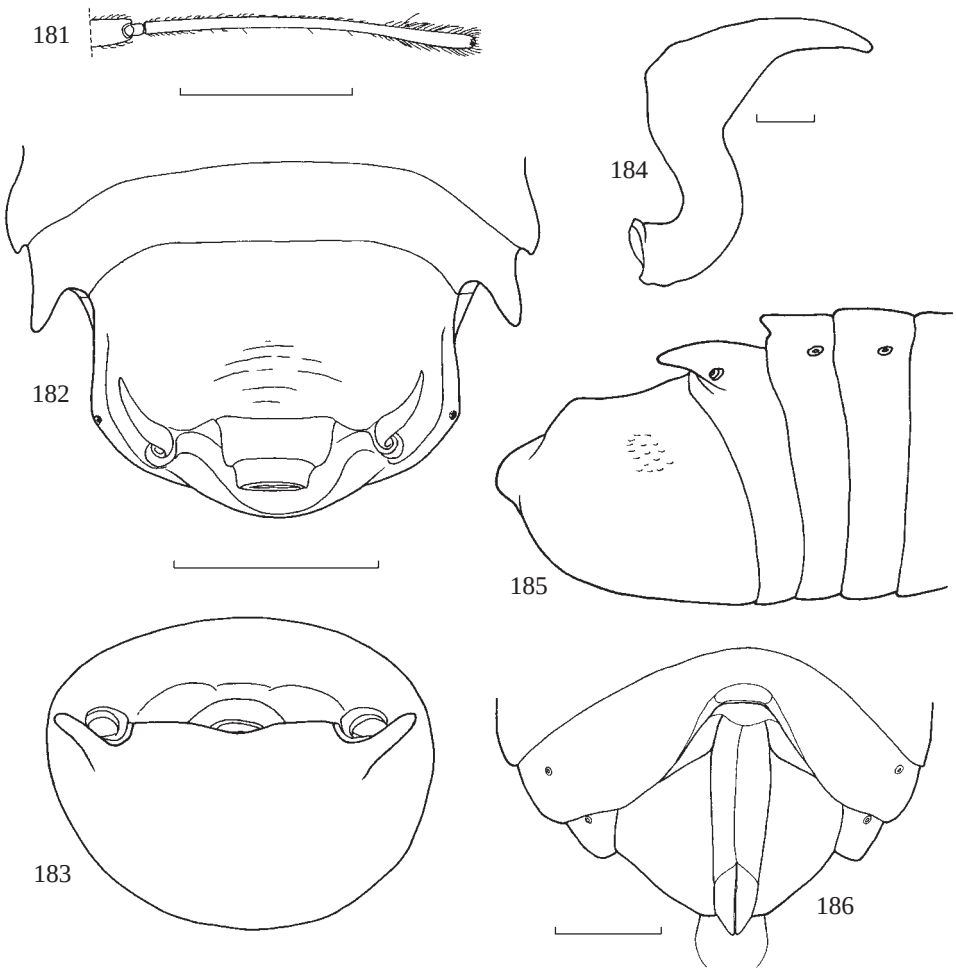
Notes.— The holotype, the undissected #2494, is missing two antennal segments at both sides and the left hind tarsus. The female specimen from Olsobip, Fly River, has the pronotal calli grooved.

Costomedes karimui spec.nov.
(figs 187-193)

Material.— Holotype, ♂ (BPBM), New Guinea [**Papua New Guinea**], Karimui, 1080 m, 8-10.vii.1963, J. Sedlacek.

Head.— Head blackish brown, towards apex, labrum and rostrum brown; upper side rather densely set with very short (0.02 mm) adpressed, white setae; ocelli small. (diameter 0.1 mm); antennae dark brown, distal 0.3 of second segment (fig. 187) clothed with golden brown pile; under side of head clothed with much longer white curled, decumbent setae.

Thorax.— Anterior part of pronotum shiny black, anterior calli and posterior half of collar dull, other calli shining; posterior part very dark reddish brown; scutellum black, inflated posterior corner reddish brown; under side of thorax dull black, propleural calli shining; metasternum yellowish brown with mesal keel and small adjacent area blackish; met-episternal scent gland outflow centrally brownish; legs reddish brown, tibiae towards apex and tarsi gradually from brown to yellowish; fore wings very dark brown (clavus) to brown distally, tip of exocorium yellow; setae on punc-



Figs 181-186, *Costomedes hirsutus* gen. nov. & spec. nov. 181, 185, holotype, ♂. 181, right antenna, second segment, posterior aspect; 185, end of abdomen, right ventro-lateral aspect. 182-184, ♂, topotypic paratype. 182, end of abdomen, dorsal aspect; 183, pygophore, caudal aspect; 184, right paramere, lateral aspect. 186, paratype, ♀, end of abdomen, ventral aspect. Bar of paramere represents 0.1 mm; other bars 1.0 mm.

tures of pronotum and fore wings extremely short or wanting, best developed on exocorium and cuneus.

Abdomen.— Dorsal side light brown, laterotergites and bands along posterior margins of tergites, dull; tergites sparsely set with long erect yellow silky setae, especially in posterior corners of last tergites; laterotergites more or less clothed with fine yellow recumbent setae; posterior corners of seventh laterotergites sharply extended caudad, eighth laterotergites at each side with a rather sharp, posteriorly directed tooth (figs 188, 190); ventral side of abdomen including genital capsule, dark brown,

setation short; dorsum of genital capsule light brown, glossy, surface anterior of the parameres, with fine, regular, transverse ripples; lateral walls of genital cavity rather low, evenly rounded and strongly bent outwards; posterior wall high, somewhat produced caudad, strongly inflated at both sides of thin mesal part, dorsal margin more or less deeply emarginate as seen from behind (figs 189, 191, holotype and paratype respectively); posterior profile of capsule sinuous (fig. 190); parameres (figs 192, 193, holotype and paratype respectively) each with a curved stem, distally perpendicularly bent to a gently curved, basally broadened, apically tapering spur.

Female.— Unknown.

Measurements.— Holotype, ♂: tl, 9.6; lb, 8.0; lw, 6.1; ww, 4.5; lh, 1.3; wh, 1.3; lp, 2.1; wp, 3.25; la, 1.75; lr, 3.4; lt, 4.35;

Distribution.— Papua New Guinea. Altitude: 1080 m.

Etymology.— The species is named after the type locality Karimui, in the NE section, not far from Okapa.

Notes.— This species is close to *C. hirsutus* but setation of head is much shorter, setose part of second antennal segment longer, pronotal calli shining, lateral wall of the pygophore is lacking a point and the posterior wall is strongly sinuous. The holotype specimen, #2518, is missing one right and two left antennal segments, right middle and left hind tarsi and the right hind leg.

Costomedes karimui eliptamin subspec. nov.
(figs 192, 193)

Material.— Holotype, ♂ (BPBM), New Guinea [**Papua New Guinea**], Eliptamin Valley, 1665-2530 m,19.vi.1959, W.W. Brandt / #2500.

Habitus.— Very near the former species, but somewhat teneral and a little paler coloured.

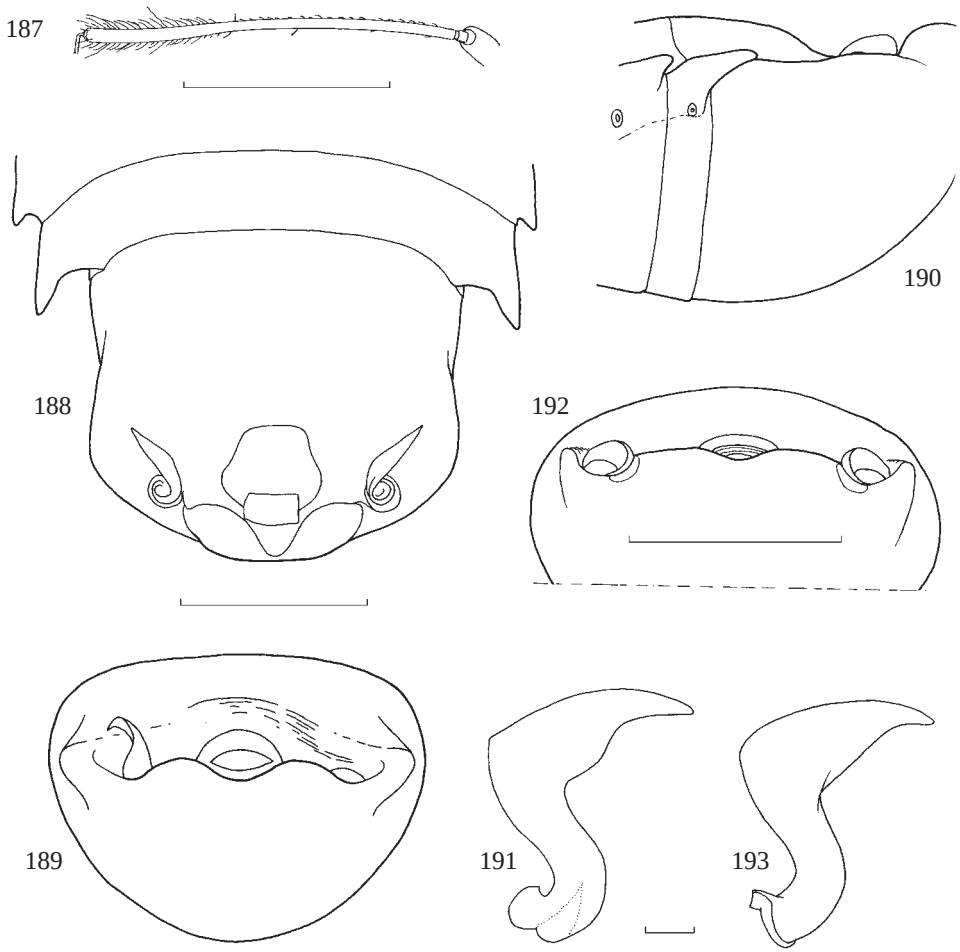
Head.— The clothed part of the second antennal segment is somewhat longer, about one-third of its length, and the ocelli are greater (diameter 0.12 mm), the metepisternal scent gland outflow yellowish-brown.

Abdomen.— Tergites yellowish brown, dull, posterior corners of seventh latero-tergite only slightly extended caudad, of eighth latero-tergite considerably extended and slightly flattened; sternites and genital capsule brown, dullish and sparsely set with short decumbent setae; dorsal surface of capsule light brown, shining, with a low protuberance mesially against proctiger; lateral wall of genital capsule rather low, shallowly rounded and only slightly bent outwards; posterior wall higher, moderately inflated at both sides of thinner mesial part, strongly roundly produced caudad, dorsal margin mesially slightly excavated as seen from behind; posterior surface of capsule only slightly sinuous in profile (fig. 192); paramere (fig. 193) with a short, curved stem and a basally broad, flat, tapering, somewhat hook-like short spur.

Female.— Unknown.

Measurements.— Holotype, ♂: tl, 10.4; lb, 9.0; lw, 7.0; ww, 4.45; lh, 1.36; wh, 1.36; lp, 2.1; wp, 3.3; la, 1.85; lr, 3.47; lt, 4.3; la1, 0.6; la3, 1.25; la4, 1.0.

Distribution.— Papua New Guinea. Altitude 1665–2530 m.



Figs 187-193, *Costomedes karimui* gen. nov. & spec. nov. 187-191, holotype, ♂. 187, second segment of right antenna; 188, end of abdomen, dorsal aspect; 189, pygophore, caudal aspect; 190, end of abdomen, left lateral aspect; 191, right paramere, lateral aspect. 192, 193, male paratype from Eliptamin. 192, pygophore, caudal aspect; 193, right paramere, lateral aspect. Bar of parameres represents 0.1 mm; other bars 1.0 mm.

Etymology.— The name of the subspecies is derived from the type locality, the Eliptamin Valley.

