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TWO NEW GENERA OF BEMBIDIINE CARABID BEETLES FROM AUSTRALIA AND SOUTH AMERICA WITH NOTES ON THEIR PHYLOGENETIC AND ZOOGEOGRAPHIC SIGNIFICANCE (COLEOPTERA)¹

Terry L. Erwin²

ABSTRACT. Two genera and two species are described as new. A key to related species is given and morphological structures are discussed in a phylogenetic perspective with other bembidiine groups. An "elytral chaetotaxy map," which is based on a broad study of tachyine beetles, is included. The distribution of each species is presented by locality records. Illustrations of important morphological characters are given as well as habitus drawings of two species, each representing the new genera described.

INTRODUCTION

Darlington (1962) pointed out that the members of the *hobarti* group "are certainly *Tachys* rather than *Bembidion* by current classification, [although] the species of this group are anomalous (primitive?) in some ways and should be specially considered by students of bembidiine phylogeny." During the course of my current study of tachyine beetles, I examined several specimens of the *hobarti* group and found some remarkable characteristics, as well as representatives of two new species. In the analysis of these characteristics and their distribution throughout the carabid beetles, another species with unusual characteristics was uncovered; Jeannel (1962) redescribed and illustrated

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² Division of Coleoptera, Department of Entomology, Smithsonian Institution, Washington, D. C. 20560.

this species, "*Plataphus*" *reicheillum* Csiki, and assigned it to a "phylogenetic series" of the Tribe Bembidiini *s. str.* On the basis of these newly discovered and newly interpreted characteristics, and information from my general tachyine study, I here propose two new genera to contain the groups of species discussed above, and discuss the phylogenetic implications and relict distribution pattern exhibited by the extant species of each group. I have included in this paper an "elytral chaetotaxy map," which is the result of the examination of all described and many undescribed groups of tachyine beetles. This was done now to facilitate the descriptions and discussions of these groups.

METHODS

The methods used here are essentially the same as those I employed elsewhere (Erwin, 1970) with a few exceptions. Measurements were made with a micrometer eyepiece in a Wild M5 stereoscopic microscope at a magnification of 50 diameters. The scale interval was 0.015 mm. Total length given here is in the sense of Lindroth (1961-69), that is, one overall "habitus" measurement of the specimen in a near normal pose, rather than the summation of head, pronotum, and elytron measurements used commonly for variation studies.

Illustrations are of two types. Most are India Ink on bristol board, but those with half-tone qualities were made with an "F softness" pencil on bristol board.

ACKNOWLEDGEMENTS

I wish to thank P. J. Darlington, Jr. and H. B. Leech for the loan of beetles in their charge and C. H. Lindroth for critically reading the manuscript and offering many valuable suggestions.

TAXONOMY

Tasmanitachoides new genus

(Figures 1, 5, 6, 8, 10, 11, 12, 13, 15, 16, 19, 21, 22)

Type Species. *Bembidion hobarti* Blackburn 1901: 123, present designation. This genus includes those species Darlington (1962) recognized as the *hobarti* group of *Tachys*, as well as two new species described below.

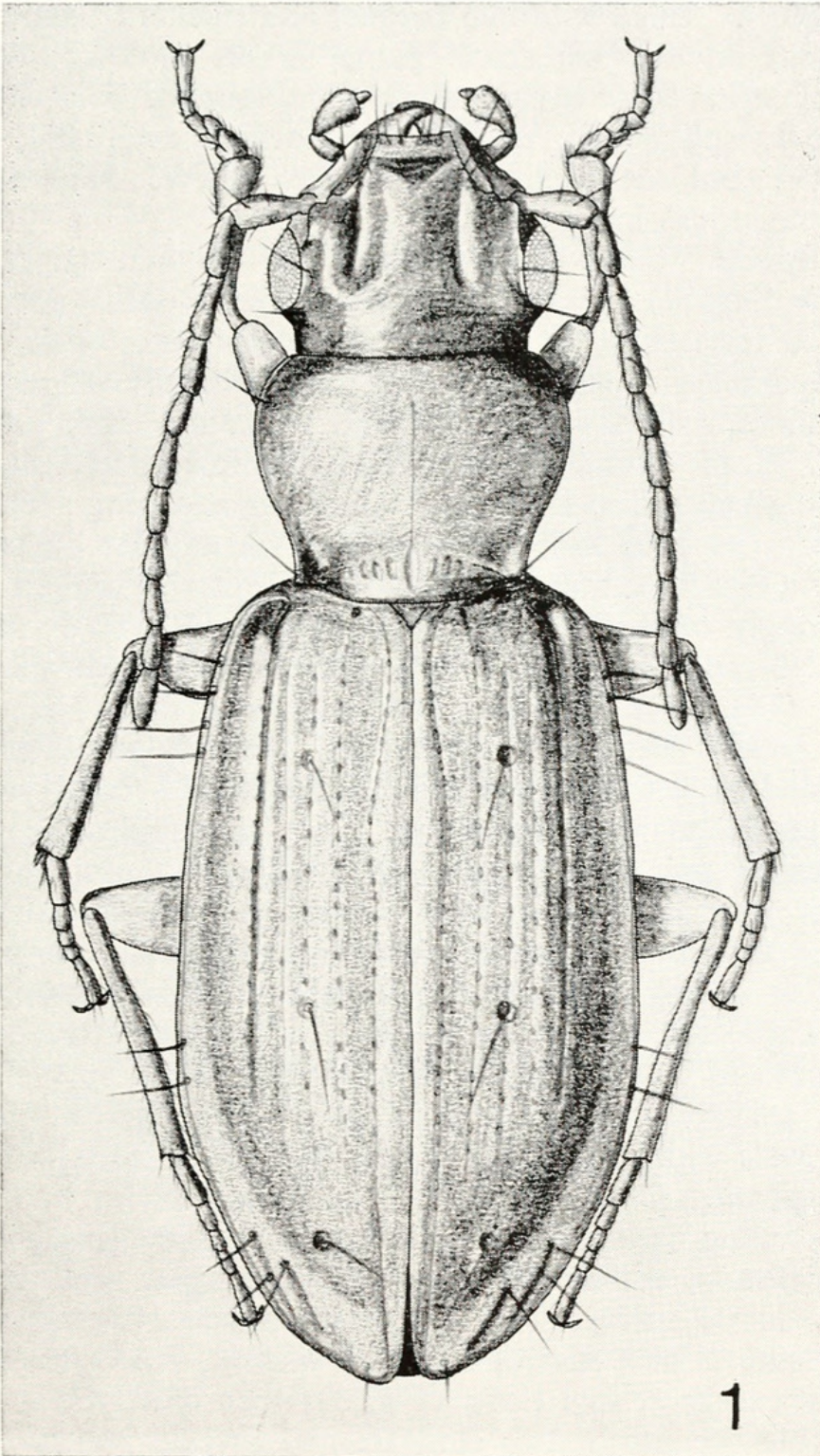


Figure 1. *Tasmanitachoides hobarti* (Blackburn), dorsal aspect, male, Queenstown, Tasmania.

