

A STUDY OF THE THAUMASTODINAE, WITH ONE NEW GENUS AND TWO NEW SPECIES (LIMNICHIDAE)

By T. J. SPILMAN¹

Coleopterists are always interested in the Micromalthids, Paussids, Lucanids, and other anomalous beetles. We get pleasure in speculating on their proper position in the beetle hierarchy, or we simply like to see the digressions that Nature takes. Whenever we speak of peculiar beetles, let us not fail to include the Thaumastodinae. They parallel the Hydradephaga in their streamlined form, the Dytiscids in their hind coxa, and the Melandryids in their hind tibial spurs; but except for con-familial relatives, they are dissimilar to all other beetles in the appearance of their head. The Thaumastodinae were transferred from the Byrrhidae by Hinton (1939, 1939a) and made a subfamily of the family Limnichidae. The other subfamilies of the Limnichidae are the Limnichinae, Cephalobyrrhinae, and Bothriophorinae.

This group came to my attention when I found Central American specimens in the National Museum collection. Heretofore the subfamily was known only from the Indo-Malayan Region. Blackwelder's (1944: 273) inclusion of *Throscinus* in the Thaumastodinae must certainly have been a mistake; Hinton (1939: 161) includes the genus in the Cephalobyrrhinae. Mr. G. E. Vogt and the late Mr. L. L. Buchanan were very helpful with suggestions, and Dr. W. T. M. Forbes wrote the descriptions of the hind wings. Mr. Harry G. Nelson kindly loaned two specimens from the Chicago Natural History Museum, Chicago, Illinois. All other specimens used in this study are in the U. S. National Museum, except as noted.

Thaumastodinae Champion

———— Heller, 1921:155 (not named, described as new tribe, in Melandryidae).

THAUMASTODINAE Champion, 1924:25 (described as new subfamily, in Byrrhidae); Champion, 1924a:116 (different spelling, Thaumastinae, points out priority of his 1924 name); Hinton, 1939:161 (in key to subfamilies of Limnichidae); Hinton, 1939a:185 (repeats key of 1939); Blackwelder, 1944:273 (in Latin American checklist, by inclusion of *Throscinus*, probably in error).

Body streamlined and very compact. Head hypognathous, without posterior constriction, with mouthparts resting on the prosternum, the maxillae and labium hidden from view, in lateral aspect the face oriented approximately 30 degrees from

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the vertical and the dorsal surface subhorizontal; eyes large, for the most part dorsal, separated by less than the width of a single eye; antenna short, with 7 or 11 segments, appearing weakly clavate because of the smallness of the middle segments, inserted near mandibles or distant from them; epistomal suture present or absent; labrum as long as broad; mandible with large molar area, apically tripartite and acuminate, and with median ciliated, movable, sclerotized appendage; maxilla elongate, lacinia and galea apically acuminate, with palpus having four segments, the last of which is fusiform; labium with postmentum, the prementum for the most part membranous, anteriorly arcuate, the palpi three segmented with the last segment truncate and parallel-sided; hypostomal bridge quadrangular; foramen magnum large, occupying much of the posterior area of the head, causing the distance between it and the emargination for the maxillary cardo to be very short; cervical membrane with a large cervical sclerite on each side extending in part from the membrane.

Pronotum as wide at base as elytra, with lateral borders strongly converging anteriorly. Pronoto-hypomeral junction angulate throughout its length. Hypomeron without suture or carina. Prosterno-hypomeral suture incised anteriorly. Prosternum very short anterior to fore coxal cavities; fore coxal cavities broadly opened posteriorly and closed interiorly, the cavities separated by a broad prosternal process, the apex of the process overlaying part of the mesosternum. Mesosternum very short, linear or short anterior to the middle coxal cavities, these cavities open laterally. Mesepisternum slender, broadest medially. Mesepimeron broad, tapering medially to attain the trochantin of the middle coxa. Metasternum short or very short anterior to the hind coxae. Metepimeron gradually or strongly narrowed posteriorly. Fore legs short, hind legs very long, middle legs of intermediate length; fore coxae oval and convex; middle coxae with trochantins; hind coxae adjacent, large or very large, oblique or strongly oblique, with large ventral plates which cover part of the femora in repose; hind trochanter large, oval, and projecting from the border of the femur; hind tibia with many strong spurs; tarsal segments simple except when sexually modified on the fore tarsi, with a formula of 4-4-4 or 4-5-5.

