The Coleopterists Bulletin, 46(3):297–305. 1992.

# A NEW GENUS OF BUPRESTIDAE (COLEOPTERA) FROM SOUTHERN AFRICA WITH NOTES ON THE TAXONOMY OF AFRICAN ACMAEODERINI

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ABSTRACT

A new genus, *Brachmaeodera* Volkovitsh and Bellamy, is described for *Acmaeodera tantilla* Kerremans, which is redescribed, illustrated and discussed in comparison to the nominate subgenus of *Acmaeodera* Eschscholtz. It is contrasted with other taxa of Acmaeoderini Kerremans. Notes on the taxonomy of Ethiopian Acmaeoderini and evolutionary directions in these taxa are given.

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In his revision of Ethiopian *Acmaeodera* Eschscholtz, Holm (1978) included *Acmaeodera tantilla* Kerremans in the subgenus *Acmaeodera*. However, this species differs greatly from all described species of *Acmaeodera* and other tribal members by a number of character states which we view as highly derived and which will be discussed in detail below. These differences, as well as Holm's interpretation of the composition of Ethiopian *Acmaeodera* (*s. str.*), motivated our study of one unusual species and a further assessment of Ethiopian Acmaeoderini.

Material examined came from or is deposited in the following collections, with the acronyms as noted: BMNH, The Natural History Museum (British Museum of Natural History), London, U.K.; CLBC, C.L. Bellamy research collection; HAHC, H. F. Howden collection, Ottawa, Ontario, Canada; MNHN, Museum National d'Histoire Naturelle, Paris, France; NMPC, National Museum, Prague, Czechoslovakia; SANC, South African National Collection, Pretoria; SAMC, South African Museum, Cape Town; and ZIAS, Zoological Institute, Academy of Sciences, St. Petersburg, Russia.

## *Brachmaeodera* Volkovitsh and Bellamy, **new genus**

TYPE-SPECIES. *Acmaeodera tantilla* Kerremans (new designation).

Body short, robust. Frontoclypeus normal, not reduced. Antennae sexually dimorphic. Pronotum transverse with strongly curved lateral carinae. Elytra not longer than 2× basal width, with dorsal inflection; covered with broad squamiform setae; epipleura with shallow incisure ventral to humeri; irregular markings consisting of dark brown spots

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dispersed on brownish-yellow background. Prosternum with transverse mentonniere anteriorly; hypomeron strongly depressed, without distinct lobe posteriorly. Mesepimera and metepimera narrow, reduced. Metacoxal plate strongly broadened laterally, forming a large acuminate triangular projection which covers the metafemur and extends posterolaterally to partially cover the epipleural margin; visible from above laterally. Tibiae strongly spatulate, with incision on outer surface to receive tarsi in repose. Abdominal pleurites 1 and 2 separated from sternites by sharp carinae; visible from above laterally. Aedeagus of *Acmaeodera* (*s. str.*) type; basal piece of tegmen with deep scoop-like ventral apodeme (Figs. 3–5); median lobe trilobate distally, with isolated median portion; complete ventral membrane connecting apophyses in distal portion (Fig. 6); 9th tergite with apophyses fused medially (Fig. 9). Ovipositor of *Acmaeodera* (*s. str.*) type, urite-like (Fig. 11).

ETYMOLOGY. The new generic name combines the Latin root *brach* (short) with all but the first syllable of the generic root *Acmaeodera* to emphasize the significance of the shortened body form.

DISCUSSION. From comparisons of genitalic structure, *Brachmaeodera* is related to *Acmaeodera* (*s. str.*). It differs significantly from all known genera of Acmaeoderini by the combination of its small, robust body, strongly curved pronotal lateral carinae, the lateral margins of abdominal tergites being visible dorsally, the scoop-shaped basal apodeme of the tegmen and the specific structure of the median lobe. *Brachmaeodera* contains only the type-species, which is redescribed below.