Diagnosis. Head with two parallel and sulcate frontal furrows continuous on clypeus; apical palpal article subulate; ligula 6-setose; anterior coxal cavity uniperforate; anterior tibia with apex truncate to suboblique; scutellar stria absent externally; sutural stria entire, but not strictly recurrent (see below); male aedeagus with symmetrical basal lobes.

Description. Size: small beetles, 1.6–2.8 mm (upper limit from Darlington). Color: piceous to testaceous, appendages rufous to testaceous, or piceous. Microsculpture: wide, irregularly isodiametric meshes almost longitudinally arranged on elytra, more transverse on head and pronotum, very finely impressed. Head: broad and moderately depressed, with small but protruding eyes; frontal furrows sulciform and long, continuous on clypeus; clypeus with two setae at each anterior angle; ligula 6-setose (Fig. 10); mentum not foveate, anterior margin acutely and strongly toothed; mouthparts (Figs. 5, 10, 16). Antennal article 2:3 ratio more than 1.0; flagellar articles longer than wide, filiform (Fig. 15). Eyes and head with very short and sparsely spaced setae. Prothorax: pronotum narrowly cordiform with sharp hind angles and broadly lobed base, sides barely reflexed, carina medial to hind angles; two pairs of lateral setae present, the anterior pair far forward even before anterior third, the posterior pair just before hind angles; margins not serrate or setulose; anterior transverse impression obsolete, the posterior impression deeply engraved, interrupted at middle, basal foveae deeply impressed. Prosternum with short, sparsely spaced setae. Coxal cavities uniperforate-separate-closed. Tibia very shallowly oblique apically with outer spine lateral to subapical transverse comb. Male with two dilated basal tarsal articles each with sparse setae beneath. Claws simple. Pterothorax: elytra narrow and elongate, more or less parallel-sided with prominent humeri; sides barely reflexed, without subapical plica; margins setulose-serrate or not; dorsal surface with deeply impressed punctulate striae, at least sutural and base of 5 always present, others various, but 8 absent except at seta Eo8a (Fig. 3); recurrent groove appearing double because of two elongate and foveate punctures (Fig. 1) that are not continuous with sutural stria. Elytral chaetotaxy as in Figure 1. Mesonotum fully winged. Mesocoxae conjunct-confluent. Middle tibia of male with lateroapical brush. Claws simple. Abdomen: segments II, III, IV, and V with a single

pair of ambulatory setae; segment VI with one pair in male and two pairs in female specimens, those in female parallel to hind margin of segment; venter with many scattered setae as described for eyes and head. Genitalia: female stylus (Figs. 8, 11, 12). Male parameres and median lobe (Figs. 19, 21, 22), the latter with symmetrical basal lobes.

Habitat. According to Darlington (1962) these beetles occur “in sand or gravel or under stones by rivers or brooks.”

Distribution. The known range extends from Tasmania and temperate southeastern Australia north to Katherine in the Northern Territory, but no specimens are known from the area between Rockhampton and Katherine, a distance of more than 1500 miles.

Etymology. From Tasmania, the type locality of the type species; from genus *Tachys* (another group of carabid beetles), to which this group was originally assigned; and from Latin, *oides*, meaning similar to.

Key to species of *Tasmanitachoides* new genus
(modified from Darlington’s 1962 key to the *hobarti* group)

- 1. Dorsal elytral striae, except sutural, obliterated . . . *lutus* Darlington
- 1'. Dorsal striae, at least 5, and usually some others, present on disc 2
- 2(1'). Clypeus distinctly impressed at middle 3
- 2'. Clypeus not distinctly impressed at middle 5
- 3(2). Color piceous, length *ca.* 1.75 mm*murrumbidgensis* Sloane
- 3'. Color: forebody darker, rufo-piceous to rufo-testaceous, than elytra, rufous to testaceous; length *ca.* 1.95 mm or longer 4
- 4(3'). Small narrow beetles, *ca.* 1.95–2.0 mm long, 0.65 mm wide across elytra; forebody rufo-piceous, elytra testaceous

arnhemensis n. sp.
- 4'. Larger and broader beetles, *ca.* 2.5–2.8 mm long and 0.9–1.1 mm wide; forebody rufo-testaceous, elytra testaceous at apex; male genitalia (Figs. 6, 19) *fitzroyi* Darlington
- 5(2'). Larger (2.3–2.7 mm long), almost black beetles with more or less well-defined elytral striae 6
- 5'. Small (1.8 mm or less), pale beetles with weakly impressed elytral striae 7
- 6(5). Head across eyes subequal to distance across pronotum at widest part; elytral striae well impressed (may include *leai* Sloane)

hobarti Blackburn

- 6'. Head narrower than pronotum; striae, especially 5, shallower
wattsense Blackburn
- 7(5'). Elytral stria 5 well defined to at least middle of elytron; pronotum
 convex, broad anteriorly, and wider than head across eyes; male
 genitalia (Fig. 22) *kingi* Darlington
- 7'. Elytral stria 5 hardly visible, barely impressed except just behind
 humerus; pronotum subconvex, narrower than head across
 eyes *katherinei* n. sp.

Tasmanitachoides arnhemensis n. sp.

(Figure 11)

Type specimens. The holotype female and one female paratype, labelled "Australia, N.T., Edith Falls nr. Katherine, 110 m, X-25-62," and "Collectors E. S. Ross, D. Q. Cavagnaro" are in CAS (California Academy of Sciences, San Francisco).

Type locality. Edith Falls on the north branch of the Daly River, near Katherine, Northern Territory, Australia.

Diagnosis. Medium-sized beetles, broad, subconvex with rufo-piceous forebody and testaceous elytra; clypeus well impressed medially; striae 1, 2, and 5 well marked beyond middle.

