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A REVISED KEY TO THE WEST-PALEARCTIC SPECIES OF LEUCOSPIS (HYM. CHALC.), WITH SOME NEW SYNONYMY

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Although Schletterer's monograph of the genus *Leucospis* Fabricius of 1890 was an excellent work, the identification of some species, especially those described by Klug, has sometimes caused considerable difficulties. Having recently had the opportunity to re-examine Klug's types, lent to me through the courtesy of Prof. H. Bischoff and Dr. G. Steinbach from the Zoological Museum in Berlin, I believe it useful to publish a fresh illustrated key to the west-palearctic species. The considerable material

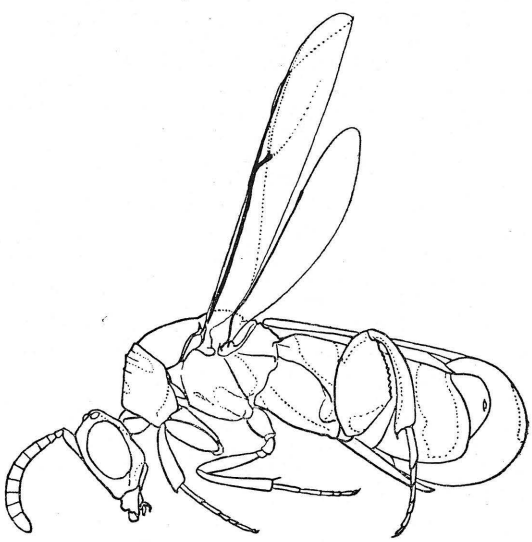


Fig. 1. *Leucospis dorsigera* F., ♀.

that has been available for study enables me to understand better, I hope, the individual variability of several species and, as a result of this, two species are sunk in synonymy.

The species parasitize solitary bees (perhaps also other Aculeata) and the imagines are met with mostly on flowering *Umbelliferæ,* on *Rubus, Alium, Eryngium,* etc. Striking in appearance, they are often collected but the host records remain very scarce.

Key to the Mediterranean species of Leucospis

1 Pronotum with two transverse carinæ in front of hind margin; hind carina more extended sidewards, imbedded in yellow colour, anterior carina less extending, lying usually in the dark coloured part 2

— Pronotum only with one cross-carina in front of hind margin (which itself is usually also carinaceous), this carina lying always in the yellow or orange part of surface 6

2 Dents on lower margin of hind femora small and short apart from the triangular basal dent (figs. 1, 2, 6); anterior pronotal cross-carina low even in the middle; female first gastral tergite grooved throughout along median line 3

— Dents of hind femora large, often rather long and slender (figs. 2, 6); cross-carinæ on pronotum angularly raised at median line, anterior carina slightly emarginate on top (fig. 3); body of female often more or less rufous instead of black . . . 5

3 Ovipositor sheaths reaching forward only to hind margin of first tergite; first two funicle segments subquadrate, the following segments transverse; body rather plump; ♀ 6—10 mm., ♂ unknown; Italy and Yugoslavia to Iran, the Crimea to Israel . . . . . **L. bifasciata** Klug

— Ovipositor reaching at least to the front third of first tergite; basal funicle segments of female longer than broad; body relatively slender 4

4 Ovipositor reaching to hind margin of scutellum or nearly so; hind femora broader (fig. 1); basal tergite slightly longer than broad from above, back part of gaster comprising fifth tergite 1.5 times as long as broad in dorsal view; pronotum usually with two yellow cross-bands, rarely also sides bordered with yellow colour; antennæ of male slender, first 5 segments of funicle subquadrate to distinctly lengthened; ♀ 5.5—13 mm.; ♂ 3.8—11 mm.; Central and South Europe, Southwest and Temperate Asia, North Africa . . . . . **L. dorsigera** Fabricius

— Ovipositor reaching forward only to basal fourth of first tergite; hind femora slenderer (fig. 7); basal tergite at most as long as broad, back part of gaster including fifth tergite only 1.25 times as long as broad; pronotum wholly bordered with yellow colour; ♀ 8—9 mm., ♂ not known; Central Asia, Iran . . . . . **L. turkestanica** Radoszkowski

5 Ovipositor short, nearly vertical, its tip does not reach beyond middle of fifth (broadest) tergite; gaster in both sexes strikingly broadened in caudal half (fig. 5) and abruptly depressed behind in female (fig. 6); male first tergite about twice as narrow as greatest breadth of gaster; ♀ 6.5—8 mm., ♂ 5.5—6.5 mm.; Portugal and South France to Italy and North Africa . . . . **L. brevicauda** Fabricius

