A REVISION OF THE LEUCOSPIDAE (HYMENOPTERA : CHALCIDOIDEA) OF THE WORLD

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A REVISION OF THE LEUCOSPIDAE (HYMENOPTERA : CHALCIDOIDEA) OF THE WORLD

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CONTENTS

SYNOPSIS

In this revision, based on a study of material from institutions all over the world, four genera are recognized: *Polistomorpha* Westwood (7 tropical American species, of which 3 are new), *Leucospis* Fabricius (109 species, of which 31 are new, from all the warmer regions of the world), *Neleucospis* gen. n. (1 new West African species) and *Micrapion* Kriechbaumer (12 African species, of which 8 are described as new, and 1 Madagascan species). The type-material of more than 150 names was examined (including 57 holotypes), and 91 lectotypes are newly designated. Keys are given to all genera and species; in *Leucospis* three separate keys are given for the American, African and Asiatic-Australian species, respectively, the Palaearctic species being included in both the keys to the Old World species. Two generic, and 58 specific and subspecific names are newly synonymized, and 5 new combinations are proposed.

INTRODUCTION

THE Leucospids include most of the largest insects among Chalcidoidea, but in spite of this our knowledge of them has been rather poor. The earlier history of the group was well reviewed by Schletterer (1890), in his excellent monograph. The most important contributions before him were a paper on the European species by Klug (1814), another with descriptions of some species from north-east Africa and Arabia (Klug, 1834), the two reviews of the world species by Westwood (1834; 1839) and later a paper on the North American and Mexican species by Cresson (1872). Most publications, especially the numerous descriptions by Walker (1834–1871), did not include comparisons with the previously known species, or any keys (exception: Cresson, 1872). Schletterer provided keys to the three genera then included (two of them with only one and two species, respectively) and in *Leucospis* to 36 species, whilst about the same number of further species were quoted from the original descriptions. He studied all the types and material available, mainly from various European museums (but not, for example, from London and Paris), and aptly and critically reviewed the existing knowledge, including the known biological data, and for the first time evaluated also the variation in colour and structure. Partly as a result of this, he dropped many names into synonymy, in most cases rightly so.

Another three decades were reviewed by Weld (1922) in a similar way, although to a much lesser extent, as the aim of her work was much more restricted. Against Schletterer she had the advantage of a better knowledge of some American species, the types of which she could examine. Working in the U.S. National Museum, Washington, shortly after the first world war, she had, however, almost no contact with Europe. Weld's work, although it must not be regarded as another revision, is good, but many of her species also proved to be synonyms.

The post-Schletterer authors mostly contributed in smaller papers, with single or few descriptions or other information, but Ducke (1906), for example, revised the *Polistomorpha* species. Later, particularly after Weld's work, a few local faunas were worked out. Thus Berland (1934*b*) revised the French species of *Leucospis*, Mani (1937) the Indian species, Steffan (1948) treated the African *Micrapion*, Nikolskaya (1952) keyed out the *Leucospis* of the U.S.S.R. and later on (1960) treated them more comprehensively in the Fauna of U.S.S.R., Erdös (1955) keyed out the Hungarian species, Bouček (1959) the West Palaearctic ones, Ceballos (1959) the Spanish ones, Habu (1962) worked out comprehensively the two Japanese species and Porter (1972) briefly the Floridan species. Of all the papers which include valuable criticism, corrections and other information, perhaps the most important is that of Masi (1935). Otherwise descriptions of the Australian species were provided mainly by Girault, whilst those of the other parts of the world are more scattered and are mentioned with the relevant taxa and more fully under References. These include also some recent catalogues, viz. of the Indian species (Mani, 1938), of the North American ones (Peck, 1963) and of the Argentinian species (De Santis, 1967).

The taxonomic aims of the present work have been mainly to reach a better understanding of the existing (described or undescribed) taxonomic units of

Leucospidae and to draw up their present classification. The re-evaluation of the old taxa could be achieved only by a review of the existing knowledge and by checking it, at the same time, against all the available rich material. This, together with the biological information (including distribution), was supposed to reveal something of the actual range of variation and thus of the natural limits of various taxa and of the gaps between them. Only then could I be relatively sure to which taxa the types eventually belonged, apart from their nomenclatural value. In a few species, however, the available material seems to be still inadequate for safe conclusions.

The limits, relationship, variation and other aspects of taxonomy including the biological data are eventually treated, where necessary, with the individual taxa, including the family taxon as a whole. In a general scheme the valid name is followed by the quotation and the synonymy, then by the eventual information on the type material, including its nomenclatural and taxonomic aspects, problems concerning the intraspecific variation and the interspecific relations. In a few cases several infraspecific forms are recognized, in *Leucospis affinis* and *L. histrio* on the subspecific level, in which case the discussion is followed by a key to the subspecies and then each subspecies is treated as a separate unit. Biological data and general distribution (mostly in terms of countries) of species (or subspecies) are treated in separate paragraphs, followed by an account of the material examined. In the synonymy only names having some bearing on the nomenclature i.e. names available under the *International Code of Zoological Nomenclature* are mentioned. Misidentifications are therefore referred to only where a name is partly or entirely based on them.

MORPHOLOGICAL TERMS AND MEASUREMENTS

Some of the morphological terms, including all less common ones, are explained here and in a few figures (mainly Text-figs 1–15), together with the measurements used in descriptions. In spite of the relatively large size of these insects exact measurements are sometimes necessary, although their variation may be greater than known at present. There is no point in giving absolute measurements (e.g. in microns), as their main value is in relation to the measurements of the other parts.

The normal position of the *head* is taken as that with the mandibles and other mouth parts directed downwards. Consequently the length of head is its maximum thickness in antero-posterior direction (in dorsal view; Text-fig. 2), its breadth (or width) the distance between the outer margins of the eyes (less pubescence) and its height is measured from the uppermost point, usually on the *occipital carina*, down to the lowermost point of the lower clypeal margin (Text-fig. 1). The head usually has dorsally an area in front of the occipital carina delimited anteriorly by the frontal protuberances. As the part in front of the ocelli is called frons, this area is called *fronto-vertex;* its breadth is measured as the minimum distance between the inner margins (orbits) of the eyes, at about the level of the median ocellus. *Ocellar triangle:* the width means the distance between the outer margins

of the lateral ocelli, the height is the distance between the anterior margin of the median ocellus and a line through the posterior margins of the lateral ocelli. POL, or post-ocellar length, is the distance between the inner margins of the lateral ocelli, whilst OOL, or ocell-ocular length, is measured between the outer margin of the lateral ocellus and the eye margin. Measurements of the eye give the maximum and minimum diameters, in an antero-lateral view. The *scrobes* (united antennal or supra-antennal pits) are well delimited by the scrobal carina; the width is the maximum distance between the outer scrobal carinae, and the height is the distance between the upper scrobal carina (at the ocellus) and the lower edge of the antennal *toruli* (the torulus is the actual hole in which the antennal radicula is inserted). *Lower face:* the height is measured between the lower margins of the toruli and the lowermost point of the clypeus; the breadth is the minimum distance between the eyes below the antennal insertions. The *malar space* is measured between the lower extremity of the eye and the mouth margin in a vertical line, i.e. in front of a trace of the malar (genal) suture, not more posteriorly on the gena, where the mouth margin sometimes curves slightly upwards. The *mouth* is measured between its lateral corners, usually easy to see in a ventro-facial view, outside of the mandibles. The latter always have a well separated lower tooth (less distinct only in *Micrapion*), by a triangular notch or by a semicircular gap; their inner margin above the notch may be straight or emarginate to form another two teeth. The well developed labio-maxillary complex is rarely used in descriptions, although it shows a few good characters, mainly in the subdivision of the apical part of maxilla, beyond stipes and the membranous part to which the maxillary palpi are attached (I am not sure whether the apical part seen for example in Text-fig. 11 is actually homological with lacinia).

The *thorax* is treated together with the propodeum, i.e. originally the first abdominal segment (*mesosoma* of some authors). The pronotum often bears transverse keels, carinae; the complete set (Text-fig. 10) includes the carinate hind margin, a premarginal carina and a discal carina. Sometimes a distinct arcuate swelling is developed anteriorly connecting the anterior corners (shoulders). The mesoscutum sometimes shows traces, in form of shallow and broad longitudinal depressions on either side of the middle, diverging forwards; these are the *notaular furrows* or notauli, whilst the *parapsidal furrows* are indicated by short, often slot-like vestiges inside the hind corners of the mesoscutum. The breadth of the *scutellum* is measured about in its middle and does not include the axillae (Text-fig. 8). The *dorsellum* is the central raised part of the metanotum. The propodeum usually has the median carina and sub-lateral carinae, called *plicae*, inside the postspiracular furrow. The thoracic pleurum (I have previously used 'pleura' as singular and 'pleurae' as plural) is subdivided as shown in Text-fig. 4. The *stigmal vein* of the fore wing emits a branch subparallel to the anterior margin and this branch is called *uncus*, whilst the apex of the vein, beyond the uncus, where present (absent in Text-fig. 20) is called the *terminal processus*.

The *gaster* of the female is shown in Text-fig. 4. It has a strongly reduced petiole and *tergites* counted as 1–6, the sixth bearing a good landmark in the spiracles and followed by the *epipygium* (the following two tergites fused together) bearing

cerci. Some of the tergites in the female are reduced and more or less hidden (but shown in Text-figs 4 and 252), as well as the basal sternites, of which only the last, called the *hypopygium* is always conspicuous. In the male the tergites and sternites can be better observed, but tergites 3–6 are more or less fused into a carapace; its hind corners often protrude as teeth or auricles. The sternites are seven in number, i.e. the last is always counted as the seventh.

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ABBREVIATIONS OF DEPOSITORIES

AM, Grahamstown	Albany Museum, Grahamstown, Cape Province, South Africa (C. F. Jacot-Guillarmod)
AM, Sydney	Australian Museum, Sydney, N.S.W., Australia (G. A. Holloway)
ANS, Philadelphia	Academy of Natural Sciences, Philadelphia, Pennsylvania, U.S.A. (Dr D. C. Rentz)
BBM, Honolulu	Bernice Bishop Museum, Honolulu, Hawaii, U.S.A. (Dr J. L. Gressitt)
BMNH	British Museum (Natural History), London
CAS, San Francisco	California Academy of Sciences, San Francisco, California, U.S.A. (P. H. Arnaud)
CIS, Berkeley	California Insect Survey, University of California, Berkeley, California, U.S.A.
CM, Pittsburgh	Carnegie Museum, Pittsburgh, Pennsylvania, U.S.A. (G. E. Wallace)
CSIRO, Canberra	Division of Entomology, Commonwealth Scientific and Industrial Research Organisation, Canberra City, A.C.T., Australia
CU, Ithaca	Cornell University, Department of Entomology, Ithaca, New York, U.S.A. (Dr L. L. Pechuman)
DEI, Eberswalde	Deutsches Entomologisches Institut, now Abteilung Taxonomie der Insekten, Institut für Pflanzenschutzforschung, Eberswalde, East Germany (Dr J. Oehlke)
DE, Davis	Department of Entomology, University of California, Davis, California, U.S.A. (Prof. R. M. Bohart, E. E. Grissell)
DE, Riverside	Department of Entomology, University of California, Riverside, California, U.S.A. (S. Frommer)