Description. Size: 1.95–2.0 mm total length; 0.6–0.7 mm wide (2 specimens measured). Microsculpture: almost perfectly isodiametric on elytra, moderately impressed, surface shiny. Head: broadly transverse, slightly wider across eyes than pronotum; antennae with middle articles slightly longer than wide; clypeus well impressed medially; frontal furrows deeply sulcate from anterior margin of clypeus to just behind mid-eye level, roughly parallel throughout. Prothorax: subcordate, sides sinuate just before acute hind angles; base broadly lobed, sinuate laterally inside hind angles; side margins moderately beaded, strongly rounded at apical third; anterior margin truncate; surface micro-punctulate; basal transverse impression deep and coarse laterally, interrupted medially by extended median groove. Pterothorax: wings long; elytra elongate and narrow, sides subparallel; humerus about square, margins subserrate and microsetulose; stria 1 (sutural) deep and entire from base to apex, broadly recurrent at apex to foveate puncture Eo8b; stria 2 moderately impressed from near base to Ed6c; striae 3 and 4 short, weakly impressed from Ed3 to Ed5a; stria 5 sulcate behind recurrent

humeral margin to level of Ed3, less impressed from Ed3 to mid-elytron; Ed7b foveate, forming inner pseudo-recurrent groove. Abdomen: as described under generic description. Male genitalia unknown. Female stylus (Fig. 11).

Notes. This species is most closely related to the more southern *T. fitzroyi* Darlington, but it has members that are considerably smaller, both in length and width.

Habitat notes. Exact habitat unrecorded, but taken near Edith Falls, so probably as Darlington (1962) and Sloane (1921) recorded for other species, that is, near water's edge.

Distribution. Known only from the type locality.

Etymology. From Arnhem Land, the northernmost projection of land in Australia; in reference to the general area where the types were collected.

Tasmanitachoides katherinei n. sp.

(Figure 12)

Type specimen. The holotype female labelled "Australia, N.T., Edith Falls nr. Katherine, 110m, X-25-62," and "Collectors E. S. Ross, D. Q. Cavagnaro" is in CAS.

Type locality. Edith Falls on the north branch of the Daly River, near Katherine, Northern Territory, Australia.

Diagnosis. Small beetles, narrow, fragile, depressed, with rufo-testaceous forebody and testaceous elytra; clypeus not impressed; striae 2-5 almost obliterated; micropunctulae and microsculpture well marked.

Description. Size: 1.6 mm total length; 0.5 mm wide (type). Microsculpture: almost perfectly isodiametric on elytra, moderately impressed, surface shiny. Head: broadly transverse, slightly wider across eyes than pronotum and elytra; antennae with middle articles about twice as long as wide; clypeus not impressed medially; frontal furrows shallowly sulcate, poorly defined behind level of anterior edge of eye, slightly convergent posteriorly. Prothorax: subcordate; sides sinuate just before slightly obtuse hind angles; base broadly lobed, abruptly sinuate laterally inside hind angles; side margins weakly beaded, moderately rounded at apical third; anterior margin truncate; pronotum barely convex, micropunctulate; basal transverse impression deep and short,

laterally interrupted well inside hind angle and at middle by extended median groove. Pterothorax: wings long; elytra elongate and narrow, sides parallel; humerus almost square; side margins subserrate and microsetulose; stria 1 deep and entire from base to apex, broadly recurrent at apex to foveate puncture Eo8b; outer striae nearly obliterated; Ed7b shallowly foveate, forming an inner pseudo-recurrent groove. Abdomen: as described for genus. Male genitalia unknown. Female stylus (Fig. 12).

Notes. This species is most closely related to the more southern *T. kingi* Darlington, but it has members with much less impressed striae and a pronotum that is narrower than the head across the eyes.

Habitat notes. See preceding species.

Distribution. Known only from the type locality.

Etymology. From Katherine, the name of the town near which the type was discovered.

NOTES ON OTHER SPECIES OF *TASMANITACHOIDES*

Darlington (1962) thought that *Bembidion wattsense* Blackburn might be a synonym of *T. hobarti*. I have examined the type in the British Museum and believe that *B. wattsense* is a valid species and should be included in *Tasmanitachoides*. I have not seen specimens of *T. leai* Sloane and prefer to follow Darlington's ideas at this time. I have seen the types of all other species listed in the key; those described by Darlington are in the Museum of Comparative Zoology, Cambridge, Massachusetts, and those of Sloane and Blackburn are in the British Museum (Natural History).

Bembidarenas new genus

(Figures 2, 4, 7, 9, 14, 17, 18, 20, 23)

Type Species. *Bembidion reicheillum* Csiki 1929: 162, present designation.

This species was originally described as *Bembidium reichei* Germain (1906: 617). Since *reichei* was preoccupied (Putzeys, 1846), Csiki (1929: 162) proposed *reicheillum*. Jeannel (1962: 653) placed the species in *Plataphus* because of the structure of the basal lobes of the aedeagus. However, his drawings (Jeannel 1941: 533) are not accurate, and, as Lindroth (1963) points out, "The structure of the basal orifice of penis, used by Jea. (1941, p. 533) for characterizing his 'genus' *Plataphus*, is not different from that of related groups."