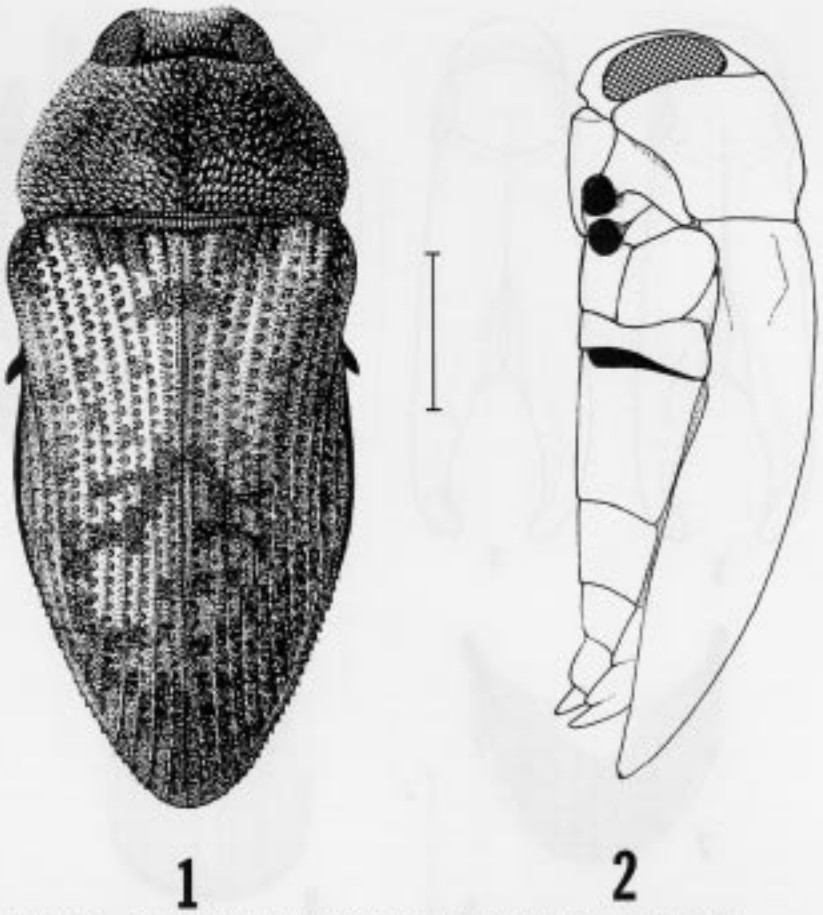
### *Brachmaeodera tantilla* (Kerremans), **new combination**
(Figs. 1–14)

*Acmaeodera tantilla* Kerremans 1906:376; Obenberger 1926*a*:91; Holm 1978: 45, 1985:154.
*Acmaeodera liliputana* Obenberger 1926*b*:94; Holm 1978:45 (syn. of *tantilla*).
*Acmaeodera minutissima* Théry 1926:126, 1937:85 (syn. of *tantilla*); Holm 1979:25 (syn. of *tantilla*).

Body small, markedly robust, convex with distinct but poorly marked dorsal inflection; length 3.60–4.80 mm, width 1.50–1.95 mm; black, often with bronzy or coppery sheen; elytral coloration with background yellow or ochre-yellow with brown, often vague, markings, partially contiguous, concentrating near base and on posterior ½; one longitudinal angular band extends to just past middle on either side; covered with white and brown squamiform setae.

HEAD broad, widely but not deeply depressed longitudinally. Front with feeble depression on ventral portion, more rarely completely depressed longitudinally, with sides nearly straight and slightly diverging to vertex. Vertex 1.85–2.08× as wide as transverse diameter of eye and 1.14–1.15× as wide as front above antennal depressions, sometimes with marked carina. Clypeus with wide arcuate median emargination anteriorly. Sculpture of vertex foveate, large deep punctures with inconspicuous inner surface; front with sculpture becoming reticulate, composed of deep umbilicate punctures, each with more or less marked granules and fine punctures. Surface covered with wide plumose scales that are strongly broadened distally. Antenna short, in male 1.7, in female 1.5× as long as eye height, with marked sexual dimorphism in their shape, broadened from 5th antennomere in both sexes. Antennomere 2 irregularly ovoid, feebly swollen; 3–4 subequal, irregularly rounded; 5 triangular; 6–10, in male strongly transverse, 1.5× wider than long, in female triangular, feebly swollen; 11 oblong, rounded.

