THE MELECTINE GENUS EUPAVLOVSKIA POPOV, 1955, WITH NOTES ON ITS DISTRIBUTION AND HOST RELATIONS (HYMENOPTERA, APOIDEA, ANTHOPHORIDAE)

by

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With 8 figures

An analysis is given of a small group of chiefly Mediterranean parasitic anthophorid bees of the tribe Melectini, hitherto known from a single species, *Eupavlovskia funeraria* (F. Smith). This taxon actually is a composite one, comprising two closely allied species, one of which splits up into two structurally nearly identical geographical races, *E. o. obscura* (Friese) and an eastern subspecies, *E. o. simulatrix,* which is new to science. Additional information is supplied to strengthen the belief that *Eupavlovskia* is inquilinous in the nests of the industrious anthophorid genus *Habropoda* F. Smith, though no conclusive evidence to that effect can yet be given. The genus is characterized anew and full descriptions of its members, with illustrations of structural organs, are provided. A specified list is given of all countries and localities where species of *Eupavlovskia* and their supposed host bees were collected simultaneously. The geographic distribution of the taxa involved is demonstrated in a map showing all verified localities superimposed on the area occupied by the Mediterranean species of *Habropoda.*

The specific or varietal names *Melecta grandii* Hedicke, 1935, *moreensis* Strand, 1921, and *rugosa* Dours, 1873, are rejected or relegated to synonymy. *Melecta italica* Radoszkowski, 1876, considered synonymous with *Eupavlovskia funeraria* (F. Smith), is restored as a valid species of *Melecta* Latr.

Introduction

In his "Generic classification of Palearctic Melectini" (1935) published in Russian, V.V. Popov briefly redefined three Old World genera nearly related to *Melecta* Latr., 1805. These genera are *Pseudomelecta* Radoszkowski, 1866 (type-species *Melecta diacantha* Eversmann, 1852), *Paracrocisa* Alfken, 1937 (type-species *P. sinaitica* Alfken, 1937), and *Eupavlovskia* Popov, 1955 (type-species *Melecta funeraria* F. Smith, 1854). Although some venational features, with a drawing of the wings, were supplied also for the type-species of *Melecta,* viz. *armata* (Panzer) (recte *M. punctata* F.), no definition of that genus was given by the author.

In August 1960 I had the opportunity to discuss the relationship of these genera with the late Dr. Popov, on the occasion of the XIth International Congress of Entomology in Vienna. We then agreed that even *Melecta* in its restricted sense is not at all homogeneous and that all genera of this closely interrelated group were still poorly characterized, the diagnoses being insufficient and based mainly upon the structure of the male sternal plates and genitalia. Sexual dimorphism, overlooked or neglected by most previous authors, is considerable and reveals itself not only by structural differences in the antennae and legs but also by the shape of the submarginal cells of the fore wing. Moreover, nearly all species exhibit marked variation in the extent of white and black hair spots, apparently due to geographic variation but often differently allotted in groups of seemingly closely related species.

In the following pages a characterization will be given of the forms presently attributed

to *Eupavlovskia* and a summary of the most distinctive features separating it from its immediate allies. I hope to redefine the other Old World melectines more comprehensively in a following paper, which will then include also the intricate specific synonymy of the difficult genus *Melecta.*

ACKNOWLEDGEMENTS

I wish to express my gratitude to all those who have contributed to the completion of the present study. It is a pleasure to extend my warm thanks to the persons whose names are mentioned in the following list, for the hospitality and assistance given to me while visiting various European museums, and for providing facilities for the inspection or loan of valuable material in institutional as well as private collections. As in most earlier papers, I have employed a series of symbols indicating the present location of types and other specimens borrowed for examination. These symbols have been used only to save space and are bracketed after the locality records in the text, under the heading of the species concerned.

BM — British Museum (Natural History), London (I. H. H. Yarrow)
CB — G. Barendrecht collection, Amsterdam
CGS — A. Giordani Soika collection, Venezia
CL — W. Linsenmaier collection, Ebikon/Luzern
CMC — M. Comba collection, Roma
CMS — Max. Schwarz collection, Linz
CV — P. F. M. Verhoeff collection, Utrecht
CVZ — G. van der Zanden collection, Eindhoven
CW — K. Warncke collection, Dachau
FAG — Faculté des Sciences Agronomiques de l'Etat à Gembloux (M. Leclercq and C. Verstraeten)
IEB — Istituto di Entomologia, Bologna (G. Grandi)
IEM — Instituto Español de Entomologia, Madrid (Señ^{a} Elvira Mingo)
INER — Istituto Nazionale di Entomologia, Roma (M. Cerruti)
MA — Zoologisch Museum, Amsterdam (G. Kruseman)
MBUD — Magyar Nemzeti Muzeum, Budapest (Moczár Lászlo)
MCG — Museo Civico di Storia Naturale, Genova (Sig^{a} Delfa Guiglia)
MKB — Zoologisches Forschungsinstitut und Museum A. König, Bonn a/Rh. (B. Mannheims)
ML — Rijksmuseum van Natuurlijke Historie, Leiden
MP — Muséum National d'Histoire Naturelle (Melle S. Kelner-Pillault)
MT — Museo di Zoologia della Università, Torino (L. Pardi)
NAMP — Narodni Museum v Praze, Praha, (Z. Bouček and O. Suštera)
NMW — Naturhistorisches Museum, Wien (Max Fischer)
NRS — Naturhistoriska Riksmuseum, Stockholm (E. Kjellander† and S. Erlandsson)
OUM — Oxford University Museum, Hope Department of Entomology, Oxford (E. Taylor)
SMF — Natur-Museum Senckenberg, Frankfort a/Main (H. Schröder and R. zur Strassen)
ZIL — Zoological Institute Acad. Sci. USSR, Leningrad (A. Ponomareva†)
ZSM — Zoologische Sammlung des Bayerischen Staates, München (F. Kühlhorn)

Definition of the genus and its components

Eupavlovskia was proposed by Popov to receive the aberrant *Melecta funeraria* Smith, the only species known to him by autopsy. The assignment of that species to a genus of its own seems to be well founded. Other taxa tentatively included were *M. rugosa* Dours, 1873, *M. funeraria* var. *obscura* Friese, 1895, *M. funeraria* var.? *moreensis* Strand, 1921, *M. funeraria* var. *grandii* Hedicke, 1935, and doubtfully, the African *M. spinosa* Friese, 1922, from Usambara.

The identity of *Melecta rugosa* Dours, recorded from the Greek islands and Algiers, will remain unknown. Dours's collection has been destroyed and since it is impossible from the description alone to establish even its generic status, this taxon can further be ignored. The whereabouts of the type of *M. funeraria* var. ? *moreensis* Strand, ♂, from Kalavrita, Morea, is equally uncertain: probably this has been lost also. Strand compared it with the description of *M. italica* Radosz., a species which he and other authors thought to be identical with *funeraria.* In fact, *M. italica* is a true *Melecta* and a good species. As Strand only mentioned some negative features of his bee, stating that "Eventuell möge diese Form (var. ?) den Namen *moreensis* m. bekommen", I feel justified to reject this name. As will be seen, Friese's var. *obscura* is a true *Eupavlovskia,* specifically distinct from *E. funeraria* (F. Smith). Lasty, *M. funeraria* var. *grandii* Hedicke is identical with the var. *obscura* Friese and clearly another name for it, *obscura* having priority. This leaves us with only two valid specific names in *Eupavlovskia,* viz. *funeraria* and *obscura.*

Popov's generic diagnosis is rather meagre and needs the following amplification:

Diagnosis. — Size moderate to rather large, 12.5—16 mm. Stature robust, body compactly built. Head broadly oval in frontal view, length (from summit of vertex to apex of clypeus) and width (across middle of eyes) in the ratio 10 : 14 approx. Face broad and flat, profile of frontal area situated below level of anterior eye margin. Eyes moderate, more convergent below than above, ratio of upper and lower interorbital distance as 4 : 3 approx., inner orbits subparallel in lower half, very slightly incurved near upper end; greatest diameter of eye in frontal view about one-half lower interorbital distance. Clypeus moderately prominent in side view, its depth perpendicular to orbit, always shorter than diameter of eye; upper surface gently convex in profile; lateral margin of paraclypeal area with sharply acute carina extending along inner orbit upward to a level slightly beyond antennal socket. Labrum almost square, widest basally, surface slightly concave, anterior border entire, little upturned, with rounded side edges; basal tubercles low but of large size. Malar space very short, about six times broader than long. Mandibles long and robust, more than half length of eye, unidentate in either sex; tooth small, blunt and placed near apex in ♂. Maxillary palpus long and slender, six-segmented; 1 scarcely thicker than the next. Segments 1 and 6 only half as long as 2—5, which are slender and subequal in length (♂); 2 longest, 3—6 gradually shorter but 3—4 about equally long, 6 about half as long as 5 (♀). Labial palpus with two free apical segments of equal length (♂ ♀). Antenna (fig. 1) long and slender, flagellar segments attenuated; 4 in anterior view at least twice as long as wide and longer than the next segments, which become successively shorter; length-breadth ratio of 5—10 about 10: 5.4—6. Rhinaria wanting. Vertex low, gently convex in frontal view, summit raised only slightly above level of eyes. Ocelli normal, placed approximately in line and a little below upper margin of vertex in frontal view. Interocellar distance subequal to

their own diameter, longer than ocellocular distance, the latter only slightly greater than ocelloccipital distance; antennocellar distance at least twice as long as ocellorbital distance.

