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A Revision of Digger Wasps of the Genus *Oxybelomorpha* (Hymenoptera, Crabronidae, Oxybelini): 6. The *O. persa* and *O. steckii* Species-groups

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Abstract—The Palearctic species-groups of the digger wasp genus *Oxybelomorpha* Brauns 1897, *O. persa* and *O. steckii*, are revised. Three species were investigated. *Oxybelomorpha steckii* (Kohl 1923) and *O. maroccana* (de Beaumont, 1957) are considered separate species. The male of *O. maroccana* is described for the first time. The lectotype of *Belomicrus* (*Pseudoxybelus*) *persa* Gussakovskij, 1933 is designated. A key to 24 revised species of the genus *Oxybelomorpha* is given.

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The final part of the revision of digger wasps of the genus *Oxybelomorpha* Brauns, 1897 deals with representatives of two Palearctic groups (Fig. 1), differing from other Palearctic species of the genus in the structure of scales of the metanotum and spine of the propodeum and in the presence of a preapical depression on 1st segment of the hind tarsus. These are the monotypical group *O. persa* with strongly widened scales and, especially, spine, and the *O. steckii* group including two closely related species, in which the scale form a nearly entire convex plate.

Oxybelomorpha persa Species-group

This group is characterized by the following main features: pronotal carina short, with sharp lateral

spines; mesoscutum and scutellum without median depression; scutellum without posterolateral lobes; scales of metanotum wide, with rounded apices and obtuse inner angles, separated by very deep oval emargination; precoxal tooth strong, triangular; metapleura without widened dorsal lobe; fore coxa of male unmodified; fore femur with transparent carina on outer surface; apex of hind femur greatly modified; 1st segment of hind tarsus with preapical depression on inner surface; spine of propodeum strongly widened, with rounded emargination at apex; metasomal tergite with bifurcate dorsal depression.

In his description of the subgenus *Belomicrus* (*Pseudoxybelus*), V. Gussakovskij (1933) has indi-

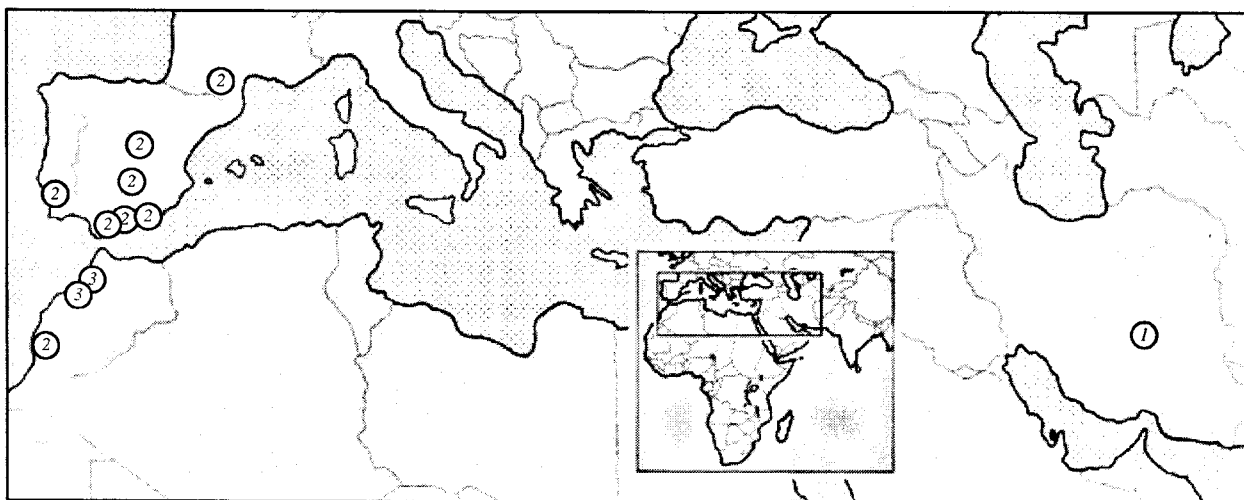


Fig. 1. Distribution of species of the *O. persa* and *O. steckii* groups: (1) *O. persa*, (2) *O. steckii*, (3) *O. maroccana*.

cated that the truncate apex of the marginal cell is an essential character differing *B. persa* from the congeners and relating it to species of the genus *Oxybelus*. However, a detailed comparison has shown that the wing venation in Oxybelini is rather monotonous, and genera clearly differ mainly in the structure of the subdiscoidal cells of the fore wing, or in the venation of the hind wing. In particular, in the genus *Oxybelomorpha*, the shape of the apex of the marginal cell correlates with the total size of the body. The apex of the marginal cell is distinctly truncate in species with the large body, rounded in those with the medium-sized body, and sharp in those with the small body. Pate (1940) has fairly noted that the other characters of *O. persa* in Gussakovskij's description entirely correspond to the diagnosis of *Oxybelomorpha*. I attach greater significance to the fact that the structure of scales of the metanotum in *O. persa* (with inner preapical angles) relates this species with the South African groups of *O. funesta* and *O. gessi*, while the structure of its mesoscutum and scutellum is more typical of Palearctic groups.

I include the only species in this group: *O. persa* (Gussakovskij, 1933).

***Oxybelomorpha persa* (Gussakovskij, 1933)**

Belomicrus (*Pseudoxybelus*) *persa* Gussakovskij, 1933 : 286. ♂: Iran [ZISP]. Lectotype designated here.

Belomicrus persa: Pate, 1940 : 240; Bohart and Menke, 1976 : 363.

Material. Lectotype: ♂, with following labels: "Kerman, str. Kuche, Kambil, 8–9.III.1901 (N. Zarudnyi)" [in Cyrillic], "Coll. Semenov-Tian-Shansky," "*Belomicrus* (*Pseudoxybelus*, subg. n.) *persa*, sp. n. V. Gussakovskij" [ZISP]. Paralectotype: ♂: "Kerman, str. Kuche, Kambil, 8–9.III.1901 (N. Zarudnyi)" [in Cyrillic], "Coll. Semenov-Tian-Shansky" [ZISP].

Description. Male. Head rounded in front view, nearly as wide as high (Fig. 2, 1a); $IOD = 38 : 28^1$; lower part of frons distinctly depressed, slightly convex, with not very distinct median depression before median ocellus; vertex convex, with oval depressions at sides of lateral ocelli; $OOD : OD : POD = 6 : 6 : 18$; parietal areas distinct, in the form of fine sulci (Fig. 2, 1b); temple obtuse-angled at posterior end (Fig. 2, 1c); median lobe of clypeus roundly projecting at lower

end, bounded by obtused lateral teeth; apical bordering not separated from other surface, with glabrous vertical stripe in middle and with transverse tubercle between antennal sockets; flagellar segments slightly wider than long (Fig. 2, 2). Pronotal carina short, not widened at sides, with sharp projecting lateral teeth, distinct narrow median depression, and fine posterior transparent bordering along entire distance between humeral calli (Fig. 2, 3); humeral callus flat at sides, with high transparent lamella turning into blunted carina; mesoscutum regularly convex, without median depression, with small median tubercle in middle of posterior margin; admedian lines hardly visible in anterior parts; parapsidal grooves absent; adlateral lines obsolete, concealed by sculpture; scutellum regularly moderately convex, wider than long, with posterior margin rounded at sides and with wide transparent lateral lamellae, without projecting lobes (Fig. 2, 4a); metanotum medially concave at base, without median carina; scales wide and long, not wider than middle tibia, with about 2/3 of outer parts transparent, bearing transverse ridges and longitudinal white stripe at inner margin, not bifurcate apically, with rounded outer margin and rectangular inner apical angles (Fig. 2, 4a, 4b); mesopleura weakly convex; precoxal tooth distinct, triangular; metapleura with fine dorsal carina, without widened lobe; fore coxa without ventral depression; fore femur flat on anterior and posterior surfaces, with projecting sharp transparent carina on antero-outer surface (Fig. 2, 5); hind femur very strongly narrowed on upper side before apex, widened at apex, with distinct, not incurved longitudinal carina (Fig. 2, 7); 1st segment of hind tarsus with wide and deep preapical depression on inner surface (Fig. 2, 8a, 8b). Dorsal area of propodeum separated by high carinae; lateral carinae strongly widened and upcurved in upper parts (Fig. 2, 9), connected in lower parts with base of median depression by transverse carinae coarser than lower parts of lateral carinae; dorsal spine of propodeum very wide, subparallel-sided, slightly widened toward apex, wider than scales of metanotum and emargination between them, with oval apical emargination and concave upper surface (Fig. 2, 4a); lateral carinae of propodeum lamellate widened in upper part. Metasomal tergite I with indistinct flat bifurcated depression on upper side and wide deep median depression on anterior surface (Fig. 2, 10a); tergites II–IV moderately depressed at bases (Fig. 2, 10b), tergites I–V with separated posterior areas, tergite VII with obtuse-triangular emargination at apex; sternite VI with smooth transverse tubercle.