Abdomen with first visible sternite shortened medially by the encroachment of the hind coxae. Elytra without striae; pseudopleuron gradually narrowed posteriorly and persistent to the apex or to apical projection; pseudopleural carina sharp throughout. Hind wings with costal chitinization abruptly truncate, Rr free and flexibly connected at distal end to R, r-m absent, Cu curved sharply to inner margin, with three radiating folds at junction of R and Rr, with Forbes Type Four folding pattern. Metendosternite elongate, heavily sclerotized, with stalk fusiform, with tendons adjacent when present, and with triangular furcal arms which support large vertical plates. Male genitalia having aedoeagi of both the trilobate and vaginate types of Jeannel and Paulian; tegmen with two parameres which are separated for all or most of their lengths; sternite nine U-shaped. Female genitalia elongate, membranous for the most part, without apical styli. Adults usually found in or near water. Immature stages unknown.

Anterior tentorial pits and arms are absent, making the identification of the suture herein called the epistomal suture open to question. When fresh specimens are to be had for a study of the musculature, this question will probably be resolved. This epistomal suture continues laterally to a narrow declivous area dorsal to the mandibles and is in turn followed by a sulcus dorsal to the triangular area separating the mandible

and maxilla (fig. 6). Could this be the subgenal suture? The foramen magnum dominates the posterior area of the head. The postoccipital suture is present, but the posterior tentorial pits are not evident. The small depression at either end of the tentorial bridge is the point of articulation of a cervical sclerite and probably not a tentorial pit. The tentorial bridge does not originate as is usual in the area posterior to the mouthparts; the invasion of this area by the foramen magnum has left little of the area available. The tentorial bridge arises from the border of the foramen, well separated from the mouthparts. The part most difficult to identify is the transverse plate suspended ventrally on the posterior area (a, figs. 5 and 6); to this plate is attached the postmentum of the labium. The plate could not be the gula, because the gula, according to Snodgrass (1935:127), must lie proximal to the tentorial pits, in this case proximal to the areas where the tentorial bridge joins the head capsule; in this insect only the cervical membrane lies proximal to these areas. It could be the submentum, actually a part of the labium, even though it is fused to the head capsule. It could merely be a part of the head capsule that has migrated ventrally, in which case it would be the hypostomal bridge; I have used this term. Once again, knowledge of the musculature would be very helpful. The part of the cervical sclerite which projects from the cervical membrane (fig. 6) is curved and fits into the anterior border of the prothorax, presumably to anchor the head in repose. On slowly extending the head, this projection slips through the incision at the anterior end of the sterno-hypomerall suture. The ciliated appendage on the mandible is intriguing (fig. 18). A membranous lobe, the prostheca or lacinia mobile, is found in a number of beetles, but it should be remembered that this structure is not a homologue of the maxillary lacinia. The sharp apex and ciliated margin of this appendage in the Thaumastodinae suggest a rasping or straining function. The broad apex of the prosternal process has on its dorsal surface a very strong carina which fits into a deep sulcus on the mesosternum. This locking mechanism is visible only when the two sterna are separated. In *Martinius* the aedoeagus is oriented inside the abdomen so that the penis is dorsal to the tegmen (figs. 13-16). In the other two genera the aedoeagus lies on its side in the abdomen because the curvature of the tegmen does not allow the usual orientation (figs. 21-22, 24-27). Thus, the dorsal view of the aedoeagus in *Martinius* is morphologically equal to the left view in the other two genera, and the right view is equal to the dorsal view. In *Martinius* the tegmen is symmetrical, trough-like, and lightly sclerotized, with the penis lying free in the tegmen. In *Acontosceles* and *Pseudeucinetus* the teg-

men is asymmetrical at the base, tube-like, and well-sclerotized, with the penis enclosed throughout most of its length in the tube-like pars basalis.