EI, Zurich	Entomologisches Institut der E.T.H., Zürich, Switzerland (Prof. W. Sauter)
EIHU, Sapporo	Entomological Institute, Faculty of Agriculture, Hokkaido University, Sapporo, Japan
ELKU, Fukuoka	Entomological Laboratory, Faculty of Agriculture, Kyushu University, Fukuoka, Japan
EM, East Lansing	Department of Entomology, Michigan State University, East Lansing, Michigan, U.S.A. (Dr R. L. Fischer)
ERI, Ottawa	Entomology Research Institute, Ottawa, Ontario, Canada (Dr C. M. Yoshimoto)
EU, Matsuyama	Entomological Laboratory, College of Agriculture, Ehime University, Matsuyama, Japan (H. Taguchi)
FCNM, La Plata	Facultad de Ciencias Naturales y Museo, Universidad Nacional, La Plata, Argentina (Prof. L. De Santis)
IBUR, Rio de Janeiro	Instituto de Biologia, Universidade Federal Rural da Rio de Janeiro, Guanabara, Brazil (Prof. C. R. Gonçalves)
IEA, Portici	Istituto di Entomologia Agraria, Portici, Italy (Dr G. Viggiani)
IML, Tucumán	Istituto de Miguel Lillo, Miguel Lillo, Prov. Tucumán, Argentina (Prof. A. Willink)
IRSNB, Brussels	Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium (Dr P. Dessart)
IZU, Naples	Istituto di Zoologia dell'Università di Napoli, Naples, Italy
LE, Wageningen	Laboratorium voor Entomologie van de Landbouwhogeschool, Wageningen, Netherlands (Drs K. W. Zwaart)
MCSN, Genoa	Museo Civico di Storia Naturale, Genoa, Italy (Prof. E. Tortonese)
MCZ, Cambridge	Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, U.S.A. (Prof. H. E. Evans)
MIZS, Turin	Museo ed Istituto di Zoologia Sistematica, Università di Torino, Turin, Italy (Prof. U. Parenti)
MHN, Geneva	Muséum d'Histoire Naturelle, Geneva, Switzerland (Dr C. Besuchet, Dr I. Löbl)
MNHN, Paris	Muséum National d'Histoire Naturelle, Paris, France (Mme S. Kellner-Pilault & Dr J. R. Steffan)
MNHU, Berlin	Museum für Naturkunde der Humboldt-Universität, Berlin, East Germany
MP, Belem	Museu Paraense 'Emilio Goeldi', Belem, Para, Brazil (Dr R. Arlé)
MRAC, Tervuren	Musée Royal d'Afrique Centrale, Tervuren, Belgium (Dr J. Decelle)
MZU, Florence	Museo Zoologico della Specola, Università degli Studi, Florence, Italy
NCI, Pretoria	National Collection of Insects, Institute of Plant Protection, Pretoria, Transvaal, South Africa
NIAS, Tokyo	National Institute of Agricultural Sciences, Nishigahara, Tokyo, Japan (Dr A. Habu)
NM, Bulawayo	National Museum of Rhodesia, Bulawayo, Rhodesia (Dr E. C. G. Pinhey & Mr F. C. de Moor)
NM, Pietermaritzburg	Natal Museum, Pietermaritzburg, Natal, South Africa (Dr M. E. Irwin)
NM, Prague	Entomologické oddělení, Národní Museum, Praha-Kunratice, Czechoslovakia
NM, Vienna	Naturhistorisches Museum, Vienna, Austria (Dr M. Fischer)
NR, Stockholm	Naturhistoriska Riksmuseet, Stockholm, Sweden (Dr K. J. Hedqvist)
QM, Brisbane	Queensland Museum, Fortitude Valley, near Brisbane, Queensland, Australia (E. C. Dahms)
RNH, Leiden	Rijksmuseum van Natuurlijke Historie, Leiden, Netherlands (P. J. van Helsdingen)
SAM, Cape Town	South African Museum, Cape Town, South Africa (A. J. Hesse)

SM, Lawrence	Snow Entomological Museum, University of Kansas, Lawrence, Kansas, U.S.A. (Prof. C. D. Michener)
SMT, Dresden	Staatliches Museum für Tierkunde, Dresden, East Germany (Frau R. Eck)
TM, Budapest	Termeszéttudományi Múzeum Állattára, Budapest, Hungary (Dr J. Papp, Prof. G. Szelényi)
TM, Pretoria	Transvaal Museum, Pretoria, South Africa (J. van Reenen)
Townes	H. & M. Townes Collection, American Entomological Institute, Ann Arbor, Michigan, U.S.A. (Dr H. Townes)
UM, Oxford	Hope Department of Entomology, University Museum, Oxford, England
USNM	United States National Museum, Washington, D.C., U.S.A. (Dr P. D. Hurd)
UZM, Copenhagen	Universitetets Zoologiske Museum, Copenhagen, Denmark (Dr B. Petersen)
Watsham	Rev. A. Watsham, Salisbury, Rhodesia
ZI, Leningrad	Zoological Institute, Academy of Sciences of U.S.S.R., Leningrad, U.S.S.R. (Dr V. A. Trjapitzin)
ZM, Amsterdam	Zoölogisch Museum, now Instituut voor Taxonomische Zoologie, Amsterdam, Netherlands
ZS, Munich	Zoologische Staatssammlung, Munich, West Germany (E. Diller)
ZSI, Calcutta	Zoological Survey of India, Calcutta, India (Dr A. P. Kapur)

LEUCOSPIDAE Walker

Leucopsidae Walker, 1834 : 13. Type-genus: *Leucopsis* Dumeril (= *Leucospis* Fabricius).
Leucospidae Walker; Haliday, 1839 : ii. [Justified emendation.]
Leucaspoidae Förster, 1856 : 18, 20. Type-genus: *Leucaspis* Burmeister (= *Leucospis* Fabricius).
Leucospidinae Cameron, 1883 : 76. [Unjustified emendation.]
Leucospinae Walker; Howard, 1886 : 197.
Leucospididae Cameron; Brues & Melander, 1932 : 485.

In the past both spellings Leucospidae and Leucospididae were used. As there is no definite proof that the ending of the name *Leucospis* is derived from the Greek *aspis, aspidis* or *ops, opos* (cf. Schletterer's comments, 1890 : 144), the shorter form is preferred.

The family-group name was first used by Walker (1834 : 13) as 'Leucopsidae' (from the unjustified emendation of *Leucospis* to *Leucopsis*, see generic synonymy) and the group was regarded for some time as a family (for example by Förster, 1856 : 18, 20), but later on it was lowered to subfamily rank. A slight taxonomic change was introduced by Ashmead (1899 : 247), who, while regarding the other major groups of the Chalcidoidea as families, divided Chalcididae into two subfamilies: Leucospidinae and Chalcidinae, thus stressing the similarity of the two groups. The major groups of Chalcidoidea were treated again as subfamilies by Schmiedeknecht (1909), who again levelled Leucospinae with them, although he largely followed Ashmead. This status has been retained by the more recent authors, except that most major groups, including the Leucospids, have been regarded as families. The question of whether this is justified is partly outside the scope of this paper, as it largely depends on the relative weighting of various

characters, the gaps between the relevant groups and the measure which is taken in comparing the families. I feel that family rank for Leucospidae is much more justified than in, for example, some groups of bees, quite apart from higher animals such as mammals.

There are no fossil records to offer any lead as to how old the group may be. Some characters, for example the unspecialized dense pilosity of the wings with many veins indicated by darker shades or folds (cf. also Burks, 1938), seem to point to a relative primitiveness among the Chalcid flies. Some other characters, often regarded as specialized (apomorphic), for example the ovipositor bent over the gaster, may not be of such value; the latter position of the ovipositor is normal in the parasitic Hymenoptera with a long ovipositor in the pupal stage and in Leucospidae it is retained into the adult stage.

Body of relatively large size (2·3–16·5 mm), heavily sclerotized, mainly black or brownish, often partly to extensively red (varying extent of rufinism), as a rule with yellow or whitish markings, and in the Americas and the Indo-Australian region often with metallic tinge; including the gaster relatively coarsely punctured and pubescent, though hairs usually not long.

Head densely punctured or rugulose-punctured, face with rather dense short pubescence. Eyes large, pubescent, inner margin more or less emarginate in upper third. Ocelli normal, usually large. Occipital carina mostly developed, often sharp, but temples at lower part of eye and genae terete and strongly receding to conspicuous hypostomal carina; malar sulcus fine or indistinct. Antennal scrobes very deep, carinate at margin, reaching near to median ocellus. Frons above more or less elevated (frontal protuberances); flat or slightly convex interantennal area triangular, often with median keel, in almost same plane as its lower part called the supraclypeal area, which is usually well delimited. Clypeus always large, more or less trapezoidal or subquadrangular (Text-figs 1, 7, 15); tentorial pits indistinct; lower margin of clypeus free, usually produced. Labrum not traceable. Mandibles with upper edge hidden (when closed) behind mouth margin (or clypeus), generally with two teeth, the upper tooth then often broad and eventually double. Labio-maxillary complex well developed (Text-figs 11, 17, 18), with long glossa emarginate at apex; labial palpus 3-segmented, maxillary palpus usually rather long and 4-segmented, rarely rudimentary (*Polistomorpha*). Antennae 13-segmented (Text-fig. 9); scapus at most about 3·5 times as long as broad; pedicellus short; flagellar segments with basal one not reduced to anellus but narrowed at base; funicle counted therefore as 8-segmented and remaining three segments regarded as clava (its apical segment very short, indistinct and often appearing double), although the first segment is well separated, its suture being almost as conspicuous as those between preceding segments. The antennal segmentation was discussed by Habu (1961 : 85–86). Antennae of both sexes subequal, with very short dense pubescence, sensilla minute and not conspicuous.

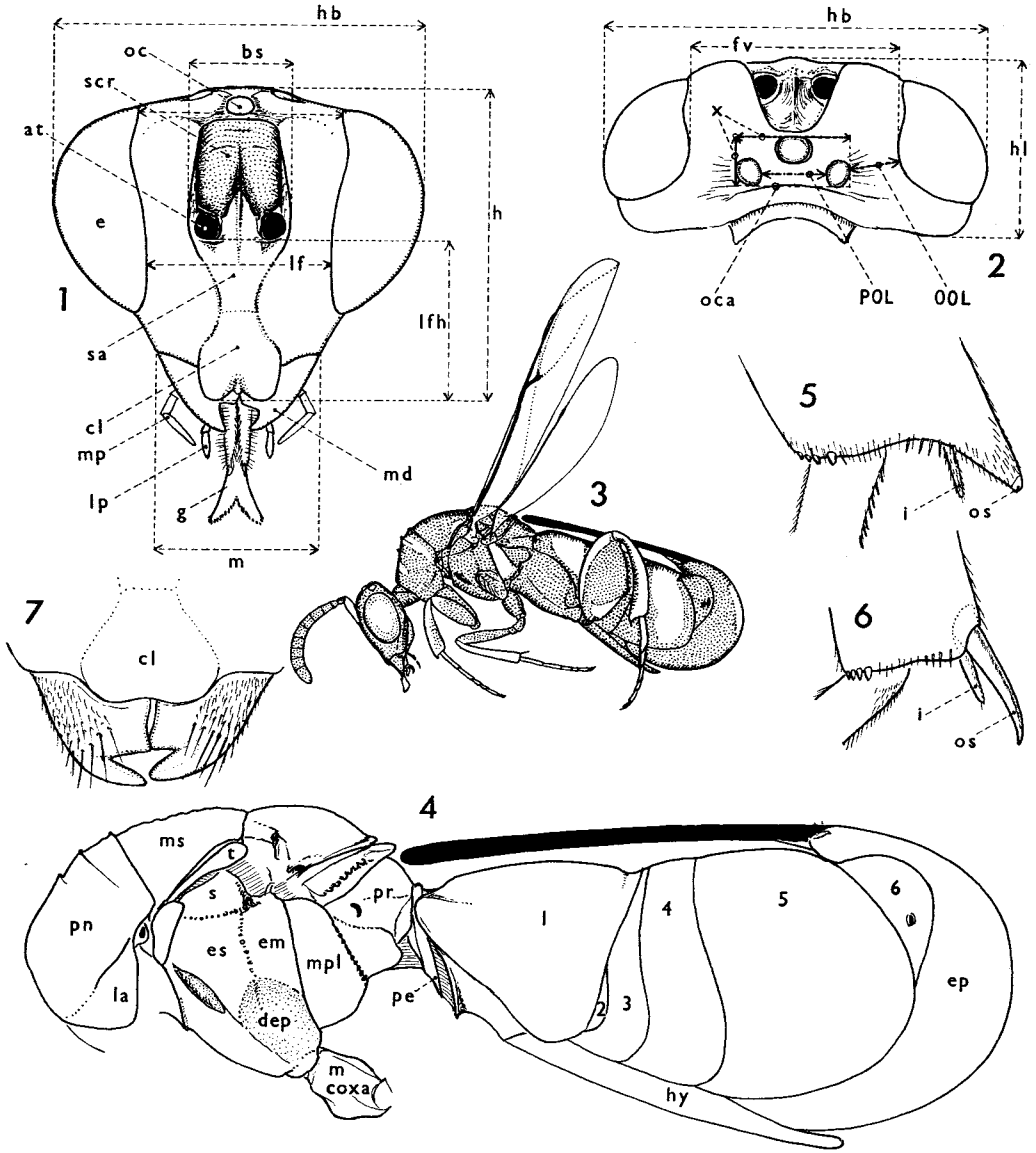
Thorax with large pronotum, often with transverse carinae; sides of collar (pronotal dorsum) subparallel or slightly converging forwards, sometimes concave in middle; anterior corners always conspicuous; lateral panel not high (Text-fig. 4), convex or with subhorizontal depression, posteriorly often with adspiracular emargination. Mesoscutum only rarely with vague notaular depressions, these never groove-like; parapsidal furrows reduced to short (often slit-like) but distinct vestiges posteriorly at lateral corners. Scutellum not subdivided, its hind margin low, rounded or subtruncate; frenum not developed. Axillae very short, their hind part vertical, outer corner more or less tooth-like. Metanotum with well differentiated dorsellum, latter often of characteristic form, sometimes carinate or even toothed at margin. Propodeum punctured or rugose-punctured, always pilose, mostly with distinct median carina and simple sublateral plicae but without further carinae or regular alveolae; spiracles narrowly reniform, situated in anterior part of large sublateral furrows. Prepectus showing as small movable sclerite below anterior end of the unusually elongate spatulate tegula. Mesopleurum with deep depression beneath, to accept mid femur and tibia; upper part punctured, distinctly

subdivided in subalar area, upper episternum and upper epimerum; anterior aspect of mesopleurum without any shelf in front of mid coxae but with deep elongate depression on either side above, to accept the postero-lateral edge of pronotum. Metapleurum sub-triangular, often produced above at hind wing. Fore coxa longer than half of femur, anteriorly pubescent, without oblique carina. Fore tibia (Text-figs 92, 93) with distinct tooth at apex, spur curved, its apex shortly (sometimes indistinctly) cleft. Mid coxa relatively short; mid tibia slender, apical spur not long. Hind coxa unusually large, with distinct depression externally between dorsal edge and blunter lateral edge; more or less punctured, at least between lateral and meso-ventral edges; often with dorsal tooth. Hind femur greatly enlarged, its ventral edge, except at base, toothed. Hind tibia arcuate, dorsally rounded, ventrally with percurrent carina and another externo-ventral carina usually not reaching apex; apex of tibia with two spurs (Text-fig. 6) but sometimes produced into a spine which bears only a rudiment of the outer spur on its top (Text-figs 5, 40, 131, 144), whilst the inner spur is normally developed, microscopically pubescent. Tarsi 5-segmented, normal; claws of fore and mid legs pectinate, teeth often different in outer and inner claw (Text-fig. 62); hind claws simple or with very short comb at broadened base. Wings densely pubescent, including lower surface of costal cell, and if pubescence slightly reduced in proximal part of wing, then hairs not forming any special formations; fore wing with long and smoothly curved submarginal vein, very long postmarginal vein, but marginal vein very short, shorter than stigmal vein which often bears a distinct uncus; sclerotized spot present outside of lower corner of basal cell. Hind wing with rather long marginal vein, but this even apically slightly removed from the margin, with three subequal hamuli.

