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Old World species of Belomicrus A. Costa, 1871

(Hymenoptera, Sphecidae)

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Abstract

The Old World species of the genus *Belomicrus*, A. COSTA, 1871, are revised. 8 species are described: *Belomicrus ottomanus* **sp. nov.**, *Belomicrus lucifer* **sp. nov.**, *Belomicrus beelzebub* **sp. nov.**, *Belomicrus dimorpha* **sp. nov.**, *Belomicrus guelmimensis* **sp. nov.**, *Belomicrus funereus* **sp. nov.**, *Belomicrus dromedarius* **sp. nov.** and *Belomicrus bimaculatus* **sp. nov.**

Since PATE (1940) dealt with the classification of *Belomicrus*, A. COSTA, 1871, concentrating on species of the New World, little has been added to the knowledge of the Old World species and an attempt is now made to sort out an accumulation from various sources of undescribed material. Obviously more members of this neglected genus of pygmies will be discovered and their presence is sometimes heralded by a search in the debris of killing bottles. They may also be detected by an examination on hands and knees of small prostrate annuals, particularly umbellifers, in areas of sandy or light soil.

Belomicrus nests in the soil and recorded prey are Coleoptera (Melyridae) and Hemiptera (Miridae).

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Key to some Old World species of *Belomicrus* including eight new ones

1 Squamae of metanotum more or less flat, situated laterally and therefore not enclosing the metanotum behind (fig.5) 2
- Squamae situated obliquely on the metanotum and posteriorly close together leaving a narrow emargination (fig.2) 11
2 Head with postocular tubercles (fig.10). Mandibles without excision beneath. Female with frontal impressions dull, distinct and narrow. Scutellum and metanotum fig.3. North Africa ..... *beelzebub* **sp. nov.**
- Head without postocular tubercles 3
3 Scape excavated. Black. 2.5 mm. Scutellum and metanotum fig.7. Front coxae excavated ..... *dromedarius* **sp. nov.**
- Scape normal 4
4 Scutellum with posterior lateral lobes (fig.14). Pronotal collar sharply angled laterally. Temporal carinae strongly developed forming a transparent lobe. Algeria ..... female *patei* DE BEAUMONT
- Scutellum simple 5
5 T2 and T3 basally excavated. Female with pronotal collar rectangularly produced in middle. Temporal carinae forming a conspicuous lobe. Egypt, Soudan, Ethiopia ..... *mirificus* KOHL
- T2 and T3 simple. Pronotal collar not produced in middle 6
6 Head and body black except humeral tubercles and part of squamae whitish. Scutellum and metanotum fig.6. Thorax dull, densely punctate. Abdomen densely, shallowly and very finely punctate, little shining. Mandibles in both sexes not excised beneath ..... *funereus* **sp. nov.**
- At least pronotal collar and often part of metanotum white 7
7 Mesonotum dull, densely punctate, the interstices between the punctures forming ridges only 8
- Mesonotum more or less shining, the interstices between the punctures about the diameter of a puncture 9
8 Squamae of metanotum with pointed tips, the emargination between them wide. Female mandibles excised beneath ..... *guelmimensis* **sp. nov.**
- Squamae of metanotum with more or less rounded tips, the emargination between them narrow and semicircular (fig.1). Female mandibles not excised beneath. Turkey ..... *ottomanus* **sp. nov.**
9 Silver pubescence on front as long as diameter of front ocellus. Mesopleurae shining and rather coarsely punctate leaving the ground clearly visible. Scutum with rather coarse punctation. Female mandibles beneath each with about a dozen long conspicuous macrochaetae. Tergites with pale lateral marks or quite unmarked. Base of female clypeus more or less produced, sometimes forming a 'snout' ..... *waterstoni* KOHL (= *kohlianus* SCHULTHESS)

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- Silver pubescence on front close-cropped and shorter than diameter of front ocellus. Mesopleurae with dense silver pubescence largely or completely hiding ground. Scutum with fine dense punctation. Female mandibles beneath with, if present, only about six macrochaetae 10

10 In front view, narrowest part of front a little wider than width of eye. Tegulae ferruginous, more so in female. Emargination between squamae wide, rectangular. Tergites without pale apical bands..... *dunensis* DE BEAUMONT

- In front view, narrowest part of front about twice the width of an eye. Tegulae colourless. Emargination between squamae narrower, sometimes almost semicircular. Tergites 1-5 (? always) with well defined pale apical bands .... *schulthessii* KOHL

11 Head with postocular tubercles..... 12

- Head without postocular tubercles..... 13

12 Tergites with white apical bands, sometimes broken, followed by contrasting and finely punctate apical margins. Front with shining impressed median line. Scutellum and metanotum fig.2. Mesopleurae with silver pubescence not hiding the ground ..... *lucifer* **sp. nov.**

- Tergites black almost to apical margins. Front without clear impressed median line. Mesopleurae with indistinct silver pubescence. Abdomen finely punctate, the interstices about equal to the diameter of a puncture; scutum shining and more coarsely punctate than abdomen..... *wouroukatte* DE BEAUMONT

13 Scutellum divided by a median impression into two convexities..... 14

- Scutellum simple 15

14 Male only. AS3-5 about square. Squamae almost touching apically. Clypeus in profile convex, apically tridentate. Vertex brilliant with scattered minute punctation. Scutum brilliantly shining and almost impunctate; mesopleurae with a few scattered tiny punctures. Iran, Pakistan..... *meyeri* KOHL

- AS3-5 in both sexes transverse. Apices of squamae separated, the tips rounded (fig.4). Male clypeus slightly produced in middle; female clypeus feebly tridentate. In both sexes vertex and mesonotum shining, the male densely and finely punctate, the female only in parts. In both sexes the scutellum with slightly larger punctures. Mesopleurae with dense silver pubescence obscuring ground. Abdomen black or sometimes dark ferruginous..... *dimorpha* **sp. nov.**