A comparison of the three genera is given in the description of *Pseudeucinetus*. If the character mentioned for *Pseudeucinetus* is identical or similar to that same character in *Martinius*, an "(M)" is placed after the character. An "(A)" after the character represents similarity or identity to *Acontosceles*. Where neither (A) nor (M) is indicated after a characteristic, *Pseudeucinetus* is intermediate in that the character is not distinctly similar to that character in either *Acontosceles* or *Martinius*. Some of the attributes listed are qualitative and some are quantitative, and not all are to be given equal weight. From this tabulation it appears that *Pseudeucinetus* is intermediate, that it is more closely related to *Martinius* than to *Acontosceles*, and that *Martinius* is the virtual antithesis of *Acontosceles*.

The nomenclature of the group is rather simple; all generic names were proposed with original type species designations and were monobasic. However, the history of the subfamily name is interesting. In the description of his new genus Heller (1921) wrote "*Pseudeucinetus* g.n. Melandryidarum, tribus nova, prope Eustrophinos," but he did not specifically cite the tribal name. Of course, we could assume that his tribal name would consist of the generic stem plus a tribal suffix, but such a family-group name has never appeared in print. Hence, we must ask the question: Are the requirements for proposal of a new family-group name satisfied when an author shows intent but does not specifically mention that family-group name? I find nothing in the Règles, the Copenhagen Decisions, or in the draft of the new Code to cover this problem. At first glance we would say that Heller's statement, "tribus nova," is the same as citing his tribal name, but we must consider what would happen in many other groups if we decided in this manner. Quite often authors have stated that a certain genus will or probably will require a new tribe or subfamily, but we do not automatically append a suffix to the generic stem. It is necessary that a family-group name be specifically cited, just as we require that a genus be given a name.

Thaumastodinae was proposed by Champion (1924) for his new genera, but just a few months later Champion (1924a) realized that his genus *Thaumastodus* was a junior synonym of *Pseudeucinetus* of Heller (1921). This family-group name is therefore based on a junior synonym. Proposal 54(1)a of the Copenhagen Decisions recommends that a family-group name not be changed even though it is based on a junior synonym, and it appears that the new Code will incorporate this proposal. We do not have a choice of family-group names in this case, for only one name has been proposed.

Figure 10 on plate B in Champion's original description shows divergent parameres. This divergence was undoubtedly caused by rotation of the parts; this is corrected in my illustrations (figs. 24-25).

Previous records from literature. INDIA. *United Provinces*: Sudlimath River Bank, Haldwani Division of Kumaon, III-1923, leg. H. G. Champion (from Champion 1924).

Specimens examined. INDIA. *United Provinces*: (same data as given above) in the Baker Collection, USNM No. 64212 Cotypes 2 males.

Acontosceles tagalog, NEW SPECIES

Compared with *hydroporoides*: head with antennal scrobe deeper; antenna light brown, with apical segments becoming darker. Pronotum widest at posterior third; lateral borders converging posteriorly on posterior third and not forming a continuous border with the border of the elytra; posterior border with median lobe shorter. Metasternum broadly concave medially. Elytra more strongly convex laterally, so as to make the pseudopleural carina invisible dorsally through most of its length; more strongly declivous at apex; the sutural sulcus very shallow and barely evident toward the apex. Male genitalia with tegmen more arcuate and more slender; pars basalis more bulbous basally; parameres with serrations on apical half and strongly arcuate at apex.

Head with setae much coarser. Pronotum with very dense minute punctures and very dense minute scale-like setae over the surface, and large coarse punctures and posteriorly directed prominent setae; the small punctures are more distinct and the large setae are more elert than in *hydroporoides*; the large setae are black but appear yellowish in certain light. Prosternal process covered with very long, very dense, yellowish, depressed setae. Elytra with punctures confusedly arranged, with very indistinct to roughened small punctures, larger punctures also less distinct and smaller than on pronotum; color pattern variegated, minute scale-like setae blackish or silverish. Ventral surface dark brown on the anterior part of the prothorax and gradually becoming reddish brown posteriorly. Measurements in mm.: length 2.1, width 1.0. (figs. 26-30).