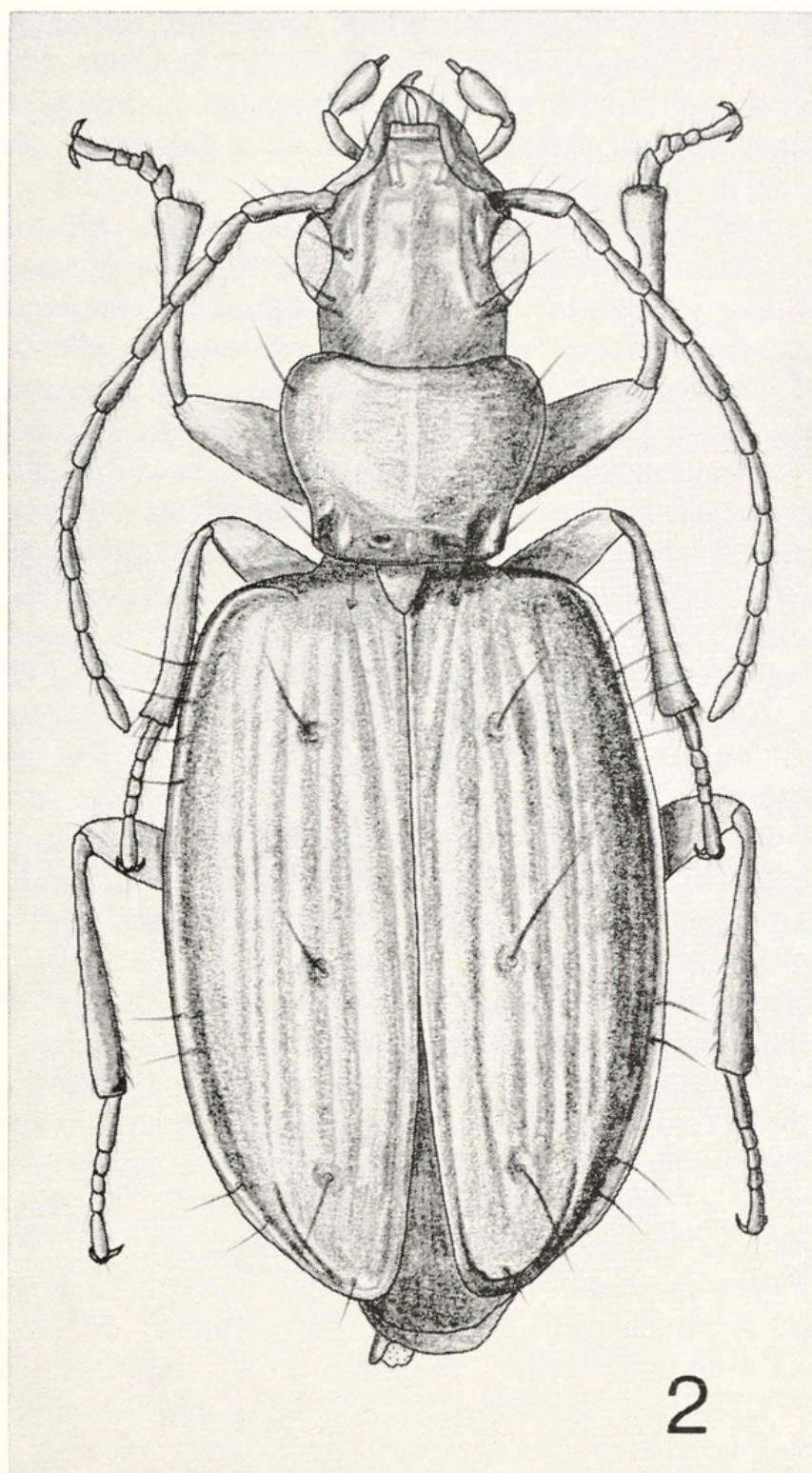


Figure 2. *Bembidarena reicheillum* (Csiki), dorsal aspect, male, vicinity Punta Arenas, Chile.

Diagnosis. Apical palpal article subulate, scutellar stria present, anterior coxal cavity uniperforate, anterior tibia with apex truncate, but with transverse subapical comb, clypeus 4-setose, apex of stria 5 deepened, abdomen pubescent and male aedeagus with symmetrical basal lobes.

Description. Size: 3.6 to 4.2 mm. Color: piceous with rufescent tibiae. Microsculpture: moderately wide on elytra, almost regularly isodiametric meshes with slight tendency toward transverse arrangement throughout. Head: broad and moderately depressed, with moderate but prominent eyes; frontal furrows double, the inner pair linear, deep and wide from clypeus to just behind eyes at posterior edge, and with a slightly raised tubercle at middle of each furrow, the outer pair short and deep, enclosing the anterior supraorbital setae but not continued on clypeus; clypeus with two setae at end of each frontal furrow; ligula 6-setose (Fig. 9); mentum not foveate, anterior margin with strong, truncated tooth; mouth parts (Figs. 4, 9, 17). Antennal articles 1, 3–5 of subequal length, 1 more robust; flagellar articles and 2 only slightly shorter (Fig. 18). Eyes and gena beneath eyes with short and scattered setae. Prothorax: pronotum narrowly cordiform with sharp but slightly obtuse hind angles and truncate base, sides slightly reflexed, with deep basal foveae; two pairs of lateral setae present, the anterior pair far forward, even before anterior third, the posterior pair just anterior to hind angles; margin not setulose, anterior transverse impression obsolete, the basal impression deep and wide. Prosternum glabrous. Coxal cavities uniperforate-separate-open. Tibia truncate apically but with subapical transverse comb terminated with two spine-like setae. Male with two dilated basal tarsal articles each with parallel rows of sparse modified setae beneath. Claws simple. Pterothorax: elytra moderately narrow, depressed and elongate, with slightly arcuate sides and prominent humeri; sides reflexed, with small subapical plica; margins not setulose; dorsal surface with 5 well-impressed striae, the sixth feebly impressed, seventh obsolete, and eighth well impressed behind middle only, absent before middle; scutellar striae well developed; apex of stria 5 deeply impressed and connected with sutural stria (forming "recurrent groove"). Elytral chaetotaxy as in Figure 2. Mesonotum fully winged. Mesocoxae conjunct-confluent. Metasternum and

metacoxae with scattered pubescence. Abdomen: segments II, III, IV, V with a single pair of ambulatory setae; segment VI with one pair in male and two pairs in female specimens, those of female arranged in a row transversely across segment; all segments with short, sparse pubescence. Genitalia: female stylus (Fig. 20). Male parameres and median lobe (Fig. 23), the latter with symmetrical basal lobes, but no "brush sclerite" in the internal sac as in *Bembidion* members.

Notes. I have also seen specimens of a second species of this genus from southern South America in the collection of J. Nègre. Nègre plans to describe and figure this species in a paper he is preparing on *Bembidion* of southern South America.

The presence of short sparse setae covering the venter of all segments of the abdomen is also found in the subgenus *Trichoplataphus* Netolitzky of *Bembidion*. Setae are also found along only the apical margin of each segment in members of the subgenus *Blepharoplataphus* Netolitzky. This character state must be regarded as convergent in these otherwise quite different groups of beetles.