Gaster rather broadly sessile, the second abdominal segment (petiole) strongly reduced, mostly hidden but sometimes more apparent, often with transverse carina dorsally. First tergite (postpetiolar tergite) in both sexes large. In female second tergite strongly reduced, mostly hidden under the first (Text-figs 4, 252), consisting of lateral sclerotized discs, connected medially with a broad membrane (which extends greatly at oviposition); third tergite very short, its basal impunctate part mostly not exposed, punctured part very narrow; fourth tergite always at least partly exposed, punctured, not long. Fifth tergite the largest, forming broadest part of gaster. Sixth tergite (landmarked well by spiracles) normal only in *Polistomorpha*, in other genera its exposed part divided in two, showing at sides in front of epipygium; the latter extending along ovipositor. Cerci always present, but very low, disc-like, their setae short. Sheaths of ovipositor often long and then bent upwards and forwards; in that case an ovipositorial furrow (to accept ovipositor) of corresponding length developed on dorsal side of thorax (Text-figs 8, 55). Sternites strongly reduced except the last (hypopygium) which projects far back along ventral side of gaster.

In the male, second tergite much shorter than the first but distinct (e.g. Text-figs 31, 80, 120), punctured, well separated from the following tergites which are more or less fused into a carapace. Carapace at base with sublateral keels marking off subvertical epipleura which show better margins of fused tergites; segmentation of carapace often indicated by changing density of puncturation (e.g. Text-figs 114, 115) or by yellow bands (Text-figs 169, 171, 197, etc.), sixth tergite again bearing spiracles. Epipygium readily separated, more or less transverse, usually with cross-depression; cerci low. Exposed parts of sternites with strong sclerotization, punctured; all well developed, the first often with tooth-like projection ventrad. Aedeagus (Text-figs 12–14, 245–248) of a relatively simple form, volsellar digiti not developed.

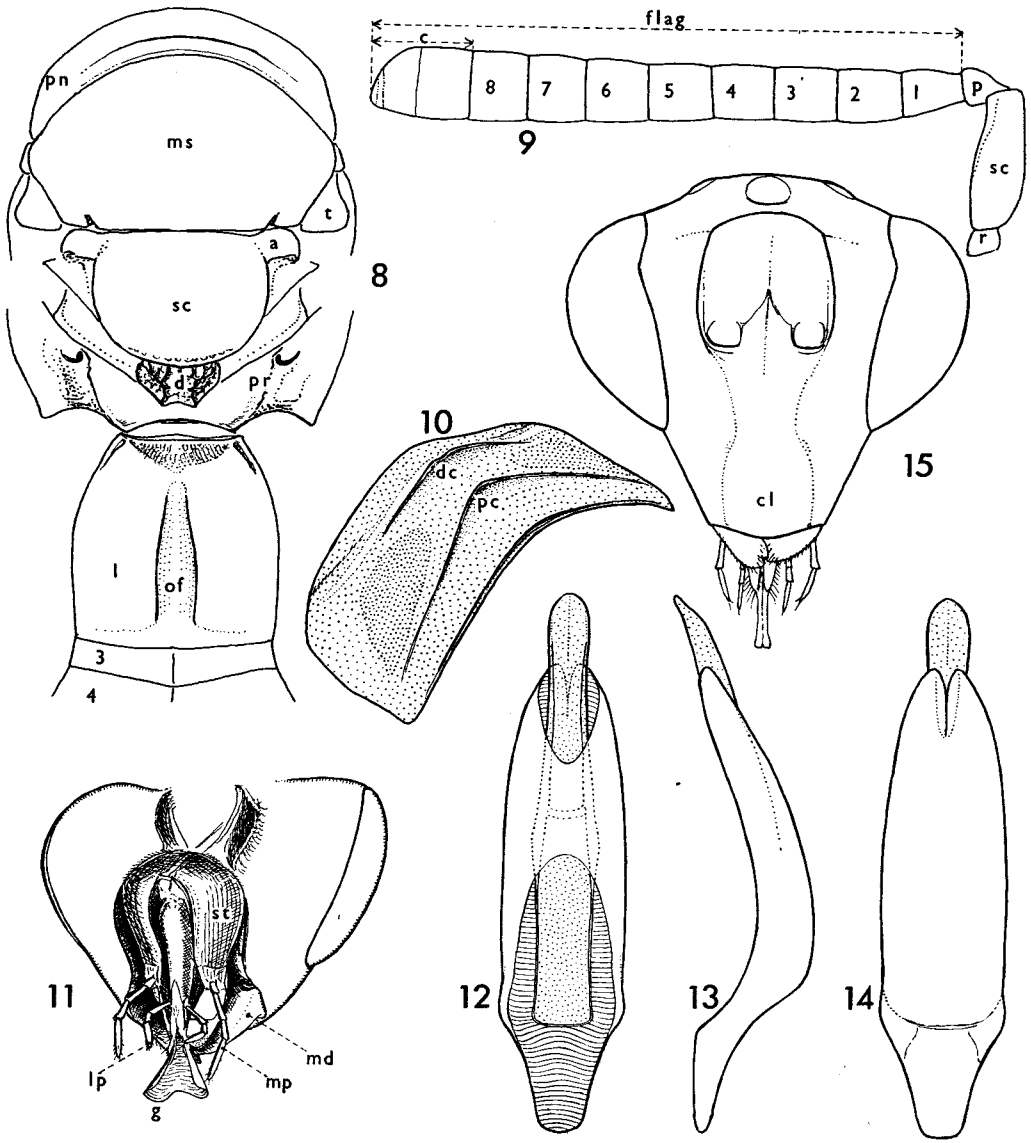
As mentioned, Leucospidae are similar to Chalcididae, mainly in having the hind femora greatly enlarged and toothed beneath, but differ from them in many characters, in particular in the following: concealed labrum; unusual development of labio-maxillary complex, especially of glossa; antennae subequal in both sexes, with large first flagellar segment but short pedicellus; absence of clear-cut notaular furrows; presence of parapsidal vestiges; simple scutellum but specialised form of dorsellum; absence of propodeal areolation; folded fore wings with always



FIGS 1–7. 1, 2, 5. *Leucospis gigas*. 1, 2, head in facial and dorsal views; 5, apex of hind tibia externally. 3, 4. *L. dorsigera*. 3, body of ♀; 4, thorax and gaster. 6. *Polistomorpha conura*, apex of hind tibia. 7. *Leucospis opalescens*, clypeus and mandibles.

LETTERING IN FIGS 1–7, 8–15. *at*, antennal torulus; *ax*, axilla; *bs*, breadth of scrobes; *c*, clava of antenna; *cl*, clypeus; *d*, dorsellum; *dc*, discal carina; *dep*, mesopleural depression; *e*, eye; *em*, epimerum; *ep*, epipygium; *es*, episternum; *flag*, antennal flagellum; *fv*, frontovertex; *g*, glossa (ligula); *h*, height of head; *hb*, breadth of head; *hl*, length of head; *hy*, hypopygium (last sternite); *i*, inner spur; *la*, lateral panel of pronotum; *lf*, lower face; *lfh*, height of lower face; *lp*, labial palpus; *m* (breadth of) mouth; *md*, mandible; *mp*, maxillary palpus; *mpl*, metapleurum; *ms*, mesoscutum; *oc*, ocellus; *oca*, occipital

carina; *of*, ovipositorial furrow; *os*, outer spur; *ov*, ovipositor (sheaths); *p*, pedicellus; *pc*, premarginal carina; *pn*, pronotum; *pr*, propodeum; *s*, subalar area; *sa*, supraclypeal (and interantennal) area; *sc*, scutellum; *scr*, scrobes; *st*, stipes; *t*, tegula; *x*, breadth and height of ocellar area; 1–6 on gaster, postpetiolar tergites; 1–8 on antenna, flagellar segments; OOL, ocell-ocular length; POL, post-ocellar length.



FIGS 8–15. 8, 9. *Leucospis gigas*. 8, thorax and base of gaster of ♀ in dorsal view; 9, antenna of ♀. 10, 11. *L. ornata*. 10, pronotum in oblique postero-lateral view; 11, head in oblique view from below showing the mouth parts. 12–14. *L. dorsigera*, aedeagus in dorsal (left), lateral and ventral (right) views. 15. *Micrapion steffani*, head in facial view.

extremely long postmarginal vein, short marginal vein, presence of sclerotized spot in basal third, and in the veins, faintly indicated, the radial sector only very shortly fused with the media (Burks, 1938); special form of gaster in females (second tergite, partly ovipositor) and in males (carapace); in males absence of volsellar digiti on aedeagus.

The account of the morphological characters can never be complete and certainly new characters may be found and used in the future. Apart from those which are mentioned above I have tried to use some other characters in a few cases, including for example the claws (Text-figs 34, 62, 145, 191, 268, 269). They proved to be of some importance in clearly different species but do not seem to help with very similar species. Also, apart from the difference between the anterior (fore and mid) claws and hind claws (Text-figs 268, 269) already mentioned often the inner claw of the same tarsus has a different comb of teeth from that of the outer claw. Other interesting specific characters seem to be in the subdivision of the maxilla (sometimes difficult to examine without dissection), in the structure of the glossa (Text-figs 22, 23), in the form of the inner edge of the mandibles, in the pegs on the apex of fore and hind tibiae, etc. If not at the specific level, they may be useful for the grouping of species, as may be the aedeagus of the males although this seems to be surprisingly uniform in the three genera (Text-figs 12–14, 245–248).

Biology. As a group, the Leucospids are rather specialized in their host relations: they develop as parasites of aculeate Hymenoptera. Their hosts are mainly solitary bees, less frequently so solitary wasps, viz. Eumenidae and Sphecidae, nesting in a similar way to the bees. Occasionally parasitic bees have also been recorded as hosts (of the genera *Coelioxys* and *Stelis*), probably attacked by the Leucospid when occupying the cell of a solitary bee after killing its original owner. The known records are listed alphabetically at the end of this paper with omission of apparently incorrect records, such as of a gall maker, when a bee used the gall as a nesting site.

The Leucospids are normally bisexual, but some species are apparently able to reproduce parthenogenetically, as is known in *Leucospis gigas* in European populations (pointed out first by Berland, 1934*a*) and suspected in a few other species (Bytinski-Salz, 1963 : 530).

The act of oviposition was described already by Jurine (1807 : 305–306) and by Westwood (1834 : 213), later by Fabre (1886) and Bischoff (1927 : 337, fig. 151), and by Habu (1962 : 169) who summed up the observations of several Japanese authors. A more detailed account, based mainly on Graenicher's paper (1906), is given by Clausen (1940 : 236–238). The egg is laid through the protective wall of the cell of the host, i.e. through the hard dry mud, wood or other material, in a special way enabled by the singular structure of the female gaster. For the act of oviposition the long ovipositor is spiralled back into the basal part of the gaster, while the gaster is bent down behind the first tergite. The space for the ovipositor is provided by the unusual extension of the median membranous part of the second tergite (and a part of the third) which bulges out, while the tip of the hypopygium is turned down and forward into a vertical position, to give a

lead to the tip of ovipositor. A similar position of the gastral segments is shown in Text-fig. 166 and was illustrated by Bischoff (1927 : 337, fig. 151).