Notes.— This specimen represents a higher montane subspecies of *C. karimui*. The most obvious differences concern the antennal setation, the size of the ocelli, the postero-ventral margin of the pygophore (fig. 192) and the form of the parameres (fig. 193). The specimen is missing two left antennal segments and four tarsi. The abdomen is glued to a card and the pygophore is stored in glycerin in a PVC microvial pinned underneath the specimen

Costomedes morobensis spec. nov.
(figs 194-200)

Material.— Holotype, ♂ (BPBM), New Guinea [**Papua New Guinea**], NE, 13 km SE Okapa, 1650-1870 m, 26.viii.1964, J. & M. Sedlacek. Paratypes (5 ♂♂, 4 ♀♀): 1 ♀ (BPBM), New Guinea Wau, Morobe distr., 1250-1700 m, 15-16.vi.1962, J. Sedlacek. 1 ♂ (BPBM), 1 ♂ (RMNH) same data as holotype;.1 ♂ (BPBM), New Guinea Wau, Mt Missim, 1700 m, 7.iii.1963, J. Sedlacek; 1 ♂ (BPBM), New Guinea, Okapa, Okasa, 1400-1600 m, 17.i.1966, J. Sedlacek; 1 ♂ (BPBM), New Guinea, Wau, Nami Ck, 1700-1850 m, ii.1966, J. Sedlacek; 1 ♀ (QMBA), Edie, Creek Rd, J. Sedlacek; 1 ♀ (ZMAS), New Guinea, NE, Wareo, Breuning ded. / *Scotomedes ?ater* Stål, Kerzhner det. 963; 1 ♀ (BMNH), New Guinea: Madang Distr. Finisterre Mts, Moro. C. 1700 m, 30.x-15.xi.1964 / Stn No. 85/, M.E. Bacchus, B.M. 1965-120; 1 ♀ (BPBM), SE, Papua, Fly River, Olsobip, 700-1150 m, 3.viii.[19]69, J. & M. Sedlacek.

Habitus.— A dark, broad species with slightly shortened wings.

Head.— Upper side dark brown, setation rather short, decumbent; ventral side black, setation much longer, decumbent; antennae dark brown, apical half of second segment and rest lighter coloured; second segment (figs 194,195) lightly bent in middle' with tuft of pile over apical third; ocelli small.

Thorax.— Pronotum, scutellum, clavus, prosternum, mesosternum and pleurae, black, corium blackish-brown, with a yellow spot against costal margin and cuneal fracture; membrane dark brown; legs dark brown, with yellowish white knees (basal parts of the tibiae), and tarsi; fore wings broad, somewhat brachypterous; setae on pronotum and scutellum short, on corium longer, about 0.06-0.08 mm; prosternum almost bare, mesosternum with short, silky setae.

Abdomen.— Colour of sternites including genital capsule brown to dark brown, surface dullish, with very short reclined setae; posterior corners of seventh laterotergites (figs 196, 198) with a short caudad extension, those of eight, long and dentate; dorsal surface of genital capsule shining, posterior part of lateral margin roundly produced laterally, halfway and dorsally provided with a small tooth; posterior wall of genital cavity broad, roundly produced caudad, dorsal margin almost straight or very shallowly emarginate as seen from behind (fig. 197); Parameres (fig. 199) each with a short, curved stem, and a hook-shaped spur with a broad base.;

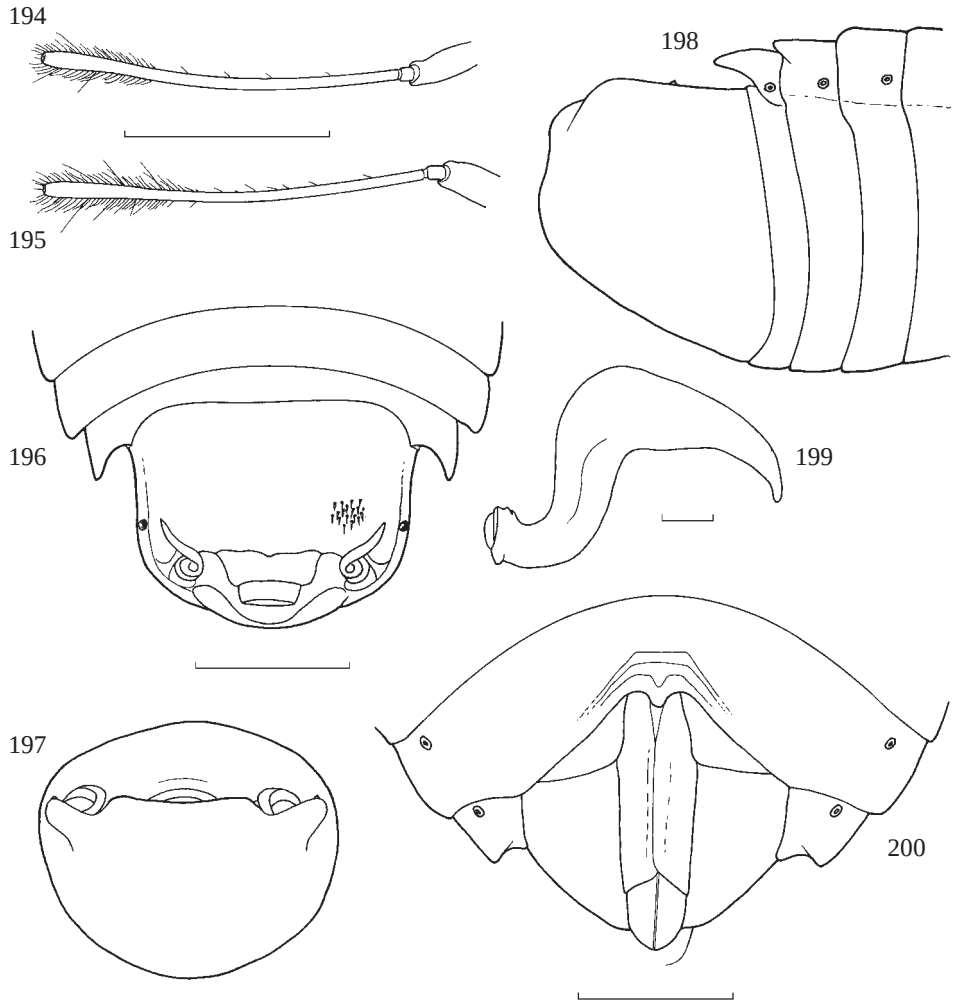
Female (fig. 200).— Posterior margin of seventh sternite medially raised and angularly excavated, median squama rounded apically; lateral margin of eighth laterotergite angularly produced.

Measurements.— Holotype, ♂: tl, 9.3; lb, 7.75; lw, 5.8; ww, 4.7; lh, 1.35; wh, 1.28; lp, 1.95; wp, 3.1; la, 1.9; lr, 3.5; lt, 4.2.

Distribution.— Papua New Guinea, at higher altitudes, 1250-1850 m, mean of 1522 m.

Etymology.— The name of the new species refers to the Morobe district in which most specimens of this species were collected.

Notes.— This species is remarkably covered with dirt. The holotype is not dissected and is in a perfect state; it bears two Uropodina (diameter: 0.6 mm), respectively on pronotum and abdomen.



Figs 194-200, *Costomedes morobensis* gen. nov. & spec. nov. 194, paratype, ♀, left antenna, second segment; 195-199, paratype, ♂from Wau. 195, left antenna, second segment; 196, end of abdomen, dorsal aspect; 197, pygophore, caudal aspect; 198, end of abdomen, right ventro-lateral aspect; 199, right paramere, lateral aspect; 200, paratype, ♀, end of abdomen, ventral aspect. Bar of paramere represents 0.1 mm; other bars 1.0 mm.

Costomedes sedlaceki spec. nov.
(figs 201-208)

Material.— Holotype, ♂ (RMNH), New Guinea [**Indonesia**: **Papua**], Neth. New Guinea Exped., K.N.A.G. 1939, Paniai [lake], 6.ix.1939 / #2334, [collectors: H. Boschma, c.s.]. Paratypes: (5 ♂♂, 10 ♀♀): 1 ♀ (RMNH), Neth. New Guinea exped., Star Range, 1800 m, Tenma Sigin, at light, 21.v.1959. 1 ♀ (BPBM), New Guinea, Wissel Lakes, Enarotadi, 1900-2000 m, 2-11.vii.1962, J. Sedlacek; 1 ♂ (BPBM), idem, 1850-2000 m, 28.vii.1962; 1 ♀ (BPBM), idem, 1850 m, 2-3.viii.1962; 1 ♂, 1 ♀ (BPBM), New

Guinea, NE, Upper Biaru, 1600-2200 m, 10.iii.1971, Gressitt & Tawi; 1 ♀ (BPBM), 1 ♀ (RMNH), New Guinea [**Papua New Guinea**], 1 ♂ (BPBM), New Guinea, Kainantu, 2100-2240 m, 8.i.1965, J. & M. Sedlacek; Wau, 2100-2300 m, 3.viii.1971, J. Sedlacek; 1 ♂ (WEIC), Morobe distr., Mt Kaindi, 2360 m, 15.v.1977, W.C. Gagne, Bishop; 1 ♀ (WEIC), id. id.,10.ix.1979; 1 ♂ (BPBM), New Guinea, NE 32 km E Wapenamunda [Wapanamanda], 2500-2700 m, 9.vi.1963, J. Sedlacek; 1 ♀ (QMBA), "Giluwe 2350", Mt Giluwe, 2350 m, Papua New Guinea, J. Sedlacek (data supplemented by G.B. Monteith, in litteris, 1997); 1 ♀ (BPBM), New Guinea (SE) Mt Giluwe, 2500 m, 7.vi.1963, M. Sedlacek; 1 ♀ (BPBM), New Guinea, 40 km S. of Wau, Bulldog Rd, 2700-2800 m, 22-30.iv.1969, J. & M. Sedlacek. 1 ♀ (WEIC), NE, Wau, Morobe Distr., Mt Missim, 2600 m, 23.iii.1974, W.C. Gagne, coll. Bishop / *Velocipeda* sp. det. W.C. Gagne (Nabidae).

Head.— Upper side blackish-brown, densely set with short, white curled, decumbent setae, ventral side with longer decumbent setae; antennae and rostrum brown; setose apical part of second antennal segment (fig. 201) covering more than one third, but less than half (about 0.40-0.45) of its length; ocelli rather small, diameter: 0.10, distance to eye 0.12.

Thorax.— Pronotum, scutellum and ventral side blackish, anterior calli and posterior part of pronotum dull brownish-black, collar, central and lateral calli shining black with traces of oblique dull vittae; punctation of posterior part somewhat finer and denser than in *C. gressitti*; posterior part of prosternum and metasternum with silky setae; metathoracic scent gland canal brown; fore wings dark to blackish-brown (clavus) to brown at the membrane, a yellow spot at tip of corium, and a smaller one on membrane at tip of cuneus; setae (near punctures) very short; legs brown, tibiae and tarsi more or less yellowish;

Abdomen.— Tergites light brown, posterior margins whitish, dull; sternites brown to dark brown, semi shiny; in male posterior corners of seventh laterotergites (fig. 202, 204) produced posteriorly by a small lobe, those of eighth long, rather sharply toothed. Male genital capsule (figs 202-205) with lateral walls produced caudo-laterad; posterior wall broad, somewhat roundly produced caudad, and shallowly excavated mesially, as seen from behind; dorsal surface shiny, with a small sharp tooth anterior of each paramere; parameres (fig. 206, 208) with a long curved hook.

Female (fig. 207).— Posterior margin of seventh sternite sinuously emarginate, a little thickened, and somewhat raised above base of posteriorly directed, obtusely rounded mesial tooth; eighth laterotergite posteriorly sharply produced.