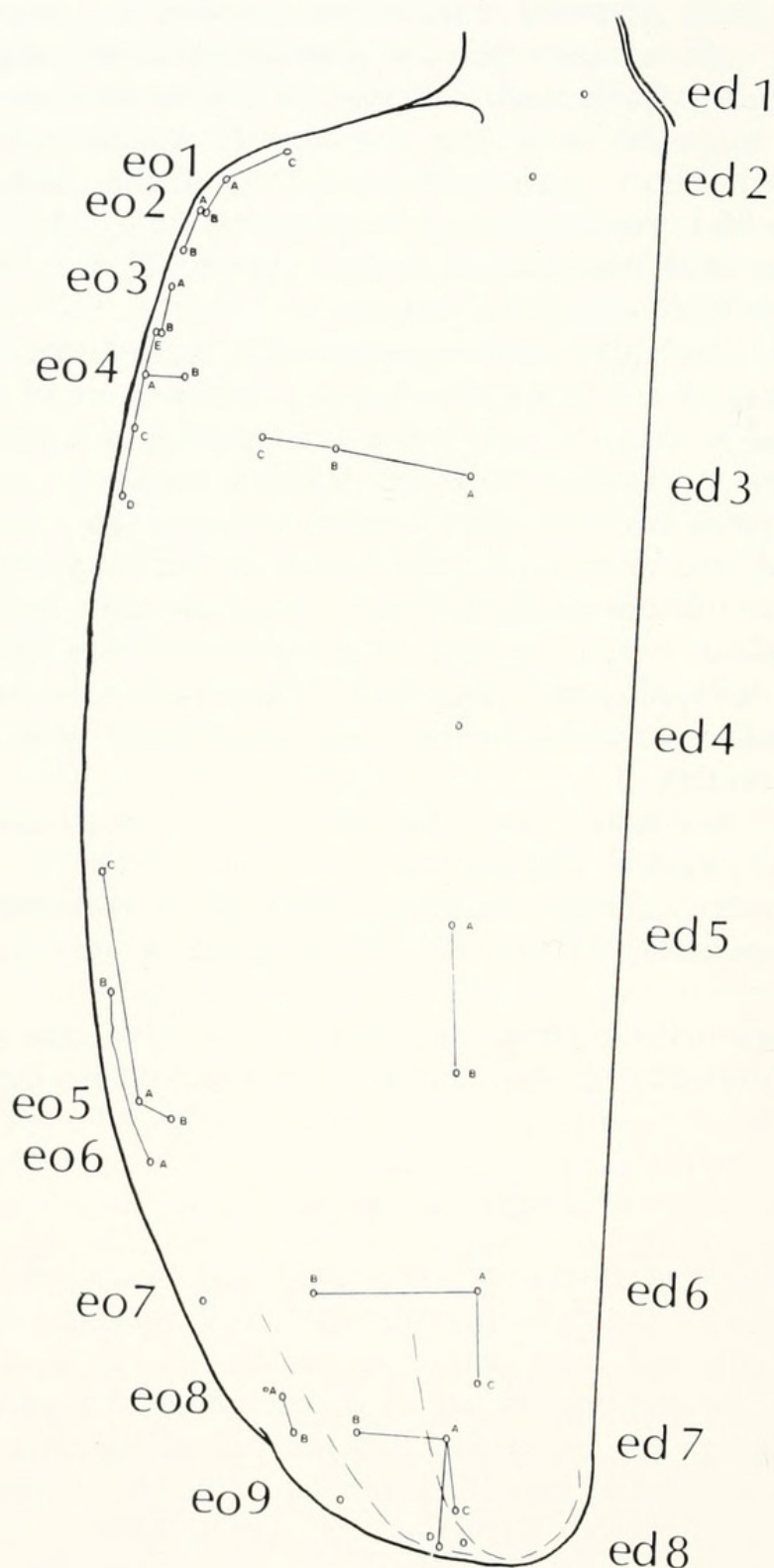
Habitat. According to Darlington (*in litt.*) this beetle "live(d) in gravel by brooks."

Distribution. The known range of this group is southern Chile (Prov. Magellanes) in the vicinity of Punta Arenas (53°40' S Lat.).

Etymology. From *Bembidion*, another group of closely related beetles, and Punta Arenas, the area in which these beetles are found.