The eggs are relatively large (Parker, 1924, gives 3 mm as their length in *Leucospis gigas*), whitish, curved, tapering to one end, as described in *L. gigas* by Fabre (1886) and by Parker (1924 : 264, pl. 1, fig. 1), in *L. affinis* by Graenicher (1906) and in *L. japonica* by several Japanese authors (Habu, 1962 : 169). Almost all these authors describe also the larval stages. The first instar larva (Parker, 1924 : 268–269, pl. 6, fig. 51; reproduced in Clausen, 1940 : 238) does not take any food at first but searches the host cell for competitors; in all cases, only one parasite larva survives and develops as an ectoparasite sucking the body fluids of the host larva. A later instar of the larva of *L. gigas* was also described and figured by Parker (1924 : 298–299, pl. 21, fig. 138), who classifies it as belonging to his group VI (pp. 332–333) of the Chalcidoid larvae. The larva of *L. hopei* was described and figured by Janvier (1933).

The development from the deposited egg to the emergence of the adult depends largely on temperature and takes about three weeks under optimal conditions in *L. japonica* (see Habu, 1962), and five weeks in *L. affinis* (Clausen, 1940 : 237), but may extend over many months in colder periods. In *L. hopei*, a South American species, Janvier (1933 : 298) found that only the feeding period of the larva takes four or five weeks.

The adults have well adapted protractile mouthparts to lick nectar from shallow and medium-deep blossoms, and may be encountered either on such flowers (many authors give lists of some of them, for example, Porter (1972) mentions 15 genera of plants in Florida) or near the nesting sites of their hosts.

In appearance some Leucospids, mainly the *Leucospis* of the American *texana*-group and of the closely related African *tricolor*-group, seem to mimic their hosts, the Anthidiine bees. The majority of the species, however, are quite unlike their hosts and imitate various wasps, apparently to acquire some protection against various enemies. In the wasp-like pattern they seem to follow certain 'model' Aculeates from the same area. Ducke (1910 : 460) records several South American wasps of the genera *Polybia*, *Stelopolybia*, *Parachartergus*, *Megacanthopus*, *Pachymenes*, *Montezumia* and *Polistes* and the bee *Odyneropsis foveata* Ducke in connection with some *Polistomorpha* species and with *Leucospis leucotelus* Walker. There are two more South American species very similar to the latter *Leucospis*, namely *L. propinqua* Schletterer and *L. imitans* sp. n. With the wide distribution of some Leucospids they usually imitate different 'model' wasps in different areas, which adds to their variation. It is possible that this fact accounts for various forms within certain species (e.g. *L. petiolata*, *L. histrio* in the Indo-Australian region, *L. ornata* and *L. tricolor* in Africa, to a lesser degree also the already mentioned South American *L. leucotelus*).

It is certainly interesting to see that those *Leucospis* which are known as parasites of solitary Eumenidae, do not imitate their hosts, but quite different species. For example, the Indo-Australian species of the *pediculata*-group look very much like some Odynerine wasps, but at least three species are known as

parasites of quite different-looking species of the genera *Calligaster* and *Xenorhynchium* (Eumenidae).

ZOOGEOGRAPHY. The Leucospidae are confined to the warmer countries of the world. Only a few species reach the temperate zones of America and Eurasia; only one species, *Leucospis affinis* Say, reaches as far north as southern Canada, *L. dorsigera* reaches up to about 50° N. in Central Europe, *L. hopei* to about 43° S. in South America, a few species reach southernmost Africa and southern Australia. The increase in the number of species with increasing warmth is best shown by the fact that there are only 6 species known from the whole of the U.S.A., whilst there are 16 species known from Mexico. The Leucospids are rather poorly represented on islands and even as large an island as Madagascar has (as far as is known) only three species (1 *Micrapion* and 2 *Leucospis*).

The fact that the New World Leucospidae have no species in common with the eastern hemisphere may possibly be connected with their rare occurrence in the temperate zones. Only few species could have had the chance of crossing from Asia to North America when the two continents were connected. This might explain, eventually, the close relationship of the small American *texana*-group, rather isolated in the American fauna, with the related Old World groups.

CLASSIFICATION WITHIN THE FAMILY. Four genera are recognised, viz. *Polistomorpha* Westwood, *Leucospis* Fabricius, *Neleucospis* gen. n. and *Micrapion* Kriechbaumer. *Polistomorpha* includes 7 species confined to Central and South America, *Leucospis* more than 100 species in all continents, *Neleucospis* one species in West Africa, *Micrapion* 11 species in Africa and Madagascar.

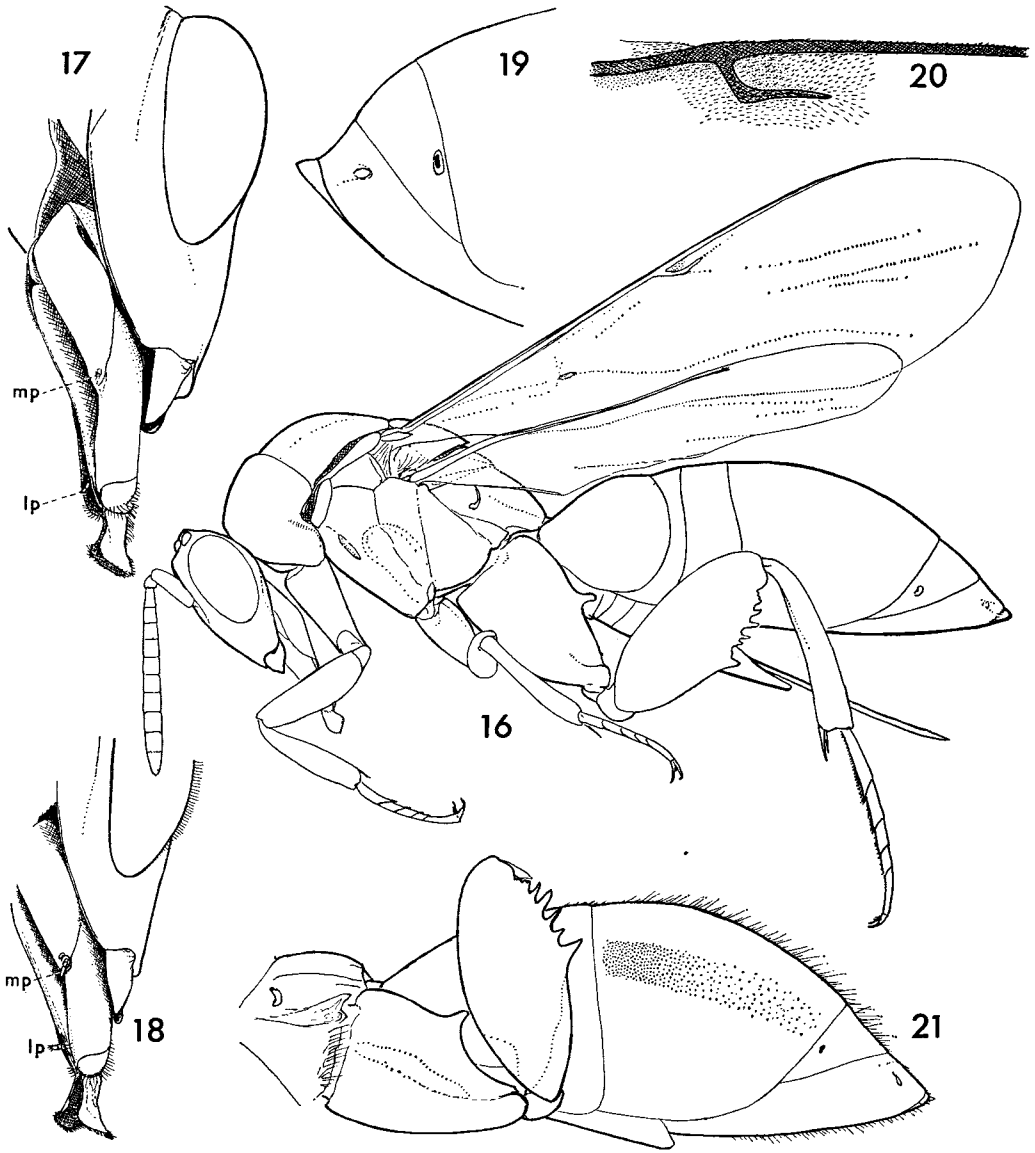
Polistomorpha seems to have retained the most primitive characters, except for the reduction of the palpi. On the other hand, *Neleucospis* and *Micrapion* seem to be apomorphic derivates of *Leucospis*, in various ways more specialized. In particular, *Neleucospis* is very close to *Leucospis*, but is separated by a distinct gap in several characters, mainly in the form of the head, scutellum, dorsellum, and of the female gaster. All three genera (except *Neleucospis*, in which the males are not yet known) show relatively high similarity in the males, including the aedeagus.

Marres Walker was excluded from the Leucospidae by Menon (1949) and is discussed at the end of this paper (p. 229).

In the past no serious effort was made to split *Leucospis* in smaller units, although several generic names were proposed for aberrant-looking species (*Exochlaenus*, *Metallopsis*) or based on characters which seemed outstanding when judged from a small sample of species (as were the names proposed by Girault for the Australian species). Their characters are discussed under the genus *Leucospis*.

KEY TO THE GENERA OF LEUCOSPIDAE

1 Maxillary palpi either absent (Text-fig. 17) or reduced to a short brush-like rudiment (Text-fig. 18), labial palpi very short; hind tibia perpendicularly truncate at apex, with outer spur distinctly longer than the inner (Text-figs 6, 27); ovipositor confined to ventral side of gaster, the latter spindle-shaped, its apex usually formed by conical epipygium (Text-figs 16, 20, 30, 32; exception *P. fasciata*, Text-fig. 24); C. and S. America . . . . . ***POLISTOMORPHA*** Westwood (p. 18)



FIGS 16–21. *Polistomorpha.* 16. *P. surinamensis,* ♀. 17. *P. conura,* head in oblique ventro-lateral view showing the labio-maxillary complex. 18. Ditto in *P. fasciata.* 19, 20. *P. nitidiventris.* 19, apex of gaster in ♀; 20, venation of fore wing. 21. *P. sphegoides,* propodeum, hind coxa, femur and gaster in ♀.

– Palpi conspicuous (Text-figs 1, 11, 119), maxillary ones 4-segmented, labial ones 3-segmented; hind tibia at apex more or less produced, often into distinct spine, outer spur usually reduced, always shorter than inner spur; ovipositor of varying length, usually distinctly turned upwards and forwards, with epipygium following the turning and never forming an apical conical cap 2

2 Lower margin of clypeus slightly arcuate, produced (Text-figs 15, 251); mandibles densely pubescent down to apex which is thin, more or less rounded, with small notch; in both sexes gaster strongly clavate, narrow basally, in ♀ fourth tergite produced backwards, unusually angulate (Text-figs 249, 256, 257), sixth tergite fused with epipygium; in ♂ dorsum of second tergite subquadrate to distinctly elongate (Text-fig 271); Africa and Madagascar . ***MICRAPION*** Kriechbaumer (p. 211)

– Lower margin of clypeus more or less bilobed, between lobes often with a median tooth (Text-figs 1, 7); mandibles stronger, bare at apex, lower tooth always rather strong; gaster much less clavate than in alternate; in ♀ fourth tergite posteriorly straight or nearly so, sixth tergite distinctly separated from epipygium (Text-fig. 4); in ♂ dorsum of second tergite always short, transverse . . . 3

3 Head in dorsal view longer than breadth of frontovertex, lateral ocellus less than its diameter from eye (Text-fig. 244); gaster in ♀ (Text-fig. 243) in dorsal view formed by narrower first and fourth tergites and a large oval unsegmented carapace; short and nearly straight ovipositor hidden under apex of carapace; scutellum with cross-carina anteriorly; dorsellum nearly as long as broad, horizontal, with translucent bidentate lamina; ♂ not known; Africa . ***NELEUCOSPIS*** gen. n. (p. 210)

Head more transverse in dorsal view, frontovertex broader, ocellus more removed from eye; gaster in ♀ with ovipositor (although sometimes short) always visible from above, as well as epipygium; scutellum without cross-carina; dorsellum usually transverse, otherwise; cosmopolitan . . ***LEUCOSPIS*** Fabricius (p. 28)