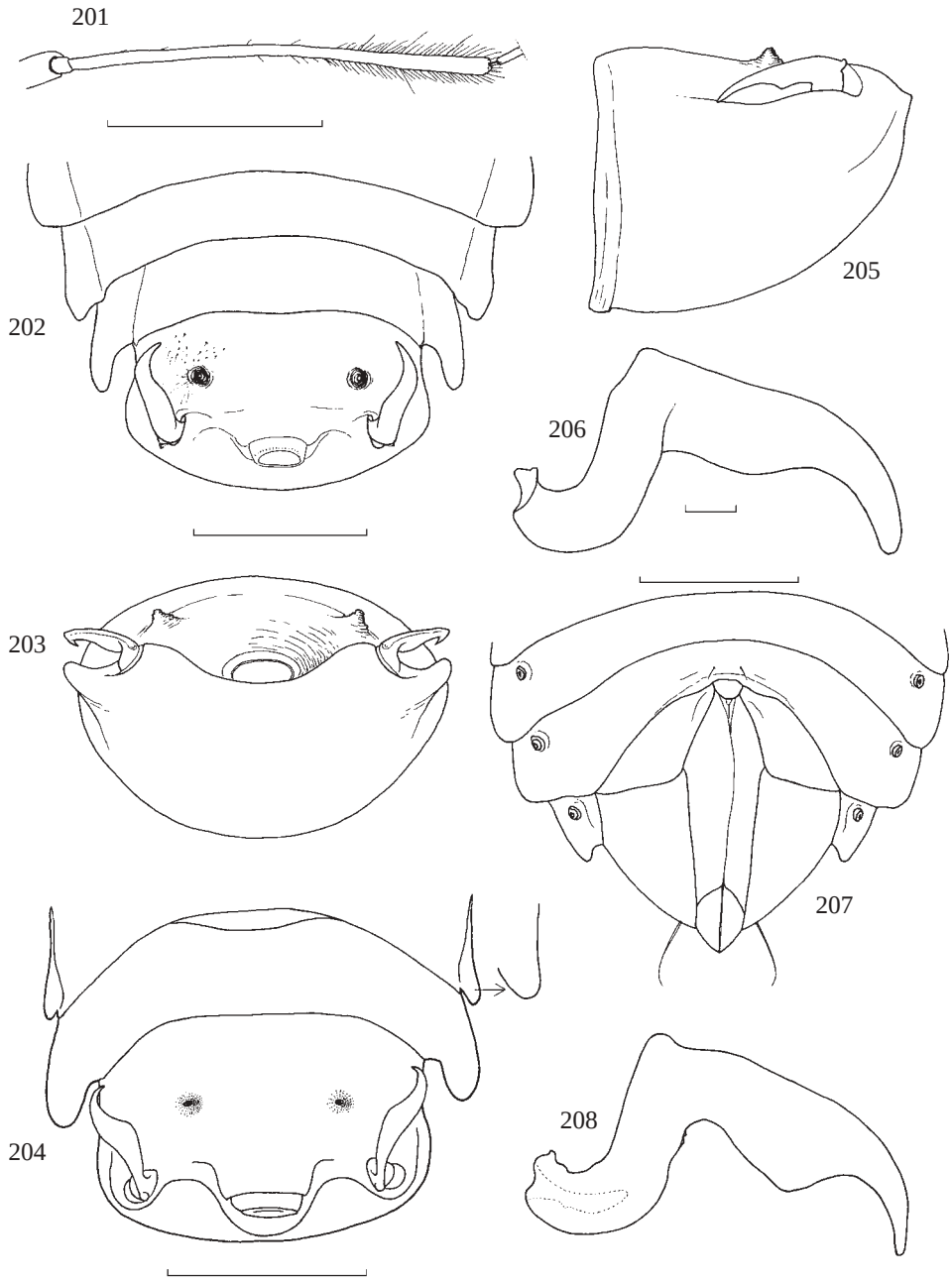
Measurements.— Holotype, ♂: tl, 9.8; lb, 8.0; lw, 7.0; ww, 4.4; lh, 1.5; wh, 1.23; lp, 1.95; wp, 3.25; la, 1.8; lr, 3.0; lt, 4.75.

Distribution.— Indonesia (Papua) and Papua New Guinea; central mountains, at high altitudes, 1600-2800 m, mean of given altitudes: 2218 m.

Etymology.— The name *C. sedlaceki* allude to the late Mr Joseph Sedlacek, who did much important collecting in New Guinea, assisted by his wife Maria and son J.H. Sedlacek.

Notes.— The holotype (RMNH), #2334, is missing its right antenna, the left fore leg, the right fore tarsus while the right hind leg and the right fore wing are glued to a card together with the dissected abdomen and pygophore.

The specimens from the higher parts of its distribution, viz. above 2300 m, have the clothed part of second antennal segment a bit longer (ratio 0.45); the punctation of pronotum somewhat denser; in the male the lobes of the posterior corners of the



Figs 201-208, *Costomedes sedlaceki* gen. nov. & spec. nov. 201, paratype, ♀, left antenna, second segment, dorsal aspect; 202, 203, 205, 206, holotype, ♂, 202, end of abdomen and pygophore, dorsal aspect; 203, 205, pygophore, caudal and left lateral aspect respectively; 206, right paramere, lateral aspect; 207, paratype ♀, end of abdomen, ventral aspect; 204, 208, paratype ♂ from Wapenamunda. 204, end of abdomen and pygophore, dorsal aspect; 208, right paramere, lateral aspect. Bars of parameres represent 0.1 mm; the other bars 1.0 mm.

seventh and eighth paratergites are much broader (fig. 204), the papillae on the dorsal surface of the genital capsule are very small, the postero-ventral margin is less concave and the parameres (fig.208) are comparable.

Costomedes solomonensis spec. nov.
(figs 209-214)

Material.— Holotype, ♂ (BPBM), [**Papua New Guinea**], **Solomon Islands**, **Bougainville**, Kukugai Vill. (Buin), 150 m, x.1960, W.W. Brandt. Paratypes (7 ♂♂, 16 ♀♀): 2 ♂♂, 2 ♀♀ (BPBM), 1 ♂, 1 ♀ (RMNH), same data as holotype, but xi and xii.1960; 1 ♀ (ANIC), same data as holotype, but 17.x.1960-2.ii.1961; 1 ♀ (BMNH) Kolombangara, base camp, 1.6 km inland from Kuzi, by Kolombara R, 5.ix.1965, Roy. Soc. Exped. Brit. Mus. 1966-1; 1 ♀ (BMNH), idem, Camp 1, 7.ix.1965; 1 ♀ (BPBM), Kolombangara, Gollifers Camp, 700 m, P. Shanahan, 20.i.1964; 2 ♀♀ (BPBM), 1 ♀ (RMNH), idem, 27.i.1964; 1 ♂ (BPBM) Choiseul Island, Kolombangara R, 60 m, 20.iii.1964, P. Shanahan; 1 ♂ (BMNH), Guadalcanal, Gallego, Camp 1, vegetation on banks of river, 9.vii.1965, Roy. Soc. Exped. B.M., 1966-1; 1 ♀ (BPBM), Guadalcanal, Paripao, under dead bark, 21.v.1960, C.W. O'Brien; 1 ♂ (BPBM), Malaita Island, Tangtalau-Kwalo, 200-350 m, M.V. light trap, J.M. Sedlacek; 2 ♀♀ (BMNH), San Cristoval, Camp 2, Tilley lamp, 24.vii.1965, Roy. Soc. Exped.; 2 ♀♀ (BMNH), 1 ♀ (RMNH) idem, Tilley lamp during heavy rain, 25.vii.1965; 1 ♂ (BMNH), Camp 2, Warahito-Pagato confluence, black light, 3.viii.1965.

Head.— Upper surface of head dark brown, anteriorly lighter, set with very short decumbent white setae; ventral side black, setae a little longer, more semi-erect and yellowish white; rostrum and antennae brown; third antennal segment and basal third of fourth segment, light brown, rest yellowish white, second antennal segment (fig. 209) setose for apical half. Rostrum shorter as in *C. gazelle*, its length about 3.6 mm; ocelli small.

Thorax.— Anterior part of pronotum blackish-brown, shining, posterior part dull reddish brown; basal part of scutellum blackish, distal inflated corner reddish brown; setulae on pronotum, scutellum and fore wings very short, longest on cuneus (0.03 mm) and hypocostal area; ventral side of thorax black, metapleural scent gland dispenser very short, tumid, almost egg-shaped, brown.

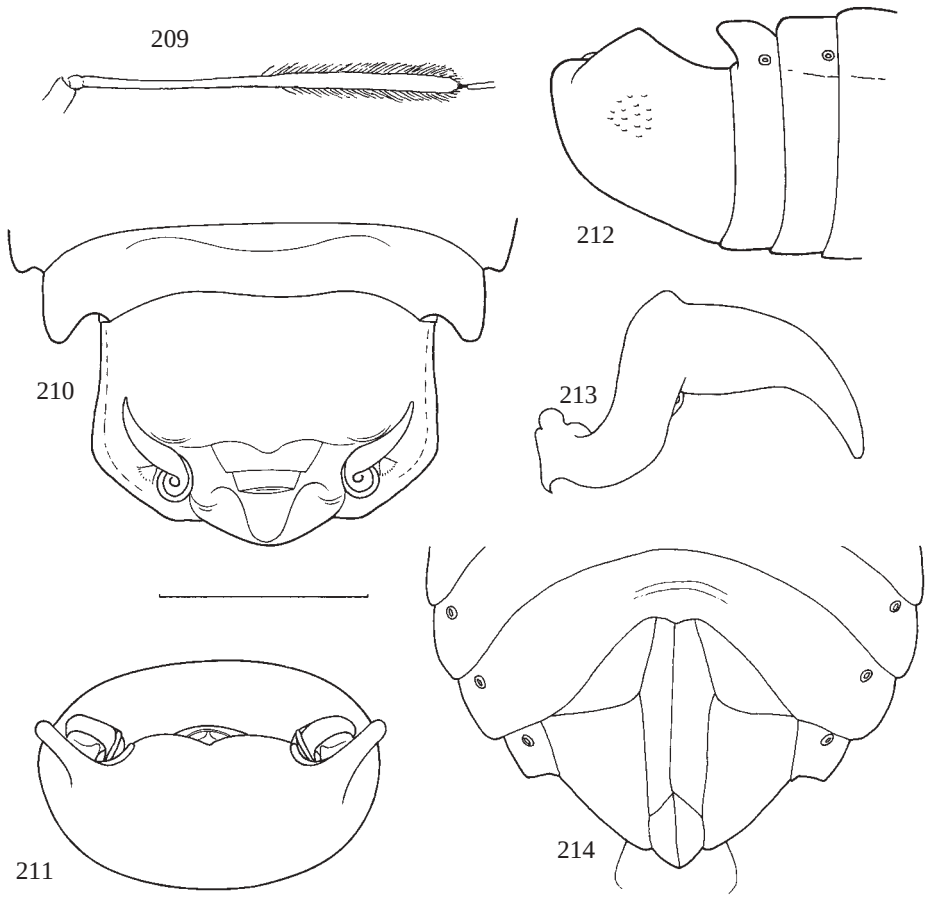
Abdomen.— Tergites light brown, dull, dorsal surface of genital capsule glossy; sternites including capsule, brown, semi-mat, setae short, decumbent.

Male.— Posterior corners of seventh laterotergite simply rounded, not extended caudad, posterior corners of eighth laterotergite however prolonged caudad, lamellate (figs 210, 212); lateral walls of genital capsule (fig. 212) sharply raised, without a tooth and strongly bent outwards, making capsule broadest behind; posterior wall roundly extended caudad, inflated laterad, with a narrow, thin mesial part, dorsal margin mesially more or less sharply but shallowly excavated in posterior view (fig. 211); parameres (fig. 213) of considerable size, each with a curved shaft, a small, rounded, apical protuberance, and a firm hooked spur.

Female (fig. 214).— Basal parts of genital sclerites flattened, smooth; posterior margin of seventh sternite mesially flattened.

Measurements.— Holotype, ♂: tl, 9.5; lb, 7.9; lw, 6.4; ww, 4.5; lh, 1.3; wh, 1.25; lp, 1.85; wp, 3.1; la, 1.75; lr, 3.5; lt, 4.0. Female paratype, tl, 9.3; lb, 7.8; lw, 6.4; ww, 4.1; lp, 1.94; wp, 3.08; lr, 3.6; lt, 4.0.