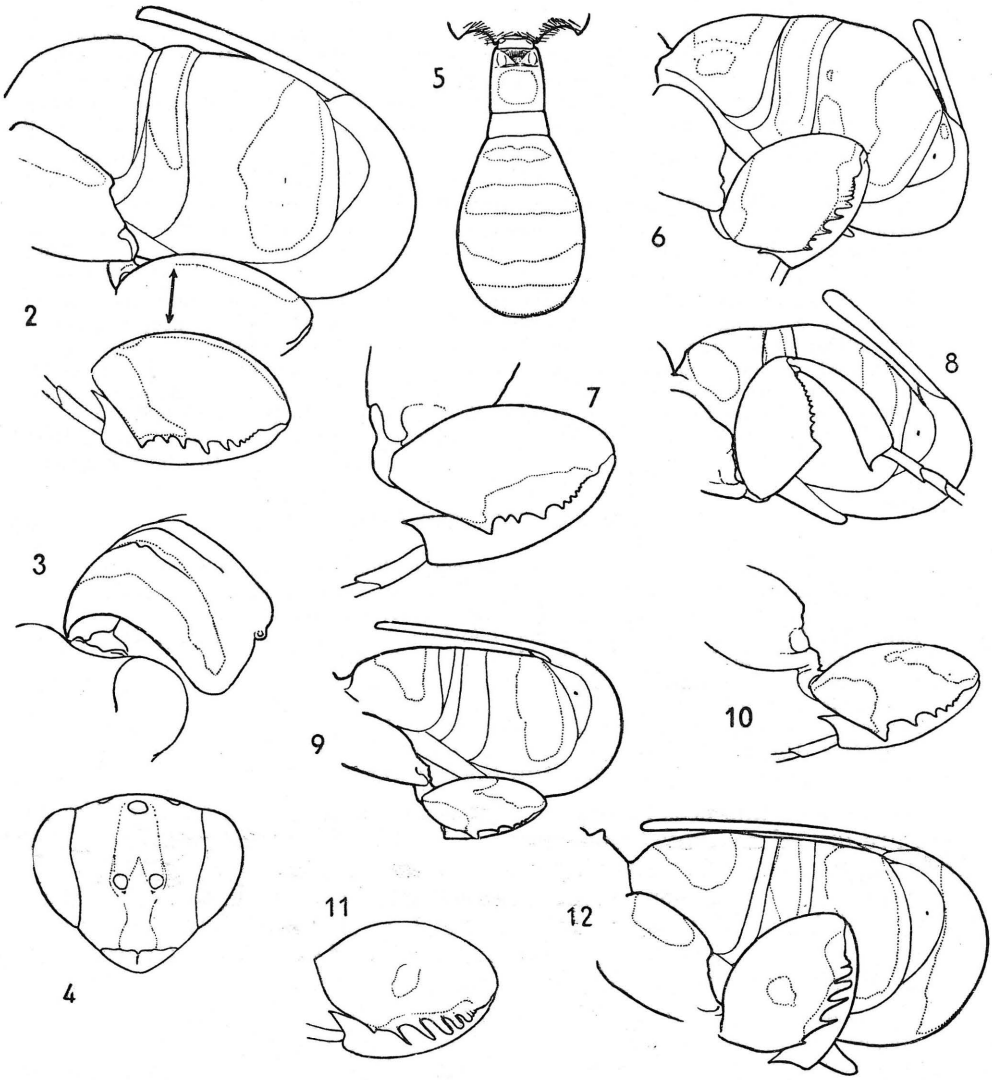
— Ovipositor subhorizontal and reaching hind margin of first tergite which is grooved medially in posterior ⅔; gaster moderately broadened backwards, not abruptly depressed; ♀ 10 mm., ♂ unknown; Arabia . . . . . **L. elegans** Klug

6 Dents on lower margin of hind femora small and short apart from the large basal dent (fig. 8, as in *dorsigera*); back part of gaster strikingly expanded, ovipositor oblique, not reaching to base of fifth (broadest) tergite, this tergite alone very deeply grooved; funicle segments transverse in both sexes; ♀ 5—8.5 mm., ♂ 7 mm.; Central and South Europe, North Africa, Israel . . . . . **L. biguetina** Jurine

