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No. 1. A. J. Besseling, 1964. — De Nederlandse Watermijten (Hydrachnellae Latreille, 1802) (The Hydrachnellae of the Netherlands), 199 pp., 333 figs., D.Fl. 30.—.

FURTHER STUDIES ON OLD WORLD MELECTINE BEES, WITH STRAY NOTES ON THEIR DISTRIBUTION AND HOST RELATIONSHIPS (HYMENOPTERA, ANTHOPHORIDAE)

by

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ABSTRACT

with 2 plates, 57 text-figures, 1 table and 2 maps

The present paper is a revisionary study of the smaller genera of parasitic anthophorid bees of the tribe Melectini occurring in the Eastern Hemisphere. The eight Old World genera presently recognized are redefined and arranged in a key, which includes the diagnoses of two new genera of Ethiopian bees, *Afromelecta* and *Acanthomelecta*, each with a single previously described and named species. With the exception of the large and polymorphous genus *Melecta* Latr., which will be dealt with in a separate article, three new species and 14 earlier described taxa are analysed and, where necessary, redescribed and illustrated. Keys for the identification of species are given for all genera. New species described are: *Protomelissa tricolor, Pseudomelecta atroalba* and *chalybeia*. New synonymies established are: *Callomelecta* Ckll. (= *Protomelissa* Friese), *Anthophora sauteri* Friese (= *Protomelissa formosana* (Ckll.)), *Melecta glasunowi* Mor. (= *Paracrocisa kuschakewiczi* (Radoszk.)), and *Melecta spinosa* Friese (= *Acanthomelecta bicuspis* (Stadelmann)). The taxonomic treatment is preceded by general notes on the biology of Melectini throughout the world, followed by a preliminary list of concurrent Melectini and Anthophorini, whose parasite-host relationships have been either authenticated or suspected.

CONTENTS

INTRODUCTION

The present account is one of the last in a series of revisional papers dealing with Old World Melectini, started by the writer in 1944 (Lieftinck, 1944—1969), and may be regarded as a continuation thereof. It aims at a critical study of all smaller and least known genera assigned to the tribe, some members of which were tentatively analysed already by Popov (1955). The components of this parasitic group are presently understood to be most closely related to their own hosts, i.e. the pollen-collecting bees of the tribe Anthophorini, with which they form one subfamily, Anthophorinae.

A critical review of the dominant Holarctic genus *Melecta* Latr., with its numerous species in the Mediterranean basin and Eurasia, has not yet been given, but is in course of preparation and will, it is hoped, be published in a forthcoming final part of the series.

ACKNOWLEDGEMENTS

In the following list I have employed a series of symbols indicating the present location of the material studied, followed by the names of all colleagues, who have generously allowed me to study the specimens under their care. I wish, therefore, to express my sincere thanks to all who have helped me to make this survey as complete as possible.

An important phase of this research has been the study of type specimens in various museum and private collections. I am especially indebted to Dr. H. Bytinski-Salz, formerly of Tel-Aviv University, for his interest and friendly support, now several years ago, in the location of melectine types in the Museum für Naturkunde at Berlin. Dr. E. Königsmann, of the same institution, and Professor Dr. M. N. Nikolskaja, of the Leningrad Museum, have provided considerable facilities for the examination of critical specimens on the occasion of my scanning the Leningrad and Berlin collections of Hymenoptera, during August 1968 and the autumn of 1970, respectively. Freedom of access to all component parts of these and many other important collections has frequently resulted in the discovery of individual specimens that were temporarily lost, but could now be restudied.

AMNH — American Museum of Natural History, New York (J. G. Rozen, Jr.)
BM — British Museum (Natural History), London (I. H. H. Yarrow)
BRNO — Moravské Museum (Entomological Department of the Moravian Museum), Brno, CSSR (Jaroslav Stehlik)
CBS — H. Bytinski-Salz collection, Tel-Aviv
CK — M. Kocourek collection, Vyskov, CSSR
CW — K. Warncke collection, Dachau
IEM — Instituto Español de Entomologia, Madrid († G. Ceballos and Señª Elvira Mingo)
IZK — Instytut Zoologiczny (Institute of Systematic and Experimental Zoology), Polish Acad. Sci., Krakow (Miss M. Dylewska)
MBUD — Magyar Nemzeti Muzeum (Hungarian National Museum), Budapest (J. Papp)
MHW — Martin Luther Universität, Halle-Wittenberg (R. Piechocki)
ML — Rijksmuseum van Natuurlijke Historie, Leiden
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MZUC — Museu e Laboratorio Zoologico, Universidade Coimbra (M. de A. Diniz)
NMW — Naturhistorisches Museum, Wien (Max Fischer)
NRS — Naturhistoriska Riksmuseum, Stockholm (S. Erlandsson)
TMJ — Transvaal Museum, Pretoria (H. N. Empey and C. K. Brain)
USNM — National Museum of Natural History, Washington, D.C.
ZIL — Zoological Institute Acad. Sci. USSR, Leningrad († A. Ponomareva, M. N. Nikolskaja, and V. I. Tobias)
ZMM — Zoological Museum, Moskow (A. N. Zhelokhovtsev)

General biology of the Melectini

I have taken the present opportunity to summarize briefly the most remarkable facts pertaining to the life history of the Melectini on the whole, as contained in the literature on the subject.

Early stages

Among the authors who have supplied first-hand knowledge of this kind the following deserve special attention. The most instructive and well-illustrated account dealing with the larval stages of the melectine Anthophoridae generally, is the one offered by J. G. Rozen (1969a). This important contribution to our knowledge of the tribal phylogeny was followed by an interesting memoir published by the same author on the biology of a new *Thyreus*, parasitic on a species of *Anthophora*, described from the Cape Province in South Africa (Rozen, 1969b). The larvae and pupae of the Australian *Thyreus caeruleopunctatus* (Blanch.) and *lugubris* (Smith), inquilines in the nests of *Amegilla pulchra* (Smith), were described by Cardale (1968b). Linsley & MacSwain (1942) reported some of the features of the biology of the Nearctic *Xeromelecta (Melectomorpha) californica* (Cresson) as a parasite of *Anthophora linsleyi* Timberlake (Hurd & Linsley, 1951). A complete description and figures of the larva of the last-mentioned cuckoo-bee are to be found in a paper by Michener (1953).

Giordani-Soika (1936) briefly discussed the first instar larva of *Melecta (M.) luctuosa* (Scop.) in Italy. Torchio & Youssef (1968) published observations on the biology of the Nearctic *Anthophora (Micranthophora) flexipes* Cresson, and the immature stages of its parasite *Zacosmia maculata* (Cresson), with notes on the first instar larva of *Melecta (M.) pacifica* Cresson. Descriptions of the pupa of *Melecta* are to be found in papers by Semichon (1922) and Porter (1951).

Host relationships

The object of the Table here presented is to bring together our present knowledge of the inquilinic relation of various Melectini with their hosts throughout the world. This global survey does not pretend to be in any way complete, but gives an impression of the lacunae and may stimulate further research in this field. I have included in this Table also some of my own field observations made in the Oriental tropics, on various *Amegilla* presumably serving as the proper hosts of the species of *Thyreus* listed. However, I have been unable to definitely establish these specific relationships, owing to the absence of the nesting sites of the host bees involved. Hence in these and many

Table showing parasite-host relations between various Melectini and Anthophorini. Established associations are printed in bold type.

Parasite (Melectini)	Host (Anthophorini)	Author	Habitat
Acanthomelecta gen. nov.			
A. bicuspis (Stadelmann)	unknown		
Afromelecta gen. nov.			
A. fulvohirta (Cameron)	*Habropoda* (?) *festiva* Dours	Brauns (1926)	Cape Province, S.A.
Eupavlovskia Popov			
E. funeraria (Smith)	*Habropoda tarsata* (Spinola)	Popov (1955), Lieftinck	
E. obscura (Friese) c.subsp.	and *H. zonatula* (Smith)	(1966, 1969)	S. Europe; W. Asia
Melecta Latreille			
M. (M.) luctuosa (Scop.)	**Anthophora aestivalis** (Panz.)	G. Soika (1936)	Italy
	and **A. retusa** (L.)	auct. div. (e.g. Alfken, 1912)	Europe
M. (M.) pacifica atlantica Linsley	*Anthophora ursina* Cresson	Mitchell (1962)	Centr. East U.S.A.
M. (M.) punctata (F.)	**Anthophora acervorum** (L.)	auct. div. (e.g. Alfken, 1912; Semichon, 1922)	Europe
	A. fulvitarsis Brullé	Friese (1891), Semichon (1906, 1925)	Germany; France
	A. plagiata (Ill.)	Frey-Gessner (1910)	Switzerland
M. (M.) separata callura Ckll.	**Anthophora edwardsi** Cresson	Hurd & Linsley (1951); Rozen (1969)	West U.S.A.
M. (M.) thoracica Cresson	*Emphoropsis cinerea* Smith, subsp.	Linsley (1943a, sub *M. sierrae* Linsley)	California

M. (Melectomimus) edwardsii Cresson	*? Emphoropsis* sp.	Linsley (1939)	California
Paracrocisa Alfken			
P. guilochei (Dusmet)	unknown		
P. kuschakewiczi (Radoszk.)	*Anthophora (Paramegilla) semperi* Mor.	Popov (1955, sub *P. glasunovi* Mor.)	Centr. Asia
P. sinaitica Alfken	unknown		
Protomelissa Friese			
P. formosana (Ckll.)	*Habropoda* (subg.?) spec.	Lieftinck (huj. op.)	Taiwan
P. habropodae (Ckll.)	*Habropoda* (subg.?) *sutepensis* Ckll.	Cockerell (1929)	Siam
P. himalayana (Bingham)	*Habropoda* (subg.?) sp., or *Elaphropoda* sp.	Lieftinck (huj. op.)	N. India
P. insidiosa (Lieft.)	*Elaphropoda erratica* (Lieft.)	Lieftinck (1944, 1966)	W. Java
P. iridescens Friese	unknown		
P. pendleburyi (Ckll.)	unknown		
P. tricolor spec. nov.	unknown		
P. vulpecula (Lieft.)	*Elaphropoda impatiens* (Lieft.)	Lieftinck (1944, 1966)	S. Sumatra
Pseudomelecta Radoszk.			
P. atroalba spec. nov.	unknown		
P. atripes (Mor.)	unknown		
P. chalybeia spec. nov.	unknown		
P. diacantha (Eversm.)	*Anthophora* (s.l.) *hanseni* Mor.	Popov (1955)	Centr. Asia
P. fuscipennis (Mor.)	*Anthophora solskyi* Fedt.	Popov (1955)	Centr. Asia

Parasite (Melectini)	Host (Anthophorini)	Author	Habitat
Thyreus Panzer			
a. abdominalis (Friese)	*Amegilla caroli* Lieft., *A. cyrtandrae* (Lieft.), *A. jacobi* (Lieft.)	Lieftinck (1962)	Java
a. rostratus (Friese)	*Amegilla elephas* (Lieft.)	Lieftinck (1962)	Sumatra
affinis (Mor.)	*Amegilla salviae* (Mor.)	Yuga (1958)	Rumania (?)
caeruleopunctatus (Blanch.)	Amegilla pulchra (Smith)	Cardale (1968a-b)	Queensland
	A. murrayensis (Rayment)	Rayment (1935, sub *Cr. lamprosoma* (Boisd.)	Victoria
ceylonicus (Friese) c. subsp.	*Amegilla andrewsi* (Ckll.) & allies	Lieftinck 1962)	Indomalaya
c. nereis Lieft.	*Amegilla andrewsi* (Ckll.) subsp.	Lieftinck (1962)	Engano I.
himalayensis (Rad.) c. subsp.	*Amegilla andrewsi* (Ckll.) & allies	Lieftinck (1962)	Indomalaya
histrionicus (Ill.)	Amegilla quadrifasciata (Vill.)	Ferton (1920), Bischoff (1927), Stoeckhert (1954)	Algeria Europe
	A. albigena (Lep.)	Lieftinck (1968)	Hungary
irena Lieft.	*Amegilla feronia* (Lieft.), *A. jacobi* (Lieft.)	Lieftinck (1962)	Java
lieftincki Rozen	Anthophora braunsiana Friese [1])	Rozen (1969b)	Cape Province
lugubris (Smith)	Asaropoda sp. (? *bombiformis* Smith)	Cardale (1968a-b), Lieftinck (1962)	Queensland; Sydney
	A. spec.	Rayment (1935)	S. Australia; N.S.W.
nitidulus aspasius Lieft.	*Amegilla ternatensis* (Ckll.)	unpublished	N. Moluccas
— *gemmatus* (Ckll.)	*Amegilla sapiens* (Ckll.)	unpublished	Solomon Is.
— *nitidulus* (F.)	*Amegilla pulchra* (Smith)	Cardale (1968a)	Queensland
— *verticalis* (Ckll.)	*Amegilla elegans* (Smith) subsp.	Lieftinck (1959b)	Ambon I.

novaehollandiae amboinensis (Rad.)	*Amegilla buruensis* (Ckll.)	Lieftinck (1959b)	Ambon I.
— *irisanus* (Ckll.)	*Amegilla flammeozonata* (Dours) & allies	Lieftinck (1962)	Java
orbatus (Lep.)	**Anthophora quadrimaculata (Panz.) & A. borealis** Mor.	Stoeckhert (1954)	Bavaria
praestans Lieft.	*Amegilla fimbriata* (Smith)	unpublished	Malay Peninsula
ramosus (Lep.)	**Amegilla albigena** (Lep.)	Bischoff (1927) et auct.	Europe
surniculus Lieft.	*Amegilla violacea* (Lep.)	Lieftinck (1959a)	S. India & Ceylon
truncatus (Pérez)	*Amegilla garrula* (Rossi)	Bischoff (1927) et auct.	Europe
Xeromelecta Linsey			
(Melectomorpha) californica (Cresson)	Anthophora abrupta Say & various other spp.	**Linsley (1943b); Hurd &** Linsley (1951); Mitchell (1962)	California; Centr. U.S.A.
	A. edwardsii Cresson, **A. stanfordiana** Ckll., **A. linsleyi** Timberlake	Linsley & MacSwain (1942)	California
	A. stanfordiana (Ckll.)	Michener (1953)	California
	A. urbana Cresson	Linsley (1939)	California
(Melectomorpha) interrupta (Cresson)	*Anthophora abrupta* Say	Mitchell (1962)	Centr. U.S.A.
Zacosmia Ashmead			
m. maculata (Cresson)	**Anthophora (Micranthophora) curta** Cresson	Hurd & Linsley, sec. Hicks (1951)	West U.S.A.
	A. (M.) flexipes Cresson	Torchio & Youssef (1968); Rozen (1969a)	Utah, U.S.A.

[1]) Generic position doubtful

other cases the associations recorded are merely suspected. Nevertheless, a survey of the literature reveals that a substantial number of records are well founded and based on a study of the biology of both parasite and host, the assessments of true parasitism having been accomplished by rearings or otherwise. Consequently, in the Table all names of well-established associations have been printed in bold type.

DISTRIBUTION OF REGIONAL GENERA AND SPECIES

Leaving the widely spread *Thyreus* out of account, and with the exclusion also of the large genus *Melecta* — which is abundantly represented in the Mediterranean basin and West Asia — all Old World members of the tribe occurring in temperate climatic regions are rare in collections, despite their striking body pattern. The locality records are few in number and scattered over wide areas, while hardly anything is known of their habitations. This applies not only to *Paracrocisa* and *Pseudomelecta,* but also to the isolated Ethiopian genera *Afromelecta* and *Acanthomelecta,* two taxa founded on solitary species represented by few individuals only. We are somewhat better informed geographically about the occurrence of *Eupavlovskia* and *Protomelissa,* whose ranges, as far as at present known, are roughly outlined in the accompanying maps, in conjunction with the distribution of their hosts, i.e. the anthophorine genera *Habropoda* and *Elaphropoda* (see maps I and II on p. 268 and 271, respectively). For a more detailed account of *Eupavlovskia,* see Lieftinck (1969). It will be seen that *Protomelissa* is mainly tropical in distribution. Its species exhibit a colour design that deviates much from that of the others, in such a way, in fact, as to attract little attention in the field. With few exceptions, the remainder are characterized by a pubescent pattern of black and snowy-white, many of them when freshly emerged being extremely handsome and conspicuous bees.

KEY TO THE MELECTINE GENERA OF THE EASTERN HEMISPHERE

1. Marginal cell of fore wing usually markedly shorter than three submarginal cells combined, at most equal in length to, usually much shorter than, the distance separating its apex from wing tip, whether or not exceeding third submarginal cell. Body black-haired or spotted with white and/or blue, pubescence never pale yellow, orangish, fulvous or dark brown 2

— . Marginal cell long, usually little shorter than three submarginal cells combined, longer than the distance separating its apex from wing tip, and exceeding third submarginal cell (Fig. 11). Body lacking well defined white or blue pubescent spots: whole dorsal surface and sides of thoracic segments clothed densely with long erect pubescence entirely concealing surface. First gastral tergite markedly shorter than second, lacking tufts of longish erect hairs; abdominal pubescence short, generally dense, appressed and feathery, but never forming spots and usually not much different in colour from that of underlying surface. Head only one-third as deep as its breadth across eyes, posterior angles not developed. Face rather short, slightly to moderately protuberant, i.e., height at apex of clypeus in side view about one-third to four-sevenths greatest diameter of eye at the same level; clypeus broader than long, convex dorsally. Labrum broader than long, often emarginate anteriorly. Mandibles curved, shorter than length of eye, inner margin unidentate or with angular projection far beyond halfway length. Inner orbits nearly straight, sub-

parallel or slightly converging anteriorly. Maxillary palpi 6-segmented, long and slender, subequal in length to antennal scape. Antennae rather long and slender, often exceeding tegulae, flagellar segments variable, but in male up to almost three times as long as broad; rhinaria absent. Mesoscutellum short and convex, much broader than long, with distinct middorsal carina; dorsal lobes armed with a robust erect and curved spine, as long as or shorter than surrounding pubescence and directed caudad. Parascutella small, subtriangular, convex. Wings lightly infuscated. Legs rather thin and slender, of simple structure; hind tibial spurs almost straight, finely serrulate, outer spur only little shorter than inner. Tarsal arolia well developed, though occasionally of minute size. Male terminalia, see specific descriptions and figures. Pygidial area of female broad, subtriangular and plate-shaped, not covering entire dorsum of tergite. Body size small to medium, 10.5—13.5 mm. Hab.: Himalayan region to Taiwan and Java . . . . . Protomelissa

2. First gastral tergite usually distinctly longer than second in normally exposed position, or at least equal in length to the latter. Tarsal arolia vestigial or absent 3

— . First gastral tergite markedly shorter than second. Tarsal arolia conspicuously present, claws usually divergent. Maxillary palpi distinct, 5—6 segmented, as long as, or little shorter than, three apical segments of labial palpi combined, exceeding 1 mm in length 5

3. Scutellum plate-like, flat or almost so, thin-edged with dorsal surface abruptly and acute-angularly divided from forward-slanted or incurved posterior surface, never armed with a pair of cylindrical or abruptly raised spines or tubercles; more rarely slightly convex or bituberculate and, though not markedly projecting beyond metanotum at middle, yet distinctly angulate in profile, with the prominent lateral angles directed caudad and overhanging metanotum laterally. Parascutella triangular, on a level with scutellum or almost so, occasionally convex dorsally. Tarsal arolia absent or replaced by a vestigial orbicula. Face protuberant, height at apex of clypeus at least equal in profile to greatest diameter of eye at the same level. Maxillary palpi wanting or rudimentary (1-2 segmented) and only occasionally made up of more (3-4) short segments, whole palpus shorter than, or about as long as, distal two segments of labial palpus combined and not exceeding 1 mm. Mandibles with inner margin strongly unidentate about halfway length. Antenna normal, thickness and length of flagellar segments variable but never unusually attenuated; rhinaria often present in both sexes and rarely wanting in male. Wing membrane often obscurely spotted and frequently very dark. Outer face of mid tibia often somewhat flattened and/or broadened, and nearly always with dense pad of short felt-like pubescence. Integument of thorax above at least partly exposed; dorsal pubescence short and frequently dense, but integument never completely hidden from view. Abdomen with short, sparse black hairs variegated with pubescent spots composed of longer, but predominantly appressed, branched, feathery or scale-like hairs, either pure white or coloured various shades of blue and/or green. Size very variable. Hab.: Old World subtropics and tropics, with radiations into the southern Palaearctic . . . . . Thyreus

— . Scutellum modified, but neither flattened nor plate-like, whole segment about twice as broad as long, strongly but gradually declivous and impressed posteriorly; dorsal surface not overhanging any part of metanotum, rounding into vertical posterior surface, the swollen parts on either side of median concavity armed with compressed

tooth or spine placed far laterad and directed caudad; parascutella inconspicuous, convex, usually hidden from view by dense appressed pubescence. A conspicuous patch of white appressed tomentum at middle of scutellum posteriorly. Tarsal arolia rudimentary. Face broad. Labrum subquadrate, anterior border bituberculate with distinct crescentic emargination; surface partly or entirely clothed with dense brush of stiff hairs. Clypeus convex, little prominent, much shorter in profile than greatest diameter of eye (Fig. 46). Eyes converging anterad, inner orbital margin straight and upper portion not or scarcely incurved; in side view widest below middle of their length, much more broadly rounded anteriorly than above. Mandibles strongly curved, inner margin edentate or with vestigial tubercle placed about midway or slightly in advance of their length. Malar space linear. Antennae slender, unmodified, similar in both sexes, barely attaining tegulae (female), or slightly longer and reaching to beyond middle of latter (male); scape curved, with short appressed pubescence; flagellar segments normal, but longer than broad, rhinaria wanting. Legs normal, shaped similarly in both sexes, mid and hind basitarsi of male unmodified, covered externally with short, dense, appressed white pubescence; hind tibial spurs relatively short, gently curved, inner spur not much longer than outer. Fore wing membrane partly obscured; marginal cell elliptical, rather attenuated distad, only slightly shorter than distance from apex to wing tip, exceeding third submarginal cell. Front of head thickly white-haired, pile on clypeus decumbent but less dense and very short anteriorly; thorax variegated with semi-erect black and white pubescence only partly hiding surface on mesonotum and scutellar area. Abdomen dull, especially on dorsum, surface finely closely punctate, but punctation invisible where covered by dense, appressed, finely branched hairs forming well-defined white spots. Gastral tergite 7 of male rounded apically. Exposed surfaces of male gastral sternites 2-6 uniformly pubescent; no indication of a conspicuous subapical comb of thick brushy hairs projecting from beneath sternal plates 3-5. Sternite 7 of male constricted basally, distal portion plate-shaped, more or less bilobate and with dense frings of strong bristles; apex of 8 subtruncated and fringed with longish hairs (Fig. 51, 56). Genital capsule of large size and complex structure (see specific descriptions). Pygidial plate of female triangular, with broadly rounded apex 4

4. Maxillary palpus slender, 6-segmented, 2nd to 4th longest (Fig. 55). First gastral segment distinctly longer than second in normally exposed position (male), or second segment, when extended, almost equal in length to first (female). Convex scutellar lobes armed on either side with an enormous, slightly downcurved, laterally compressed spine, which is directed straight back, equals middorsal length of scutellum, and bears a strong, longitudinal dorsolateral carina. Tarsal arolia contracted to a plumose or bristly rudiment. Hab.: East Africa (Tanzania) . . . . . Acanthomelecta

— . Maxillary palpus rudimentary, consisting of 1-2 minute segments, which together are equal in length to, or shorter than, the two apical segments of labial palpus combined. First gastral segment a little shorter than, or subequal in length to, the second. Convex scutellar lobes armed with a pair of slightly downcurved and laterally compressed teeth or spines, which are slightly divergent and at most half as long as midlength of scutellum; dorsolateral margin of each strongly longitudinally carinate. Tarsal arolia wanting, replaced dorsally by an orbicular fan of long and

strong bristles, and ventrally by a fringe of bristles suggesting a planta. Hab.: South and East Africa . . . . . Afromelecta

5. Soft raised pubescence covering dorsal thoracic segments exceptionally long and dense, especially at sides, the thick velvet-like pile composed of feathery hairs concealing all of the surface inclusive of posterolateral pronotal tubercles and scutellar spines. Basal propodeal triangle glabrous, except few short longitudinal striae laterally at base. Fore wing greatly expanded towards apex, distal margin strongly convex, tip blunt; marginal cell short, almost regularly elliptical, over three times as long as broad, not or only little surpassing third submarginal cell. Body compact, thorax large and globular; abdomen even more abruptly pointed than in *Melecta* and *Pseudomelecta*. Maxillary palpus 6-segmented. Mandible unidentate, tooth rather large and placed near apex in male, rather smaller and blunt, situated slightly beyond halfway length in female. Antenna long and slender in both sexes, scape shortly pubescent, segment 4 always longer than 3 and more than twice as long as broad, next flagellar segments also attenuated, about twice as long as broad, the distalia frequently slightly crenulated in male; rhinaria wanting. Thoracic dorsum closely punctate, scutellum with a pair of robust, straight, upturned divergent spines hidden by surrounding pubescence. Legs dull, outer faces of all parts finely reticulate-punctate, conspicuously lacking spines or bristles, clothed densely with short, predominantly black pubescence almost concealing surface, only femora below fringed with long hairs. Mid tibia of male not expanded, lacking conspicuous external pad of short felt-like pubescence; hind tibia of male expanded and swollen distad, with strongly produced, robust antero-apical process; hind basitarsus of male modified, laterally compressed, rather abruptly expanded and hollowed out externally, that of the female subparallel-sided. Hind tibial spurs long, innermost spur undulated and much longer than outer, which is straight, both microscopically serrulate. Inner rami of mid and hind tarsal claws slender, neither flattened nor plate-like. Gastral tergites finely superficially tessellate-punctate, surface dull or slightly shining. Pubescent pattern variable: body either entirely jet-black, or thorax with white or greyish-yellow anterior mesothoracic collar, long black and white lateral tufts behind wings, lateral tufts of long raised hairs at extreme base of tergite 1, and snowy-white appressed pubescent spots on each side of succeeding segments. Pile on mesonotum never forming grey-white and black spots or streaks. Tergite 7 of male subtruncated, apex clothed with appressed tomentum. Sternite 7 very slender, with narrow, widely divergent arms and bilobate apex, the lobes fringed with strong bristles; sternite 8 with well developed postmedian ridges, apex with tufts of long feathery hairs. Hab.: Western Mediterranean to Caucasus . . . . . Eupavlovskia