Distribution.— Solomons (Choiseul, Kolombangara, Malaita, Guadalcanal, San Christobal); Papua New Guinea (Bougainville, ?Bismarck Archipelago: New Ireland). A lowland species.



Figs 209-214, *Costomedes solomonensis* gen. nov. & spec. nov. 209, right antenna, second segment; 210, 211, 213, paratype, ♂ from Bougainville; 210, end of abdomen, dorsal aspect; 211, pygophore, caudal aspect; 213, right paramere, lateral aspect. 212, holotype, ♂, end of abdomen, ventro-lateral aspect; 214, paratype, ♀ from Bougainville, end of abdomen, ventral aspect.
Bar of paramere represents 0.1 mm; other bars 1.0 mm.

Etymology.— The species is named after the Solomon Islands, the group of islands where this species is found.

Notes.— The holotype specimen, #2504, is missing three right antennal segments and the left fore tarsus. The proximal half of the abdomen bears about 45 Uropodina (diameter: 0.3-0.4 mm).

Costomedes toxopeusi spec. nov.
(figs 215-220)

Material.— Holotype, ♂ (RMNH), New Guinea [**Indonesia**: **Papua**], Neth. Ind.-American New Guinea Exped., Rattan Camp, 1000 m, 1-7.ii.1939, L.J. Toxopeus / #2335. Paratypes: 1 ♀ (RMNH), idem, 1150

m. 1 ♀ (RMNH), Neth. New Guinea Exp., Star Range, Sibil, 1260 m, 25.iv.1959 [C. van Heijningen] / #2525; 1 ♂ (BMNH), Mt Cyclops, 3500 ft = 1170 m, iii.1936, L.E. Cheesman, B.M. 1936-271 / #2526.

Head.— Dorsal side of head (vertex) dark brown to brown more anteriorly, covered with rather long (0.05-0.07 mm) white decumbent setae; ventral side, including sides of head behind and fore eyes, black, same setation, but longer (0.1 mm); second antennal segment (fig. 215) apical 0.3 of its length covered by a tuft of yellow longer setae.

Thorax.— Anterior part of pronotum blackish-brown, glossy, but anterior calli dull; posterior part and scutellum dark reddish brown posterior inflated top of the latter more reddish; ventral side of thorax mainly black, metapleural scent gland spout and legs brown; corial part of fore wings reddish brown, with a yellow spot at tip of the exocorium; membrane brown, with a minute yellow spot at tip of the cuneus, first basal cell almost closed by fainting vein; legs brown, tibiae, especially towards tarsi, and tarsi yellowish; surface of central calli with reclined fine, long (0.04-0.06 mm) seta, pronotum, scutellum and corium with short, decumbent setae (0.02-0.04 mm).

Abdomen.— Upper surface light brown, dull, posterior corner of seventh laterotergite simply rounded, hardly extended posteriorly, corners of eighth laterotergite strongly extended into a tooth (fig. 216); ventral side rather dark brown, dullish, more or less regularly set with adpressed (sternites) to decumbent (genital capsule) setae, very short at first sternites, gradually to longest on capsule (0.05 mm); pygophore (figs 216-218): upper side glossy; lateral walls only slightly sinuously extended dorsad, posteriorly bent outwards, each bearing dorsally a small tooth; posterior wall much higher, broad, 0.55 of maximum width of capsule, inflated at both sides, close to parameres, leaving a broad mesial part thinner; dorsal margin of this wall sinuate in posterior view (fig. 217), posterior surface emarginate in lateral aspect (fig. 218); parameres (fig. 219) with a curved and short stem, a rather short, broad, flat, slightly hook-like spur, and a small apical prominence.

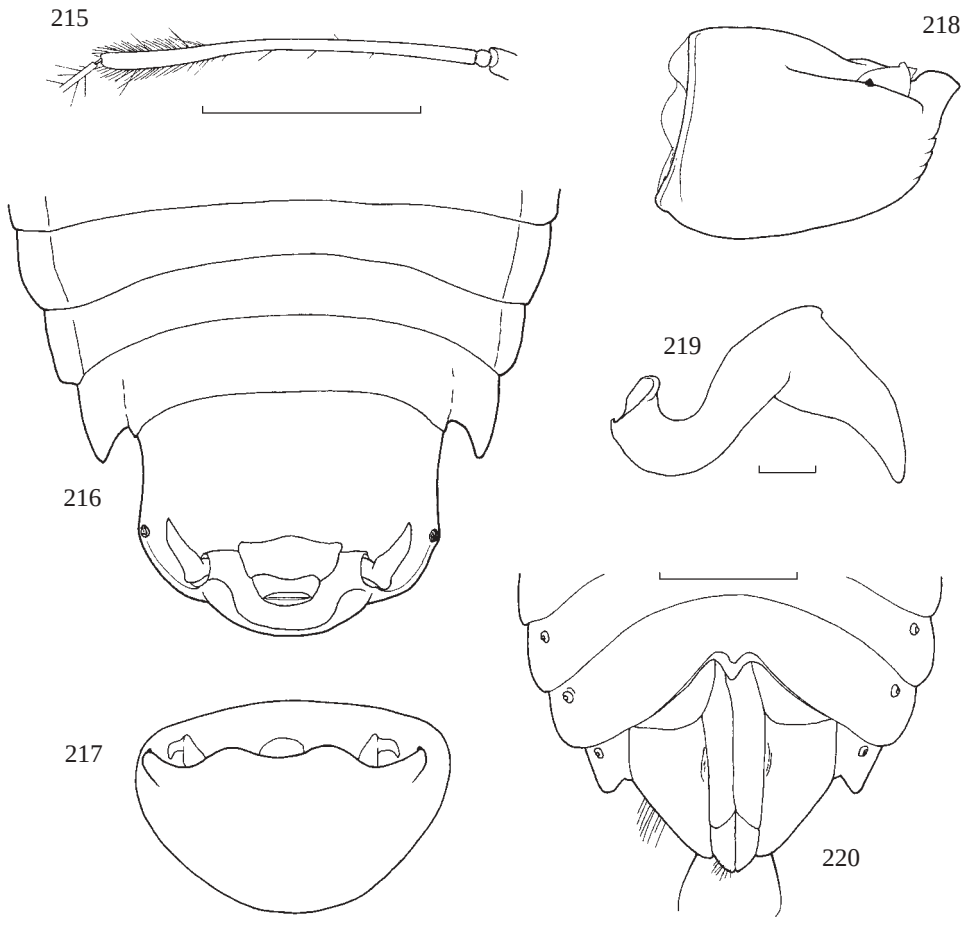
Female.— Setae on head pronotum and fore wings slightly shorter than in the male; genital sclerites (fig. 220): seventh sternite rather broad, lateral margins rounded, mesial excavation shallow, posterior margin slightly thickened, mesially with a small posteriorly directed tooth, squama triangular, its apex narrowly rounded-off; gonocoxite VIII crescent-shaped; eighth paratergite posteriorly extended with narrowly rounded apex.

Measurements.— Holotype, ♂: tl, 9.45; lb, 8.0; lw, 6.25; ww, 4.3; lh, 1.27; wh, 1.27; lp, 1.9; wp, 3.2; la, 1.75; lr, 3.1. Paratype: tl, 10.4; lb, 8.7; lw, 7.0; ww, 4.45; lh, 1.5; wh, 1.35; lp, 2.1; wp, 3.45; la, 1.85; lr, 3.65; lt. 4.48.

Distribution.— Indonesia (Papua).

Etymology.— This species is named after the late Prof. Dr L.J. Toxopeus (1894-1951) as a posthumous homage to his important contributions to entomology in Indonesia (Roepke, 1951).

Notes.— The pinned holotype, #2335, is missing the right middle tarsus and the right hind leg; its pygophore was dissected and preserved together with the abdomen in a plastic microvial underneath the specimen. The label shows 1000 m as the altitude, but Archbold, c.s. (1942: 243) report the Rotankamp (= Rattan camp) being at 1200 m and describe an abundant rain forest in the surroundings. Toxopeus (1940: 279), the collector of some of the specimens, explains the discrepancy in altitude: "*Altitude:* 1200 m. By



Figs 215-220, *Costomedes toxopeusi* gen. nov. & spec. nov. 215-219, holotype, ♂. 215, right antenna, second segment; 216, end of abdomen, dorsal aspect; 217, 218, pygophore, respectively caudal and left lateral aspect; 219, right paramere, lateral aspect. 220, paratype, ♀, end of abdomen, ventral aspect. Bar of paramere represents 0.1 mm; other bars 1.0 mm.

going down into some ravines specimens were collected to below 1100 m." These statements give also an indication about the habitat of the species.

The Netherlands Indian-American New Guinea Expedition [De Indisch Amerikaansche Expeditie] is also known as the Third Archbold New Guinea Expedition and lasted from April 1938 to May 1939).

Species incertis sedis

— 1 ♀ (ZMUC), Bismarck Archipelago, New Ireland, Lemkamin, Mercury Light, 10.iv.1962, Noona Dan Exped. 61-62, resembles much more *C. solomonensis* than *C. gazelle* from the adjacent New Britain Island, especially concerning the female genital

sclerites, but some other characters (rostrum, ocelli) are more like those of *C. gazelle*. Because males from New Ireland are not yet available, the true taxonomic position of the specimen is uncertain. It is provisionally named "*C. solomonensis*?" and excluded from the type series; it may belong to an undescribed (sub)species.

— *Scotomedes* spec.: 1 ♀ larva V (NSMT), W. Malaysia, Berinchang [Berincang], 1400 m, Cameron Highlands, Pahang Reg., 21.vii.1987, M. Sato.

— *Costomedes* spec.: 1 ♂, 1 ♀ (ZMAN), both have the abdomen missing, S New Guinea, Versteeg 1912.13, Beaufort 10/11.

— *Costomedes* spec.: 1♂ (AMNH), Papua, New Guinea, Menapi, Cape Vogel Peninsula, 0-30 m, 1-30.iii.1953, fourth Archbold Expedition, Geoffrey M. Tate Collection.