— Dents on lower margin of hind femora large, interspaces between basal dents wide; gaster at most moderately expanded backward; ovipositor reaching at least to base of fourth tergite 7

7 Hind femora with a large basal dent followed by several further large, triangular dents (fig. 10); shortest distance between lower orbitæ as long as distance between lower margin of clypeus and upper border of frontal protuberances on either side of scrobes (37:38); face rather coarsely vertically rugulose; pronotal carina weak; metascutellum with an arched bilobed-raised carina; ovipositor reaching basal third of first tergite which is grooved throughout; female funicular segments 1—5 quadrate; margins of body ivory-white instead of yellow, abdominal cross-bands 2 and 3 subequal in extent in male; ♀ 8 mm., ♂ 6.5 mm.; North Sudan . . . . **L. obsoleta** Klug

— Basal dent of hind femora small, followed by several long and slender, oblique dents (figs. 11, 12); no characters as in alternate couplet 8



Figs. 2—12. — 2, *Leucospis elegans* Klug, ♀, gaster and hind femur; 3. pronotum in oblique anterior view; 4, head in front view. — 5, *L. brevicauda* F., ♂, gaster in dorsal view; 6, ♀, gaster. — 7, *L. turkestanica* Rad., hind femur. — 8, *L. biguetina* Jur., ♀, gaster. — 9, *L. obsoleta* Klug, ♀ (type), gaster; 10, hind femur. — 11, *L. intermedia* Ill., hind femur; 12, ♀, gaster (type of *L. frenata* Klug).

8 Female funicle segments 2—4 subquadrate, in male subtransverse; face short, distance between eyes below insertion of antennæ nearly as long as distance between lower clypeal margin and upper margin of frontal protuberances (or apex of scape); face rather coarsely rugulose; ovipositor reaching at least to base of first tergite; yellow cross-bands 2 and 3 on male gaster subequal in extent; ♀ 5—13 mm., ♂ 6.5—9 mm.; Central and South Europe, Southwest Asia, North Africa . . . . . **L. intermedia** Illiger

— Funicle segments 2—4 longer than broad in both sexes or at most subquadrate in male; face longer, distance between eyes clearly shorter than height of face which is very finely granulated-rugulose (or punctured-rugulose); ovipositor reaching forward at most to base of first tergite; gastral yellow cross-band 2 usually narrower than 3 in male 9

9 Metascutellum roundedly vaulted, not bidentate, throughout uniformly punctured; ovipositor reaching only to base of fourth gastral tergite, first female tergite slightly keeled longitudinally, not grooved, more finely punctured, as well as pronotum; the latter is not depressed transversely and has hind margin only vaguely carinaceous; hind femur slenderer; body colour orange and black; ♀ 12 mm.; ♂ unknown; Egypt . . . . . **L. miniata** Klug

— Metascutellum with two small conical dents which are smooth on their outer wall; ovipositor reaching at least distal third of first tergite which is deeply grooved throughout at median line (in female); first tergite and pronotum more coarsely punctured, the latter usually distinctly saddle-like, depressed transversely; pronotal carina more distinct and also hind margin of the sclerite usually distinctly carinaceous; hind femur broad, as in *intermedia*; yellow or orange, and black; ♀ 8.5—16 mm., ♂ 8—15 mm.; South Europe, Southwest and Central Asia, North Africa . . . . . **L. gigas** Fabricius

Leucospis dorsigera Fabr.

Leucospis dorsigera Fabricius, 1877, *Systema Entomologiæ*, p. 361.
Leucospis Cœlogaster Gmelin, in Linné, *Systema Naturæ*, ed. 13, p. 2740.
Leucospis dispar Fabricius, 1804, *Systema Piezatorum*, p. 169.
Leucospis Ligustica Nees, 1834, *Hym. Ichneum. affin. Monogr.*, 2: 17, 412.
Leucospis Spinolæ Westwood, 1834, *Ent. Mag.*, 2: 216.
Leucospis Sicelis Westwood, 1834, *Ent. Mag.*, 2: 218.
Leucospis scutellata Spinola, 1838, *Ann. Soc. ent. Fr.*, 7: 441.
Leucospis assimilis Westwood, 1839, *Zeitschr. f. Ent.*, 1: 261.
Leucospis Algerica Walker, 1860, *Journ. of Ent.*, 1: 17.
Leucospis lepida Chevrier, 1872, *Mitt. Schweiz. ent. Ges.* 3: 274.