Thorax of large size, solid and globular, only little wider than high (8 : 7). Mesonotum, scutellum and metanotum densely punctate; mesonotum posteriorly with small triangular impunctate area; median line not impressed, extending caudad to level mid-

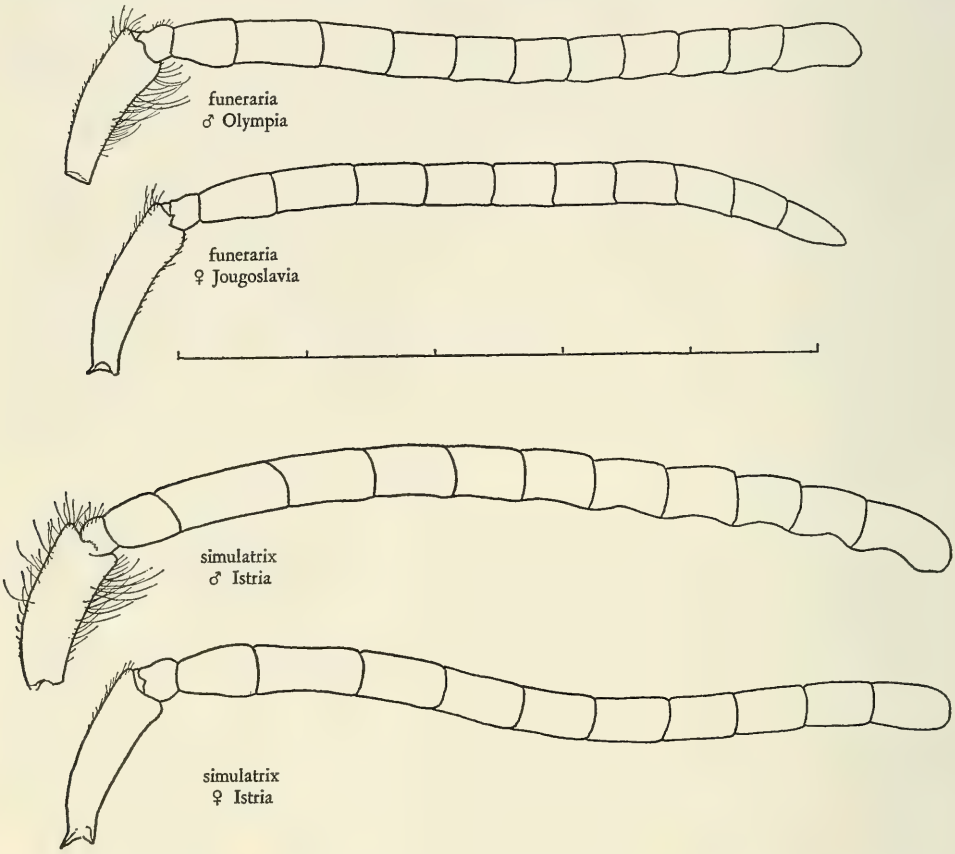


Fig. 1. *Eupavlovskia funeraria* (F. Smith) and *E. o. simulatrix* subsp. nov. Right antenna of either sex, seen from behind. Scale-line = 5 mm

way length of tegula; parapsidal lines very short, slightly impressed, parallel with median line. Scutellum short and broad, trapezoidal, widest basally, at most two-thirds as long as its width at base; entire surface strongly convex, very slightly impressed medially and separated from mesonotum by a deeply impressed sulcus; dorsal surface abruptly rounding into convex vertical posterior surface and distinctly overhanging metanotum; rounded side-angles armed with a pair of robust, straight divergent spines which are about two-thirds as long as scutellum, slightly upturned and directed caudad (completely hidden by much longer dense pubescence). Metanotum very short, vertical, separated from scutellum by deeply impressed sulcus. Basal propodeal triangle (enclosure) vertical, smooth and shiny except basally where the surface is covered with about half a

dozen short longitudinal ridges on either side of the middle at extreme base of triangle; posterolateral portions of propodeum closely punctate.

Legs robust, coxae and trochanters unarmed. Outer face of all tibiae and basitarsi densely reticulate-punctate, surface even, lacking tubercles or denticles; tibiae swollen towards apex. Mid tibia of ♂ not expanded, apex in both sexes with short, robust, slightly curved, conical posterior process, longest and finger-like in ♀. Hind tibia of ♀ normal, of ♂ with strongly produced antero-apical process; spurs long, of unequal length, innermost spur long and undulated, the outer much shorter and straight, both microscopically serrate; colour black. Hind basitarsus shorter than tibia, subparallel-sided in ♀, modified and hollowed out externally in ♂. Tarsal claws acute with distinct elongate arolia; colour very dark brown. Inner ramus of all claws thin and slender, shorter than outer, but not flattened or plate-shaped; claws very dark brown.

Wing membrane semitransparent, coloured light to dark grey brown. Fore wing greatly expanded distad, especially in ♀, distal margin convex, apex blunt; marginal cell narrowly oval, apex rounded, little or not extending beyond apex of third submarginal cell; cubito-anal vein curved, distal to fork. Venation otherwise as shown in figures 2 and 3.

Gaster short and broad, rapidly tapered and more abruptly pointed apically than in *Melecta,* especially in ♀; colour black. First segment much shorter than second. Tergites 1—6 (♂) or 1—5 (♀) finely superficially tessellate-punctate, surface dull or moderately shiny.

Sides of tergite 7 of ♂ strongly converging towards apex, the latter truncated with blunt side-angles and a wide V-shaped median emargination; upper surface somewhat concave apically but integument completely hidden from sight by long, dense, appressed tomentum. Posterior border of sternite 6 of ♂ broadly rounted, surface finely reticulate-punctate and covered with short hair, distal half with shallow, narrowly oval, median impressed area. Apical sternal plates and genital capsule of ♂ resembling *Melecta* more closely than *Paracrocisa.* Sternite 7 very slender with narrow apodemes and apex, the 8th with strongly developed postmedian ridges. Gonocoxites (basiparameres) of large size, gonostylus distinctly marked off, short and densely setose; volsellae reduced and partly hidden; sagittae (penis valves) of complex structure, strongly curved apically; penis free. Sternite 5 of ♀ with or without weakly pronounced median ridge, indicated (when present) at extreme apex only; median carina of sternite 6 complete though very low. Pygidial field elongate-triangular, covering entire dorsal surface of tergite 6; surface flat, finely reticulate, apex rounded, slightly swollen, median carina short and low.

Pubescence. Black, suberect and rather dense on labrum, with longer bristle-like hairs interspersed, except hairless basal area which includes the tubercles. Very long fringe at mandibles outwardly. Clypeal hairs dense but mostly decumbent, very long and erect on hypostomal area, genae, frons and vertex posteriorly; supraclypeal area and vertex on either side of ocelli bare. Vestiture of thoracic segments erect, entirely concealing surface, exceptionally long, dense and feathery; fine and velvety on dorsum, much longer at the sides, densest and tufty behind tegulae and base of metapleurae; metanotum, enclosure and lateral parts of propodeum bare. Pubescense of coxae and trochanters short and decumbent, except long fringes posteriorly; similar fringes of fore and mid femora subequal in length or a little longer than diameter of femur, those of hind femur rather long at base only, for the rest short (♂) or almost as long as on fore and mid femora (♀). Appressed pubescence on outer faces of tibiae and basitarsi short and evenly

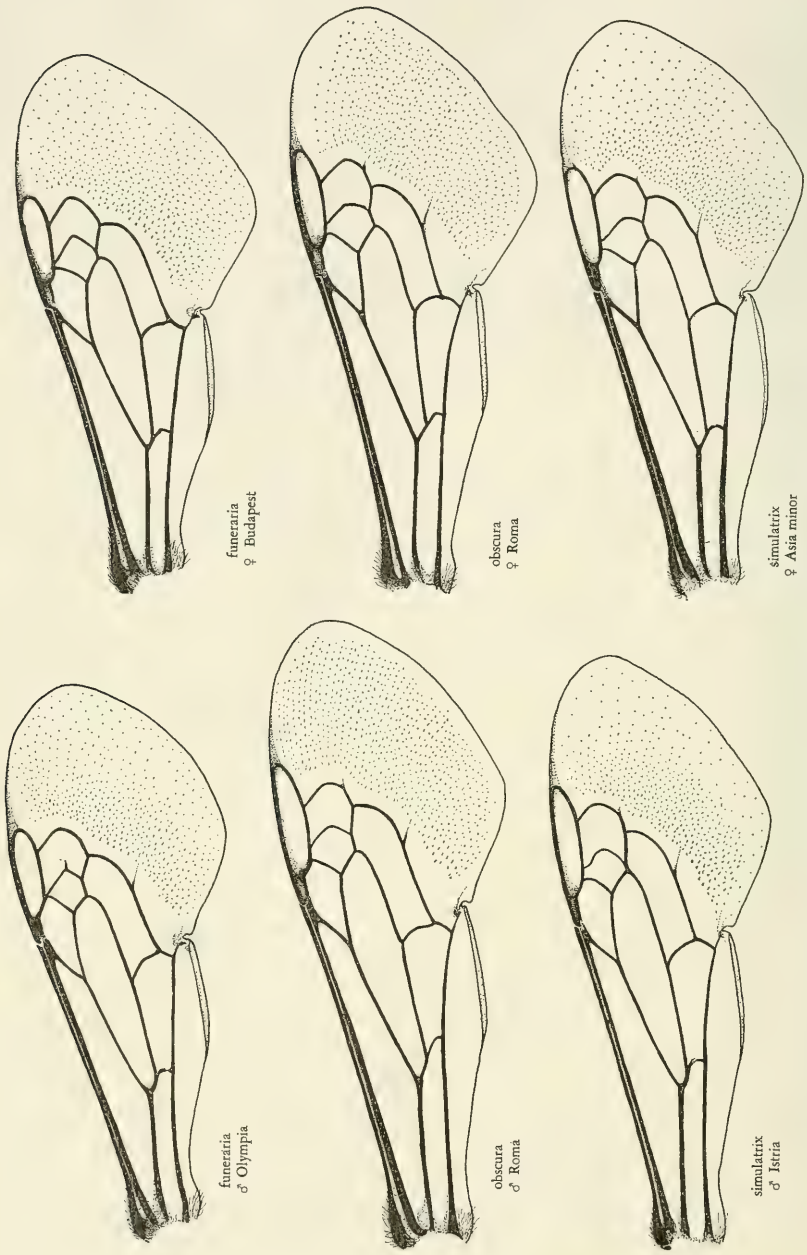


Fig. 2. *Eupavlovskia* species. Right fore wings, drawn on the same scale

distributed, almost (♂) or entirely (♀) concealing surface; long hairs interspersed posteriorly only on fore legs; pubescence covering inner faces short and scanty. No conspicuous patch of felt-like pubescence on outer face of mid tibia of male. Disk of gastral tergites clothed evenly with very short, fine hairs; consistence of abdominal pubescence otherwise variable, often long and feathery, forming conspicuous snowy-white lateral patches (see specific descriptions).