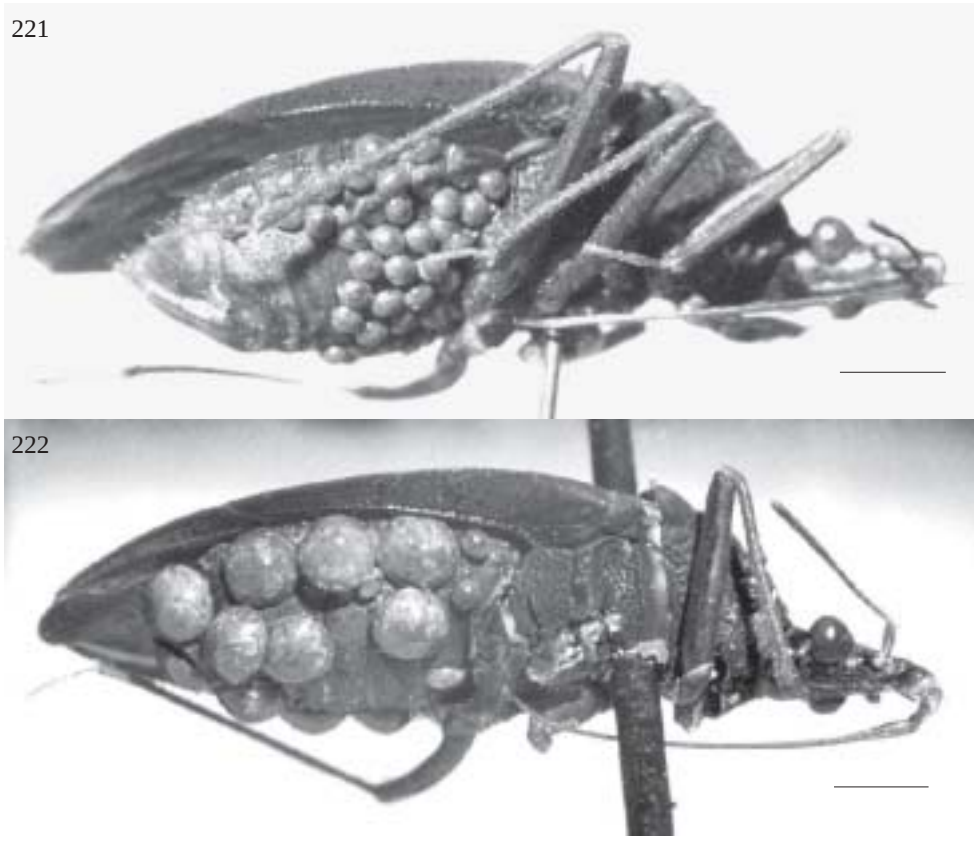
Biology

Biology.— Almost nothing is known about the biology of the members of the family Velocipedidae. In view of the structure of the mouthparts, it seems clear that these insects live predaceously (Cobben, 1978: 195), while the prolonged head and the exceptional long and protrusible rostrum suggests a specific use of them. The prolonged head reminds somewhat of that of the Triatominae, who feed themselves with blood through fur or feathers. The lack of fossulae spongiosae on the fore and middle tibiae, so characteristic for many if not most of the predaceous living Heteroptera (Reduvioidea, Cimiciformes; see Schuh & Štys, 1991: 338), may indicate a mode of feeding in which the fore legs are not involved in catching and/or holding the prey in combination with a shorter rostrum. The long rostrum in Velocipedidae may be used to feed on some deep-lying food or prey, as in soil, dung, holes in dead wood, fur, etc., but actually, nothing is known about their feeding habits. Remarkable is that in both sistergroups the rostrum is highly similar in length and length ratios of the segments, which in all probability points to a highly similar way of feeding. It is obvious from their anatomy that the members of this family are good runners (see below) and flyers. Most of the specimens studied were taken at light, especially those of the genus *Costomedes* nov.

About the habitat of the Velocipedidae scarcely more is known. It seems that they are dwellers of the forests, especially at greater altitudes (see under Distribution). Toxopeus (1940) in his list of collecting stations (pertaining to *Costomedes gressitti* spec. nov.), describes the vicinity of the Rattan camp (1000-1200 m) as being dense jungle with many rattan-palms and for Bernhard camp (50 m) dense virgin jungle, locally swampy, traversed by many creeks.

Only in two cases some little clarifying particulars about the catch were given on the labels: "secondary forest, on bark of felled tree" (B.M. Hobby & A.W. Moore, 1933), 1 ♂, *Bloeteomedes borneensis* van Doesburg, 1970; "vegetation on banks of river" and "under dead bark" (C.W. O'Brien, 1960), 1 ♂, 1 ♀, of *Costomedes solomonensis* spec. nov.

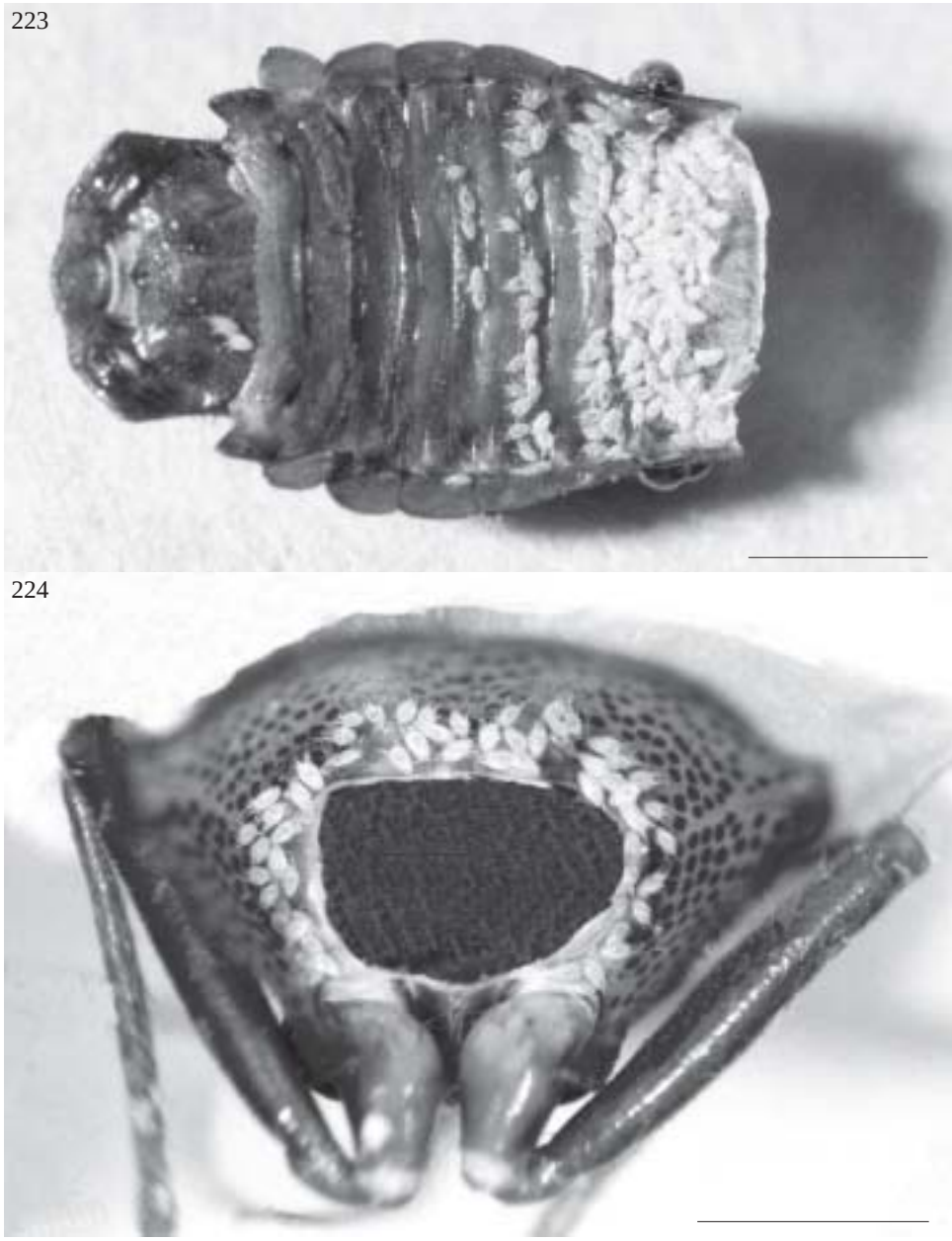
Dr G.B. Monteith states (*in litteris*, 1979): "The way I collect [apterous Aradidae] is to carefully pick up any dead sticks and pieces of wood lying on the forest floor and patiently examine the moist ventral side. This is the situation in which I have found the few Velocipedidae I have encountered. They are rather cryptic and usually remain motionless until disturbed." The two male specimens Dr Monteith collected in this way and sent me on loan are: *Scotomedes minor* (Breddin, 1903) from Java, and *Scotomedes ater* Stål from the Malay Peninsula. A similar experience was mentioned by Dr Heiss.



Figs 221-222, phoretic mites on Velocipedidae. Fig. 221, female paratype of *Costomedes solomonensis* gen. nov. & spec. nov. from Kukugai, Bougainville, bearing many small Uropodina on abdomen; 222, female paratype of *Costomedes gressitti* gen. nov. & spec. nov., from Lae, New Guinea, bearing many large and several smaller Uropodina. Bars represent 1.0 mm.

About the habitat, he stated *in litteris*: "Aber alles spricht dafür, dass auch diese Tiere im Habitat der Aradiden gefunden wurden - so wie ich es selbst in Bali beobachtet hatte. Wie erinnerlich, waren diese *Scotomedes* auf der Unterseite von verpilzten Ästen oder Baumteilen, welche nicht am Boden ganz aufgelegen sind, doch genügend Verbindung dazu hatten, um feucht zu bleiben." It is possible that these specimens were aestivating under the pieces of wood as their nymphs were not found.

Another striking aspect is the fact that in many cases the upper side of the specimens is covered by a layer of dirt, apparently held by a thin film of some dried yellowish-white substance, the latter sometimes being the only dirt of the specimens. In several species, for instance *Scotomedes minor* from Java, all specimens are covered with the same kind of dirt, while the few nymphs I examined are not. In this example, the setae on pronotum and fore wings are rather long, and seem to be involved in affixing the layer of dirt. The yellow markings along the costal margins and the membranes are devoid of these setae and stipples and remain usually free of dirt. About the same



Figs 223-224, phoretic mites on Velocipedidae. 223, male paratype of *Costomedes solomonensis* gen. nov. & spec. nov. from Bougainville, carrying many small white Acari (deutonymphs of Astigmata) on abdominal tergites and some small Uropodina on dorsal and ventral paratergites of second abdominal segment; 224, posterior view on detached pronotum of female paratype of *Costomedes gressitti* gen. nov. & spec. nov. from Sentani, Cyclops Mts, New Guinea, showing the small white Acari underneath the posterior lobe and in the passages at both sides which give access from the anterior coxal cavities to the subpronotal space. Bars represent 1.0 mm.

condition is found in *Costomedes morobensis* from New Guinea. In both cases this phenomenon is accompanied by some reduction of the membranous part of the fore wings as well (submacroptery, Schuh & Slater, 1995: 23). It seems to be a remarkable case of analogous evolution, which may point to a similar, ground-living way of life; they even were found in the same altitude of about 1500 m. Whether the sticky film is secreted by the specimens themselves, perhaps through the numerous punctures of the corium, could not be ascertained. The membranes of the fore wings, which bear no punctures at all, are usually clean or at most secondarily soiled. The dirt apparently consists mostly of organic debris in which vegetable fragments often are to be found. An extensive study of this debris could possibly furnish clues to the habitat and biology of these insects. The function of the dirt may be a camouflage against the litter on the ground or the bark of wood on which the adult insects perhaps are dwelling. This is also the opinion of Dr Monteith (*in litteris*, 1996): "They tend to crouch pretty low when first exposed and thus take advantage of their camouflaged appearance. Then they run off quickly when they finally try to escape. ... Many of my Aradidae, which also occur on wood lying on the ground also coat themselves with soil. So do many litter inhabiting Tenebrionidae in Australian rainforests. I presume it increases their camouflage." About the habitat of the Velocipedidae scarcely more is known. It seems that they are dwellers of the forest floor.

Another remarkable fact is that many specimens bear phoretic mites (Acari), often in more than one species and often in large numbers. They are attached to the integument of the host by a thin stalk, the anal pedicel, formed by a hardened secretion from glands in the anal region (van der Hammen, 1972: 49). These mites belong mainly to two different groups. Large (0.35-0.9 mm) half-spherical shiny yellowish-brown specimens, "turtle mites" (figs 221, 222) are found all over the body, even on the head, but there is clearly a preference, especially with the smaller species, to gather at the sides of the anterior 3-4 abdominal sternites. Small (0.14 mm) whitish mites (fig. 223) could also be found astray all over the body, but usually in numbers together on the abdominal tergites underneath the wings, clearly with a preference for the most anterior unoccupied segments, and also in the space between the posterior lobe of the pronotum (fig. 224) and the mesoscutum underneath. This was found in several specimens from which the prothorax, including head, had fallen off from the rest of the body. Apparently there is room enough for many of these mites. The habitation of this minute hidden space, here named subpronotal cavity, is remarkable; it can be reached from each anterior coxal cavity through a narrow passage on either side along the first large spiracle up to the space under the posterior lobe of the pronotum. These passages are often occupied by the mites as well. This phenomenon was found in a female of *Costomedes gazelle* from New Britain, a male of *C. toxopeusi* from Mt Cyclops, Indonesia-Papua and in a male of *C. gressitti* from Holmafin, Papua New Guinea. In the latter case, about seventy sedentary mites were accompanied by seven larger (0.22 mm) adult free-living (predatory?) mites. The occupation of this subpronotal cavity by mites may occur also in other species of *Costomedes*. By scarcity of material it could not be proved whether this aspect occurs also in *Scotomedes* and *Bloeteomedes*.