¹ For abbreviations and designations, see Communication 1 (Antropov, 2005).

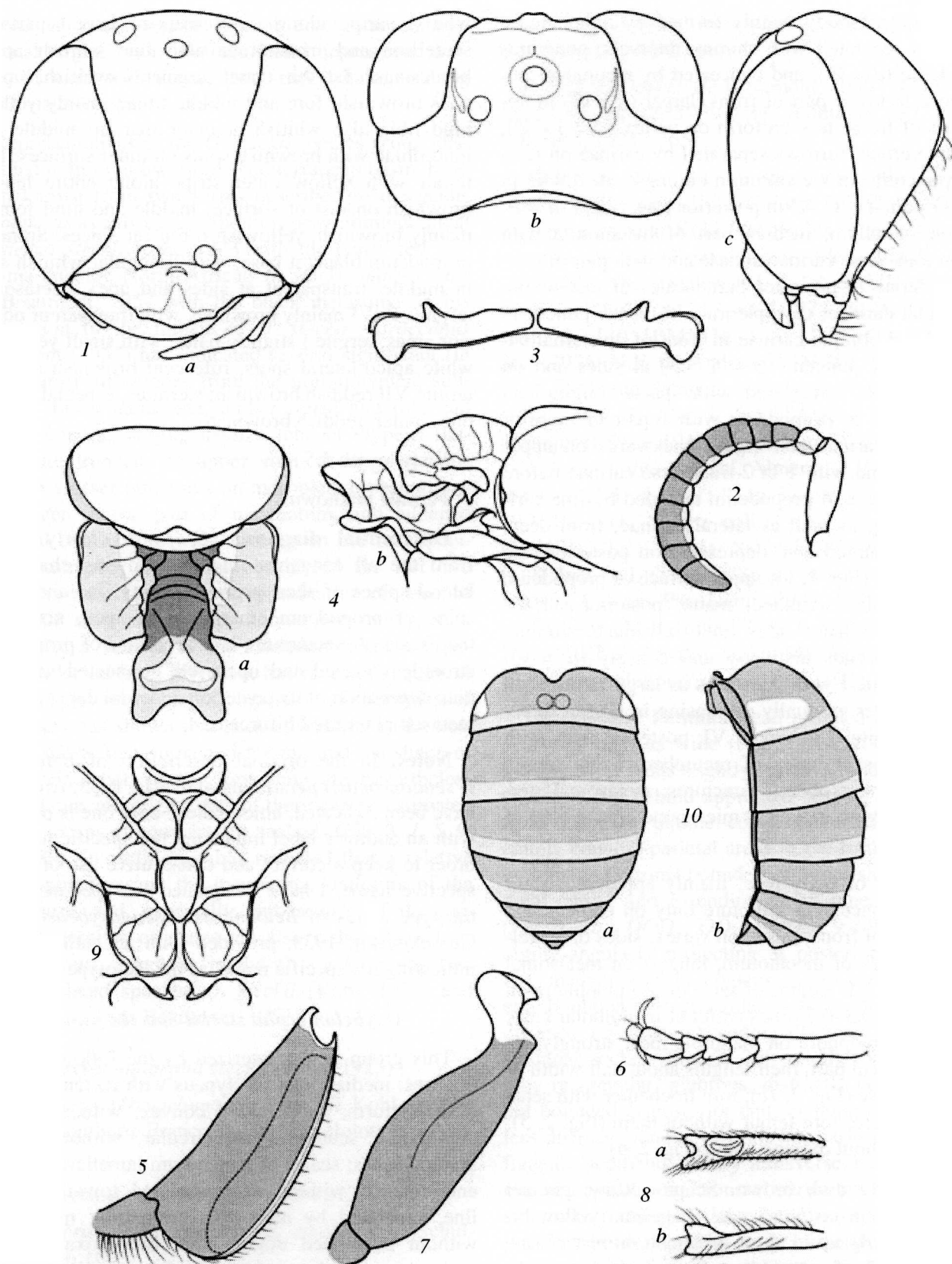


Fig. 2. *Oxybelomorpha persa*, male: (1) head [(a) front, (b) dorsal, (c) lateral view]; (2) antenna, front view; (3) pronotal carina, dorsal view; (4) scutellum, metanotum, and spine of propodeum [(a) dorsal, (b) lateral view]; (5) fore trochanter and femur, view from inner surface; (6) fore tarsus, view from outer surface; (7) hind femur, view from outer surface; (8) 1st segment of hind tarsus [(a) view from inner surface, (b) posterior view]; (9) propodeum, posterior view; (10) metasoma [(a) dorsal, (b) lateral view].

Sculpture of body mainly formed by rather dense punctures separated with shining intervals; punctures fine, dense ($d = \emptyset$), and concealed by recumbent pubescence in lower part of frons, larger ($d = \emptyset$) in upper part of frons, less uniform on vertex ($d = 1-3\emptyset$), forming vertical furrows separated by carinae on temples; punctures of mesoscutum oblong-oval, $d = \emptyset$ in anterior part, $d = 1-3\emptyset$ in posterior part, round ($d = 1-2\emptyset$) on scutellum; median part of metanotum with broken transverse carinae at base and with pair of converging striae in posterior part; scales of metanotum with radial carinae; mesopleura with dense punctures ($d = \emptyset$) and oblique carinae in front of episternal suture, regularly punctate ($d = 1-3\emptyset$) at sides and on lower surfaces; metapleura with sparse longitudinal carinae. Spine of propodeum with 1 pair of more or less regular carinae converging backwards on upper side at base and with 1 or 2 transverse carinae before apex; dorsal area of propodeum bounded by fine carinae beginning, as well as lateral carinae, from deep, distinctly separated oval depression on posterior side of propodeum (Fig. 2, 9); upper surface of propodeum densely alveolate-wrinkled, matte; posterior surface transversely carinate; sides finely alveolate, shining. Metasomal tergites distinctly and densely ($d = \emptyset$) punctate; tergite I with punctures as large as those on frons; punctures gradually decreasing in size in direction from tergite II to tergite VI; posterior areas with micropunctures at bases of recumbent hairs; tergite VII with coarsest oblong punctures; metasomal sternites shining, with indistinct micropunctures at base of fine hairs.

Pubescence of body pale, mainly appressed, short and sparse, concealing sculpture only on clypeus and in lower part of frons, raised on vertex, sides of scutellum, and scales of metanotum, longest on metasomal tergites V and VI; lengths of setae of psammophore on temples about 0.5–0.7 times width of mandibular base; setae of psammophore on mandible most strongly developed in apical part, their lengths about half width of mandibular base (Fig. 2, 1c); fore trochanter with setae of psammophore; fore femur without them (Fig. 2, 5); fore tarsus without digging comb (Fig. 2, 6).

Body mainly dark brown. Scape yellow; pedicel yellow, rufescent on upper side; flagellum yellow on lower side nearly up to apex, brownish on rest of surface; basal 2/3 of mandible yellow, apex brownish; humeral callus and pronotal carina yellow on upper side; tegula and basal wing sclerites pale brownish; scales of metanotum with transparent outer margin and

whitish stripe along inner margin; lateral parts of scutellum and metanotum with fine whitish apical borderings; 1st–4th tarsal segments whitish, apical ones brownish; fore and middle tibiae mainly yellow; hind tibia also whitish at outer margin; middle and hind tibiae with brownish spots on inner surfaces; fore femur with yellow outer stripe along entire length, brownish on rest of surface; middle and hind femora mainly brownish, yellowish rufous at apices. Spine of propodeum black at base, with triangular whitish spot in middle, transparent at sides and apex. Metasomal tergites II–VI mainly brownish, with transparent posterior areas; tergite I slightly paler, with small yellowish white apico-lateral spots, rufescent brownish at base; tergite VII reddish brownish; sternites, especially basal ones, paler, reddish brownish.

Body length 4.5 mm.

Female unknown.

Differential diagnosis. *O. persa* clearly differs from the all congeners in the following characters: lateral spines of short pronotal carina fine and sharp; spine of propodeum emarginate at apex, not wider than scale of metanotum; lateral carinae of propodeum strongly widened and upcurved, connected with median depression of its posterior side; and depression on metasomal tergite I bifurcate.

Notes. In the original description of *Belomicrus* (*Pseudoxobelus*) *persa* Gussakovskij, 1933, two males have been indicated, among these only one is provided with an author's label indicating the specific name. In order to keep a correct and consecutive use of the respective name, I have designated the specimen from the type series of *Belomicrus* (*Pseudoxobelus*) *persa* Gussakovskij, 1933, provided with an author's label indicating the specific name, as the lectotype.