15 Pale mucro strongly curved apically. Metanotum fig.12. Punctation coarse and dense. Sides of abdomen ferruginous. Pygidium ferruginous. Clypeus with large vertical shining area. Mandibles basally excised beneath. France, Iberia, Morocco..... *stecki* KOHL

- Mucro not strongly curved apically..... 16

16 Mandibles basally lobed beneath in both sexes. AS3-5 more or less transverse.. 17

- Mandibles beneath simple or almost so. AS3-5 not transverse. 18

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17 T2 with pale lateral spots. Apical margin of clypeus with a small well defined central point. Small mucro of metanotum pointed. Scutellum nearly semicircular. Emargination between squamae shallower, often narrower. Scutum brilliant, shining between small punctures. Mandibles with basal lobe beneath. Precostal plates entirely pale. Arabia, Israel ..... *bimaculatus* **sp. nov.**

- T2 uniform. Apical margin of clypeus very feebly tridentate, the central 'tooth' often hardly visible. Small mucro of metanotum usually rounded-truncate. Scutellum more or less transverse. Emargination between squamae deeper and often wider. Scutum dull to moderately shining. Mandibles with basal lobe beneath. Precostal plates often partly dark. Female of ssp. *maurusius* DE BEAUMONT with tooth at base of mandibles. North Africa, Mali, Turkey, Caucasus ..... *odontophorus* KOHL and ssp.

18 Head and thorax completely dull. In male AS4-8 bulged beneath. Male clypeus apically tridentate. Emargination between squamae narrow and deep. Enclosed area of propodeum with numerous diagonal striae. Austria eastwards .... *antennalis* KOHL

- Head and thorax more or less shining. In male antennal segments not bulged beneath..... 19

19 Squamae with tips pointed and clearly separated. Scutum rather shining with small dense punctation. Female with apex of clypeus tridentate. Enclosed area of propodeum ill defined with reticulate microsculpture. Except legs, body almost entirely black, underside of antennae paler. 5 mm. Fennoscandia..... ..... *borealis* FORSIUS

- Squamae separated only by a small notch, the tips more or less rounded. Clypeus in both sexes with a brilliant more or less triangular area. Pygidium of female ferruginous, somewhat narrowed in apical half. Punctation variable, ground more or less shining. 5-7 mm. Central and southern Europe, North Africa .... *italicus* A. COSTA

Belomicrus ottomanus sp. nov.

Holotype: Female. Turkey: Yesilhisar 1000 m., 8.VI.1987, K.M. GUICHARD (in British Museum Nat. Hist., London).

Paratypes: 8 males 18 females as holotype; 4 females Kayseri, Sultanhani 1200 m., 15.VI.1962, GUICHARD & HARVEY (Brit. Mus.); 4 males Kayseri, Incesu 20 km S, 4.VI.1988, Max SCHWARZ (coll. SCHWARZ); 1 male Konya, As Turk, 4.-5.VI.1967, Jos. SCHMIDT (coll. SCHWARZ).

Holotype female: Black with the following parts white to cream: Mandibles except tips, mouthparts, scape, underside of antennae, collar of pronotum and humeral tubercles, metanotum and lateral sutures, tibiae, much of front femora and

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apices of mid femora. Tegulae pale brown, apices of tergites paler, tarsi darker, apex of clypeus and pygidium brownish. Wing veins brownish.

Mandibles externally with weak basal lobe beneath and hardly excised, internally with ferruginous flange. Clypeus bulged and with a median shining area, apically slightly arcuate. Scape more or less parallel-sided. Antennal segments 3-7 transverse, orbits more divergent above. In front view, width of front at narrowest part greater than width of an eye, the front with short decumbent silver pubescence extending to below the front ocellus, the ocellar area densely punctate. Temporal carina obsolete. Pronotum more or less rounded. Mesonotum dull, closely punctate. Metanotum and mucro fig.1. Mesopleurae dull with dense and somewhat linear punctation not hidden by silver pubescence. Enclosed area of propodeum reticulate, the lateral areas smoother and more shining and the lateral carinae strong. Tergites rather dull, impunctate with slight microsculpture and with lateral patches of silver micropubescence, more feeble on T5. T1 with a median basal longitudinal groove. Pygidium dull with large evenly spaced punctures.

Length 3.5 mm.

Male similar to female but punctation on thorax denser and silver pubescence everywhere denser. Front margin of clypeus pale and feebly bisinuate. Front tarsi with small pecten. T7 more or less truncate.

Length 3 mm.

This is a species mentioned by DE BEAUMONT (1967) as possibly described by GUSSAKOVSKIJ (1952). George POPOV kindly provided an English translation of this last work which included descriptions of *B. kuznetzovi, affinis, minimus* and *excisus*. Briefly, the illustrations of the metanotums of the first three species excluded them from *ottomanus* and *excisus* is excluded by its shiny mesonotum.

The holotype and its related paratypes were swept from a white umbellifer growing in sandy soil.

Belomicrus lucifer sp. nov.

Holotype: Male. Jordan (Jordanien): 80 km NE Aqaba (Straße nach Amman), 13.IV.1989, J. GUSENLEITNER (in coll. GUSENLEITNER).

Paratypes: 11 females 5 males as holotype, but some 8.-15.IV. and 1 female 70 km NE Aqaba, 12.IV.1989 (in coll. GUSENLEITNER and coll. GUICHARD). Turkey: 2 males Hakkari, Suvari Halil Pass 2500 m, 27.VI.1985, Max SCHWARZ (in coll. SCHWARZ); 1 female Hakkari, Tanin-Tanin Pass 2500 m, 25.VI.1985, Max SCHWARZ (in coll. SCHWARZ); 1 male Yozgat, 9.VI.1988, K.M. GUICHARD (in coll. GUICHARD).

Holotype male: Black with following parts white: Basal half of mandibles, apical half of clypeus except margin, scape, underside of antennae except terminal segments, pronotal collar, humeral tubercles, most of metanotum, lateral sutures,

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legs except most of femora and part of tibiae beneath, narrow bands on apical half of tergites. Tegulae brown. Wing veins dark brown.