Specimens examined. PHILIPPINE ISLANDS. *Manila*: Manila, Luzon Is., 10-1913, leg. G. Boettcher, from H. P. Loding 1935, Holotype male, USNM No. 64213.

This specific name refers to the Tagalog nation of Philippine peoples who inhabit the type locality.

Acontosceles sp.

One specimen before me differed from the two previous species in two obvious ways: the apex of each elytron is more strongly and broadly projected, and the ultimate visible abdominal sternite is glabrous on the middle line and angulate apically. A dissection of the genitalia shows the specimen to be female. It is possible, though admittedly not probable,

that the differences mentioned are the result of sexual dimorphism. Therefore, I think it is better not to name this form until the female is known and described in the other two species. The specimen is from Calian, Mindanao Is., Davao Province, Philippine Islands, V-31-30, leg. C. F. Clagg; it is now located in the Chicago Natural History Museum.

Pseudeucinetus Heller

Pseudeucinetus Heller, 1921:155 (described as new genus); Champion, 1924a:116 (synonymized *Thaumastodus*).

Thaumastodus Champion, 1924:25 (described as new genus).

Head with face weakly convex in lateral aspect (M); epistomal suture present (M); eyes subcircular, almost contiguous; antennal groove margined dorsally (M); antenna inserted near mandible (M), with 11 segments (A), middle segments moniliform (M); labrum with lateral borders evenly arcuate (M); maxilla slender, with galea simple apically (M); labium with postmentum as wide as long (M), with ligula arcuate laterally (A), and with second palpal segment longer than third (M). Pronotum evenly convex (M). Mesosternum on the same level as the prosternal process (M), but without distinctly bordered depression for the reception of the prosternal process (A), and linear in the area anterior to each middle coxa (M). Metasternum evenly convex, very short anterior to hind coxae, expanded laterally, posterior borders converging medially to become very long and linear between the coxae (M). Metepisternum narrow, widest anteriorly, then becoming linear through most of its length (M). Hind coxa strongly oblique, subparallelogramic, very large, its length much greater than the distance between it and the middle coxa (M). Hind tibia with many heavy spurs throughout its length (M). Fore leg exhibiting sexual dimorphism (M). Tarsal formula 4-4-4 (M). Elytra with lateral border posteriorly entire (A). Abdomen with the first visible sternite very long laterally and very short medially where the very large hind coxae encroach (M); with the border of the ultimate visible sternite bidentate (M). Metendosternite with stalk not bulbous anteriorly; vertical plate not thickened along its dorsal border; anterior tendons not visible (M). Male with aedoeagus lying on its side when retracted within the abdomen (A), with the pars basalis asymmetrical and sclerotized on all sides to form a tube (A), with the parameres subequal in length to the pars basalis and not acuminate apically (M); sternite nine asymmetrical (A); sternite eight small and in the form of a wide V (M).

Pseudeucinetus zygops Heller

Pseudeucinetus zygops Heller, 1921:156, figs. 1-3 (described as new species); Champion, 1924a:116 (synonymized *fusiformis*); Maulik, 1931:505 (distribution).

Thaumastodus fusiformis Champion, 1924:27, pl. A (described as new species).

Figure 5 on plate A in Champion's original description shows some distortion, probably because of rotation of curved parts. The lacinia should be rotated a quarter-turn to the left to show the broad setae as

facing medially and to show the distal end as being more arcuate; the galea should be rotated a half-turn. I have re-illustrated the male genitalia (figs. 20-23).

Previous records from literature. PHILIPPINE ISLANDS. *Davao*: Davao, Mindanao Is., Baker Collection No. 6814 (from Heller 1921, and Champion 1924). FEDERATED MALAY STATES. *Selangor*: Kuala Lumpur, Setapak Pond D, August 11 and 12, 1926, among algae, leg. C. Dover (from Maulik 1931).