Oxybelomorpha steckii Species-group

This group is characterized by the following main features: median lobe of clypeus with rectangular median platform; mesoscutum convex, without median depression; scutellum semicircular, without posterolateral lobes; scales of metanotum lamellar, transparent, convex, without teeth directed toward median line, separated by narrow emargination; metapleura without developed dorsal lobe; fore coxa of male without ventral depression; fore femur with fine outer carina; hind femur with modified apex; 1st segment of hind tarsus in both sexes with preapical depression on inner surface; spine of propodeum fine, strongly

curved at apex, without apical emargination; metasomal tergite I with distinct dorsal depression; sternites of male with dense, long, raised hairs forming brush visible in lateral view.

Representatives of the *O. steckii* species-group, distributed in the southwestern Mediterranean basin, have been known from two forms described in the genus *Belomicrus* as subspecies: the European nominotypical *B. steckii steckii* Kohl, 1923 with the partly red metasoma and the North African *B. steckii maroccanus* de Beaumont, 1957 with the black metasoma. In his description of the female of *B. steckii maroccanus* Beaumont (1957) has indicated several significant (in its opinion) differences from the nominotypical subspecies: black metasoma, darker tibiae and fore and middle femora, shining median lobe of clypeus flattened and truncate on upper side, shining intervals between sparser punctures on mesopleura, proportionally larger central part of metanotum, and widened marginal cell of fore wing. Basing on the two specimens examined, Beaumont considered the last two characters variable. However, examination of males of *B. steckii maroccanus*, not known previously, and, especially, a female of the "nominotypical subspecies," collected from Morocco, has revealed that these forms are not subspecies. Comparison of specimens of both sexes has shown that such characters as the coloration of the metasoma and femora and the shape of the marginal cell of the fore wing are nevertheless rather stable, although a part of these can be estimated only by means of comparative analysis (Fig. 3, 1, 5, 9, 6, 7a, 7b). In addition, I has revealed that a relative size of punctures on the mesosoma, sculpture of the propodeum, and, especially, pubescence of the metasomal sternites of males are also stable characters. As the result, I include in the *O. steckii* group two closely related species: *O. steckii* (Kohl, 1923) and *O. maroccana* (de Beaumont, 1957).

Oxybelomorpha steckii (Kohl, 1923)

Belomicrus (*Oxybelomorpha*) *steckii* Kohl, 1923 : 188. ♀: southern France [NHMW]. Holotype examined.

Belomicrus steckii: Berland, 1925 : 212;

Belomicrus (*Oxybelomorpha*) *stecki*: von Schulthess, 1926:160;

Belomicrus steckii: Pate, 1940 : 232; Mingo Pérez, 1966 : 106; Bohart and Menke, 1976 : 364; Gayubo, 1982a : 8, 1982b : 102; Gayubo and Sanza, 1986 : 56;

Bitsch and Leclercq, 1993 : 236; Leclercq, 1993 : 45; Gayubo *et al.*, 1998 : 16;

Belomicrus stecki: de Beaumont, 1950 : 423, 1957 : 157, 159; Suárez, 1969 : 34; Balthasar, 1972 : 168; Guichard, 1991 : 365.

Material. Holotype, ♀, specimen with following labels: "Gallia mer., 1897 (Collect. Graeffe)," "*Oxybelomorpha premita* Kohl (det. Kohl). Type, "*Oxybelomorpha steckii* Kohl. Type. (det. Maidl teste) "[NHMW]. Other material: 1 ♀: "S. SPAIN, Algeciras (near Ho. Solimar), 17–30.V.1974 (K.M. Guichard) "(fig. 3, 12f) [BMNH]; 1 ♀: "(PORT. S.) Sines, 26.V.1956 (N.F. de Andrade)" [MZL] (fig. 3, 12c); 1 ♀, 1 ♂: "Punta Sabinal, Almeria, 2.V.1964 (J. Suárez coll.)" (figs. 3, 12b; 4, 5a) [TAU]; 1 ♀: "Aranjues [Aranjuez], 26.V.1912 (G. Mercet coll.)" (fig. 3, 12a); 1 ♀, 1 ♂: "Punta Sabinal, Almeria, 2.V.1964 (J. Suárez coll.);" 1 ♂, 1 ♀: "San Roque, Cadiz (Espana), 19.V.1974 (J. Suárez coll.)" (figs. 3, 12d; 4, 5b) [MNCN]; 1 ♂: "Punta Sabinal, Almeria, 2.V.1964 (J. Suárez coll.);" 1 ♂: "Spain, Almeria Prov., Punta Entinas, Sabinas Par. Natur; 29.IV.1999, 38°28.12'N, 03°31.54'W (M.E. Irwin)" (fig. 3, 12a) [MNHU]; 1 ♀: "MAROKKO. Assafid, 40 km ME Agadir, 20.IV.1988 (leg. J. Gusenleitner)"(fig. 3, 12e) [JG].

Description. Female. Head rounded in front view, nearly as high as wide (Fig. 3, 1a); *IOD* = 57 : 45; lower part of frons slightly concave, with longitudinal shining areas behind appressed scapes; upper side of frons convex in middle, concave at sides; vertex moderately convex; parietal areas in the form of fine sulci with matte bottoms bounded on inner side by longitudinal carina and extending along inner orbit of eye (Fig. 3, 1b); *OOD* : *OD* : *POD* = 9 : 9 : 25; temple obtuse-angularly projecting at posterior end (Fig. 3, 1c); median lobe of clypeus ovally convex at lower end, bounded by rectangular lateral teeth separated by distance 1.5 times exceeding distance from tooth to antennal socket (Fig. 3, 2a); middle part of median lobe rectangular, glabrous, distinctly convex at base, not bounded at posterior end, or bounded by more or less distinct rounded tubercles or carinae (Fig. 3, 1b); flagellar segments mainly transverse, except for basal one and apical one. Pronotal carina rounded on upper side, with rectangular lateral angles and entire narrow posterior bordering (Fig. 3, 3); humeral callus in anterior part with distinct carina extending onto pronotal carina as a short, smoothened carinae; mesoscutum regularly convex, without distinct median depression; admedian lines fine, approximate, nearly reaching