Mandibles with pronounced internal tooth proximally; clypeus produced, apical margin with median tooth and well defined lateral angles. Antennae with basal segments somewhat bulged beneath, AS3-4 about equal in length. Front about twice the width of an eye and with close forwardly directed silver pubescence nearly to the level of the anterior ocellus; orbits parallel-sided. Vertex shining and densely punctate with well defined postocular tubercles; orbital foveae ill defined, shining. Pronotal collar rounded, punctate, bounded posteriorly by a narrow membranous margin. Mesonotum shining, punctate but more densely and finely front and rear. Scutellum semicircular and strongly punctate. Mesopleure with very close punctation visible through decumbent silver pubescence. Metanotum fig.2. Propodeum rather dull with diagonal striae and a small area of fine reticulation basally. Tergites somewhat shining with fine fairly close punctation and with broad clear terminal more closely punctate margins. T6 and T7 laterally with obvious rounded expansions, T7 with stronger close punctation. S2 with long decumbent pubescence. S6-7 with denser more erect pubescence.

Length 6 mm.

Female. Colour and markings similar to male but clypeus and antennae darker; silver pubescence on face confined to orbital margins. Clypeus with prominent median smooth and strongly shining triangular area. Mesosternum densely and finely punctate. S2 with fine punctation, sparser centrally, remaining sternites with fine scattered punctation. Brown pygidium shining with coarse punctation.

Variations: The Turkish male from Yozgat has the abdomen with ferruginous replacing black.

Belomicrus beelzebub sp. nov.

Holotype: Female. S. Morocco: Km 6 Sidi Ifni-Goulimine Rd. 150 m., 15.III.1974, K.M. GUICHARD (in British Museum Nat. Hist., London).

Paratypes: 2 females 4 males as holotype (in Brit. Mus. and coll. GUICHARD); 1 female 3 males Tagmout N, 26.II.1986, Max SCHWARZ (in coll. SCHWARZ); 2 females 4 males Assafid 40 km NE, 16.-20.IV.1988, J. GUSENLEITNER (in coll. GUSENLEITNER); 2 males 12 km N Agadir, 29.III.1987, J. GUSENLEITNER (in coll. GUSENLEITNER). Tunisia: 2 males Feriana 10 km Nord, 8.V.1973, J. GUSENLEITNER (in coll. GUSENLEITNER); 1 male Sbeitla, 11.V.1973, J. GUSENLEITNER (in coll. GUSENLEITNER). 1 Female Jordan (Jordanien), 80 km NE Aqaba (Straße nach Amman), 15.IV.1989, J. GUSENLEITNER (in coll. GUSENLEITNER).

Holotype female: Black with the following parts cream: Basal half of mandibles (merging into ferruginous with black tips), underside of scape and antennae,

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pronotal collar and humeral tubercles, metanotum and lateral sutures, base of hindwings, legs except most of femora and last tarsal segments darker, terminal narrow paler bands on T1-5. Apex of clypeus ferruginous, tegulae pale ferruginous and pygidium. Wing veins brownish.

Mandibles internally with notch and small rounded tooth. Clypeus in profile bulged, centrally shining, apical margin arcuate and slightly produced in the middle. Orbits divergent above and below; front in narrowest part twice the width of an eye, with longitudinal impressed line becoming fainter as it approaches the front ocellus - the front and ocellar area densely and finely punctate. Postocellar area with prominent tubercles. Width of hind ocellus a little more than OOL. Orbital foveae dull and narrow. Pronotum widely rounded. Mesonotum somewhat shining, desely punctate. Mesopleurae densely linear-punctate, the 'striae' observable through the decumbent silver pubescence. Scutellum semi-ovoid with the punctation a little denser than that on mesonotum. Metanotum as fig.3, similar to that of *B. dunensis* DE BEAUMONT. Propodeum dull, finely reticulate with scattered lateral striae. Front tarsi with pecten a little spathulate. Tergites rather shining with very dense minute punctation, the membranous apical margins with micropunctation. Pygidium with large shallow punctures. Sternites shining with scattered minute punctures. Pubescence above microscopic.

Length 4.5 mm.

Male similar to female. Mandibles with an internal flange. Apical margin of clypeus somewhat variable, arcuate to feebly tridentate rather depending on the angle from which it is surveyed. Tegulae paler than those of female. T7 subquadrate, dull with confused larger punctation. S5-7 with lateral tufts of erect hairs. Third antennal segment longer than wide, slightly bulged beneath.

Belomicrus dimorpha sp. nov.

Holotype: Female. Saudi Arabia: El Ha'ir near Riyadh 520 m., 30.IV.1980, K.M. GUICHARD (in British Museum Nat. Hist., London).

Paratypes: 6 females 1 male as holotype (in Brit. Mus. and coll. GUICHARD); 2 males Ad Diriyah near Riyadh, 28.IV.1980, K.M. GUICHARD (in coll. GUICHARD); 2 males Abu Arish, 23.-29.III.1980, K.M. GUICHARD (in coll. GUICHARD); 1 male Bahra near Jeddah, 14.IV.1980, K.M. GUICHARD (in coll. GUICHARD). 1 Female 2 males Oman, Rostaq, 21.-31.III.1976, K.M. GUICHARD (in coll. GUICHARD). 2 females United Arab Emirates, Al Ain, 10.-24.VI.1988, I.L. HAMER (in coll. HAMER). 2 females 5 males Palestine, Ein Bokek, Zohar, 25.V.1975, K.M. GUICHARD (coll. GUICHARD).

Holotype female: Black with the following parts white to cream: Most of mandibles, palpi, scape, AS2 and underside of antennae, pronotal collar, humeral tubercles, metanotum and lateral sutures, mucro, tibiae and tarsi and much of

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femora, apical transverse band on T1. Apex of clypeus pale brown. Pygidium ferruginous. Wing veins brownish, hind wing pale at base.