Specimens examined. PHILIPPINE ISLANDS. *Davao*: (same data as given above) in the Baker Collection, 5 males, determined by K. M. Heller; Calian, Mindanao Is., V-31-30, leg. C. F. Clagg, 1 female [Chicago Natural History Museum]. *Negros Occidental*: *Tibidabo*, Manapla, Negros Is., XII-12-28, leg. W. D. Pierce, No. CC237, hooping beetles on ground, 2 males and 2 females; Saravia, Negros Is., III-22-29, leg. W. D. Pierce, cane soil, 1 female.

Martinius, NEW GENUS

Head with face weakly convex in lateral aspect; epistomal suture present; eyes transversely ovate, dorsal, almost contiguous; antennal groove margined dorsally; antenna inserted near mandible, short, with seven segments, apical segments moniliform; labrum with lateral borders evenly arcuate; maxilla slender, with galea simple apically; labium with postmentum as wide as long, with ligula having slender lateral projections, with the second palpal segment longer than the third.

Pronotum evenly convex. Mesosternum on the same level as the prosternal process, with distinctly bordered depression for the reception of the prosternal process, linear in the area anterior to each middle coxa. Metasternum evenly convex, very short anterior to hind coxae, expanded laterally, posterior borders converging medially to become very long and linear between the coxae. Metepisternum narrow, widest anteriorly, then becoming linear through most of its length. Hind coxa strongly oblique, subparallelogramic, very large, its length much greater than the distance between it and the middle coxa. Hind tibia with many heavy spurs throughout its length. Fore leg exhibiting sexual dimorphism. Tarsal formula 4-4-4. Elytra with lateral border posteriorly serrate.

Abdomen with the first visible sternite very long laterally and very short medially where the very large hind coxae encroach; with the border of the ultimate visible sternite bidentate. Metendosternite with stalk not bulbous anteriorly; vertical plate not thickened on dorsal border; anterior tendons not visible. Male with aedoeagus having the tegmen ventral to the penis when retracted within the abdomen, with the pars basalis symmetrical and not sclerotized dorsally, thus forming a trough for the penis, with the parameres subequal in length to the pars basalis and not acuminate apically; sternite nine symmetrical; sternite eight small and in the form of a modified V.

This new genus is named in honor of Dr. John C. Martin of Canada, who died in 1957. The description of the type species follows.

Martinius tellipontis, new species

Head with eyes slightly raised above the dorsal surface, one or two rows of punctures between the eyes; antenna attaining the middle point of the fore coxa, segments submoniliform, segment 3 short, segments 1, 2, and 7 longer than wide, the remainder with length subequal to width. Pronotum with anterior border emarginate, anterior angles acute, lateral borders arcuate and very strongly diverging posteriorly, posterior angles subrectangular and weakly overlaying the elytral humeri, posterior border sinuate on lateral thirds and on medial third with a broad, posteriorly projecting, truncated lobe. Elytra widest at anterior fourth, this being the widest point on the whole body; surface transversely evenly convex and longitudinally weakly convex; lateral border evenly arcuate and converging posteriorly to form a parabola at the apex; the pseudopleural carina, that is, the angulation of the dorsal surface with the pseudopleuron, visible throughout its length in dorsal view and therefore forming the lateral border; pseudopleural carina with approximately twelve serrations on the posterior half, the first few being widely separated and small, but becoming more closely placed and larger posteriorly; the apex of each elytron with a small truncated projection which lies medial to the apical projections on the ultimate sternite of the abdomen; pseudopleuron occupying completely the deflexed part of the elytra, wide anteriorly, narrowing gradually posteriorly, then maintaining a narrow width from the first visible abdominal sternite until it ends at the truncated projection of the apex.