As hosts of this best known and commonnest palearctic species (fig. 1) there are quoted the bees *Osmia rufa* (L.), *Anthidium diadema* Latr., and *Anthidiellum strigatum* (Latr.).

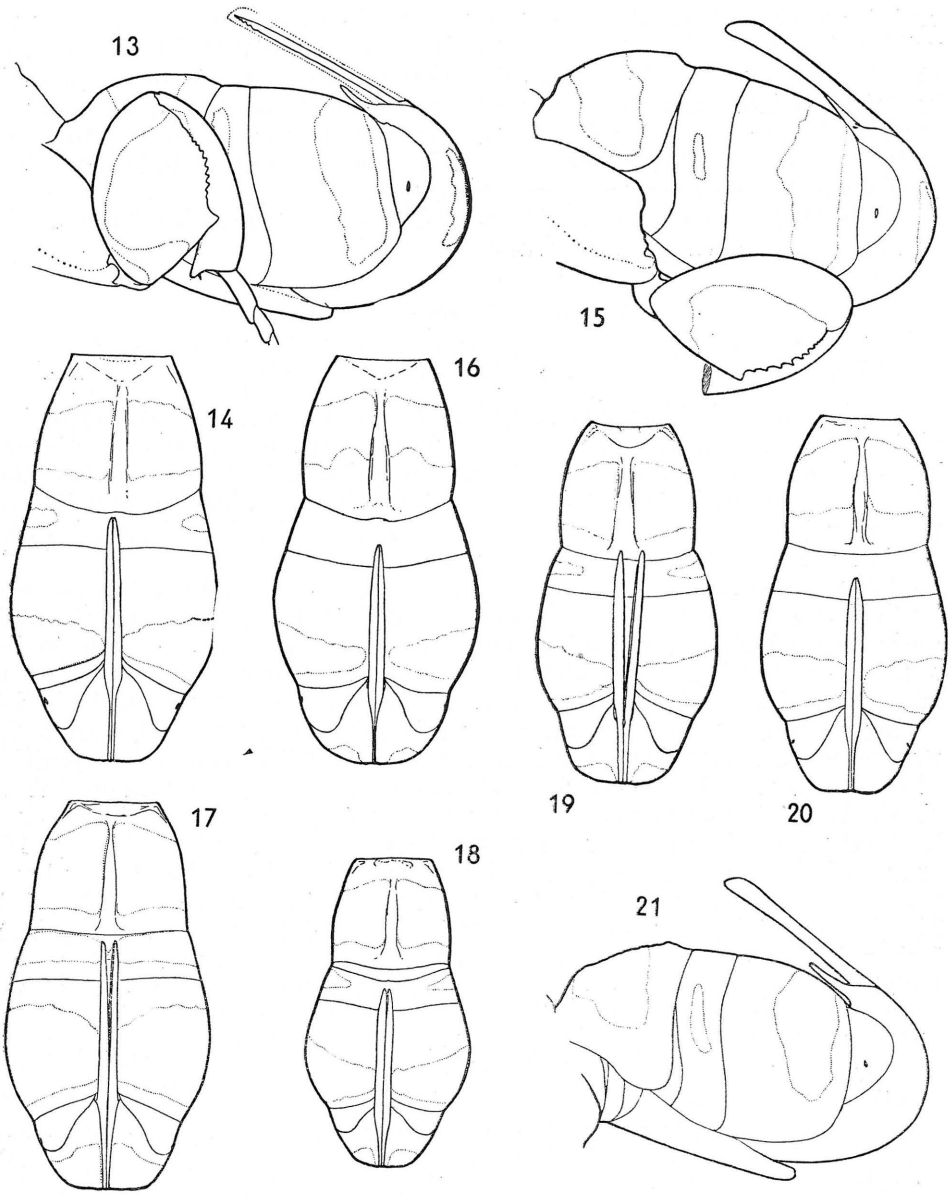
I have seen specimens from Germany, Austria, Czechoslovakia, West Ukraine, Bulgaria (Trnovo, 8. VII. 1931, Gregor leg.; Zlatni pjasecy at Varna, VII. 1957, Bouček leg.), Hungary, Italy, Asia Minor, Cyprus, Palestine, Iran, Afghanistan and Transbaikalia (!).