— . Raised pubescence covering dorsal and lateral thoracic segments shorter, often dense and feathery but only very rarely completely concealing surface, the integument remaining visible at least on middorsum and frequently also on parts of the sides; black and white pubescent pattern variable. Body shape and size, and form of wings very variable, but combined structural characters of antennae, legs, and male apical sternal plates not as described above for *Eupavlovskia* 6

6. At least posterior portion of mesonotum and entire scutellum exposed, integument well visible under scanty pilosity. Mesonotum anteriorly, mesopleurae above, a subcircular area in front of parascutella at each side of mesonotum, and dorsolateral metanotal area, clothed with longer, but mostly decumbent, silky hairs frequently

forming condensed patches of soft, silvery-white pubescence. Abdomen variable, tergites usually dull and almost lustreless, clothed with minute dark hairs and often variegated with pure white pubescence forming spots or definite patches of dense, appressed silky hairs of somewhat greater length; tergite 1 never with tufts of long raised hair on each side at extreme base (except *Pseudomelecta chalybeia*). Abdomen occasionally more shining and almost bare (some species of *Pseudomelecta*). Sternites 2-6 (or at least 3-5) of male with subapical fringe of strong, backward directed, black bristles, which often form a dense brush. Legs with short, generally scanty, pubescence, except longer fringe at fore femora posteriorly and, more sparsely, often also at basitarsi. Inner rami of mid and hind tarsal claws always much shorter and broader than outer, the former usually flattened and often axe-shaped or squarely cut off. Scutellum broader than long, raised and greatly swollen, well marked off anteriorly from mesonotum and convex parascutella by deep furrows; dorsal surface (inclusive of well developed backward directed processes) on a level with mesonotum in side view, strongly declivous posteriorly, but whole structure not or only little overhanging posterior thoracic segments. Antennal scape naked or covered with minute appressed pubescence, rarely with sparse fringe of long erect hairs. Mandible with single, robust, interior tooth beyond halfway length. Malar space linear or wanting. See also under couplet 6b, of *Melecta* 7

— . Raised pubescence on thorax rather long and dense, usually covering all parts of dorsum and sides: although integument remains visible in places, most areas are hidden from view, including the scutellar spines, which are frequently raised, but often vestigial and only rarely as long as the surrounding pubescence. Pile entirely black or, more often, predominantly grey-white (rarely brownish-white) on mesonotum anteriorly, becoming black and/or white posteriorly (male), or forming alternating grey-white and black blotches and streaks on anterior part of dorsum (female). Gaster moderately to strongly shining, frequently almost polished, disk of tergites finely, sparsely punctate and with short scanty pubescence; tergite 1 in most species with tufts of long erect white hair laterally at extreme base, sides of this and/or following tergites in addition spotted with condensed patches of appressed white pubescence. Sternites often with long, strong subapical hairs, but 2-6 (or 3-5) of male lacking dense combs of thick stiff bristles pointing caudad. Antennae normal, relative lengths of segments varying among species; scape frequently fringed with long hairs; flagellar segments (except two basal ones) never distinctly attenuated or much longer than broad, often thick and distinctly transverse, especially in male; rhinaria almost invariably present in male. Legs variable, but hind tibia of male unmodified; outer faces of tibiae and tarsi often tuberculate and/or denticulate; mid tibia of male frequently expanded and with dense external flattened pad of short felt-like, white or black, pubescence; inner hind tibial spur not undulated; hind basitarsus of male not modified, but outer face frequently concave and apex occasionally distinctly produced externally. Shape and armature of scutellum, as well as of tarsal claws, variable. Numerous species of very variable appearance and size. Hab.: Old World forms widely-spread in temperate regions . . . . Melecta

N.B. — In a number of aberrant *Melecta*, the integument of the thoracic segments is well visible under much shorter and more scanty pubescence, while the gastral tergites are lustreless, finely punctate and clothed densely with minute hairs, the extreme base of tergite 1 at the same time lacking the characteristic lateral tufts of long raised hair. Members of this species

group are extremely similar superficially to *Paracrocisa*, the shape of the scutellum also being almost identical. Despite this similitude, they have the following negative characters in common by which they can be distinguished from *Paracrocisa*. (1) labrum in both sexes not markedly broader than long, usually distinctly longer than broad; (2) antennae of normal length, scape in male with lateral fringes of long erect hairs, the flagellar segments not unusually attenuated and with distinct, impressed rhinaria; (3) inner rami of mid and hind tarsal claws of male and female never distinctly plate-like, axe-shaped or squarely cut off; (4) gastral sternites 3-5 of male without dense subapical combs of thick, suberect bristles pointing caudad; (5) hind tibia of male not markedly expanded, apex not hollowed out and toothed; and (6) apical sternal plates and genital organs of male not at all shaped and modified as described and figured for *Paracrocisa*. The females are less easily recognised, those of *Melecta* usually having a more protuberant face, a longer labrum, and the exposed portions of abdominal sternites more broadly impunctate.

7. Body small (length 8-12.5 mm), compact; abdomen thick-set, ovoid (e.g., length: breadth ratio 10 : 7.5-8.6). Marginal cell of fore wing short, elliptical, about 2.2-3 times as long as broad, apex broadly rounded or subtruncated; sides of second submarginal frequently closely approximated above but only rarely fused together or stalked at anal side of marginal; third submarginal distinctly smaller than first and generally a little higher than long. Antenna moderately long, usually reaching to slightly beyond anterior margin of tegulae; shape varying between species: either thick and strong, with flagellar segments distinctly transverse and bearing deeply impressed, crescentic or horseshoe-shaped rhinaria (male), or thinner with the distalia longer than broad (female); or else, much slenderer and almost alike in both sexes, the flagellar segments longer than broad, and with male rhinaria only feebly indicated. Legs short and robust, femora and tibiae of male slightly more expanded than in female, but apices of male tibiae and basitarsi lacking any specializations; mid basitarsi of male invariably more or less expanded and flattened, with external pad of dense appressed pubescence. Hind tibial spurs more or less curved, not wavy, inner spur not considerably longer than outer. Maxillary palpus 6-segmented, segments varying in length, the two terminalia occasionally fused together, 2 and 3 usually longest. Labrum very small, subquadrangular, at most half as broad as lower interorbital distance. Eyes broader and more evenly rounded above than in *Paracrocisa*, a little shorter than upper interorbital distance; inner orbits straight and converging anterad. Texture of abdomen variable, tergites moderately shining and punctate, but often lustreless, with very closely set fine punctures; premarginal (subapical) brush covering sternites 3-6 of male composed of evenly distributed, stiff suberect bristles, fewer in number and less conspicuous than in *Paracrocisa*, hairs not upcurved apically. Sternite 7 of male with strongly protuberant lateral angles at end of divergent arms; disk broad and flat, not at all constricted basally, subrectangular or more or less tapering posteriorly, lateral margins not thickened and only weakly sclerotised, apex beset with few strong bristles. Sternite 8 with poorly marked and strengthened subapical angles at base of slightly prominent apex, the hind margin of which is undulated, carrying few bristle-like hairs on either side (Fig. 20, 24, 26). Genital capsule compact, small and spherical, gonocoxites broadening gradually posteriorly, with rather short, strongly converging gonostyli; no membranous flap at base of gonostylus; dorsobasal and ventrobasal processes variable, conspicuous, but not strongly modified, densely pubescent and bristled (Fig. 21, 25, 27). Hab.: E. Turkey (Armenia) eastward to Mongolia . Pseudomelecta

—. Body size moderate (length 12-17 mm), elongate; abdomen slender, less abruptly pointed than in *Pseudomelecta* (e.g., length : breadth ratio 10 : 6.6). Marginal cell of fore wing narrower, about 3.3 - 4 times as long as broad, with bluntly pointed apex; third submarginal cell frequently almost equal in size to first. Antenna long and very slender, though little surpassing tegulae (male), or shorter and reaching anterior margin of same (female); segments 3-5 slightly more than $1\frac{1}{2}$ times as long as broad and of about the same length, remaining segments only little shorter, all smooth and rather shining below, with shallow longitudinal impressions, but lacking distinct rhinaria (male); or shorter, with separate flagellar segments about $1\frac{1}{3}$ times as long as broad (female). Legs strong, hinder pair modified in male, normal in female. Hind tibia of male considerably expanded and swollen towards apex, which is hollowed out below implantation of basitarsus, ending in a variously shaped ventral process carrying articulated spines; spurs originating from the inside just above the truncated apical border, the inner spur distinctly wavy, much longer than outer; hind basitarsus strongly compressed laterally and a little outbent, its external surface distinctly hollowed out. Maxillary palpus 6-segmented, long and slender, about as long as last three segments of labial palpus combined, 1 only half as long as next segments, which are subequal in length, 6 only little shorter than the preceding. Labrum larger than in *Pseudomelecta,* much shorter than its width at base and broader than half the lower interorbital distance. Eyes very large, as long as, or a little longer than, upper interorbital distance, elongate-oval, broadest slightly in advance of their middle and narrowest above; inner orbits converging anterad, straight or slightly convex inward. Abdomen generally dull, evenly finely punctate from base almost to apex of tergites; premarginal (subapical) brush covering sternites 2-6 of male conspicuous, composed of thick bristles, the apical ones comb-like and usually with upturned tips. Apex of tergite 7 of male subtruncated or bluntly rounded. Sternite 7 lacking prominent lateral angles at end of widely divergent arms, abruptly and very strongly constricted at base of disk, which is at first long, narrow, and subparallel-sided, then broadens rather abruptly to form a plate-like apical lobe bearing numerous strong, closely set, radiating bristles on either side. Sternite 8 subtriangular, surface basally with well marked ribs and prominent, heavily sclerotised subapical angles at base of protuberant and equally strengthened apex, the hind margin of which is finely setiferous (Fig. 40, 42, 44). Genital capsule oval and of large size, gonocoxite abruptly broadened posteriorly, with large membranous flap at base of long gonostyli, and intricately shaped basal processes carrying a variety of bristles and fine hairs (Fig. 41, 43, 45). Pygidial plate of female slender, narrowly triangular, about $2\frac{1}{2}$ times as long as its width at base, apex rounded. Hab.: N.W. Africa to E. Kazakhstan . Paracrocisa

DISCUSSION OF GENERA AND SPECIES (EXCLUSIVE OF *Melecta* LATR., 1802)

Thyreus Panzer, 1806

This is probably the most advanced and diversified genus of the tribe, the members of *Thyreus* showing a number of specializations and reductions not found elsewhere. The relatively great length of the first gastral segment as well as the obliteration of the maxillary palpus and lack of arolia, are presumably all characters indicating the highest

stage in the evolution of the Melectini. With the exception of the numerous species peculiar to the Ethiopian fauna — which are still in great need of further study — most *Thyreus* occurring in the rest of the world were reviewed in a series of articles published by Lieftinck (1959—1968).

All Anthophorini whose association with *Thyreus* has been either ascertained or may reasonably be expected, are listed in the Table on p. 258 of this paper.

Type species: *Nomada scutellaris* Fabricius, 1781.

Eupavlovskia Popov, 1955

A small genus that has recently been treated in full (Lieftinck, 1969). The silky pubescent pattern of *Eupavlovskia* strongly recalls that of certain aberrant Eurasian members of the polymorphic and widely spread genus *Melecta*. Yet the genus differs fundamentally from all species of *Melecta* in several structural characters suggesting a closer affinity with *Paracrocisa* than with any other tribal genus.

There are only two species, which are apparently confined to southern Europe and parts of West Asia, the centre of their distribution lying in the peninsular countries of the north-east Mediterranean (see Lieftinck, loc. cit., fig. 8, map).

Eupavlovskia is parasitic on the larger-sized species of *Habropoda*, i.e., the more typical members of that genus. The approximate range of both units has been roughly outlined in Map I on page 268 of this paper. Further towards the east, these anthophorines are replaced by a far greater number of somewhat smaller '*Habropoda*' showing characters approaching those of the Nearctic *Emphoropsis*. In point of fact certain Eurasian members of this group are rather intermediate morphologically and are suspected to be the hosts of *Protomelissa*, discussed hereafter.

On a collecting trip to Rodos, in April 1971, I took some *E. obscura simulatrix* Lieft. in company with *Habropoda tarsata* (Spin.), the latter being common all over the island. On the nearby island of Kos, opposite the Turkish coast, the same *Eupavlovskia* occurred together with both *H. tarsata* and *zonatula*, but of the last only a single male was observed. Unfortunately no nesting sites were found of either of the host bees.

Type species: *Melecta funeraria* Smith, 1854.

New localities, in addition to those enumerated in my former paper, are:

E. funeraria (Smith). — Italy: ♀, Calabria, Antonimina, 1905 (MNB). Greece: ♀, Naxos I. (MNB).

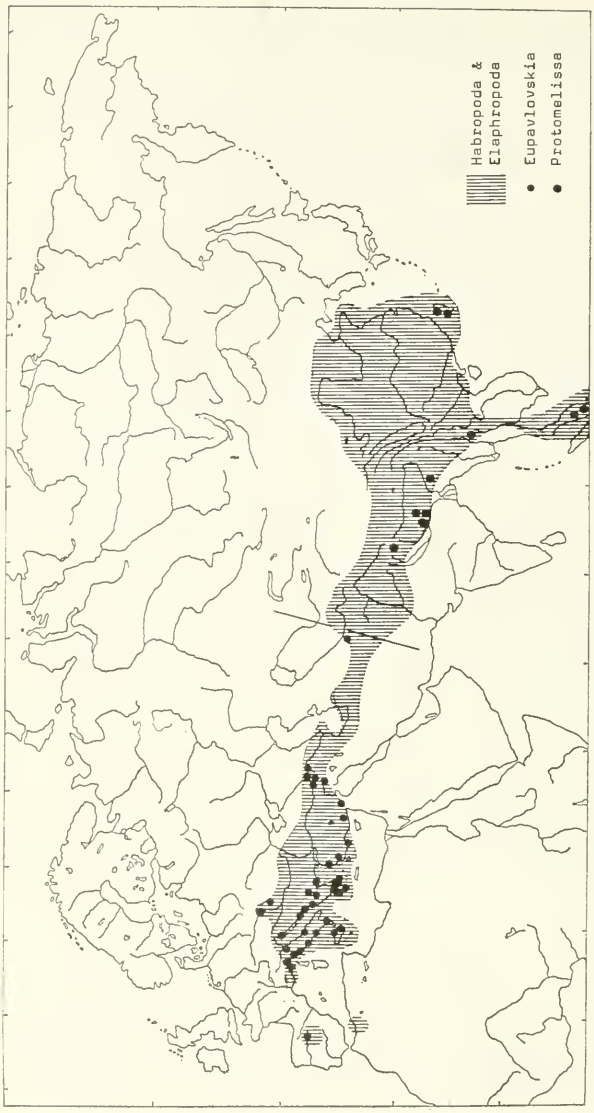
E. o. obscura (Friese). — Italy: ♀, Naples (as *M. aterrima* Lep.) (MNB); ♂ ♀, Apulia, Sporgano, IV-V. 1933 (MNB).

E. o. simulatrix Lieft. — Greece: ♂ ♀, Corfu (as *M. funeraria* Smith, det. Alfken) (MNB).

Protomelissa Friese, 1914

Protomelissa Friese, 1914, Dtsch. Ent. Z. : 322—323 (two species: *P. sauteri* (Fr.) ♂ ♀ Formosa, and *P. iridescens* Fr., ♂ Formosa). — Cockerell, 1929, Ann. Mag. Nat. Hist. (10) 4 : 133 (note, not seen). — Sandhouse, 1943, Proc. U.S. Nat. Mus. 92 : 592 (not seen; designation of type species *P. iridescens* Friese, 1914). — Lieftinck, 1944, Treubia, hors sér. : 59 (note, not seen). — Michener, 1944, Bull. Amer. Mus. Nat. Hist. 82 : 287 (note, not seen). — Popov, 1955, Trudy Zool. Inst. Akad. Nauk USSR 21 : 322, 333 (notes, not seen).

Callomelecta Cockerell, 1926, Ann. Mag. Nat. Hist. (9) 18 : 621—622 (♀ Malay Peninsula;



Map 1. Distribution of melectine genera *Eupavlovskia* (left of boundary line) and *Protomelissa* (right, in part) superimposed on partial range of anthophorine host genera *Habropoda* and *Elaphropoda*

type species by monotypy *C. pendleburyi* Ckll., 1926). — Sandhouse, 1943, Proc. U.S. Nat. Mus. 92 : 533 (not seen; type-species *C. pendleburyi* Ckll., 1926). — Lieftinck, 1944, Treubia, hors sér. : 58—62, fig. & pl. (full generic & specific descr. ♂ ♀, type-species *C. pendleburyi* Ckll). — Michener, 1944, Bull. Amer. Mus. Nat. Hist. 82 : 287 (note, not seen). — Popov, 1955, Trudy Zool. Inst. Akad. Nauk USSR 21 : 333 (note, not seen).

The first described species in this genus is *Anthophora sauteri* Friese, 1911, originally known from a single male "von Taiwan (Formosa), Sauter leg." When Friese (1914) had received examples of both sexes, he proposed the new generic name *Protomelissa,* to hold it. The generic diagnosis, brief and insignificant as it is, starts as follows: "Eine neue Schmarotzer-Bienengattung, die noch vollkommen den *Anthophora*-artigen Habitus bewahrt hat und ein schönes Mittelding zwischen dieser Gattung und den typischen *Melecta-* und *Melissa*-Arten darstellt. *Protomelissa sauteri* wurde von mir 1911 nach einem defekten ♂ als *Anthophora s.* beschrieben, nach Bekanntwerden des ♀ treten aber alle Eigenschaften der Schmarotzerbiene zweifellos hervor und lassen sie als ein vortreffliches Bindeglied zwischen *Anthophora* und *Melecta-Melissa* erscheinen." (loc. cit.: 323). In the next pages Friese describes the female and adds a few characters of the male, starting his description of *P. sauteri* again with the following sentences: "Diese von mir nach einem ♂ als *Anthophora* beschriebene Art gehört nach dem Bekanntwerden des ♀ zu den Schmarotzerbienen, sie liefert ein gutes Bindeglied zwischen *Anthophora* und *Melecta.* Der Habitus ist ganz *Anthophora*-artig, auch die Behaarung, doch fehlt im ♀ der Beinsammelapparat (= Scopa). Ich gebe hier eine neue Beschreibung, zugleich die Diagnose für das ♂ erweiternd."

The type of *A. sauteri* is not "defekt", as stated by Friese, but a specimen in good condition (see below). However, it may have been the reason why Sandhouse (1943), instead of selecting the much better known *P. sauteri,* designated *P. iridescens* Friese as the type species of *Protomelissa.* This type designation is incongruous with the facts that (1), *P. sauteri* is not only the earliest but also the fullest described species of which both male and female were known, the diagnosis of *Protomelissa,* as stated explicitly by Friese himself, being based primarily on characters of the female; and (2), because the unique type male of *P. iridescens* does not quite fit the generic diagnosis and has apparently become lost, the description of it being even more fragmentary than that of *P. sauteri.* See also p. 277 under *P. iridescens.* It has now been found that *P. sauteri* is conspecific with *Melecta formosana* Cockerell, 1911, described about two months earlier than *sauteri,* so that the former name should replace it.

At the time of redefining *Callomelecta* Ckll. (Lieftinck, 1944), no species of *Protomelissa* were known to me, but in 1970, while studying three of its members in the Berlin museum, it soon became clear that the two genera are inseparable. A re-characterization of *Callomelecta* was given by me in 1944, and this elaborate diagnosis applies equally well to *Protomelissa* in almost every respect. In general facies all species presently included in it are strikingly alike, while they agree also in the structure of the mouthparts and venation; lastly, the male terminalia and female pygidial plates of *Protomelissa* correspond closely with those of Malaysian *Callomelecta.* The differences are mainly found in the shape and pubescence of the antennae and tarsal claws, which seem to be of specific rather than generic importance.

As may appear from the photographs (Pl. 1 Fig. 1-2), the members of *Protomelissa* are entirely unlike any of the Old World melectines, differing from all in the unspotted body and vividly coloured pubescence, features suggestive of their hosts and leading to

the opinion that they have preserved some primitive features peculiar to the ancestral anthophorini.

It is tempting to speculate upon the possible relation between parasite and host throughout their range. There seems to be little doubt that the equatorial members of this Asiatic genus (i.e., *Callomelecta* olim), are restricted to the submontane and montane forest zones of Malaysia, and that they are special parasites of the anthophorine *Elaphropoda*. Three species of the latter have been found associated with them in such different localities as the Malay Peninsula, Sumatra, and Java. *P. habropodae* (Ckll.), on the other hand, was captured by its describer in the mountains of Thailand simultaneously with *Habropoda sutepensis* Ckll. Nothing, however, is known with certainty of the more northern *Protomelissae,* described from the Himalayan range and Taiwan. There are about four nearly interrelated species of *Elaphropoda* and at least five or six *Habropoda* (excluding a few undescribed ones), which are distributed throughout the eastern Himalayan mountains. From the corresponding locality records and dates of capture it is obvious that some members of either genus inhabit the same area and may even occur side by side (see maps). In an easterly direction, the two anthophorine genera are each of them represented by at least two species in the mountain provinces of East China (Fukien); but whereas *Habropoda tainanicola* Strand, *H. bucconis* (Friese) and a third — possibly undescribed — species have succeeded to reach Taiwan — in which island they occur at much lower levels than on the mainland — no single species of *Elaphropoda* has turned up yet in Taiwan. Their absence is significant because, as we will see, no less than three *Protomelissae* do occur in the island and strongly suggest their association with the two *Habropodae* just mentioned.

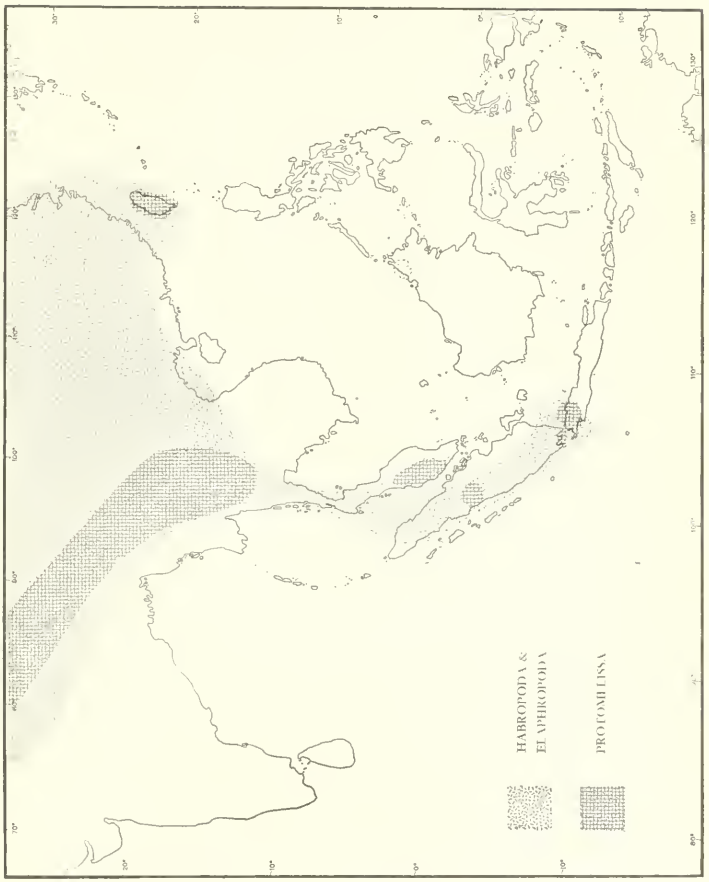
The absence of *Protomelissa* on the mainland of China and the Indochinese provinces does not, of course, preclude the possibility of their occurrence in the intervening countries as it can easily be explained by their rarity and also the insufficient exploration of the Chinese mountains. This is also the opinion of Dr. T. C. Maa, who recently told me in a letter that the lacunae in his very rich Fukien collections of bees are, perhaps, due to the fact that collecting was done in all seasons for seven consecutive years, but only around a field station set up at 1600 metres; only occasionally he and his assistants visited the lowland as well, thus missing the right season and localities for *Protomelissa.*

KEY TO THE SPECIES OF *Protomelissa*

(The females of *P. habropodae* and *iridescens,* and the male of *tricolor,* are unknown)

1. "Integument of abdomen shining bright clear ferruginous, clothed above with short, appressed, pale fulvous tomentum on apices of second and following segments. Thorax with abundant, long, erect fulvous hair. Clypeus black, but densely covered with appressed pale hair. Flagellum of antenna not very long, barely reaching tegulae, apical joint curved. Female unknown." (transcribed from Cockerell). Hab.: Thailand (Siam) . . . . . habropodae

— . Integument of abdomen at least with basal portion of first two segments dark brown or black and clothed above with appressed, light brown to brownish black or black tomentum, the hairs varying in length: either short and simple, or longer and finely branched; integument of distal portion of tergites often more or less ferruginous, and if so, then distal portion of antennal scape clothed in front with long, raised, pale pubescence 2



Map II. Distribution pattern of the melectine genus *Protomelissa* superimposed on the eastern range of the suspected anthophorine host genera *Habropoda* and *Elaphropoda*