Mandibles angled near base, their lower margin not excised but with a basal flange. Bulged clypeus with apical margin feebly tridentate (difficult to observe when mandibles are closed). Lower part of face with dense silver pubescence narrowly extended along the orbits. Frons shining with small close punctation and with a median impression extending to the front ocellus. Ocellar area and vertex shining with small punctation; orbital foveae narrow and dull. Cheeks with silver pubescence hiding the ground. Tegulae translucent. Mesonotum brilliantly shining with close small punctures near front margin and scattered ones elsewhere. Scutellum bituberculate, shining with some small punctures. Mesopleurae with the silver decumbent pubescence obscuring the ground. Metanotum and mucro fig.4. Enclosed area of propodeum including fosette dull and finely reticulate, lateral areas more shining centrally. Terga rather shining and with micropunctation; T2 and T3 with a deep basal transverse impression. Mid and hind tibiae with 4-5 white spines; front metatarsi with five pale spines, the remaining apical spines distinctly longer than the following segment.

Length 3 mm.

Male similar to female but scutum less shining and closely and minutely punctate all over. Basal antennal segments more or less transverse. Mandibles beneath with basal flange making them appear excised. Face narrower and more parallel-sided with more extensive silver pubescence. T7 more or less truncate.

Variation: In both sexes the pale band on T1 can be absent or in the male there is sometimes a partial second band on T2. In one female from Al Ain the abdomen is entirely ferruginous and generally speaking all abdomens are more pitchy than black.

Belomicrus guelmimensis sp. nov.

Holotype: Female. Morocco: Km 10 Guelmim-Tan Rd., 21.III.1989, K.M. GUICHARD (in British Museum Nat. Hist., London).

Paratypes: 2 males 2 females as holotype (coll. GUICHARD). 1 Male Algeria, Hoggar, Guelta bei Hamane 1800 m, 29.III.1989, Max SCHWARZ (in coll. SCHWARZ).

Holotype female: Head and thorax black except for the following parts cream: Mandibles except tips, scape, antennae, pronotal collar, humeral tubercles, metanotum, lateral sutures, precostal plates, tibiae and tarsi (tinged brownish), front and mid femora partly, apical bands on T1-4, central patch on T5. Abdomen and most of femora ferruginous; sternites pitchy to ferruginous. Apical margin of clypeus pale brown. Wing veins pale.

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Mandibles angled, an indentation on lower margin caused by a flange, internal margin without tooth. As3-5 transverse. Clypeus in profile angled, the apical margin produced in the middle and with very small lateral tubercles. Orbits converging. Width of an eye greater than half the width of front at narrowest point; front together with vertex dull and densely and minutely punctate. Orbital foveae obsolete. Diameter of a hind ocellus greater than OOL. Pronotal collar with lateral angles widely rounded. Mesonotum and scutellum dull and punctate like vertex. Scutellum more or less semicircular. Metanotum dull (fig.5). Mucro narrow, chanelled, parallel-sided and rounded apically. Enclosed area of propodeum rather dull, finely reticulate with some lateral striae. Lateral areas of propodeum more shining. Mesopleurae dull, the ground largely obscured by silver pubescence. Abdomen rather dull with micropunctation, the pale apical margins preceded by small serrations. Tergites with lateral patches of pale micropubescence. Pygidium triangular, narrowed apically, somewhat shining with scattered punctures. S2 with micropubescence obvious.

Length 3.5 mm.

Male similar to female including roughly the shape of the clypeus. Last antennal segments dark. Mandibles with a distinct tooth on inner margin. Pale micropubescence everywhere more extensive. T7 truncate apically. Distinct hair fringe on front trochanters beneath. Pecten of fore tarsi vestigial.

B. guelmimensis **sp. nov.** is related to *B. dunensis* DE BEAUMONT and has the same form of metanotum which however is dull and not shining as in *dunensis*. The latter is altogether more shining above and has well marked shining orbital foveae. *B. dunensis*, especially in the female, has the apical margin of the clypeus tridentate, the central fosette of the enclosed area of the propodeum shining, and the female pygidium triangular but not narrowed apically. The male has no tooth on the internal margin of the mandibles, only a slight flange and the hair fringe on the front trochanters absent or greatly reduced.

B. guelmimensis **sp. nov.** was found prospecting small white-flowered prostrate umbellifers.

Belomicrus funereus sp. nov.

Holotype: Female. Marokko: 18 km N Agadir, 2.IV.1987, J. GUSENLEITNER (in coll. GUSENLEITNER).

Paratypes: 1 Female 4 males as holotype (in coll. GUSENLEITNER and coll. GUICHARD).

Holotype female: Black except following parts pale ferruginous: Mandibles except tips, underside of scape (antennae broken), tibiae and tarsi and tips of femora. Humeral tubercles and distal half of squamae white. Tegulae, precostal plates and wing veins fuscous. Pygidium ferruginous.

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Mandibles not excised beneath, a small tooth on the internal margin. Clypeus in profile angled, in front view with a brilliant area in the shape of three arms of a cross. Orbits slightly sinuate bounded in the centre by a slight carina. Front shining and closely punctate, as wide as twice the width of an eye. Orbital foveae narrow, shining; front ocellus depressed. Ocellar area and vertex with denser punctation. Pronotal collar impressed in middle, lateral angles rounded. Mucro parallel-sided, apically more or less truncate. Enclosed area of propodeum reticulate with lateral diagonal striae, central fosette shining in the lower half. Scutum and mesopleurae densely punctate and scarcely shining. Metanotum fig.6. Abdomen slightly shining with microscopic punctation. Pygidium shining, coarsely punctate, the lateral margins a little sinuate. Micropubescence everywhere sparse.

Length 5 mm.

Male similar to female but pale coloration still paler. As3-5 each a little longer than wide. Head and thorax even duller and more densely punctate than those of female. All the tibiae with an internal dark mark. T7 truncate.

Belomicrus dromedarius sp. nov.

Holotype: Male. Saudi Arabia, Riyadh 600 m, 29.IV.1980, K.M. GUICHARD (in coll. British Museum Nat. Hist., London).