The dorsal surface is covered with very dense, fine, setigerous punctures. The setae on the head are directed anteriorly and those on the pronotum and elytra are directed posteriorly. The setae have submetallic luster and are of three types. Those of the first type are very dense, short, fine, appressed, and light brown, and they cover most of the surface. The second type of setae, which are very dense, short, broad, appressed yellowish-golden, form irregular bands or spots on the elytra; these markings become obscured when light comes from certain directions. A third type of seta is evenly dispersed among the other two types; these are sparser, longer, fine, recurvate, and light brown. A very long seta projects anteriorly and then curves ventrally from the dorsal margin of each eye. The ventral surface is covered with very dense, fine, setigerous punctures. The setae of these punctures have submetallic luster, are whitish-yellow, posteriorly directed, appressed, and fine; they are slightly longer on the posterior abdominal segments. However, on the hypomeron the setae are directed antero-ventrally, and on the abdominal sternites there are sparser and longer setae mixed with the dense and short setae. The ultimate visible sternite has four rows of very long, coarse, brown, curved setae, each row with three or four setae. Also on the ultimate sternite there is a very long, fine seta adjacent to each of the two apical projections. The antenna is clothed with whitish setae which are longer and denser on the ventral surface; much longer setae are sparsely distributed and are especially noticeable on the apex of the last segment. Legs with dense, whitish setae, except on the middle femur and tibia where they are less dense, and except on the middle tarsus where the setae are very scarce; the tarsi have a pair of coarse setae on the apex of each segment except the distal segment.

Sexual Dimorphism: the fore leg of the male has the apical third of the tibia and the first tarsal segment ventrally clothed with very dense and long setae and the first tarsal segment weakly broadened; in the female the setae of the fore leg are not modified, that is they are uniform throughout the leg, nor is the first tarsal

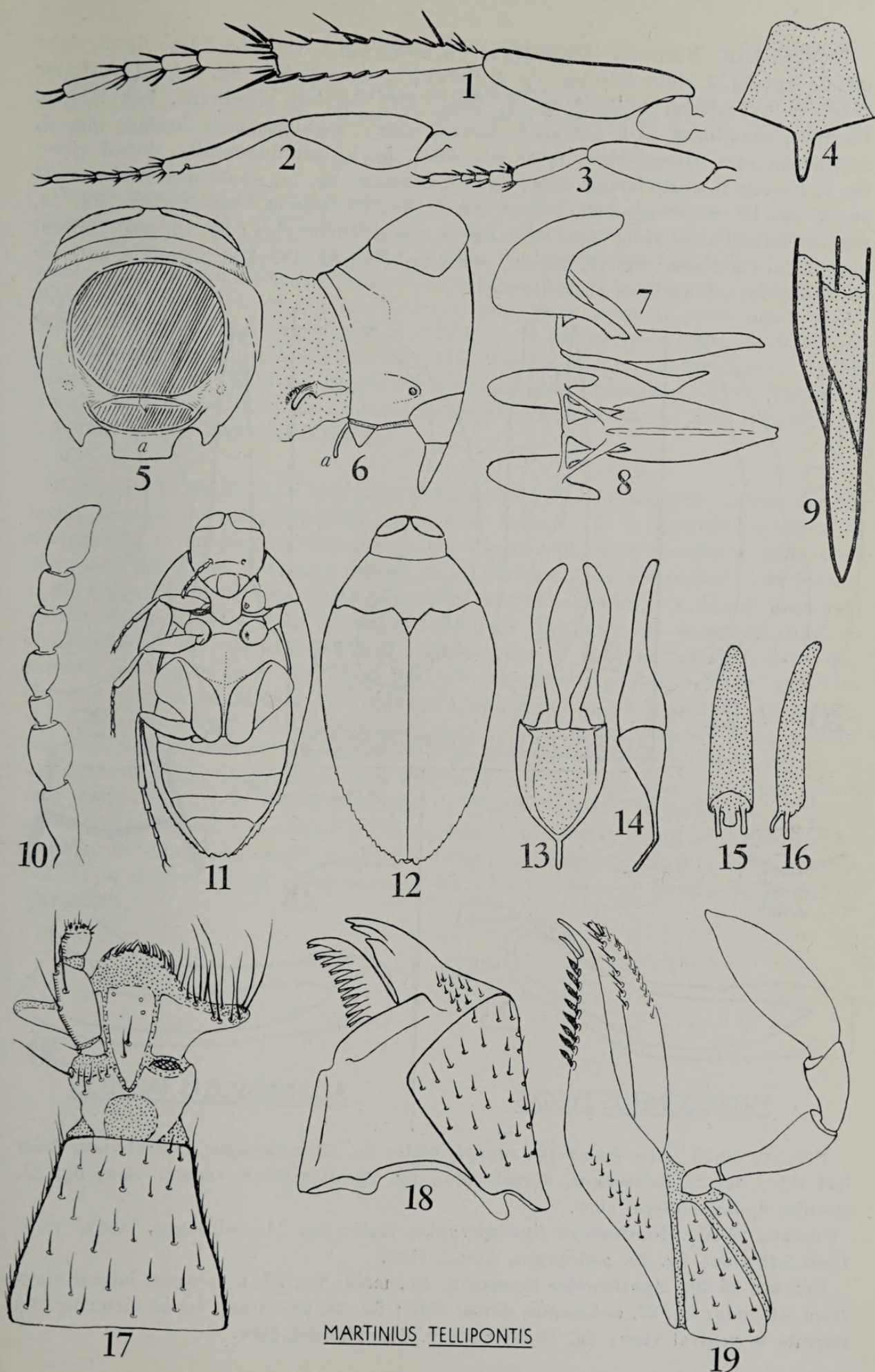
segment wider than the adjacent segment. Measurements in mm.: male length 2.3-3.0, width 1.2-1.6; female length 2.3-3.2, width 1.2-1.6; the average measurements of the males are less than those of the females. (figs. 1-19).