2. Dense pubescence covering thoracic segments above unicoloured brownish- to orange-yellow, ferruginous, or xanthine-orange, composed of long, finely branched raised hairs 3
— . Dense pubescence covering thoracic segments above bicoloured and composed of still longer, finely branched, raised hairs: either pale yellow with a transverse blackish brown median pubescent band between the wings, or else, dark brown anteriorly as far back as base of scutellum, and canary-yellow posteriorly 6
3. "Integument of abdominal segments above and underneath red-brown, the bases black; tergites finely punctate, dullish, with slight metallic reflex; pubescence short, reddish, felt-like; apex of tergite 7 of male straight cut off. Labrum squarish, anterior margin shallowly emarginate. Antenna red, second flagellar segment (3rd antennal) much shorter than third (4th antennal), all flagellar segments of simple structure. Head and thorax above clothed densely with long reddish yellow ("rot-gelb") pubescence. Legs blackish brown. Female unknown." (transl. from Friese). Hab.: Taiwan (Formosa) . . . . . iridescens
— . Combined characters not as above. Inner ramus of mid and hind tarsal claws short, thin, and almost square; tarsal arolia conspicuous 4
4. Pubescence on dorsum of abdomen short and sparse, mainly dark, hairs not plumose and not concealing surface, contrasting strongly in colour with long, feathery, bright orange-red pubescence on head and thorax. Antennal segment 3 a little shorter than 4 (male), or more markedly so (female) 5
— . Pubescence on dorsum of abdomen short, but much denser, mainly light brown, forming more or less distinct colour bands of appressed plumose hairs partly hiding the surface and not much different in colour from the long, feathery pubescence covering head and thorax. Labrum emarginate anteriorly. Apex of tergite 7 of male bituberculate, the approximated lobes separated by a crescentic emargination. Antennal segment 3 subequal in length to 4 (male), or a little shorter than this (female). Hab.: W. Java . . . . . insidiosa
5. Anterior margin of labrum almost straight or very slightly concave. Integument of body and legs reddish- to brownish black. Dense feathery pubescence covering dorsum of thorax capucine-yellow to mikado-orange. Apex of tergite 7 of male produced in two more or less triangular lobes, which are irregularly truncated and separated from each other by a deep U-shaped emargination, which is about equal in size to each of the projecting tubercles. First gastral tergite of female clothed sparsely with short, light ochraceous-buff tomentum, following tergites with very short brownish black hair, 2—4 moreover with transverse lateral patches of light ochraceous-buff tomentum. Hab.: Malay Peninsula . . . . . pendleburyi
— . Anterior margin of labrum distinctly emarginate. Integument of body and legs black. Dense feathery pubescence covering dorsum of thorax bright xanthine-orange. Apex of tergite 7 of male produced in two more or less triangular protuberances separated from each other by a shallow emargination. First gastral tergite of female clothed with short, appressed, ochraceous-orange tomentum forming a narrow, transverse and obliterated band, following tergites clothed sparsely and evenly with brownish black hair. Hab.: Sumatra . . . . . vulpecula
6. Long pubescence covering head and dorsum of pro- and mesonotum dark chocolate-brown as far back as just behind tegulae, all the rest of thorax clothed densely with yellow hairs. Labrum very short, almost twice as broad as long and widest at middle,

anterior margin shallowly emarginate (Fig. 4). Front of antennal scape pubescent, but lacking tuft of much longer raised hairs at distal portion; segments 3 and 4 much longer than broad, 3 only little shorter than 4. Inner ramus of mid and hind tarsal claws short, plate-like, axe-shaped and almost square; tarsal arolia vestigial. Male unknown. Hab.: Assam . . . . . tricolor

— . Long pubescence covering head and thorax mainly yellow, but mesonotum with broad, transverse, blackish brown pubescent stripe between the wings. Labrum much longer and only little shorter than its greatest breadth at base, anterior margin deeply emarginate (Fig. 1, 3). Front of antennal scape clothed densely with pale raised hairs, which in the male form a conspicuous compact brush; segment 3 very short, only about one-third as long as 4 (male), or a little less than half as long as this (female); flagellar segments distinctly crenulated posteriorly (male, Fig. 2), or normal (female). Inner ramus of mid and hind tarsal claws longer, laterally compressed, but claw-like, not squarish; tarsal arolia conspicuous. Scutellar processes glossy black, in the form of long, very robust, slightly divergent, curved thorns, which are occasionally more or less soother-shaped, with adruptly pointed tips . 7

7. Scutellar spines in dorsal view entirely surrounded and hidden from view by very long and dense pale pubescence; no small tuft of long dark hairs just in front of the spines and no dark-tipped hairs just beside tegulae. Labrum a trifle longer and less deeply excised anteriorly (Fig. 3). Apical sternal plates and genitalia of male as in Fig. 7—8. Hab.: from Kumaon (N. India) as far as Shillong (Assam) . . . . . himalayana

— . Scutellar spines in dorsal view not entirely concealed, the black tips remaining partly visible between very long, but slightly less dense, pubescence, which is pale-coloured, save for a small, isolated tuft of equally long dark hairs just in front of the roots of the spines; also a few dark-tipped hairs just beside tegulae. Labrum a trifle shorter and more deeply excised anteriorly (Fig. 1). Apical sternal plates and genitalia of male as in Fig. 5-6. Hab.: Taiwan (Formosa) . . . . formosana

Protomelissa himalayana (Bingham), comb. nov.
(Fig. 3, 7—8)

Melecta himalayana Bingham, 1897, Fauna Brit. India, Hym. 1 : 516, fig. 172 (insect, with left wing), ♀ "Kumaon, 5000 ft., and probably throughout the Himalayas at and above that altitude"

Type material. — N. India (United Prov., Kumaon): 1 ♀ (holotype *M. himalayana* Bingh.), Kumaon, North India, 4.90, Bingham coll. / Melecta himalayana Bingh. ♀ Type (both labels in Bingham's writing) (BM).

Further material. — N. E. India (N. Bengal): 1 ♂ (diss., Fig. 7-8), Kurseong, Nord-Bengal (print), Coll. Friese (print), Anthophora bengalensis Fr. [nom. nud.?], ♂, det. Friese 1913 (MNB). 1 ♂, Dardschiling, 14-16.XI.1929, Dr. Enslin (print), Protomelissa sauteri Friese ♂ ? (in Alfken's writing), Slg. Alfken (print). Sikkim: 1 ♀ (left antenna and most of abdomen missing), Sikhim, Coll. Bingham (print on yellow) (MNB). Assam: 1 ♂ (right antenna missing), Assam, Shillong, 10. 03, Coll. Bingham (print & written on yellow), himalayana Bingh. (Bingham's pencil writing) (ML).

The holotype of this Himalayan bee was studied and redescribed by me in great detail several years before a long-anticipated journey to the Berlin museum could be realised.

It was immediately recognized as a member of Cockerell's equatorial (tropical) genus *Callomelecta* which, as we have seen, is congeneric with *Protomelissa*. Bingham's type agrees in every respect with some additional specimens of *himalayana* from Northern India in the Berlin museum, listed above. The latter were probably obtained from Bingham on an exchange basis, since Alfken labelled one of them as *P. sauteri,* with a query. These Himalayan bees are, indeed strikingly similar to the species described by Cockerell and Friese as *Melecta formosana* and *Protomelissa sauteri,* respectively. Both are easily distinguished from other species by the bicoloured, long-fleeced thorax pubescence and shorn, orangish body segments. As a matter of fact, *P. himalayana* and *formosana* are undoubtedly very nearly related and so closely similar to one another that they may be only geographical representatives of but one species. The pubescent colour pattern is almost the same, and the internal genital organs of the males are practically identical. Added to this, even in the shape and relative lengths of the antennal segments no differences whatsoever could be detected between them, the presence in both of a conspicuous hair-brush at the antennal scape of the male being particularly striking. Despite all this, I prefer to keep the two species apart on the basis of the characters enumerated in the key. For the rest, see the specific description of *P. formosana* (Ckll.).

Protomelissa formosana (Cockerell) comb. nov.
(Fig. 1—2, 5—6)

Melecta formosana Cockerell, March 1911, Ann. Mag. Nat. Hist. (8) 7 : 227—228 (♀ Kosempo, Formosa, 1908, Sauter).

Anthophora sauteri Friese, 15 May 1911, Verh. Zool-bot. Ges. Wien. 61 : 127—128 (♂ Tainan, Formosa). — ? Strand, 1913, Suppl. Ent. 2 : 51 (♀ Taihorin and Hoozan, Formosa; note).

Protomelissa sauteri Friese, 1914, Dtsch. Ent. Z. : 323—324 (♂ ♀ Tainan and Takao, Formosa).

Type material. — Taiwan : 1 ♀ (holotype *M. formosana* Ckll.), Formosa, Kosempo, II.08, Sauter S.V. (print on yellow), Melecta formosana Ckll. Type (in Cockerell's hand), Type (print on light red) (MNB). 1 ♂, left hind leg missing (holotype *A. sauteri* Fr.), labelled Tainan, Formosa (written); Anthophora sauteri Fr. ♂ det. Friese 1913 (both names in H. Friese's writing); Type (print on dark red) (MNB).

Further material. — Taiwan : 1 ♂ (diss., fig. 5—6), Formosa, Takao, 12.1908, Sauter (print), Protomelissa sauteri Fr. ♂, det. Friese 1913 (MNB). 2 ♀, Formosa, Takao, 1908/9, Sauter (print), Protomelissa sauteri Fr. ♀, det. Friese 1913 (in H. Friese's writing) (MNB, ML).

Here follows first, for completeness' sake, the original description of *Melecta formosana* Cockerell:

"♀. — Length about 14 mm.

Black, the abdomen stained with reddish, the hind margin of second segment broadly clear ferruginous; head and thorax with abundant long pale ochreous hair, but very long dark brown hairs on vertex and at extreme sides of face, and thorax with a broad band of dark chocolate-brown hair between the wings, also a little brown hair just below the base of the wings, and a large tuft of the same at the base of each of the very long, curved, acute scutellar spines; legs very dark reddish or reddish black, with ochreous pubescence and ferruginous spurs; hind basitarsus straight; tegulae margined with ferruginous. Wings very brown, though translucent; abdomen broad conical, without

spots, but covered with very fine appressed fox-red pubescence. Mandibles dark red except at base and apex; labrum broadly emarginate at apex; clypeus minutely granular, the linear margin shining; flagellum dark reddish; fourth antennal joint much longer than fifth, but not nearly twice as long; mesothorax shining, with strong separate punctures; apical plate of abdomen extremely narrow. Close to *M. himalayana,* Bingham, but differing in details of sculpture and pubescence.

Hab. Kosempo, Formosa, 1908 (*Sauter*). Berlin Museum.

This is an example of a Formosan species resembling a Himalayan one. The genus is new to Formosa."

General appearance of *P. insidiosa* (Lieft.) and *vulpecula* (Lieft.) (Pl. 1 Fig. 1—2), but vestiture of head and thorax still longer.

Male. — Labrum (Fig. 1) light brown; disk somewhat hollowed out above, the bilobed distal portion slightly upturned, free margin thin, nearly sharp; surface rather shining, superficially reticulate-punctate, sparsely clothed with very long, raised and forward directed, silvery-yellow bristles, the fringe at free margin composed of more closely set, shorter bristles. Maxillary palpus not visible (see female). Mandibles slender, chestnut-coloured, the bases and apices dark brown; inner subapical projection small and angular, removed further distad than in *P. pendleburyi* (Fig. 9) and *tricolor;* no inner prominence near base. Antenna (Fig. 2) light to dark brown, surpassing tegula for about the combined length of two apical segments; scape robust, little curved; 2 (pedicel) retracted, annular and of minute size (not shown in Fig. 2 !); 3 in frontal view only about one-third as long as 4, the latter more than twice as long as broad (100 : 41.3);

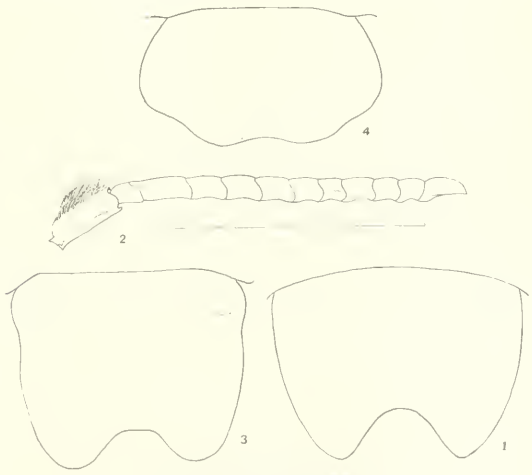


Fig. 1—2. *Protomelissa formosana* (Ckll.), ♂ from Takao, Formosa; fig. 1, dorsal view of labrum; fig. 2, right antenna, posterior view. — Fig. 3. *P. himalayana* (Bingham), ♂ from Darjeeling, dorsal view of labrum. — Fig. 4. *P. tricolor* spec. nov., holotype ♀ from Shillong, Assam, dorsal view of labrum. — Scale-lines of fig. 1, 3 and 4 (labrum), 1.0 mm, of fig. 2 (antenna), 4 mm

5—13 successively shorter, from 3 on feebly longitudinally carinate, increasingly more distinctly nodose distally and clothed with minute appressed hairs, except the scape, which in front carries a dense brush of soft, golden yellow hairs. Clypeus longer and more prominent than in *P. tricolor,* only slightly longer than labrum, but its depth in side view more than half the greatest transverse diameter of eye (6 : 10). Eyes elongate-oval, broadest very slightly in advance of the middle, length-breadth ratio about 100 : 48; inner orbits slightly converging anterad and a little inwardly convex. Long appressed tomentum covering clypeus forming a thick pale silvery-ochreous coating, the hairs becoming long and erect posteriorly on supraclypeal area, around antennae, and on entire genal area, the hairs along eye-margin and at summit of head very long and mixed with brown. A naked, transverse band across ocellar region smooth, shining, and finely superficially punctate; occipital border again fringed with long, raised, yellow and brown hairs. Thoracic sclerites all black and closely punctate, but hidden under the dense pale pubescence, except the basal propodeal triangle, which is conspicuously naked and polished; blackish brown hair band between wing bases well defined, but its posterior limit only a short distance away from the isolated dark tufts at base of scutellar spines. Processes of scutellum long, cylindrical and tapering to a point; they are broadest at base and at first raised, but soon curve gradually backward and a little outward, the tips often rather abruptly pinched and downcurved; colour black. Legs slender, of simple structure, ferruginous to reddish brown; femora rather shining, finely superficially punctate, tibiae and tarsi more closely and coarsely so; outer faces of tibiae lacking spicules. Pubescence short, not very dense, except conspicuous tufts at coxae and trochanters, and long fringes at ventral ridges of fore and mid femora. Wing membrane lightly stained with ochreous, outer border of fore wing more deeply so; neuration very similar to that of *P. pendleburyi* (Fig. 11), but distal portion of fore wing (including marginal cell) less expanded, and second submarginal cell narrower, with its sides more closely approximated costad. Integument of gaster ferruginous to reddish brown, basal portion of segments, when fully extended, dark brown, especially those of 2 and 3. All tergites rather shining basally, the punctation fine, superficial, not very close; brown appressed tomentum increasingly more conspicuous posteriorly, the hairs covering 6 and 7 hiding the surface completely. Tergite 7 tapering rapidly towards apex, which is narrow and shallowly excised. Sternites 1—5 finely punctate, the hind margins straight; 6 more projecting, strongly narrowed, the apex bluntly triangular; pubescence not dense, composed of appressed, decumbent, branched hairs interspersed with few long bristles, except sternite 1, which bears a tuft of long raised hairs at middle. Sternites 7 and 8 as in Fig. 5. Genital capsule 2,0 mm (incl. gonostylus); gonostylus incurved, its sides almost parallel in profile, apex not broadened, evenly rounded off; basodorsal and basoventral processes of small size, *Melecta*-like (Fig. 6).

Female. — Resembles the male in most respects, but differs in the shape and pubescence of the antennae, which are equally long but more slender than in the other sex. Scape slightly curved, longer and less swollen than in male, broadest at apex (length-breadth ratio 100 : 29); long raised shock covering frontal face conspicuous, but much thinner; pedicel short and annular, though fully exposed; 3 in frontal view a little over one-third as long as 4 (but fully one-half length of 4 when measured from behind); 4 almost three times as long as broad (100 : 36), following segments successively a little shorter, but all much longer than in male and not nodose. Maxillary palpus long and slender, about equal in length to three segments of labial palpus, length of separate

segments variable (even in one individual), but first and sixth segments shortest. Body structure, colour and pubescence otherwise practically agreeing with the male, gastral sternite 5 very little prominent, its apical border almost straight. Pygidial plate black, one-third longer than its width at base (3 : 2), forming an almost isosceles triangle; margins very slightly outbent and a little thickened basally, but apex slightly produced, swollen and narrowly rounded off; surface flat almost as far as the tip, finely reticulate, apex slightly downcurved, carrying a low median ridge.

Total length: ♂ ♀ 14.0—15.0 mm; fore wing 8.8—9.7 mm.

The host of *P. formosana* is still unknown. As mentioned before, it is not unlikely that the black- and red-haired *Habropoda tainanicola* Strand, and/or the yellowish brown *H. bucconis* (Friese) [1]) will prove to be the most suitable foster species of the Taiwanese *Protomelissae*.

A nesting site of *H. tainanicola* was recently discovered by my friend T.C. Maa at Neihu, near Taipei, Taiwan. He came across a small colony of this during early summer of 1970, in sandy soil underneath an overhanging rock, not far away from the observer's residence. Repeated visits to this locality during April and May, 1971, yielded a second species, which, though closely similar to *H. bucconis,* surprisingly enough proved to be specifically distinct. The two species nested together in the same "bee village", but the colony of *H. tainanicola* was the most populous of the two, albeit that the males (still undescribed !) had already disappeared. Probably this bee had established itself earlier than the new species, for individuals of either sex were present only of the latter, males even outnumbering the females. Although the nesting site was watched closely for several weeks in succession, no single *Protomelissa* was seen by Dr. Maa. Further observations on the spot will, it is hoped, lead to the rediscovery of the parasitic *Protomelissa formosana* and its allies.

Protomelissa iridescens Friese

Protomelissa iridescens Friese, 1914, Dtsch. Ent. Z.: 324 (♂ Takao, Formosa). — Sandhouse, 1943, Proc. U.S. Nat. Mus. 92 : 592 (selected as type species of *Protomelissa;* not seen).

The unique type of this enigmatic species could not be retraced in any collection including Friese's main collection in the Berlin museum.

The original description runs as follows:

"Wie *Pr. sauteri,* aber Thorax ohne schwache Querbinde, Antenne erreicht nur die Flügelbasis, Abdomen mit Erzglanz.

♂. Schwarz. Kopf und Thorax lang und dicht rotgelb behaart, Kopf fein runzlich punktiert, Clypeus vorgewölbt, Labrum viereckig, vorn schwach ausgerandet, Antenne rot, kürzer, erreicht nur die Flügelbasis, zweites Geisselglied viel kürzer als 3, ohne besondere Knoten. Thorax oben mit flachen, grossen Punkten, stark glänzend, aber Skulptur durch die lange Behaarung verdeckt, Scutellum jederseits mit langem, schwarzem Dorn, der aber vollkommen von der rotgelben Behaarung verdeckt ist. Abdomen fein punktiert, fast matt, schwach erzfarben schillernd, Segmente rotbraun mit schwarzer Basis und rötlich befilzt, Segmente 6—7 stark verjüngt, 7 klein und abgestutzt. Ventral-

1) Both species are represented also on the Chinese continent (Fukien) by well defined, though still undescribed, subspecies.

segmente rot mit schwarzer Basis dicht punktiert, matt, mit glattem, glänzendem und häutigem Endrande, siebentes klein, gerundet. Beine schwarzbraun, gelblich behaart, Tarsen verlängert und braun, Tegulae und Flügelbasis rotgelb. L. 13 mm, Br. 4½ mm. ♂ von Takao, Sauter leg., im September 1908, Formosa (Ost-Asien)."

Friese's statement that the "zweites Geisselglied" (= third segment) of the normally shaped antennae is much shorter than the fourth, would imply that the second segment (pedicel) is well visible in this species, not retracted and easily overlooked, as it is in *P. formosana* and *himalayana*.

Unless the type of this puzzling bee will turn up somewhere sooner or later and prove to be congeneric with *P. formosana* (Ckll.), I suggest that a request be made to the International Commission on Zoological Nomenclature for action to recognize the priority of *Protomelissa formosana* (Ckll.) as the type of *Protomelissa* over Sandhouse's unfortunate selection of *P. iridescens* Friese and give the former practical as well as *de jure* status by suspension of the rules.

Protomelissa tricolor spec. nov.
(Fig. 4)

Material. — N. E. India: 1 ♀, Assam, Shillong, 8. 03, Coll. Bingham (print and written on yellow). Labio-maxillary complex and apical abdominal sternites dissected out and glued on card. The specimen is the holotype (MNB).

Very similar to *P. himalayana* and *formosana,* but immediately distinguished from both by the form of the labrum, absence of a beard-like flocculus at the antennal scape, and by the variegated colour-pattern.

Female (holotype). — Body dark brown; vertex, occiput and most of the thorax black, or almost so. Labrum (Fig. 4) short and broad, side edges obtuse-angulate, apex shallowly emarginate and a little upturned; surface slightly concave, rather shining, coarsely but not very closely punctate and clothed with strong brown bristles, which are much longer than the labrum itself and directed obliquely forward, the apical margin with dense fringe of shorter bristles. Maxillary palpus 6-segmented, slender, segment 3 longest. Mandibles strong, incurved, chestnut-coloured, but dark brown basally and growing darker also towards apex, outer border and dorsal carina with fringe of very long pale bristles; inner tooth distinct, rounded, situated slightly in advance of the apical one-fourth of mandibular length measured along dorsal carina; a second, much lower and rather crescentic prominence at about one-fifth from base. Antennae slender, not quite reaching tegulae. Scape long, slightly curved, little shorter than segments 2—4 combined, rather densely pubescent, especially in front, but hair not longer than half diameter of scape; 3 almost two times as long as its width at apex, this segment only little shorter than the following, which are subequal in length to one another and slightly less than twice as long as broad, 12 obliquely cut off and flattened beneath; 2 and 3 clothed densely with short, raised silky hairs, 4—12 practically naked, the appressed hairs being all but invisible. Clypeus about 1½ times as long as labrum, surface evenly convex, surface dull, very closely punctate; entire face in front of antennae clothed with dark brown pubescence partly concealing surface and mixed with long, erect, finely branched bristle-like hairs. Eyes broader, poles more rotundate, than in *himalayana* and *formosana*

(length-breadth ratio 100 : 56), widest slightly in advance of middle in side view; inner orbits distinctly more converging anterad than in the above species and with fringe of long, dark marginal bristles. Summit of vertex, on either side behind raised frontal crest, with dense tufts of very long, erect, blackish brown feathery hairs, which are almost as long as the antennal scape. A transverse area in front and on each side of ocelli, bare, shining and sparsely punctate; vertex, occipital region as well as genal area, clothed again with dense brown pile. Thorax bulky and of great size, its entire surface including the ventral parts hidden from view by long dense pubescence composed of soft feathery hairs, which form a large subcircular, dark chocolate brown patch occupying the dorsum from the pronotum rearward to somewhat beyond level of tegulae; all around this patch the colour changes rather abruptly to canary yellow, the boundary dividing the two colours being convex posteriorly. Yellow are: the thoracic sides entirely, a narrow area around tegulae, and all of the dorsal parts behind the latter, the hairs being longest posteriorly, projecting at all sides to somewhat beyond base of abdomen, only the propodeum beneath the vestiture remaining hairless. Scutellar processes distinct, short and slightly curved, directed caudad, though barely one-fourth as long as the surrounding pubescence and completely hidden from view. Entire propodeal area polished and impunctate.

Legs ferruginous, femora and bases of tibiae rather more brownish; surface smooth and rather shining. Femora finely and superficially, tibiae more coarsely and closely punctate externally, but lacking strong spicules; intero-apical process at mid tibiae long, curved and flattened; hind basitarsus subparallel-sided, very slightly outcurved. Spurs slender, slightly curved, brown. Inner ramus of fore tarsal claw half as long as outer, compressed, but little broader than this; those of mid and hind tarsi less than half length of outer, flattened and almost square. Arolia globular, of very small size. Pubescence brown, fringes at ventral ridges of femora long and rather dense, though not longer than diameter of femora, on remaining parts shorter, but more dense and silky on external faces of mid tibiae.

Wing membrane yellowish, the distal border light brown, more broadly so and better defined than in *himalayana;* neuration as in that species, except that the second submarginal cell is broader, though the distal side is equally recurved.

Integument of first two gastral segments dark brown above and below, tergite 2 becoming slightly more reddish brown near the end, the exposed portions of following tergites ferruginous, 3 definitely ochraceous-orange and basal areas of remaining tergites somewhat darker than their distal portions. All tergites dull, distinctly more closely punctate than in *himalayana* and *formosana,* the finely branched hairs accordingly more numerous, longest and palest in colour towards apical margins. Hind margins of sternites 1—5 shining, superficially punctate, punctures fine and sparsely distributed, much as in *formosana,* but pubescence shorter and less dense. Pygidial plate reddish brown, more broadly triangular than in the above-mentioned species (length and basal width in the ratio of 100 : 73.7); margins distinctly raised, sides at first a little outbent, then straight, apex narrow, almost squarely cut off; surface flat, rather shining, finely reticulate from base as far as apex, with weak indication of a short median subapical ridge.

Total length: 14.0 mm approx., fore wing 9.5 mm.

Male unknown.

This very distinct species is the second of its genus occurring in the high mountains of northern India.