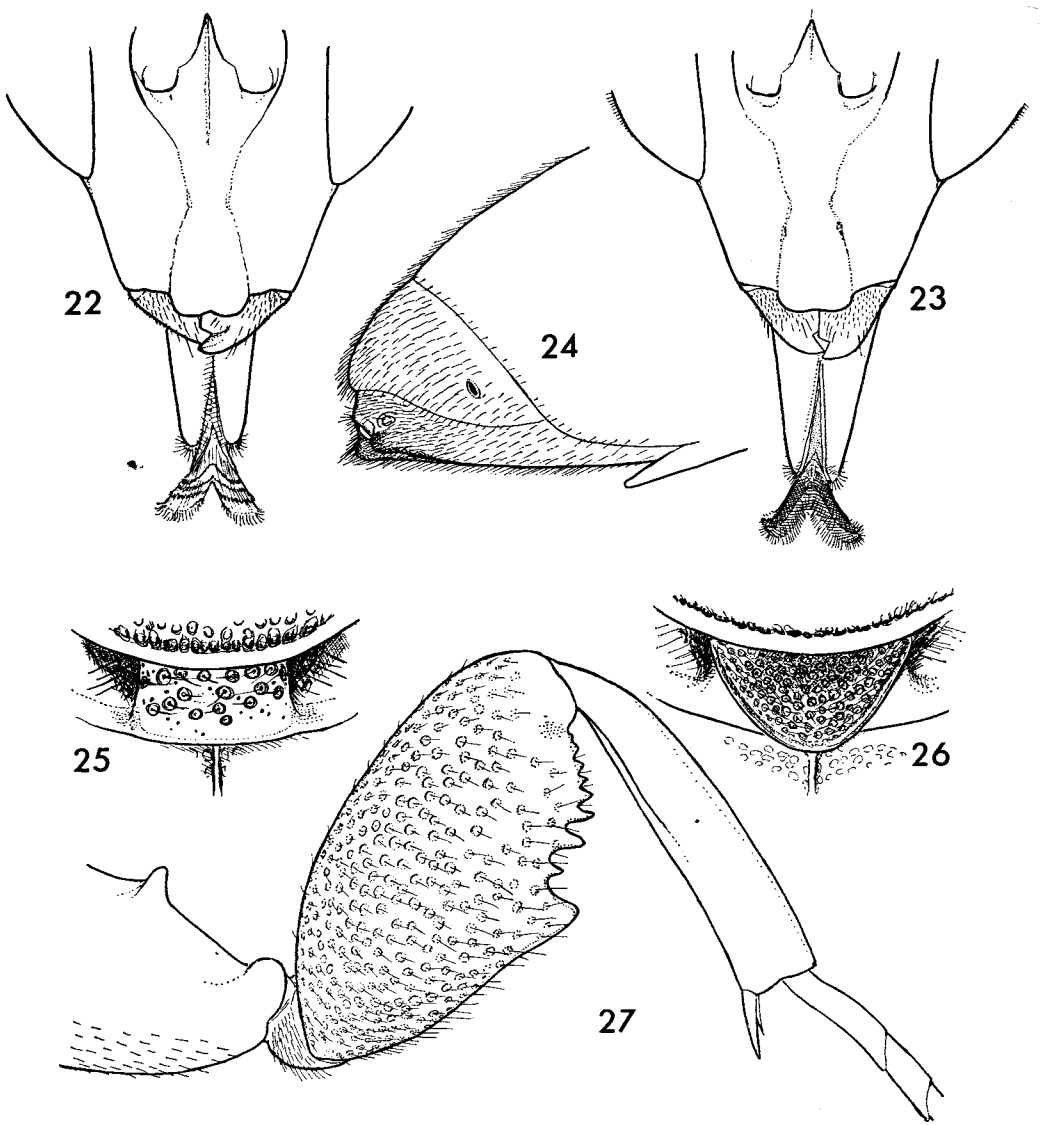
POLISTOMORPHA Westwood

Polistomorpha Westwood, 1839 : 265 [as subgenus of *Leucospis* Fabricius]. Type-species: *Leucospis* (*Polistomorpha*) *surinamensis* Westwood, by monotypy.

Förster (1856 : 21) and Walker (1860 : 22) treated the original subgenus *Polistomorpha* as a genus and so did all subsequent authors. Not many of them, however, had a good knowledge of it and even Schletterer (1890) knew only one species and Weld (1922) probably did not examine any species, for *Leucospis bulbiventris* Cresson, which she provisionally attributed to *Polistomorpha*, has nothing to do with this genus. On the other hand, Westwood (1874) knew three species well and Ducke (1906) knew four species. The latter author described some very useful characters, although he did not use them in his key to the species. His key was used later on by Mani (1937 : 289–290), who added two species from India; these proved, however, to be *Leucospis*.

Polistomorpha is close to *Leucospis* and apart from the rudimentary palpi and the female gaster, with ovipositor confined to its ventral side, all the other distinguishing characters (included in the following paragraph) are more of quantitative than qualitative nature.

Colours of body non-metallic ochreous-yellow with red, brown or black. Pilosity on face reduced and mostly absent on ventral parts of eyes. Clypeus much higher than broad (Text-figs 22, 23), its sides weakly diverging downwards, lower margin produced and mostly bilobed, medially subtruncate or emarginate, without median tooth. Genae long and in facial view forming a



FIGS 22–27. *Polistomorpha*. 22. *P. atrata*, face with mouthparts. 23. *P. surinamensis*, ditto. 24, 25. *P. fasciata*. 24, gastral apex of ♀; 25, dorsellum. 26. *P. conura*, dorsellum. 27. *P. nitidiventris*, hind leg.

distinct angle with outer outline of eyes; subocular suture lacking. Mouth narrow, mandibles weakly curved. Palpi rudimentary; labial ones 3-segmented, each segment subquadrate; maxillary ones either missing or indicated by a scar, or reduced to a tiny 3-segmented brush half as long as breadth of ocellus (Text-figs 17, 18). Pronotum short, without any cross-carinae although the premarginal sometimes indicated by a swelling; sides in dorsal view emarginate; lateral panel with relatively sharp lower corner, hind margin deeply emarginate at spiracle. Mesoscutum with fine linear notauli anteriorly, vestiges of parapsidal furrows at postero-lateral corners not conspicuous. Propodeum in both sexes long, medially elevated, hind margin of median part more or less produced and usually hardly broader than the emarginate gap separating it from the tooth-like postero-lateral corner. Dorsal edge of hind coxa broad, convex, always without piliferous punctures, posteriorly with digitiform tooth. Hind femur often slender, basal tooth always the largest and situated in or beyond middle (Text-figs 16, 21, 27). Hind tibia perpendicularly truncate at apex, outer spur longer than inner one; outer ventral carina not reaching apical half of tibia. Fore-wing: stigmal vein about as long as or shorter than its uncus (Text-fig. 20) which is subparallel to margin; apical processus lacking. Gaster in dorsal view not very different in the two sexes; ovipositor sheaths subhorizontal, nearly straight, confined to ventral side, not up-turned; consequently in both sexes sixth (spiracle bearing) tergite longest in the median line.

BIOLOGY. Hosts of two species are the bees of the genus *Euglossa* Latreille (Apidae), i.e. insects of quite different appearance from the Polistine wasps which *Polistomorpha* species mimic.

DISTRIBUTION. Central and South America (7 species). The Indian species placed in *Polistomorpha* by Mani (1935; 1936; 1938) belong to *Leucospis* Fabricius.

KEY TO THE SPECIES OF *POLISTOMORPHA*

1 Dorsellum quadrangular (Text-fig. 25), transverse, beset with coarse piliferous punctures similar to those on scutellum; in ♀ epipygium in dorsal view bidentate (Text-fig. 24); maxillary palpi rudimentary but present, 3-segmented (Text-fig. 18); pronotum with median triangular black spot, body predominantly testaceous, gaster usually with conspicuous alternating testaceous and brown bands
fasciata Westwood (p. 22)

– Dorsellum more or less triangular (Text-fig. 26), densely hairy and finely punctured; in ♀ epipygium not bidentate; maxillary palpi reduced to a scar (Text-fig. 17); pronotum without median triangular spot; body either predominantly testaceous or black but gaster not conspicuously banded 2

2 Dorsellum carinately margined; body predominantly testaceous, with black or brown pattern; impunctate upper part of hind coxa finely cross-striate . . . 3

– Dorsellum not carinately margined; body often predominantly black; upper part of hind coxa striate or smooth 6

3 Sixth tergite in ♀ conically overlapping epipygium which is confined to ventral side and is not visible from above (Text-fig. 30); in ♂ sixth tergite in profile with distinct boss (Text-fig. 31) . . . . . ***conura*** sp. n. (p. 22)

– Gaster otherwise, in ♀ epipygium not concealed under sixth tergite, so that two segments are visible from above behind fifth (largest) tergite; ♂ unknown . . 4

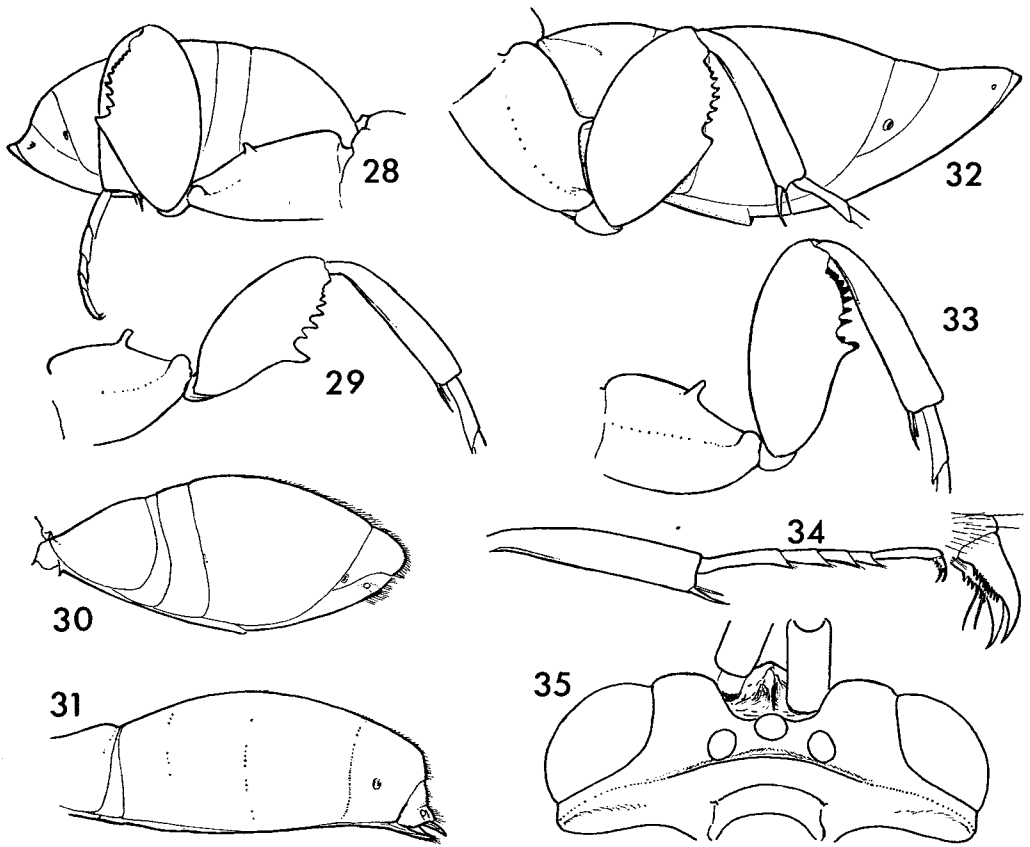
4 Hind femur slender (Text-fig. 16), about twice as long as broad, outer ventral carina of hind tibia confined to basal third; scutellum with dense and fine puncturation similar to that on mesoscutum and dorsellum; apex of gaster conical (Text-fig. 16)
surinamensis (Westwood) (p. 25)

– Hind femur broader, at most 1·8 times as long as broad; scutellum with conspicuously coarser and less dense puncturation than mesoscutum and dorsellum; apex of gaster otherwise 5

5 Outer ventral carina of hind tibia reaching middle (Text-fig. 27); in ♀ fifth tergite very sparsely punctured and about 3 times as long as remaining apical part (Text-fig. 28) which is bluntly acuminate, with epipygium notably shorter than sixth tergite (Text-fig. 19), medially rather sharply carinate; stigmal vein of fore wing arising at very broad angle (Text-fig. 20); propodeal plicae high, distinct
nitidiventris Ducke (p. 26)

– Outer ventral carina of hind tibia confined to basal third; in ♀ fifth tergite rather densely punctured, dull, only twice as long as apical part (Text-fig. 32) which is conical, epipygium slightly upturned and longer than sixth tergite, latter bluntly keeled medially; stigmal vein of fore wing at more acute angle; propodeal plicae blunt . . . . . ***femorata*** sp. n. (p. 24)

6 Hind coxa dorsally smooth; hind tibia mainly black; dorsellum apically rounded, narrow interspaces between fine punctures smooth and shiny; scutellum sublaterally and posteriorly with smooth interspaces . . . . . ***sphegoides*** Walker (p. 26)



FIGS 28–35. *Polistomorpha*. 28. *P. nitidiventris*, hind leg and gaster in ♀ (holotype). 29–31. *P. conura*. 29, hind leg; 30, gaster of ♀ in lateral view; 31, gaster of ♂. 32. *P. femorata*, gaster of ♀ and hind leg. 33. *P. atrata*, hind leg. 34, 35. *P. sphegoides*. 34, hind tibia and tarsus, with claws more magnified, separately; 35, head in dorsal view.

