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A REVIEW OF PALEARCTIC GROUPS OF THE TRIBE Acmacoderini (COLEOPTERA, BUPRESTIDAE)

M. G. VOLKOVICH (VOLKOVICH)

Members of the tribe Acmacoderini form a natural taxon that is morphologically well segregated from related groups. However, the study of this tribe is made very difficult by the lack of a taxonomic revision at the level required by present day systematics, by the paucity of diagnostic characters, and the extremely confused synonymy. Owing to the inadequacy of descriptions it is often impossible to form an idea of particular species and their systematic position. Hitherto there has been no consensus among researchers on the content and systematic status of the groups included in the tribe; some authors regard it as consisting of one genus.

Marseul (1865) distinguished a group of Ethiopian species in the genus Acmacodea, for which he established the subgenus Psychomus. The American authors Horn (1876) and Fall (1899), who based themselves on the structural characters of the anterior margin of the prothorax, the legs and the sculpture of the elytra, subsequently distinguished 6 groups of Neartic species. Kirbyman (1906) extended this classification to the Palearctic, Neotropic and Indo-Malayan members of the genus, most of which he included in a new group Incisea completely absent from the New World; species of the subgenus Psychomus formed a separate group. Consequently, the genus Acmacodea was divided into 8 groups - Oceifominae, Cylindrominae, Labrechini, Pachycestini, Incisea, Acmacodeinae and Psychomus, that, with the exception of the subgenus Psychomus, had no taxonomic status. Some American investigators continue to use the Horn-Fall system, although the classification is advanced based on variable characters having little weight. At the same time attempts have been made to distinguish natural groups, drawing on more reliable taxonomic characters. The following taxa are currently included in the tribe: Acmacoderini, Aescholzitz, 1829, Psychomus, Paracoderini, Acmacoderini, Microacoderini, Acmacoderini sp.; Anamaboda and Rupacoderini. Because the limits of these taxa are inadequately defined and many characters overlap, there are differences among present day students of the Buprestidae concerning the groups listed. For example, Cobos (1955) regards the taxa Acmacoderini and Acmacoderini subgenus as genera, Maseur (1969) treats Psychomus as a genus, but Paracoderini and Acmacoderini subgenus as genera of the genus Acmacodea; Holm (1978) treats Psychomus and Paracoderini as subgenera of the genus Acmacodea, and Acmacoderini as a group of species in the subgenus Acmacoderini.

In the period 1972-1978 we examined extensive material of the Palearctic and, to a lesser extent, the Indo-Malayan, Neartic and Ethiopian members of the tribe Acmacodea. A study of the type-specimens of nearly 150 species made it possible to detect previously undescribed species and to establish new synonymy (Volkovich, 1976a, b, 1977a, b, 1978). Evaluation of the accumulated data enabled us to draw conclusions on the classification of this group of the Buprestidae. In view of the impossibility of giving expanded descriptions of the taxa in the paper we shall refer to the works of the respective authors.

The author would like to express his deep gratitude to Doctor S. Bily, of the National Museum in Prague, Czechoslovakia (NMP), to Dr. A. Descarpentries, of the French National Museum of Natural History in Paris (MNHN), to Dr. G.H. Nelson, of the College of Geographers, Kansas City, USA, to Mr. S. Woltering, Microscope Laboratory, State University, East Lansing, USA and to other individuals who sent valuable material for study.

TAXONOMIC CHARACTERS OF BUPRESTIDS OF THE TRIBE Acmacoderini AND PARALLELS

Differences concerning the taxonomic composition of the tribe and the status of the groups incorporated in it are due to differences in the assessment of the taxonomic weight and should the main diagnostic characters overlap, they refer to intermediate species, disregarding the possibility of parallel evolution. No use is made of genital structure, and Holm (1978) even stresses that this character provides less information than external characters.

Thorough investigation of the morphology of the beetles has shown that most of the characters used in the classification of the Acmacoderini develop in parallel in different, frequently unrelated groups. The incision and refinement of a distinctive type of flight apparatus, which we shall describe as acmacoderoid, should be regarded as the main trend in the evolution of the Acmacoderini. This type of flight apparatus has some similarity to the oryctoid type (Schneider, 1978), but its establishment was accompanied by profound morphological modifications affecting the entire pterothorax, and by a different mode of folding of the wings. The elytra are closely aligned along the suture in the Acmacoderini and form a single morpho-functional complex with the mesonotum, a complex of limited mobility relative to the other elements of the pterothorax, and one that forms a kind of protective casing. In the course of refinement of the flight apparatus and the development of a distinctive type of flight in the Acmacoderini, nearly every species has changed the shape of the body (Figs. 9-11); we should note, in particular, the appearance of a dorsal inflection (Fig. 10, 6-1), reduction of the epipleurs of the elytra and the development of an inflection or concavity on the hind edges of the elytra, the development of a collar on the pronotum and of recesses to house the antennae and the legs, reduction of the mesopleura and development of other adaptive formations. There are also other evolutionary characteristics and associated modifications on the elytra (the formation of a scaly cover), pollinophagy (modification of mouth parts and appearance of pharyngeal processes in the fore gut), development of sexual dimorphism (appearance of secondary sexual characters in both sexes). Consequently, most of the external characters are closely related to the adaptive nature and function of these evolutionary characters or sets of correlated characters develop in parallel owing to existence under extremely similar conditions. The parallel development of some characters not of obviously adaptive importance clearly follows Varvill's law of homologous series (1865). We may take as examples of such parallelism, due apparently in the main to the shared properties of the genotype, the similar states of the adeagus in Neartic species of the genus Acmacoderini and Palaearctic species of the genus Acmacoderini, the similarity of the clypeus in Neartic species of the genus Anamaboda and Palaearctic species of the genus Acmacoderini, and also the occurrence of similar systems of markings in the different groups. On the other hand, some structural characters of the adeagus, in particular the elongation of their components, may be due to elongation of the genital tract of the female owing to elongation of the ovipositor (a result of specialization); markings may also be functions of significant adaptive importance, following Glover's rule.