Omitting differences in the pubescent colour pattern, *E. funeraria* and *obscura* can be distinguished by the following combination of characters:

E. funeraria. — Antenna relatively short and slender, not much longer than width of thorax across tegulae (ratio in ♂ approx. 10 : 8); 4th segment in either sex less than 1½ times length of 3rd; apical flagellar segments of ♂ hardly noticeably bulging out or crenulated posteriorly (fig. 1). Hind basitarsus of ♂ gradually expanded from base to apex, ventral (inner) face of basal portion narrow, narrowly lanceolate, its reticulate surface at least partly covered with short hairs and its intero-ventral carina subacute (fig. 4). Wings relatively shorter, fore wing more suddenly expanded beyond middle,

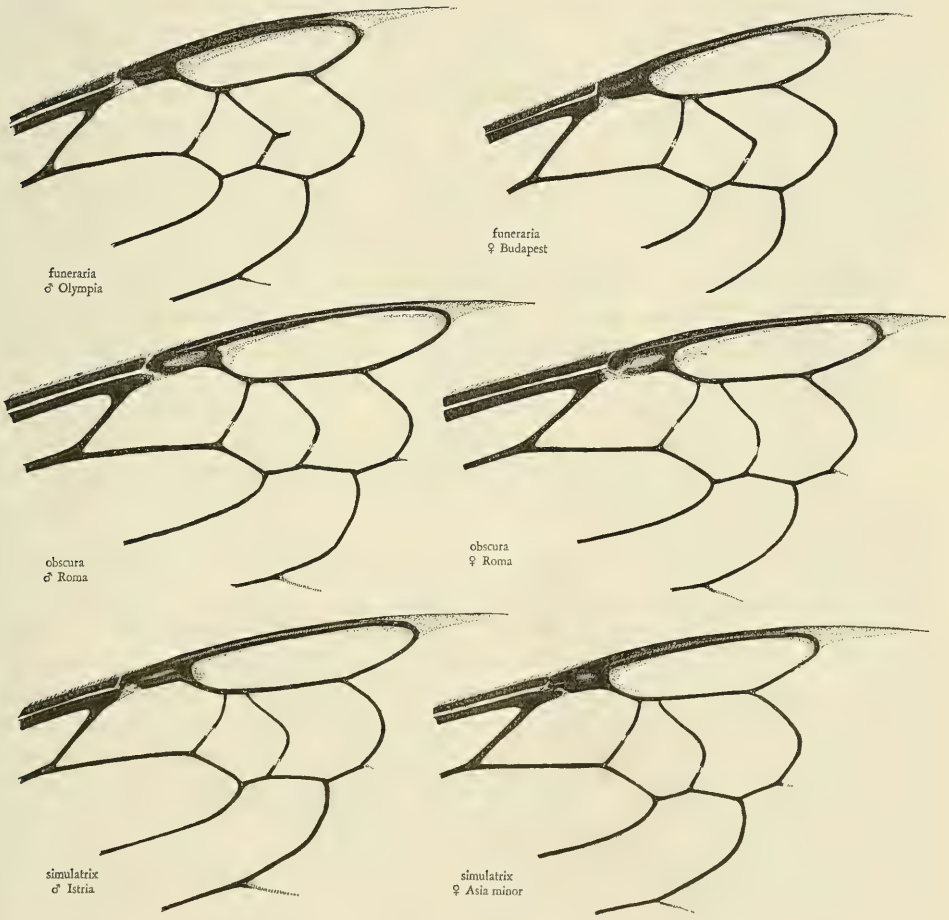


Fig. 3. *Eupavlovskia* species. Submarginal area of right fore wings, drawn on the same scale

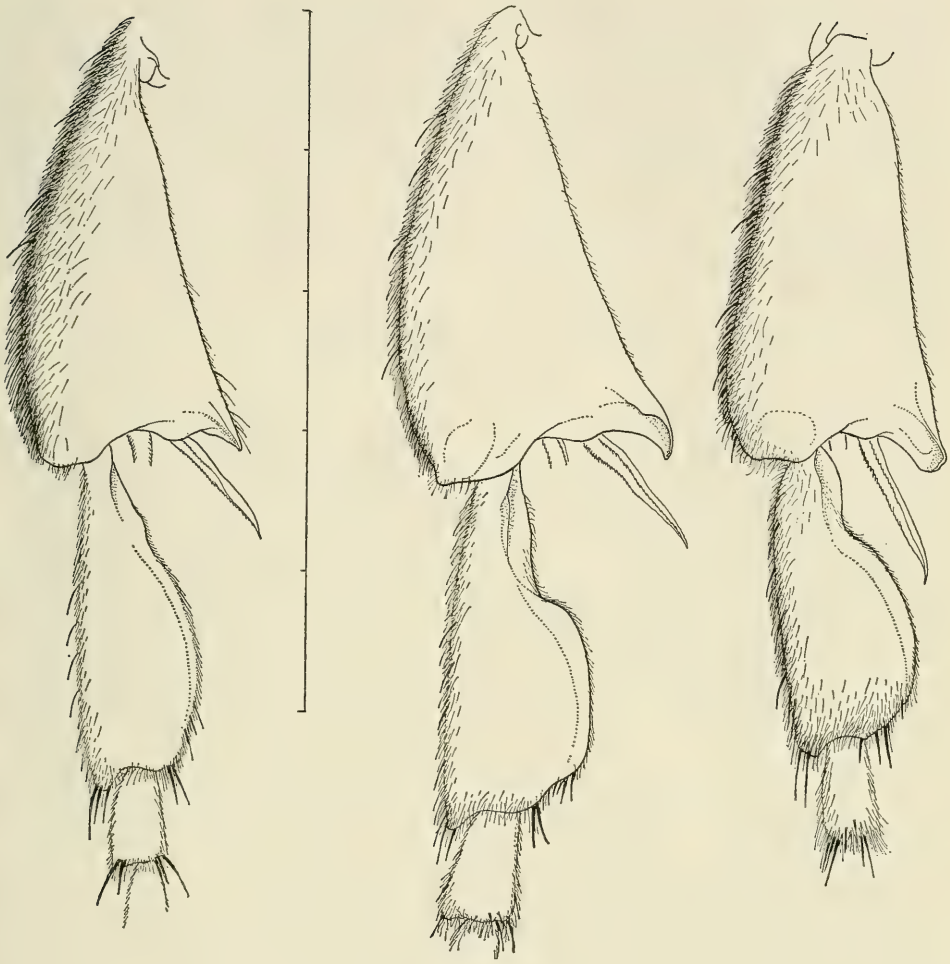
apex blunt, length/breadth ratio 100 : 38 (♂) or 100 : 45 (♀); marginal cell elongate-oval, about three times longer than wide, not extending beyond 3rd submarginal cell; proximal and distal sides of 2nd submarginal cell strongly converging anteriorly; closely approximated and often interstitial at marginal cell; 2nd and 3rd cubital veins abruptly elbowed, the 2nd frequently giving off a rudimentary side branch at angulation; 3rd submarginal cell short, at least 1.2 times broader than long (figs. 2—3). Membrane of fore wing obscurely grey-brown. Legs of ♂ partly white-haired externally, of ♀ entirely black. Both sexes with clypeus and frontal area white-haired. Thorax with broad anterior collar of long, shortly branched, erect white hairs; long tuft of similar pubescence on either side of metapleurae. Gaster with conspicuous patches of white on either side of segments 1—5 (♂) or 1—4 (♀). Hidden sternal plates 7 and 8 shaped as in fig. 5. Genital capsule of ♂ ovoid, abruptly expanded and strongly swollen laterally at apex. Gonostylus rather small and but little incurved, narrowly oval in profile, its inner face in ventral view concave and densely clothed with recurved bristles; latero-basal ventral process knob-like and of small size, apparently unprotected ventrally and in side view projecting in the form of a subtriangular setiferous tubercle (fig. 7 vlp). Volsellae almost unarmed at extreme base, the laterobasal process reduced to a swollen ridge, but apices of volsellae forming a pair of subrectangular, semitransparent, tessellate plates directed obliquely inward (fig. 5). Average size smaller and stature less robust.

E. obscura. — Antenna markedly longer than width of thorax across tegulae (ratio in ♂ approx. 10 : 6.9); 4th segment at least 1½ (♂) or 1¼ (♀) times longer than 3rd; apical flagellar segments of ♂ markedly knotty posteriorly (fig. 1). Hind basitarsus of ♂ abruptly expanded at about ⅓ to ¼ the distance from base, ventral (inner) face of basal portion more nearly oval and more strongly hollowed out, its reticulate surface more shiny and hairless, the intero-ventral longitudinal crest more strongly raised and sharply acute (fig. 4). Wings longer, fore wing more elongate, less abruptly expanded beyond middle, apex more pointed, length/breadth ratio 100 : 37 (♂) or 100 : 40—41 (♀); marginal cell about four times longer than wide, extending beyond 3rd submarginal cell and usually tapered somewhat to apex; proximal and distal sides of 2nd submarginal cell converging but well separated costad; course of 2nd and 3rd cubital veins variable but less abruptly outbent, the 2nd lacking rudimentary side-branch; 3rd submarginal cell longer, equalling its breadth (figs. 2—3). Membrane of fore wing slightly lighter grey-brown.

Gaster with white pubescent markings either similar to *funeraria,* or the white spots are almost or wholly absent and replaced by black.