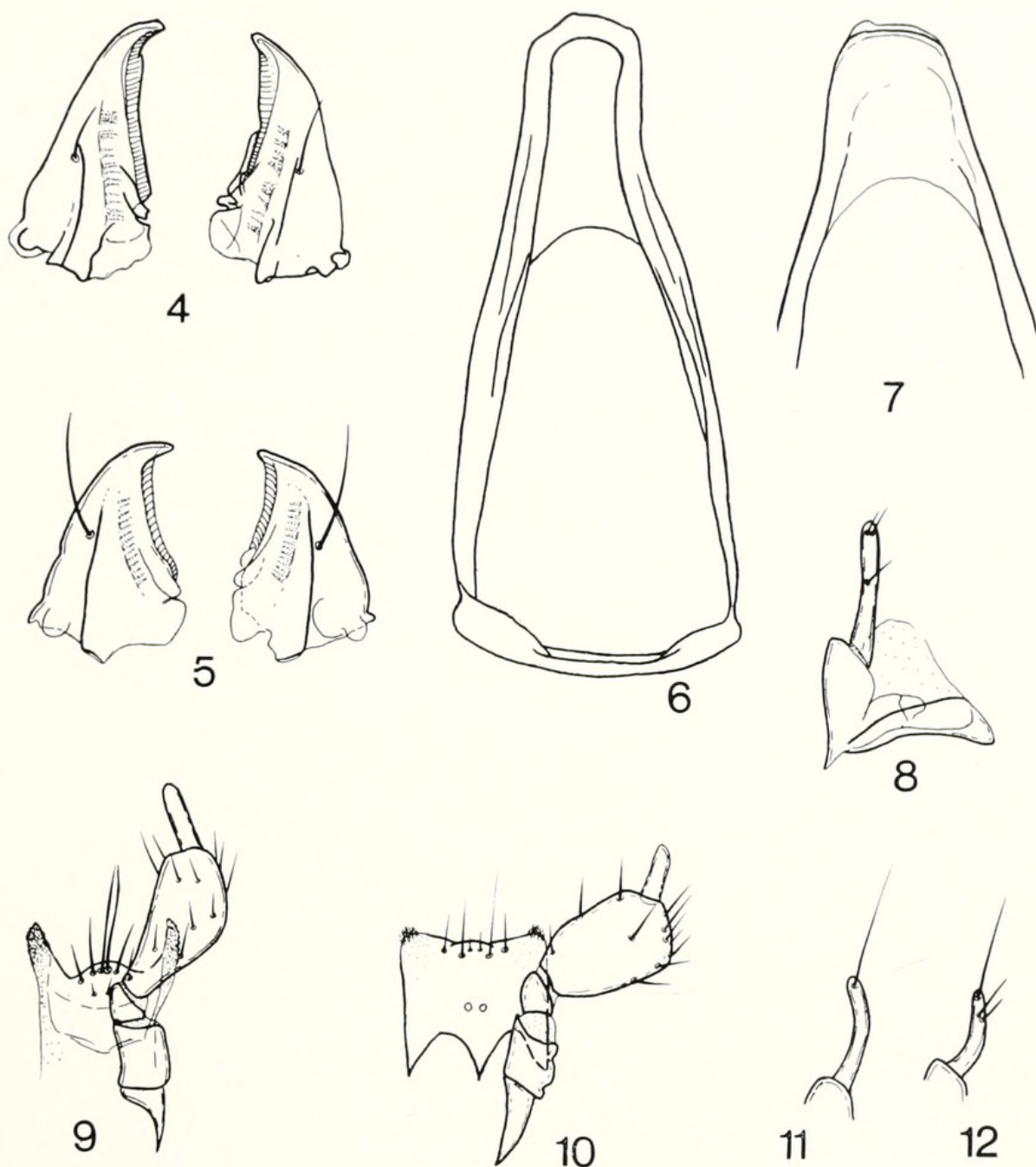
DISCUSSION

The unexpected discovery of symmetrical basal lobes on the male genitalia of the *hobarti* group and *Bembidarenas* led me to investigate this and many other characteristics, as well as their distribution throughout the trechine-bembidiine complex. Some of this investigation has been done on actual specimens, but I have also consulted articles by Jeannel (1926, 1932, 1936, 1941, 1946, 1962), Lindroth (1961, 1963, 1966, 1969), Darlington (1962), Ball (1960), Bell (1967), Valentine (1932), and benefited through correspondence with T. C. Barr and his unpublished "Key to Tribes of Subfamily Bembidiinae."