It was predominantly the structural characters of the genitalia that were used by us in constructing the classification. Although adaptive features are often to be noted on the ovipositor, structure and although various specialized forms are observed which, apparently detract from the taxonomic weight of a given character, it is sometimes possible to establish comparatively morphological series distinct in only one particular taxonomic character. Thus in a short article-like ovipositor (Figs. 74-77) to a long tubular ovipositor (Figs. 80-83), due, in our opinion, to transition from laying eggs in the surface of the substrate to laying eggs in cracks and crevices in the bark, axes, etc., a feature of most groups. Specialized forms may arise at any stage in this transition. We may include among them the ovipositors of Acmacodea quadrivittata, A. wethoi, Acmacodera albilhirs (Fig. 84), A. insignis, etc. However, the ovipositors of members of the...

Figs. 26–33. *Acmadonini* (*Acmaeodera*), male genitalia.

Nearctic genus *Acmadonopsis* and of the Palearthic-Ethiopian genus *Xanthemia*. (Fig. 7, see also Volkovitch, 1978) form a specific comparative morphological series. The structure of the sdeagus is more conservative; several structural types typical of individual phylogenetic trends of the tribe *Acmadonini* may be distinguished. Since we are unable here to demonstrate the comparative morphological series of the state of the sdeagus in this tribe originate from types similar to those noted in species of the subgenus.
Acmaeodera, especially of the elater, pulchra and cecropia groups (Figs. 26-33). In distinguishing types and shapes of aedeagus we concentrated on the structure of the penis.

When erecting taxa it is also essential to consider their ranges. Most species and groups of the tribe Acmaeoderae have fairly narrow ranges. Species of the tribe in the Palearctic are mainly confined to the Mediterranean subregion of the Hesperian (Mediterranean-Mauretanian) evergreen forest region and the Afghan-Turanian subregion of the southern (Saharan-Gobi) desert region (in our paper we employed the division of the Palearctic and the nomenclature of ranges proposed by Yemel'yanyov (1974)). Certain species that have the widest ranges penetrate into the European meromor and the Soviet steppe regions. The scanty fauna of the West Orthorian subregion of the Orthorian evergreen forest region (Himalayan-South Chinese-South Japanese), containing endemic species of an obviously relict nature that possibly existed from the Pilociene (Acmaeodera yunnana), is extremely interesting. Most species are associated with types of vegetation that may be described as xerophilian open woodland; many members of the genus Acmaeodera also develop on herbaceous vegetation.

In referring to what may be called "intermediate" forms, it should be noted that Holm (1976) places some Ethiopian species of the tribe Acmaeoderae in the genus Acmaeodera (a species group according to Holm) and regards them as transitional between Cephalan species of the signata group of the genus Acmaeodera and Palearctic species of the genus Acmaeodera; the similarity is based on external morphological characters, without employing genital structure. Some of these species probably belong to the subgenus Hugacmaeodera of the genus Acmaeodera. Although the external similarity between Hugacmaeodera and Acmaeoderae is in fact very great by virtue of the parallel development of a number of characters, they are readily distinguishable by the structure of the male genitalia. A. flavopinna, A. straminea and A. fasciata are placed in the new genus Xanthemera. In the structure of the aedeagus, which has two apodemes, and in certain other characters Acmaeoderae tantilla differs greatly from all known members of the tribe Acmaeoderinae and it is possible that a separate genus must be established for this species. Consequently, judgements concerning similarity based on an incomplete study of external characters may lead to mistakes owing to the parallel evolution of such characters.

THE CLASSIFICATION OF PALEARCTIC MEMBERS OF THE TRIBE ACMAEODERINAE

We must first solve the question of the type-species of the genus Acmaeodera. Eschscholtz (1829), who described the genus, included 15 species in it: A. viridipes, A. flavofasciata, A. ruficornis, A. ornata and A. cylindrica. In the subsequent erection of taxa of various rank no type-species was designated for the nominate subgenus. Since the first 3 species are now incorporated in other taxa, we designate Hugacmaeodera cylindrica as the type-species of the genus Acmaeodera (type by subsequent designation).

Genus ACMAEODERA

Eschscholtz, 1829: 9.

Aedeagus depicted in Figs. 26-38, 43-52; apophyses of penis short in most instances and undifferentiated; inner folds only occasionally merging apically and forming a cone. Clypeus (Fig. 33) not reduced, broad, with a deep notch in front. Mesepimeron prominent. Pubescence consisting of hairs and setae, occasionally scales. A more detailed description is given when the subgenera and species groups are described.