– Hind coxa above distinctly transversely striate; all tibiae testaceous; dorsellum dull, extremely densely punctured, dorsally flat and rather abruptly edged posteriorly and laterally; scutellum sublaterally dull, with hardly any interspaces between dense punctures . . . . . ***atrata*** sp. n. (p. 27)

Polistomorpha fasciata Westwood

(Text-figs 18, 24, 25, 247, 248)

Polistomorpha fasciata Westwood, 1874 : 134, pl. 25, fig. 3, ♀. LECTOTYPE ♀ (here designated), BRAZIL: 'Amazonas' (UM, Oxford) [examined].

Polistomorpha nigromaculata Cameron, 1904 : 96, ♂. LECTOTYPE ♂ (here designated), PANAMA (BMNH) [examined]. **Syn. n.**

The apparently unique original specimens of *fasciata* and *nigromaculata* are accepted as lectotypes.

The species stands rather apart from all the other known species of the genus, differing mainly by the quadrangular dorsellum (Text-fig. 25) and preserved rudiments of the maxillary palpi (Text-fig. 18).

BIOLOGY. Reared from cells of *Euglossa ignita* Smith and *Euglossa* sp., Apidae.

DISTRIBUTION. Panama, Colombia, Trinidad, French Guiana, Brazil, Ecuador.

MATERIAL EXAMINED.

Type data given in synonymy.

COLOMBIA: Gorgona Island, vii.1924, 1 ♂ (*L. E. Cheesman*) (BMNH). TRINIDAD: 10.vi.1933, 1 ♀ (*D. Vesey-FitzGerald*) (BMNH); Arena Forest, 30.iv.–1.v.1945, ex *Euglossa ignita*, 1 ♀, 1 ♂ (*R. G. Donald*) (USNM); St Augustine, 1.v.1945, ex *Euglossa* sp., 1 ♀ (*Donald*) (USNM); 7.vi.1949, 1 ♂ (*D. L. Mbotela*) (BMNH). FRENCH GUIANA: Saint Laurent de Maroni, 2 ♀ (MNHN, Paris). BRAZIL: State Pará, Alter de Chão nr Santarem, 1 ♀ (*Bates*) (BMNH). ECUADOR: Guayaquil, 1920, 1 ♀ (*Buchwald*) (TM, Budapest); 1930, 1 ♀ (BMNH).

Polistomorpha conura sp. n.

(Text-figs 6, 17, 26, 29–31)

[*Polistomorpha surinamensis* (Westwood); Westwood, 1874 : 133–134, pl. 25, fig. 2. Misidentification.]

♀. 11·0–15·5 mm. Ochreous-yellow with black and brown markings; black are: transverse band on vertex across ocelli, inner edge of mandibles, two transverse submedian spots on pronotum (usually connected), median and sublateral longitudinal streaks on mesoscutum not reaching posterior margin, broad triangle on scutellum, middle of propodeum and teeth of hind femur apically; darker or lighter brown are: genal streak below eye, cross-band on occiput, indistinct spots in front of pronotal maculae, tegulae, dorsellum basally and posterior metanotal margin, lateral margin of propodeum and gaster except, usually, for paler bands at apex of first tergite and base of fifth tergite. Pubescence mainly brown, darker on black spots. Wings yellowish brown, veins brownish.

Head slightly narrower than pronotum posteriorly, in dorsal view about 2·5–2·7 times as broad as long, with temples distinct though very short. Occipital carina strong and complete down to lower third of eye, sharp and shiny laterad of ocelli; vertex densely punctured; POL: OOL as 13 : 12, ocelli large, their triangle in ratio 2·1–2·4 : 1. Frontal protuberances low but distinct, subrectangular; scrobal carina weak or indistinct. Head in facial view fully 1·1 times as broad as high; face flat but interantennal area conspicuously convex, sharply carinate only above; rugulose puncturation dense, pubesence indistinct, beneath extremely short. Relative measurements: height of head 80, width of frontovertex 49, scrobes 31, lower face width 41, height 45, eye 48 : 34, upper orbit shortly subemarginate; malar space 22·5, width of mouth 30. Clypeus much higher than broad although dorsally vaguely delimited, its sides feebly diverging, lower margin rounded laterally, subemarginate in middle, distinctly produced. Scapus as long as malar space. Flagellum broadly filiform, combined with pedicellus about 1·3 times as long as breadth of head; pedicellus slightly shorter than following segment (8 : 9); all flagellar segments moderately oblong, second about 1·4, eighth fully 1·1 times, clava 2·5 times as long as broad, subacuminate.

Pronotum short (about 2·3 : 1), strongly sloping, except near hind margin at which there is a slight swelling; sides strongly converging forwards, concave in middle; rather densely clothed with hairs which are longer than on mesoscutum, finely punctured; lateral panel smooth at the nearly rectangular lower corner. Punctures on mesoscutum less fine but still about twice as fine as in *P. fasciata*; vestige of parapsidal furrow at hind corner in form of diverging depression at lateral margin. Scutellum about 1·2 times as broad as long, moderately convex, apical margin bordered by impressed row of punctures; on disc puncturation coarser than on mesoscutum, submedially with interspaces generally about one-third as broad as punctures. Dorsellum bearing distinct sublaminate carina delimiting dorsal triangle which is rounded at apex, inside of triangle hairy and densely punctured; postero-lateral flanks below carina, smooth, Propodeum usually with strong plicae and median carina, median part strongly raised, 0·83 times the length of scutellum. Fore femur 3·5 times, mid femur 3·4 times as long as broad. latter nearly parallel-sided. For hind leg see Text-fig. 29. Hind coxa on dorsal impunctate part finely transversely strigose. Fore wing: hairs below stigma slightly shorter than width of stigmal vein.

Gaster (Graham, 1969 : 17, fig. 21, as *P. surinamensis* [misidentification]) hardly longer than head plus thorax combined, densely punctured, punctures rarely confluent but mostly not lengthened, interspaces only laterally on first tergite broader than punctures. First tergite about 1·1 times as long as broad, with large elongate-triangular basal fovea, sides diverging, nearly straight. Third, fourth and basal two-thirds of fifth tergite with blunt median carina bearing mostly a fine groove. Pubescence on fifth tergite basally subdecumbent, short, apically semi-erect and much longer, dense. Sixth tergite the last one visible from above, very densely covered with longish pubescence, bluntly conical, about 0·6 times as long as broad at its base, in lateral view (Text-fig. 30) rounded at apex and overlapping epipygium which is confined to ventral side, distinctly exceeding tip of ovipositor. Hypopygium slightly behind middle of gaster.

♂. 14–15 mm. In colour similar to ♀ but gaster more regularly banded, with four darker bands apart from that on first tergite, all four medially slightly angularly produced backwards suggesting margins of tergites. Fifth tergite posteriorly with rounded boss which appears subconical dorsally, posterior outline of boss nearly in one subvertical line with epipygium (Text-fig. 31). Middle to penultimate sternites slightly depressed, slightly transverse, last sternite shallowly depressed along middle (in two specimens with a small hole in four-fifths of sternite), longer than broad, sides slightly converging, apex subtruncate and waved in middle, corners rounded. Antenna little different from ♀, last flagellar segment subquadrate, clava more acuminate, flagellum with sparse thin semi-erect hairs.

BIOLOGY. Reared as parasite of solitary bees of the genus *Euglossa* Latreille.

DISTRIBUTION. Ecuador, Guayana, French Guiana, Brazil, Bolivia, Peru.

Holotype ♀, PERU: Loreto, Atalaya, 29.iii.1954 (*J. M. Schunke*) (BMNH).

Paratypes. 'CENTRAL AMERICA': ex *Euglossa* sp., 1 ♀ (USNM). ECUADOR: Coca, v. 1965, 1 ♀ (*L. Peña*) (CU, Ithaca). GUYANA: Tumatumari, vi. 1923, 1 ♀ (*F. X. Williams*) (BBM, Honolulu); Kamakusa, 1 ♀ (*H. Lang*) (USNM); Tuheit Trail, Kaieteur, 1. and 3.ix.1937, 3 ♂ (*Richards & Smart*) (BMNH). FRENCH GUIANA: Cayenne, 1 ♀ (MHN, Geneva). BRAZIL: 'Amazonas', 1861, 1 ♀ (*Bates*) (UM, Oxford); without data, 1 ♀ (BMNH). BOLIVIA: Prov. Cochabamba, Yungas Esp. Santo, ix.–xi. 1949, 1 ♀ (*L. Peña*) (MCZ, Cambridge); without data, 1 ♀ (BMNH).

I cannot suppress some doubts whether the male described above really belongs to this species and not to the closely related and similar *P. surinamensis* (Westwood). Both species are similar in colour, and form of dorsellum, but the males have, like the females of *P. conura* sp. n. relatively less fine and denser puncturation, particularly on the scutellum. They also show an indication of a boss on the sixth tergite, which is so characteristic of the female, but have rather weak propodeal plicae like *P. surinamensis*, the male of which remains unknown to me.

I find also a slightly puzzling problem in the females which I attribute to *P. conura*. They all seem to be conspecific but some show weaker propodeal plicae and the Amazonas and Cayenne specimens deviate also in the form of the gastral apex. Whilst in all the other specimens it is as described above, in these specimens the epipygium very slightly exceeds the apex of the sixth tergite so that it is not completely hidden in dorsal view.

Polistomorpha femorata sp. n.

(Text-fig. 32)

♀. 15·5 mm. Body mainly testaceous with brown to blackish markings very similar to those of *P. surinamensis*, except that the fifth tergite has, apart from the apical brownish band, another sub-basally; also wings darker due to slightly longer brown pilosity which is very similar to that of *P. conura* sp. n.

Head distinctly narrower than pronotum posteriorly (0·9 : 1·0), dorsally about 2·5 times as broad as long, temples slightly broader than in *P. conura*. Occipital carina between ocelli stout, arched forwards, strigose; vertex laterad of ocelli dull but broad area without coarse punctures; ocelli not large, their triangle about 2·3 : 1. Face very finely punctured; convex interantennal area distinctly keeled. Relative measurements: height of head 84, width of frontovertex 51, of scrobes 32, lower face width 42, height 44, eye 47 : 33, upper orbit not distinctly emarginate; malar space 27, width of mouth 32. Lower margin of clypeus distinctly produced, medially emarginate and depressed. Scapus shorter than malar space as 25 : 27; flagellum similar to *P. conura* but first flagellar segment twice as long as broad, about 1·5 times as long as pedicellus.

Pronotum medially nearly regularly convex; sides emarginate in middle; lower corner about 70 degrees. Puncturation of thoracic dorsum as in *P. conura*, finer than in *P. surinamensis*. Scutellum 1·35 times as broad as long; axillar furrows distinctly converging forwards, otherwise as in *P. conura*. Dorsellum dorsally densely punctured and hairy, sharply carinate but apex truncate, with carina lowered medially so that the shape is more crescentic, not triangular. Propodeum only 0·58 the length of scutellum, median carina strong but plicae obliterated as in *P. surinamensis*; postero-lateral corners nearly reaching level with apex of median carina. Fore femur stout, 2·9 times as long as broad; mid femur stout basally, tapering to apex. Dorsal

part of hind coxa with distinct striation which becomes obliterated in lower half of depression. Hind femur unusually broad (Text-fig. 32; hence the name), broad basal tooth followed by about eight small teeth; hind tibia with outer ventral carina confined to basal one-third. Fore wing: hairs below stigma slightly longer than width of stigmal vein.

Gaster with median keel distinct except on first tergite, only slightly obliterated at apex of fifth and on sixth tergite, but distinct as a smooth blunt keel on epipygium. Puncturation mostly dense but less so and coarser on paler cross-band on fifth tergite; first tergite mostly smooth, with broad median cross-band of sparse fine punctures. First tergite hardly longer than broad, basal fovea short, transverse, shallow; disc strongly convex. Fifth (broadest) tergite 1·75 times as long as the first, about 1·1 times as long as broad, more than four times as long as sixth tergite; latter 2·5 times as broad as long, its anterior and posterior margins parallel. Epipygium nearly as long as broad, conical, apex elevated (Text-fig. 32), its long ventral outline convex; cerci low, small, in four-fifths of segment. Hypopygium reaching middle of gaster.

♂. Unknown.

BIOLOGY. Unknown.

Holotype ♀, BRAZIL: Pará (BMNH).

P. femorata sp. n. is very similar to *P. surinamensis* (Westwood) (for redescription see Schletterer, 1890 : 295–297) and *P. conura* sp. n. It differs from all species of the genus mainly by the unusually broad hind femora.

Polistomorpha surinamensis (Westwood)

(Text-figs 16, 23)

Leucospis (*Polistomorpha*) *Surinamensis* Westwood, 1839 : 265–266, pl. 4, fig. 5, ♀. LECTOTYPE ♀ (here designated), SURINAM (MNHU, Berlin) [examined].