Hidden sternal plates 7 and 8 shaped as in fig. 6. Genital capsule of ♂ slightly constricted at middle and more evenly expanded apically. Gonostylus broad, rather strongly incurved and hollowed out in ventral view, swollen and angular in profile; inner face densely clothed with two rows of strong bristles; latero-basal ventral process in ventral view knob-like, protected by an oval, hairless, thin and wholly transparent convex plate (fig. 6), the process in side view projecting in the form of a roundish tubercle (fig. 6). Volsellae in caudal view armed on either side with conspicuous, transverse, disk-shaped and densely setose, interobasal process pointing inward, this process in ventral view being rod-like in appearance (fig. 6). Size slightly larger and facies more robust.

Other slight differences between the two species applying to both sexes are found in the shape of the eyes and the prominency of the face (depth of clypeus), the approxi-



funeraria
♂ Olympia

obscura
♂ Genoa

simulatrix
♂ Istria

Fig. 4. *Eupavlovskia funeraria* (F. Smith), *E. o. obscura* (Friese) and *E. o. simulatrix* subsp. nov. Outer aspect of right hind tibia and basitarsus. Scale-line = 5 mm

mate length-breadth-depth ratios in *funeraria* being 20 : 10 : 6, in *o. obscura* and *o. simulatrix* 23 : 10 : 8—9. The most reliable characters separating the two are most easily understood by a comparison of the accompanying drawings of structural details.

Whereas *E. funeraria* throughout the whole of its distributional area exhibits a uniform pattern of black-and-white pubescence, the sexes being almost alike in this respect, *E. obscura* is a much more variable insect. The female of typical *obscura* is at once distinguished from *funeraria* by having the whole body black, while in the male it is the abdomen (except the first segment) which is almost or entirely unspotted. However, two clearly recognizable races can here be distinguished. In parts of the Mediterranean where the ranges of the two species overlap, a subspecies of *obscura* occurs which

has developed a black-and-white body pattern resembling that of *funeraria* so closely that recognition, particularly of the females, is possible only on close scrutiny. Further particulars will be given below. Looking upon relationships in their true perspective, the nomenclature applied to this polytypic species is unfortunate, as it does not probably reflect its phylogeny. Typical *obscura* as well as its white-spotted subspecies *simulatrix* were both of them confounded with *funeraria* by Friese and all later authors. If the name *obscura* had not been in use already for more than seventy years, it would have been far more appropriate and convenient to rank it as the western race and melanotic representative of *simulatrix,* a name now necessarily applied to a subspecies with a much wider geographical range.

Eupavlovskia funeraria (F. Smith)
Figs. 1—5 and 7

Melecta funeraria Smith, 1854, Cat. Hym. Ins. Brit. Mus. 2: 287 (♀ Albania). — Morawitz, 1876, Horae Soc. Ent. Ross. 12: 66 sep. (Borshom, Caucasus). — Friese, 1895, Bienen Europa's 1: 155-156 (♀ ♂ key, partim), 166-167 (pars: Budapest-Czinkota; Istria and Corfu very doubtful). — Dusmet, 1905, Bol. Real Soc. esp. Hist. nat.: 154-155 (♀ Madrid). — Maidl, 1922, Ann. Naturhist. Mus. Wien 35: 92 (pars: Durazzo & Mamuras in Albania; Tinos; Corfu, doubtful). — Schmiedeknecht, 1930, Hym. Nord- u. Mitteleuropas: 830 ("Südeuropa bis Budapest", partim). — Moczár, 1957, Apidae, Fauna Hung., Hym. 3 (13): 31-33 (Hungarian locs.). — Moczár, 1958, Folia Ent. Hung. 11, no. 24: 413 (Hungarian locs.). — ?Iuga, 1958, Fauna R.P.R. 9: 208-211, fig. 80 (♀ struct., ♂ ♀ Circea nr. Craiova, S. Rumenia).

Eupavlovskia funeraria Popov, 1955, Trudy Zool. Inst. Akad. Nauk USSR 21: 330-333, fig. 1^3 (wings), 4^{1-5} (♂ structures), gen. nov., type-species *Melecta funeraria* F. Smith, 1854. "Algeria to Caucasus, northwards to Hungary; in Russia: Borshom, Kazikoporani (sec. Morawitz), Araks Valley" (pars!).

Type material. — Albania: ♀ (lectotype by present selection), labelled "Albania 336 *M. punctata* ♂", and ♀ (syntype) labelled "Alb.", both over drawer label *funeraria* (OUM).

Further material. — Spain: 1 ♂, Madrid, Dusmet, and 1 ♀, Vallecas, Dusmet, both labelled *Melecta funeraria* Sm. by J. A. Dusmet (IEM). — Hungary: 1 ♂ 1 ♀, Pest, 5.6.86, Friese, coll. A. Weis, *M. funeraria,* det. Friese 1900 (SMF); 1 ♂, Pest, 5.6.86, Friese, *funeraria* (det.?) (MCG); 1 ♂ 2 ♀, Pest, 5.6.86 (♂), 16.6.85 (♀) and 27.6.86 (♀), Friese, *M. funeraria,* det. Mocsáry (MBUD); 2 ♀, Pest, 3.6.86, Friese, one with *M. funeraria* Sm., det. Friese 1898 (ex coll. Friese, coll. m.); 1 ♂ 1 ♀, Czinkota Ujhelyi (print), *M. funeraria,* det. D. B. Baker (NMW); 3 ♂ 6 ♀, Czinkota Ujhelyi (3 ♂ 4 ♀), Cinkota Bartkó (♀) and Czinkota det. Kiss (♀), all *M. funeraria* Sm., det. M. Moczár (MBUD); 2 ♂ 1 ♀, Kistarcsa, leg. Bartkó, same identification labels (MBUD); 1 ♂ 1 ♀, Budapest, Mocsáry, ex coll. Wollmann (ZIL); 1 ♀, Pest, 5.4.86, Friese, coll. Morawitz, *M. mocsaryi* n. sp. ♀, det. Morawitz, "Parasit *H. zonatula*" (ZIL). — Jugoslavia: 1 ♀, Macedonia, Lake Prespa, E. shore, 15.VI.1965, J. T. Wiebes (ML); 1 ♂ (diss.), Atari-Dojran [Dojran in SE Macedonia], 2-12.VI.1955 Jonco (print), ex coll. Cingovski (CVZ). — Greece: 3 ♂ (1 diss.), Olympia, Schmiedk., 1912 (print) (SMF); 1 ♂, Greece, Olympia (CW); 1 ♂, Olympia, Graecia, *Melecta funeraria* Sm. ♂, det. Friese (both in Schmiedeknecht's writing (MBUD); 1 ♂, *Melecta funeraria* Smith ♀ ♂ Olympia, Griechenland, det. Schmiedeknecht (in Schmiedeknecht's writing (NMW); 2 ♂ 2 ♀, Graecia, Peloponnes, Zachlorou, 2.VI.1963 (2 ♂) and Kalamata [Kalamai], 12.V.1964 (2 ♀), Max. Schwarz & J.

Gusenleitner (CMS). 1 ♀, Tinos [Tenos I.], coll. O. Sichel 1867, *funeraria* Sm. ♀ ♂ Tinos 5.67, det. O. Sichel (MP); 1 ♀, Tinos, Erber 1867, *funeraria* det. Kohl, *M. funeraria* Sm., det. Friese 1893 (NMW); 1 ♂ 1 ♀, Insula Tinos, *funeraria* Smith ♂ ♀, coll. & det. Morawitz (ZIL). — Italy: 1 ♀, Lazio, Roma, Fo. Toraccia Montebello, 26.V.1958, M. Comba (CMC). Sicily: 3 ♂, Sicily (BM). — Asia Minor (Turkey): 2 ♂, Erzurum, 14—20 km Ispir-Ikizdere Rd., 14—1700 m, 2.VI.1962, K.M. Guichard & D. H. Harvey (BM). — USSR: 2 ♀, Caucasus, Araxes thal, Leder-Reitter (ZIL).

Synonymy. — Schmiedeknecht (1930) and Iuga (1958) gave *Melecta italica* Radoszkowski, 1876, as a synonym of *E. funeraria*, but this is incorrect. The type of *M. italica*, now before me and here selected as the lectotype of that species, is a male in the Berlin Museum (ZMB), bearing locality and identification labels in Radoszkowski's own handwriting and also a label in G. Enderlein's hand confirming the identification as well as the type designation. This specimen was first (1876) mistaken by Radoszkowski for a female but later (1893) recognized as a male. It is a true *Melecta*, answering the original Latin and French descriptions published in 1876 in every respect, the name *italica* being validly applied to it. The genital armature was dissected by Radoszkowski and figured in his next paper (1893: 182, figs. 36a, b, c and i). Parts of the hidden sternal plates and genital capsule, still retained with the insect, are clearly recognizable and of the shape characteristic for *Melecta*, agreeing well with Radoszkowski's sketches. The second male (apparently also from "Italie"), which Radoszkowski associated with the former, is almost certainly a male *Eupavlovskia*, as would appear from his description of the leg structure. This example I have not seen.