Subgenus ACMAEODERA

Aedeagus depicted in Figs. 26-33; lamina (Fig. 33, 1) usually large and broad; 9th sternite with membranous areas on anterior margin in most species (Fig. 67), apophyses

*Translator's note. This in fact includes the East Orthorian subregion in Yemel'yanyov's classification.

Figs. 34-42. Acmaeoderae, male genitalia.

34) Acmaeodera (Liposcelis) italobonii, aedeagus (holotype, NMP); 35-36) A. (Liposcelis) scylla; 37) tegmen; 38) penis; 39-40) Pseudacmaeodera longicornis; 41) tegmen; 42) penis.

of 9th tergite isolated (Fig. 66). Orvotisor (Figs. 74-77) write-Ilo, sometimes greatly modified. Body flattened or terete (Fig. 9), sometimes with expressed dorsal projection (Figs. 10, d.i.), sides of pronotum often with strong projections to behind the middle or in the posterior third; posterior margin of hypomerae strongly curved (Fig. 13); body surface covered with umbilicate punctures, often forming reticulate sculpture with concentric rings, less frequently isolated umbilicate punctures; pubescence consisting of hairs and setae. Epipleura of elytra straight or basally slightly curved (Figs. 1, 2), without

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Male unknown. Ovipositor urate-like, greatly modified (Volkovitch, 1977b). Body elongated, flattened (Fig. 9). Sides of prothorax rounded, surface covered with umbilicate punctures forming reticulate sculpture, without rugae and with short suppressed hairs. Epipleura of elytra with a slight inflection in anterior third (Fig. 1); teeth of lateral margin smooth. Elytra dark brown, with light longitudinal stripes; elytra covered with very short inclined setae. Hind coxae with a blunt tooth. Tarsal claws with a small basal tooth. Turkestanian Province of the Iranian-Turanian subregion of the Sibthian region.

Composition: A. inquirenda

elater Group

Aedeagus depicted in Figs. 30–31 (see also: Volkovitch, 1976b); penis weakly sclerotized, with large laminae. Ovipositor depicted in Fig. 74. Body elongate, slender, flattened (Fig. 9). Antennae of males longer and more strongly broadened than those of females. Pronotum broadened in posterior third; covered with frequent umbilicate punctures forming reticulate sculpture, less frequently superficial cells, without concentric rugae; pubescence consisting of erect and inclined setae and suppressed hairs. Epipleura of elytra practically straight (Fig. 1); lateral margin slightly crenulated from the middle of the elytra. Elytra dark brown or light brown, unicolored, or with indistinct spot broadening rearward. Teeth of hind coxae often long and sharp, apparent from above. Claws bearing small teeth, identical in both sexes. Mediterranean subregion of the Hesperian region, Gobi Province of the Central Asian subregion of the Sibthian region.

Composition: A. elater, A. damaea, A. melvedovi.

cercropia Group

Aedeagus depicted in Figs. 28, 29. Female not known to the author. Body slender, terete. Sides of prothorax almost regularly rounded; its overall width greater than the length. Epipleura of elytra acutely curved under the humeri (Fig. 10); lateral margin slightly crenulated in posterior third. Elytra light brown, with large dark brown spots broadening rearward. Teeth of tarsal claw in male reaching apex of claw (Fig. 16). Eastern Mediterranean Province of Mediterranean subregion of Hesperian Province.

Composition: A. cercropia.

pulchra Group

Aedeagus depicted in Figs. 26, 27 (see also: Cobos, 1958); parameres with sharp projections on inner margin; penis weakly sclerotized, with a large lamina. Ovipositor urate-like. Body squaR, flattened (Fig. 9). Sexual dimorphism is expressed in antennal structure. Sides of prothorax abruptly widened in posterior third; surface covered with fine umbilicate punctures, less frequently cells, without concentric rugae; pubescence consisting of erect and inclined hairs and setae. Epipleura practically straight in anterior third (Fig. 1); lateral margin sometimes bearing strong subulate teeth (Fig. 21), more often small teeth (Fig. 22); markings of elytra greatly varied. Teeth of hind coxae weakly developed in some species. Teeth of tarsal claws larger in males than in females. Mediterranean subregion of Hesperian region, Tethyan Province of Saharan subregion of Sibthian region.

Composition: A. pulchra, A. reevleri, A. rufocincta, A. santeliebra, *A. morales,*

*An asterisk designates species not known to the author.

incision; shape of teeth on lateral margin variable. Elytra with markings or unicolored. Hind coxae almost invariably bearing a tooth on outer margin. Tarsal claws with strong teeth. Mediterranean subregion of Hesperian region, West Ortheian subregion of Ortheian region, Sibthian region.

The subgenus incorporates several groups, including monotypic groups. These groups usually occupy isolated ranges and are apparently the remains of lines becoming extinct. We should emphasize the external similarity of some of them to Neartic groups that contain a large number of species at the present time.
semenovi Group

Male unknown. Ovipositor depicted in Fig. 77. Body squat and flattened (Fig. 9), black; elytra black-brown; covered above with long wavy black hairs, below with white and blackish straight hairs; pronotum transverse, with regularly rounded sides, wider in the middle; sculpture consisting of very frequent umbilicate punctures, devoid of rugae. Epipleura of elytra straight in anterior third (Fig. 1); lateral margin with weak teeth in posterior third. Suture and 9th interval of elytra slightly carinately upraised. Hind coxae without a tooth. Claws with a perceptible basal tooth. Yunnan Province of West Orhbian subregion of Orhbian region.