There are known now several species close and very similar to *P. surinamensis*, so that it is not possible to find out which of the earlier records really concern this species, except where the original material can be re-examined. Only Schletterer (1890 : 295–297) redescribed *P. surinamensis* from the then unique type (now regarded as lectotype, as Westwood did not specify how many specimens he had). He mentioned also another specimen in the Hamburg Museum, but that was destroyed during the last war. It is not sure which species Ducke had (1906) and Westwood himself redescribed and figured in 1874 another species as *surinamensis* (see *P. conura* sp. n.), mistaken for the type also by Graham (1969 : 17).

The male is still unknown.

BIOLOGY. Host unknown. Like several other species of the genus, *P. surinamensis* mimics some Polistine wasps, but that does not necessarily mean that these wasps are its hosts.

DISTRIBUTION. Guyana, Surinam, French Guiana, ? Brazil.

MATERIAL EXAMINED.

Type data given in synonymy.

GUYANA: Essequibo River, Moraball Creek, 4.xi.1929, 1 ♀ (*Oxf. Univ. Exped.*) (BMNH). FRENCH GUIANA: Tollinche, 1 ♀ (*Le Moult*) (MNHN, Paris).

Polistomorpha nitidiventris Ducke

(Text-figs 19, 20, 27, 28)

Polistomorpha nitidiventris Ducke, 1906 : 165–166, ♀. LECTOTYPE ♀ (here designated), BRAZIL: State Para, Obidos (MP, Belém) [examined].

Ducke did not specify how many specimens he had so I designate the orginal female, kindly sent to me for examination by Mr R. Arlé, as lectotype.

P. nitidiventris is a good species but I have not seen any other specimens. It has rather short, mainly paler brownish body, with sparsely punctured gaster, as stressed by Ducke in the specific name. It should be readily recognizable from my key, but as existence of some unknown species cannot be excluded, I give here a few more characters in addition to those mentioned in the key and in Ducke's original description.

♀. Blackish markings confined to vertex, occiput, pronotum and mesoscutum, scutellum being immaculate dark testaceous and gaster posteriorly and hind femora externally being only darker brown. Pronotum with only two bands: a weaker and narrower one at anterior margin, distinctly interrupted medially, but here indicating oblique communications towards middle of the second cross-band which is situated just behind middle, not interrupted medially, not reaching lateral margin. Occipital carina as in *P. conura*. Head in facial view 1·16 times as broad as high. Interantennal (and supraclypeal) area moderately convex, smooth median keel nearly percurrent. Lower margin of clypeus medially hardly emarginate, nearly flat. Relative measurements: height of head 80, width of frontovertex 50, scrobes 31, lower face 45, its height 42, eye 49 : 35, upper orbit not distinctly emarginate; malar space 25, width of mouth 30, length of scapus 22, flagellum plus pedicellus combined 102, i.e. 1·12 times the breadth of head. First and second flagellar segments subequal in length, first about 1·5 times as long as broad. Antenna similar to *P. conura*, which shows also similar thoracic characters, except for the following. Scutellum about 1·3 times as broad as long, anteriorly slightly more coarsely and less densely punctured than in *P. conura*. Propodeum shorter, medially 0·6 the length of scutellum, plicae distinctly arched, median area (between them) 2·2 times as broad as long medially. Fore femur 2·8 times as long as broad, mid femur distinctly swollen towards base. For gaster see Text-figs 16, 28; in general, as the whole body, less densely but more distinctly punctured: interspaces dorsally on first and fourth tergite about as broad as punctures, laterally and partly near hind margin on first tergite and on most of fifth tergite distinctly to much broader than punctures.

♂. Unknown.

BIOLOGY. Unknown. Ducke (1906 : 166) collected this species on blossoms of *Paullinia pinnata* L.

DISTRIBUTION. Brazil (Pará).

Polistomorpha sphegoides Walker

(Text-figs 21, 34, 35)

Polistomorpha sphegoides Walker, 1860 : 22–23, ♀. LECTOTYPE ♀ (here designated), BRAZIL: Sao Paulo [d'Olivença] (BMNH) [examined].

This is a large black species which should be easily recognizable from the key. It was redescribed and figured by Westwood (1874 : 134, pl. 25, fig. 1). The only similar species is *P. atrata* sp. n. The male is still unknown.

BIOLOGY. Host unknown. The species mimics the wasp *Stelopolybia angulata* (Fabricius), as already noted by Ducke (1906 : 164).

DISTRIBUTION. Brazil, Peru.

MATERIAL EXAMINED

Type data given in synonymy.

BRAZIL: 'Amazonas', 1861, 1 ♀ (*Bates*) (UM, Oxford); Obidos, iii. 1908, 1 ♀ (*Ducke*) (MNHN, Paris); without data, 1 ♀ (TM, Budapest). PERU: Cuzco, Atalaya, Rio Tambo, 19.iii.1954, 1 ♀ (*J. M. Schunke*) (BMNH).

Polistomorpha atrata sp. n.

(Text-figs 22, 33)

♀. 14 mm. Body mainly black or brownish black with following parts testaceous (darker dorsally, paler ventrally): antenna except pedicellus and following segment, vaguely bottom of notaular furrows and narrowly sides of mesoscutum, tegulae, subalar area and metapleurum, first tergite beneath and narrowly along hind margin, epipygium, hind coxa beneath, a line anteriorly on fore femur, mid femur except dorsally, hind femur except broadly on disc, all tibiae and tarsi. Wings yellowish brown.

Head only as broad as pronotum anteriorly, dorsally about 2·5 times as broad as long, temples distinct but narrow. Occipital carina complete, sharp, smooth; vertex densely punctured, smooth areas laterad of each ocellus small; ocellar triangle fully 2·1 : 1, POL : OOL as 13 : 14. Head in facial view 1·06 times as broad as high; convex interantennal area bluntly ridged in middle. Relative measurements: width of head 90, frontovertex 55, width of scrobes 36, lower face 52, its height 51, eye 56 : 35, inner orbit not distinctly emarginate; malar space 27, length of scape 25, width of mouth 38. Lower margin of clypeus bilobed, medially emarginate and depressed. A scar instead of maxillary palpi. Scapus about 2·2 times as long as broad; pedicellus oblong, slightly shorter than second flagellar segment; first flagellar segment the longest, about 1·6 times as long as broad, the eighth subquadrate, clava 2·3 times as long as broad.

Pronotum swollen before hind margin but without indication of a carina, from swelling towards head strongly declivous; hind margin obtusely subincised medially, sides slightly concave, strongly converging; surface densely finely punctured, but behind and on swelling more coarsely and less densely punctured; lateral panel strongly depressed behind middle, lower corner subrectangular. Mesoscutum strongly convex along median line and here slightly shiny, as pronotum posteriorly moderately coarsely and much less densely punctured than elsewhere; notaular furrows indicated by broad percurrent depressions. Scutellum strongly convex, on disc with narrow smooth interspaces as on disc of mesoscutum, 1·3 times as broad as long, very narrow hind margin set off by crenulate groove; pilosity dense, black, but very thin, not very conspicuous. Dorsellum except for separated smooth postero-lateral low corners dull, densely punctured and pilose, sculptured area subtriangular, forming a raised dorsal plain delimited by subvertical slopes. Propodeum medially fully twice as long as dorsellum; median carina and plicae high; hind margin of median area not reaching far behind level of postero-lateral corners. Pubescence of thoracic pleura, as on dorsum, much thinner than in *P. sphegoides*; horizontal groove delimiting subalar area very deep; mesepisternum: upper convex part dull, densely punctured, punctures extending down on a neck between deep femoral depression and long-oval pronotal depression (this neck extensively smooth in *P. sphegoides*) and then down to mid coxa. Mid femur broadened basally as in *P. sphegoides*. Hind coxa with distinct transverse striation on impunctate dorsal black part. Hind femur moderately stout (Text-fig. 33), basal tooth long and slender, subapical teeth on a lobe; externally surface

coarsely but not very densely punctured, interspaces partly broader than punctures and slightly dull due to microscopical longitudinal reticulation. Hind tibia with outer ventral carina confined to basal two-fifths. Fore wing: uncus longer than true stigmal vein.

Gaster fully 1·2 times as long as head plus thorax combined, with median keel distinct only on third, fourth, basal half of fifth tergite and on epipygium. Puncturation in general moderately dense and not very fine, on central part of fifth tergite fairly coarse and sparse; first tergite with smooth elongate-triangular basal fovea, posteriorly very distinctly and rather densely punctured, on flanks with a mixture of sparse fine and coarser punctures. Pilosity blackish brown, basally on gaster less conspicuous, on fifth tergite basally very dense and rather uniformly short, more posteriorly double, consisting of shorter and of abundant longer, more erect hairs, all much denser than in *P. sphegoides*. Fifth tergite 1·7 times as long as the first, about 1·3 times as long as broad, nearly four times as long as sixth tergite medially; hind margin of fifth tergite slightly angulately emarginate. Epipygium nearly twice as broad as long, slightly compressed from sides, not elevated; rudiments of cerci low but large, long-oval, slightly behind middle of epipygium; ventral outline of epipygium slightly convex, tip of sheaths very slightly exceeding epipygium. Hypopygium reaching three-fifths along gaster.

♂. Unknown.

BIOLOGY. Unknown.

Holotype ♀, PANAMA: Curiche, Choco, Colon, viii.-ix.1967, Malaise trap (*G. B. Fairchild*) (EM, East Lansing).

Superficially *P. atrata* is very similar to *P. sphegoides*, but in many morphological characters probably closer to *P. nitidiventris* Ducke, a species mainly brownish yellow in colour.

LEUCOSPIS Fabricius

Leucospis Fabricius, 1775 : 361. Type-species: *Leucospis dorsigera* Fabricius, by monotypy.

Coelogaster Schrank, 1780 : 303–306, pl. 8, fig. 4. Type-species: *Leucospis dorsigera* Fabricius, by subsequent monotypy (first subsequently included species).

Leucopsis Olivier, 1792 : 531. [Incorrect subsequent spelling.]

Leucopsis Duméril, 1823 : 167–168. [Unjustified emendation.]

Leucaspis Burmeister, 1835 : 47. [Unjustified emendation.]

Metallopsis Westwood, 1839 : 264, 265 [as subgenus of *Leucospis* Fabricius]. Type-species: *Leucospis cayennensis* Westwood, by monotypy.

Exochlaenus Shipp, 1894*b* : 245. Type-species: *Leucospis anthidioides* Westwood, by original designation.

Parexoclaenus Girault, 1915 : 355. Type-species: *Parexoclaenus vespoides* Girault, by original designation.

Exoclaenoides Girault, 1915 : 356. Type-species: *Exoclaenoides uncinctus* Girault, by original designation.

Epexoclaenoides Girault, 1915 : 357. Type-species: *Epexoclaenoides bicinctus* Girault, by original designation. **Syn. n.**

Under *'Coelogaster'*, Schrank (1780) described and figured a Leucospid and his one-word name has been regarded as establishment of a genus without species, although his expression 'Gattung' for the taxon at that time could mean what we call a species nowadays. This suspicion seems to be well-founded by Schrank's subsequent statement (1781 : 307) that his species (*Coelogaster*) was already described before him by Fabricius as *Leucospis dorsigera*, although he added some doubts as to the specific identity. The name *Coelogaster* has, however, been treated as a

generic name ever since, especially after Schrank used it again for his species as '*Coelogaster passavianus*' (1782 : 296). The latter statement was taken as a subsequent reference and *C. passavianus* Schrank, 1782, regarded as the type-species of *Coelogaster* Schrank, 1780, by Gahan & Fagan (1923 : 38), who overlooked that the first species mentioned (by Schrank, 1781 : 307) as belonging to the genus (if we take it as such), was *L. dorsigera* Fabricius. In any case this is of minor interest only, because already Schrank himself (1782 : 296), and rightly so, put his *Coelogaster passaviensis* in synonymy with *L. dorsigera*.

The two grammatical emendations of the name *Leucospis* by Duméril and Burmeister were used by some subsequent authors but they are invalid under the *Code*.

Metallopsis was erected as a subgenus and virtually never raised to generic rank. It is mentioned under the American *cayennensis*-group (p. 92) where its type-species belongs.

Similarly *Exochlaenus* (misspelt *Exoclaenus* by Ashmead (1904*a* : 247) and by some subsequent authors) and the remaining three names of Girault were proposed for species showing some unusual characters but without real knowledge of the related and intermediate species. In Girault's case the names were proposed for the few Australian species known to him. Their characters are discussed together with the subdivision of the genus (p. 31) and under the species-groups in question, e.g. *Exoclaenoides* with the *australis*-group (p. 190), *Epexoclaenoides* (misspelt *Epexochlaenoides* by Mani (1936; 1937)) with the *pediculata*-group, *Exochlaenus* with the *hopei*-group. *Exochlaenus*, *Parexoclaenus* and *Exoclaenoides* were put in synonymy with *Leucospis* by Weld (1922 : 3, 5), although still listed as valid by Gahan & Fagan (1923). Only *Epexoclaenoides* has been regarded as valid after Weld's paper (1922 : 4, 35). Its type-species, *E. bicinctus* shows an extreme form of the denticulation of the hind femur, with the large basal tooth followed by a comb of numerous minute and regular teeth. This feature (Text-figs 225, 233) is developed in several species but several other, undoubtedly very close species show various intergrades towards the common form of teeth, seen for example in the common European *L. dorsigera* Fabricius, the type-species of the genus.