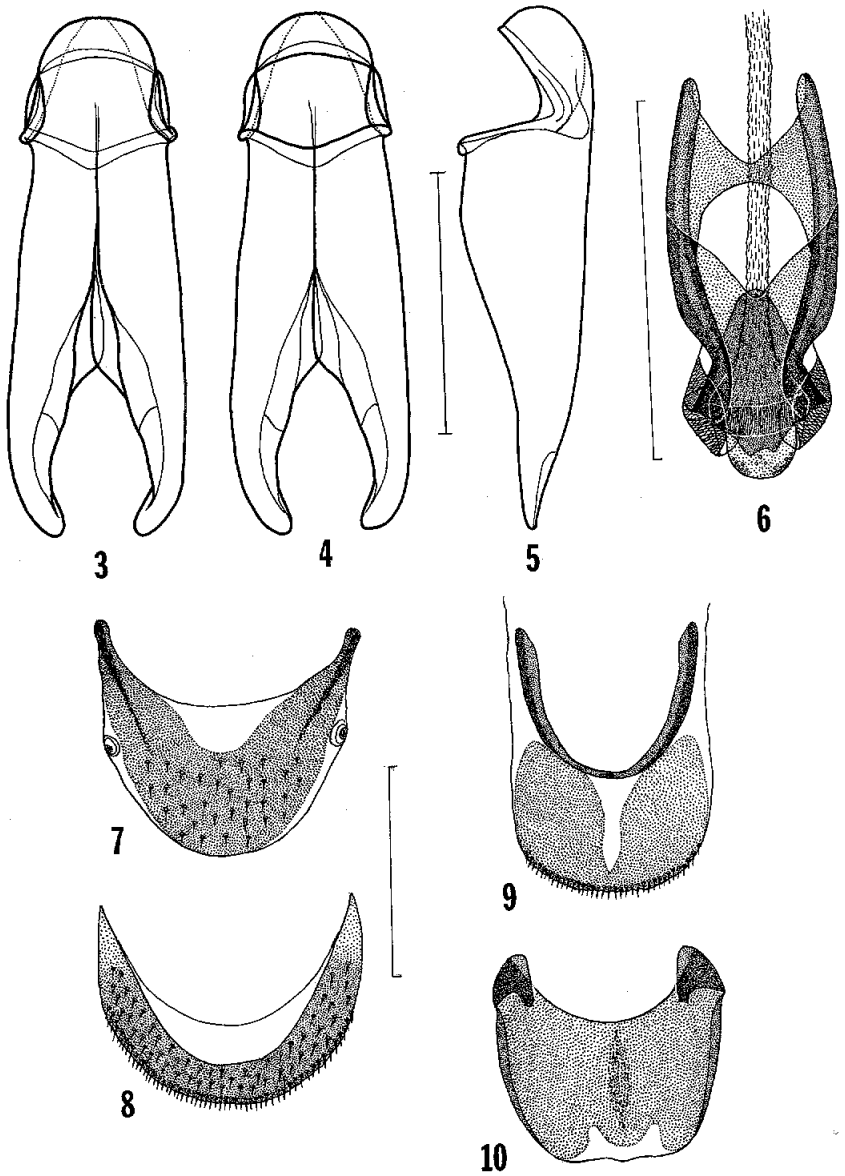
THORAX. Pronotum convex, strongly transverse, basal width 1.81–2.06× length, widest just posterior to midpoint or in posterior ⅓; sides sharply diverging from base to widest point, then feebly arcuate, strongly attenuate to anterior margin; basal margin straight. Lateral carinae distinct, extending from base to anterior ⅓, strongly arcuate on