A. semenovi

This species is externally reminiscent of some Nearctic species, for example A. resplendens. In the structure of the ovipositor, the shape of the body, the sculpture of the pronotum and the punctuation of the elytra it may be confused with members of the elater and pulchra groups, from which it is distinguished by the shape of the pronotum and the long wavy pubescence.

cylindrica Group

Aedeagus depicted in Figs. 32, 33 (see also: Cobos, 1959); parameres lacking noticeable projections on inner margin; penis strongly sclerotized, lamina (Fig. 33, 1) triangular, often greatly reduced. Ovipositor urate-like (Fig. 16), sometimes greatly modified. Body broad, squat, flattened or with slightly apparent dorsal inflection. Sexual dimorphism in antennal structure is not manifested in all species. Sides of pronotum broadened in posterior third or slightly to rear of middle, sometimes with strong projections; surface covered with umbilicate punctures usually forming reticulate sculpture, often with concentric rugae. The pubescence consists of confused erect and inclined hairs, less frequently short appressed and inclined hairs. Epipleura straight or slightly curved in anterior third (Figs. 1, 2) teets on lateral margin, small and blue, occasionally sharp, serriform (Fig. 21). Markings and pubescence of elytra extremely similar to those of A. semenovi. Hind coxae usually bearing a sometimes barely perceptible tooth. Claws almost most identical in the two sexes, except that in the female, the elytra the claw tooth of the male is far larger than that of the female (Figs. 14, 15). Mediterranean subregion of Hesperian region, Iranian-Turanian subregion of Sethian region.


yunnana Group

Male unknown to the author. Ovipositor depicted in Fig. 75. Body squat, with marked dorsal inflection (Fig. 10). Pronotum lacking lateral projections, basally broadened; covered with umbilicate punctures forming reticulate sculpture on sides and thinned on disc, devoid of rugae; pubescence consisting of short appressed whitish and inclined brownish hairs. Pronotum of elytra noticeably curved in anterior third (Fig. 10); lateral margin with strong sharp teeth in posterior third (Fig. 21). Hind coxae without a tooth. Tarsal claws with a strong tooth. Yunnan Province of West Orhbian subregion of Orhbian region.

Composition: A. yunnana.

Subgenus LOEPOTETHYA

Aedeagus depicted in Figs. 35, 36; parameres long and narrow; penis weakly sclerotized, with incisiform cone and fine rodlike lamina; chamber of ductus ejaculatorius small; apophyses relatively well differentiated; 5th sternite uniformly sclerotized and colored, apophyses of 5th tergite fused (Fig. 69). Female not known to the author.

Body squat, terete, with perceptible dorsal inflection (Fig. 11). Sides of pronotum lacking projections; posterior margin of hypomerae strongly curved (Fig. 12); surface covered with umbilicate punctures forming reticulate sculpture and without concentric rugae; sides with broad yellow stripes; pubescence consisting of long erect black hairs. Epipleura of elytra strongly curved beneath humeri (Fig. 5); lateral margin bearing sawlike teeth from the middle onward. Elytra with markings consisting of transverse yellow bands and separate spots, covered with long straight black hairs. Hind coxae without a tooth. Tarsal claws with a strong tooth. Yezdavine Province of Iranian-Turanian subregion.

Type species of subgenus, Amaeoderma ocellata.

A. ocellata.

In claw structure, body shape, pubescence and certain structural details of the aedeagus this species, forming the subgenus Loepotethya, resembles Nearctic species similar to A. palchella; however, A. ocellata may be confused with members of the subgenus Palaeotethya on the basis of the sculpture of the head, pronotum and elytra, the shape of the clypeus and other characters.

Subgenus Palaespethya

Aedeagus depicted in Figs. 37, 38 (see also: Cobos, 1959); apophyses of penis differentiated, relatively long, lamina narrow; terminal segments of abdomen as in A. ocellata. Ovipositor tubular, of variable length. Body terete or flattened, lacking dorsal inflection. Sexual dimorphism is manifested in antennal structure. Pronotum lacking lateral projections; sculpture of head and pronotum consisting of umbilicate punctures giving way on pronotal disc to simple punctures and strong concentric rugae; posterior margin of hypomerae strongly curved (Fig. 12). Epipleura of elytra with weak, barely perceptible incision or inflection at lateral margin and small, lateral margin with weak inconspicuous teeth in posterior third. Markings of elytra rather varied; unicolorous dark species abundance. Hind coxae with a sharp tooth or small projection on posterior margin. Tarsal claws with small teeth, except that in the female, elytra the claw tooth of the male is far larger than that of the female (Figs. 14, 15). Mediterranean subregion of Hesperian region, Iranian-Turanian subregion of Sethian region.


rubromaculata Group

Aedeagus depicted in Figs. 37, 38; penis without a sclerotized area on dorsal surface; apophyses long and differentiated. Pronotum convex; lateral carinae barely traceable in basal half; pubescence of head and pronotum short, apressed, less frequently inclined (A. nigella). Markings bispotted, usually consisting of irregular bands and spots, less frequently elytra dark, unicolorous or with regular longitudinal stripes. Hesperian region.


bispotted Group

Penis with a small sclerotized area on dorsal surface; apophyses relatively short, weakly differentiated. Pronotum convex; lateral carinae barely traceable in basal half. Pubescence of head and pronotum fairly long and erect. Markings consisting of longitudinal rows of regular or blurred spots, less frequently elytra dark, without markings. Mediterranean subregion of Hesperian region.