Specimens examined. PANAMA. Canal Zone, Feb. 10, 1939, leg. C. H. Richardson, USNM No. 64214 Holotype male; same data, Allotype female, and Paratypes 19 males and 20 females; same data except leg. C. J. Drake, Paratypes 2 males and 1 female; Panama City, Canal Zone, Feb. 1939, leg. Carl J. Drake, Paratypes 2 females.

Dr. Drake, who presented these specimens to the National Museum, does not recall the exact situation in which these specimens were collected, but he says that he and Dr. Richardson did all their collecting in and very close by a small stream at Panama City. The name *tellipontis* is Latin: *tellus*—land, *pons*—bridge.

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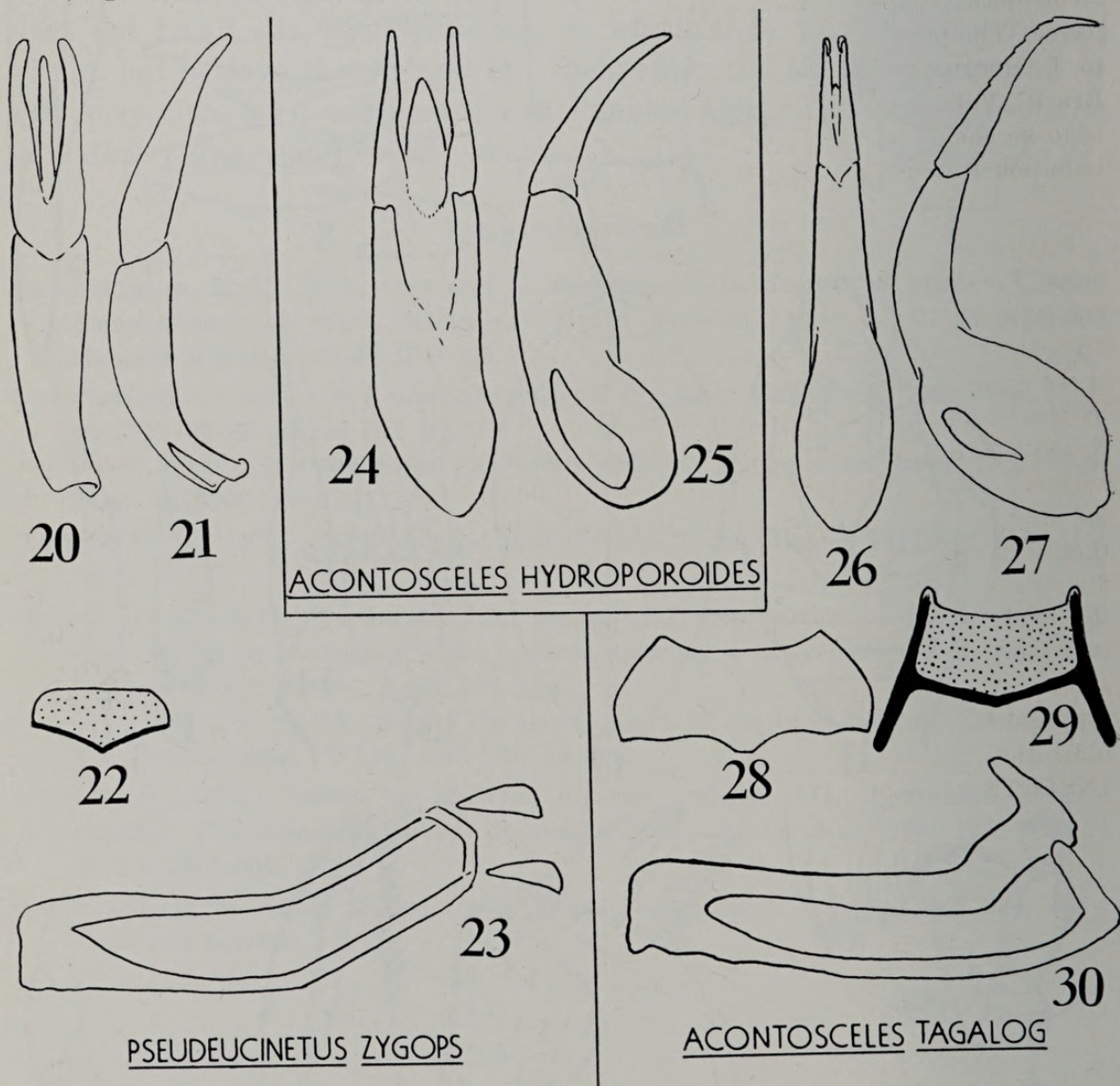
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MARTINIUS TELLIPONTIS

(See captions, next page)

FIGURES 1-19. *Martinius tellipontis* n. sp., male; fig. 1, right hind leg; fig. 2, right middle leg; fig. 3, right fore leg; fig. 4, sternite 8, ventral view; fig. 5, head, posterior view; a—hypostomal bridge; fig. 6, head, with cervical membrane, less labium, maxillae, mandibles and antennae, lateral view; a—hypostomal