The possession of these phoretic acari in Velocipedidae is so striking that it seems to play a role in their biology. Especially if we may consider the occupation of the subpronotal cavity as an adaptation of both sides, we could think of a symbiotic aspect.

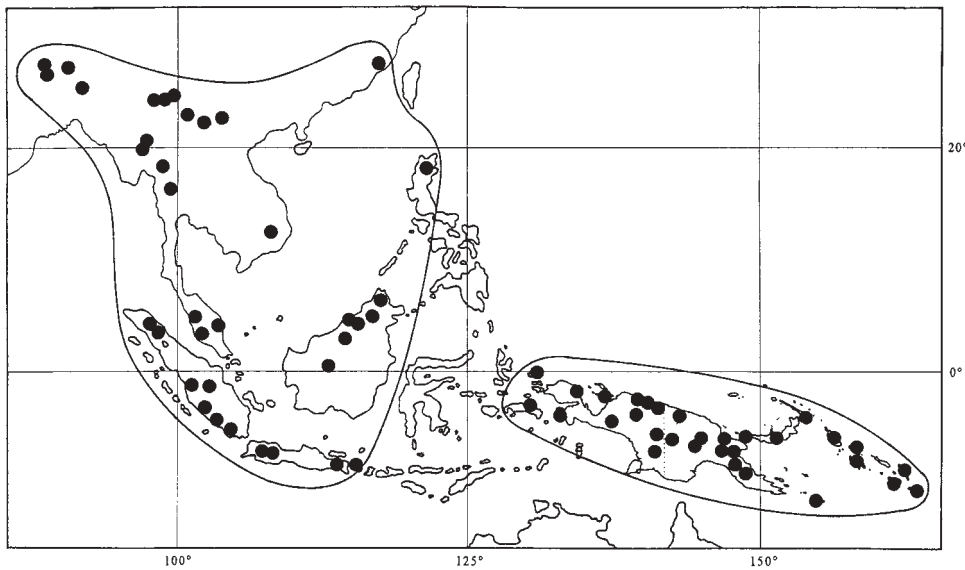


Fig. 225, Distribution of the family Velocipedidae; SE Asia, New Guinea and adjacent areas showing a survey of all known localities (dots), and the distribution of the two supposed western and eastern sistergroups (outlines) separated by line of Wallace.

Possibly the mites are of some advantage for the bugs in their habitat.

According to Dr L. van der Hammen (personal communication) the "spheres" belong to deutonymphs of Uropodina, while the small white mites are deutonymphs of Astigmata species (Dr R.B. Halliday, 2003, *in litteris*).

Distribution

(fig. 225)

Geographical distribution

Velocipedidae are only found in the Old World tropics and their distribution (fig. 225) ranges from eastern India to the Solomon Isles, and from southern China and northern Philippines to Java, but falls apart into two groups, widely separated by "Wallacea", the archipelago between the edges of the Sunda Shelf (Wallace's Line) and the Sahul Shelf, the "Limit of Australo-Papuan Mainland Fauna" (Mayr, 1944: 2, fig. 1). The original Line of Wallace includes the Philippines into the Asian zoological region, while Huxley's modification of Wallace's Line runs west of the Philippines. Velocipedidae, viz. *Scotomedes*, are found in Luzon, and not (yet?) in the other Philippine Islands, the eastern boundary of the known distribution of the western group should run east from Luzon (and Mindoro) but may exclude the rest of the Philippines.

The western group (fig. 226), containing two genera, viz. *Scotomedes* and *Bloeteomedes*, takes up the eastern continental part of Asia including Sikkim, South China, Malayan Peninsula, Sumatra, Java, Bali, Borneo and Luzon. Velocipedidae are not (yet?) known from Hainan, Taiwan (Formosa), southern Philippines, Halmaheira, Buru,

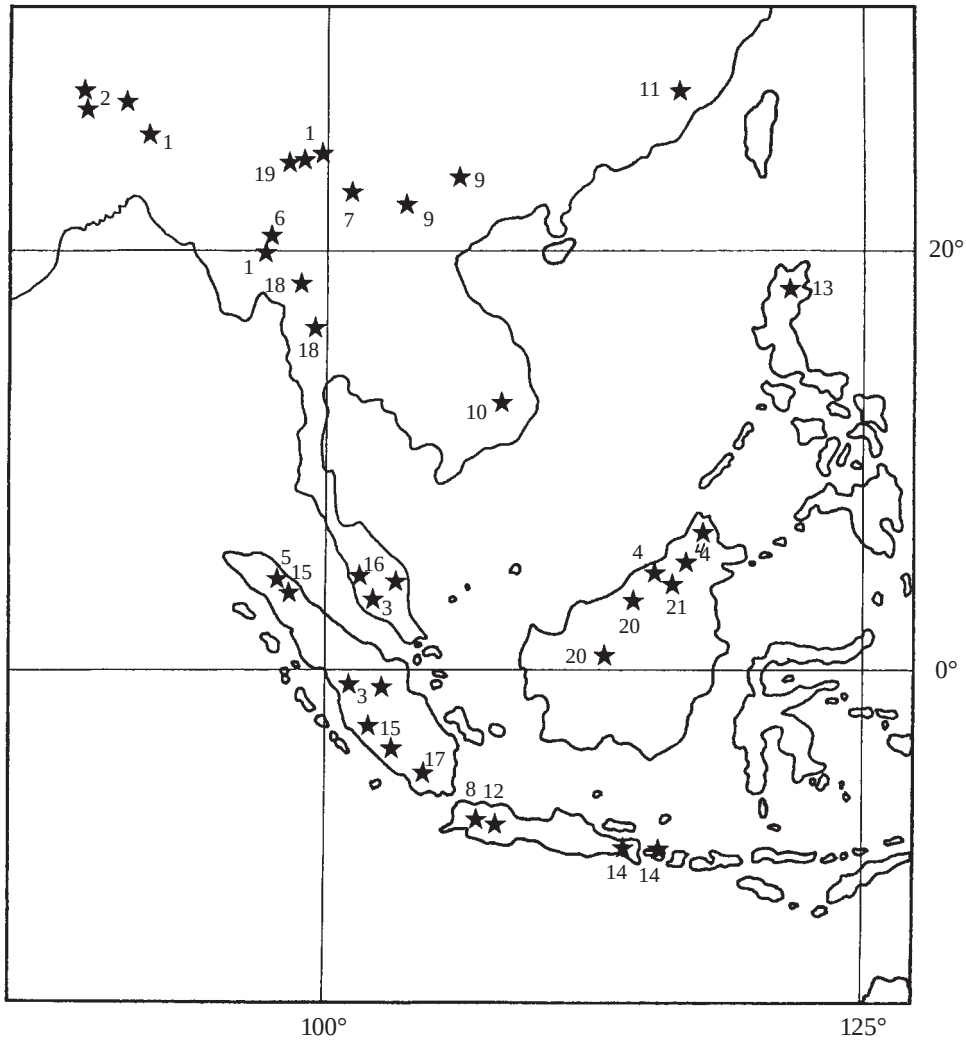


Fig. 226, SE Asia, distribution of the species of Velocipedidae of the Western group, *Scotomedes* Stål, 1873 and *Bloeteomedes* van Doesburg, 1970. Numbers on the map:1 = *S. alienus* (Distant, 1904); 2 = *S. alienus sikkimensis* subspec. nov.; 3 = *S. ater* Stål, 1873; 4 = *S. ater confrater* subspec. nov.; 5 = *S. biguttulata* (Reuter, 1908), (= *ater*); 6 = *S. distanti* spec. nov.; 7 = *S. doesburgi* Ren, 2000; 8 = *S. gedehensis* spec. nov.; 9 = *S. guangxiensis* Ren, 2000; 10 = *S. lemoulti* spec. nov.; 11 = *S. maai* spec. nov.; 12 = *S. minor* (Breddin, 1903); 13 = *S. polis* spec. nov.; 14 = *S. priscus* (Bergroth, 1891); 15 = *S. priscus jacobsoni* subspec. nov.; 16 = *S. rudolfi* spec. nov.; 17 = *S. sumatrensis* spec. nov.; 18 = *S. thai* spec. nov.; 19 = *S. yunnanensis* Ren, 2000; 20 = *B. borneensis* van Doesburg, 1970; 21 = *B. sarawakensis* van Doesburg, 1980.

Sulawesi (Celebes) and the lesser Sunda Islands east of Bali.

The distribution of the eastern group (fig. 227), belonging to the genus *Costomedes*, comprises: Ceram (Moluccas), New Guinea including Waigeu (or Waigeo), Japen Island and the Louisiade Archipelago, Bismarck Archipelago, and the Solomon Islands.

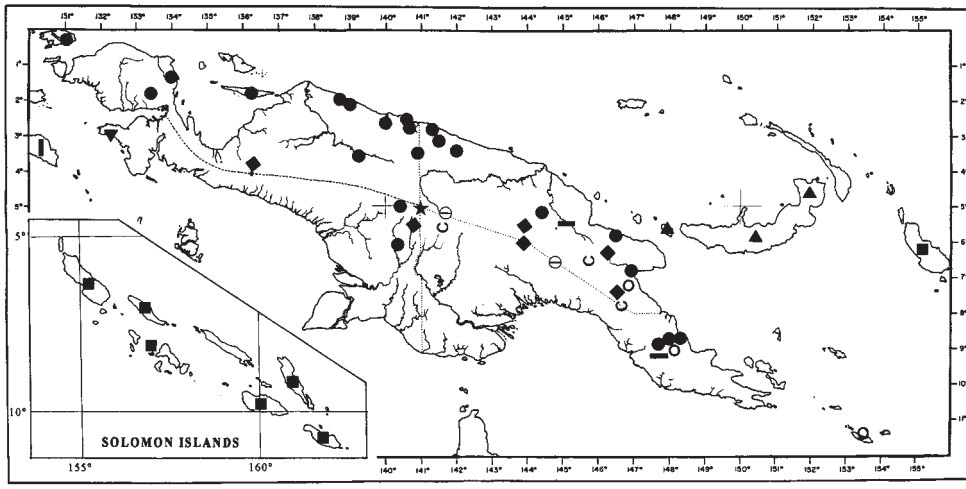


Fig. 227, Seram, New Guinea, Bismarck Archipelago and the Solomon Islands (inset) showing known localities of Velocipedidae species of *Costomedes* gen. nov.
○ *C. cheesmanae* spec. nov. ▌ *C. heissi* spec. nov. ♦ *C. sedlaceki* spec. nov. ▼ *C. fakfakensis* spec. nov. ▬ *C. hirsutus* spec. nov. ■ *C. solomonensis* spec. nov. ▲ *C. gazelle* spec. nov. ⊖ *C. karimui* spec. nov. ★ *C. toxopeusi* spec. nov. ● *C. gressitti* spec. nov. ○ *C. morobensis* spec. nov.

They are not (yet?) found in the northern parts of Australia.

Vertical distribution

Another obvious aspect concerns the altitude in which the specimens were collected. From these data it is clear, that the different species are more or less committed to different altitudes. As the bulk of the specimens, apparently good flyers, were collected on light, there could be a discrepancy between the true altitude of living habitat and the place of the light trap, especially in hilly areas with steep slopes. Also in specimens where only rough limits are given: e.g. 500-1000 m. According to the classification of the altitudinal zonation for vegetations in New Guinea, proposed by Johns (1982: 209f), Velocipedidae are found from lowland to high in the mid-montane zone that reaches up to 2700-2800 m (*Costomedes sedlaceki)*. Although it is impossible to define the intermediate altitudinal zones sharply, the transition between lowland and montane is arbitrarily given at 700 m, that between lower and mid-montane, at 1500-2000 m. The most common species, *C. gressitti*, is widespread in New Guinea, mostly in the lowlands, up to about 300 m (average 284 m) while its nearest relatives, *C. heissi*, *gazelle*, and *solomonensis*, are found in Ceram, the Bismarck Archipelago and Solomon Islands, respectively. The other species are mainly found in the higher areas of New Guinea.