Composition: A. bispotted, A. guillebeau.
Aedeagus in as members of the previous group. Pronotum flattened, lateral carina traceable to anterior angles; sides of pronotum covered with appressed hairs, head and pronotal disc with erect and inclined hairs and setae. Markings of elytra consisting of a longitudinal row of regular rounded yellowish spots. Western Mediterranean province of Hesperian region.

Composition: A. alicricea.

Subgenus ACMAEOTETHYA

Aedeagus depicted in Figs. 49-50 (see also: Cobos, 1958); a detailed account is given in the descriptions of the groups. Ovipositor tubular, long. Body elongate, flattened, without dorsal incision (Fig. 9). Sides of pronotum without projections; posterior margin of hypomeres practically straight (Fig. 13). Head covered with frequent umbilicate punctures, pronotum with umbilicate and raduliform punctures forming a superficial network, usually with strong concentric rugae on the sides and simple punctures on the disc. Epipleura of elytra with a prominent shallow incision beneath humeri (Fig. 5); lateral margin with weak teeth in posterior third. Pubescence of upper surface consisting of hairs or short setae, that of lower surface consisting of fine hairs. Markings of elytra consisting of spots and bands; species and aberrations with unicolorous dark elytra are known. Hind coxae with straight posterior margin, without a tooth. Tarsal claws with a small blunt tooth, less frequently with a long sharp tooth. Canaries province of Malagorean subregion. Mediterranean subregion of Hesperian region; West Oriental subregion of African region; Hesperian-Turanian subregion of Arabian region. Some species penetrate into the Saharan subregion of the Saharan region and into the European and Scythian regions.

Type-species of subgenus, Elyter degener.

In general size and in a number of other characters the Capitan signata group (Holm, 1978) is similar to the Aedeagidae subgenus Palaeotethya and Acmaeotethya (especially members of the cisti group); all these groups are probably of common origin. The species group is, in our view, to be treated as a separate subgenus.

CISTI GROUP

Aedeagus depicted in Figs. 45, 46; 8th sternite uniformly sclerotized and colored (Fig. 69); apodeme of tegmen apically narrowing abruptly; apophyses of penis usually long, lamina thin; hypomeres without membranous external areas. Head and pronotum covered with short appressed and inclined hairs. Tarsal claws not broadened. Canaries province, Malagorean subregion, Hesperian region; West Oriental subregion, Saharan province, Saharan subregion, Hesperian region; Eastern Mediterranean province, Mediterranean subregion, Hesperian region; Hesperian-Turanian subregion, Saharan region. Some species are found in the Indo-Malayan region.


TROQUIL GROUP

Male genitalia not investigated. Head and pronotum covered exclusively with appressed hairs. Pronotum rounded, convex, with no traces of a longitudinal groove or line, with barely perceptible impression of the base; sculpture consisting of very frequent simple punctures. Eastern Mediterranean province, Mediterranean subregion, Hesperian region; Hesperian-Turanian subregion, Saharan region.

Composition: A. biloba, A. troqui.

PALLIDDEPIETA GROUP

Aedeagus depicted in Figs. 47, 48; 8th sternite uniformly sclerotized and colored (Fig. 69); apodeme of tegmen apically narrowing appreciably; apophyses of penis short, lamina (Fig. 48, 1) broad; hypomeres with apical marginal membranous areas. Pubescence consisting of appressed and inclined hairs and setae. Fore tibiae scarcely broadened apically. Khorasan Province, Iranian-Turanian subregion, Saharan region.

Composition: A. paliodepicta.

degener GROUP

Aedeagus depicted in Figs. 49, 50; 8th sternite uniformly sclerotized and colored (Fig. 69); apodeme of tegmen apically narrowing abruptly; apophyses of penis very short, lamina entirely or almost entirely reduced; hypomeres with apical membranous areas on the outside. Head and pronotum disc bearing long wavy hairs in many species. Most (but not all) species have fore tibiae noticeably broadening apically, Hesperian-Turanian subregion, Saharan region; Western Oriental subregion, Hesperian region; Hesperian-Turanian subregion, Saharan region.


OTTOMAN GROUP

Aedeagus depicted in Figs. 43, 44; 8th sternite with membranous areas on anterior margin (Fig. 67); apodeme of tegmen scarcely narrowing apically; apophyses of penis very short, lamina entirely or almost entirely reduced; hypomeres apically with membranous areas on the outside. Head and pronotum disc bearing long wavy hairs in many species. Most (but not all) species have fore tibiae noticeably broadening apically, Hesperian-Turanian subregion, Saharan region; Western Oriental subregion, Hesperian region; Hesperian-Turanian subregion, Saharan region.


SUBGENUS LISPERGELUS

Aedeagus depicted in Fig. 36; similar in structure to the aedeagus in the cisti group. Posterolateral margins of hypomeres practically straight (Fig. 13) head and pronotum covered with appressed hairs. Elytra with irregular yellowish longitudinal stripes. Fore tibiae with strong teeth on anterior margin (Fig. 20). West Oriental subregion, Saharan region.

Type-species of subgenus, Acmaeodera Jakobsani.

Composition: A. jakobsani.