Male. — Hair of labrum silvery on disk, black at the sides, with long black bristles sparsely intermixed; thin fringe at margin of mandibles black. Long beard-like hypostomal tuft white. Dense coating on clypeus pure white, with admixture of long black bristles on paraclypeal area; much longer erect white tufts covering anterior half of antennocellar area, the posterior half of which is almost bare; longish erect hairs on occipital area, white centrally, black laterally; behind the eyes black. Scape of antenna with long anterior fringe of white hairs. A fully 2 mm broad collar of long, dense, erect silvery pubescence covers the entire anterior portion of mesothorax in front of and surrounding the black tegulae, this vestiture is continued laterally, extending as far down as the mesocoxae; behind this the thorax is black except conspicuous long tufts of white arising from upper portion of metepisternum and outer portion of scutellum-metanotum. Sternites also partly white-haired. Legs mainly black; long posterior fringe on trochanters and femora white on fore legs, black on mid legs and absent on hind legs, on which it is replaced by short black hair. Outer faces of all tibiae with apical patch of appressed, finely plumose, silvery hair covering from 1/5 to 1/6 of fore and mid tibiae, 2/5 to 1/2 of hind tibia; outer face of fore and mid tarsi black with distal patch of white on basal and apical segments, the intermediate ones mainly white; outer face of hind basitarsus silvery white except basally; succeeding segments also white, end segment mainly bare. Disk of first tergite mixed black and white, long and erect on anterior half, short, black and decumbent posteriorly; sides with conspicuous, oval patch of long, suberect, finely branched hairs occupying whole surface. Hair covering following segments very short and black, but 2—5 in addition with conspicuous, transverse lateral patches of much longer, dense and decumbent, snowy-white hair, these spots largest and more or less oval on 2, successively smaller and rectangular on 3—5, the one on 5 reduced to a squarish

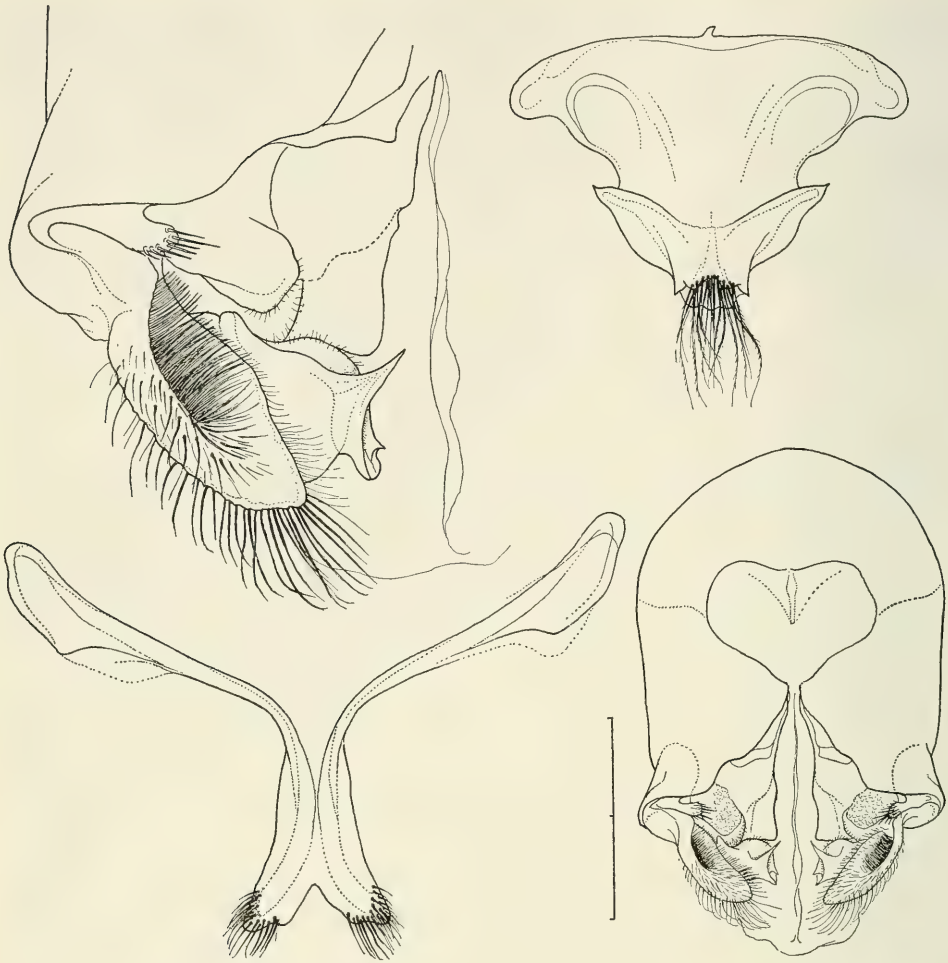


Fig. 5. *Eupavlovskia funeraria* (F. Smith), ♂ from Olympia (Greece). Genital capsule, ventral view (lower right); right gonostylus and adjoining structures of same, more enlarged, showing reduced laterobasal plate (upper left); seventh (lower left) and eighth (upper right) sternal plates, ventral view. Scale-line = 1 mm

or circular spot. For the rest black, except disk of 7th tergite which bears a dense coating of golden brown decumbent tomentum. Sternites all black.

Female. — Differs from male, as follows: labrum, vertex, occipital area, temples and genal area all black, head in front otherwise as in male. Anterior white thoracic band more sharply defined but almost half as broad as in male (1.0—1.2 mm) and consisting of much shorter and denser snowy-white hairs, the half collar above leaving off abruptly just in front of tegulae and at the sides about half-way down mesopleuron. Metepisternal tufts also purer white, more sharply delimited, shorter and a little smaller than in male. Whole ventral surface of thorax and all of the legs dark brownish black or black, lacking white fringes or spots. First gastral tergite as in male but erect pubescence shorter and apparent only on basal one-third of dorsum; lateral patches snowy-white,

more compact, angular and extending somewhat inward basally, consisting of longish appressed pubescence; white lateral patches of 2—4 very compact, slightly larger than in male, especially the one on 2, which is about equal in size to that of 1, subrectangular or almost circular in outline, those on 3 and 4 more transverse, angular and successively smaller. Pygidial plate dark reddish brown outlined in black.

Measurements. — Body length: ♀ (lectotype) 13.0 mm, fore wing 9.3 mm. Further specimens: ♂, 12.5—13.5 mm and 8.7—10.0 mm, respectively; ♀, 12.5—14.0 mm and 9.0—9.7 mm, respectively.

The internal accessory genitalia of *funeraria* have been dissected and compared in a number of males, the specimen here figured (fig. 5) being taken only as an example. Variation is slight and mainly apparent in the shape of the 7th sternal plate, whose apex may be more or less deeply notched; also the number of strong, finely plumose setae varies between individuals. The whole structure is distinctly more slender than in *E. obscura,* the long, widely divaricate apodemal processes of *funeraria* being especially distinctive.

Flower records. — *Vicia* and *Thymus* (sec. Friese).

Distribution. — A widely-spread Mediterranean species with a scattered distribution, probably more continuously so towards the east. Actual range presumably coinciding with that of *Habropoda zonatula* (and *tarsata?*); see last chapter.

Eupavlovskia obscura (Friese)
Figs. 2—4 and 7

Melecta funeraria Smith var. *obscura* nov. Friese, 1855, Bienen Europa's 1: 155-156 (♀ ♂ key, partim), 166-167 (pars: ♀ Dalmatien; ♀ Livorno).

Melecta nigra Spinola: Gribodo, 1893, Bull. Soc. Ent. Ital. 25: 414-415 (♀ ♂ Liguria).

Melecta funeraria Smith forma *Grandii* nov. Hedicke, 1935, Boll. Lab. Ent. Ist. Sup. Agrar. Bologna (1934) 7: 213 (♂ Bologna). — Grandi, 1954, Boll. Ist. Ent. Univ. Bologna 20: 251 (Versilia, littor. tosco-ligure).

Eupavlovskia funeraria Smith var. *grandii* Hedicke: Popov, 1955, Trudi Zool. Inst. Akad. Nauk USSR 21: 332 (note; not seen).

Type material. — Italy: ♀ (lectotype by present designation), labelled 13/Mann 1872 Livorno, *aterrima* det. Kohl, 122 *funeraria* var. *obscura* Friese ♀, det. Friese 1893 (NMW). Jugoslavia: ♀ (lectosyntype), labelled Mann Dalm. 850 (written on square), *aterrima* det. Kohl, *funeraria* var. *obscura* Friese ♀, det. Friese 1893 (NMW). Italy: ♂, Emilia, labelled Bologna, Ronzano, 15.IV.1934, *Melecta funeraria* var. *grandii* m., det. H. Hedicke, lectotype *M. funeraria* var. *grandii* Hedicke (IEB).

Further material. — Italy: series ♂ ♀ (syntypes *grandii* Hedicke, 2 ♂ diss.), Bologna, Ronzano, 12-26.IV.1934 (1 ♂ with Bologna, Gaibola), all taken in April and May, 1 ♂ identified as *M. funeraria* Sm. var. *grandii* Hed. and 1 ♀ as *M. funeraria* Sm. var. *obscura* Friese, by J. D. Alfken 1937 (IEB); 3 ♀, same loc. and dates, 1938 and 1940, *M. nigra* Spin. det. J. D. Alfken 1939 (IEB). 1 ♂ (diss.), Emilia, Italia, *M. funeraria* Sm., det. ? (NAMP). Series ♂ ♀, Liguria, Borzoli [near Genoa], IV.1883, G. Doria, 1 ♂ with *M. nigra* Spinola, det. Gribodo, 1 ♂ with *M. nigra* Spin. ??, det. Gribodo, and 1 ♀ with *M. nigra* Spin. (nec Lep.), det. Gribodo (MCG); series ♂ ♀, Borzoli, 10-20.IV.1909 (♂), 15-20.IV.1909 ♀), all with addition "su fiori *Brassica oleracea* G. Doria", 1 ♂ with Genova dint. and 1 ♀ with *M. nigra* Spin. (unknown writing) (MCG); 1 ♂ 1 ♀, Genova, Aprile, ♂ with *Melecta* spec., det. Guiglia, ♀

with *M. nigra* Spin. *aterrima* Lep., Genova D. gribodo, det. Gribodo (MCG); 2 ♂ (1 diss.), Pegli [near Genova], 3-5.IV.1954, D. Piet (MA). 1 ♂ 1 ♀, Italia, Sestri Levante, 7. IV.1906, leg. Dr. Uzel, *funeraria* det. Kohl (NMW). 3 ♀, Toscana, Castiglioncello, near Livorno, 3-11.V.1958, G. Barendrecht (CB). Series ♂ ♀, Latium, environs of Rome: Lazio, Fo. Toraccia, Acilia, Marino, Roma dint. and Montebello, from 31.III tot 17.IV.1934, 1936, 1946, 1947 and 1953, leg. M. Comba, M. Armani and Castellani (CGS, CMC, ML). 1 ♂ 1 ♀, Lazio, Marino, 12-14.IV. 1933, ex Ist. Naz. Ent. Roma (print) (INER); 4 ♀, Lazio, Marino, 18.IV.1933, *M. nigra,* det. ? (ZSM); 1 ♂, Pescara, 21.IV.1963, Klaus Warncke (CW); 1 ♀, Calabria, Erber, coll. Morawitz, *M. nigra* Lep. (ZIL). Sicily: 1 ♂ 1 ♀, Sicily, *M. nigra* St. Farg., det. F. Smith (?) ex coll. F. Smith (BM); 3 ♂ 7 ♀, Sicily, indet., ex coll. F. Smith (BM); 1 ♀, Sicily, Palermo, 1.VI.1965, S. Novoitely (?) (CMS); 2 ♀, Sicil. (print), loc. illegible, 1 ♀ with var. *obscura* ♀, det. Friese 1904 (NRS).