In Czechoslovakia, *L. dorsigera* is widely distributed. Imagines appear from June to September, mostly in July. I have seen specimens from the following localities:
Bohemia: Jince at Příbram, 1912 (Uzel); Křivoklátsko, 1950, 1951 (Macek); Unětice at Praha, 1951 (Macek); Čelákovice, 1941 (Kocourek); Rožďalovice, 1913 (Šustera); Mcely at Nymburk, 1912 (Šustera); Hradec Králové (Uzel), 1916 (Sekera), 1944, 1945 (Bouček); Velký Vřešťov (Bouček); Prčice at Votice, on old balks of timber, 1953 (Tůma). - Moravia: Čejč, 1941 (Kocourek), 1944 (Šustera). - Slovakia: Nitra, 1948 (Šustera); Gbelce (= Köbelkút), 1953 (Kocourek); Kamenín at Štúrovo, 1948 (Bouček); Kováčov, 1946 (Šustera); Somotor, 1948 (Bouček).

Leucospis turkestanica Radosz.

Leucospis turkestanica Radoszkowski, 1886, *Horæ Soc. ent. Ross.* 20: 51.

Since the time of Schletterer's monograph (1890, p. 187), this species had been considered mostly probably identical with *L. dorsigera* Fabr., ex-



Figs. 13—21, showing the variability of the gaster in ♀♀ of *Leucospis bifasciata* Klug. — 13, gaster of the type of *bifasciata* from Liguria, Italy; 14, the same from above; 15, side view of ♀ gaster of a specimen from the Crimea (type of *L. gibba* Klug); 16, the same from above; 17, the same according to a specimen from Wadi el Kelt, Israel; 18, specimen from Limassol, Cyprus; 19, specimen from Riccione, Italy; 20, specimen from Elbrus, Iran; 21, gaster of the same specimen in side view.

cept for Shestakov (1923, p. 99), who took it as a subspecies, and was revalidated as a species only recently by Nikolskaja (1952, p. 80), and Bouček (1956, p. 250). The morphological differences from *L. dorsigera* seem to be fairly reliable, but as for richer yellow colouring, this also occurs in some Mediterranean specimens of *dorsigera*. Nevertheless, only further material and data on the biology and distribution might decide, whether *turkestanica* is a species or a subspecies.

I possess one female of *L. turkestanica* from Krasnovodsk, Transcaspia, and another labelled simply Turkestan.

Leucospis bifasciata Klug

Leucospis bifasciata Klug, 1814, *Mag. Ges. naturf. Freunde Berlin*, 6: 70.
Leucospis gibba Klug 1814, *Mag. Ges. naturf. Freunde Berlin*, 6: 70. N. syn.

So far both *L. bifasciata* Klug and *L. gibba* Klug were treated as two different species. All authors based their identifications only on Schletterer's key, and this often led to difficulties; see e. g. Masi, 1943 (p. 82), and 1950 (p. 91), and Bouček, 1952 (p. 47), and 1956 (p. 251). Having had the opportunity to study the Klug types of the two species in question, I failed to find any specific differences.

The only noticeable differences in the outline of abdomen as stressed by Schletterer are illustrated in my figures 13—16. I believe not to have made any mistake when taking them as secondary phenomena due to the position in question of the abdominal segments. These are (apparently in all species of the genus) considerably mobile between the first and the following gastral tergite to facilitate the retraction of the ovipositor from the sheaths when ovipositing (*vide* Bischoff 1927, p. 337). The mutual position of these segments influences also the outline of the gaster if examined from above. If the dorsal parts of the first and fifth tergites are at the same level (fig. 13), the back part of gaster is not so strongly inflated (fig. 14) as it is the case when the back part is more or less distinctly sloping backward in relation to the dorsal part of the first tergite (figs. 15, 16, 18). The dorsum of the first gastral tergite is often also rather uneven (fig. 21). I should like to emphasize, too, that the thin marginal part of the first tergite in *Leucospis* is considerably elastic to collapse to the level of the following segments, and that is why a more distinct angle arises in the distal eighth of the named tergite in fig. 15 (*vide* Schletterer 1890, p. 183).

The position of the back part of the abdomen affects also the relative length of the ovipositor sheaths when this is expressed in relation to the margins of gastral segments. So in extreme cases it may nearly exceed the level of the hind margin of the first gastral tergite (cf. figs. 14, 19), or on the other hand, hardly reach forward to the middle of the next large tergite (fourth; the second, and to a great part also the third tergite are hidden beneath the first; figs. 15, 21). To show the variability in shape of abdomen, most specimens examined were drawn up and the sketches are presented here (figs. 13—21) to be judged by any reader.