Holotype male: A very small shining black species with the following parts white: Mandibles except tips, most of front of scape, underside of antennae except tips, humeral tubercles, squamae, front tibiae and tarsi, mid tibiae in front, base of hind tibiae, mid and hind tarsi. Tegulae fuscous. Wing veins brownish.

Mandibles not excised. Clypeus in front view minutely punctate, with silver pubescence, with a narrow shining apical arc, the margin gently curved. Antennae somewhat clavate, AS3-11 transverse. Front shining with minute punctation, a fringing band of silver pubescence extending halfway along the orbits which diverge above; half the width of front less than width of an eye. Orbital foveae absent. Cheeks without silver pubescence and with faint linear punctation. Mesonotum and scutellum shining with obsolete punctation, the scutellum divided into two raised areas. Postscutellum fig.7. Mucro narrowed apically and more or less truncate. Mesopleurae shining and finely and transversely striate, the episternal suture with five shining fosettes. Dorsal area of propodeum dull and reticulate with obsolete striae laterally. Terga rather shining with indefinite ground sculpture and weak pale micropubescence mostly lateral. Front coxae conspicuously excavated. Forewing with lower distal angle of discoidal cell rounded.

Length 2.5 mm.

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Belomicrus bimaculatus sp. nov.

Holotype: Female. Oman: Rostaq 350 m (23t20'N - 27t20'E), 21.-31.III.1976, K.M. GUICHARD (in British Museum Nat. Hist., London).

Paratypes: 6 females 1 male as holotype. Male Sinai, Wadi Watir, 6.IV.1973, D. FURTH (Tel Aviv University).

Holotype female: Black with the following parts cream: Mandibles except tips, mouth parts, apical margin of clypeus, underside of antennae except last segment, scape, pronotal collar, humeral tubercles, precostal plates, metanotum, lateral sutures, tibiae and tarsi, front and mid femora except for fuscous patch behind, lateral marks on T2. Apical margin of T5 and pygidium ferruginous. Wing veins straw-coloured.

Mandibles widely and shallowly excised beneath, no internal tooth only a feeble ferruginous flange. Clypeus in front view with a small median shining area surrounded by dense decumbent silver pubescence, the apical margin arcuate with a small central point, the lateral angles rather rounded. Antennae with AS3-5 transverse. Front shining with minute dense punctation, longitudinal impression feeble, silver pubescence ending well before front ocellus. Orbits rounded but more strongly diverging above. Ocellar area and vertex with shallower and less well defined punctation. Orbital foveae distinct and dull; temporal carinae present. Pronotal collar with rounded lateral angles. Mesonotum shining with small evenly distributed punctation. Scutellum semicircular, the punctation a little sparser than on mesonotum. Metanotum fig.8. Enclosed area of propodeum finely reticulate with four or five short diagonal striae basally. Abdomen shining with dense micropunctation; terga with apical margins paler, some micropubescence laterally. Micropubescence on sterna most evident on S2.

Male similar to female. Mandibles beneath with marked incision. Front with decumbent silver pubescence almost reaching the level of front ocellus. T7 roundly truncate. Orbital foveae obscure.

Length both sexes 3 mm.

Belomicrus patei DE BEAUMONT, 1950

Belomicrus patei DE BEAUMONT, 1950. - Bull. Brit. Mus. (Nat. Hist.) Ent. 1: 422.

A North African endemic (Algeria, Tadjemout, type in Brit. Mus.) of which the male is unknown. In his description of the female De Beaumont mentions the development of the mesopleural carinae, the slight convergence of the eyes and the truncate ending of the radial cell.

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***Belomicrus mirificus* KOHL, 1905**

Belomicrus mirificus KOHL, 1905. - Zeitschr. f. Hym. u. Dipt. 5: 225.

Easily recognized by the produced middle of the pronotal collar. There are two females in Brit. Mus. from Soudan, Wad Medani, 15.I.1927, H.B. Johnston, on Berseem (White Clover).

***Belomicrus* sp. (aff. *guelmimensis* sp. nov.)**

A female and two males from Morocco, Wadi Sayad, 28.III.1989, may belong to another species despite the fact that the locality is only a few kilometres from the *guelmimensis*-locality and the three were caught on the same small prostrate umbellifers. The two males seem indistinguishable from *guelmimensis* sp. nov., but the female has a very different pygidium - much broader, darker and more coarsely punctate; the colouration is also much darker.

***Belomicrus waterstoni* KOHL, 1923**

Belomicrus waterstoni KOHL, 1923. - Konowia 2: 263.
Belomicrus kohlianus SCHULTHESS, 1926. - Konowia 5: 158, - syn. nov.

The type of *B. waterstoni*, a female from Palestine, is in Brit. Mus. Apart from the entirely dark colour it is identical with another female, also in Brit. Mus., from Gebel Elba in Egypt collected by Priesner. This second female is labelled by DE BEAUMONT '*Belomicrus kohlianus* SCHULTH.'. Therefore, and in consideration of the two descriptions, *kohlianus* falls into synonymy. This is a very distinct species easily identified by the relatively long silver micropubescence and the very long mandibular macrochaetae which hang downwards.

***Belomicrus wouroukatte* DE BEAUMONT, 1967**

Belomicrus wouroukatte DE BEAUMONT, 1967. - Bull. Brit. Mus. (Nat. Hist.) 5: 366.

This species is known from only two Turkish females. I have seen the specimen from Konya collected by SCHWARZ. The outer transparent margin of the squamae stands out clearly from the rest; the humeral tubercles are white and the tegulae and the precostal plates dark. De Beaumont figures the postscutellum and mucro etc.

***Belomicrus dunensis* DE BEAUMONT, 1957**

Belomicrus dunensis DE BEAUMONT, 1957. - Bull. Soc. sc. nat. Maroc 36: 161.

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B. dunensis appears to be a Moroccan endemic known from the sandy Atlantic coast at Agadir and Sidi Moussa. Single specimens have also been taken at Taroudant and on the Tizi n'Test at 1800 m during April 1987 (K.M. GUICHARD).