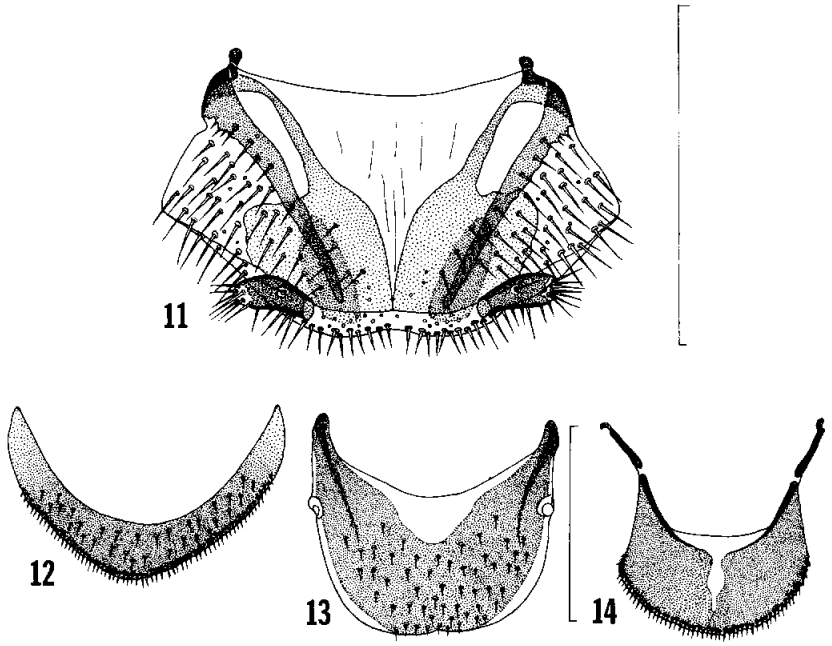
Figs. 1–2. *Brachmaeodera tantilla* (Kerremans), dorsal and lateral aspects.

posterior ½, crossing to hypomeron and not visible from above distally. Surface evenly convex with inconspicuous basal pits, slightly depressed along base and anterior margin; with simple punctation on disc, sides punctate-reticulate. Vestiture of disc with narrow, semi-erect, plumose, white and brown squamae; sides with more dense covering of very broad, white, decumbent squamae, which almost conceal integument. Prosternum with mentonniere, margin feebly arcuate or nearly straight; process broad, angular posteriorly, with apex widely rounded. Hypomeron with deep, broad, longitudinal depression laterally to receive antennae and legs in repose; posterior margin emarginate without distinct lobe. Thoracic sternites and metacoxal plates rugose to punctate-reticulate, densely covered with very broad white scales, which almost conceal integument.

ELYTRA broad, shortened, 1.84–2.12× as long as wide at base, strongly broadened at shoulders; sides weakly converging to anterior ⅓, then slightly diverging to posterior ⅓ and evenly arcuately converging to widely and conjointly rounded apices. Epipleura shallowly emarginate posterior to humeri, extending into shallowly arcuate projection, then becoming feebly arcuate; lateral margins with small inconspicuous denticles on posterior ⅓ and more or less conspicuous serrulations along last interval, sometimes visible up to anterior ⅓. Disc with striae formed by large, deep, rounded punctures, some




Figs. 3–10. Male genitalia and pregenitalic sclerites of *Brachmaeodera tantilla*. 3, parameres, ventral aspect; 4, parameres, dorsal aspect; 5, parameres, lateral aspect; 6, median lobe, dorsal aspect; 7, 8th tergite, dorsal view; 8, 8th sternite, ventral view; 9, 9th tergite, dorsal view; 10, 9th sternite, ventral view (scale lines = 0.5 mm).




Figs. 11–14. Ovipositor and female pregenital sclerites of *Brachmaeodera tantilla* (holotype of *Acmaeodera liliputana* Obenberger). 11, ovipositor, dorsal aspect; 12, 8th sternite, ventral aspect; 13, 8th tergite, dorsal view; 14, 9th tergite, dorsal aspect (scale lines = 0.5 mm).

fused into grooves on posterior ½; intervals flat, subequal in width to striae; 5th and 9th slightly elevated; 9th with indistinct denticles, each with inconspicuous uniseriate punctures on feebly rugose or shagreened surface; vestiture of white and brown plumose squamae.

LEGS. Metacoxae with hind margin widely arcuately emarginate or nearly straight, posterolateral portion projecting over metafemur and epipleura, visible from above. Protibia strongly spatulate; meso-, metatibiae widening distally, with distinct incision on outer surface to receive tarsi in repose. Femora with broad squamae; tibiae with narrow squamae and hair-like setae. Tarsomeres shortened, 4 very reduced; 5 thin, longer than 1–4 together; claws simple, thickened basally.

ABDOMEN. 1st and 2nd pleurites separated from their respective sternites by sharp carinae; lateral margins not covered by elytra, forming support for lower margin of epipleura, visible from above and covered with narrow squamae. Anal sternite short, evenly rounded, margin entire, bordered with fine groove in both sexes. Surface with simple punctures dense, covered with broad, round, decumbent squamae.