SUBGENUS COBOISELLA

Aedeagus depicted in Figs. 51, 52; penis weakly sclerotized, with a weakly expressed cone in anterior part; terminal abdominal segments as depicted in Figs. 69, 70. Elongated, slender, with noticeable dorsal incision (Fig. 10). Head and pronotum with round umbilicate punctures, without concentric rugae; posterior margins of hypomeres practically straight (Fig. 13). Epipleura of elytra with a deep incision beneath humeri (Fig. 6); lateral margins with sharp serriform teeth (Fig. 21). Markings usually consisting of a marginal stripe on the anterior half of the elytra; in some species this stripe bends toward the apex from the middle; irregular spots are also sometimes present. Hind coxae without a tooth on outer margin. Tarsal claws with a sharp slender apical tooth sometimes reaching the distal end of the claw. (Fig. 16). Under-surface, at least on thorax, covered with branching hairs giving way in some species to branching scales; such hairs are occasionally found on the pronotum; dorsum covered with white short appressed hairs.
The only Paleartic member of the subgenus, *A. chotani*, is found in the South Turanian and Tauric provinces of the Iranian-Turanian and Central Asian subregions, Sashian region; the other species are found in the Indo-Malayan Kingdom.

Type-species of subgenus, *Acmaeoderia chotani*.

Composition: *A. chotani*, *A. luronica*, *A. stictipennis*, *A. interrupta*, *A. indica*, *A. beharica*, *A. rondoni*, *A. somalica*.

Species incerta sedis: *A. morio*, *A. twitter*, *A. brunneipennis*, *A. coluber*, *A. gracilis*, *A. becaeni*, *A. gardneri*.

**Genus MICROACMAEODERA**

Cobos, 1966: 310 (subgenus).

Aedeagus depicted in Figs. 39, 40; on the upper part of the penis there is an area that is probably homologous to the cone; lamina broad, shifted to lower half of aedeagus; apophyses long and differentiated; 8th sternite uniformly sclerotized and colored; 9th tergite very narrow, with fused apophyses. Ovipositor tubular, very long. Body small (body length 2.9–4.4 mm), elongate, slender, with prominent dorsal inflection (Fig. 10). See also: Cobos, 1966. Clypeus not reduced. Antennae of male half as long as the body, those of female reaching anterior margin of metathorax; segments greatly elongated, broadening from 3rd segment outward. Pronotum with uniformly rounded sides, without basal impressions; posterior margins of hypomeres strongly curved (Fig. 12); sculpture of elytra with short, distinct, rounded punctures; elytra with short, faint, indistinct lines. Male terminalia: legs slender; tibiae not broadened; tarsal claws with small teeth. Male genitalia: black, without metallic luster; elytra with short, inclined plates, remaining surface with short, appressed whitish and brownish hairs. Himalayan Province, West Orharian subregion, Orharian region.

Type-species of genus, *Acmaeoderia longicornis*.

Composition: *A. longicornis*.

**Genus Xantheremia**

Aedeagus depicted in Figs. 41, 42 (see also: Volkovich, 1978; Holm, 1978); apodeme of tegmen very long and narrow; penis weakly sclerotized, lamina greatly reduced, apophyses long, differentiated; 8th sternite uniformly sclerotized and colored, 9th tergite with fused apophyses. Ovipositor depicted in Fig. 78 (see also: Volkovich, 1978). Small, flattened or with prominent dorsal inflection (Fig. 10). Clypeus not reduced; vertex with prominent longitudinal carina. Antennae short, slightly broadened from 5th segment outward. Pronotum broadened basally; posterior margin of hypomera strongly curved (Fig. 12). Sculpture consisting of frequent umbilicate punctures giving way to longitudinal striations, or with concentric grooves bearing traces of punctures on the disc. Epipleura of elytra with strong notch beneath humeri (Fig. 7); lateral margin of elytra. Hind coxae without a tooth on outer margin. Legs slender, tibiae not broadened. Tarsal claws with long blunt or sharp teeth (Fig. 15). Elytra yellowish or reddish, with irregular dark spots sometimes merging to form broad, 'brownish' stripes; less frequently unicolorous; pronotum occasionally with yellow spots on sides. Body covered with scales. Sashian region (apart from Central Asian subregion).

Type-species of genus, *Acmaeoderia koenigi*.

Because of external similarity, some authors include species of the genus *Xantheremia*, in the genus *Acmaeoderella*. However, the species of each of these genera are typified by separate comparative morphological series of the aedeagus and in the ovipositor. In this respect *Xantheremia* may be considered with members of the Nearctic genus *Acmaeodera*, from which *Xantheremia* is distinguished by the presence of a notch on the epipleura, the lack of secondary sexual characters in females, the surface sculpture and other characters. The similarity in the comparative morphological series of the genitalia probably arose as a result of parallel evolution. Members of the new genus are distinguished from other taxa of the tribe *Acmaeoderini* by genital structure; the sculpture of the pronotum and the shape of the claws. Owing to the poor state of investigation of members of the subgenus we shall confine ourselves to an indication of the species groups.

**koenigi Group**

Volkovich, 1978: 34.
Lateral margins of clypeus strongly angularly broadened (Fig. 24). Body flattened, with very weak dorsal inflection. Prothorax covered with umbilicate punctures, sometimes giving way to fine longitudinal cicatrices. Iranian-Turanian subregion, Sethian region.