In *Scotomedes* this phenomenon is less clear because of the paucity of specimens. Still it is obvious that, for instance, *Scotomedes minor* is found in Java not below 1220 m, maybe somewhat higher, in view of the rough data in the Drescher series, and the more exact statements of 1400 m and 1500 m on the labels of other specimens. In Myanmar (Burma) in the Karennee region *Scotomedes alienus* is found at an altitude of

900-1100 m, and *S. distanti* at 1300-1400 m.

Fig. 228 gives roughly the altitudes calculated from the data on the labels of the species in *Scotomedes* and *Costomedes*, respectively, giving a good indication that at least part of the species are connected to different altitudes.

Fig. 228, The species of Velocipedidae sorted according their existence in altitude. A: species of *Scotomedes* Stål, 1873; B: *Costomedes* gen. nov.

Phylogeny

The Velocipedidae constitute a rather isolated family of the Cimicomorpha that in all probability was already very early separated from the still unspecialised cimicomorphan ancestors, as was thouroughly analysed by Schuh & Štys (1991: 302). They illustrated the position of the family in the Cimicomorpha in a cladogram (figure 1, p. 312) proposing for the group even an own superfamily status: Velocipedoidea. Therefore, this family shows several pleisiomorphous features, such as a prognate head, ocelli, four segmented labium and antennae, normally developed hemelytrae, unspecialised cursorial legs, fully developed eighth abdominal segment in the male, and anteriorly directed parameres which in *Costomedes* and *Bloeteomedes* are unspecialised. Also the supposed predaceous way of life, concluded from the structure and the prognate insertion of the labium (Cobben, 1978; Schuh & Štys, 1991) may be seen as pleisiomorphous, in view of Cobben's opinion: "the direct predecessors of cimicomorpha s.s. were undoubtedly exclusively predaceous (Cobben, 1978: 214)".

The monophyly of the Velocipedidae is supported by several synapomorphies (fig. 229, 1), such as the strongly expanded exocorium of the fore wing; the pronotum, the scutellum, the clavus and the corium are heavily punctured; the venation of the membrane has three short closed cells, including the possession of a "stub"; the unique "velocipediform structure" (Zrzavý, 1990) of the (third and fourth) flagellar antennal segments; the unique structure of the rostrum showing a combination of a vestigial first, an extremely long third, and a very short fourth segment.

The Velocipedidae, consist of two widely separated groups, both distinct in several characters without exceptions or transitions.

The western group consists of two genera, *Scotomedes* and *Bloeteomedes*, the eastern

group only, *Costomedes* gen. nov.

Table 1. The most important characteristics on generic level of the family Velocipedidae are listed.

Genera of Velocipedidae	***Scotomedes***	***Bloeteomedes***	***Costomedes***
Macroseta on second antennal segment present	+	+	-
Anterior spot on exocorium present	+	+	-
Cross vein m-cu of hind wing lost	+	-	-
Paramere derived (with 'operculum')	+	-	-
First antennal segment long	-	+	-
Ratio of insertion of macroseta above 0.7	-	+	-
Greatest width of exocorium proximal of centre	-	+	-
Cuneus prolonged posteriorly	-	-	+
Middle femur in male armed	-	-	+
Macrosetae on pronotum and head lost	-	-	+
Pygophore broad behind	-	-	+

The western group could be regarded as monophyletic, sharing the following synapomorphies (fig. 229, 2): (1) antennal macro seta on second antennal segment present; (2) exocorium anteriorly with a yellow spot.

Both genera are considered monophyletic because of the following autapomorphies. Autapomorphies for *Scotomedes* (fig. 229, 3): (1) vein m-cu lost; (2) shape of paramere derived.

Autapomorphy for *Bloeteomedes* (fig. 229, 4): (1) first antennal segment long; (2) seta on second antennal segment distal; (3) maximum width of exocorium proximal of centre (vein m-cu present and shape of paramere primitive)

The eastern group (= *Costomedes* gen. nov.) is monophyletic, sharing the following autapomorphous character states (fig. 229, 5): (1) cuneus prolonged posteriorly; (2) middle femur of male armed; (3) antennal seta lost; (4) anterior spot of exocorium lost; (5) pygophore wide posteriorly.

Therefore, I suppose that the following cladogram depicts best the generic relationships in the family Velocipedidae (fig. 229).

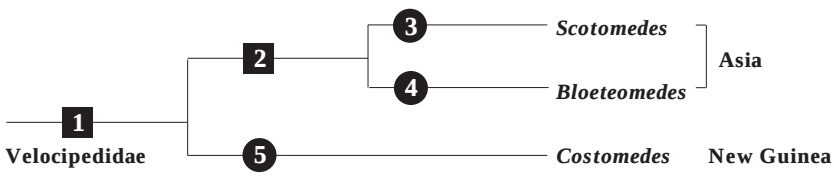


Fig. 229, Taxon-area cladogram of the genera of the Velocipedidae. For the meaning of the numbers, see text above.

As, on the other side, the basal structures, size, the highly specialised food apparatus, and even the striking occupation with mites (nymphs) is so similar in the two groups, that it is almost certain that there must be a special relation to or even a co-evolution with the food-source or prey and great similarity in habitat between the two groups. Knowledge of these factors, may be crucial for further understanding of the phylogenetic aspects of the family. Regrettably, so far, almost nothing is known

on this subject.

Biogeography

It is far from clear how the peculiar distribution of the Velocipedidae has evolved, nor where this group originated. It would be too far-fetched to present here an extensive analysis, because of the extremely complicate geological history of the area. That should deserve a separate study; yet some general remarks are made.

Obviously, the Velocipedidae consist of two groups geographically separated by Wallace's line and that the ancestor species became divided into two species (groups) in which the adults differed –among others- in setation of the second antennal segment and the length of the cuneus. This separation probably took place long ago, since both groups show a wide distribution and a rather rich speciation. The eastern group is found in New Guinea and adjacent archipelagos and reaches Wallacea.

According to Gressitt (1982: 897) "New Guinea obtained much of its original insect fauna from Asia." and (1959: 2) "... the great majority of the rich and divers fauna (as well as flora) of New Guinea and associated islands is of Oriental derivation." In this case the ancestor species of *Costomedes* should have reached one of the land masses that later formed New Guinea through one of the island arcs, presumably the Outer Melanesian Arc (Holloway, 1979, Duffels, 1986, de Boer, 1995). But on some elements of this arc, viz. Central Philippines, North and East Sulawesi, no representatives of Velocipedidae have ever been discovered. The only species found in North Luzon, (S. *polis* spec. nov.), belongs in every respect to the genus *Scotomedes*, and may have reached Luzon directly from the Asian mainland or through Palawan and Mindoro.

It is probable that the proto-*Costomedes* species reached one of the original New Guinea parts from which the present-day New Guinea was populated while speciation took place. Further dispersion and speciation happened from here to the surrounding archipelagos i.e. the Moluccas, the Bismarck and Solomon Islands, each with its own species but both closely related to *C. gressitti*, the most common lowland species in New Guinea. In view of the fact that in the species found in the Bismarck Archipelago as well as the one in the Solomon Islands, a further speciation did not take place, colonising of these archipelagos must have happened much later in time. Even no differentiation was found between the populations of the various Solomon Islands.

In the western group the picture is less distinct, undoubtedly also due to the scarcity of the available material. *Bloeteomedes* seems to be an endemic group of Borneo who kept the plesiomorphous paramere. The predecessors of this group evidently reached Borneo at an early stage and became isolated from those of *Scotomedes*. These reached the Asian continent and the Sunda Islands and developed the parameral "operculum" and lost vein m-cu in the hind wing. A further dispersion and speciation took place on the Asian mainland as far as Sikkim in the West and southern China in the North-East and the Sunda Islands Sumatra, Java and Bali. The other Bornean species, *Scotomedes ater confrater* apparently reached this island from the continental stock much later, presumably during the last glacial period.

Another possibility is a collective origin from Gondwana. According to this hypothesis the ancestor species of both groups was present on the northern boundary of

supercontinent Gondwana. Fragments of the later parts of New Guinea, Borneo, Sumatra, Malaya and Indo-China migrate as microcontinents northward (Audley-Charles, 1987). The more or less differentiated populations of the ancestor species on these parts may have reached Asia and New Guinea, respectively. An argument against this hypothesis may be that in the present-day Australia, Velocipedidae or close relatives are not (?yet) known. But extinction is a possibility or even probable, in view of the past and present climatological circumstances of the northern parts of Australia. These have mainly xeric-adapted biota and only small rainforest pockets are left in NE Queensland possessing an extremely depauperate version of the New Guinea rainforest fauna (Gressitt, 1982).

List of depositories

Abbreviations of the institutions / collections are, if possible, in accordance with the list of Arnett et al. (1993).

AMNH = American Museum of Natural History, New York, U.S.A.;
AMSA = Australian Museum, Sydney, Australia;
ANIC = Australian National Insect Collection, CSIRO, Canberra, Ausrtralia;
BMNH = The Natural History Museum, London, U.K.;
BPBM = Bernice P. Bishop Museum, Honolulu, Hawaii, U.S.A.;
CEH = Collection Ernst Heiss, Innsbruck, Austria;
LEW = Laboratorium voor Entomologie, Landbouwuniversiteit, Wageningen, The Netherlands;
MCSN = Museo Civico di Storia Naturale “Giacomo Doria”, Genova, Italy;
MNHN = Museum National d’Histoire naturelle, Paris, France;
MRAC = Musée Royal de l’Afrique Centrale, Tervuren, Belgium;
MZHF = Zoological Museum, Helsinki, Finland;
NHMW = Naturhistorisches Museum Wien, Austria;
NSMT = National Science Museum, Tokyo, Japan;
PIM = Palaeontological Institut, Moscow, Russia;
QMBA = Queensland Museum, S Brisbane, Australia;
RMNH = Nationaal Natuurhistorisch Museum, Leiden, The Netherlands
SAMA = South Australian Museum, Adelaide, Australia;
SUK = Silesian University, Katowice, Poland;
TMNH = Nankai University, Dept. of Biology, Tianjin, P. R. China;
UQMA = University of Queensland Museum, Brisbane, Australia;
USNM = United States National Museum, Smithonian Institution, Washington, U.S.A.;
WEIC = Wau Ecology Institute Insect Ranch, Wau, Papua New Guinea;
ZMAN = Zoological Museum, University of Amsterdam, The Netherlands;
ZMAS = Zoological Institute, Russian Academia of Sciences, St. Petersburg, Russia;
ZMHB = Museum für Naturkunde, Berlin, Germany;
ZMUC = Universitetets Zoologiske Museum, København, Denmark;
ZSM = Zoologische Staatssammlung München, Germany.