GENITALIA. Aedeagus (Figs. 3–6) with parameres rounded, inner margins arcuate; basal piece of tegmen with a single, very deep, scoop-like ventral apodeme; median lobe with trilobate apex and isolated middle portion, complete ventral membrane connecting apophyses basally; pregenital sclerites of segments 8 and 9 as in Figs. 7–10, with median fused apophyses in tergite 9. Ovipositor (Fig. 11) urite-like; pregenital sclerites of segments 8 and 9 as in Figures 12–14.

DISTRIBUTION. Botswana, Malawi, Namibia, South Africa (Natal, Transvaal), Zambia, and Zimbabwe. The description (Théry 1926) and subsequent

synonymical comments (Théry 1937; Holm 1979) on *A. minutissima* from Madagascar leave much doubt on whether this taxon is an established part of that island's fauna.

BIOLOGY. Larval hosts unknown. Holm (1978, 1985) records adult collections from "mosasa," *Vitex amboniensis* (Verbenaceae) and *Grewia* sp. (Tiliaceae). One of us (CLB) has most often encountered adults feeding on flowers or flying around flowering species of *Acacia*, including *A. karoo*.

TYPES. *Acmaeodera tantilla*, lectotype: Sebakwe, Rhodesia, 1902, D. Dods (SAMC) (not examined); paralectotype: Salisbury, IX.1898 (SANC) (not examined); *A. liliputana*, holotype, female: (Zimbabwe) Mashonaland (NMPC 19871); *Acmaeodera minutissima*, holotype: Madagascar (MNHN) (not examined).

MATERIAL EXAMINED. 1 male, **BOTSWANA:** Serowe SE 22 26 Bd, 30.IX.1984, P. Forschhammer (ZIAS); 1 ex., **ZAMBIA:** N. Rhodesia, Congo Zambesi, Watershed, 1928, Dr. H. S. Evans (BMNH); **SOUTH AFRICA:** 1 ex., E. boundary, Pafuri K.N.P., 22.XI.1973, J. Braack, on *Grewia* sp. (ZIAS); 4 ex., Transvaal, 500 m, Blyde River/18 km WSW Hoedspruit, S24.24, E30.47, 23.X.1983, C. L. Bellamy; 1 male, 22 km SE Thabazimbi, S24.43 E27.28, 8.XI.1985, 900 m, C. L. Bellamy; 3 ex., Sand River Mt. S24.32 E27.39, 10-12.XI.1986, 1100 m, C. L. Bellamy (all CLBC); 1 ex., Kruger N. Pk. Skukuza, 30.XI-3.XII.1984, H & A Howden (HAHC).

REMARKS. Until recently, political situations precluded expedient access to some of the type material listed above. Therefore, we accept without reservation the descriptions and synonymy used by Holm (1978) for this taxon. The respective structures of the male aedeagus, female ovipositor and the pre-genitalic sclerites are most similar to species of *Acmaeodera* (*s. str.*) as discussed below. According to Holm (1978), the aedeagus has a well developed dorsal apodeme, but this seems to be a mistake since such is not found in any known acmaeoderine species.

## DISCUSSION

Before discussing the taxonomic position of *Brachmaeodera*, it is necessary to consider briefly the classification of Ethiopian Acmaeoderini presented by Holm (1978). According to him, the *Acmaeodera* of sub-Saharan Africa consist of 116 species belonging to four subgenera, *Acmaeodera* (*s. str.*), *Ptychomus* Marseul, *Paracmaeodera* Théry and *Rugacmaeodera* Holm. We agree with Holm's opinion on composition and status of the three latter taxa but regard his definition of *Acmaeodera* (*s. str.*), which included *A. tantilla*, to be a wholly artificial polyphyletic taxon, an opinion expressed by Volkovitsh (1979).