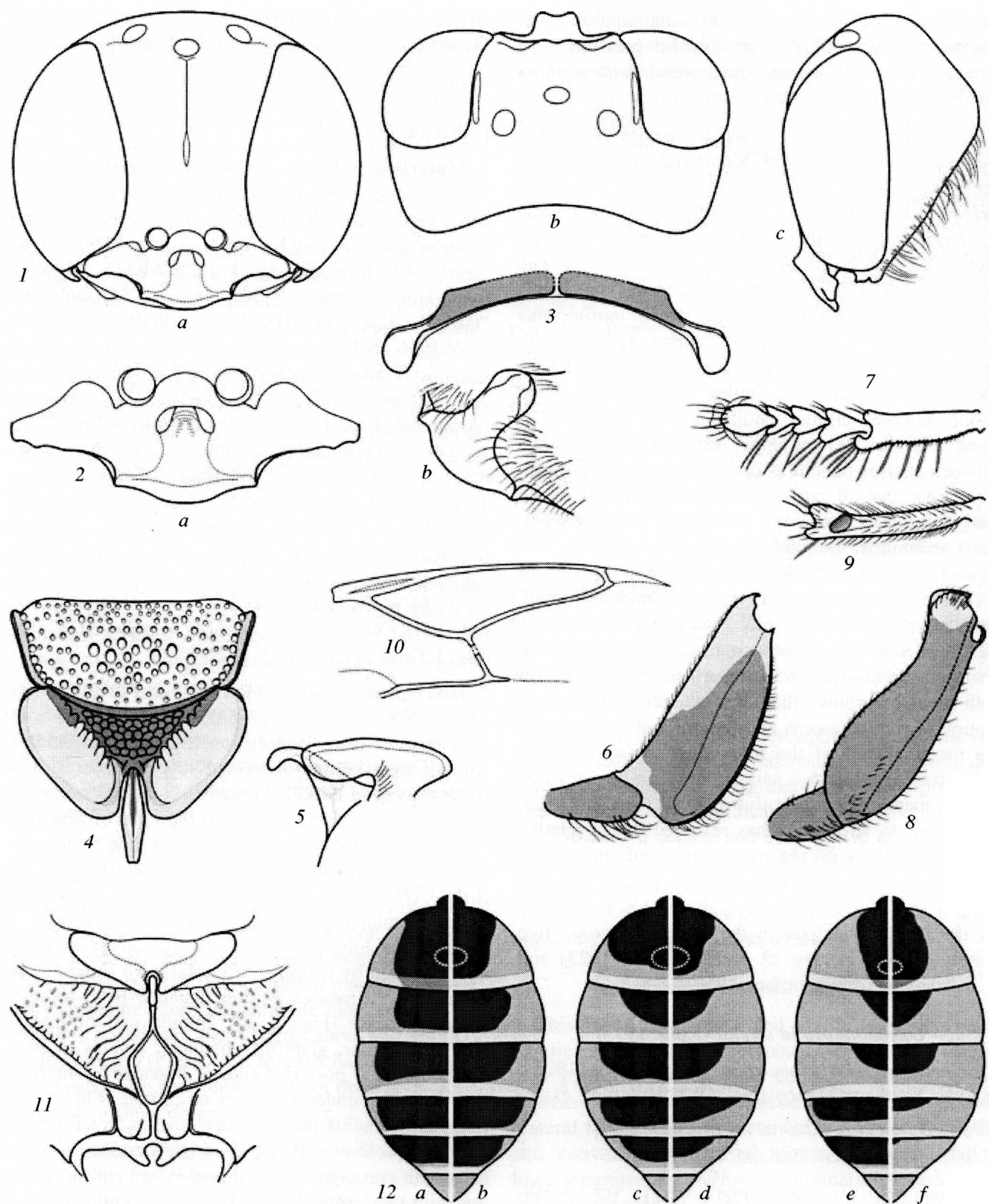


Fig. 3. *Oxybelomorpha steckii*, female: (1) head [(a) front, (b) dorsal, (c) lateral view]; (2) clypeus [(a) front view, (b) view from anterolateral surface]; (3) pronotal carina, dorsal view; (4) scutellum, metanotum, and spine of propodeum, dorsal view; (5) metanotum and spine of propodeum, lateral view; (6) fore trochanter and femur, view from inner surface; (7) fore tarsus, view from outer surface; (8) hind femur, view from outer surface; (9) 1st segment of hind tarsus, view from inner surface; (10) marginal cell of fore wing; (11) propodeum, posterior view; (12) metasoma, dorsal view [for (a-f), see "Material"].

middle of mesoscutum; parapsidal lines in the form of fine short lines, slightly longer than distance between lateral and median ocelli; adlateral lines fine, in the form of shorter costae; scutellum widely rounded in posterior part, with distinct, but narrow lateral carinae, without projecting lobes (Fig. 3, 4); metanotum without median carina, convex in middle of base, with transparent scales; scales rounded at sides and convex at apices, separated in posterior parts by narrow oval emarginations, widths of which less than diameter of median ocellus; mesopleura flat on upper sides, regularly convex on lower side; precoxal tooth well developed, triangular; metapleura regularly densely carinate, with fine carinae on upper sides, without widened lobe; fore femur convex in anterior part on inner surface, deep longitudinal depression near its outer margin separated from lateral side by fine carina (Fig. 3, 6); hind femur deeply depressed before apex on upper side, widened at apex, with fine longitudinal carina turning at apex into incurved lobe (Fig. 3, 8); 1st segment of hind tarsus inner surface with distinct preapical depression on inner surface (Fig. 3, 9). Propodeum with distinct lateral carinae beginning near its posterior margin and slightly widened in upper part; dorsal surface not separated by sculpture (Fig. 3, 11); spine of propodeum long, slender, extending into emargination between scales of metanotum, convex in anterior part, distinctly hook-shaped curved at apex, without apical emargination (Fig. 3, 4, 5). Metasomal tergite I with distinct oval transverse depression on upper surface, without distinct median depression in anterior part; tergites II and III moderately transversely depressed at bases; posterior areas of tergites distinctly separated from rest of surfaces, transparent (Fig. 3, 12).

Sculpture of body formed by dense uniform punctures separated by mainly shining intervals. Lower part of frons with oblong-ovate smooth areas behind appressed scapes; near eye orbits, sculpture concealed by recumbent pubescence; upper side of frons with dense punctures, $d < \emptyset$ in middle, $d \leq \emptyset$ near eye orbits; vertex with transverse punctures ($d \leq \emptyset$); median area of clypeus with shining, impunctate apical bordering and rectangular vertical area; temple with elongate punctures forming in lower part vertical furrows separated by fine wrinkles. Mesoscutum regularly and densely punctate, $d \approx \emptyset$ over most part, $d \geq \emptyset$ in middle before posterior margin, densest punctures situated at anterior and posterior margins and near humeral callus ($d < \emptyset$); posterior margin with short striae; scutellum with sparser and scattered punctures, $d \geq \emptyset$

in middle, $d = 1.5-2\emptyset$ at sides; metanotum coarsely alveolate and matte in middle, without median carina; scales of metanotum smooth, without wrinkles; mesopleura with punctures $d = 1-3\emptyset$ above and near hypersternaulus, $d \leq \emptyset$ in upper part, $d = 3-5\emptyset$ below hypersternaulus; metapleura regularly and densely striate; fore femur shining on outer surface, impunctate, separated from similarly smooth anterior part by sharp not transparent carina. Dorsal area of propodeum not separated from upper part of lateral surfaces; upper surface of propodeum under spine without sculpture, polished, matte and finely alveolate on rest of surface, with sparse transverse rugae near lateral carinae (Fig. 3, 11); lateral surface of propodeum semi-matte in anterior part, irregularly finely alveolate-folded, shining and smoothened near apex. Metasomal tergites I-V densely regularly punctate, largest punctures situated on tergite I, gradually becoming smaller in direction to tergite V ($d \leq \emptyset$); punctures on posterior areas half as large on tergites I-IV ($d \leq \emptyset$), absent on tergite V; largest and elongate punctures situated on pygidial area ($d \geq \emptyset$); metasomal sternites with dense micropunctures at bases of semi-recumbent hairs, sternite VI impunctate along middle part.

Pubescence of body mainly short, recumbent or semi-recumbent, raised on vertex, in middle of metanotum, and on sternite VI; longest hairs situated on vertex (length subequal to diameter of median ocellus) and on preapical fimbria of sternites II-V; pubescence mainly silvery, golden on mesoscutum and scutellum, mainly sparse, not concealing sculpture, but dense recumbent and entirely concealing sculpture on lateral parts of clypeus and in middle and at sides of lower part of frons; setae of psammophore on temple rather dense, their length subequal to width of mandibular base; length of those on mandible slightly exceeding width of mandibular base (Fig. 3, 1c); fore trochanter on lower side with row of setae curved forwards and slightly shortly than those on temple; fore femur behind sharp carina with uniform row of setae about half as long as those on trochanters (Fig. 3, 6); digging comb on 1st segment of fore tarsus consisting of no more than 5 outer raised flattened setae, length of which equal to, or slightly exceeding width of segment (Fig. 3, 7).

Head and mesosoma mainly black; lower bordering of clypeus reddish brownish; mandible whitish at base, yellowish rufous in middle, reddish brownish at apex; antenna dark brown. Pronotal carina black; humeral callus whitish; lateral parts of scutellum and metanotum with fine whitish apical stripes; middle part of