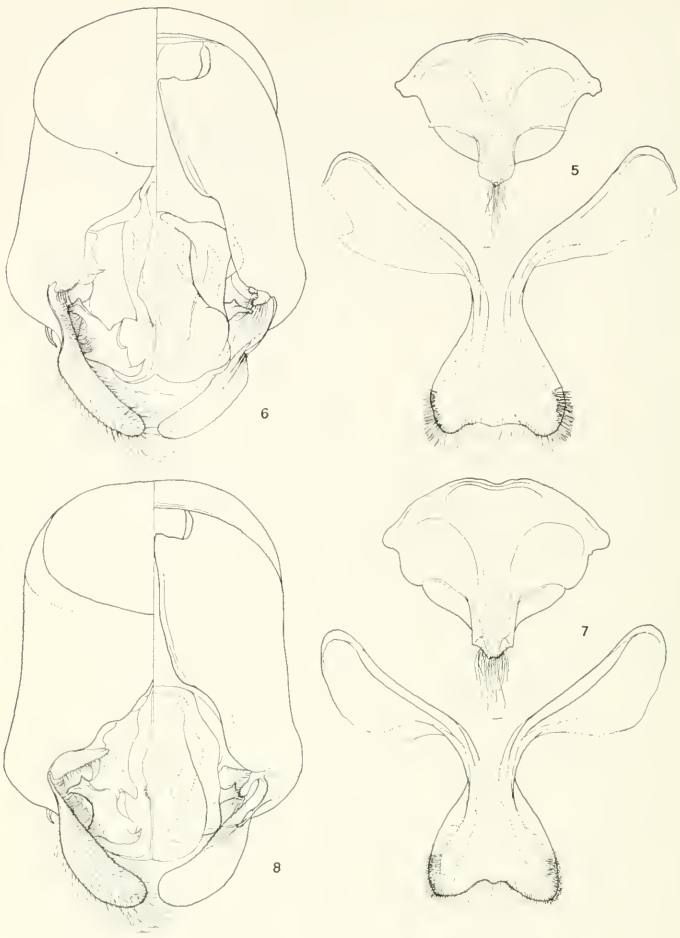


Fig. 5—6. *Protomelissa formosana* (Ckll.), ♂ from Takao, Formosa; fig. 5, sternites 8 and 7, external view; fig. 6, right half of genital capsule, ventral (left) and dorsal view (vestiture partly omitted). — Fig. 7—8. *P. himalayana* (Bingham), ♂ from Kurseong, N. Bengal; fig. 7, sternites 8 and 7, external view; fig. 8, right half of genital capsule, ventral (left) and dorsal view (vestiture partly omitted). All figures enlarged on the same scale

It was taken at Shillong together with *P. himalayana* only two months earlier than this. The two species are almost certainly parasitic on *Habropoda* (and maybe *Elaphropoda* as well). In the collection of the British Museum (Nat. Hist.) I have found a mixed series of similarly labelled *H. radoszkowskii* D.T., *rowlandi* Meade-Waldo, and *turneri* Ckll., all probably collected simultaneously during the summer months (August to October) of 1903, by R. E. Turner.

In connection with the foregoing, it is of particular interest to note that both sexes of one of the latter, viz. *H. turneri,* differ from their congeners by the reduction of tarsal arolium. By a remarkable coincidence this happens to be the case also with the melectine presently described as *Protomelissa tricolor,* which at the same time imitates its possible host by a strikingly similar colour pattern of dark brown, light yellow and orange-red.

Protomelissa habropodae (Cockerell) comb. nov.

Callomelecta habropodae Cockerell, 1929, Ann. Mag. Nat. Hist. (10) 4 : 133 (♂ Doi Sutep. Siam). — Lieftinck, 1944, Treubia, hors sér. : 62, 75, footnote (notes, not seen).

I have not seen this species, but it is evident from the description that *habropodae* is congeneric with the preceding, i.e. the type species, *Callomelecta pendleburyi* Ckll., described a few years previously. It should be transferred accordingly to *Protomelissa,* with which Cockerell already had suggested an apparent relationship.

The original description follows:

"♂. — Length about 9.5 mm.

Head and thorax black, abdomen shining bright clear ferruginous, legs dusky red. Clypeus black, but densely covered with appressed pale hair; antennae brown below, practically black above, scape large and stout; flagellum not very long, barely reaching tegulae, apical joint curved; top of head, mesothorax, and scutellum polished; thorax with abundant long erect fulvous hair, not mixed with black; tegulae ferruginous. Wings brownish; marginal cell going far beyond third cubital; basal nervure going a considerable distance basad of nervulus; second cubital cell greatly contracted above, bulging on outer side, receiving recurrent nervure about the beginning of its last third. Abdomen with short appressed pale fulvous tomentum on apices of second and following segments.

Siam: Doi Sutep, on summit, Feb. 9, 1928 (*Cockerell*).

It was flying with many *Habropoda sutepensis,* which it greatly resembles, and on which it is doubtless parasitic. The genus was based on a very different-looking species from the Malay Peninsula. An apparently related genus, with much longer antennae, is *Protomelissa,* Friese. It contains two species, occurring in Formosa."

It is worth mentioning that *Habropoda sutepensis* Ckll., 1929, is neither an *Elaphropoda* nor a true *Habropoda,* as these genera are presently understood. It belongs to a group of Eurasian species nearly related to *Emphoropsis* Ashmead, which can probably be segregated from the latter and placed in a genus (or subgenus) of its own. This is remarkable, because the hosts of two Malaysian species of *Protomelissa,* as far as we know, are members of *Elaphropoda.*

Protomelissa pendleburyi (Cockerell) comb. nov.
(Fig. 9—16)

Callomelecta pendleburyi Cockerell, 1926, Ann. Mag. Nat. Hist. (9) 18 : 621—622 (gen. et spec. nov., ♀ Selangor, Malaya). — Lieftinck, 1944, Treubia, hors sér. : 62—68, fig. 1—9 & 75—77, key ♀ ♂ (incl. ♂ allotype, Perak and Pahang, Malaya).

Hab.: Malay Peninsula.
No new material.

Protomelissa vulpecula (Lieftinck) comb. nov.
(Pl. 1 Fig. 2)

Callomelecta vulpecula Lieftinck, 1944, Treubia, hors sér. : 68—71, pl. 42 fig. 1—2 & fig. 10—16, & 75—77, key ♀ ♂ (♀♂ Sumatra).

Hab.: Sumatra.
No new material.

Protomelissa insidiosa (Lieftinck) comb. nov.
(Pl. 1 Fig. 1)

Callomelecta insidiosa Lieftinck, 1944, Treubia, hors sér. : 71—75, pl. 42 fig. 3—4, fig. 17—22, & 75—77, key ♀ ♂ (♀♂ W. Java).

Further material. — Of this very rare species I collected a number of additional specimens in the mountain forests of West Java. Practically all were caught on flowers of introduced and wild Balsam (*Impatiens*), viz., 1 ♂ (topotype), W. Java, Puntjak pass, 1450 m, Telagawarna, 18.III.1953, on *Impatiens chonoceras* Hassk.; 9 ♂ 1 ♀, W. Java, N.E. slope of Mt. Pangrango, ca. 1200 m, Tjisarua-zuid Estate, 16, 23 and 28.IV.1950, 29.V.1950, and 17.VI.1950, all in close vicinity of each other on *Impatiens platypetala* Lindl., in open spaces along mountain trail. A year earlier, while collecting in the same place (7.VIII.1949), a single female of *Elaphropoda erratica* (Lieft.) was captured, the second known example of an extremely rare species whose male still remains to be discovered. Previous collecting records at nearby Telagawarna strongly suggest a parasite-host relationship between *P. insidiosa* and *E. erratica* (see Lieftinck, 1944 : 75, and 1966 : 156).
Hab.: Java.

Pseudomelecta Radoszkowski, 1865

Pseudomelecta Radoszkowski, 1865, Horae Soc. Ent. Ross. 3 : 55, pl. 1 fig. 2 (insect). — Alfken, 1937, Konowia 16 : 175 (key). — Linsley, 1939, Ann. Ent. Soc. Amer. 32 : 434 (partim: composite key with *Thyreus* sp. aff. *sibiricus* (Rad.). — Michener, 1944, Bull. Amer. Mus. Nat. Hist. 82 : 287. — Popov, 1955, Trudy Zool. Inst. Akad. Nauk USSR 21 : 323—326 (genus restricted, diagn., distrib., figs.). — Lieftinck, 1968, Zool. Verhand. Leiden 98 : 54, 56 (notes). — Osychniuk, 1970, Inst. Zool. Akad. Nauk Ukrain. SSR, 12 (4) : 49 (key).

Type species: *Melecta diacantha* Eversmann, 1852.

Prior to Popov's account (1955), this genus has been misunderstood by several authors, including Radoszkowski in his later works. *Pseudomelecta* in its restricted sense was redefined by Popov, who, on the basis of the original diagnosis and coloured picture, removed *Pseudomelecta baerii* Radosz., 1865, from it. This was thought by him to be

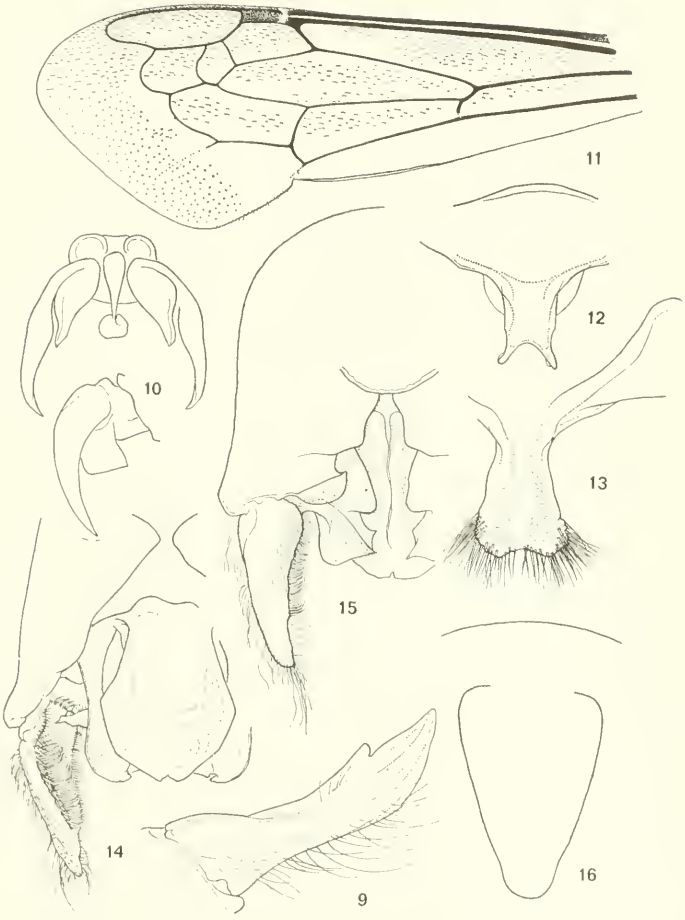


Fig. 9—16. *Protomelissa pendleburyi* (Ckll.), ♂ and ♀ from Perak and Pahang, Malaya; fig. 9, right mandible of ♂, external view; fig. 10, hind tarsal claw of ♀, caudal and lateral view; fig. 11, left fore wing of ♀; fig. 12, sternite 8 of ♂; fig. 13, sternite 7 of ♂; fig. 14, left half of genital capsule, posterodorsal view; fig. 15, right half of genital capsule, ventral view; fig. 16, pygidial plate of ♀, dorsal view. After Lieftinck (1944)

a true *Melecta,* and from an examination of the type of *baerii,* this indeed proves to be so. The same is true for two other melectines doubtfully referred to *Pseudomelecta,* viz. *M. corpulenta* F. Mor. and *nivosa* F. Mor. An analysis of these three species will, it is hoped, be given in my forthcoming revision of the genus *Melecta.*

Popov argued that only three species should be included. These are the type species, *P. diacantha* (Eversm.), *fuscipennis* F. Mor. and *atripes* F. Mor. He gives good figures of the male terminalia of *diacantha* and new localities for *fuscipennis* and *atripes,* but of the last two no descriptions are supplied. In the following account one, *P. fuscipennis transcaucasica* Popov, 1955, is left out of consideration. This subspecies was based on a single female in Morawitz' collection which came from Kazikoporan; it was poorly characterized and could not be recovered in Popov's collection at Leningrad. As to *P. atripes,* I must refer to the original description and my own observations on the type, which are, however, too incomplete to admit of its inclusion in the key. On the present occasion two species are added to those already known, making a total of five. Nevertheless, by the exclusion of *atripes* and *transcaucasica,* the absence of the male of *P. chalybeia* sp.n., and of the female of *P. atroalba* sp.n., our knowledge of the genus still remains incomplete.

A peculiarity not mentioned in the description, but shared by all members, is the well pronounced limitation of the pre- and postgradular areas of the gastral tergites 2—6 (♂) and 2—5 (♀). The former are more strongly elevated than usual at their posterior margins, the raised graduli being convexly outbent on either side just in front of the pubescent spots so as to give the tergal surfaces a rather uneven appearence.

Summarizing the key characters, the species can be distinguished from small-sized members of *Melecta* by a combination of the following characters:

(1) partial or complete absence of pubescence on mesonotum, scutellum and parascutella, coupled with deeply sulcate sutures between the latter and fully exposed scutellar processes;

(2) closely punctate gastral tergites carrying spots which are removed far inward, away from the lateral margins of segments;

(3) absence at base of gastral tergite 1 of a lateral tuft of longer, raised hairs;

(4) characteristic shape of sternal plates 7 and 8 of male.

Among the melectini of the Western Hemisphere, the nearctic *Melectomorpha* Linsley, 1939, seems to come rather near *Pseudomelecta,* although the few known members of the former have a different facies. By the most recent authors (Hurd, 1953), *Melectomorpha* is considered a subgenus of *Xeromelecta* Linsley, 1939, but in the writer's opinion would better stand as a distinct genus. *Pseudomelecta* differs from *Melectomorpha* by having unidentate (not bidentate) mandibles, longer (6-segmented) maxillary palpi, very dissimilarly formed scutellum and parascutella, and also in the more oval shape of the marginal cell, which in *Melectomorpha* is subtruncated at the apex. Linsley (1939) compared the type species, *M. californica* (Cresson), with an example of the supposed Siberian *Pseudomelecta diacantha* (Eversm.) which he had received from Cockerell. He arrived at the conclusion that these bees were not congeneric, in which he was certainly right. As has been pointed out by Popov (1955), however, the bee sent by Cockerell was a mis-identified species of *Thyreus,* probably *T. sibiricus* (Radosz.), or a near ally. This is evident from Linsley's table of genera (loc. cit.: 434) in which some (not all !) of the characters given for the Asiatic *Pseudomelecta* are in agreement

with those of the *Thyreus sibiricus* group. The same species (or a near relative of *T. sibiricus)* was also mistaken for *Pseudomelecta diacantha* by Friese (1895). It must be admitted that these bees are easily confounded, resembling each other superficially in a surprising way.

The following key may prove helpful to recognize the four species that could be studied in greater detail.

Key to the species of *Pseudomelecta*

1. No traces of white pubescent spots on abdomen, which is black, almost bare, with distinct steely blue and/or low purple reflections. Head, thorax above and legs, deep black, very shiny, clothed with erect, mainly black, pubescence not concealing surface on any part, hair longest on upper face, occipital crest, mesonotum anteriorly, and sides of metanotum. Scutellum not much swollen above, feebly biconvex, with dorsoventrally flattened, acute, triangular spines, which are slightly raised and directed straight back (Fig. 31). Legs, except femora dorsally, covered sparsely with long black hairs, lacking dense pubescent patches, surface shining. Wings clear hyaline, but distal two-thirds of fore wing membrane abruptly changing to dark brown, with slight metallic lustre. Male unknown. Hab.: Mongolia . . **chalybeia**

—. Abdomen in both sexes at least with paired white pubescent spots on gastral tergites 1—4, those at sides of 2 and 3 frequently twofold. Wings often obscured, but fore wing bases never abruptly changing from hyaline to dark brown 2

2. Males 3

—. Females (of *P. atroalba* sp.n. unknown) 5

3. Antenna thick, segments 4—12 transverse, distinctly broader than long; rhinaria distinct, transverse, crescent- or hoof-shaped. Legs black, black-haired. Upper surface of head and thorax predominantly black-haired. Distance between white lateral spots on middorsum of gastral tergites 1—4 greater than their own transverse diameter, at least so on tergites 2—4. Apex of tergite 7 narrow, subtruncated 4

—. Antenna distinctly more slender, segments 4—12, even in frontal view, squarish or a little longer than broad; rhinaria indistinct, elongate-oval, feebly impressed. Fore femur interiorly and fore tibia at base, silvery-white. Upper surface of head and thorax with much longish, silky, silvery-white and shortly branched hairs. Mesonotum, scutellum and parascutella shining, all closely punctate, but punctures much smaller than interspaces. Abdomen dull, punctation of all tergites extremely dense and fine, leaving interspaces of hardly one puncture width; all segments above clothed evenly and densely with short, appressed, finely plumose, blackish brown hairs; posterior margins bare, minutely tessellate. White spots on either side of median line on gastral tergites 1—5 very conspicuous and of large size, though not very sharply outlined, distance separating those on 1—4 on middorsum less than their own transverse diameter; spots on 1 either united to form an ill-defined transverse band, or subinterrupted medially; those on 2 and 3 twofold, the innermost largest, oval; all dark and white hairs equally plumose. Scutellar spines strong, slightly laterally compressed and downcurved; median sulcus of concave sloping vertical area, between and behind scutellar lobes, with subtriangular white hair-spot. Fore wing membrane throughout brown with two tiny, hyaline, external spots at apical transverse veins only; hind wing subhyaline, apices slightly obscured. Tergite 7

lacking middorsal ridge, apex blunt, straight or shallowly emarginate. Structural details, Fig. 23—25. Hab.: Turkmenia; Uzbekistan . . . . . fuscipennis

4. Mesonotum, scutellum and parascutella shining, punctation less dense than in *fuscipennis*. Scutellum small, rather pinched, strongly biconvex, with sides markedly converging, deeply hollowed out posteriorly between strongly divergent spines emerging rather abruptly from the lobes as long, slender, acuminate processes, which themselves are impunctate and shiny. Fore wing membrane brown with subhyaline streaks traversing cells lengthwise and with two confluent hyaline external spots at apical transverse veins, the free border beyond veins broadly darker brown. Abdomen shining, all segments evenly, rather superficially punctate, punctures closer and finer than on mesonotum, but smaller than interspaces; apical tergal margins narrowly, the postgradular areas of sternites much more broadly, impunctate. Appressed black pubescence covering dorsal surface of segments much sparser than in *fuscipennis*, the hairs not at all branched or feathery. White spots on 1—4, largest and transverse on 1, progressively smaller posteriorly, the one on 2 twofold, innermost spot largest and transverse, outermost spot small and subcircular, as is also the spot on 4; all hairs finely plumose. Submarginal fringes at sternites 3—6 not very dense, consisting of long, suberect, blackish brown bristles. Tergite 7 lacking middorsal ridge, apex blunt, shallowly emarginate. Structural details, Fig. 17—22. Hab.: Central USSR and Mongolia . . . . . diacantha

— . Mesonotum, scutellum and parascutella lustreless, coarsely, very closely punctate, the interspaces barely one puncture width. Scutellum larger, main body longer with sides only slightly converging, less markedly bilobate and convex above; the lobes tapering gradually into straight, parallel, conical processes, which are more widely apart than in *fuscipennis* and evenly punctate. Fore wing membrane throughout very dark brown, with two minute, ill-defined clear spots at apex of outer transverse veins only; hind wing also darker than in *diacantha*. Abdomen lustreless, all segments very closely and finely reticulate-punctate, punctures much smaller, more superficial, than on mesonotum, and even more numerous than in *fuscipennis*. White spots on 1—4 placed much as in *diacantha*, the first pair subrotundate, those on 2—4 successively smaller and almost circular, the outermost spot on 2 only about one-third the size of inner and still quite some distance away from lateral border. Hind margins of sternites 2—5 shallowly emarginate medially, but more broadly so than in *diacantha* and *fuscipennis*. Tergite 7 with low but distinct middorsal ridge, apex almost squarely cut off. Structural details, Fig. 26—27. Female unknown. Hab.: Armenia; Transcaucasia . . . . . atroalba

5. Dorsum of abdomen dull, lustreless, evenly and very densely clothed with short, appressed, finely plumose, dark brown pubescence; tergites 1—4 on each side of the middle with very compact, sharply defined, snow-white subapical spots, consisting also of plumose hairs; spots on 1 transverse, those on 2—4 circular, but frequently twofold on 2, the innermost spot then much the largest of the two. Head above, prosternum posteriorly, pronotum, mesonotum anteriorly, and scutellum on vertical surface, with rich snow-white pubescence, hairs mostly decumbent and shorter than in male; patches of white also on paraclypeal area, in front of antennae, and at base on outer face of fore tibia; sides of thorax almost bare . fuscipennis

— . Dorsum of abdomen shining, punctation and nature of pubescence exactly as in male: tergites covered sparsely with very short, non-plumose, black hairs; 1—4 on

each side of middle with white subapical spots consisting of plumose hairs, similar in arrangement to *fuscipennis* but less sharply defined, less compact; spots on 2 and 3 twofold, the outermost of these vestigial, the inner on 2—4 subrotundate, placed a little more transverse than in *fuscipennis;* all white hairs finely plumose. Upper part of clypeus, paraclypeal area and rest of anterior surface of head clothed with erect black hairs, those behind antennae at least as long as interocellar distance but not concealing shining punctate surface; vertex almost bare, occipital margin with long fringe of grey-brown. Thorax above mixed black and whitish, hairs more sparsely distributed and longer than in *fuscipennis* and predominantly white on mesonotum anteriorly; no white between scutellar lobes posteriorly. Sides of thorax also clothed with rather long suberect black hairs. Legs entirely black-haired . . . . . diacantha

The length ratios of pterostigma, marginal cell and distance separating the latter from the wing apex, are variable even in individuals of the same species. The average are for *P. diacantha,* 26 : 56 : 100 (♂), 25 : 50 : 100 (♀); *fuscipennis,* 28 : 54 : 100 (♂), 20 : 47 : 100 (♀); *atroalba,* 23 : 54 : 100 (♂); *chalybeia,* 27 : 50 : 100 (♀).

Pseudomelecta diacantha (Eversmann)
(Pl. 1 Fig. 5; Fig. 17—22)

Melecta diacantha Eversmann, 1852, Faun. Volg. Ural., Bull. Soc. Nat. Moscou, 25 : 103 (♂ — not ♀! — "terr. transuralensibus"; "Mongolia", teste Popov, 1955).

Melecta (Pseudomelecta) diacantha, Friese, 1895, Bienen Europa's : 155 (key), 170—171 (excl. German description of ♀ = *Thyreus sibiricus* (Rad.), teste Popov, 1955!).

Pseudomelecta diacantha, Radoszkowski, 1865, Horae Soc. Ent. Ross. 3 : 55—56, pl. 1 fig. 2 (♂ insect) (♂ Transbaïcalie, Irkutsk, Mongolie). — Popov, 1955, Trudy Zool. Inst. Akad. Nauk USSR, 21 : 326 (discussion, distrib.), fig. 1 (wings), 2^{1-5} (♂ struct.). Popov. 1960, Entom. Oboz. Moscou, 30 : 239 (note on type deposition). — Lieftinck, 1968, Zool. Verhand. Leiden, 98 : 54, 56 (notes).

Type material. — Mongolia (?): 1 ♂ (holotype *M. diacantha;* antennae, right fore wing, and all tibiae and tarsi of right fore and both hind legs missing), with the following pin-labels: gold disk; Radack (? print); Alp. Sibir. (print on purple); Pseudo-Melecta diacanth as, Pall. (written, Eversmann's writing ?), ex coll. Radoszkowski Inst. Zool. P.A.N. Krakow 25/57 (print), Pseudomelecta diacantha Rad. (Radoszkowski's writing), det. ex coll. Radoszkowski (print); Typus (written on red) (IZK).

Further material. — Mongolia: 1 ♂ (right antenna and mid legs partly missing), S. Mongoliet 1927, Hutjertu Gol, Sven Hedin Exp. Ctr. Asien, Dr. Hummel (print), 218/51 (print on red), Pseudomelecta diacantha Ev. ♂, det. J. D. Alfken 1934 (NRS). 1 ♂ (diss., fig. 17—18, 20—22), Mongolia, Ulan Bator, dr. Sobeslavsky, Melecta sp. ♂, det. Kocourek (CK). 1 ♀ (antennae missing), Sibir. Altai (print on red), Pseudomelecta diacanth. (same handwriting as ♂ holotype), ex coll. Radoszkowski Inst. Zool. P.A.N. Krakow 25/57 (print), Pseudomelecta diacantha Rad. (Radoszkowski's writing), det. ex coll. Radoszkowski (print) (IZK).

Through the kindness of Miss Dr. M. Dylewska and Dr. St. Bleszynski, I received on loan Eversmann's type of *M. diacantha,* in the collection of the Zoological Institute at Krakow (see Popov, 1960). This turned out to be a male, but the same collection also contains a single example of the undescribed female, which enables me to redefine both sexes along with a few males found in other collections.

Before Popov had visited Krakow to examine Eversmann's type in Radoszkowski's collection, he gave as the typical locality "Mongolia", still believing the specimen to be a female. This should now be corrected, inasmuch as the type is a male, which Eversmann had received from Pallas, originating from the "Siberian Alps" (possibly in Mongolia) and clearly labelled "Type". The specimen was wrongly sexed and unquestionably is the one figured by Radoszkowski, who did not even know the female at that time. According to Popov, more examples have since become known, as appears from his locality list (loc. cit., 1955 : 326), which includes more places in Mongolia and others in the U.S.S.R. (e.g. Hika, Irkutsk, Minusinsk and Tshiba, in southern Siberia).