Composition: *X. loricig*, *X. subascaris*, *X. steinberg*, *X. chrysina*.

**flavipennis Group**

Lateral margins of clypeus pointed (Fig. 25). Body usually with strong dorsal inflection (Figs. 10, 11). Pronotum covered with fine concentric grooves. Saharan subregion, Sethian region, Ethiopian Kingdom.

Composition: *X. flavipennis*, *X. strophina*, *X. philatina*.

Holm (1978) regards *X. strophina* as a subspecies of *X. flavipennis*, but these forms are independent species by genital structure.

**fascista Group**

Lateral margins of clypeus pointed (Fig. 25). Body with barely perceptible dorsal inflection. Side of pronotum covered with cells, disc with raduliform punctures. Ethiopian Kingdom.

Composition: *X. fascista*.

**Genus ACMAEODERELLA**

Cobos, 1955: 5.

Aedeagus depicted in Figs. 53-66; apodeme of tegmen broad; penis strongly sclerotized, inner folds merging apically, forming a cone; lamina large, apophyses long, differentiated; 8th sternite uniformly sclerotized and colored (Fig. 69). Ovipositor depicted in Figs. 78-84, tubular, its length varying greatly from species to species; highly specialized forms are found; *A. insignis* has a strongly modified urite-like ovipositor (Volkovich, 1977b). Body terete, usually with strong dorsal inflection (Fig. 25), less frequently without. Clypeus greatly reduced (Fig. 25). Sexual dimorphism often manifested in antennal structure. Shape and sculpture of pronotum highly variable; the pronotum may have umbilicate and simple punctures or cells; a combination of all these elements is often to be seen. Mesepimeron completely reduced. Hypomerae with curved posterior margin. Epipleura of elytra with a strong and deep notch (Fig. 8); lateral margin with barely perceptible teeth. Hind coxae without teeth on outer margin. Tarsal claws bearing teeth (Figs. 16, 17). Legs frequently simple (Fig. 19). Color highly variable; unicolorous dark aberrations are found in many species with markings on the elytra. Markings usually consisting of irregular merging yellow or orange spots, stripes and bands; unicolorous aberrations are black or black-brown. Species of the subgenus *Euacmaeodera* are typically copper-brown, brown, copper-red or blue with a strong metallic luster; such structural coloration is also highly variable. The pubescence consists of scales of various shapes, sometimes mingled with setae; in some species the scales completely cover the body surface. Canaries Province, Makaronesian subregion; Mediterranean subregion; Lusitanian region; Sethian region (except for the greater part of the Central Asian subregion); some species penetrate into the European and Sibthian regions.

Type-species of genus, *Buprestis discoides*.

**Subgenus LIOGASTRIA**

Aedeagus depicted in Figs. 61, 62; parameres sometimes broadened in anterior half; apophyses of penis relatively short. Ovipositor depicted in Fig. 62; stylus usually widely separated, ventral hemisternites not reaching distal end of ovipositor. Body squatt, with or without a slight dorsal inflection. Sexual dimorphism is prominently expressed in antennal structure. Pronotum without basal carinae, more or less transverse, covered...
with cells or frequent simple punctures. Elytra with markings consisting of alternating light and dark stripes; we do not know of completely dark forms. Body with lanceolate scales not entirely covering the undersurface. First apparent abdominal sternites of female without clusters of small punctures or impressions in the middle. Claws simple or with a tooth. Canaries Province, Makaronesian subregion; Mediterranean subregion, Hesperian region; Kurs-Araks and Levantine provinces, Iranian-Turanian subregion, Sthenian region.

Type-species of subgenus, Buprestis virgulata.

Owing to the poor state of investigation of members of the subgenus we shall confine ourselves to its provisional division into two groups on the basis of claw structure.

**virgulata** Group

Tarsal claws with a basal tooth (Fig. 17).


**elegans** Group

Tarsal claws simple (Fig. 19).


Subgenus ACMAEODERELLA

Aedeagus depicted in Figs. 59, 60 (see also: Cobos, 1958); apophyses of penis long. Ovipositor depicted in Fig. 63; stylus converged, ventral hemisternites reaching distal end of ovipositor; features of specialization are to be seen in some species. Body stout, with weak dorsal inflection. Sexual dimorphism is prominently manifested in antennal structure. Pronotum without basal carinae, covered with cells and with simple punctures on disc. Markings consisting of alternating dark and light stripes; elytra often black or black-brown, occasionally with steely luster. First apparent abdominal sternites of females bearing clusters of small punctures or small impressions (Figs. 71-75, 85); these formations differ in configuration and may serve as taxonomic characters; the scales covering the clusters are usually more frequent, reddish or slightly yellowish. Some species (*A. coarctata, A. heiligeni*) lack these clusters. Tarsal claws toothed (Figs. 16, 17) or simple (Fig. 18); the tooth reaches the distal end of the claw in *A. abelleni, A. seminata, A. coarctata* and *A. macedonica* males (Fig. 16). Body covered with lanceolate and oval scales, often concealing the undersurface. Mediterranean subregion, Hesperian region; Iranian-Turanian subregion, Sthenian region.

Distinguished from the previous subgenus by genital structure and by the presence of secondary sexual characters in females. We here confine ourselves to enumerating the species in this subgenus.