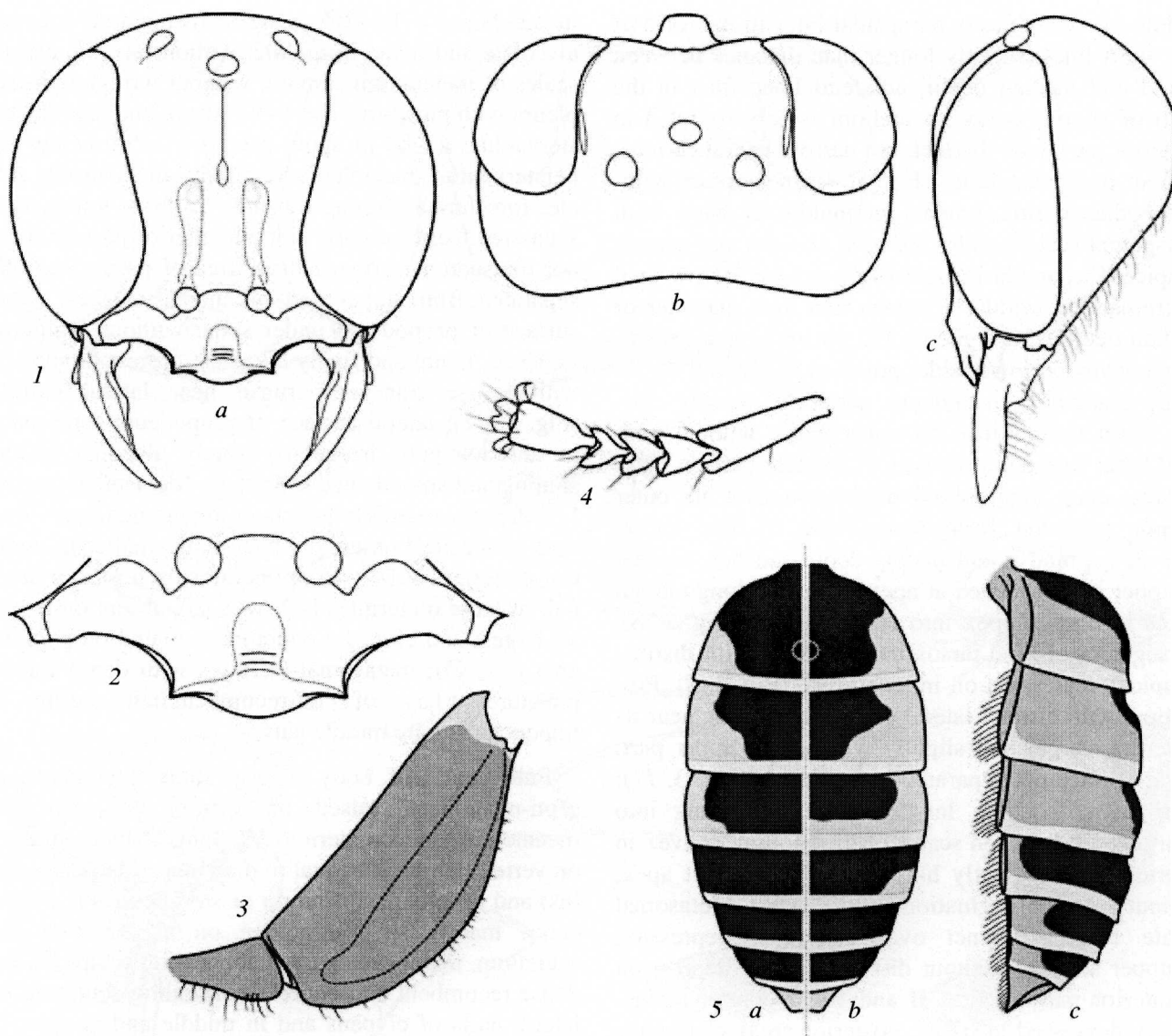


Fig. 4. *Oxybelomorpha steckii*, male: (1) head [(a) front, (b) dorsal, (c) lateral view]; (2) clypeus, front view; (3) fore trochanter and femur, view from inner surface; (4) fore tarsus, view from outer surface; (5) metasoma [(a, b) front view, see "Material"; (c) lateral view].

metanotum black, with fine whitish lateral spots at base and apex; scales pale, transparent, whitish along outer margin; fore tarsus rufous; middle and hind tarsi brownish, with 1st segments bearing darker spot near apices; tibiae white on outer surface, rufous on rest of surface; hind tibia with brownish spot on lower side in posterior part; fore and middle femora mainly dark brown, rufous on outer surfaces near apices, with white apical spot; hind femur blackish brownish, rufous at apex; tegula transparent, rufous; basal wing sclerites with brownish spot in middle and with whitish bordering and transparent margin; veins of fore wing mainly brownish; bases of veins of hind wing whitish. Spine of propodeum black at base in anterior part, pale and transparent in posterior part, white in

middle, pale and transparent at apex. Metasomal tergites I–V reddish rufous, with more or less developed black median spots usually reaching posterior areas; spots occupying from 1/3 of, to nearly entire or entire width of tergite (tergites IV and V); tergite VI reddish rufous; posterior areas of tergites transparent, golden (Fig. 3, 12a–12g); sternites brownish, bases of sternites II and VI brownish rufous.

Body length 7.0 mm.

Male mainly similar to female, except for characters associated with sex: median lobe of clypeus narrower, distance between its lateral angles subequal to that from angle to antennal socket (Fig. 4, 2); $IOD = 48 : 36$ (Fig. 4, 1a); parietal areas inconspicuous, with

weak marginal carina (Fig. 4, 1b); $OOD : OD : POD = 7 : 8 : 19$. Metasomal sternites with long dense raised hairs most strongly developed on sternites II–III, forming there separated convex areas (Fig. 4, 5c). Lower surface of scape with yellowish white apical spot occupying at least half of its length; fore femur rufous on inner surface at apex, its outer surface with yellowish white preapical spots reaching $1/4$ – $1/3$ of length of femur; middle femur rufous in apical half, its lower side with large yellowish white preapical spots reaching $1/3$ – $1/2$ of length of femur; hind femur brownish, with rufous or yellowish rufous apex; metasomal tergites reddish rufous, with more or less developed dark brown and black spots on tergites I–VI (Fig. 4, 5a–5c). Setae of psammophore on temple and mandible distinctly shorter, their length half subequal to width of mandibular base (Fig. 4, 1c); fore trochanter and femur without distinct psammophore (Fig. 3, 3); fore tarsus without digging comb (Fig. 3, 4).

Body length 6.5 mm.

Differential diagnosis. *Oxybelomorpha steckii* clearly differs from the congeners in the wide, convex, lamellar, transparent metanotal scales rounded at the sides and apices and separated by a narrow longitudinal emargination; it differs from *O. maroccana* in the partly red metasomal tergites in both sexes, developed rufous spots on the femora, distinctly coarser and sparser punctuation of the pronotum, mesoscutum, scutellum, and mesopleura, polished areas at the base of the spine on the dorsal part of the propodeum, and separated convex areas of long hairs on metasomal sternites II–III in the male.

Oxybelomorpha maroccana (de Beaumont, 1957)
stat. n.

Belomicrus stecki maroccanus de Beaumont, 1957 : 157. ♀: Morocco [MZL]. Holotype examined.

Belomicrus steckii maroccanus: Bohart and Menke, 1976 : 364; Gayubo, Asis, and Tormos, 1998 : 16.

Material. Holotype, ♀, with following labels: "Typus," "Port Lyautey, Mehdiya, 26.V.1947 (J. de Beaumont)," "*Belomicrus stecki maroccanus* Beaum., ♀. J. de Beaumont det. Tours., 1956" [MZL]. Other material: 2 ♂: "MOROC, Kenitra, 30–4–90 (M. Halada)" [LM].

Description. Female. Head rounded in front view, much wider than long (Fig. 5, 1a); $IOD = 60 : 46$; lower part of frons flatly depressed, with nearly merg-

ing, smooth vertical areas behind appressed scapes; upper side of frons weakly convex along fine median groove, widely depressed near inner eye orbits; vertex regularly convex; $OOD : OD : POD = 9 : 9 : 26$; parietal areas oval, narrowed in anterior part, convex, shining, with fine sulcus near eye orbit; temple angularly convex (Fig. 5, 1b); median lobe of clypeus angularly convex at upper margin, with short transverse carina or 2 tubercles at base of flat median area, widely roundly projecting in anterior part, bounded by lateral angles separated by distance equal to 1.5 times distance from angle to antennal socket (Fig. 5, 2a, 2b); flagellar segments, except for 1st, 2nd, and apical one, much wider than long. Pronotal carina convex, with median groove, without transverse carinae, with small lateral angles (Fig. 5, 3); humeral callus with carinae along anterior margin; mesoscutum regularly convex, without median depression; admedian lines fine, approximate, reaching middle of mesoscutum; parapsidal grooves in the form of short rows of approximate punctures; adlateral lines absent; scutellum rounded, regularly convex, with transparent lateral carinae, without posterolateral lobes (Fig. 5, 4); metanotum convex in middle, with convex scales rounded at outer margin and separated by emargination width of which less than diameter of anterior ocellus; precoxal tooth well developed, triangular; metapleural carina not widened; fore femur depressed on inner surface along outer margin, with distinct marginal carina (Fig. 5, 5); hind femur deeply depressed on upper side before apex, widened at apex, with incurved dorsal lobe (Fig. 5, 7); 1st segment of hind tarsus with distinct preapical depression on inner surface (Fig. 5, 8). Propodeum with lateral carinae widened in anterior part, not reaching its posterior margin; dorsal area not separated; median depression of posterior surface separated only in lower part; dorsal spine of propodeum slender, without median depression on anterior surface, hook-shaped at apex, without apical emargination (as in Fig. 6, 6). Metasomal tergite I with superficial dorsal depression, without median depression on anterior surface; tergites II–III with shallow transverse basal depressions; posterior areas of tergites distinctly separated from rest of surface, transparent.