Male. — Labrum broader than long (about 4 : 3), almost flat, coarsely rugosely punctate basally, disk almost bare and polished, with few large punctures towards apex; anterior border shallowly emarginate with rounded side-angles; surface with few long black bristles, the latter more numerous and shorter at anterior border. Mandibles robust, with strong, subtriangular, blunt interior tooth at about three-fourth length from base. Tongue only little shorter than antenna. Maxillary palpus apparently 6-segmented, but last two joints fused together in dissected male from Ulan Bator (Fig. 18). Malar space smooth and shining. Antenna thick, scape curved, distinctly broadened apically, clothed sparsely with long hairs, impunctate and shining; 3 markedly longer than its width at apex but only slightly longer than 4; all flagellar segments transverse (length ratio of 3—13 as 26 : 20 : 16 : 18 : 16 : 15 : 15 : 15 : 15 : 15 : 14); rhinaria on 3—13 deeply impressed, transverse, crescent-shaped, the one on 3 oval. Face moderately prominent, depth in side view more than half greatest diameter of eye (ratio 3 : 5). Clypeus and dorsal surface of head closely punctate, interspaces rather shining but barely one puncture width on clypeus and frontal area, punctures on vertex larger and more widely spaced. Pubescence black, erect and rather dense, especially on antennal area, but nowhere hiding surface, hairs about half as long as diameter of eye; vertex almost bare, but long black hairs are present on occipital area and under surface, those at occipital border partly whitish. Dorsal surface of thoracic segments shining, less closely punctate than on head, all punctures smaller than smooth interspaces, centre of mesonotum with small, almost impunctate area on either side of impressed median line at level of anterior margin of tegulae; parapsidae short, indistinct. Basal portion of tegulae coarsely striato-punctate, distally smooth. All of the thoracic sides closely rugosely punctate, punctures larger than interspaces; posterior parts behind scutellum dull, closely punctate except smooth stripes bordering propodeal triangle. Pubescence of thorax rather long and dishevelled, mostly black with whitish hairs intermixed on anterior portion of mesonotum, in front of tegulae, pure white and tufty at lateral metanotal area; at sides and underneath erect, not very dense, entirely black. Legs black, entirely black-haired; femora densely punctate, lower ridges fringed sparsely with rather long hair; outer faces of fore and hind tibiae shining, those of mid tibiae dull, the external pad dense, covering almost entire surface, hair short, very dark brown; outer face of hind tibia impressed and shining at apex, covered towards the end with short thick spicules, but margin convexly rounded and a little upturned; hind basitarsus straight and parallel-sided, clothed with long hairs; inner ramus of tarsal claws shorter than outer, on fore legs only little broader than this, but those of mid and hind legs broader, though not definitely truncated or axe-shaped, the tips being acute (Fig. 19). Marginal cell of fore wing rounded at both ends. Distal side of second submarginal cell rudimentary in left fore wing of holotype (right fore wing missing), this cell in the other males variable, occasionally very narrow, with sides almost

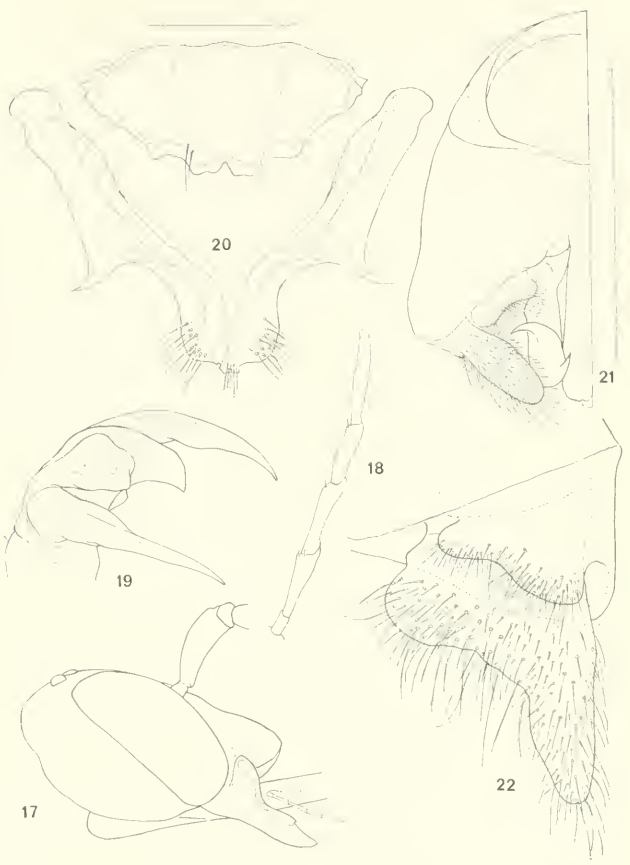


Fig. 17—22. *Pseudomelecta diacantha* (Eversm.), ♂ from Mongolia; fig. 17, head, side view; fig. 18, maxillary palpus; fig. 19, right hind tarsal claw; fig. 20, sternites 8 and 7, external view; fig. 21, right half of genital capsule, ventral view; fig. 22, interior view of left gonostylus, more enlarged, showing ventrobasal process. Fig. 19 after ♂ from Hutjertu Gol, all others after ♂ from Ulan Bator. Fig. 20 and 21 with same scale-lines = 0.5 and 1 mm, respectively

meeting marginal cell in one point; third submarginal a little shorter than high (20 : 22).

Tergite 7 gently tapering, apex rather narrow, feebly bituberculate, whole surface closely punctate and clothed with dark pubescence. Hind margin of sternites 3—5 very shallowly incurved medially; apex of sternite 6 a little produced, bluntly rounded. Sternites 7 and 8 as in Fig. 20, apex of 7 much broader than in the other species. Genital capsule (Fig. 21—22), small, ca 1.2 mm (incl. gonostylus).

Female (unique). — Very similar to male, differing as follows. Labrum subquadrangular, a little longer, length: breadth ratio of 17 : 20; anterior border straight, lacking minute subapical median tubercle. Mandibles with inner tooth robust and broad, placed more proximad, flattened with truncated apex. Maxillary palpus invisible; antennae missing. Nature and colour of pubescence of head and thorax as in male, mesonotum lacking definite white spots dorsally, but hairs partly whitish at the same places as in male. Pubescence shorter and less dense on all parts of legs; hind tibial spurs straight and of almost equal length. Scutellar spines as in male, distance separating them about twice their length, apices slightly downcurved, not acuminate, impunctate and shining. White spots on dorsum of gastral tergites 1—4 in a regular row, those on 1 transverse. Exposed portion of gradually tapered pygidial plate convex, not carinate, dark brown, the rounded apex black. Sternites almost bare and shining; pregradular portions of sternites closely punctate, all postgradular areas broad, finely tessellate.

Pseudomelecta fuscipennis (F. Mor.)
(Pl. 1 Fig. 3—4; Fig. 23—25)

Melecta fuscipennis Morawitz, 1875, *in* Fedschenko's Reise in Turkestan, etc., Mem. Imp. Anthrop. & Ethn. Moscou 19 : 141—142 (♀ ♂ Zaravshan; — in deserto Kisilkum); Morawitz, 1876, Ibid. 21, tab. II figs. 26—27 (♀ ♂ insects, coloured).

Pseudomelecta fuscipennis, Popov, 1955, Trudy Zool. Inst. Akad. Nauk USSR, 21 : 326 (♂ ♀, new locs.; excl. ♀ *transcaucasica* subspec. nov., Zakavkazje, Kazikoporan).

Type material. — U S S R : 1 ♂ (diss., Fig. 23—25), lectotype *M. fuscipennis,* by present designation, Bairakum (print, in Russian), 4 (print on pink), Melecta fuscipennis n.sp. F. Morawitz det. 1875 (print; specific name and year in Morawitz' writing) (ZMM).

Further material. — U S S R : 1 ♂, Seravschan, Katty-Kurgan, Glasunov 1892 (print), F. Morawitz (print), fuscipennis F. Mor. ♂ var. (Morawitz' writing) (ZIL). 5 ♂ 8 ♀ (3 ♂ wrongly sexed by Morawitz!), 2 ♂ of these (one wrongly sexed) bearing gold disks and Sutkent (print, in Russian), fuscipennis Mor. Typ, in Morawitz' writing, the remainder originating from Baigakum nr. Djulek, Turkestan, S. Malyshev leg., Sarafschan valley (1 ♀), and Katty-Kurgan, Glasunov 1892 (all ZIL). 3 ♂, with red labels and identified by F. Morawitz in 1875, with Sutkent Valley (in Russian), one additionally with Karak (in Russian, Morawitz' writing) (ZMM). 1 ♀, 13 (print), Dzhamskoe [canyon] (in Russian), Melecta fuscipennis nov. sp. ♀ (written), F. Morawitz det. 1875 (print; specific name and year in Morawitz' writing (ZMM). 1 ♀, Turkestan, Sarachs, 22.6.1880, Melecta fuscipennis Mor., det. Friese 1896 (MNB). 1 ♀, Ferganah, Ochs, Coll. Hauser 94 (print), Pseudomelecta fuscipennis (Mor.) ♀, det. D.B. Baker (NMW).

The following is an almost verbatim translation of the original Russian diagnosis. "♀. Black, with dark fore wings and almost smooth disk of labrum. Third antennal segment slightly longer than fourth. Head above covered with short white hair; meso-

notum anteriorly partly clothed with similar white pubescence; scutellum alongside and beneath with projecting tuft of fairly long white hair; impression between scutellar spines covered with short hair. Mesonotum and scutellum, with the exception of the aforementioned spots, quite bare. Prongs of scutellum acute, spine-like and rather long. Body punctation on dorsal surface fine and rather dense. Abdomen, especially the first three segments, rather densely clothed with short black tomentum by which its surface is a little shiny only along the hind margins. First four segments with two snowy-white spots situated in front of the hind borders, so that the latter as well as the side portions of the tergites remain quite black. In addition to the large spots on the second tergite, there are also two smaller spots, placed one on either side of the same segment. Legs covered with black hair.

♂. Basal half of mesonotum clothed with fairly long and dense white hairs, clypeus with short silvery hairs. Second, 3rd and 4th tergites usually with 4 white spots, those on the 2nd segment frequently confluent. Segment 1 almost wholly covered with hairs; legs either entirely black, or the tibiae with white hair externally, especially on the mid tibia. Hind margins of the hindermost sternites emarginate; apical border of 7th tergite almost rounded.

Somewhat resembles *M. plurinotata*, from which it can be distinguished by smooth disk of labrum, almost naked scutellum, lustreless (mat) abdomen, dark fore wings and shorter pubescence."

The last paragraph of the original description runs as follows: "This magnificent species is found in the valley of Zaravshan: in the Dzham canyon, 13 May; in Kara-Tube, 20 May. In the steppe Kisilkum near the ruins of Sutkent, 3 May; on Mt. Karak, 7 May, and near Bai rakum, 4 May (700—3200 ft.)."

New localities mentioned by Popov were Aktasta river (Akmolinski distr.); Dzulek on Sir-Darja; Tshangir in Zaravshan; near Kitaba; Ashabad; and Annan.

Two males, one the dissected lectotype (Pl. 1 Fig. 3), are still before me; they resemble each other closely and have the following additional characters in common.

Labrum squarish, rugosely punctate at extreme base, disk almost bare and shining, apical one-third and sides more finely punctate; anterior border straight, with rounded side angles, fringed with brown bristles, the subapical tubercle narrow and distinctly raised. Mandibles with very robust interior tooth placed about midway length. Antennal scape long and strong, curved, as long as segments 3—5 united; 3 and 4 subequal in length. Pubescence surrounding pronotal tubercles and mesopleurae white, rather long but not concealing surface, hairs becoming dark brown laterally and underneath. Posterior spot of appressed white hairs between scutellar lobes; apical fringe at lower ridge and at base on outer faces of fore tibiae, white; for the rest legs are dark brown lacking white hairs. Outer faces of mid tibiae at extreme tip, as well as most of the external faces of the hinder pair, smooth and shining, the latter covered with numerous sharp spicules. Inner rami of all tarsal claws broad, flattened and axe-shaped. Marginal cell of fore wing almost to fully three times as long as broad, apex rounded. Third submarginal cell almost as long as high; sides of second submarginal strongly converging anteriorly, fused together and shortly stalked before reaching anal side of marginal cell in both fore wings of the lectotype. White postgradular markings on gastral tergites 1—5 approximated middorsally, as described in the key, those on 4 and 5 more widely separated, on 5 very small and often wanting; spots on 1 frequently united and band-like, but subinterrupted

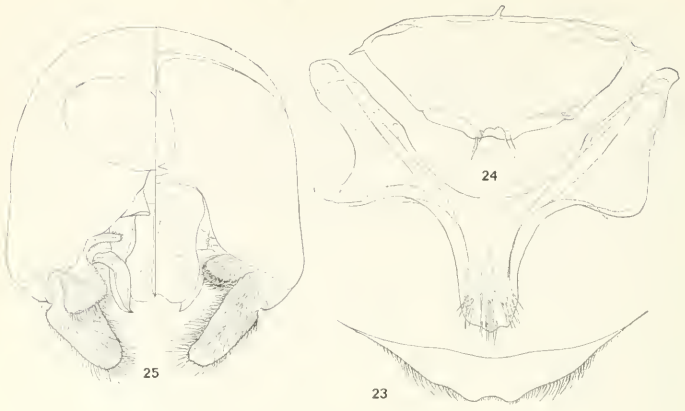


Fig. 23—25. *Pseudomelecta fuscipennis* (Mor.), ♂ lectotype from Bairakum; fig. 23, tergite 7, ventral view; fig. 24, sternites 8 and 7, external view; fig. 25, right half of genital capsule, ventral (left) and dorsal view. Fig. 24 same magnification as fig. 26 of *P. atroalba*

posteriorly in the lectotype (Pl. 1 Fig. 3). Hind margins of tergites 4—6 more broadly impunctate than preceding ones, their surface finely tessellate and rather shining; apex of tergite 7 blunt, almost squarely cut off or shallowly emarginate, whole surface clothed with dark hairs (Fig. 23). Exposed basal areas of sternites 2—6 closely punctate, less densely brushy than in *P. diacantha,* the dark hairs not exceeding hind margins of sternites; distal areas rather shining, finely tessellate; hind margin of sternite 2 very slightly and narrowly, of 3—5 much more broadly and deeply emarginate, distinctly crescent-shaped. Apex of sternite 6 scarcely produced, its margin almost straight. Sternites 7 and 8 as in Fig. 24. Genital capsule (fig. 25), ca 1.5 mm long (incl. gonostylus).

Female (Pl. 1 Fig. 4). — Averages smaller in size than male. Labrum subquadrangular, slightly shorter than its greatest width across middle (17 : 20); basal portion slightly convex, with few punctures, then flat, rugosely punctate, with marginal fringe of strong black bristles; anterior border shallowly emarginate, the subapical median tubercle of minute size. Face little projecting, depth in side view less than half diameter of eye. Clypeus convex, surface slightly shining, closely finely punctate, interspaces about one puncture width, clothed with decumbent dark brown pubescence at base, for the rest hairless. Punctation of dorsal thoracic segments and abdomen much as in male, but punctures even more numerous on all parts, the dorsal surface and sides of thorax accordingly less shining. Integument of legs and abdomen dark reddish brown, not quite black as in *diacantha;* pubescence of legs shorter and less dense than in that species. Shape of submarginal cells variable, but second cell invariably broader than in *P. diacantha,* the fractured anal side longer (as in male); third submarginal distinctly shorter than high (15 : 21). Abdomen compact, entirely lustreless above, the white pubescent spots much more sharply outlined than in *P. diacantha* and often almost circular; postgradular areas

of sternites 1—4 broadly impunctate, all of the exposed surface of 5 and 6 closely punctate. Pygidial plate gradually tapered, with gently rounded apex; surface (except at extreme base) convex, with low median ridge, finely tessellate, side-margins subacute and a little upturned almost as far as apex; colour dark reddish brown, bordered with black.

Measurements variable. Total length: ♂ 12.0—12.5 mm, fore wing 9.0 mm; ♀ 9.0—10.5 mm and 7.5—9.0 mm, respectively.

Hab.: Southern USSR: Turkmenia; Uzbekistan.

In January, 1965, Dr. A. N. Zhelokhovtsev kindly sent to me for inspection the supposed types of this species, a male from Bairakum, here selected lectotype, and a female from Dzhamskoe Canyon, which may be considered lectoallotype, both labelled *M. fuscipennis* by F. Morawitz himself and deposited in the collection of the Zoological Museum at Moscow. These specimens were compared by me in 1968 at Moscow with red-labelled males from Sutkent standing over a drawer label *M. corpulenta,* but also carrying identification labels *M. fuscipennis,* written by Morawitz in 1875. These pinned individuals, along with some others in the Leningrad museum, are undoubtedly conspecific. Although a number of the latter bear witness of having been studied by V. B. Popov, it is unfortunate that none of them were determined by him, and I have also looked in vain for the female from Kazikoporan, on which Popov based the new subspecific name *transcaucasica.*

Morawitz' coloured illustrations of the two sexes of this bee give a good impression of the colour design, although the general aspect of both male and female is more dumpy than would appear from these pictures.

Pseudomelecta atroalba spec. nov.
(Fig. 26—27)

Material. — U S S R : 1 ♂ (diss., Fig. 26—27, holotype), Transcaucasia, labelled Eriwan, 1898, Korb (print), 17 (written) (MNB); 1 ♂ (paratype), with same locality label and Melecta fuscipennis Mor. Kauk., in H. Friese's writing (MNB); 1 ♂ (paratype), Asia min. 1890 (print), 17 (written), Melecta fuscipennis Mor. ♂, det. H. Friese 1900 (Friese's writing) (ML).

Male. — Labrum black, little broader than long (27 : 22), basal tubercles convex, smooth, with few deep punctures; median area of disk impunctate, irregularly rugose (in one ♂ with few coarse punctures), this area somewhat triangularly pointed, ending in a low marginal tubercle; rest of surface closely punctate. Disk of labrum with few raised hairs that become longer and more numerous towards anterior border, which is almost straight. Mandibles with strong, incurved and pointed inner tooth slightly beyond halfway length; bases with numerous closely set fine punctures. Maxillary palpus 6-segmented, 2 and 6 longest, both distinctly longer than each of the intermediate segments. Malar space linear, shining. Antenna shaped similarly to *P. diacantha,* but still thicker, the curved scape shorter and more broadened apically, ratio of length and width at apex 100 : 48 (*diacantha,* 100 : 40; *fuscipennis,* 100 : 31.6); segment 3 only a trifle longer than succeeding segments; rhinaria as in *diacantha.* Face much as in *P. diacantha,* but clypeus more convex. Whole anterior and dorsal surface of head closely deeply punctate, punctures on clypeus, paraclypeal and frontal areas separated by less than one

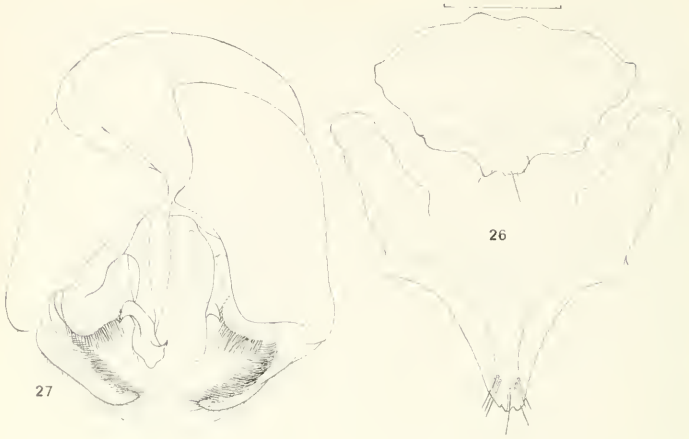


Fig. 26—27. *Pseudomelecta atroalba* spec. nov., ♂ holotype from Erewan; fig. 26, sternites 8 and 7, external view; fig. 27, right half of genital capsule, ventral (left) and dorsal view (ventrobasal process shown in both aspects: dorsobasal process wanting). Scale-line = 0.5 mm

puncture width on dull ground; surface of vertex more shining, with smooth impunctate and impressed areas on each side of lateral ocelli. Punctures more closely set and larger than in both *diacantha* and *fuscipennis*. Pubescence on upper face and antennal area deep black, the erect tufts behind antennae long and dense, hiding the surface from view, behind which the pile becomes sparse, decumbent and mainly silvery, notably on vertex, postoccipital area and occiput; genal area clothed with long, raised black hairs. Texture of thorax as described in the key; all of the sides and posterior parts behind scutellum closely, rugosely punctate, lacking smooth sutural stripes. Pubescence short, sparse and only partly raised, mainly black; thin patches and narrow lines of white decumbent hairs forming indistinct more or less confluent *ms-lpn-als-plsa* spots, are present on dorsal surface; lateral metanotal area and posterior surface between scutellar lobes also shortly white-haired in the holotype (black in the others). Legs black, entirely black-haired; texture and pubescence quite similar to *diacantha,* except that the inner rami of all tarsal claws are in the form of very broad and thin plates, larger and more distinctly axe-shaped than in that species, and even larger than in *fuscipennis*. Venation of fore wing similar to *fuscipennis,* sides of second submarginal cell strongly converging anterad, meeting marginal cell in a single point, or almost so; third submarginal about as long as high. Abdomen short, thick-set, broadly oval, completely lustreless above. Pure white tergal markings on 1—4 only, all spots sharply defined, in a regular row, those on 2 twofold, the outermost of these very small; dark ground on either side of (innermost) spots on 2—4 well visible in dorsal view, as in the allied species. Sternites all black, black-haired; surface densely punctate, the apical strips rather broad, smooth and finely tessellate, the margins very shallowly emarginate at middle; bristles shorter than in

diacantha. Apex of sternite 6 an almost rectangular triangle. Sternites 7 and 8 as in Fig. 26. Genital capsule (Fig. 27) small, ca 1.3 mm (incl. gonostylus).

Total length: 11.5—12.5 mm, fore wing 9.2—9.5 mm.

Female unknown.

A stockily built species, with a large, globular thorax and very dark wings. Distinctive features are the compact ovoid shape of the abdomen, coarsely punctate, dullish black integument, and almost complete absence of white pubescent markings on head and thorax. The sharply defined white abdominal spots are placed much as in the female of *fuscipennis*, but the male of the latter is more profusely white-haired, has much slenderer antennae, and lighter wings. In some respects the new species comes nearer *diacantha*, although this is a more shiny insect, in which the antennae and legs are less swollen than in *atroalba*.

P. atroalba is the most westerly distributed member of the genus.

Pseudomelecta atripes (F. Mor.)

Melecta atripes Morawitz, 1895, Horae Soc. Ent. Ross. 29 : 40—41 (♂ Tschuli, Turcmenia).
Pseudomelecta atripes, Popov, 1955, Trudy Zool. Inst. Akad. Nauk USSR 21 : 326—327 (♂ Topjatan, Uzboi).

Material. — U S S R : 1 ♂, Perevan (transl. form Russian), 26.IV.1889, with illegible writing, coll. Morawitz (print), Melecta atripes F. Mor. ♂ (in Morawitz' hand) (ZIL). 1 ♂, illegible locality (probably Topjatan, Uzboi, leg. D.M. Steinberg, 24.IV.1951, on *Astragalus*, as given by Popov, 1955), Pseudomelecta atripes F. Mor., det. V. B. Popov (ZIL).

Original description. — "♂ 9 mm. Bei diesem Männchen sind Kopf und Clypeus, das Gesicht, das vordere Drittel des Mesonotum und der obere Teil der Mesopleuren weisslich behaart; diese sind fein und dicht runzlig, jenes nebst dem fast kahlen Schildchen spärlicher punktirt, indem die glänzenden Zwischenräume der Punkte meist breiter als diese sind. Zu beiden Seiten des Schildchens steht ein Busch weisser Haare. Die Seiten des Mittelsegmentes, die Brust, die Bauchringe und die Beine sind einfarbig kohlschwarz behaart. Die erste Dorsalplatte des Abdomens hat jederseits eine querovale weisse Haarmakel; auf der 2-ten, 3-ten und 4-ten ist zu beiden Seiten der Scheibe, dem Endrande näher stehend, eine rundliche weisse Haarmakel vorhanden; ausserdem sind noch auf der 2-ten und 3-ten nahe dem Seitenrande sehr kleine, aus wenigen weissen Haaren zusammengesetzte Flecken zu sehen. Die glänzenden Flügelschuppen sind schwarz. Die pechschwarz geäderten Flügel sind dunkelbraun getrübt.

M. fuscipennis F. Mor. ähnlich; diese ist aber grösser, deren erstes Abdominalsegment fast vollständig weiss befilzt; die weissen Haarmakeln der folgenden sind, namentlich die am Seitenrande stehenden, grösser, fliessen auf dem zweiten zusammen; die Schienen des mittleren Beinpaares sind aussen vollständig, die des vorderen am Grunde weiss befilzt.

Bei Tschuli von A. Semenow gesammelt."

Popov (1955 : 326) rightly says that the specimens in the Leningrad Museum do not fully agree with the description, the localities being also different.

Unfortunately, my observations on this species, made while studying bees in the collections of the Leningrad museum in 1968, are incomplete. However, on comparing the

above males with those of *P. diacantha* and *fuscipennis,* I noted the following.

A true *Pseudomelecta.* Very similar superficially to certain Central Asiatic *Thyreus,* but apart from the primary generic characters separating them (e.g., the relative lengths of the first two gastral segments), distinguished by decumbent and at the same time denser and longer white pubescence upon the anterior portion of mesonotum, the deeply concave area between the scutellar spines, and white gastral spots consisting of appressed tomentum. Scutellar processes rather long, directed straight back. Similar to *P. diacantha,* but body of the latter more compact, scutellar spines more closely approximated, the area separating them deeper. Also similar to *P. fuscipennis,* which likewise has a more thick-set body than *atripes,* shorter pubescence and more widely distant scutellar processes, the area between the latter being more densely clothed with felt-like hairs.

The antennae and genital organs of the holotype male will have to be studied before anything definite can be said about the position of this species. In any case it is a much slenderer, more *Thryreus*-like insect than our new species *P. atroalba,* described in the previous pages.

Hab.: Turkmenia.

Pseudomelecta chalybeia spec. nov.
(Pl. 1 Fig. 6; Fig. 28—32)

Material. — Mongolia: 9 ♀, S.W. Mongolia, Aimuk Bajanchongor: N. of Altai-Gobi, S.E. shore of lake Bun-cagan-nur, 7.VI.1962 (1 ex.); Transaltai-Gobi, S. of Argalant Mts., Somon Bajancagan, 9.VI.1962 (6 ex.); same area, oasis Ouro Dzun-mod, 12.VI.1962 (1 ex.); all R. Piechocki, Mongolisch-Deutsche Biologische Expedition 1962. Holotype, Somon Bajancagan, 9.VI.1962, and four paratypes from the above localities (MHW); three paratypes (ML), one paratype (USNM).