This is the bee so lyrically praised for its beauty by Gribodo, whose excellent descriptions of either sex, written in his own language, leave no doubt about the identity. His specimens came from Liguria, a country which happens to coincide with that of the type locality of *Melecta nigra* Spinola, 1806. This is, however, a much smaller bee and a true *Melecta.* Although Gribodo knew this species well from other localities in Italy and realised it to be only a black "variety" of *M. armata* Panz. (recte *punctata* F.), he was misled by the corresponding localities "Liguria" and finally arrived at the wrong conclusion, mistook the bigger species for Spinola's *nigra* and left the former without a name. Had he inspected the type of *M. nigra,* a female still in good condition and preserved in Spinola's own collection at Torino, Gribodo would undoubtedly have recognized it and corrected the error. The females of both species are black and both occur during the spring in similar surroundings, but whereas *M. punctata nigra* Spinola is distibuted almost all over Italy, *E. o. obscura* has a much more restricted range.

The correct name for this bee is *obscura* Friese, who considered it a dark variety of *E. funeraria.* Remarkably enough, even Alfken, who in 1937 revised Hedicke's specimens of *grandii* in the Istituto di Entomologia at Bologna, failed to associate the sexes, the males being labelled by him as var. *grandii,* the females as var. *obscura.* Two years later (1939) some more females, like the others from Bologna, were identified by Alfken with *Melecta nigra* Spin.

Male. — Pubescence of mouth-parts as in *funeraria* but all hairs uniform deep black, only the long hypostomal tufts being yellowish-white. Clypeus, frontal area, summit of head anteriorly, and antennal scape, as described for *funeraria,* except that all light hairs have a distinct yellowish tinge; pubescence covering rest of head including occipital area deep black. Thoracic pattern also resembling that of *funeraria,* except that the collar is broader (2.5—2.8 mm on middorsum) and all light-coloured silky hairs are slightly longer, dirty yellowish white (in perfectly fresh bees) to palest grey (in older examples), instead of pure white. Light metepisternal tufts behind wings also longer and similarly coloured. Pubescence of legs longer than in *funeraria*; coxae and trochanters of fore and mid legs partly light-haired, those of hind legs black; posterior fringes of femora black except slight admixture of white on first pair. Outer faces of all tibiae and tarsi black, vestiges of whitish spots only at extreme apices of all tarsal segments except the last. Gaster black. Pubescence on disk of first tergite as described for *funeraria* but all hairs black save for the more or less triangular patches of long soft pubescence placed on each

side, which are yellowish-white, slightly variable in size and composed of hairs that are longer than in *funeraria*. Succeeding segments either entirely black (in the majority of specimens), or 3—4 (still more rarely 2—4) each with a minute circular spot or point of white pubescence on either side. For the rest black, the disk of 7th tergite clothed also with black or very dark brown tomentum.

Female. — Body jet-black, clothed all over with deep black pubescence, there being no concentrations of black hair-spots in places which in *funeraria* and *o. simulatrix* are covered with white hair bands or spots. Only the tomentum of the tarsal segments is dark brown with slight reddish brown lustre.

Variation. — Whereas the females are very uniform, remaining totally black, the males exhibit some slight variation in the extent of white on the abdomen. In our series from the environs of Genoa and Rome about half of the males possess white hair points at the sides of tergites 3 and 4 (not on 2) in addition to the white tufts on either side of gastral 1. In all males from Bologna and Sicily, however, all tergites except the first are unmarked. The single specimen from Emilia approaches *simulatrix* by having tergites 2, 3 and 4 white-spotted, albeit that the spots on 3 and 4 are extremely minute.

Measurements. — Body length: ♂, 13.5—16.0 mm, fore wing 11.0—11.3 mm; ♀, 14.0—15.5 mm and 10.5 mm, respectively.

Flower records. — *Brassica oleracea* (near Genoa, sec. Doria and Gribodo).

Eupavlovskia obscura simulatrix subspec. nov.
Figs. 1—4 and 6

Melecta funeraria Friese, 1895, Bienen Europa's 1: 155-156 (♀ ♂ key, partim), 166-167 (♀ ♂ descr., partim) ("Italien, Dalmatien bis Budapest", partim). — Zavattari, 1913, Bull. Mus. Zool. Anat. comp. Torino 28, no. 671: 2 (♂ Rodi, no descr.). — Schmiedeknecht, 1930, Hym. Nord- u. Mitteleuropas, 2. Aufl.: 830 ("Südeuropa bis Budapest": err., partim). — Leclercq, 1965, Bull. Inst. Agron. et Stat. Rech. Gembloux 33: 144 (♀ Vienna; ♀ Asia minor mér.: Bulghar Dagh).
Eupavlovskia funeraria Popov, 1955, Trudy Zool. Inst. Akad. Nauk USSR 21: 332 (locs., partim).

Material. — Jugoslavia: ♀ (holotype) and ♀ (allotype), Mazedonien [S. Jugoslavia], Treskaschlucht, 10.V.1956 (♂) and 20.V.1956 (♀), leg. Pinker, ex coll. H. Bytinski-Salz (ML). 1 ♀, Macedonia, Katlanovska Banja [Vardar valley near Skopje], 5.VI.1965, W. Vervoort, on *Vicia dasycarpa* Ten. (ML). 1 ♂, Macedonia, Cavenworth (?) (BM). ♂, Dalmatien, Jugosl. Insel Lokrum [opposite Dubrovnik] 1966, leg. C. v. Demelt, *M. funeraria* det. Leclercq (FAG). 1 ♀, Dalm [atia], Zelenika [nr. Castelnuovo], Csiki, *M. plurinotata* Brullé, det. Mocsáry (MBUD). 2 ♂ (1 diss.), Istria, Rovigno, Mai 1900, Dr. Uzel, both with *Melecta/Eupavlovskia/funeraria* Sm. det. ? (NAMP), 1 ♀, Istria, Limski Fjord, 3.VI.1962, C. F. van Beusekom, on *Cistus villosus* (ML).— Albania: 1 ♀, Albanien, Durrec [Durazzo], IV.1917, Karny, *Mel. funeraria* Sm. ♀, det. Maidl (NMW). — Austria: 1 ♀, Wien, Kuchelau, coll. Muhr-Wien (FAG). — Greece: 1 ♀, *Melecta funeraria* Smith, ♀ (♂ eraded), Olympia, Griechenland, det. Schmiedeknecht (in Schmiedeknecht's writing), *Eupavlovskia funeraria* Sm., det. D. B. Baker (NMW). 1 ♀, Lamia (S of Othrys Mts., lat. 39°), 12.V.1962, W. Linsenmaier (CL). 1 ♀, Sparta (Peloponnesus, lat. 37°), 18.V.1962, W. Linsenmaier (CL). 1 ♂, Graecia, Stymphalischer See [Stimfalias], 16-19.IV.1956, Fr. Borchmann 1960 (MKB). 2 ♀, Graecia, Peloponnes, Zachlorou, 30.V.1962 and 28.V.1964, Max. Schwarz (CMS). 2 ♀, Ellas, Athene, Mt. Imitos, 2.V.1963, S. Daan & V. van Laar (MA); 1 ♀, Ellas, Attica, Limni Marathonos, 11.V.1963, S. Daan & V. van Laar (MA). 1 ♀, Tinos [Tenos I.], coll. Morawitz (ZIL). — Sicily: 4 ♂,

Sicily (BM); 1 ♀, Sicily, white-spotted, not re-examined, of doubtful status (BM). 2 ♂, Sizilien, Messina, 27.III.1930, Troll, Hym. Inv. Nr. 318—319, *Eupavlovskia funeraria* Sm., det. D. B. Baker (NMW). — Rhodos I: 2 ♂ (1 diss.) Rodos, Agios-Isodoros, and same island, Rodi, Kattabia, III-VI.1913, Rodos, F. Festa, one with *Melecta funeraria* Sm., det. E. Zavattári (MT). — Asia Minor (Turkey): 1 ♂, W-coast, Ayvalik, 18.IV.1965, Klaus Warncke (CW); 6 ♂ 1 ♀, Aydin, Bozdogan, 200 m, 23.IV.1962; 1 ♂, Mugla, S.L., Marmaris, 19.IV.1962; 1 ♀, Antalya, Finike,