In every specimen the wings are more or less infuscated, and no range is possible to be drawn to distinguish any groups. Also the puncturation of

the body and the slightly raised metascutellum (dorsellum) of the metanotum failed in furnishing any reliable distinguishing characters. Concluding from this, we might consider *L. gibba* Klug a synonym of *Leucospis bifasciata* Klug, through line priority.

I have seen specimens from Italy, the Crimea, Asia Minor, Cyprus, and Israel (only females).

Leucospis elegans Klug

Leucospis elegans Klug, 1834, *Symbolæ Physicæ*, Ins., Dec. 4, pl. 37, fig. 4.

This species is known so far only from the type, labelled "Arabia felix, Ehrenberg S.". I have included it to my key in spite of its being considered an element of the Ethiopian Region. *L. elegans* is most closely related to the Mediterranean *L. brevicauda* Fabr.

Leucospis brevicauda Fabr.

Leucospis brevicauda Fabricius, 1804, *Systema Piezatorum*, p. 169.
Leucospis Grohmanni Spinola, 1838, *Ann. Soc. ent. Fr.*, 7: 442.
Leucospis clavata Westwood, 1839, *Zeitschr. f. Ent.*, 1: 256.
Leucospis Fabricii Westwood, 1839, *Zeitschr. f. Ent.*, 1: 257.
Leucospis torquata Costa, 1882, *Atti Acad. Fis. Napoli*, 9: 37.

L. torquata was synonymized with *L. brevicauda* by Masi (1935, p. 37), who redescribed also the male (see my fig. 5). In females, as well as in *L. elegans* Klug, the body is often red-coloured in place of black (with yellow markings).

My figure of the female gaster was drawn from the type of *L. grohmanni* Spin., deposited in the Berlin Zoological Museum, and labelled "Sicilien, Grohmann S.". The male gaster was drawn from a specimen collected at Lisbon, Portugal, 29. V. 1949, by N. F. de Andrade

L. brevicauda seems to be confined to the western part of the Mediterranean Region.

Leucospis biguetina Jur.

Leucospis biguetina Jurine, 1807, *Nouvelle Méthode de classer les Hym. et les Dipt.*, p. 307.
Leucaspis parvicauda Mocsáry, 1879, *Természet. Füzetek*, 3: 119.

L. biguetina appears very local though widely distributed in the Mediterranean Region reaching the northernmost point of its range in Bohemia. I have seen only females, from Czechoslovakia, Hungary, Switzerland, and Israel.

Checked specimens from Czechoslovakia. Bohemia: Praha-Sv. Prokop, 26. VII. 1908 (Šustera); Radotín, 24. VI. (Čepelák). - Moravia: Pouzdřany, VI. 1940 (Kocourek). - Slovakia: Gbelce (= Köbelkút), 16. VII. 1953 (Kocourek); Kováčov at Štúrovo (= Parkan), 10. VI. 1946 (Šustera), 1954 (Balthasar); Čierná nad Tisou, VI. 1948 (Hoffer).

Leucospis obsoleta Klug

Leucospis obsoleta Klug, 1834, *Symbolæ Physicæ,* Ins., Dec. 4, pl. 37, fig. 5.

I have seen only the type of this species labelled "Ambukol, Septbr., Ehrb.". As well as *L. elegans* it belongs rather to the Ethiopian fauna, however, as there exists no sharp distinction from the Palearctic Region I have included this North Sudan species in my key, also. The specific characters of *L. obsoleta* mentioned by Schletterer may be emphasized by my figures 9 and 10.

Leucospis miniata Klug

Leucospis miniata Klug, 1834, *Symbolæ Physicæ,* Ins., Dec. 4, pl. 37, fig. 1.

This species is morphologically rather different from *L. gigas* Fabr., as shown in the key, though in the latter the orange colouring, instead of yellow, often occurs in the North African and Near East specimens. Accordingly *L. rufonotata* Westw. considered a synonym of *L. gigas* cannot be identical with *L. miniata,* as supposed Shipp (1894); and Masi (1935, p. 39) and Mader (1937, p. 160—161) were quite right in rejecting it.

I have seen only the type female, deposited in the Berlin Zoological Museum.

Leucospis gigas Fabr.