Female. — General appearance (Pl. 1 Fig. 6). Labrum deep black, squarish (Fig. 29), rugosely punctate all along extreme base, basal tubercles poorly defined, centred with brown; disk flat, median portion subtriangular in outline, ending in a minute marginal tubercle, surface bare, polished and very shining, with a few scattered punctures; side portions irregularly, closely punctate, sparsely clothed with raised black bristles and a dense comb of shorter hairs fringing anterior margin, the latter shallowly and broadly excavated with a few minute crenations. Mandibles with strong, blunt inner tooth placed at three-fifths to three-fourths distance from base; bases with numerous minute, superficial punctures externally. Malar space linear, surface polished. Proboscis (labio-maxillary complex) when fully extended, longer than antenna (ratio about 100 : 71). Maxillary palpus 6-segmented, 1 very short, 2—4 slender, little more than five times as long as broad and subequal in length, 5 about two-thirds and 6 only half as long as preceding segments. Antenna shaped much as in *diacantha* female, but scape slenderer, a little more than three times as long as its width at apex (100 : 30) and about as long as 3—5 united, clothed sparsely with long black bristles above and below; segments 3—12 all a little longer than broad and subequal in length to one another. Eyes elongate-oval (Fig. 28). Face projecting, depth about two-thirds greatest diameter of eye (Fig. 28); clypeus perfectly flat above, side-edges obtuse-angulate, whole surface shining, striato-punctate, punctures of different sizes, much smaller than interspaces anteriorly, but becoming more numerous upward; frons, vertex, occiput and genal area closely punctate,

the interspaces hardly one puncture width; a crescent-shaped polished area on either side of lateral ocelli. Pubescence of head scanty, rather long, erect and black on upper facial parts, becoming still longer and denser between and behind antennae, the tufts behind antennae consisting of silky, pure white and finely branched hairs; ocellar area almost bare, but occipital area again fringed with longish white hairs; genal area black. Mesonotum with distinctly impressed median and parapsidal lines, the latter not exceeding tegulae in length; surface smooth, very shining, punctation rather deep and irregular, with polished, almost impunctate middorsal areas running lengthwise on either side of median line and also lateral to parapsidal lines, the punctation becoming very dense, leaving no interspaces, anteriorly and at sides of mesonotum. Bases of tegulae with punctures of different sizes. Parascutella more coarsely and closely punctate than scutellum, the surface of which is rugose, partly reticulate-punctate; scutellar spines flattened dorsoventrally, upturned and hollowed out above, with almost impunctate and shining apices (Fig. 31). Metanotum finely rugose, lustreless, the propodeal triangle and lateral parts of same rugosely punctate with slightly shining sutural lines; sides and under surface of thorax throughout closely, very coarsely punctate, the punctures larger and deeper than those on postscutellar parts. Black thoracic pubescence scanty, hairs partly raised, resembling pile of *diacantha,* dorsal surface almost naked, but semierect white hairs longer, forming a pro-mesonotal collar that extends back to as far as base of tegulae; also small tufts of white around pronotal tubercles, at base of parascutella, and longer tufts of white on lateral metanotal area; raised hairs behind scutellum and at sides of thorax shorter, not hiding surface, black. Legs slender, normal; coxae and femora shining, sparsely superficially punctate; armature and pubescence of tibiae and tarsi as in *diacantha;* inner rami of all tarsal claws distinctly broadened, very similar to the last-mentioned species, but shorter and less definitely axe-shaped than in *atroalba* (Fig. 30). Wing venation variable; sides of second submarginal cell of fore wing less strongly converging towards marginal cell than in the other species, the proximal side often straight and distal side in three out of the total incompletely developed; in most females the first recurrent vein approaches the distal side of the second submarginal more closely than in the allied species, and in both wings of one female these veins are interstitial. Third submarginal also variable in shape, but always a little higher than long and occasionally subequal in size to the second. Abdomen shining, all tergites bare, with distinct, though low, metallic blue lustre, the pregradular areas occasionally more greenish and postgradular areas with purplish hue; graduli of 2—5 well indicated, slightly raised, especially at the sides, those of 2—4 distinctly convex posteriorly; all segments closely, finely and superficially punctate, with series of larger punctures intermixed at the graduli; all punctures smaller than interspaces; surface of postgradular areas of 4 and 5 finely tessellate and almost impunctate towards apical margins. Pygidial plate rather broad, surface flat, finely tessellate, apex with distinct, broad and smooth, median ridge (Fig. 32). Sternal surfaces shining and with few longish bristles fringing the undulated boundary between gradular areas; pregradular portions closely punctate on low metallic blue or green ground and with irregular row of large punctures separating them from the distal portions, which are broad, smooth, impunctate and widest at middle, with slight coppery reflections; hind margins of sternite 1 straight, those of 2—5 very slightly concave; sternite 6 finely striatopunctate.

Total length: 10.5—11.0 mm, fore wing 8.5—9.0 mm.

Male unknown.

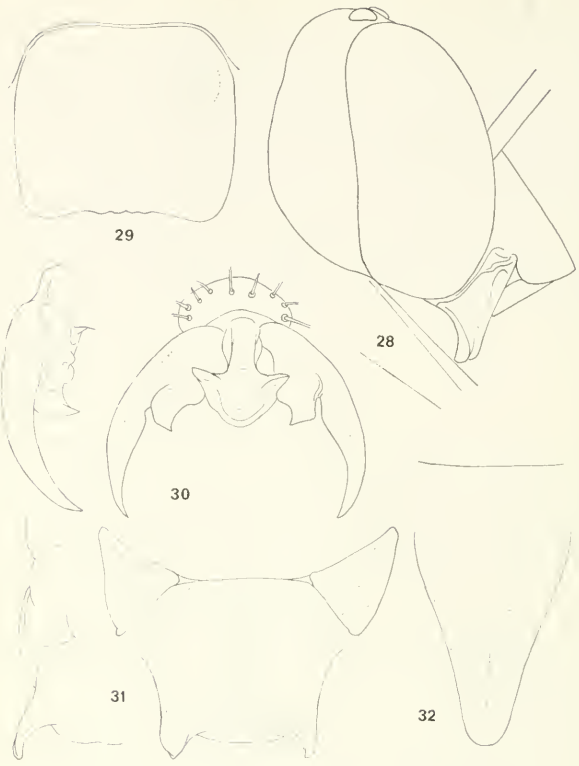


Fig. 28—32. *Pseudomelecta chalybeia* spec. nov., ♀ paratype from Mongolia; fig. 28, right side view of head; fig. 29, dorsal view of labrum; fig. 30, mid tarsal claw, right external and caudal view, setae omitted; fig. 31, scutellar area, right lateral and dorsal view; fig. 32, pygidial plate, dorsal view

This extraordinary species, by its metallic-coloured body and sharply defined wing markings, takes an isolated position among all other melectines of the Eastern Hemisphere. It has no near allies, not even among its congeners, and although it is here placed in *Pseudomelecta* with some misgivings, I can see no sufficient grounds yet for establishing a separate genus to hold it. The absence of a male is unfortunate, for this may reveal characters by which the species differs more appreciably from the other members of the genus.

Nothing, of course, can be said about its host, but it may be mentioned in passing that

a metallic coloured *Anthophora potanini* has been described also from Mongolia by Morawitz (1890, Horae Soc. Ent. Ross. 24 : 353) after a single female measuring 12—13 mm. A second metallic species of the same genus, viz. *A. aeneiventris* Hedicke, is known from the North Pamir Mts. This is likewise of small size, the female described measuring 10.5—11 mm (Hedicke, 1931, Mitt. Zool. Mus. Berlin, 16 : 850—851).

Paracrocisa Alfken, 1937

Paracrocisa Alfken, 1937, Konowia 16 : 172—175. — Sandhouse, 1943, Proc. U.S. Nat. Mus. 92 : 583. — Popov, 1955, Trudi Zool. Inst. Akad. Nauk USSR 21 : 322, 327—329, redefined and amplified, with fig. 2 (fore wing) and 3 (♂ terminalia), of *P. glasunowi* (F. Mor.). — Osychniuk, 1970, Inst. Zool. Akad. Nauk Ukrain. SSR, 12 (4): 49 (key), fig. 23[5] (fore wing).

Type species: *P. sinaitica* Alfken, 1937, ♀ ♂ S.W. Sinai Peninsula.

Paracrocisa was proposed for the reception of a single pair of a peculiar melectine, the proper status of which has long remained a mystery. Owing to the shockingly inadequate generic diagnosis, and of the description of its type species as well, no subsequent records of *P. sinaitica* are to be found in the literature. The identity of the female "Typus" is still uncertain; it was stated by Alfken to be in Kustos A. Kneucker's collection and may have been lost, but the male "Allotypus", selected as such by Alfken, fortunately remained in his private collection. After Alfken's death, this bee came into the possession of the Berlin Museum (MNB). In 1970, while going over Alfken's bees at Berlin with Dr. Königsmann, I finally recovered the specimen in question, whereupon allowance was made to study it in greater detail. This male is here selected lectotype, bearing in mind that a comparison with the type of the much earlier described *P. guilochei* has revealed that the two are very nearly related and may even prove to be conspecific.

Popov (1955) lists five species, but *P. caesareae* (Friese), which he knew only from the description, was wrongly assigned to *Paracrocisa;* it is, in fact, an aberrant member of *Melecta,* whose members will be discussed in a later part of this revision. I have accepted Popov's re-characterization of the genus, as this is based on the nearly related *P. glasunowi* (F. Mor.), at that time the only species with which he was actually acquainted. As we will see, *P. glasunowi* is synonymous with the earlier defined *P. kuschakewiczi* (Radoszk.). This leaves us with three closely allied species, which will be discussed hereafter.

Apart from the generic characters mentioned in the key, the following diagnosis may serve to recognize fresh examples of either sex.

Head. — Labrum about three-fourths as long as its greatest breadth at middle; basal tubercles low but of large size; surface hollowed out medially, coarsely rugosely punctate, its distal half clothed sparsely with raised, usually white, hair; anterior border straight, but margin a little thickened, with small, upturned median tubercle (Fig. 33). Mandible-bases of male often with white hair-spot. Clypeus short and broad, surface convex, very finely reticulate-punctate and in male clothed densely with decumbent, snowy-white, silky pubescence, the hairs becoming longer and upright posteriorly to as far as the level of ocelli; this pubescence much shorter and finer in female, especially on clypeus and supraclypeal area. Vertex closely punctate, except slightly impressed, shiny hairless areas on either side of lateral ocelli. Whole occipital and upper portion of postocular area with raised white hairs, longest in male. Antennal scape with very short appressed white hair in front; flagellum dull anteriorly, smooth and more shining posteriorly.

Thorax. — Dorsum and sides strongly, closely punctate, punctures rather deep and often coalescent, especially on scutellum. This convex, strongly declivous between the processes; the latter varying in length, at most one-third length of main body, parallel or slightly divergent, usually spine-like and pointed. Parascutella triangular, likewise convex. Surface of all posterior thoracic segments including propodeum dull, rather coarsely striato-punctate, lacking smooth areas. Tegulae finely punctate. Male with complete, broad, mesothoracic collar composed of semierect white hairs occupying all of the sides, except almost smooth metepisternum and a small area above mesocoxae; appressed patches on *pls,* longish tufts behind wings and on *lp*. Female lacking mesothoracic collar of longish hair, but instead with isolated spots *lpn-als, ms, pls,* confluent *hypm-deps,* and long posterior tufts as in male, the lower portion of the thoracic sides and venter remaining black-haired.

Legs. — Femora laterally compressed in both sexes, posterior longitudinal ridges obtuse; surface shining, finely superficially punctate, almost naked; outer faces of mid and hind tibiae coarsely rugose, with smooth shining interspaces and beset with strong acute spicules; outer face of hind tibia moreover with small, impressed subapical area.

Wings. — Submarginal cells of fore wing shaped similarly in all species, the area occupied by the first and third being almost the same, the third only little longer than high. Also, the length ratio of pterostigma, marginal cell and distance separating the latter from the apex, differs little among the species (e.g., *kuschakewiczi,* 2.4 : 6.7 : 10; *sinaitica,* 2.2 : 6.1 : 10; *guilochei,* 3.0 : 7.6 : 10).

Abdomen. — Gastral tergites 1—5 or 1—6 (male) and 1—4 (female) with lateral patches of appressed white pubescence, those of 1 extending from base to apex; sternites predominantly black-haired. Tergite 7 of male blunt, apex squarely cut off or shallowly emarginate with slightly raised, rounded side-angles; surface finely reticulate-punctate, clothed with dark appressed pubescence. Tips of dense brushy hairs fringing sternites 3—5 of male slightly upcurved.

The apical sternal plates and genital organs of the male were first described by Radoszkowski, who also noted the peculiar appendage described below as the „membranous flap", at the base of the gonostylus. This structure was considered by Radoszkowski to represent the volsella. He writes: "..... la véritable volsella du forceps n'est pas soudée avec sa branche comme chez la *Crocisa* et la *Melecta,* mais est detachée et forme une partie indépendante", the last observation being quite correct. Popov also gave sketches of the genitalia, but in his drawing (loc. cit., fig. 3[5]), the "volsella" is shown to form part of the gonostylus, which is not the case. I am unable to corroborate Radoszkowski's interpretation of the volsella. The appendages of the genital capsule are probably manifold and may be exemplified for *P. kuschakewiczi,* as follows.

Capsule of large size (2.8 mm, incl. gonostylus); general appearance in ventral and dorsal aspect as in Fig. 41, 43, 45. In ventral view, the gonocoxite carries at its extreme base a pair of small, roundish interobasal lobes, which are closely approximated and placed nearest the median line, forming sclerotised, naked tubercles. Along its entire hind margin, the gonocoxite is bordered by an elongate, semitransparent thin membrane, which extends outward until meeting (and partly overlapping) a heavily sclerotised tubercle, placed on the inside at the base of each gonostylus, this tubercle bearing a tuft of thick, strong bristles. In dorsal view, the gonocoxite is seen to bear three appendages, the smallest of these being an interobasal gonocoxal tubercle carrying a dense apical hair tuft, followed beyond the capsule by a very conspicuous semitransparent scale, which

arises from the inside of the apical margin of the gonocoxite; at its base this parchment-like, incurved plate is partly covered by the broad stem of the gonostylus, but remains completely free from it; the whole surface of this membranous flap is coated with rather long plumose hairs, a dense row of similar fine setulae fringing also its entire margin. In lateral view, the gonostylus is very broad basally, for the greater part membranous, semitransparent and strongly convex externally, forming a naked subtriangular shield, of which only the outer border and narrow apex are darkly pigmented and sclerotised; in dorsal view, the styli are slenderly lanceolate, twisted and incurved, their basal portions almost bare and the rounded tips tufted with long bristles (Fig. 41, 43, 45).

The hosts of *Paracrocisa* are unknown and we can only guess at their identity. Popov (1955) mentions *Anthophora (Paramegilla) semperi* Mor. as the possible foster species. This is not unlikely, because the distribution and phenology of the latter harmonize with those of *P. glasunowi* (= *kuschakewiczi* Radoszk.) in Turkestan and Kazakhstan. The supposed host is a conspicuous white-spotted bee of about the same size, superficially resembling a *Melecta* in certain respects.

Key to the species of *Paracrocisa*

1. Male and female. Integument dark reddish brown, more rarely deep black. Parapsidal and median mesonotal lines markedly furrowed, especially anteriorly. Abdomen almost lustreless, all segments finely tessellate, very closely and superficially punctate, the interspaces about one puncture width; dark pubescence dense, consisting of minute, appressed, finely branched hairs. Male. Apical process at lower margin of hind tibia short, oval and a little upturned, apex hollowed out within, armed with marginal comb of 4—7 short, strong spicules; S-shaped inner hind tibial spur fully twice as long as gently curved outer spur. Lower margin of hind basitarsus without small subbasal prominence, but clothed instead with small patch of appressed, shining, brown hairs (Fig. 34). Subapical brush on gastral sternites 3—5 moderately long, tips of bristle-like hairs not projecting beyond hind margin of sternites. Sternite 6 abruptly narrowed, its apex a little protuberant but hind margin almost truncated; surface slightly impressed, densely pubescent, postgradular area clothed with longer hairs. Apex of sternite 8 bilobed and distinctly emarginate (Fig. 40). Pubescent flap at base of gonostylus more or less trapezoidal, hind margin broadly and shallowly emarginate (Fig. 41). Pygidial plate of female narrowly triangular, almost two and a half times as long as its width at base; sides at first converging and slightly incurved, almost parallel, margins raised and carinated; disk flat, finely tessellate, reddish brown, tip obscured, distinctly swollen, its surface smooth. Hab.: from Turkey to E. Kazakhstan . . . kuschakewiczi

— . Male and female. Integument deep black. Parapsidal and median mesonotal lines only slightly impressed. Abdomen slightly more shining, punctation fine but punctures less numerous, separated by more than one puncture width; dark pubescence accordingly less dense, but otherwise similar to preceding species. Male. Apical process at lower margin of hind tibia longer, more slender and slightly twisted, almost three-fourths length of outer spur, apex carrying 3—5 short, strong spicules; S-shaped inner hind tibial spur less than twice as long as gently curved outer spur. Lower margin of hind basitarsus with small, roundish subbasal prominence, the surface of which is polished and naked (Fig. 36). Subapical brush on sternites 3—5

more conspicuous, composed of thick bristles, the apical ones comb-like with tips projecting markedly beyond hind margin of sternites. Sternite 6 more evenly and broadly rounded, apex only slightly projecting, hairs longer, thicker and more definitely plumose than in *kuschakewiczi*. Apex of sternite 8 squarely cut off, at least slightly produced medially (Fig. 42, 44). Pubescent flap at base of gonostylus narrower, deeply trilobate (Fig. 43, 45). Pygidial plate of female as in *kuschakewiczi*, but tapering more gradually, sides straight with raised margins; apex scarcely swollen, with distinct low median ridge. Hab.: from Israel westward to Morocco . . . . . guilochei and sinaitica

Paracrocisa kuschakewiczi (Radoszk.)
(Pl. 2 Fig. 10; Fig. 33—35, 40—41)

Pseudomelecta kuschakewiczi Radoszkowski, 1890, Hor. Soc. Ent. Ross. 25 : 247—248, pl. II fig. 2—3 (♂ Vernoé = ? Alma Ata sec. Popov, 1955). Radoszkowski, 1893, Bull. Soc. Imp. Nat. Moscou, n.s. 7 (2—3) : 185, pl. VII fig. 41a-c, i & k, ♂ sternal plates & genit. (misspelled *kuchakevitzi*).

Paracrocisa kuschakewiczi, Popov, 1955, Trudy Zool. Inst. Akad. Nauk USSR 21 : 329 (not seen; transferred to *Paracrocisa*, and compar. notes with *P. glasunowi* (F. Mor.). Popov, 1960, Entom. Oboz. Akad. Nauk USSR, 39 : 237—240.

Melecta glasunowi Morawitz, 1895, Hor. Soc. Ent. Ross. 29 : 41—43 (♀ ♂ Koschlagar and Pul-i-Chatun, S. Turcmenia). — Syn. nov.

Paracrocisa glasunovi (sic), Popov, 1955, Trudy Zool. Inst. Akad. Nauk USSR 21 : fig. 2, fore wing and 3^{1-7}, ♂ struct. ♀ ♂, transferred to *Paracrocisa;* compar. notes with *P. kuschakewiczi* (Rad.); addit. descr., distrib., USSR and Iran.

Type material. — USSR : 1 ♂, Uzbekistan, Katta-kurgan, 20.VI.1931, V. Gussakovski (written, transl. from Russian), P. glasunovi Mor., det. V. B. Popov; neotype *Ps. kuschakewiczi* Rad., by present designation (ZIL). 1 ♀, Southern Turcmenia, labelled Pul-i-Chatun, Melecta Glasunowi F. Mor. ♀, in F. Morawitz' writing; Coll. Morawitz (print); lectotype *Melecta glasunowi* F. Mor. by present selection (ZIL).

Further material. — USSR : 1♂ 1♀, Transcaspia, F. Morawitz (in Alfken's writing), both with red label Paratypus (print) and Melecta Glasunovi Mor. ab auct. 1904 (in Alfken's writing), ♂ with additional label Pseudomelecta kuschakewiczi Rad., Mor. sp. ist synonym ? (in Alfken's writing), Slg. Alfken (print) (MNB); 1 ♀, Turkestan, Pul-i-Chatun/glasunovi F. Mor. (in Morawitz' hand) (MNB); 1 ♀, Turcmenia, Gaudan Pass, 5th feet, Transcaspian region, Filipovich 1897 (print, transl. from Russian), det. V. B. Popov (ZIL); 1 ♂ (diss., Pl. 2 Fig. 10 & Fig. 40—41), Turcmenia, ex coll. Morawitz, Melecta sp.? Pseudomelecta, det. Friese 1893, Paracrocisa sp. aff. glasunovi Mor., det. D. B. Baker (NMW); 1 ♀, Russ. merid., Elisabethpol, Kindermann, P. glasunowi Mor., det. D. B. Baker (NMW). Iran : 1♂, N. Persia, Shakhrud, 26.V.1914, Kirichenko (print, transl. from Russian), P. glasunovi Mor., det. V. B. Popov (ZIL). Afghanistan : 1 ♂ (diss., fig. 33—35), N. Afghanistan, Prov. Herat, Wadi-i-Namak Sor, 400 m, 16.VI.1964, coll. O. Jakes (BRNO). Asia minor (Turkey): 1 ♂ 1 ♀, Asia min. 1890, both with Melecta baerii Rad., det. Friese 1900, the ♂ with additional labels Melecta niveipes ! ♂ ♀ det. Enderlein, and Melecta baerii Rad. (Friese's hand) (MNB, ML); 1 ♀, O.-Anatolien, Eski Malatia, 5.7.1937, Ramme leg. (MNB); 1 ♀, Asia min., Naday 1911, Dinek, VI.1926 (MBUD); 1 ♀, Turkei, Konya, 23.VII.1971, Kl. Warncke (CW).

As mentioned above, the copulatory organs of the unique type of this species were dissected out and drawn by Radoszkowski, — presumably one of the reasons why the specimen has become lost or destroyed. It was not present in Radoszkowski's collection of Hymenoptera in the Krakow museum (Popov, 1960), nor anywhere else. The description is superficial, no information being given on the mouthparts, antennae, etc.; but judging from the outline sketches of the scutellum and hind leg, there can be no doubt that Radoszkowski's bee is the same species as the one described as *glasunowi* by Morawitz, some years afterwards. This is evident also from the author's remarks: "..... bords des 4me—5me segments ventraux frangés des poils longs et couchés noirs, mêlés de poils blancs, qui forment une espèce de brosse". The illustrations of the sternal plates and

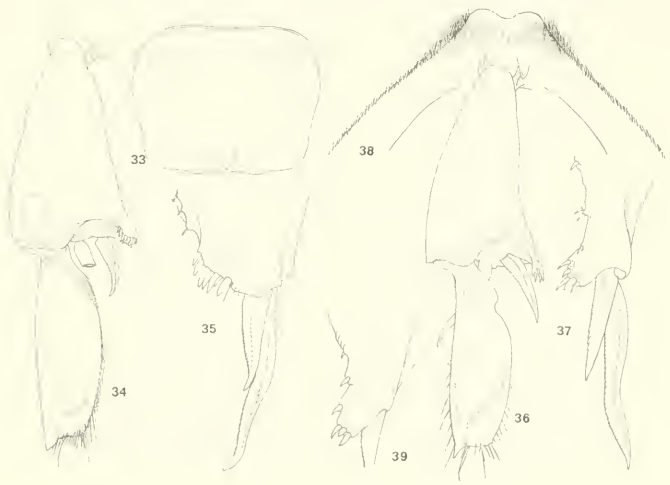


Fig. 33—39. *Paracrocisa* spp., ♂ structures; fig. 33—35, *P. kuschakewiczi* (Radoszk.), from Afghanistan, dorsal view of labrum (33), external view of right hind tibia and basitarsus (34), apex of same right hind tibia, more enlarged, interoventral view (35); fig. 36—38, *P. sinaitica* Alfken, from Gebel Elba, external view of right hind tibia and basitarsus (36), apex of same right hind tibia, more enlarged, interoventral view (37), and tergite 7, ventral view (38); fig. 39, *P. guilochei* (Dusmet), from Morocco, apex of right hind tibia, interoventral view (same magnification as fig. 35 and 37)

genitalia, published by Radoszkowski in 1893, and obviously taken from the same specimen, are excellent and quite decisive. As neotype of *P. kuschakewiczi* I have selected a male in perfect condition from Morawitz' collection in the Leningrad museum, which came as nearly as practicable from the original type-locality. It tallies the original description of *kuschakewiczi,* at the same time agreeing in all respects with authentic syntypic specimens of the same sex identified by Morawitz as *P. glasunowi.*

The original description of male and female *glasunowi* is appropriate and very full,

the characters mentioned being applicable also to the other species, except that the author failed to mention the characteristic thick bristles covering most of the exposed surface of the last four gastral sternites of the male.

The species exhibits but little variation, except in size. The ground colour of head, thorax and part of the legs in the majority of specimens is black, whereas the scutellum, femora and abdomen are definitely dark brown. All individuals appear to be quite mature. In Friese's unlocalized male, the Konya female from Turkey, and the two large males from Iran and Afghanistan, the body is entirely black. Males are more profusely white-haired than females, in which all markings are more sharply outlined. Body shape and pattern of the male are practically as shown in the photograph (Pl. 2 Fig. 7—8)

Fig. 40—41. *Paracrocisa kuschakewiczi* (Radoszk.), ♂ from Afghanistan; fig. 40, sternites 8 and 7, external view; fig. 41, right half of genital capsule, ventral (left) and dorsal view. Both halves of sternite 7 torn apart lengthwise and drawn separately

for *P. guilochei,* the small size of the white spot on the first gastral segment of male *kuschakewiczi* (Pl. 2 Fig. 10) being rather unusual for that species. The brushy hairs on the abdominal sternites are mainly dark brown or black, except laterally at 3 (or 3—4), on which they are at least partly white. For more details, see Morawitz' descriptions.

Size variable. Total length: ♂ 13.0—15.5 mm, fore wing 9.0—12.0 mm; ♀ 12.0—16.0 mm and 9.3—11.0 mm, respectively.

Distribution. — Transcaspian region as far as Alma Ata, and into N. Iran.

Paracrocisa sinaitica Alfken
(Pl. 2 Fig. 9; Fig. 36—38, 42—43)

Paracrocisa sinaitica Alfken, 1937, Konowia 16 : 173—175 (♂♀ Wadi Ab-Orta, Sinai). — Popov, 1955, Trudy Zool. Inst. Akad. Nauk USSR 21 : 329 (not seen).