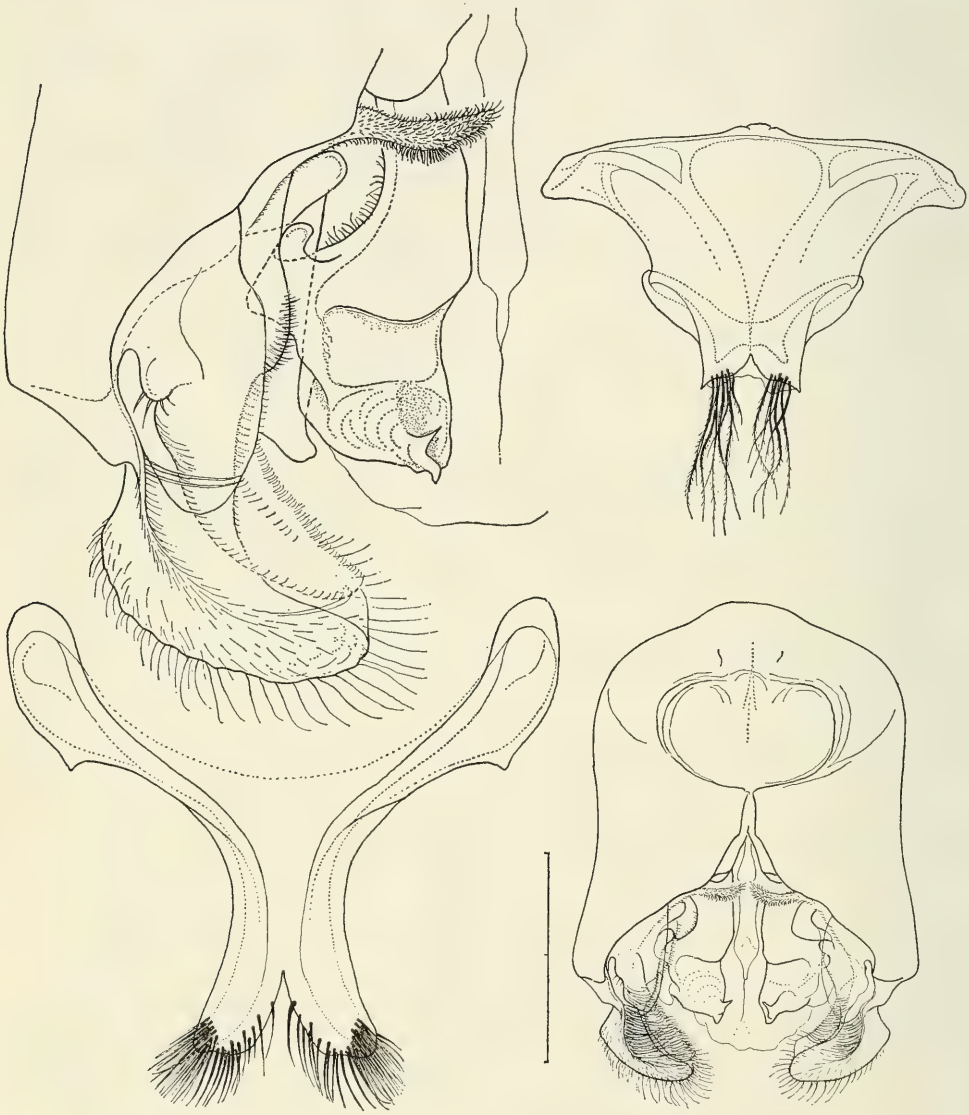


Fig. 6. *Eupavlovskia obscura simulatrix* subsp. nov., ♂ from Istria. Genital capsule, ventral view (lower right); right gonostylus and adjoining structures of same, more enlarged, showing membranous cover and setiferous laterobasal plate, the dense bristly coating mostly omitted (upper left); seventh (lower left) and eighth (upper right) sternal plates, ventral view. Scale-line = 1 mm

50—100 m, 7.IV.1962; ♂ ♀, Ispir [Armenia], IV.1962 (alt. & dates not noted); all K. M. Guichard & Harvey (BM); 1 ♀, Asia minor mérid., Bulghar Dagh, 1200 m, leg. Demelt, 6-15.VI. 1964, *M. funeraria,* det. Leclercq (FAG). 1 ♀ Taurus [Kurdistan], Marasch, V.1928, E. Pfeiffer, *Melecta funeraria* Sm., det. F. Stocklein (ZSM). — USSR : 1 ♀, Caucasus, Kazikoporani [Armenia], *funeraria* Sm., coll. & det. Morawitz (ZIL); 1 ♀, Transcaucasus, Borshom (ZIL). 1 ♀, Wag [ner] Cauc [asus] (written on square), *funeraria* det. Kohl (NMW). 1 ♀, Ost-Buchara (Uzbekistan), Tschitschantan, coll. Hauser 1898 (NMW).

At least half of the bees named *funeraria* in collections belong to this species, which is more robust, averages slightly larger in size and has longer hair than *funeraria.*

Morphologically, *E. o. simulatrix* is almost an exact replica of *obscura,* the size being the same, the venational characteristics correspond closely, and there are only slight differences in the form of the leg structure and genitalia of the male. Both sexes differ from the nominotype mainly in that the light markings are much more extensive, especially on the abdomen, the yellowish tinge of the thoracic pubescence of male *obscura* having become pure white in *simulatrix.*

Male. — White fringe of long erect hairs at occipital crest sparsely intermixed with few dark hairs. Long white pubescence covering thoracic segments pure silvery-white, the anterior collar frequently a little broader than in *o. obscura* (up to 3 mm), more or less confluent laterally below the wings with the metepisternal tufts and occupying most of the sides. Legs predominantly black-haired; coxae and trochanters with much white hair, long posterior fringe of fore femur also pure white, those of remaining femora black; tibiae black but outer faces of all segments, except (or partly including) the last, clothed with white tomentum similarly to *funeraria.* White lateral patches of gastral tergite 1 larger and more approximated than in *obscura,* the erect hairs on anterior portion of disk frequently likewise partly or wholly white; white tergal blotches covering the sides of 2—5 consisting of decumbent hairs, resembling those of *funeraria* in shape but all slightly larger, usually more angular and extending a little further inward in several specimens (except in the holotype, in which the spots are quite similar to those of most *funeraria*). In a large-spotted male from Istria the spots have attained their maximum size, being placed transversely on tergites 3 and 4 and equal in breadth to the distance separating them; this is, however, an exceptionally light specimen. Minus variants originate from Sicily. Tomentum covering 7th tergite exactly as in *E. funeraria.*

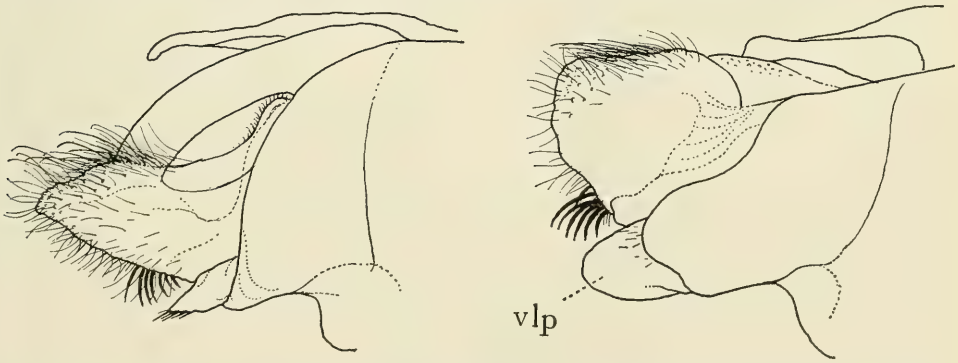


Fig. 7. Left: *Eupavlovskia funeraria* (F. Smith), from Olympia (Greece); right: *E. o. obscura* (Friese), from Bologna (Italy). Right lateral view of apex of gonocoxite and gonostylus of ♂ genitalia; vlp = ventro-lateral process of gonostylus

Female. — Differs from the male in the same way as do the sexes of *E. funeraria:* thoracic pubescence much shorter, dense and velvety, the light areas thus appearing snowy-white, contrasting strongly with the rest of the vestiture, which is deep black. Body pattern quite similar to *funeraria,* the white abdominal spots showing corresponding variation in size and shape.

Worn females of *funeraria* and *o. simulatrix* can be distinguished with certainty only by using the structural characters given earlier. Helpful features separating the two are found in the shape, colour and neuration of the fore wings (figs. 2—3), the wing membrane of *funeraria* being much the darkest. Otherwise the resemblance between them is very striking, hence the name *simulatrix* for the present taxon.

Measurements. — Body length: ♂ (holotype) 13.3 mm, fore wing 10.2 mm; ♀ (allotype) 13.3 mm, fore wing 11.0 mm. Further specimens: ♂, 13.3—16.0 mm and 10.2—11.2 mm, respectively; ♀, 13.3—15.0 mm and 10.0—11.0 mm, respectively.

Whereas the geographical ranges of *E. funeraria* and *o. simulatrix* overlap very extensively, "typical" *obscura* and *simulatrix* are largely mutually exclusive forms. Considering their distribution pattern in combination with the extreme similarity of structure, *similatrix* seems to be best placed as a subspecies of *obscura.*

Flower records. — *Vicia dasycarpa* (near Skopje); *Thymus* (Istria, sec. Friese, sub *M. funeraria*); *Cistus villosus* (Istria, in ML).

DISTRIBUTION AND HOST RELATIONS

It is generally assumed that the species of *Eupavlovskia* are parasitic in the nests of the anthophorine *Habropoda.* The earliest indications relating to this were given by Friese, who in June 1886 observed *H. zonatula* (F. Smith) and *E. funeraria* in the Rakos area, east of Budapest (Bienen Europa's, 1895: 167 and ibid., 1897: 55). Here the bees visited the flowers of *Vicia* and were seen flying together close to the ground over the nesting site of *Habropoda,* whose burrows were made in loamy soil at the roadside. This is apparently all that is known about the biology of these bees, no species having ever been reared from nests.

The following is an attempt to summarize the distributional knowledge of *Eupavlovskia* in conjunction with that of the two Mediterranean species of *Habropoda* (see also the map, fig. 8). The bees of the last-mentioned group were revised by me earlier (Lieftinck, 1966), most localities definitely known at that time having already been enumerated. Since then more distributional records of *Habropoda* have come to my knowledge, and this enables me to establish more accurately the occupied territory, the approximate boundaries of which enclose the hatched area on the map. From this it will be seen that practically all localities of *Eupavlovskia* in the Mediterranean area, Transcaucasia and Armenia fall within the known range of *Habropoda.* True, this includes also the northern extremity of Africa; but although a third species, *Habropoda oraniensis* (Lep.), has long been known as some species of "*Anthophora*" from Oran in Algeria, no *Eupavlovskia* have so far been discovered on the African continent. It should be added that all localities of *Eupavlovskia* entered in the map are based on critically identified or otherwise authenticated specimens, save only a few non-verified records taken from the literature, e.g. some eastern outposts lying beyond the area outlined, like E. Bukhara in Uzbekistan.