Sculpture of body formed by dense and regularly arranged punctures separated by mainly shining intervals. Lower part of frons with very fine and dense punctures ($d < \emptyset$) in middle and along inner eye orbits; upper side of frons with larger punctures ($d = 1$ – $2\emptyset$) elongated along eye orbits; vertex with dense

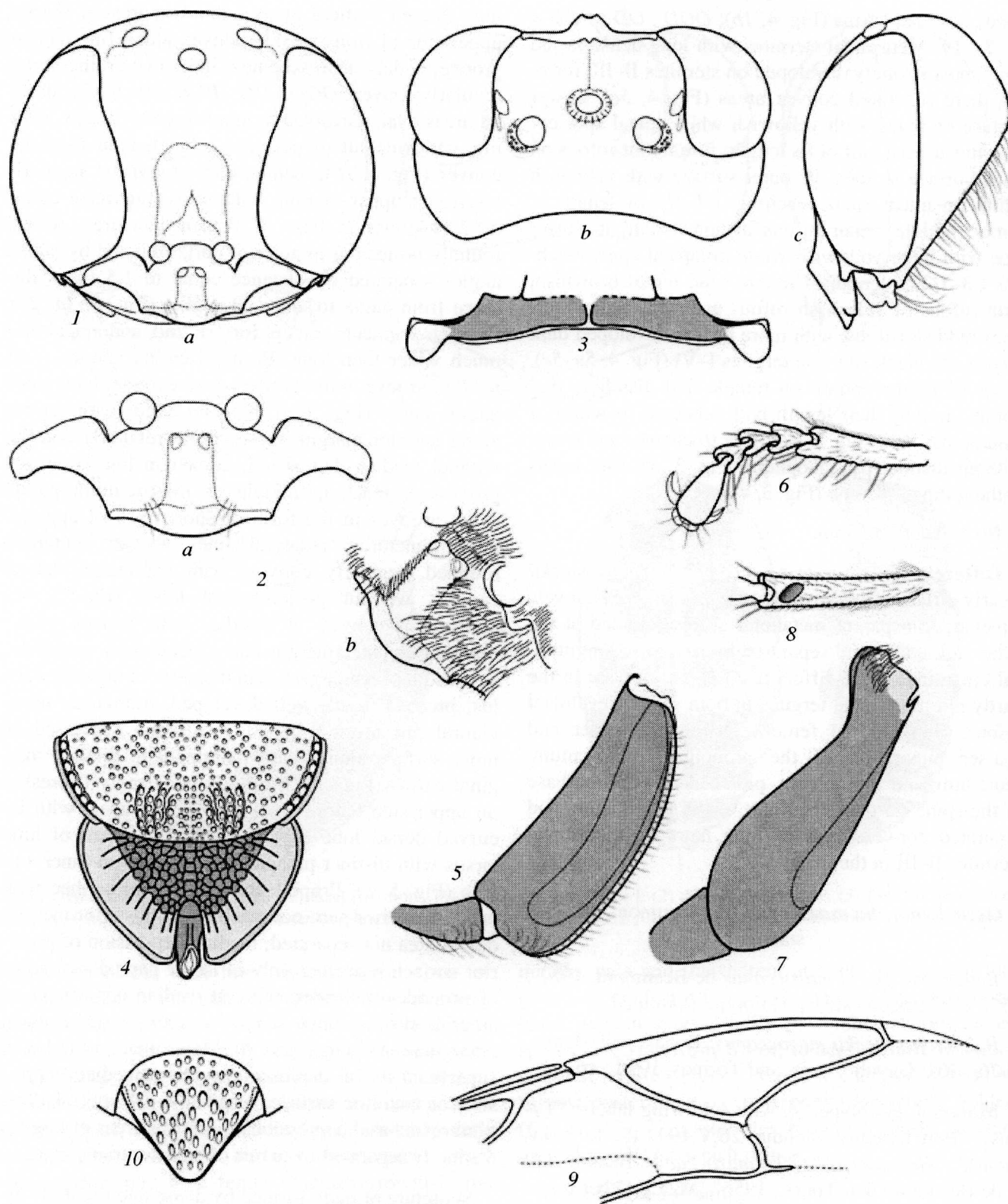


Fig. 5. *Oxybelomorpha maroccana*, female: (1) head [(a) front, (b) dorsal, (c) lateral view]; (2) clypeus [(a) front view, (b) view from antero-lateral surface]; (3) pronotal carina, dorsal view; (4) scutellum, metanotum, and spine of propodeum, dorsal view; (5) fore trochanter and femur, view from inner surface; (6) fore tarsus, view from outer surface; (7) hind femur, view from outer surface; (8) 1st segment of hind tarsus, view from inner surface; (9) marginal cell of fore wing, (10) metasomal tergite VI, dorsal view.

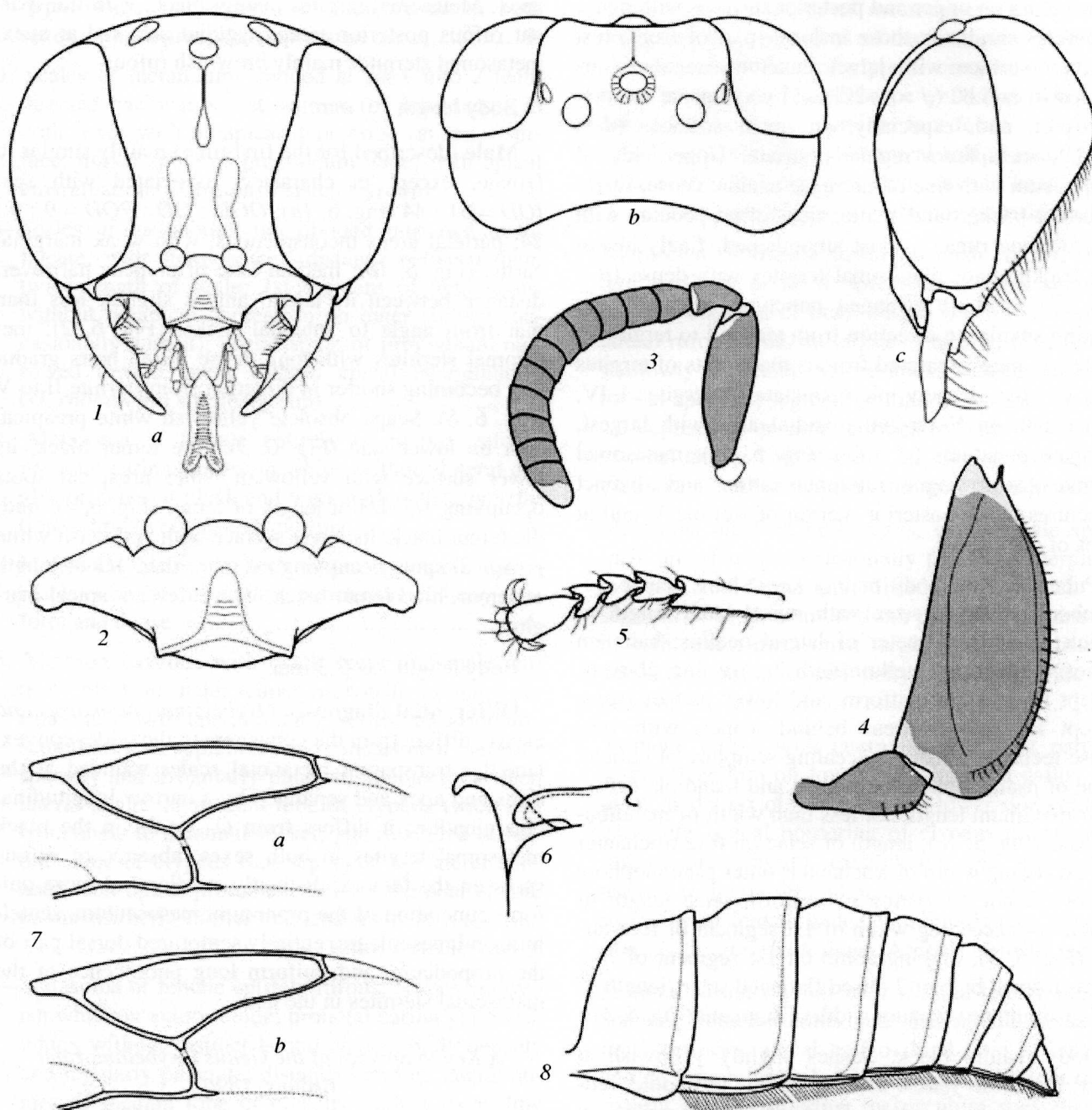


Fig. 6. *Oxybelomorpha maroccana*, male: (1) head [(a) front, (b) dorsal, (c) lateral view]; (2) clypeus, front view; (3) antenna, front view; (4) fore trochanter and femur, view from inner surface; (5) fore tarsus, view from outer surface; (6) metanotum and spine of propodeum, lateral view; (7) marginal cell of fore wing [(a, b) see "Material"]; (8) metasoma, lateral view.

punctures ($d = \varnothing$) merging to form strigae in posterior part; temple with punctures slightly smaller than those on vertex ($d = \varnothing$) and merging to form vertical striae. Pronotal carina with punctures similar to those on temple ($d = 1-1.5\varnothing$); punctures on mesoscutum slightly larger than those in lower part of frons, mainly dense ($d = \varnothing$) on rest of surface and similar to those

on vertex, sparser ($d = 2\varnothing$) only at sides; dense punctures along posterior margin merging into short striae; punctures on scutellum merging into striae, similar to those on mesoscutum; median part of metanotum very coarsely and densely punctate, without intervals between punctures, matte; scales smooth, with short radial costae only along border with median part;

mesopleura on upper and posterior surfaces with dense punctures similar to those in lower part of frons, rest of their surface with larger punctures regularly arranged in middle ($d = 1-2\varnothing$) and very sparse in anterior part, and, especially, on lower surfaces ($d = 2-6\varnothing$); metapleura regularly striate. Upper side of propodeum with fine radial rugae against dense, finely alveolate background, matte; sides of propodeum with fine oblique rugae against smoothened, finely alveolate background. Metasomal tergites with dense ($d = 1-1.5\varnothing$) regularly arranged punctures gradually becoming smaller in direction from tergite I to tergite V; posterior areas separated from convex parts of tergites only by step, densely micropunctate on tergites I-IV, impunctate on V tergite; pygidial area with largest, elongate punctures ($d = \varnothing$) (Fig. 5, 10); metasomal sternites with vague micropunctuation and distinct punctures along posterior margin of sternite V and at sides of sternite VI.