***Belomicrus schulthessii* KOHL, 1923**

Belomicrus schulthessii KOHL, 1923. - Konowia 2: 261.

A small species described from Transcaspia. The distribution range is increased by the following records: Morocco: 1 Male Erfoud, 27.IV.1987, K.M. GUICHARD. Female Cyrenaica, 31.III.1958, K.M. GUICHARD (in Brit. Mus.). 4 males Saudi Arabia, Dirab Agricultural Station, 18.III.1980, K.M. GUICHARD. 3 males United Arab Emirates, 6.III.1981, C.G. Roche. 2 males Tunisia (Tunesien), Nefta, 15.IV.1981, J. GUSENLEITNER (coll. GUSENLEITNER).

Variation occurs in the emargination between the squamae, from almost semicircular to quadrate; wing veins vary from pale straw to brownish. Three Saudi specimens have only one white apical band confined to T1; the fourth specimen has a second band on T2. According to DE BEAUMONT (1956) the species was unknown to Pate.

***Belomicrus meyeri* KOHL, 1923**

Belomicrus meyeri KOHL, 1923. - Konowia 2: 260.

The type of *B. meyeri* is in Brit. Mus. from the Nurse coll. and is from Quetta, 6.1903. This specimen bears two labels; the first reads '*Belomicrus glabratus* K, det. KOHL Type male' and the second reads, 'Type *Belomicrus meyeri* KOHL, Maidl teste'. B M Type Hym. 21.1.124.

***Belomicrus stecki* KOHL, 1923**

Belomicrus stecki Kohl, 1923. - Konowia 2: 188.

DE BEAUMONT (1956) describes a Moroccan subspecies of *stecki* which lacks the ferruginous colour. He also emphasized a character of *stecki* shared by *patei* and *waterstoni* (*kohlianus*) - a prominent epicnemial carina bordering the mesopleurae and which thickens and curves to form a precoxal carina. Other characters of *stecki* are the carinae in front of the pronotal collar and the hind femora strongly recurved apically.

***Belomicrus odontophorus* KOHL, 1892**

Oxybelus odontophorus KOHL, 1892. - Ann. K. K. Naturhist. Hofmus., Wien 7: 205.

Belomicrus caesariensis PATE, 1931. - Bull. Soc. Hist. Nat. Afrique du Nord 22: 113, - **syn. nov.**

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DE BEAUMONT (1956) lists seventeen characters common to *odontophorus* and *caesariensis*, those of the tridentate clypeus and the temporal carinae being accompanied by the words 'more or less'. In the MORICE Collection at Oxford there is a pair of *B. odontophorus* determined by KOHL with a question mark, from Biskra, 14.V.98. They also carry underneath DE BEAUMONT'S 1948 det. label '*caesariensis* PATE'. Three other males from the same series bear only KOHL'S *odontophorus* label without the question mark. Series (coll. K.M. GUICHARD) from Algeria (Tamanrasset), Tunisia (Tabarka), Morocco (three localities), Mali (Gao) and Turkey (Kars, coll. SCHWARZ) leave no doubt that *caesariensis* must fall into synonymy. Professor ANDROPOV of Moscow (in litt.) has come to the same conclusion. DE BEAUMONT (1956 and 1958) created three subspecies of *caesariensis*: *oceanicus*, *maurusius* and *saharicus*, all of them with mixed characters. The Turkish examples mentioned above, 2 females and 5 males from Kars, 4.VII.1985, Max SCHWARZ, are very shining with clear intervals between the fine punctures on the scutum; the scutellum is almost semicircular and in the females the temporal carinae are almost like those of *maurusius* and the emargination between the squamae is more semicircular than triangular, although this last character in several species of *Belomicrus* seems to be rather variable. Otherwise these Turkish specimens share all the characters of De Beaumont's '*odontophorus-caesariensis* groupe' and I refrain from adding another subspecies.

***Belomicrus antennalis* KOHL, 1899**

Belomicrus antennalis KOHL, 1899. - Ann. K. K. Naturhist. Hofmus., Wein 14: 314.

The only specimen I have seen of *B. antennalis*, a male determined by L. MOCSAR has incipient postocular tubercles which might appear to lead it to couplet 11. However, it is easily distinguished from *lucifer* sp. nov. and *wouroukatte* by the very dull scutum.

***Belomicrus borealis* FORSIUS, 1923**

Belomicrus borealis FORSIUS, 1923. - Notul. ent. 3: 65.

Endemic to northern climes and apparently not found south of Scandinavia. Illustrated in Lomholdt (1976).

***Belomicrus italicus* A. COSTA, 1871**

Belomicrus italicus A. COSTA, 1871. - Ann. Mus. Zool. R. Univ. Napoli 6: 80.
Belomicrus obscurus KOHL, 1892. - Ann. K. K. Naturhist. Hofmus., Wien 7: 207.

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DE BEAUMONT (1967) noted that according to the region there were very great differences in the sculpture of *B. italicus* which might indicate a number of geographical races or several species. The problem still remains.

***Belomicrus moricei* KOHL, 1923**

While going to press, the female type from Jaffa, Palestine, 19.IV.1899, was suddenly found to be available at Oxford and is not therefore included in the key. The male is unknown.

B. moricei runs in the key easily to couplet 6 and is then separated from *B. funereus* **sp. nov.** by its strongly dentate pronotum and the strong excision in the mandibles beneath. The type is the average size and colour of *italicus*. The female clypeus is regularly convex, brilliantly shining with the apical margin arcuate. The scutum is shining with well defined clearly separated punctures, scutellum quadrate. The squamae, similar to fig.7, are well separated; the chanelled mucro is parallel-sided but the tip is broken. The carina in front of the shining and punctate mesopleurae is sharply defined. The enclosed area of the propodeum is at the base finely and then coarsely reticulate. The dark pygidium is very coarsely and confusedly punctate. Tibiae and tarsi and apices of femora white. The dentate pronotum is peculiar to this species in the distribution area covered.