bridge; fig. 7, metendosternite, lateral view, from left side; fig. 8, metndoesternite, dorsal view; fig. 9, sternite 9, dorso-lateral view; fig. 10, antenna; fig. 11, whole specimen, ventral view; fig. 12, whole specimen, dorsal view; fig. 13, tegmen, dorsal view; fig. 14, tegmen, lateral view, from right side; fig. 15, penis, dorsal view; fig. 16, penis, lateral view, from right side; fig. 17, labium, posterior view; fig. 18, right mandible, anterior view; fig. 19, left maxilla, posterior view.



FIGURES 20-23. *Pseudeucinetus zygops*, male; fig. 20, aedoeagus, lateral view, from left side; fig. 21, aedoeagus, dorsal view; fig. 22, sternite 8, ventral view; fig. 23, sternite 9, dorso-lateral view.

FIGURES 24-25. *Acontosceles hydroporoides*, male; fig. 24, aedoeagus, lateral view, from left side; fig. 25, aedoeagus, dorsal view.

FIGURES 26-30. *Acontosceles tagalog* n. sp., male; fig. 26, aedoeagus, lateral view, from left side; fig. 27, aedoeagus, dorsal view; fig. 28, pronotum, dorsal view; fig. 29, sternite 8, ventral view; fig. 30, sternite 9, dorso-lateral view.



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