Pubescence of body mainly very short, sparse, recumbent, silvery; vertex with raised hairs length of which equal to diameter of lateral ocellus; hairs on mesoscutum and scutellum with bronze tint; clypeus, except for median platform, and lower part of frons, except for smooth areas behind scapes, with very dense recumbent hairs concealing sculpture of cuticle; setae of psammophore on temple and mandible dense, their maximum length not less than width of mandibular base (Fig. 5, 1c); length of setae on fore trochanter not exceeding width of trochanter; outer psammophore of fore femur consisting of uniform setae length of which not exceeding width of 1st segment of fore tarsus (Fig. 5, 5); digging comb on 1st segment of fore tarsus formed by 6 or 7 raised flattened setae, length of which slightly exceeding width of segment (Fig. 5, 6).

Body mainly black. Scares slightly yellowish at apex; mandible yellow at base, rufous in middle, reddish brownish at apex. Humeral callus yellowish white; scales of metanotum transparent, yellowish; tegula transparent, brownish; basal wing sclerites brownish in middle, rufous at margin, with yellow marginal stripe; all tarsi rufescent brown; fore tibia with yellowish white stripe on outer surface, rufous on rest of surface; middle and hind tibiae with yellowish white stripe on outer surface, except for at apex, brownish on rest of surface; fore and middle femora with small yellowish white spot on lower sides at apices, dark brown on rest of surface; hind femur entirely brownish. Spine of propodeum black at base, yellowish white in middle, transparent at anterior margin and

apex. Metasomal tergites mainly black, with transparent rufous posterior areas; pygidial area red at apex; metasomal sternites mainly brownish rufous.

Body length 7.0 mm.

Male (described for the first time) mainly similar to female, except in characters associated with sex. $IOD = 51 : 44$ (Fig. 6, 1a); $OOD : OD : POD = 9 : 9 : 24$; parietal areas inconspicuous, with weak marginal carina (Fig. 6, 1b); median lobe of clypeus narrower, distance between its lateral angles slightly less than that from angle to antennal socket (Fig. 6, 2); metasomal sternites with long dense raised hairs gradually becoming shorter in direction from sternite II to V (Fig. 6, 8). Scape obsolete yellowish white preapical spot on lower side (Fig. 6, 3); fore femur black, its lower surface with yellowish white preapical spots occupying $1/5-1/3$ of length of femur (Fig. 6, 4); middle femur black, its lower surface with yellowish white preapical spots occupying no more than $1/3$ of length of femur; hind femur black, with rufescent apical margin.

Body length 7.0-7.3 mm.

Differential diagnosis. *Oxybelomorpha maroccana* clearly differs from the congeners in the wide, convex, lamellar transparent metanotal scales rounded at the sides and apex and separated by a narrow longitudinal emargination; it differs from *O. steckii* in the black metasomal tergites in both sexes, absence of rufous spots on the femora, distinctly smaller and more uniform punctuation of the pronotum, mesoscutum, scutellum, and mesopleura, entirely sculptured dorsal part of the propodeum, and uniform long pubescence of the metasomal sternites in the male.

A Key to Species of the Genus Oxybelomorpha Brauns, 1896

1. Mesoscutum with more or less deep median depression 2.
- Mesoscutum, at most, with fine admedian lines, without deep median depression 17.
2. Metapleuron with more or less strongly developed dorsal lobe; fore coxa in male with transverse ventral depression; 1st segment of hind tarsus in both sexes with preapical depression on inner surface, less frequently without it 3.
- Metapleuron, at most, with fine dorsal carina, frequently without it; coxae in male without ventral

- depressions; 1st segment of hind tarsus in both sexes without preapical depression 9.
3. Scales of metanotum divided at apex into 2 teeth directed backwards; 1st segment of hind tarsus in both sexes with preapical depression on inner surface; dorsal spine of propodeum wide, with apical emargination (*O. braunsii* species-group) 4.
- Scales of metanotum not divided into two teeth, falcate, with sharp apices, distance between them twice length of scale; 1st segment of hind tarsus without preapical depression on inner surface (occasionally with it); dorsal spine of propodeum narrowed toward apex, without apical emargination (*O. rhodesiana* species-group) 7.
4. Metasoma of female entirely or mainly rufous; pronotal carina yellowish white, without lateral angles or, when it black and with angles, then punctuation of body very sparse and fine 5.
- Metasoma black in both sexes, pronotal carina black, with lateral angles, punctuation of body uniform and dense 6.
5. Metasoma rufous with black spots in female, entirely black in male; scapes brownish; pronotal carina black, with lateral angles; vertex, mesoscutum, scutellum, mesopleura, and metasomal tergites sparsely and irregularly punctate; distance between lateral angles of median lobe of clypeus twice that from angle to antennal socket; glabrous area of median lobe of clypeus flat, separated by lateral carinae; outer apical prominence of 1st segment of fore tarsus distinctly shorter than 2nd segment *O. braunsii* (Kohl) (female, male).
- Metasoma of female entirely rufous; scapes yellowish white on anterior side; pronotal carina yellowish white, without distinct lateral angles; body densely and regularly punctate; distance between lateral angles of median lobe of clypeus slightly exceeding that from angle to antennal socket; glabrous area of median lobe of clypeus convex, not separated by lateral carinae; outer apical prominence of 1st segment of fore tarsus nearly as long as 2nd segment ... *O. separata* Antropov (female).
6. Inner angles of scales of metanotum sharp, projecting backwards beyond apices of outer angles; glabrous area of median lobe of clypeus flat, separated by lateral carinae; scape brownish; all femora yellow only at apices; hind tibia of female yellowish white on outer surface *O. sordida* (Arnold) (female, male).
- Inner angles of scales of metanotum rounded, not projecting beyond apices of outer angles; glabrous area of median lobe of clypeus convex, not separated by lateral carinae; scape yellowish white in apical half on lower surface; fore femur yellow in apical 1/4 in female and in apical half in male; hind tibia in female yellowish white only in basal third *O. pseudosordida* Antropov (female, male).
7. Metasoma of female mainly reddish rufous, only tergites IV–V or III–V with medial black spots at bases; metasoma of male mainly black, with small lateral rufous spots on tergites I or I–II; hind femur shallowly depressed before apex, widened and rufous at apex; 1st segment of hind tarsus with preapical depression on inner surface in both sexes; metasomal tergite I with small, but distinct dorsal depression *O. wojciechi* Antropov (female, male).
- Metasoma black in both sexes, without pale spots (pale apical stripe occasionally present on tergite I in male); hind femur unmodified, entirely black; 1st segment of hind tarsus without preapical depression in both sexes; metasomal tergite I without distinct dorsal depression, occasionally with vague wide depression 8.
8. Pronotal carina with lateral angles; most part of scape, flagellum on lower side, humeral callus, all tibiae, and apex of fore femur on lower side yellowish white; apical bordering of clypeus transparent, rufous; mesoscutum, mesopleura, and metasomal tergites with coarser and denser punctuation ($d \leq \emptyset$); pygidium of female wider, with contiguous punctuation *O. rhodesiana* (Arnold) (female, male).
- Pronotal carina smoothened, without lateral angles; antenna, humeral callus, fore and middle tibiae on inner surfaces, apical half of hind tibia in female, and all femora entirely black; clypeus without transparent apical bordering; mesoscutum, mesopleura, and metasomal tergites with finer and less regular punctuation (in places, $d > 2-3\emptyset$); pygidium of female narrower, with sparser punctuation ($d \geq \emptyset$) *O. turneri* (Arnold) (female, male).
9. Scales of metanotum falcate, approximate (distance between their apices not exceeding length of scale); dorsal area of propodeum weakly separated by carinae; metasomal tergites I–V rufous, with whitish preapical bands, without black spots; pygidial area entirely whitish. (Outer apical prominence of 1st segment of fore tarsus subequal nearly as long as 2nd segment; scales of metanotum with convex in-