***Belomicrus* sp.**

A battered black male from Sinai, 12.IV.1974, D. FURTH, in the Tel Aviv University Collection appears to be undescribed. It has weak postocular tubercles, coarse punctation, one pale-tipped squama is pointed, the tegulae brownish, humeral tubercles black, AS4-5 a little longer than wide.

***Belomicrus* sp.**

A single male from Turkey, Hakkari, 29.VI.1985, Max Schwarz, runs down to couplet 19 in the key. Unlike *antennalis* the scutum is strongly shining with wide gaps between small punctures. The clypeus is not unlike that of *italicus* from which it clearly differs by the well defined semicircular emargination between the squamae.

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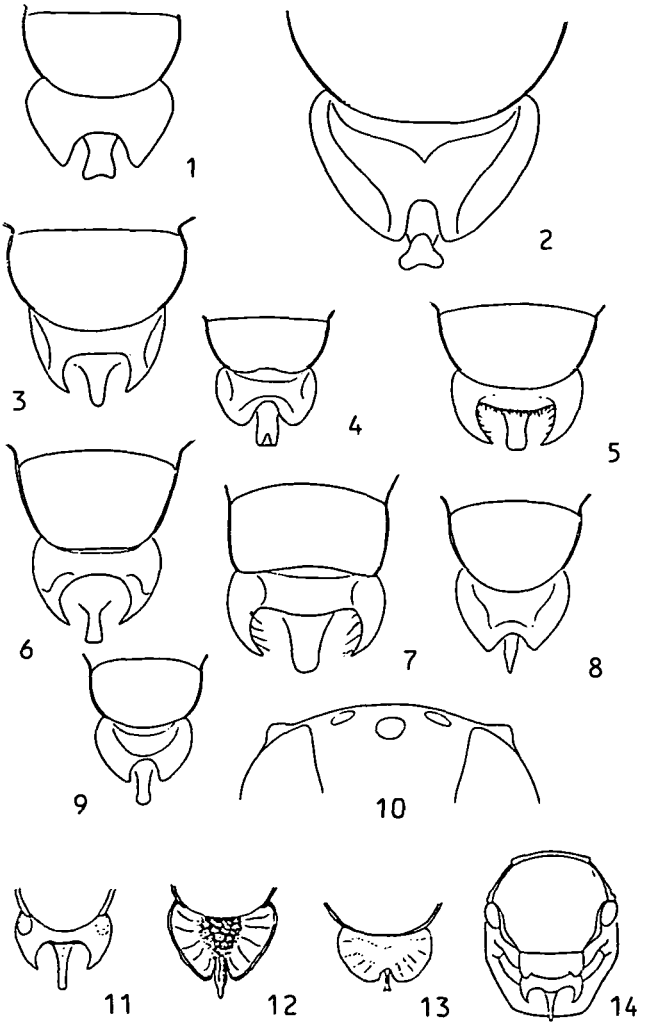

Figs.1-9 scutellum and metanotum, fig.1: *ottomanus* **sp. nov.**; fig.2: *lucifer* **sp. nov.**; fig.3: *beelzebub* **sp. nov.**; fig.4: *dimorpha* **sp. nov.**; fig.5: *guelmimensis* **sp. nov.**; fig.6: *funereus* **sp. nov.**; fig.7: *dromedarius* **sp. nov.**; fig.8: *bimaculatus* **sp. nov.**; fig.9: *odontophorus* KOHL from Kars, Turkey.

Fig.10: postocular tubercles of *lucifer* **sp. nov.**

Fig.11-14 after DE BEAUMONT (1956/58/61), fig.11: squamae of *dunensis* DE BEAUMONT; fig.12: squamae of *stecki* KOHL; fig.13: squamae of *wouroukatte* DE BEAUMONT; fig.14: thorax of *patei* DE BEAUMONT.

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Literaturbesprechung

SCHUBERT, R.(1991): Bioindikation in terrestrischen Ökosystemen, 2. Aufl.- G. Fischer Verlag, Jena. 338 S., 147 Abb., 38 Tab.

Je stärker der Mensch Einfluß auf seine Umwelt nahm, desto schwieriger wurde es, die Kurz- und Langzeitwirkungen auf bestimmte Umweltnoxen zurückzuführen. Um komplexe Wirkgefüge in der Natur und ihre Reaktionen auf anthropogene Einwirkungen besser verstehen zu können, bedient man sich zunehmend der Bioindikation, also der biochemischen, physiologischen, morphologischen, verhaltensbiologischen und populationsdynamischen Reaktionen der belebten Natur.

Die im vorliegenden Buch vorgestellten Untersuchungen stützen sich zu einem großen Teil auf die Pflanzen terrestrischer Ökosysteme. Pflanzen sind relativ ortsfest und erlauben daher die Untersuchung relevanter Parameter auf relativ einfachem Wege. Die Autoren weisen darauf hin, daß die Einbeziehung der Fauna als Bioindikatoren zunehmende Bedeutung erlangen wird. Die Defizite auf diesem Gebiet sind evident. Das vorliegende Buch gibt einen umfassenden Überblick über den Stand der Forschung und weist auf neue Fragestellungen hin. Die erfreulich klare Gliederung sowie das umfangreiche Glossar ermöglichen einen schnellen Zugriff auf die vielfältigen angesprochenen Themenkomplexe.

M. CARL

ABBOTT, T. R.: Compendium of Landshells. A Full-Color Guide to more than 2.000 of the World's Terrestrial Shells. - American Malacologists, Inc., Burlington, MA, 1989. 240 Seiten, 1940 Farbfotos.

Nach dem "Compendium of Seashells", ist nun das Gegenstück für die Landschnecken erschienen. Weltweit gibt es etwa 30.000 terrestrisch lebende Schneckenarten, in 85 Familien. Über 2.000 verschiedene Taxa werden in diesem Buch behandelt und fast alle, anhand ausgezeichneter Farbfotos, vorgestellt.