?Leucospis gigas Tourette, 1780, *Mém. Sav. étrang.,* **9**: 130.
Leucospis Gallica Villers, 1789, *Caroli Linnaei Entomologia,* **3**: 261.
Leucospis gigas Fabricius, 1793, *Entomologia Systematica,* **2**: 245.
Leucospis grandis Klug, 1814, *Mag. Ges. naturf. Freunde Berlin,* **6**: 65.
Leucospis varia Klug, 1814, *Mag. Ges. naturf. Freunde Berlin,* **6**: 67.
Leucospis nigricornis Walker, 1834, *Ent. Mag.,* **2**: 16.
Leucospis Shuckardi Westwood, 1834, *Ent. Mag.,* **2**: 214.
Leucospis rufonotata Westwood, 1839, *Zeitschr. f. Ent.,* **1**: 245.
Leucospis Costæ Schembri, 1847, *Ann. Soc. ent. Fr.* (s. 2), **5**: Bull., p. LXXXVII.

In spite of some variation in the colouring this species is correctly identified by most authors. As may be seen from the key above I fully agree with Schletterer's conclusions on the synonymy, especially as for *L. varia* Klug and *L. grandis* Klug, though I could not re-examine the types in question. The characters given by Mader (1936 and 1937) to distinguish the named forms as valid species, occur in the studied material of *L. gigas* and do not have any taxonomic value. There are also no morphological differences between the typical yellow-coloured *gigas* and the orange-coloured *rufonotata* Westw. Until the cause of this difference is explained I think it reasonable to consider this form as a variety only.

Tourette's paper of 1780 not being available to me, I cannot say (similarly as Schletterer) anything about his *Leucospis gigas* which is, however, older than the same name given by Fabricius (1793). If *L. gigas* Tourette were not identical with *L. gigas* Fabr., then our species should bear the name *L. gallica* Villers, 1789. In the opposite case the name *gigas* should be credited to Tourette.

As hosts the following solitary bees are quoted: *Megachile parietina* (Fourcr.), *M. pyrenaica* Lep., *Osmia* sp., perhaps *cærulescens* (L.)

The geographic range of *L. gigas* covers North Africa, the Near East, the Middle East up to Afghanistan and Central Asia, and South Europe, where the northernmost localities are in the neighbourhood of Vienna, Austria, and of Bratislava, Czechoslovakia.

Leucospis intermedia Illig.

Leucospis intermedia Illiger, 1807, *Fauna Etrusca*, 2: 130.
Leucospis aculeata Klug, 1814, *Mag. Ges. naturf. Freunde Berlin*, 6: 68.
Leucospis frenata Klug, 1834, *Symbolæ Physicæ*, Ins., Dec. 4, pl. 37, figs. 2, 3. Syn. n.
Leucospis Sardoa Costa, 1884, *Atti Accad. Sci. Fis. Napoli* (s. 2) 1: 57.

I re-examined the female type of *L. frenata* Klug and did not find any noteworthy difference from *L. intermedia* Illig. It is true that some ventral parts of the body, viz. lower face, anterior part of mesosternum, coxae, base of abdomen, sides of propodeum, are more or less reddish instead of black, but this colouring alone cannot be taken for a specific character. In the North African and Near East specimens of several species this often occurs, and even in *intermedia* in many specimens, too, the mouth region, coxæ, and ventral black parts of abdomen, are sometimes more or less red. As for the length of the ovipositor sheaths, besides the type of *frenata* I saw two further females of the typical *intermedia* with such short sheaths, in one specimen from Cyprus they are still shorter than in *frenata* (fig. 12). The form of abdomen is slightly variable, similarly as but weaker than, in *L. bifasciata*, and all differences in shape and puncturation are quite negligible. The slightly less infuscated wings and the vaguely indicated median carina on propodeum are certainly within the range of species variation.

As host *Osmia emarginata* Lep. is quoted, and also in Bohemia *L. intermedia* was observed at a nest of this solitary bee.

Widely distributed in the Mediterranean region up to Central Asia, but does not go so far northwards as *dorsigera*. In Europe it reaches its northernmost locality in Bohemia.

Checked Czechoslovak specimens come from the following localities. Bohemia: Prčice, nest of *Osmia emarginata*, 22. 7. 1952 (J. Tůma). - Slovakia: Kamenica nad Hronom, 6. 6. 1946, and Kováčov (at Štúrovo, formerly Parkán), 17. 8. 1946 (Šustera); Turna nad Bodvou, 25. 6. 1948 (Bouček).

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