- ner margins; vertex and mesoscutum with coarsely, sparse, scattered punctures ($d = 3-4\emptyset$); length of hairs on of head, mesoscutum, scutellum, and metanotum at least 1.5 times diameter of lateral ocellus; clypeus with white preapical stripe; antenna yellowish rufous; only posterior angles of scutellum with pale spots; all femora without black spots.) (*O. rubicunda* species-group) *O. rubicunda* Antropov (female).
- Scales of metanotum with rounded or obtuse-angled outer margins, with inner tooth directed toward median line; metasomal tergites of female without whitish bands 10.
10. Scales of metanotum with outer margins obtuse-angled at apices; metanotum with median carina; spine of propodeum not widened toward apex, without apical emargination (*O. kohlii* species-group) 11.
- Scales of metanotum with rounded outer margins, without apical angle; metanotum without median carina 12.
11. All femora mainly black; middle and hind tibiae with black spots; metasomal segments III–VI or IV–VI of female black *O. kohlii* Brauns (female).
- All femora black only in basal 1/2–2/3; tibiae without black spots; metasoma entirely rufous in female, rufous or with black spots in male *O. rufiventris* (Arnold) (female, male).
12. Scutellum with nearly straight posterior margin and weak posterolateral lobes; spine of propodeum distinctly widened toward apex, with deep apical emargination; apex of hind femur modified; metasomal tergite I with wide, but shallow, rounded dorsal depression; head, mesosoma, and metasoma black, without pale spots; pronotal carina with straight lateral angles; scape black in female, yellow in apical 1/3 of lower side in male; flagellum rufous on lower side; all femora black; middle and hind tibiae mainly black in female, half black in male (*O. funesta* species-group) *O. funesta* (Arnold) (female, male).
- Scutellum with strongly roundly projecting posterior part and strong posterolateral lobes; spine of propodeum usually parallel-sided (rarely, slightly widened), without apical emargination; apex of hind femur unmodified; metasomal tergite with strong, usually longitudinal dorsal depression; head and mesosoma with more or less strongly developed yellowish white spots; metasoma (at least, in female) usually with red pattern (*O. gessi* species-group) 13.
13. Metasoma black in both sexes; middle and hind tibiae mainly black *O. pulawskii* Antropov (female, male).
- Metasoma more or less rufous in female (frequently entirely black in male); middle and hind tibiae mainly yellowish white or yellowish rufous 14.
14. Mesoscutum, mesopleura, and metasomal tergites I–IV with very sparse and scattered punctures ($d > 5-6\emptyset$); pronotal carina with 1 pair of obsolete pale spots, without distinct lateral angles; apical 1/3 of scape entirely, and that of 3rd–8th antennal segments on lower side whitish yellow; metasomal tergite I almost entirely black (except for rufous base and posterior area), tergites II–III with black bordering in middle (bordering on tergite II twice as wide as that on tergite III) *O. nitens* Antropov (female).
- Mesoscutum, scutellum, and mesopleura more regularly and more densely punctate; pronotal carina usually with distinct lateral angles 15.
15. Flagellar segments in both sexes distinctly convex on lower surfaces; length of raised hairs on upper part of frons and on vertex, mesoscutum, and scutellum exceeding diameter of lateral ocellus; pale spots on pronotal carina of female almost always merging with spots of humeral callus; metasomal tergites (especially II–IV) with inconspicuous and very scattered punctate; 1st–7th flagellar segments in female, and 1st–8th ones in male rufous on lower side; metasoma of female usually entirely reddish rufous (less frequently with black depression on tergite I) *O. gessi* Antropov (female, male).
- Flagellar segments not convex on lower surfaces; length of raised hairs on mesoscutum and scutellum not exceeding diameter of lateral ocellus; pale spots on pronotal carina always separated from spots of humeral callus by brownish interval; metasomal tergites (including tergite I) distinctly and rather densely punctate ($d \leq 2-3\emptyset$) 16.
16. Fore femur with entirely yellowish white stripe along entire length of outer surface; 1st–4th or 1st–5th flagellar segments of female rufous on lower side; 2nd–5th flagellar segments of male entirely whitish yellow, others black *O. sgesae* Antropov (female, male).

- Fore femur yellowish white along no more than along apical half of outer surface; 1st–5th flagellar segments brownish only on lower side in both sexes *O. imitans* Antropov (female, male).
17. Scutellum rectangular, with developed posterolateral lobes; metanotum with widely spaced falcate scales; pronotal carina short, distinctly lower than level of strongly convex mesoscutum, with sharp transverse carina entire or interrupted at sides; 1st segment of hind tarsus without preapical depression; inner eye orbits parallel or hardly converging downwards (*O. patei* species-group) 18.
- Scutellum semicircular, with lateral carinae, but without posterolateral lobes; scales of metanotum of different shape (when scales triangular, then approximate); pronotal carina longer, without transverse carina, with upper margin nearly reaching level of moderately convex mesoscutum; inner eye orbits distinctly converging downwards 19.
18. Metasomal tergites with narrow rufous, occasionally obsolete preapical bands; pygidium entirely rufous; occipital carina projecting downwards as flat tooth, with dense hairs, but without distinct psammophore; median lobe of clypeus with basal transverse prominence bifurcate at lower margin; pronotal carina black, with sharp transverse carina between rectangular lateral angles; humeral callus reddish rufous in posterior part; precoxal tooth rounded, obsolete; spine of propodeum yellowish white, truncate apically, its width half diameter of median ocellus *O. patei* (de Beaumont) (female).
- Metasomal tergites black, without preapical bands; pygidium rufous; occipital carina fine, not projecting in the form of flat tooth, without dense hairs, but with short psammophore; median lobe of clypeus convex, without prominence; pronotal carina with transverse yellowish white spots, bearing transverse carina only in middle; lateral angles rounded; humeral callus yellowish white; precoxal tooth absent; spine of propodeum black, rounded at apex, its width slightly less than diameter of median ocellus *O. anatolei* Antropov (male).
19. Scales of metanotum lamellar, convex, rounded at apices, without inner tooth directed toward median line, separated by very narrow emargination; spine of propodeum fine, hook-shaped at apex; 1st segment of hind tarsus with preapical depression on inner surface in both sexes; (*O. steckii* species-group) 20.
- Scales of metanotum with tapered apices or with inner tooth directed toward median line; spine of propodeum not hook-shaped at apex 21.
20. Metasomal tergites I–V in female or I–VI in male with more or less strongly developed median black spots, reddish rufous at sides; ventral lobe of mandible rather obsolete; marginal cell of fore wing narrower; dense pubescence forming distinctly convex areas on sternites II–III in male *O. steckii* (Kohl) (female, male).
- Metasoma black in both sexes, except for rufous apex of last segment; ventral lobe of mandible rather strong; marginal cell of fore wing wider; dense pubescence of metasomal sternites of male gradually becoming shorter from its base to apex, forming no convex areas *O. maroccana* (de Beaumont) (female, male).
21. Scales of metanotum with rounded outer margins, with right angle directed toward median line; emargination between scales nearly as wide as scales; spine of propodeum wider (its width at least 3 times diameter of lateral ocellus), subparallel-sided, with rounded subapical emargination; pronotal carina with sharp, forward-directed spines near humeral calli; scape entirely yellow; flagellum yellowish rufous on lower side, except for brownish apical segment; pronotal carina, humeral callus, scales of metanotum, spine of propodeum, and lateral spots on metasomal tergite I (less frequently, hardly visible on tergite II), all yellowish white; fore femur flattened, with transparent bordering and yellow stripe along entire length of lower surface; all tibiae yellow (middle and hind ones with obsolete brownish spots in posterior parts); 1st segment of hind tarsus with preapical depression on inner surface (*O. persa* species-group) *O. persa* (Gussakovskij) (male).
- Scales of metanotum triangular, with sharp apices directed backwards; width of emargination between scales distinctly wider than scales; spine of propodeum not widened at apex, with, or without shallow emargination; 1st segment of hind tarsus without preapical depression (*O. moricei* species-group) 22.
22. Pronotal carina, scutellum, and metasoma black; median lobe of clypeus with wide convex glabrous platform *O. moricei* (Kohl) (female).

- Pronotal carina and metasoma with yellowish white spots; scutellum with yellow or rufescent spots; median lobe of clypeus with narrow flattened glabrous vertical stripe 23.
23. Median lobe of clypeus of female with sharp prominence in upper part; scutellum black, except for transparent lateral carinae and rufescent posterior angles; spine of propodeum widened at base; metasomal tergites I–IV with small pale lateral spots *O. waterstonii* (Kohl) (female).
- Median lobe of clypeus of female without prominence in upper part; scutellum with large posterolateral yellowish white spots; spine of propodeum not widened at base; pale lateral spots on metasomal tergites I–II distinctly larger than the small spots on tergites III–V *O. kohliana* (von Schulthess) (female, male).

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