Subgenus OMPHALOTHRIX

Aedeagus depicted in Figs. 57, 58 (see also: Cobos, 1958); parameres long and narrow; apophyses of penis relatively long. Ovipositor (Figs. 60, 61) tubular, greatly

Fig. 74-75. *Acmaeodera* (Acmaeodera): 74 A. elater (holotype MNHN); 75 A. yunnana (lectotype, MNHN); 76 A. edmundi; 77 A. seminata (holotype, NMD); 78 Xanthomera straminea (paratype, ZIN); 79 *Acmaeodera* (Euacmaeodera) squammosa (lectotype, MNHN).
covering abdomen. Claws with a basal tooth (Fig. 17) or simple (Fig. 19). Mediterranean subregion, Hesperian region; Sethian region.

Type-species of subgenus, Buprestis adpersula.

*A. polygonalis.

Subgenus CARININOTA

Aedeagus depicted in Figs. 53–56 (see also: Volkovich, 1977b); apophyses of penis relatively long. Ovipositor tubular (Fig. 86), usually elongate (abbreviated in A. zarudnii); sometimes greatly modified (Fig. 94). Squat, broad, with weak dorsal inclination. Sexual dimorphism scarcely expressed in antennal structure. Base of pronotum with prominent carinulae, the distal ends of which lie facing the 3rd and 4th elytral interpaces basally (seen in profile). Tarsal claws with a tooth (Fig. 17), less frequently simple (Fig. 19). Markings consisting of yellowish or reddish transverse bands and irregular spots; black aberrations are known in almost all species and are sometimes described as independent species or subspecies. Body covered with lanceolate and oval scales completely covering the undersurface; upper part of frons and vertex often bearing short setae. The entire range of the genus apart from the Mākaronian subregion.

Type-species of subgenus, Buprestis flavofasciata.

flavofasciata Group

Frons bearing umbilicate punctures; its upper surface, vertex and pronotal disc covered with erect scales, narrower than elsewhere on the surface, or setae, in A. zarudnii the scales are uniform and appressed. Ovipositor tubular (Figs. 50, 51), long, less frequently abbreviated. The entire range of the subgenus.


glauconvi Group

Frons covered with rounded cells; head and pronotum with appressed white scales and without setae. Ovipositor strongly modified (Fig. 84). Iranian–Turhanian subregion and Gobi Province, Central Asian subregion, Sethian region.


Subgenus EUACMAEDORIELLA

Aedeagus depicted in Figs. 63–66; ovipositor in Fig. 79 (see also: Volkovich, 1975b), a more detailed account is given in the descriptions of the groups. Body broad, squat, with pronounced dorsal inclination (Fig. 11). Pronotum without carinulae at base, transverse. Elytra usually with metallic luster, but black matt aberrations are known in the boryi group. Sculpture and pubescence highly variable. Tarsal claws with a tooth (Fig. 17), less frequently simple (Fig. 19). Mediterranean subregion, Hesperian region; Sethian region.

Type-species of subgenus, Buprestis gibbulae.

boryi Group

Elytra bronze or blue; in the latter case bronze and black aberrations are found. Pubescence consisting of long confused trichoid scales or hairs, at least on pronotum.

Figs. 80–85. Acmaeoderaella.

80–84 Ovipositors: 80, 81) A. (Omphalothorax) longissima (= A. amnicola, holotype, MNHN); 82) A. (Lopastria) transversa not shown; 84) A. (Buprestis) albofons; 85) A. (Acmaeoderaella) caespica, shape of finely punctate spots on surface of 1st and 2nd apparent abdominal sternites of female.

Sexual dimorphism is often manifested in antennal structure. Sides and base of pronotum covered with cells, disc with fine punctures forming a transverse band in the middle of the pronotum; in this place the scales are more frequent than elsewhere on the surface, and erect. Aedeagus depicted in Figs. 63, 64 (see also: Volkovich, 1977b; Cobos, 1959); apophyses of penis long. Ovipositor tubular, elongate (Volkovich, 1977b). Mediterranean subregion, Hesperian region; Iranian–Turhanian subregion, Sethian region.

**gibbosa** Group

Bronze, blue or violet. The pubescence consists of featherlike or lanceolate, less frequently trichoid scales, sometimes intermingled with setae (almost the entire surface of A. alephida is covered with brownish setae). Sides and base of pronotum with shallow cells, remaining surface covered with simple punctures; surface of pronotum often strongly shagreened, other sculptural elements poorly apparent. The punctures do not form a transverse band, and the scales are uniformly distributed on the pronotum. Antennae short, practically the same in both sexes. Aedeagus depicted in Figs. 63-64 (see also: Volkovich, 1977b); ovipositor tubular, elongate; genital structure generally similar to that of members of the previous group. Mediterranean subregion, Hesperian region; Iranian-Turanian subregion, Sistanian region.


**dubia** Group

Copper-red or bronze. Pubescence usually consisting of broad lanceolate, oval or rounded scales sometimes completely covering the surface of the body. Sculpture highly varied. Sexual dimorphism is manifested in antennal structure in some species. Aedeagus depicted in Figs. 65, 66 (see also: Volkovich, 1977b); apophyses short in most species; ovipositor tubular, rather short (Fig. 79), elongate in only a few species. Sistanian region.


**Subgenus KOCHERIDA**

Cobos, 1958: 238.


Type—species of subgenus, *Acmaeodera trifoveolata*.

Composition: A. trifoveolata.


**LITERATURE CITED**


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