In his original description of *Acmaeodera*, Eschscholtz (1829) included the following species: *Buprestis ornata* F., *B. cylindrica* F., *B. viridaenea* de Geer, *B. ruficaudis* de Geer and *B. flavofasciata* Piller and Mitterpacher. The type-species of *Acmaeodera*, thus accordingly of the nominate subgenus, was designated as *B. cylindrica* by Volkovitsh (1979). *B. ornata* was provisionally included in *Acmaeodera* (*s. str.*) awaiting revisionary studies of the Nearctic fauna. The three remaining species are currently placed as follows: *A.* (*Paracmaeodera*) *viridaenea*, *A.* (*Rugacmaeodera*) *ruficaudis* and *Acmaeoderella* (*Carininota*) *flavofasciata*. The only species known to us from the Ethiopian region which belong to *Acmaeodera* (*s. str.*) are *A. swammerdami* Obenberger from South Africa, and *A. pici* Obenberger and one undescribed species from Saudi Arabia. Holm considered the nominate subgenus of *Acmaeodera* to be

defined by the same species as Eschscholtz (1829), as well as two species that currently belong to *Paracmaeodera* and *Rugacmaeodera.*

In his original description of *A. tantilla,* Kerremans (1906) did not indicate relationship other than placement into the "Acmaeodera incisae" group, also defined in the same work for Old World *Acmaeodera* and the species now placed in *Atacamita* Moore from Chile. It was placed between Madagascan species with a broadened body (*e.g., A. sparsuta, A. atomosparsa, A. pruinosa* and *A. postfasciata,* all of Fairmaire) and several species currently considered to belong to *Xantheremia* Volkovitsh (such as *A. subscalaris* Reitter, *A. philistina* Marseul and *A. straminea* Abeille de Perrin.) In the key, it was placed in the couplet with *A. subscalaris.*

Holm (1978) placed *A. tantilla* in his key next to *A. fasciata* Roth, *A. flavipennis* (Klug) and *A. convoluta* (Klug). The latter three currently are placed in *Xantheremia.* He included all four in *Acmaeoderella* Cobos and regarded this taxon as no more than a species-group of *Acmaeodera* (*s. str.*). However, in discussing the putative relationships, Holm compared *A. tantilla* to *A. swammerdami. Acmaeoderella* (type-species *Buprestis discoidea* F.) is an exclusively Palaearctic taxon not distributed south of the Sahara. The external similarity of *Acmaeoderella* to Ethiopian *Rugacmaeodera,* Palaearctic-Ethiopian *Xantheremia,* as well as several taxa of New World Acmaeoderini (*e.g., Anambodera* Barr), is the result of parallel evolution of some structures (*e.g.,* clypeal shape, body sculpture, squamose vestiture) in these closely related groups (see Volkovitsh 1979). The main diagnostic character for distinguishing these taxa is the structure of male genitalia.

A significant majority of species of *Acmaeodera* (*s. str.*) sensu Holm actually belong to the subgenus *Acmaeotethya* Volkovitsh (type-species *Elater degener* Scopoli). Many of the species placed in this subgenus belong or are closely related to the *cisti* species-group, which is widespread in the Palaearctic and in southeastern Asia. In the Ethiopian fauna it is possible that several species comprise separate groups of *Acmaeotethya* or even distinct subgenera (*e.g., A. affabilis* Kerremans, *A. rubidiplagis* Obenberger, *A. grata* Fåhraeus, etc.). There is one undescribed species from Sudan which belongs to the mainly Indomalayan subgenus *Cobosiella* Volkovitsh (type-species *A. chotanica* Semenov-Tian-Shanskij).

The Ethiopian acmaeoderine fauna now includes the following taxa: *Brachmaeodera, Acmaeodera* (subgenera *Acmaeodera, Acmaeotethya, Cobosiella, Rugacmaeodera, Paracmaeodera, Ptychomus*) and *Xantheremia.* The latter three are regarded as the most derived groups, with species from the remaining taxa comprising minor elements of the whole fauna. *Acmaeoderella* is not known south of the Sahara, where it is replaced by *Rugacmaeodera.* The taxonomic position of the Madagascan species is not clear, but they apparently relate to *Rugacmaeodera.*