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Appendix

List of localities

Many of the co-ordinates were measured and calculated by the author from maps, and therefore are approximations. Old / new spelling in Indonesia: tji / ci, dj / j, j / y, oe / u.
G. = gunung, mountain, Mt; Kg. = Kampong, village;

Localities west of Wallace's Line

Air Njuruk, Dempu, Sumatra	?near	4º1'S-103º7'18"E
Bali, isle of Indonesia		
Bandung, W Java (750 m)		6º55'S-107º36.5'E
Berastagi, Mt Sibayak, N Sumatra		3º11'N-98º30'E
Berincang, Cameron Highlands, West Malaysia		4˚29'N-101˚23'E
Bhutan (centrum)		27º27'N-90º25'E
Blawan, Idjen (Ijen) Mts, E Java (>1000 m)		7º59.5'S-114º10'E
Bohea Hills (Wuyi Shan), Fukien (Fujian), S China		27º50'N-118ºE
Borneo (Kalimantan)		
Bratan, Danau, (Lake Bratan), Bali		8º16'S-115º10'E
Bundu Tuhan, Sabah, E Malaysia		5º59'N-16º31'E
Burma (Myanmar)		
Cameron Highlands, West Malaysia		± 4º30'N-101º30'E
Carin (Asciuii) Chebà, Carin Ghecù, Carennee, Burma (Myanmar)		
Catur, Mt, near Lake Bratan, Bali, > Bratan		
Central Borneo (Kalimantan)		
Chungan, Fukien (Fujian), S China, > Bohea Hills		
Cibeureum, Ciburum, Nat. Park, Mt Gede-Pangrango, W Java, 1500-1600 m		
Cibeureum Wf (Falls) Mt Gede-Pangrango, W Java		7º11'S-107º37'E
Dadjan (Dajan), Danu (Lake), Bali		?
Darjeeling, W Bengalen		27º04'N-88º15'E
Datat, Indochina = Da Lat, Viet Nam		11º52'S-108º23.5'E
Dempu, Sumatra (Mt Dempo?)		4º1'S-103º7'18"E
Doi Suthep-Pui Nat. Park, Thailand		18º48'N-98º51'E
Fukien (Fujian), S China, > Bohea Hills.		
G(unung) Tangkoeban Prahoe, > Tankuban Prahu, Mt		
Gopaldhara, Sikkim, India		
Guangxi Prov., > Na'po County		
Gunung Mulu > Mt Mulu		
Idjen Mts, E Java, > Blawan		
Java, isle of Indonesia		
Tinjes & Lejok cfl., > Mt Dulit, Sarawak		
Kalimpang, W Bengalen,		27º04'N-88º28'E
Kepong Cubitt Forest Village (15 km ENE of Kuala Lumpur)		3°10'N-101°34'E
Kg Sapulut, Sabah, N Borneo		4º42'N-116º29'E
Khasia Hills, Assam (centrum)		25º35'N-91º32'E

Kinabalu Nat. Park, Sabah (summit)	6º08'N-116º57'E
Kuala Lumpur, Malay Peninsula	3º09'N-101º42'E
Lebong Tandai, W Sumatra	3º1'S-101º56'E
Lembang, W Java	6º48'S-107º36'E
Luang Prabang, Laos	19º52'N-102º8'E
Luxi (Luhsi, Mangshi), Yunnan, China	24º23'N-98º37'E
Malay Peninsula, Malaysia	
Marang, Sumatra (coast)	5º23.5'S-104º4'E
Mt Gede(h)-Pangrango, W Java, 3000 m	6º47.5'S-106º59'E
Mt (Bukit) Dulit, Sarawak, W Borneo	3º21'N-114º11'E
Mt Kinabalu, Sabah, N Borneo	6º08'N-116º57'E
Mt Murud, Sarawak, W Borneo	3º52'N-115º30'E
Mt Mulu, Sarawak, W Borneo	4º3'N-114º57'E
Mt Mulu Nat. Park, Sarawak, W Borneo	4º7'N-114º53'E
Mt Polis, N Luzon, Philippines	?
Polis Pass, N Luzon, Philippines	16º58'N-121º02'E
Nanga Raoen, Borneo (Nangaraun, Kalimantan)	0º38'N-113º9'E
Na'po County, Guangxi Prov., P.R. China	23º24'N-105º50'E
N Luzon, Philippines	
Padang, W Sumatra	0º58'S-100º21'E
Pahang (river), SE Malay Peninsula	3º30'N-103ºE
Preanger, W Java	
Rancabali, W Java, nr Mt Patuha	7º39.5'S-107º52.5'E
Ringlet, 30 km SE Ipoh, Malaysia	4º24'N-101º22'E
Rungbong Valley, Gopaldhara, Sikkim, India	
Sa Pa, Lào Cai District, N Vietnam	22º56'N-103º48'E
Sapulut, Sabah, N Borneo	4º42'N-116º29'E
Sarawak, W Borneo, Malaysia	
Sikkim, India	± 27ºN-89ºE
Si'mao County, Yunnan Prov., P.R. China	22º46'N-100º58'E
Sukaranda, Sumatra	3º37'N-98º14'E
Sumatra, isle of Indonesia	
Tak, Thailand	16º50'N-99º9'E
Tanah Rata, Cameron Highlands, W Malaysia	4º27'N-101º22'E
Tankuban Prahu, Mt, Preanger, W Java	6º45'S-107º35'E
Telupid, 80 km E of Ranau, Sabah, N Borneo	5º39'N-17º08'E
Templer Park, (Sir Gerald-), Malay Peninsula, Selangor, 20 km N of Kuala Lumpur	
Tenger Mountains, E Java	7º56.8'S-112º57.5'E
Tjibeureum > Cibeureum	
Tjibodas, Cibodas > Cibeureum?	
Upper Kapuas River, Borneo > Nanga Raoen	
Ying'jiang County, Yunnan Prov., P.R. China	24º41'N-97º56'E

Localities east of Wallace's Line

Many of the data are copied from the (provisional) "Bishop Museum list of New Guinea localities" (1966). No author (? J.L. Gressitt) is mentioned. "In many cases latitude and longitude, or altitude, are only roughly approximate". The same holds for data gathered from maps by the author.
NE, NW, SE and SW pertain to the four geographic sections of New Guinea. BA = Bismarck Archipelago; SI = Solomon Islands; Ce = Ceram (Seram).

Awelkom, Umboi Isle	NE	5º38'S-147º57'E
Bernhard Camp	NW	3º29'S-139º13'E
Bewani Mts	NW	3º10'S-141º 25'E
Big Wau Creek	NE	7º18'S-146º45'E
(Geonet)		
Bismarck Range, nr Simbai	NE	5º13'S-144º24'E
Bodem	NW	1º58'S-138º44'E
Bomberai, Coast of	SW	2º48'S-132º50'E
Bougainville Isle, Solomon Isles	SI	154º43'-156ºE
Boven Digoel	SW	4º55'S-140º38'E
Budemu Creek, Finisterre Mts	NE	5º56'S-146º04'E
(Geonet)		
Bulldog Road	NE	7º48'S-146º27'E
Ceram, (Seram) Moluccas (Maluku), > Solea		
Choiseul Isle, Solomon Isles	SI	
Cyclops Mts	NW	2º32'S-140º36'E
Damanti, Finisterre Mts	NE	5º55'S-145º58'E
(Geonet)		
Dawai River, Japen Isle	NW	1º45'S-136º15'E
Edie Creek, 15 km SW Wau	NE	7º19'S-146º41'E
Eliptamin Valley	NE	5º08'S-141º35'E
Enarotali (Enaratodi)	NW	3º55'S-136º22'E
Fakfak	SW	2º55'S-132º18'E
Finisterre Range	NE	5º50'S-146º20'E
Fly River (delta, ±)	SE	8º23'S-143º20'E
Gabumi Village, Finisterre Range	NE	5º41'S-146º33'E
Gallego, Guadalcanal Isle, Solomon Isles	SI	
Gazelle Peninsula, New Britain	BA	151º26'-152º22'E
Geelvink Bay	NW	2º30'S-135º20'E
Gollifers Camp, Kolombangara Isle, Solomon Isles	SI	
Guadalcanal Isle, Solomon Isles	SI	159º36'-160º50'E
Hollandia	NW	2º32'S-140º42'E
Holmafin	NW	2º32'S-140º42'E
Humboldt Bay	NW	2º30'S-140º50'E
Huon Peninsula	NE	7º00'S-147º25'E
Japen Isle	NW	1º45'S-136º15'E
Kaindi, > Mt Kaindi		

Kainantu	NE	6º18'S-146º15'E
Karimui	NE	6º32'S-144º47'E
Kokoda	SE	8º53'S-147º45'E
Kolombangara Isle, Solomon Isles	SI	ca. 157ºE
Kolombangara R, Choiseul Isle, Solomon Isles	SI	?
Kolombara R, Kolombangara Isle, Solomon Isles		?
Krisa, 20 km S of Vanimo	NW	2º51'S-141º17'E
Kukugai Village, Bougainville Isle,= ?kaukauai	SI	6°51'S-155°35'E
Kuzi, Kolombangara Isle, Solomon Isles, =?Kunji	SI	8°06'S-157°02'E
Lae	NE	6º43'S-147º00'E
Lemkamin, New Ireland	BA	3º19'S-151º54'E
(Wolff, 1966)		
Louisiade Archipelago	LA	
Madang District	NE	5º13'S-144º49'E
Malaita Isle, Solomon Isles	SI	160º33.5'-161º36'E
Maluku, Moluccas		
Masba Creek Camp, Huon Peninsula	NE	
Merauke	SW	8º15'S-140º42'E
Mokai Village, Torricelli Mts	NE	3º25'S-142º05'E
Moro Creek, Finisterre Mts	NE	
Morobe District	NE	7º46'S-147º37'E
Mt Bougainville	NW	2º39'S-141º02'E
Mt Giluwe	SE	6º02'S-143º51'E
Mt Kaindi, 16 km SW of Wau	NE	7º21'S-146º43'E
Mt Lamington	SE	8º50'S-148º08'E
Mt Missim	NE	7º20'S-146º43'E
Mt Nomo	NW	2º42'S-139º59'E
Mt Riu, Sudest Isle, Louisiade Archipelago	SE	11º30'S-153º30'E
Mt Sinewit, New Britain	BA	4º38'S-152º00'E
(Quate cs, 1967)		
Nakanai Mts, New Britain	BA	
Nami Creek	NE	7º20'S-146º43'E
New Britain, Bismarck Archipelago	BA	148º18'-152º22'E
New Ireland, Bismarck Archipelago	BA	150º51'-153º08'E
Oerberfaren	NW	2º16'S-138º50'E
Okapa	NE	6º32'S-145º41'E
Okasa > Okapa		
Olsobip, (Fly River)	SE	5º23'S-141º30'E
Oransbari	NW	1º21'S-134º16'E
Paniai, Wissel Lakes, nr Enarotali	NW	3º55'S-136º22'E
Paripao, Guadalcanal Isle, Solomon Isles	SI	9º33'S-160º42'E
Popondetta	SE	8º48'S-148º15'E
Rattan Camp	NW	3º30'S-139º09'E
River Tor	NW	1º59'S-138º58'E
Sabron Camp 1, 2, Cyclops Mts	NW	
Saidor, Finisterre Range	NE	5º37'S-146º33'E

San Cristoval Isle, Solomon Isles	SI	161º17'S-162º17'E
Sarmi	NW	1º51'S-138º44'E
Sentani	NW	2º36'S-140º37'E
Sibil Valley, Star Range	NW	5º00'S-141º00'E
Silanga, New Britain	BA	5º57'S-150º36'E
Simbai, Bismarck Range	NE	5º12'S-144º23'E
Singauawa River	NE	6º40'S-147º09'E
Solea, Ceram, Moluccas, 12 km SE Wahai	Ce	2º52'S-129º33'E
Solomon Isles	SI	154º30'-162º30'E
Star Range, Sibil Valley	NW	5º00'S-141º00'E
Sudest Isle, = Tagula Isle	SE	11º30'S-153º30'E
Sumberbaba	NW	1º45'S-136º15'E
Tagula Isle, Louisiade Archipelagho	SE	11º30'S-153º30'E
Tanah Merah	SW	6º05'S-140º18'E
Tangtalau-Kwalo, Malaita Isle, Solomon Isles	SI	
Temma Sigin, Star Range	NW	
Torricelli Mts	NE	3º25'S-142º05'E
Umboi Isle	NE	5º38'S-147º57'E
Upper Biaru	NE	
Vogelkop	NW	130º36'-134º14'E
Waigeu Isle	NW	130º20'-131º21'E
Wahai, Ceram, Moluccas	Ce	2º48'S-129º29'E
Wapenamunda	NE	5º40'S-143º55'E
Warahito-Pagato cfl, San Cristoval Isle, Solomon Isles	SI	
Wareo	NE	6º25'S-147º46'E
Waris	NW	3º30'S-140º55'E
Wasian, Vogelkop	NW	1º51'S-133º23'E
Wau	NE	7º20'S-146º43'E
Wissel Lakes	NW	3º55'S-136º18'E
Yela Isle (= Yeina Isle?), Louisiade Archipelago	SE	11º19'S-153º25'E