Type material. — Egypt: Sinai Peninsula: 1 ♂ (lectotype *P. sinaitica* Alfken, by present selection), SO. Sinai, Kneucker (written), Allotypus (print on red), Paracrocisa sinaitica m., det. J. D. Alfken 1937 (MNB).

Further material. — Egypt: 1 ♂, Egypt, Wadi Digla, 29-31.5.1924, Coll. C.B.W. & T.W.K., Min. Agric., Slg. Alfken (ML); 1 ♂ (diss., fig. 36—39, 42—43 & Pl. 2 Fig. 9), SE Egypt, Gebel Elba, A. 8.3.38, H. Priesner (CP); 1 ♀, Egypt, Wadi Hussein, 31.5.1919, coll. Adair, Min. Agric. (MNB). — Israel: 1 ♂, Palestina, Ejn Geddi, 30.3, H. Bytinski-Salz (CBS).

This conspicuous bee is sufficiently characterized in the generic diagnosis and key to the species. See, however, under *P. guilochei* (Dusmet). The lectotype is a worn specimen that has lost most of its white thorax pubescence. A few additional remarks, taken from fresh examples, may suffice to recognize it.

Male. — Characters of *P. guilochei,* but differing at first glance by the greater extent of white markings on all parts of the body. Labrum with the short and slightly raised hairs sparsely distributed, but all white; spot at base of mandibles also more conspicuous. Clypeus and summit of head all white, with narrow, transverse hairless spaces only at sides of lateral ocelli; lower portions of head mixed black and white. Mesothoracic collar more extensive, ill-limited posteriorly, reaching to beyond anterior margin of tegulae, which themselves also are partly white-haired. Knees of femora and outer faces of fore and mid tibiae white from end to end, those of hind tibiae on basal half only, their outer limits oblique, for the rest almost hairless, shining, and sculptured as in *guilochei;* all tarsal segments covered with minute white hairs on a dark ground. Abdominal pattern similar to *guilochei,* but white patches larger and the one at sides of 1 extending further inward at base (Pl. 2 Fig. 9). Ventral surface of abdomen black, except small white patches at sides of 3, or 3—5. Apex of tergite 7 usually shallowly excised, with the rounded angles a little swollen and upturned (Fig. 38). Sternites 7 and 8, and copulatory apparatus, as in Fig. 42 and 43.

Female. — Structurally quite similar to *guilochei,* except that the dorsal process at the apex of the hind basitarsus is not spoon-shaped but triangularly pointed.

The only avialable individual, from Wadi Hussein, is much darker than the male and may not even be conspecific. White marks on head reduced to two thick facial bars, one at each side, extending along margin of compound eyes below and above implantation of antennae, the latter being placed at about midway their lengths; remainder of clypeus and dorsal surface of head black. An additional, circular, dorsolateral white spot is placed at each side behind the eyes. White spots on thorax also smaller than in *guilochei,* like those at base of all tibiae, which are completely isolated, occupying only one-fifth or less of the total external area. Gaster dull, finely black-haired above and underneath. White pubescent spots much smaller than in male and restricted to the sides, the pair on tergite 1 extending from base to apex but shaped like an inverted comma and barely visible from above; spots on 2—4 only little larger, those on 2 and 4 roundish, on 3

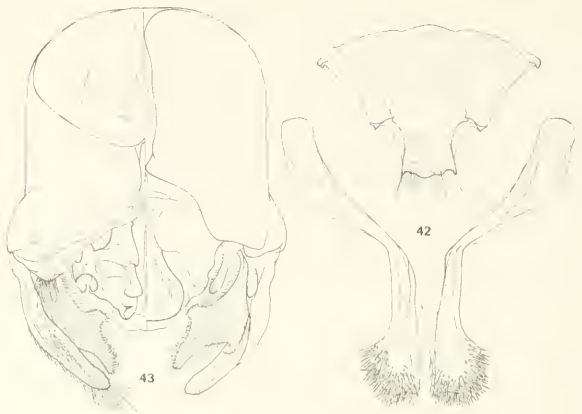


Fig. 42—43. *Paracrocisa sinaitica* Alfken, ♂ from Gebel Elba; fig. 42, sternites 8 and 7, external view; fig. 43, right half of genital capsule, ventral (left) and dorsal view. Both halves of sternite 7 torn apart lengthwise and drawn separately

transverse and constricted at middle, all of them much smaller than the distance separating them on dorsum. Apical border of sternites 1—4 rather broadly, of 5 more narrowly, impunctate, microscopically tessellate and shining, more broadly so than in *guilochei*. Sparse fringe of black subapical bristles as in that species. Pygidial plate not exposed.

Total length: ♂ 15.0—16.0 mm, fore wing 11.0 mm; ♀ 14.0 mm (approx.) and 11.2 mm, respectively.

Paracrocisa guilochei (Dusmet)
(Pl. 2 Fig. 7—8; Fig. 39, 44—45)

Melecta (Pseudomelecta) Guilochei Dusmet Y Alonso, 1915a, Mem. Real Soc. Esp. Hist. Nat. 8 (7a) : 331—333 (♂ Tigui, Marruecos). Dusmet Y Alonso, 1915b, Bol. Real Soc. Esp. Hist. Nat. 15 : 257 (♀ Imi-n-Tanut, Atlas, Marruecos; *Guilochei*, supposition).

Paracrocisa guillochei (sic), Popov, 1955, Trudy Zool. Inst. Akad. Nauk USSR, 21 : 330 (not seen).

? *Melecta transitoria* Pérez, 1896, Esp. nouv. Mellif. Barbarie, Bordeaux : 26 (♂ sine loc., rect. Djebel Bounda, Tunisie).

Type material. — Morocco: 1 ♂ (holotype *M. guilochei* Dusmet, Pl. 2 Fig. 7), with label Tigui (written), Pseudomelecta Guilochei Dusm. ♂ (Typo) Da la colección Escalada (three labels in Dusmet's writing) (IEM).

Further material. — Morocco: 1 ♂ (diss., Pl. 2 Fig. 8 & Fig. 39, 44—45), environs of Melilla, 6.VI.1955, N. F. de Andrade (MZUC); 1 ♀, Maroc, Maharidja, Muséum Paris, coll. J. de Gaulle 1919, with Melecta grandis (unknown hand) (MP); 1 ♀, Morocco: nr. Ouarzazate, 16.IV.1968, J. G. Rozen & E. Suissa coll. (AMNH).

One of the two new Melectini described by Dusmet in his "Apidos de Marruecos", viz. *Melecta Novellai* Dusmet, is conspecific with *M. albovaria* (Erichs.), which is probably best considered a subspecies of *M. punctata* (F.). The second, also unique, is his *M. (Pseudomelecta) Guilochei,* now before me.

With regard to body texture and nature of pubescence, the male of this insect approaches *P. sinaitica* Alfken so closely, that I first considered the differences between them (including those found in the copulatory apparatus) to be of little taxonomic importance. With further material of both coming to hand, this may indeed prove to be so. I am, however, unable to express any opinion about the amount of infraspecific variation that may be manifest in the various parts of the genital organs and other so-called primary sexual characters of these rare bees. No single *Paracrocisa* has yet been found in the coastal provinces between Morocco in the west, and Egypt and Israel in the east, so that possible intermediate forms are lacking. Consequently, I prefer for the present to keep these two species apart. In case of their unison, the name *guilochei* has, of course, priority over *sinaitica.*

A still earlier described species is the enigmatic *Melecta transitoria* Pérez, based on a unique specimen from Tunisia, which could not, however, be recovered in J. Pérez' collection at the Paris museum, and has probably become lost. Its description runs as follows:

"97. *M. transitoria.* — ♂. 11—12 mm. La tête, l'avant et le dessous du corselet couverts de forts poils blancs; 2 taches devant les appendices de l'écusson unies par une traînée latérale à la grande bande antérieure. Dessins de l'abdomen comme chez les *Crocisa,* c'est-à-dire en chevron aux deux 1ers segments; deux taches longues, sinuées, aux trois suivants; au 6e une tache ovale. Écusson très prolongé, émettant deux longues épines. Antennes longues, le 3e article deux fois plus long que large, les suivants une fois et demie. Tibias postérieurs tuméfiés, grossièrement tuberculés, portant au bout un éperon analogue à celui de la *funeraria,* plus long et plus aigu; le prototarse élargi, courbé et creusé. Les deux 1ers segments ventraux à peu près nus et très luisants, les suivants recouverts d'un épais duvet noirâtre, plus abondant aux bords, frisé et relevé au bout, comme chez les *Epeolus.*" — Dr. S. Kelner-Pillault kindly informed me in a letter, that there is a manuscript note in J. Pérez' unpublished catalogue referring to this insect. It says: "♂ juin, Djebel Bounda, Tunisie. Dessin de l'abdomen d'une *Crocisa,* villosité du thorax en partie, écusson tendant aussi à la forme crocisienne".

As follows from the above description, the species may well be identical with *guilochei,* and if so, the name *transitoria* would take precedence of all others, in which case it should be accepted as the proper name for the type species of *Paracrocisa.*

The type of *guilochei,* still in good condition, agrees in almost all respects with the only other available specimen of that sex, both photographed on Pl. 2 Fig. 7 and 8.

Male. — Labrum as in Fig. 33, of *P. kuschakewiczi,* sides with thin apical tuft of raised white hair, the anterior border fringed with black, for the rest almost bare. No white at mandible bases. Antennal segment 3 in both dorsal and ventral view slightly but distinctly longer than 4, which equals 5 in length, the following segments being a little shorter. Clypeus for the greater part hairless (probably entirely white in fresh examples). Raised, finely branched hairs on top of head and mesothoracic collar shorter and less numerous than in *P. sinaitica.* Scutellar processes very short, only one-fourth (or less) length of main body, spike-like and directed straight back. Fore femora with

white posterior fringe, hairs about equal in length to diameter of femur; mid and hind femora covered sparsely with vestigial dark hairs. White appressed patches on outer faces of all tibiae ill-defined distad and occupying basal two-fifths only. Tarsal segments also sparsely white externally, the short hair on inner faces blackish. Ventral pubescence of abdomen, the sternal fringes included, black, except small tufts of white at sides of sternites 3 and 4.

The density of the punctation on the thoracic dorsum and scutellum is obviously unreliable as a specific character, for in the type the mesonotal punctures are practically fused together, whereas in the second male the distance separating them, though much less than one puncture width, is smooth and slightly shining.

Tergite 7 shaped similarly to that of *P. sinaitica* (Fig. 38), apex shallowly emarginate. Sternal plates 7 and 8 as in Fig. 44. Apart from the fact that the gonostylus, as compared with that of *sinaitica,* is more slenderly pointed, the pubescent flap to the inside of the latter also differs somewhat in size and shape. In ventral view, the strongly setiferous ventrobasal process appears to be small and tubercular; seen from within, however, it runs dorsad into the capsule as an elongate ridge at right angles to the main axis of the body. In dorsal view, the dorsobasal process is considerably longer than in *kuschakewiczi,* rod- or finger-like, resembling the shape it has in *sinaitica.* The remaining interior appendages (i.e., penis valves and spatha) are distorted in the dissected specimen and therefore useless for comparison with the other species (Fig. 45).

Female. — Very similar to the male. Disk of labrum with few black bristles, lateral and apical fringes likewise black. Maxillary palpus slender, segments 1 and 6 of equal length, each about two-thirds as long as the remaining segments. Front of antennal scape with short, scanty appressed hairs; 3 hardly longer than 4, length and breadth ratio 3 : 2, succeeding segments only a trifle shorter. Anterior surface of head, with the

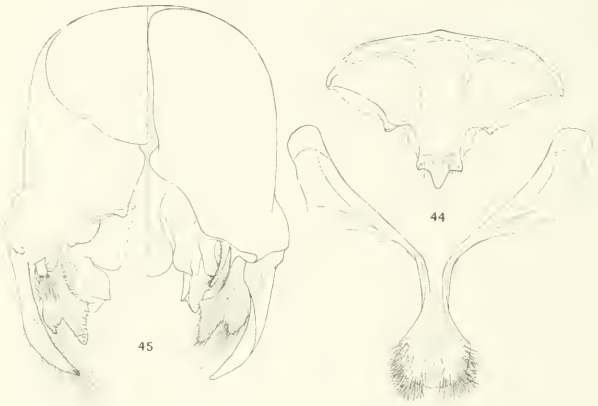


Fig. 44—45. *Paracrocisa guilochei* (Dusmet), ♂ from Morocco; fig. 44, sternites 8 and 7, external view; fig. 45, right half of genital capsule, ventral (left) and dorsal view (penis valves and spatha distorted and shown in displaced position)

exception of bare distal half of clypeus, white, as also a transverse band of longer hairs on vertex (subinterrupted by black in the median line); lower half of genal area and all ventral parts of head, black-haired. Pro- and mesonotum with the usual series of isolated white spots, the hypoepimeral area and upper half of mesepisternum clothed with long white hairs forming a large oval patch; sides for the rest black-haired. Shape, sculpture and pubescence of scutellum, as well as posterior thoracic segments, as in male. Thorax, coxae, femora and abdomen ventrally, black, sparsely black-haired. Outer faces of all tibiae with sharply defined white hair-spot occupying approximately their basal one-third; fore and mid tibiae beyond this finely tessellate-punctate, scantily bristled and strewn with thick spicules towards the end; dorso-apical process at mid tibia long and cylindrical. Hind tibia beyond hair patch smooth and shining, but surface uneven and clad with numerous short, thick spicules on raised tubercles, present also at the broadly rounded hind margin, beyond the subapical impressed area; inner spur only slightly undulated. All tarsal segments black-haired; hind basitarsus almost straight and parallel-sided, ending in a short, spoon-shaped external lobe.

Total length: ♂ 14.0—15.0 mm, fore wing 10.0—11.0 mm; ♀ 14.0 mm and 10.5—11.0 mm, respectively.

According to Dusmet (1915b), the females he received from the Atlas Mts. in Morocco (probably also in the Madrid museum), had lost too much of their freshness to allow of a proper identification. However, since the author compared them with the description of *P. kuschakewiczi,* pointing out also that the proportional lengths of the antennal segments differed from those of the type male of his own species, there can be little doubt that Dusmet's examples were correctly assigned to *P. guilochei.*

Afromelecta gen. nov.

General appearance, Pl. 2 Fig. 11 and 12.

The principal characters of this very distinct genus are enumerated in the key and will be understood more clearly from the specific description and illustrations. Of the three taxa included in *Afromelecta,* unfortunately only the type species can be fully characterized, the structural features of the other two being still incompletely known.

Type species: *Crocisa fulvohirta* Cameron, 1905.

Afromelecta fulvohirta (Cameron) comb. nov.
(Pl. 2 Fig. 11—12; Fig. 46—53)

Crocisa fulvohirta Cameron, 1905, Trans. S. Afr. Phil. Soc. 15 (4) : 247 (♀ Cape). — Friese, 1909, Bienen Afrikas, Jena : 301, 312 (orig. descr. quoted; not seen).

Melecta niveipes Enderlein, 1906, Stett. Ent. Ztg. 67 : 287—289 (Capland 3 ♀; davon 2 ♀ im Berliner, 1 ♀ im Stett. Zoolog. Museum). — Friese, 1909, Bienen Afrikas, Jena : 300—301 (verbatim quotation from Enderlein). — Bischoff, 1923, Deutsch. Ent. Zeitschr. H. 5 : 601 (*E. kobrowi* Brauns a synonym of *M. niveipes* End.).

Epeolus kobrowi Brauns, 1909, Verh. zool.-bot. Ges. Wien, 59 : 10—12 (♀ ♂ Kapland). — Meade-Waldo, 1913, Ann. Mag. Nat. Hist. (8) 12 : 97 (probably a synonym of *E. fulvohirtus* (Cam.)). — Friese, 1909, Bienen Afrikas, Jena : 298 (verbatim quotation from Brauns).

Epeolus fulvohirtus, Meade-Waldo, 1913, Ann. Mag. Nat. Hist. (8) 12 : 97 (probably synonymous with *E. kobrowi* Brauns). — Brauns, 1926, Zool. Jahrb. Abt. Syst. 52 : 206—207 (*M. niveipes* End. and *E. kobrowi* are synonyms).

Type material. — South Africa: ♀, lectotype of *M. niveipes* Enderlein, by

present designation, labelled Capland (print on blue) 31248 / Type (orange), Melecta niveipes ♀ 1906, det. Dr. Enderlein (MNB).

Further material. — South Africa: 1 ♂, Capland (print on blue), 31249 / Type (orange), Melecta niveipes ♂ 1906, det. Dr. Enderlein, with additional label Melecta baeri Rad., det. Friese 1904 (MNB). 2 ♀, Delareg, W. Transvaal, I.1917, Dr. Brauns, one with "3 specimens Epeolus kobrowi Brauns TM" (H.N. Empey's writing (TMJ). 1 ♀, Delareg, W. Transvaal, I.1917 (Brauns's writing), Dr. Brauns / Typus (print on orange), 220.61 (red), Epeolus fulvohirtus Cam. = kobrowi Brauns, det. Friese 1910, Melecta fulvohirta Cam., det. Friese 1909 (NRS). 1 ♀, Bothaville, Orange Fr. St. 25.2.99, Dr. Brauns, Epeolus n. sp., det. Kohl (TMJ). 1 ♂ (genit. diss. by H. N. Empey), 1 ♀, Florida Hills, 12 mi. from Johannesburg, Transvaal S. Afr., 31.XII.66, H. N. Empey, Epeolus kobrowi Brauns, compared with ♂ and ♀ types Transvaal Mus., det. Empey 1970 (ML). 1 ♀, Queenstown, Cape, S. Africa, 16.I.1965, H. N. Empey, Epeolus kobrowi Br., var., det. Empey (ML). 1 ♀, erroneously labelled v. d. Wulp China ? (ML). 2 ♂ (one diss., Pl. 2 Fig. 12 & Fig. 51—52), 1 ♀, Annshaw [?], S. Africa, Barrett 97—92, sub Melecta niveipes (BM). 1 ♀, Africa S. (BM). 1 ♀, Cape G.H. (bold capital print), Smith coll., pres. by Mrs. Farren-White 99—303 (BM). 1 ♀, Natal, Weenen, I.1926, H. P. Thomasset, pres. by Imp. Bur. Ent. 1929—407 (BM).

The type of Cameron's *Crocisa fulvohirta*, in the British Museum (Nat. Hist.) collection, is a discoloured specimen in poor condition. I have not examined this bee, but Meade-Waldo has, who transferred it to *Epeolus* and supposed it to be the same species as *E. kobrowi* Brauns. Some years previously, Friese had already suggested that *Melecta niveipes* Enderlein should also belong here, but Brauns (1926) was the first to establish the full specific synonymy of this remarkable South African bee. When Bischoff (1923 : 601, note) writes: "*Epeolus kobrowi* Brauns ist nach Vergleich der ausführlichen Beschreibung mit den typischen Exemplaren der *Melecta niveipes* Enderlein zweifellos ein Synonym dieser", it is obvious that he was inclined to place it near *Melecta*. In spite of that, Brauns still called it *Epeolus fulvohirtus* (Cameron)! It is of some interest to quote some of Brauns' remarks on this insect which are included in his article: "Ich kann nun mitteilen, dass die drei Arten tatsächlich zu einer und derselben Species gehören, und muss nunmehr dieselbe *Epeolus fulvohirtus* heissen, obwohl der Name völlig unpassend ist, da die Behaarung schneeweiss ist, wie aus Enderlein's und meiner Beschreibung zu entnehmen ist. Cameron hat jedenfalls ein schmutziges oder verfärbtes Exemplar vor sich gehabt; seine Beschreibung ist daher auch fehlerhaft. Die Art ist für einen *Epeolus* sehr gross und aberrant, und kann leicht für eine *Melecta* angesehen werden, deren Habitus sie hat. Sie kommt im Norden von Südafrika, im Orange-Freistaat und Transvaal nicht selten vor und ist ein Parasit der grossen *Anthophora (Habropoda) festiva* Dours. Letztere ist dort eine sehr häufige Biene, findet sich aber auch im Süden der Kapprovinz." (loc. cit.: 206—207). In the British Museum collection the specimens stood over the drawer label *Melecta niveipes* Enderlein, but none of them bear identification labels. The lectotype ♀ and first described ♂ (or allotype) of the latter, in the Berlin Museum, agree in every respect with those in the British Museum and examples in other collections referred to above. *E. kobrowi* was described after 3 ♀ and 2 ♂ taken from December to February in Orangia (Bothaville and Reddersburg) and during January in the Cape Colony (Queenstown). According to Mr. H. N. Empey

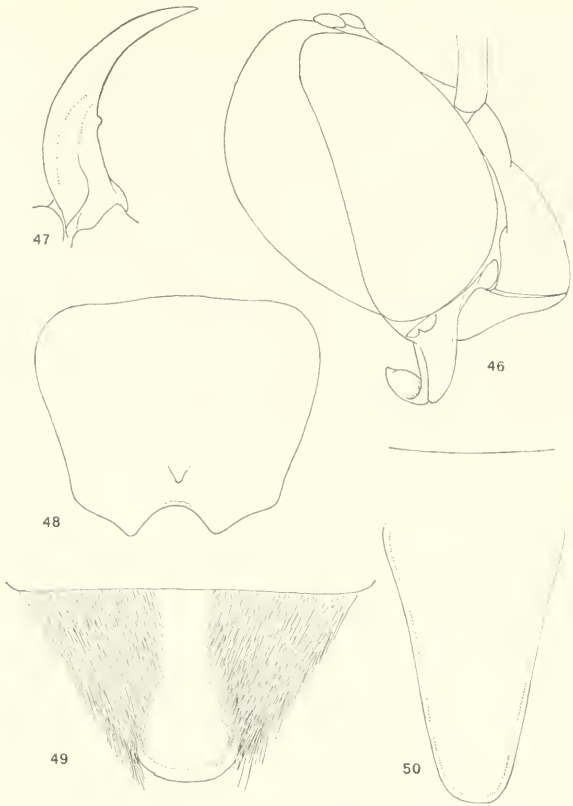


Fig. 46—50. *Afromelecta fulvohirta* (Cameron), ♂ and ♀ from S. Africa; fig. 46, ♀ syntype *E. kobrowi* Brauns, from W. Transvaal, right side view of head; fig. 47, ♀ from S. Africa, dorsal view of left mandible; fig. 48, ♀ from S. Africa, dorsal view of labrum; fig. 49, ♂ from Annshaw, S.A., dorsal view of tergite 7; fig. 50, ♀ from the Cape, dorsal view of pygidial plate

(in litt.), the types (♀ and ♂) are in the collection of the Transvaal Museum (Johannesburg) and compare very well with those taken by himself. The latter were generously presented to me and will be deposited ultimately in the Leiden Museum. Brauns' types, in the type cabinet, bear the nos. 740 (♀) and 741 (♂) and were caught by Brauns at Reddersburg (O.F.S.), 20.XII.1898 and 1.II.1899, respectively, bearing Brauns' identification and type labels.

This conspicuous bee resembles *Paracrocisa* most closely in general appearance and size. The body has the same elongate-cylindrical form, and although the abdominal segments are rather more arched, the gaster tapers to the end in the same way. Apart from the

primary sexual characters, male and female are practically alike, the thorax pattern being almost identical, differing in this respect from *Melecta* and *Paracrocisa* (and *Pseudomelecta* as well), in all of which the sexes are strikingly dimorphic.

Male and female. — Inner mandibular projection (Fig. 47) slightly in advance of the middle, usually forming a small, oval, flattened tubercle which is occasionally obsolete and — like the apices of the mandible itself — worn off; long bristles are present around the tubercle, an apical tuft also at the carina to the outside of it, and a long fringe borders the mandible externally. Malar space distinct though linear. Labrum (Fig. 48) short (ratio of length and breadth 75 : 90 in male, 70 : 80 approx. in female); whole surface coarsely punctate, evenly clothed with conspicuous brush of long and stiff, suberect, dark reddish- to blackish-brown bristles, which are directed forward; apex variously produced, the tubercle on each side of the anterior emargination often less pronounced than in Fig. 48; subapical tubercle at middle of disk invariably present but often covered with dense hair. Clypeus broad, very little prominent, surface convex, sculptured with closely set, coarse and partly coalescent, punctures, rarely with weak median impunctate line; apical portion naked or with short, scanty, appressed hairs which become longer and more crowded together posteriorly until covering entire surface of parocular area; pile still longer, erect and feathery, behind antennae. Interantennal (frontal) carina in the

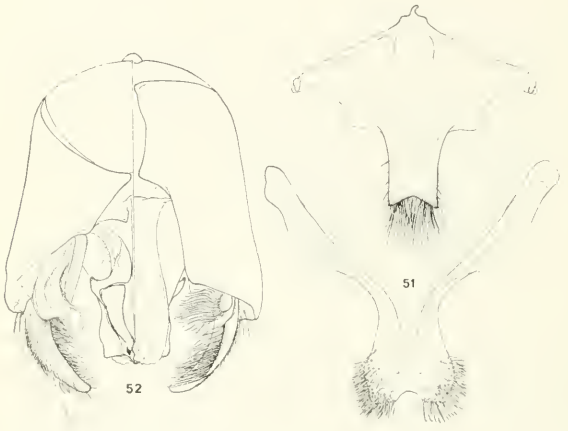


Fig. 51—52. *Afromelecta fulvohirta* (Cameron), ♂ from Annshaw, S.A.; fig. 51, sternites 8 and 7, external view; fig. 52, right half of genital capsule, ventral (left) and dorsal view

form of a thick, distinctly raised carina, highest between antennae. Vertex and ocellar area bare, rather shining, finely tessellate, with few superficial punctures; postocular region and genal area clothed and fringed densely with raised white pubescence. Eyes large, widest well in advance of the middle and distinctly narrowed above; inner orbits little converging anterad and scarcely incurved on top; interocular distance almost or fully twice as long as basal width of labrum (ratio 100 : 55 in male, 100 : 50 in female),

interocellar and ocellocular distances about equal. Antenna normal, rather short and thick in both sexes; 3 about twice as long as its width at base and a trifle longer than 4 and next segments, which are only little longer than broad (ratio about 6 : 5).