Nach einer kurzen Einführung in Klassifikation und System, klärt uns folgender Artikel über Leben, Fortpflanzung, Metamorphose und Nahrungsaufnahme, der in Prosobranchia und Pulmonata aufgeteilten Klasse Gastropoda, auf. Über geografische Verbreitung und Lebensräume, eingeschleppte Arten aus anderen Faunenbreichen, Bedeutung als Krankheitsüberträger und landwirtschaftliche Schädlinge und die archäologische Geschichte der Landmollusken, erhält der Leser grundlegende Information. Das Sammeln von Landschnecken ist weit verbreitet. Aus diesem Grund berichtet der Autor in kurzen Abschnitten von weltweit bedeutenden Sammlungen und dem Aufbau einer wissenschaftlichen Schneckenkollektion.

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Im systematischen Teil des Bandes finden wir Tafeln mit Farbfotos jeder behandelten Art. Fast jede Species ist von mehreren Seiten fotografiert, was die Bestimmung erleichtert. Der Begleittext besteht aus der systematischen Einteilung der Landschnecken von der Klasse bis zur Art. Die Familien werden anhand von Kurzbeschreibungen vorgestellt. Der Text zu den Bildern enthält den wissenschaftlichen Gattungs-und Artnamen, den Autor und das Beschreibungsjahr, den englischen Namen, die Größe in inch und cm, die geografische Verbreitung und den Seltenheitsgrad. Von vielen Gattungen und Arten wurden die Typen abgebildet, was einen großen Vorteil für den Bearbeiter dieser Tiergruppe bedeutet. Die Bibliographie ist in einen geografischen und einen taxonomisch klassifizierten Index aufgeteilt. Eine besondere Stellung nimmt hier die amerikanische Literatur ein, die geografisch nach den einzelnen Staaten gegliedert ist.
Dem Autor ist es mit diesem Band gelungen, einen repräsentativen Querschnitt der Landschnecken weltweit, in Text und Bild vorzustellen. Es handelt sich hierbei um ein Werk, das für den biologisch interessierten Laien, den Sammler und vor allem auch den professionellen Biologen, eine wertvolle Bereicherung der Literatur darstellt.

Max KÜHBANDNER

KOCH, M.: Schmetterlinge. - Neumann Verlag, Radebeul, 1991. 792S. Vertrieb: Verlag Eugen Ulmer.

Die vierbändige Reihe von KOCH'S "Wir bestimmen Schmetterlinge" liegt jetzt als Ausgabe in einem Band - in einer Bearbeitung von Wolfgang HEINICKE - vor. Die konzeptionell leicht veränderte Neuauflage beginnt mit einem "Allgemeinen Teil" zu Theorie und Praxis der Schmetterlingskunde (u.a. Geräte, Suchmethoden, Sammeltechnik, Zucht, Anlage einer Sammlung, Genitalpräparation). Der Spezielle Teil enthält 4 Kapitel, in denen die Tagfalter, die Bären, Spinner, Schwärmer und Bohrer, die Eulen und die Spanner zusammengefaßt sind. Die Identifikation erfolgt dabei anhand der Farbtafeln am Ende eines jeden Kapitels. Von vielen Arten werden auch Raupen und Puppen abgebildet. Die dortige Abbildungsnummer stimmt mit der Nummer der Tabelle im Textteil überein. Diese Tabelle enthält Angaben über das Fluggebiet, Raupen und Flugzeit, Futter der Raupe, Häufigkeit und Bemerkungen (Angaben zur biologie, Bestimmungshilfen etc.). Behandelt werden nur Schmetterlinge aus dem Territorium Deutschland und viele Schmetterlingsliebhaber werden die alpinen Arten (die nicht einbezogen wurden) schmerzlich vermissen. Hier sollte in Zukunft doch an eine mitteleuropäische Ausgabe gedacht werden. Ebenso muß die SEITZ'sche Nomenklatur als nicht mehr zeitgemäß bemängelt werden; es ist nicht ersichtlich, wieso die Verwendung einer modernen Nomenklatur eine "vollständige

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Veränderung der KOCH'schen Grundkonzeption" bedeuten würde. Gattungsnamen wie *Iphiclides* statt *Papilio* (Segelfalter), *Hipparchia* statt *Satyrus* (Waldportier) oder gar *Vanessa* statt
Pyrameis (Admiral) sind heute doch längst geläufig! Ansonsten handelt es sich wirklich um ein empfehlenswertes, kompaktes Standardwerk zur Bestimmung deutscher Großschmetterlinge, welches zahlreiche Zusatzinformationen über Besonderheiten und Lebensweise enthält.

R. GERSTMEIER

CHAZEAU, J., TILLIER, S.: Zoologia Neocaledonica. Vol. 2. -Mémoires du Muséum National d'Histoire Naturelle, Paris, 1991. 358 S. Erhältlich über: Universal Book Service, Dr. W. Backhuys, Warmonderweg 80, NL-2341 KZ Oegstgeest, NIEDERLANDE.

Mit dem 2. Band der "Zoologia Neocaledonica" folgt die Fortsetzung zur Erforschung der Fauna Neukaledoniens mit 28 taxonomischen Beiträgen. Damit ist dieser 2. Band mehr als doppelt so dick als Band 1 und auch das Inhaltsspektrum wird um einige Tiergruppen (Tricladida, Araneae, Coleoptera, Lepidoptera, Reptilia) erweitert. Wiederum stark vertreten sind Beiträge über die Dipteren; hier werden zwei neue Gattungen, eine neue Untergattung und zahlreiche neue Arten beschrieben. Alle Arbeiten sind hervorragend illustriert (Strichzeichnungen, Fotos, REM-Aufnahmen), z.T. sogar mit Farbfotos und entsprechen dem internationalen Standard. Aufgrund der Verbindung mehrerer Gruppen von Dipteren und Collembolen zwischen der Fauna von Neuguinea, Australien, Neuseeland und/oder Südamerika, ist dieser Band auch für den Biogeographen von Interesse. Weitere Bände dieser Reihe sind geplant.

R. GERSTMEIER

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