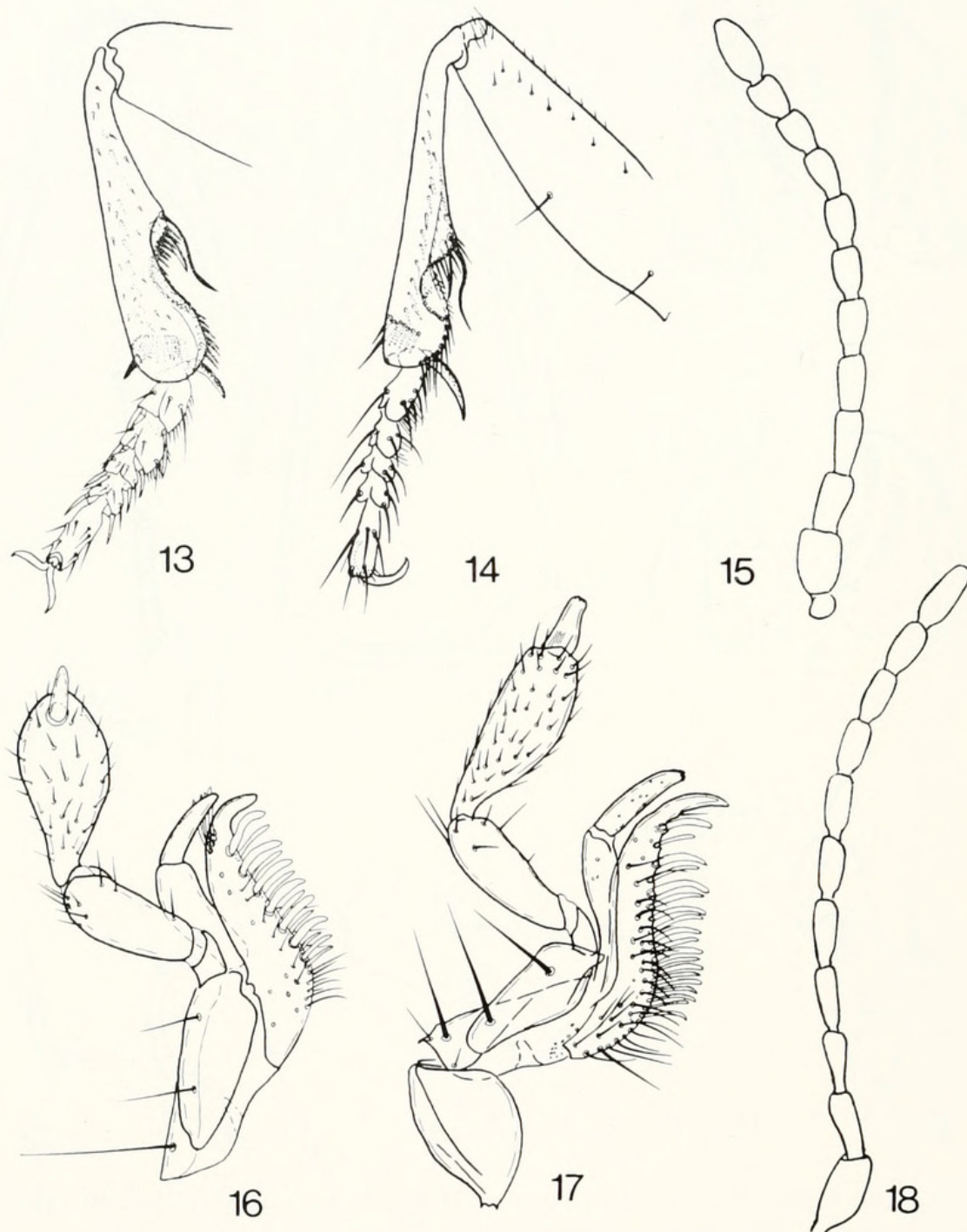


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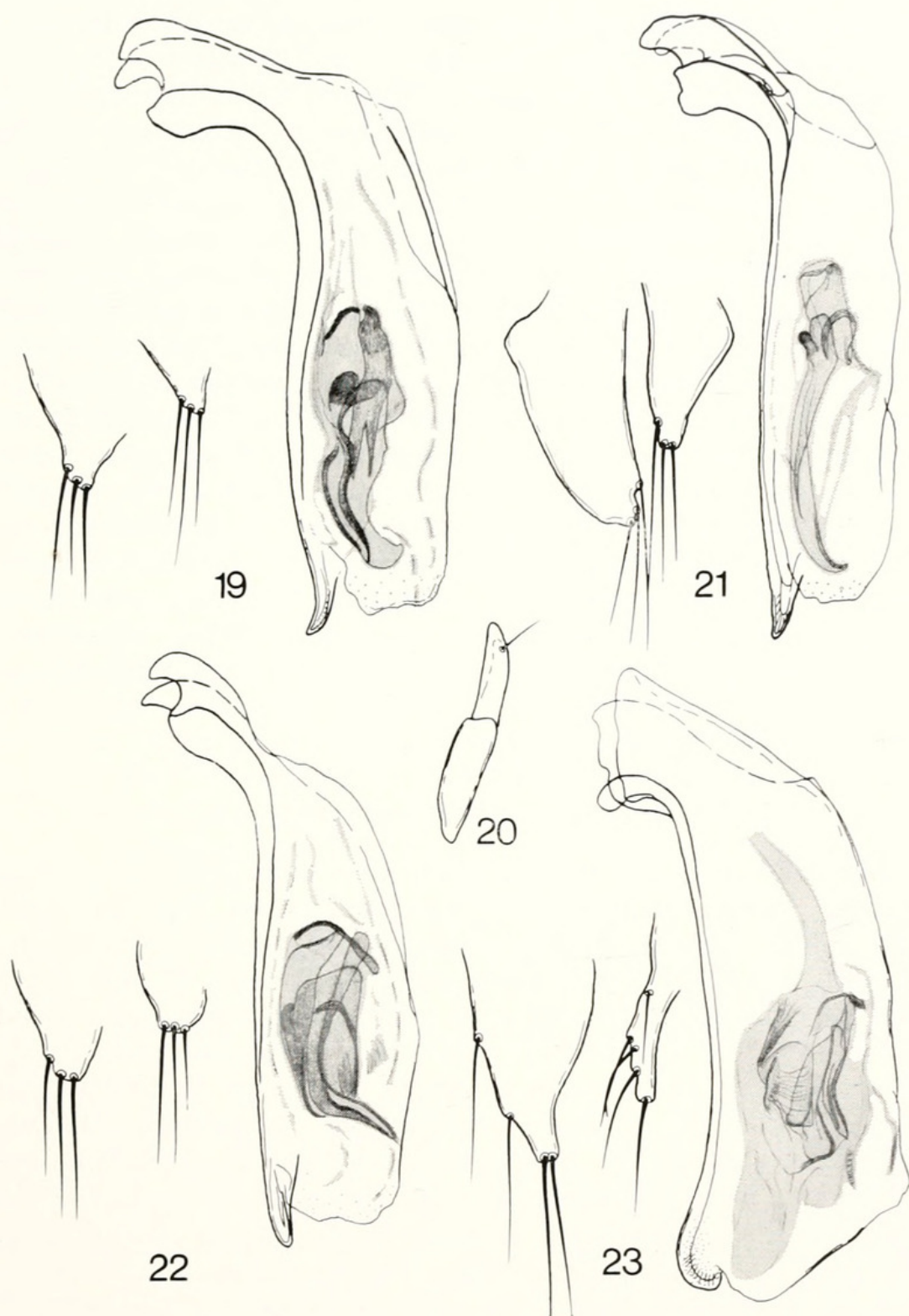
Figure 3. Diagrammatic elytron showing all known positions of setae (O) in tachyine beetles. The Eo series is the elytral "umbilicate" series. The Ed series is the elytral disc series. The letters represent the various positions in which these setae are found in different groups, while the short connecting lines are the hypothetical directions of movement from the ancestral condition (A). This drawing is to be used as a map to accompany the descriptions.



Figures 4-12. Fig. 4. Mandibles of *Bembidarenas reicheellum* (Csiki), dorsal aspect, male, vicinity Punta Arenas, Chile. Fig. 5. Same of *Tasmanitachoides hobarti* (Blackburn), male, Queenstown, Tasmania. Fig. 6. Genital ring sclerite of *Tasmanitachoides fitzroyi* (Darlington), dorsal aspect, male, Fitzroy River, North Rockhampton, Queensland, Australia. Fig. 7. Base of genital ring sclerite of *Bembidarenas reicheellum* (Csiki), dorsal aspect, male, vicinity Punta Arenas, Chile. Fig. 8. Genital sclerites of *Tasmanitachoides hobarti* (Blackburn), ventral aspect, female, Queenstown, Tasmania. Fig. 9. Labium and left palpus of *Bembidarenas reicheellum* (Csiki), ventral aspect, male, vicinity Punta Arenas, Chile. Fig. 10. Same of *Tasmanitachoides hobarti* (Blackburn), male, Queenstown, Tasmania. Fig. 11. Right stylus of female genitalia of *Tasmanitachoides arnhemensis* n. sp., ventral aspect, Edith Falls, Northern Territory, Australia. Fig. 12. Same of *Tasmanitachoides katherinei* n. sp., same locality.



Figures 13–18. Fig. 13. Left anterior leg of *Tasmanitachoides hobarti* (Blackburn), lateral aspect, male, Queenstown, Tasmania. Fig. 14. Same of *Bembidarens reicheillum* (Csiki), vicinity Punta Arenas, Chile. Fig. 15. Right antenna of *Tasmanitachoides hobarti* (Blackburn), lateral aspect, male, Queenstown, Tasmania; pubescence and setae not shown. Fig. 16. Left maxilla and palpus of *Tasmanitachoides hobarti* (Blackburn), dorsal aspect, male, Queenstown, Tasmania. Fig. 17. Same of *Bembidarens reicheillum* (Csiki), vicinity Punta Arenas, Chile. Fig. 18. Same of *Bembidarens reicheillum* (Csiki), vicinity Punta Arenas, Chile; see Fig. 15.