Thorax robust, punctation coarse and very dense, diameter of punctures about equal to their interspaces on disk of mesonotum, the latter with pair of small, oval, impunctate and shining areas, about half the size of tegulae, placed on each side upon middle somewhat in advance of tegulae, but usually barely showing through the pubescence. Scutellum in dorsal view more than four times broader than its median length, with pair of short, generally somewhat downcurved, posterolateral spines, which attain only half of the median length of scutellum or even less, the dorsal carina of each being distinct and the apices sharply acute. Pubescent pattern well defined (Pl. 2 Fig. 11—12), much as described for male *Acanthomelecta,* except that all white areas on dorsum of thorax (at least so in male) are more compact, composed of decumbent instead of raised hairs; anterior mesonotal spots either fused together, forming a broad collar of long, silky, decumbent hairs (male), or only with *als* and *plsa* coalescent in front of tegulae, and with *ms* broader than in *Acanthomelecta* (female). Entire upper three-fourths of thoracic sides clothed with very long, decumbent, finely branched hairs forming a dense patch entirely overlying the integument and occupying also parts on each side of scutellum and lateral propodeal areas; for the rest the sides are black-haired with fringes of white at lateroventral border, in front of white tufts at the coxae.

Legs quite normal, outer faces of femora in both sexes finely, rather closely punctate, more sparsely and superficially so inward; fore femur with very long and dense, mid femur with somewhat shorter posterior fringe of white, hind femur sparsely black and white only at ventral carina, all hairs on hinder pair much shorter than diameter of femur; outer faces of tibiae and tarsi white-haired, the tibiae of mid and hind legs covered with numerous short black spicules shining through the pubescence. No external pad of felt-like hair on mid tibia of male; hind tibiae of male with short, sharp, dorso-apical longitudinal crest which curves around its distal border, this apical carina lacking in female. Male hind basitarsus very slender, laterally compressed, almost parallel-sided after the basal constriction, nearly five times as long as its greatest width and distinctly outbent, its outer face clothed with short appressed hair; in female almost straight, not at all compressed or flattened, much narrower still than in male and clothed with bristly hair.

Wings (Pl. 2 Fig. 12) long, fore wing membrane strongly smoky, the posterior and outer cell areas hyaline, as is also the hind wing except apically; marginal cell more than four times (4.1—4.5) as long as broad; length of pterostigma, marginal cell and distance from the latter to wing apex, in the ratio of 30 : 80.3 : 100.

Abdomen with two first segments subequal in length, or first a trifle longer than second; black, all segments dull, finely superficially punctate, punctures smaller than interspaces on basal portions but crowded together posteriorly and extending to near posterior border of segments, above as well as underneath. Pubescence very short, black, with sparse fringe of longer subapical bristles on sternal surfaces. White dorsal marks similar in both sexes, as shown in Pl. 2 Fig. 11—12; sternites clothed sparsely with short black hair, 2—5 (male) or 2—4 (female) each with large, pure white pubescent spot placed transversely on either side. Tergite 7 of male shaped as in Fig. 49, its surface clothed densely with long, appressed, blackish brown hairs on either side of a somewhat spatulate median area, the apical portion of which is bare, flattened and finely tessellate,

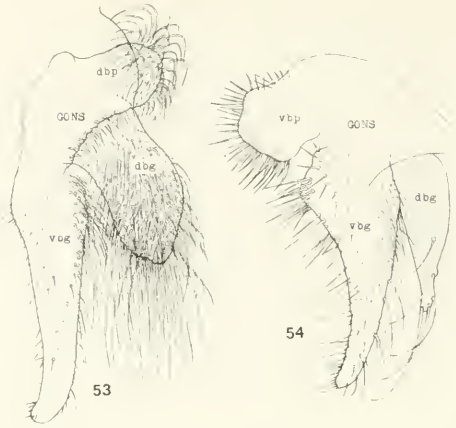


Fig. 53. *Afromelecta fulvohirta* (Cameron), ♂ from Annshaw, S.A., right gonostylus with appendages, dissected out and viewed from within; ventrobasal process removed and not shown. Fig. 54. *Acanthomelecta hicuspis* (Stadelmann), ♂ holotype *Melecta spinosa* Friese from Usambara, right gonostylus with appendages, dissected out and viewed from within; *dbg* = dorsal branch of gonostylus; *vbg* = ventral branch of gonostylus; *GONS* = main body of gonostylus; *dbp* = dorsobasal process; *vbp* = ventrobasal process (omitted in fig. 53)

with slightly swollen and ridge-like margin. Posterior margin of sternal plates 2—5 almost straight; sternite 6 of male protuberant, but apex rounded, surface with very slight median impression, clothed densely with fine, dark brown decumbent hair. Sternites 7 and 8 shaped as in Fig. 51.

Genital capsule of large size (2.3 mm, incl. gonostylus), of very complex structure. General appearance in ventral and dorsal aspect, as in Fig. 52. After removal of the ventrobasal process of the right half, the appendages of the gonocoxite, viewed from within, are as shown in Fig. 53. The ventrobasal process of the right half is shown only in Fig. 52; it is folded lengthwise and consists of a heavily sclerotised basodorsal portion and a large, horizontally placed, thin, semitransparent ventral membrane. The dorsal (inner) portion is heavily sclerotised, directed into the capsule as a lanceolate rod-like apodeme; the rounded outer portion of the membrane is also firm and beset with longish hairs, its thin distal (inner) part gently incurved in ventral view, subtruncated apically and bordered mesad by a broad, parallel-sided, subhyaline marginal strip, which is transversely striated (Fig. 52). The dorsobasal process of the gonocoxite is detached from the gonostylus and overlaps most of the latter in dorsal view; it consists of two separated parts, which are fused together only at extreme base: one small outwardly convex subcircular dorsal lobe covered with very long, strong setae (*dbp*), and a much longer, more laterally placed, broadly spatulate incurved process (*dbg*) whose entire inner surface is clothed densely with similar but still longer setae, the latter almost concealing the underlying gonostylus (Fig. 52). Gonostylus likewise incurved, rather finger-like and tapering rapidly to a bluntly pointed tip; its basal part above is fringed

rather densely with long setae, the apex bearing only short hair (Fig. 53). Pygidial plate of female occupying about median one-third of tergal dorsum, shaped as in Fig. 50; surface flat or almost so, somewhat shining, finely reticulate; colour dark chestnut brown with slightly raised and almost black side margins.

Total length: ♂ 14.0—15.0 mm, fore wing 11.5—12.0 mm; ♀ 13.0—16.0 mm and 11.0—12.0 mm, respectively.

Host-relationship. — With reference to Brauns' observation, cited above, on the distribution of this species, and its simultaneous occurrence with *Anthophora (Habropoda) festiva* Dours [1]), in parts of South Africa, it is perhaps worthy of note that there are several other anthophorines which may be looked upon as foster bees of *Afromelecta*. Besides *H. festiva* Dours, labelled as from British E. Africa and the Cape Province, the collection of the British Museum (Nat. Hist.), for instance, includes species such as *H. determinata* Friese, from Nyasa (Tanzania) and Portuguese E. Africa, and *H. bettoni* Ckll., reportedly from Abyssinia and British E. Africa. The male of *H. bettoni* from Ethiopia is quite extraordinary in that the basitarsus of the fore leg is furnished with a very conspicuous beard-like tuft of hairs, while others show unusually specialised antennal and leg structures. As far as I have been able to ascertain, the basic characters of this African section do not coincide with those of Mediterranean and Eurasian *Habropoda* s. str., as redefined by me recently (Lieftinck, 1966), the former being not even homogeneous in itself. So far, I have studied only the copulatory apparatus of a male from Tanganyika, in the Leiden Museum, which apparently belongs to an undescribed species of the same section. The apical sternal plates and genitalia of this bee are altogether different from those of true *Habropoda,* so that it will probably be necessary to erect a new genus for the reception of this and allied African species of the group.

Afromelecta spec. indet.

Material. — Ethiopia: 1 ♀, with printed label: Abyssinia, Higo Samula, 30. 10. 11, R. J. Stordy, 1912—329 (BM).

A specimen in perfect condition, evidently a close ally of *A. fulvohirta* (Cam.) and closely resembling it, but distinguished by having longer scutellar spines, which in side view are equal in length to the main body of the lobes; these spines are cylindrical at their bases, tapering to a point instead of being laterally compressed and strongly carinated above. The specimen differs further in that (1) the first gastral tergite is slightly less closely punctate; (2) almost the entire lower half of the thoracic sides is black- instead of white-haired; and (3) the apical one-fifth of the mid tibiae and apical one-half of the hind tibiae are black-haired on their outer faces, whereas in *fulvohirta* the tibiae are entirely white except at the tips, which are narrowly bordered with black.

With the discovery of the male and more material of both sexes from the same region, this may prove specifically distinct from *A. fulvohirta* (Cam.).

Afromelecta spec. indet.

Material. — Kenya: 1 ♂ (dissected, but terminalia all missing), with three printed

[1]) Cameron (1905: 255—256) described a second large-sized bee, *Habropoda capensis* Cam., measuring 17 mm in length, from the Cape Colony (Bivak Kloof) and Transvaal. This is very likely the same species as *festiva* Dours.

labels: Brit. C. Africa, Kuja Valley, S. Kavirondo, 4000 ft., Apr. 30—May 1, 1911, S. A. Neave, 1912—193 (BM).

A more slenderly built insect than *A. fulvohirta,* immediately distinguished from it by the slightly shorter labrum, the surface of which is not clothed with a dense brush of brown hairs but with thinner and pure white pubescence. Also, the scutellum is less coarsely punctate and the spines are longer, slenderer, with more sharply pointed tips, than in *fulvohirta.* Further differences are found in the abdomen, which is narrower and distinctly more slender, the tergites are less closely punctate, with broader impunctate hind margins and a more shining surface; lastly, the hind basitarsus is narrower and more definitely hollowed out externally.

Although agreeing with *A. fulvohirta* in many respects, this is undoubtedly a different species. However, by the absence of the apical segments and genital organs, I prefer to leave it without a name until more material will become available.

Acanthomelecta gen. nov.

A monotypic genus of medium-sized bees, with melectine characters intermediate between those of *Afromelecta, Melecta* and *Paracrocisa.* In the generic key and the following descriptions I have endeavoured to characterize male and female as complete as possible. Although it should be borne in mind that these features are taken from a single individual of either sex, it was found impossible to fit this remarkable species into any genus so far recognized. This necessitates the erection of a separate taxon to hold it.

Acanthomelecta is distinguished from *Melecta* by the greater length of the first gastral tergite, the absence of a well-developed tarsal arolia, the totally different shape of the scutellum, with its extraordinary spines, and the much shorter vestiture covering the head and thoracic segments. By the form of the head and apical sternal plates, the male of *Acanthomelecta* approaches *Afromelecta* most closely, but the scutellar spines here are short and the genitalia of the males are altogether dissimilar; moreover, the maxillary palpi in the three species presently attributed to *Afromelecta* are reduced to one or two short segments, whereas *Acanthomelecta* is probably more primitive by having a 6-segmented palpus. In spite of this, it must be admitted that the two genera appear to be more nearly related to one another than either of the two can be linked with *Paracrocisa,* which comprises a compact group of closely similar forms, distinguished — among other characters — by the characteristic structure of the antennae, legs and genital organs of the male. It would be of great interest to examine additional material from the typical localities of *A. bicuspis* and to discover more species from other parts in Africa, in order to find out whether the most significant characters separating the former from *Afromelecta* are constant or not. It is by no means certain that they are; and if, for example, specimens would occur which possess maxillary palpi having a varying number of segments or showing somewhat intermediate forms of scutella, then *Acanthomelecta* should be merged in *Afromelecta.* As this seems unlikely, I assume for the present that more species do exist which will prove to fit into either of the two genera here recognized.

Nothing, of course, can be said about the host-relationship of this bee. Like *Afromelecta,* it may be parasitic on the *Habropoda*-like bees belonging to the assemblage typified by *H. festiva* Dours. This is a purely African group, practically unstudied yet, and certainly not congeneric with *Habropoda* F. Smith, as at present interpreted (see Lieftinck, 1966).

Type species: *Crocisa bicuspis* Stadelmann, 1898.

Acanthomelecta bicuspis (Stadelmann) comb. nov.
(Fig. 54—57)

Crocisa bicuspis Stadelmann, 1898, Hym. Ost-Afrika's *in* K. Möbius, Thierwelt Ost-Afrik., etc. 4 (3) : 28 (nom. nud.!), pl. fig. 6 (thorax dorsally) (♀ Ujunjoni, Stuhlmann).
Melecta bicuspis, Meyer, 1921, Archiv f. Naturgesch. 87 : 177 (not seen).
Melecta spinosa Friese, 1922, Zool. Jahrb. Abt. Syst. 46 : 33 (♂ Usambara). Syn. nov.

Type material. — T a n z a n i a : 1 ♀ (discoloured, right fore wing missing), Ujunjoni 24.9 / Stuhlmann (written), Crocisa n. sp. bicuspis (ditto), Croc. bicuspis Stadelmann Type, Dr. Enderlein (Enderlein det.), Type (print on light red); holotype *Crocisa bicuspis* Stadelmann (MNB). — T a n z a n i a : 1 ♂ (all wings clipped off and wanting ! diss., Fig. 56—57), D.O.-Africa, Usambara, 6. 1903 (print), Melecta spinosa Fr., det. Friese 1908 (Friese's writing), Type (print on dark red); holotype *Melecta spinosa* Friese (MNB).

It is surprising that Friese failed to acknowledge the existence of Möbius' "Thierwelt Ostafrikas" (1898) in his own great work, thus neglecting to deal with the bees described — or, more properly, listed — by Stadelmann, whose collection could have been studied so easily at the Berlin museum. This did not happen, and so it can be explained why the types of *Crocisa bicuspis* and *Melecta spinosa* were never confronted and left unstudied until the present day. Although Stadelmann's account is incomplete, ending abruptly on page 74, it contains a number of figures which, according to Art. 16(a) VII of the Code, validate several of the proposed nomina nuda, including the present one.

A fairly large-sized melectine, superficially resembling *Afromelecta* and *Paracrocisa*, but differing from both in details of structure. The two specimens, one of either sex, are unique and unquestionably conspecific.

Female (holotype *C. bicuspis)*. — A soiled and discoloured specimen, due to wetting, but clotted pubescent pattern clearly discernible.

Inner tooth at about halfway length of mandible reduced to a mere convexity. Maxillary palpus as in Fig. 55. Labrum squarish (length : breadth = 75 : 80), widest at middle, surface slightly concave, closely punctate, punctures lacking interspaces; anterior border a little produced, apex distinctly upturned and with small crescentic emargination between bluntly triangular projections; whole margin fringed with brown bristles; tomentum short and dense, decumbent, the dark brown hairs directed anterad, interspersed with few, much longer, erect bristles. Clypeus less protuberant than lower diameter of eye, surface slightly convex, dull, very finely, closely punctate, lacking interspaces, clothed with very short, appressed white pubescence, the hairs becoming longer posteriorly. Interantennal (frontal) carina low, texture and pubescence similar to that upon hinder part of clypeus. Paraocular area clothed also with appressed tomentum, the white hairs becoming long, tufty and intermixed with black behind antennae; vertex almost bare, surface somewhat shining, superficially, not very closely punctate, the punctures of two sizes. Postocular and genal areas with long raised hairs, longest and white behind eyes, black at middle. Eyes large, shaped as described for *Afromelecta,* but inner orbits converging anterad and slightly incurved above; interocular distance slightly less than twice as long as basal width of labrum (ratio 100 : 53); interocellar and ocellocular distances as in *Afromelecta*. Antenna normal, slenderer than in *Afromelecta*, but scape similar; segment 3 more than two times longer than broad at base and subequal to next segments, which are only little longer than broad (ratio about 6 : 5). Thorax robust, whole surface

including scutellum and tegulae, dull, coarsely punctate, the punctation denser than in *Afromelecta;* scutellum in dorsal view more than four times broader than its median length, armed at either side of convex and strongly declivous median part with a long, robust, laterally compressed and carinated spur, which exceeds the median length of scutellum and is directed almost straight back; these spurs are more widely apart than the processes of *Afromelecta* and almost twice as long as they are in *fulvohirta,* the slender tips being acutely pointed. Pubescent pattern identical to that of the male, described below. Legs normal, all parts finely punctate, clothed with short pubescence, long pure white fringes only at ventral carinae of fore and mid femora; pile at outer faces of mid and hind tibiae decumbent, pure white along full length of fore tibia, and

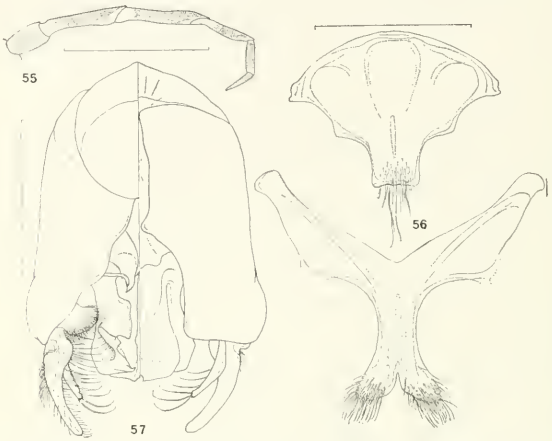


Fig. 55. *Acanthomelecta bicuspis* (Stadelmann), ♀ holotype from Ujunjoni, maxillary palpus; scale-line = 0.5 mm. Fig. 56—57. *Acanthomelecta bicuspis* (Stadelmann), ♂ holotype *Melecta spinosa* Friese from Usambara; fig. 56, sternite 8 and 7, external view, scale-line 1.0 mm; fig. 57, right half of genital capsule, ventral (left) and dorsal view, scale-line 1.0 mm

about basal one-third of mid and hind tibiae, darker (discoloured ?) on tarsi. Mid and hind tibiae moreover covered with short, but very strong, suberect setae, especially so on hinder pair. Hind basitarsus shaped much as in female *Afromelecta.* Hind tibial spurs unequal, slightly curved, brown; tarsi as described in the key. Wings yellowish brown, much darker towards apex of radial cell and in apical part of fore wing. First submarginal on fore wing not much longer than diameter of third; marginal cell long, about three times (3.2) as long as broad; length of pterostigma, marginal cell and distance from the latter to wing tip in the ratio of 20.7 : 108 : 100; nervulus postfurcal for almost twice its own length.

Abdomen elongate, tapering gradually posteriorly; gastral segment 1 slightly longer than 2. All tergites moderately shining, punctation much finer than on thorax, the punctures evenly distributed almost as far as posterior margin of segments and smaller than interspaces; punctation of sternites similar. Pygidial plate almost flat, rather broadly

triangular, a little less than twice as long as its width at base, side margins slightly raised, apex subobtuse; surface even, finely tessellate-punctate. Pubescence short, decumbent, black; tergites 1—4 with sharply defined white patches and spots composed only of finely branched appressed hairs: a large subtriangular patch, pointing inward, on each side of 1, and elongate paired transverse spots on 2—4, successively smaller posteriorly, all of them separated by black at middle by a distance greater than their own diameter. Sternites black-haired (discoloured?).

Total length: 14.0 mm (approx.), fore wing 10.3 mm.

Male (holotype *M. spinosa*). — The unique specimen, though lacking its wings, is in a good state and agrees with the description, which requires the following corrections and emendations.

Mouth-parts almost exactly as in the female: inner projection of mandibles a low crescentic convexity. Whole surface of labrum covered with dense, decumbent and raised, bristly hair, the short pile composed of white and dark brown tomentum, the hairs growing longer and almost black upon distal one-third. Pile on clypeus extremely short and appressed, silvery-white, much denser and longer upward than in front. Shape and pubescence of head, inclusive of the antennae, otherwise exactly as in the female (i.e., antenna not at all reaching scutellum and 2nd flagellar segment not longer than 3rd, as stated erroneously by Friese !).

Mesonotum, scutellum and posterior thoracic segments closely, coarsely and rather deeply punctate; punctures on mesonotum at least as wide as the interspaces, more irregular and partly confluent on scutellum (including its processes basally) and posterior areas; upper surface somewhat shining and showing through the rather long, black pubescence, except where this is replaced by white patches of still longer, erect and feathery hairs, which form a sharply defined *Thyreus*-like pattern (apparently quite similar to that of the female), as follows: transverse paired *als* and longitudinal *ms* forming together an almost T-shaped anterior mark; large, isolated, subcircular *plsa* and *pls*, the latter most conspicuous; and an equally large, subtriangular, median patch of white upon the vertical face of the scutellum, consisting of more decumbent, radiating plumose hairs, which are directed upward and forward. Sides and posterior areas of thoracic segments marked similarly to *Afromelecta*. Legs less slender, femora and tibiae somewhat more swollen and tarsi a little shorter, than in female; otherwise similar, lacking modifications; outer faces dull, coarsely closely punctate, inner faces more shining, sparsely and finely punctate. Pubescence as in female; long white fringes at base and at femora; short, appressed, black mixed with white, on following parts: whole outer face of fore tibiae and tarsi, basal three-sevenths of mid and hind tibiae, with narrow fringe at extreme tip, and outer faces of all tarsal segments. No external pad of felt-like hair on mid tibia. Hind tibia without any indication of a dorso-apical longitudinal carina. Hind basitarsus laterally compressed, straight and slender, slightly broadened from base to apex, almost five times as long as its greatest width near apex, surface scarcely concave externally.

Gastral tergite 1 distinctly longer than 2; all abdominal segments black, somewhat shining, with slight oily reflections. Punctation fine, superficial, the punctures evenly distributed, much smaller than interspaces and extending to near posterior margin of segments, above as well as underneath. Pubescence very short, black, with sparse fringe of longer subapical bristles on sternal surfaces, there being no dense subapical comb of strong bristles ventrally. A row of snowy-white lateral marks, progressively smaller from before

backward, on tergites 1—6; patches on 1 shaped as in female, though larger, subrectangular, with convergent inner border, the intero-apical angles of the spots pointing inward; distance separating these spots posteriorly equal to their own diameter; all hairs finely branched and decumbent, except small tufts of raised hair laterally at extreme base. Spots on succeeding segments transverse, elongate-oval. Sternites clothed sparsely with short black hair, 2—5 each with distinct, pure white pubescent spot placed transversely at either side. Tergite 7 shaped much as in *Afromelecta fulvohirta* (Fig. 49), but finely tessellated, naked, midapical portion more abruptly narrowed basad and apex squarely cut off, with upturned, shallowly excised posterior margin. Sternite 6 protuberant, but apex rounded; surface very slightly impressed at middle, clothed densely with dark decumbent hair. Sternites 7 and 8 shaped as in Fig. 56. Genital capsule of large size (2.4 mm, incl. gonostylus). Ventrobasal process of gonostylus shaped similarly to *Melecta,* forming a small, heavily sclerotised, subrectangular and densely setiferous lobe projecting from the inside. Gonostylus broadest at base, rather strongly incurved and finger-like, setae on basal part above long and strong, surface for the rest clothed sparsely with finer and much shorter setae. Dorsobasal process free, about two-thirds length of gonostylus and overlapping only its basal part; in side view it is plate-like and strongly convex, in dorsal aspect it appears as a slender, incurved process, with a marginal fringe of widely spaced, strong bristles of great length (Fig. 57).

Total length: 13.5 mm (approx.).

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Alphabetical index of names

(Synonyms are in *italics*)

Postscript. — Since these notes were written and printed off (see p. 309), I received from Dr. I. H. H. Yarrow the following information on the type of *Crocisa fulvohirta* Cameron, from "Cape Colony", in the British Museum (Nat. Hist.) collection:

"The specimen is a ♂, not a ♀ as Cameron says. Gaster sternite 1 is obliquely projecting and sternites 4 and 5 have projecting bristles (I presume this is what Cameron means when he says "apices of first and of the fifth and sixth abdominal segments project obliquely at the apex"). Tergite 7 is partly projecting and its apical margin is more or less truncate but a little incised in middle. The antennae, which are complete, are short and massive, segment 2 largely hidden in apex of scape and evidently invisible to Cameron! The sculpture, colour etc. agree pretty well with what Cameron says."

Fig. 1. *Protomelissa insidiosa* (Lieft.), ♂ paratype from W. Java; exp. alar. 19.2 mm. — Fig. 2. *P. vulpecula* (Lieft.), ♀ paratype from S. Sumatra; exp. alar. 19.5 mm. — Fig. 3. *Pseudomelecta fuscipennis* (Mor.), ♂ lectotype from Bairakum; body length ca. 11.0 mm, fore wing 9.0 mm. — Fig. 4. *P. fuscipennis* (Mor.), ♀ allotype from Dzhamskoe; body length 9.4 mm, fore wing 8.0 mm. Fig. 5. *P. diacantha* (Eversm.), ♂ holotype from "Alp. Sibir.". — Fig. 6. *P. chalybeia* spec. nov., ♀ paratype from Mongolia; exp. alar. 19.0 mm. — Figs. 1—2 after Lieftinck (1944)

Fig. 7. *Paracrocisa gulochei* (Dusmet), ♂ holotype from Tigui, Morocco; body length 12.4 mm, fore wing 10.0 mm. — Fig. 8. *P. gulochei* (Dusmet), ♂ from Melilla, Morocco; body length 14.5 mm, exp. alar. 23.5 mm. — Fig. 9. *P. sinaitica* Alfken, ♂ from Gebel Elba, Egypt; body length 16.0 mm, exp. alar. ca. 26.0 mm. — Fig. 10. *P. kuschakewitzi* (Radoszk.), ♂ from Turcmenia (NMW); exp. alar. 22.5 mm. — Fig. 11. *Afromelecta fulvohirta* (Cam.), ♀ syntype *E. kobrowi* from Delareg, Transvaal (NRS). — Fig. 12. *A. fulvohirta* (Cam.), ♂ from Annshaw, S.A.; exp. alar. 26.5 mm

No. 2. P. J. Brakman, 1966. — Catalogus van Coleoptera uit Nederland en het omliggende gebied (List of the Coleoptera of the Netherlands and adjacent region), 219 pp., map. D.Fl. 45.—.

No. 3. G. A. Graaf Bentinck en A. Diakonoff, 1968 — De Nederlandse Bladrollers (Tortricidae), (The Netherlands Leaf-Rollers (Tortricidae)). 350 pp. en 98 pl. D.Fl. 70.—.

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