*Brachmaeodera* exhibits a unique combination of plesiomorphic (*e.g.,* general genital structure, simple claws), apomorphic (dorsal inflection, mentonniere, depression of hypomeron, reduced mesepimera, subhumeral elytral incisure, broadened tibiae with incisions to receive tarsi, squamose vestiture) and autapomorphic (markedly shortened body, strongly arcuate pronotal lateral carina, well developed lateral projection of metacoxa, broad margins of abdominal pleurites, and scoop-like basal apodeme of tegmen) character states. Predominance of apomorphic and autapomorphic character states is evidence of ancient age and range of divergence of *Brachmaeodera* from the basal lineage of *Acmaeodera.* This apparently preceded the divergence of the main branches

of 1) *Acmaeodera* (*s. str.*), the as yet unstudied and possibly polyphyletic Nearctic *Acmaeodera* and *Atacamita* and 2) "Acmaeodera incisae" (sensu Kerremans) (*e.g.*, subgenera *Palaeotethya* Volkovitsh, *Acmaeotethya, Cobosiella, Rugacmaeodera, Paracmaeodera, Ptychomus*), *Acmaeoderella* and *Xantheremia.*

The structure of the aedeagus of *Brachmaeodera* is more primitive than that of *Acmaeodera* (*s. str.*) and Nearctic *Acmaeodera.* Simple tarsal claws are thought to be the plesiomorphic character state for buprestids and this character state occurs rarely in some species of otherwise derived taxa (*e.g.*, several species of *Acmaeoderella*) as an apparent atavism or the "instauration phenomenon" of Emelyanov (1987). The above-mentioned apomorphies independently appear in different acmaeoderine taxa as a result of parallel evolution in closely related groups or as an offshoot of the general direction in the evolution of Acmaeoderini (*e.g.*, development and perfection of the peculiar acmaeoderoid type of flight, which is characterized by a functional two-winged character state; see Volkovitsh 1979). Adaptation to arid environments, another evolutionary trend in Acmaeoderini, is exemplified by development of squamose pubescence; this character state also appears independently in many taxa of Acmaeoderini.

In our opinion the origin and subsequent evolution of *Brachmaeodera* are connected with the perfection of acmaeoderoid flight on the basis of peculiar morphological structures not occurring in other groups of Acmaeoderini. The main evolutionary trend in acmaeoderoid flight is accompanied by a profound modification of the entire pterothorax, and by development of the dorsal inflection and subhumeral incisure, facilitating the functioning of the hindwings without requiring much elevation or upward locking of the fused elytra [*e.g.*, *A.* (*Paracmaeodera*), *A.* (*Ptychomus*) and *Acmaeoderella* (*Euacmaeoderella*) Volkovitsh]. In less derived groups, with poorly developed dorsal inflection and subhumeral incisure, it is necessary to lock the raised elytra during flight [*e.g.*, *Acmaeodera* (*s. str.*), *A.* (*Palaeotethya*), etc.]. Our observations show that this locking is accomplished by means of the lower elytra margin leaning against the tips of the retracted metafemora; these are in turn held by an incision of each metacoxa, which often bears a tooth. The metacoxae sometimes are visible from above but never cover the femoral apex. In *Brachmaeodera,* the lateral projection of the metacoxa and the wider margins of the abdominal tergites are used in this support function. Along with these autapomorphies there are apomorphies in *Brachmaeodera* which are common among Acmaeoderini, *e.g.*, dorsal inflection, subhumeral elytral incisure, mentonniere, incisions to receive antennae and legs, markedly broadened tibiae. We believe that the three latter characters apparently serve for an improvement of aerodynamical parameters of the beetles.

Following our planned study of the species groups of the New World Acmaeoderini, we plan to conduct a phylogenetic analysis for the entire subfamily in order to more properly elucidate the relationships between and within the tribes, genera and subgenera which are currently recognized.

ACKNOWLEDGMENTS

We are very grateful to R. L. Westcott, Oregon Department of Agriculture, Salem, and G. H. Nelson, College of Osteopathic Medicine of the Pacific, Pomona, California, and two anonymous reviewers for their critical review and many suggestions toward the improvement of the paper. We further thank Dr. Nelson for providing us with additional morphometric data from specimens in his collection. We would like to thank the following colleagues for the loan

of material for this study: Dr. S. Bily, National Museum, Prague; Dr. E. Holm, University of Pretoria; and C. M. F. von Hayek, The Natural History Museum, London. We also extend our appreciation to N. N. Fusejeva, Zoological Institute, St. Petersburg, for preparing the superb dorsal habitus illustration (Fig. 1).

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(Received 12 June 1991; accepted 8 August 1991)