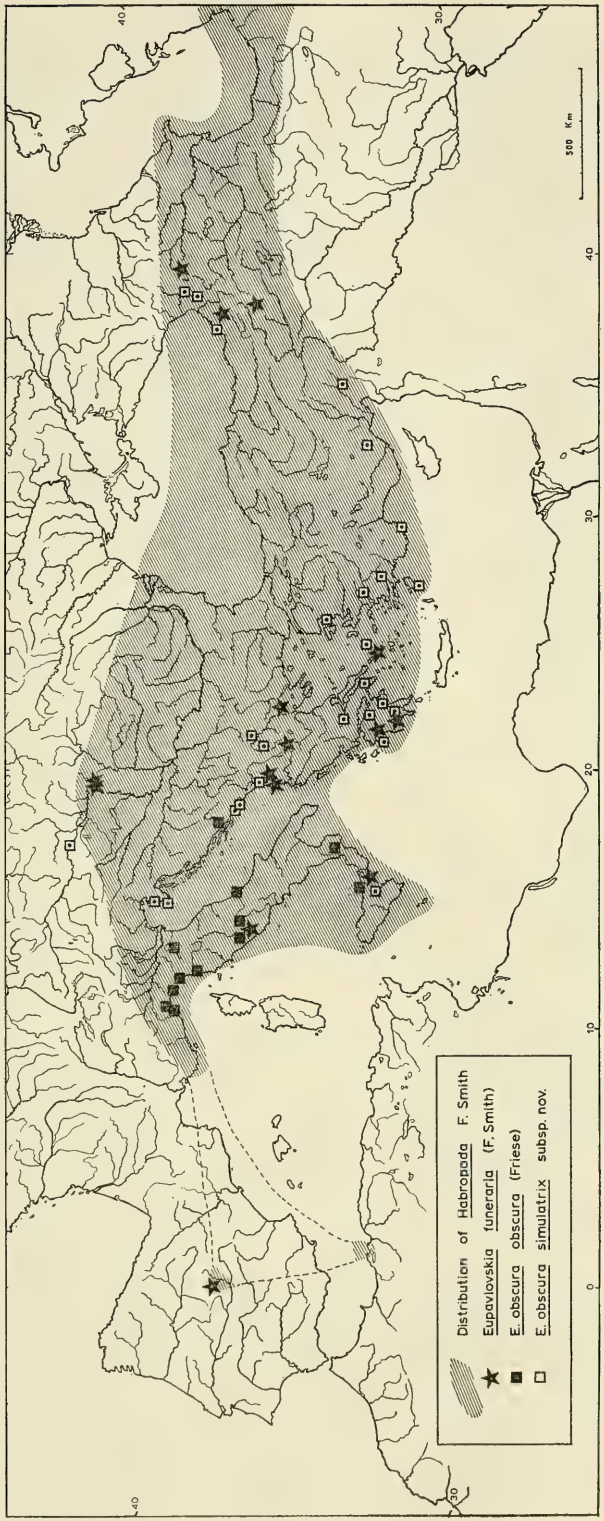


Fig. 8. Distribution of *Eupavlovskia* and *Habropoda* in the Mediterranean Region and beyond
(Note that the empty square in legend ought to be centred with black)

As we have seen, up to this time *E. funeraria* was the only taxon recognized as a full species. It seems, however, to be much scarcer and to have a more scattered distribution than *E. obscura* and its subspecies *simulatrix,* a look on the map (fig. 8) showing important gaps in our knowledge.

The only evidence of the occurrence of the genus in the Iberian Peninsula was provided by Dusmet (1905), who recorded a female *E. funeraria* from Vallecas (near Madrid). There is, however, a second, apparently unrecorded, example in Dusmet's collection and this happens to be a male, also from Madrid. Both are true to the types and were correctly identified. Diniz (1961) refers to two Spanish females of *Habropoda zonatula,* one reportedly taken at Villaverde (ex coll. Dusmet) and a second near Madrid (ex coll. Mercet). The last-mentioned example is in the Paris Museum, where I could confirm the determination. Thus it is evident that both genera do occur in Spain and that the Iberian *funeraria* is associated with *H. zonatula.*

The northernmost occurrence of *E. funeraria* is in the environs of Vienna, which is of exceptional interest because no species of *Habropoda* have yet been found in Austria.

In most localities where *H. tarsata* and *zonatula* occur together with either of the three *Eupavlovskia,* host preference still remains to be investigated. Yet in certain areas specific differentiation appears to be more clearly indicated. A few explanatory remarks may illustrate the listed distribution (Table I).

In northern Italy, for instance, *H. tarsata* and *E. o. obscura* are close associates, good series of each having been collected simultaneously near Genoa and Bologna, which undoubtedly points to their biological relation. The same bees seem to keep company on the rest of the mainland. As a matter of fact, the allied *E. funeraria* is known only from a single individual taken near Rome. This is significant, as it is only here that the two foster bees, *H. tarsata* and *zonatula* occur together, the latter being much the scarcer of the two.

It is remarkable that the genus has not yet been reported from southern France, the environs of Genoa being the westernmost habitat of *E. o. obscura.* Its absence further to the west is noteworthy, for it is a large bee not likely to be overlooked. This is the more astonishing since *H. tarsata* reaches its western limit in the extreme southeastern parts of France, where it is common locally in early spring. In the dép. Var the known localities are Hyères, Le Lavandou, Maures, Grimaux, Fayence and Le Trayas, and in the Alpes maritimes it occurs at Nice. My colleague Dr. G. Barendrecht, while collecting bees at Grimaux in April 1968, kept a sharp look-out for the conspicuous black *E. o. obscura;* but although *H. tarsata* was met with in the greatest abundance in certain places, he never once came across its cuckoo. However, as no burrows of the former were found at that time, it is just possible that its parasite may re-appear later in the season at the nesting site.

As was to be expected, the two races of *Eupavlovskia obscura* are largely allopatric in occurrence. I am unable at present to explain the co-existence in Sicily of all three melectine taxa here treated, and the two industrious bees *Habropoda tarsata* and *zonatula* as well. It would be of great interest to establish the true relationships in this island. This will require careful investigation for it is not at all precluded that other bees are also involved acting as hosts, e.g. some of the bigger vernal species of *Anthophora* occurring in Sicily[1]).

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[1]) In this connection it is worth noting that Iuga (1958: 211) mentions *Anthophora mucida* Gribodo as one of the host species of *E. funeraria* in Rumenia.

Table I. Simultaneous occurrences of cuckoo and host bees of the genera *Eupavlovskia* and *Habropoda*

	Eupavlovskia			*Habropoda*	
	funeraria	*o. obscura*	*o. simulatrix*	*tarsata*	*zonatula*
Spain					
Madrid	+				+
Italy					
Genoa		+		+	
Bologna		+		+	
Castiglioncello (near Livorno)		+		+	
Rome (Lazio)	+	+		+	+
Rome (Acilia, Lazio)		+		+	
Rome (Marino, Lazio)		+		+	
Sicily	+	+	+	+	+
Hungary					
Budapest	+				+
Jugoslavia					
Istria			+	+	
Dalmatia			+	+	+
Treska Valley		+?	+	+	
Katlanovska Banja (nr. Skopje)			+	+	
Albania	+		+?	+	+
Greece					
Athens (Mt. Imitos)			+	+	
Athens (Marathon Lake)			+	+	
Olympia (Peloponnesus)	+		+		+
Zachlorou (Peloponnesus)	+		+		
Tinos I.	+		+	+	
Rhodos			+	+	
USSR					
Borshom (near Tiflis)			+	+	
Kazikopora (Armenia)			+	+	
Araxes Valley	+				+
Turkey (Asia minor)					
Bozdogan (Aydin prov.)			+	+	+
Marmaris (Mugla prov.)			+	+	+
Ula (Mugla prov.)			+		+
Finike (Antalya prov.)			+	+	+
Ispir (near Erzurum)	+		+	+	+

On the opposite side of the Adriatic coast *E. obscura* is replaced by *o. simulatrix,* its probable host still being *H. tarsata.* Friese's old record "Dalmatia, Mann", for the syntype of *E. o. obscura* is the only — perhaps even rather doubtful — evidence of its occurrence in Jugoslavia. The *simulatrix* — *tarsata* association is apparently maintained in many parts of Greece and some of the neighbouring small islands. The much scarcer *E. funeraria,* on the other hand, has been taken at Olympia, a habitat which it shares with the equally rare *H. zonatula.*

The island of Corfu, given by Friese (1895) as a locality of *E. funeraria,* has been omitted from the map. The author states: "Ein weiteres prachtvolles ♂ Exemplar mit braungelber statt weisser Behaarung findet sich im Mus. Wien von Korfu". This specimen could not be recovered and has probably been lost; it is most likely a specimen of *E. o. simulatrix.* Corfu is also the island where *H. tarsata* has been found.

In Turkey and further towards the east the two *Habropoda* occur side by side in several places, both appearing equally common locally. As far as the limited material shows, they are accompanied in all but one locality by *E. o. simulatrix,* only at Ispir all four bees were collected simultaneously.

Summarizing the above, it would seem that the cuckoo bees of the Rassenkreis *E. obscura* are normally associated with *Habropoda tarsata,* while *E. funeraria* is the most frequent inquiline of *H. zonatula.* As a basis for further research this assumption can be expressed tentatively, by putting on record all habitations so far known where one or more representatives of either genus were captured during the same period, or even flew together the same day. These simultaneous occurrences are listed in Table I, the localities being arranged geographically from west to east.

Students in southern Europe are invited to check the above statements and the few facts assembled by observations in the field, which are urgently needed.

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