Figures 19–23. Fig. 19. Male genitalia and apicies of parameres of *Tasmanitachoides fitzroyi* (Darlington), Fitzroy River, North Rockhampton, Queensland, Australia. Fig. 20. Female stylus of *Bembidarens reicheillum* (Csiki), ventral aspect, vicinity Punta Arenas, Chile. Fig. 21. Male genitalia and apicies of parameres of *Tasmanitachoides hobarti* (Blackburn), Queenstown, Tasmania. Fig. 22. Same of *Tasmanitachoides kingi* (Darlington), Queenstown, Tasmania. Fig. 23. Same of *Bembidarens reicheillum* (Csiki), vicinity Punta Arenas, Chile.

Traditionally, the trechine-bembidiine complex has been considered as two closely related groups, each at the tribal level (higher levels in the Jeannelian "French School"). Trechini, Bembidiini, and other more loosely associated groups were considered by Jeannel (1941) to constitute the "Stylifera," a "groupement naturel" of the "Caraboidea Limbata" or higher Carabidae. Jeannel's contention that this "groupement naturel, sans cependant avoir été exactement défini" still holds today. It seems no authors before Ball (1960) and Lindroth (1961-69) worried much that their classifications were based on one or two major character states, as well as one or two minor characteristics, or less. Also these character states were investigated on only one or two specimens of one or two local species in what were in reality unknowingly diverse groups. Even so, the general classification of Carabidae has been in relatively good shape for the last 30 years and many small studies have contributed much to our knowledge at all levels; some of these studies were based on new and novel techniques and approaches. It is hoped that this paper will stimulate just such studies in the "Stylifera" to determine its inner and outer limits and its place among the diversity of the entire Family.

DISCUSSION OF *BEMBIDARENAS*

Members of *Bembidarenas reicheillum* differ from *Bembidion* at least to the extent that *Phrypeus rickseckeri* Hayward does, and under certain analysis considerably more. Superficially, though, *B. reicheillum* is more conservative than *P. rickseckeri* and thus has not undergone close scrutiny by students of carabid phylogeny. The symmetrical basal lobes of the male genitalia in *B. reicheillum* do not occur anywhere in the true *Bembidion*, but are characteristic of many trechines, all patrobines, Anillina, apotomines, psydrines, *Horologion*, deltommerines, and *Tasmanitachoides*. Nearly symmetrical lobes occur in *Phrypeus* and the subgenus *Pseudolimnaeum* of *Bembidion*, but the reduction of the right lobe is easily observable after dissection. The distribution of symmetrical basal lobes in the Stylifera and other carabid groups indicates to me that this condition is primitive (plesiomorphic). If so, then reduced right basal lobes and the "basal bulb" have arisen several times in diverse groups, and hence must be used with caution in phylogenetic analyses.

B. reicheillum has another major difference in the male genitalia. All known *Bembidion* species possess a "brush-sclerite" in the internal sac, or remnants of one; in some groups there are species without the structure but it is clearly a secondary loss (Lindroth, personal communication). *B. reicheillum* does not have this structure at all. The brush sclerite does not occur in *Phrypeus* either, but is found in *Asaphidion*. This structure and many others clearly illustrate the sister group relationship of *Bembidion* and *Asaphidion*, regardless of the one extra umbilicate seta (Eo9) in the latter.

B. reicheillum has a plurisetose ligula with remnants of paraglossal lobes. The plurisetose ligula is found in all trechines, *Asaphidion*, and *Tasmanitachoides*, each with six to eight setae. All other bembidiines, pogonines, patrobines, etc., of the Styliifera have four or less setae, usually two. The long narrow lateral lobes, probably remnants of the paraglossae, are characteristic of all trechines, but also occur in some Anillina, patrobines, and *Horologion*. Other members of the Styliifera have small rounded lobes or no lobes. The distribution of these character states indicates to me that the multisetiferous ligula is derived (apomorphic), while the produced lateral lobes are primitive (remnants of the paraglossae). At present, any attempt to interpret these two character states into overall phylogenetic analysis leads to utter confusion; new data must be accumulated before further attempts are made.

The last characteristic that is now known to be peculiar in *B. reicheillum* is the presence of two pairs of setae on the clypeus. This character state also is now known in *Tasmanitachoides* and a few primitive trechines, e.g., *Amblystogenium pacificum* Putzeys.

On the basis of gross overall form (e.g., subulate terminal palpal articles, short sutural stria, elytral chaetotaxy, pubescent penultimate palpal articles, etc.) and the analysis of character states above, I think that *B. reicheillum* is an early off-shoot of the *Bembidion* lineage which retained some characteristics of the mutual "trechine-bembidiine" stock. It seems more primitive in several characteristics than *Phrypeus* and probably separated from the main line of evolution before *Phrypeus*. The habitat of gravel by brooks is considered by Darlington (*in litt.*) to "be a very old, stable habitat, and that the running water acts as a

buffer against climatic changes. I think insects in this habitat may persist for very long periods."

DISCUSSION OF *TASMANITACHOIDES*

In addition to some of the points discussed above, *Tasmanitachoides* members have other peculiar characteristics not generally found in the Bembidiini. Deeply sulcate frontal furrows, extending to about mid-eye level, are elsewhere found only in *Phrypeus*. The small group of lateral papillae of the lacinia are unique, but some *Anillina* and *Lymnastis* have a single spine near this same location. Whether the structures are truly homologous is doubtful, however, because of their orientation.

On the basis of gross overall form (e.g., subulate terminal palpal articles, complete sutural stria, elytral chaetotaxy, uniperforate anterior coxal cavity, pubescent penultimate palpal articles, etc.) and the analysis of character states above, I think the *hobarti* group is best placed as an early off-shoot of the tachyine lineage which gave rise to the *Anillina*. All true tachyines (and *Lymnastis-Micratopus*, which I regard as true tachyines on the basis of many characteristics) have biperforate anterior coxal cavities, and are the only Styliifera that do (aside from *Apotomus* if this group really belongs to the Styliifera). The distribution of biperforate coxal cavities indicates that this character state is derived (apomorphic), but convergent in distantly related groups, perhaps in strengthening the prothorax under greater demands for digging in partial subterranean life (but see also Erwin, 1970: 168).

The characteristics of members of the *hobarti* group show similarities to the trechines, but as in *B. reicheillum* I think these characteristics indicate an old lineage surviving in an old but stable habitat, and maintaining certain characteristics of an early "trechine-bembidiine" stock.

The relationships within the Styliifera and particularly within the trechine-bembidiine complex will be thoroughly discussed along with the supporting evidence in my current revision of the Tachyina (Erwin, MS) and need not be dealt with at length here.

LITERATURE CITED

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