Colours non-metallic or metallic. Pilosity on face mostly dense, including eyes. Clypeus more or less trapezoidal or subtriangular, often transverse, its lower margin always emarginate and usually (always in non-American species) with median tooth. Genae of varying length, subocular suture often slightly indicated. Mandibles moderately curved, with distinct lower tooth separated from upper edge; their apex bare. Maxillary palpi 4-segmented, labial ones 3-segmented, well developed. Pronotum with or without cross-carinae, with or without cross-depression. Scutellum without cross-carina. Dorsellum rounded dorsally or bituberculate, posteriorly often carinate, sometimes bidentate. Propodeum of varying length, medially very short in females with long ovipositor; median carina often distinct, sometimes strongly raised (more often in males); postero-lateral corners not sharp. Hind coxa large, of varying shape, sometimes partly impunctate, in some groups with dorsal tooth, or carinate mesodorsally, then often forming a broad thin dorsal lobe. Hind femur large but of varying shape, ventral edge with teeth varying in form from large slender teeth to a comb of regular minute teeth, basal tooth usually before middle. Hind tibia with outer spur more or less reduced, shorter than inner spur, sometimes rudimentary if tibia produced into a spine. Fore wing with terminal processus of stigmal vein often distinct. Gaster different in the two sexes.

Ovipositor sometimes relatively short (Text-figs 36, 149, 234, 235) but even then its sheaths exposed, upturned and capable of some movement in antero-posterior direction (indicated in Text-fig. 229); if sheaths longer then turned forwards over dorsum of gaster, reposing in ovipositorial furrow. Exposed part of sixth tergite, landmarked by spiracles, divided in two lateral plates by (but not fused with) the median part of epipygium which is thrust upwards by the base of sheaths. In male the gaster often with exposed parts of sternites rather narrow and then laterally delimited by keels.

The genus *Leucospis* includes at present more than 100 species which are treated in species-groups and this again may raise a question of a subdivision of the genus into subgenera or even of splitting it into several genera.

There are a few characters which come into consideration. They are: the occipital carina, the form of the lower margin of clypeus, the mandibles, the pronotal carinae, the mesoscutal carina, the form of dorsellum, form of propodeum including the development of the median carina and plicae, the carinate or non-carinate dorsal edge of fore femur and tibia, form of the dorsal edge of hind coxa, of hind femur and its teeth, of the apex of hind tibia including the outer spur, in certain groups also the length of ovipositor (mean length of the ovipositorial sheaths) and in connection with it the length of the ovipositorial furrow (and of the propodeum), and in the males the relative breadth of the sternites.

Some of these characters seem to have greater weight only in certain species-groups, e.g. the high occipital carina in some American groups only. Perhaps a similar case is the absence of the median tooth on the lower margin of clypeus. It is not developed in the (again American) species of *Polistomorpha* and in the American *Leucospis* of the *texana*-group, *egaia*-group and *speifera*-group, but in the latter it sometimes becomes conspicuous, e.g. in *L. versicolor*. On the other hand, the median tooth is present in all the other groups and species solae, but is not developed for example in *L. clavigaster* of the *cayennensis*-group.

More often it is not a case of presence or absence of a certain character but of the degree to which the character is developed. In the *cayennensis*-group the lower tooth of the mandible is relatively more conspicuous, being separated from the upper edge by a semicircular emargination, whilst in the other species-groups the tooth is usually shorter and the separating notch more triangular, often small; but it is deep e.g. in *L. bulbiventris* and *L. manaica* of the *egaia*-group. It varies even within the *cayennensis*-group; it is unusually broad and deep e.g. in *L. ignota* (Text-fig. 116), but rather shallow e.g. in some *L. cayennensis* (Text-fig. 110; lower tooth worn off?). For some time I had been considering the question, whether the *cayennensis*-group should be separated as a subgenus, in which case the name *Metallopsis* Westwood were available, the more that the males of the group seem to be easy to recognize on the broad sternites not carinate at sides (similar to those of *Polistomorpha*). I dropped the idea because the separation of one species-group does not seem useful (the subgenus category being of some value only for the taxonomists) and because the diverse complex of the other species-groups of *Leucospis* is more difficult to split. And the *cayennensis*-group itself includes some rather different-looking species, mostly little known, three of them until now only in one sex.

The pronotal carinae seem a very striking character in some species but a closer study reveals that their taxonomic value is very relative. They are generally less developed in the American species which lack the discal carina. The premarginal carina in them is often weak, replaced by a swollen bare ridge and this may be present or missing e.g. in the *speifera*-group (sometimes even as intraspecific variation). A similar case occurs in the African *tricolor*-group: premarginal carina missing in *L. parvula*. And within the groups with the discal carina developed, as for example the *elegans*-group, this carina may be unusually high (e.g. *L. ornata*, *L. varicollis*, *L. carinifera*), or reduced laterally (*L. africana*), or rather low *L. fallax*, *L. insularis*).

The mesoscutal cross-carina is developed only in the African *fuelleborniana*-group, to separate it from the otherwise very close Oriental *petiolata*-group.

Also the form of the dorsellum is useful in separating some species-groups, but often only in combination with the other characters. In several species it is slightly variable but in general, as a group character, it holds well. For example it is convex, non-carinate in the *affinis*-group, or apically bidentate in the *australis*-group, both of which have a dorsal tooth on hind coxa. Only in the mentioned *cayennensis*-group and in the *gigas*-group its form is rather varied.

Whilst the presence or absence of a dorsal carina on fore femur and tibia are used only as additional group characters of some American species, the shape of hind legs, in particular of the coxal and femoral teeth and the apex of tibia, have attracted attention of many authors. Girault (1915 onwards) used them to separate *Exoclaenoides*, *Parexoclaenus* and *Epexoclaenoides* as different genera. A relatively slender hind coxa with broad dorsal side (*L. antiqua* and the *aruina*-group) probably is a primitive, plesiomorph form. With the broadening of the coxa the dorsal side becomes narrower (*elegans*-group) and turns first posteriorly into a thin ridge (*cayennensis*-group, *gigas*-group, *hopei*-group, *speifera*-group) often subserrate (*hopei*-group and *dorsigera*-group) or forming a sharp meso-dorsal carina (some species of the *tricolor*-group; *L. brasiliensis* of *hopei*-group), or developing a thin broad lobe (*hopei*-group) which may be narrowed into a tooth (*egaia*-group). The outer side of the dorsal edge may suggest or form a tooth (*petiolata*-group, *fuelleborniana*-group, *L. regalis*) which may be fairly conspicuous, although beset with piliferous punctures (*affinis*-group, *australis*-group, *L. namibica*, *L. holubi*). As shown by the examples, also this character does not correlate much with the other characters of the species-groups.

The hind femur shows a similar situation (shown together with the coxa and tibia in many text-figures). There seems to be every possible intergrade, in the most crucial point within one species (*L. africana*, Text-fig. 126). One extreme is the enormously swollen femur with very long second to fourth teeth, whilst the first is much smaller (*texana*-group, *tricolor*-group). At the next stage the femur is less swollen but the teeth have still the same character (*gigas*-group, *petiolata*-group). Then the teeth become gradually shorter and shorter (*L. regalis*, some species of the *elegans*-group), whilst the first tooth becomes broader and stronger (mentioned Text-fig. 126), although still only about as long as the middle teeth. The next form has the basal tooth distinctly the strongest (most American groups,

dorsigera-group, *elegans*-group, *australis*-group, *aruina*-group) and the femur becomes relatively slender (in correlation with the body; some species of the *egaia*-group, of *aruina*-group; *L. antiqua*). The other extreme is, however, reached in the Indo-Australian *pediculata*-group (for some time regarded as the genus *Epexoclaenoides*), in some species of which the small teeth become very numerous, minute and regular, forming an unusual comb (Text-figs 225, 233).

There seems to be a close correlation between the development of the hind femur and the form of the tibia. In general, the longer the femoral teeth, the more the tibial apex is produced into a spine and the shorter is the outer spur. In the extreme case (*texana*-group, Text-figs 39, 40) the inner edge of tibia is wavy or the outer side depressed and then separated from its dorsal side at base by a ridge or keel (*tricolor*-group). The text-figures mostly show examples of the form of the femur and tibia together and so the gradual change may be followed, as mentioned with the forms of the hind femur. The other extreme, which seems to be the most primitive form, with the apex of tibia almost perpendicularly truncate and the outer spur relatively long, is reached again in the mentioned *L. antiqua*, the *aruina*-group, in the American fauna in the *cayennensis*-group, to a lesser degree in the *speifera*-group, *L. namibica*, etc. All species with the outer spur well developed and the apex of tibia hardly produced have the femur with the basal tooth the strongest.

I hope to have explained a little my reasons why I could not split the genus *Leucospis* into several genera and why, as a result, I regard it more useful not to split it even into sub-genera but to use instead the concept of species-groups.

In general, the intraspecific variation seems to be wide and is discussed accordingly under the relevant species. There is, however, a phenomenon of greater interest, namely the occurrence of the orange-coloured instead of yellow-coloured forms within some species. In one case I accepted the subspecific level for this form (*L. affinis floridana*), in all other cases such specimens are regarded as forms. In *L. affinis* the orange colour is combined with the more infumate wings. Similar forms are mentioned under *L. tricolor* (form A), the well known *L. gigas*, and already Schletterer knew such a form of *L. histrio* (1890: 246, under *macrodon*). I have examined such specimens of *L. dorsigera* from Libya and Egypt, of *L. japonica* from Nepal and Assam and possibly the little known *L. aurantiaca* from China also belongs here, very close to *L. biguetina*. These forms may be regarded as subspecies, when more is known. All seem to develop in arid climates or at least at the fringes of the area of distribution of the species.

The biological characteristics are mentioned, where known and where suggestive of some value, with the species-groups.

The genus is cosmopolitan, as already mentioned, generally not reaching smaller islands, except for the species possibly introduced by man, such as *L. affinis* in the Hawaiian Islands and, perhaps, *L. antigua* in the Society Islands.

For practical reasons the species of the Americas, then those of Africa (including the Mediterranean ones) and Madagascar, and the Asiatic and Australian (and Pacific) species, are treated separately.

The New World species

Leucospis includes at present 42 species in the New World. From the species classified as American by previous authors two were already excluded, viz. *integra* Haldeman (see p. 229) and *shuckardi* Westwood, and two more must be omitted: *L. varicollis* Cameron and *L. pediculata* Guérin-Méneville.

L. varicollis has been regarded as an Argentinian species, for it was described by Cameron (1909) along with some Argentinian Hymenoptera, although no locality was given and the type bears no indication of origin. During my study this species proved to belong to a species-group confined to the Old World and *L. varicollis* eventually was recognized as a South African species.

L. pediculata was originally described from Java, but Schletterer (1890) misquoted the type-locality as Cuba.

L. shuckardi is a synonym of the Mediterranean *L. gigas* Fabricius but was recorded originally from 'North America', because it was received together with some other American insects. It was rightly excluded from the list of the North American species (by Peck, 1951) and referred to later on (Peck, 1963 : 907) as an exotic species. The original record must have been erroneous or based on a specimen introduced from some Mediterranean country (e.g. with reeds containing cells of Megachiline bees). The latter possibility cannot be excluded; for example I have seen another female of *L. gigas* (MNHN, Paris, Coll. De Gaulle) labelled 'New York'. The species is not known, however, to be established in North America and is not included in the key below.

On the other hand, *L. ignota* Walker, the country of origin of which has not been known, was recognized as an American species and treated as such.

The American species show a different grade of similarity and are put accordingly in several species-groups, viz. the *texana*-group, *hopei*-group, *affinis*-group, *egaia*-group, *speifera*-group and the *cayennensis*-group. These are characterized below and to some extent also in the key, which aims not only at the correct identification, but also tries to put together species belonging to the same group, although sometimes secondary but more apparent characters are used (as for example in *L. hopei, L. leucotelus, L. propinqua*). The *cayennensis*-group includes the type-species of the subgenus *Metallopsis* Westwood, but I do not think it opportune or useful to split the genus in subgenera, mainly because of the existence of various intermediates. A similar situation is in the *hopei*-group which includes, in the *anthidiorum*-subgroup, the type-species of *Exochlaenus* Shipp.

Most American species are fairly distinct and it is hoped that they may be readily recognizable even if known at present in one specimen only and in spite of the sometimes amazing sexual dimorphism. In some cases, however, I feel some uncertainty as to the proper status. For instance the following species seem to have their twin species, sometimes more distinct, sometimes very similar and with the characters partly overlapping, but even then mostly allopatric (at least as far as known):

L. texana Cresson and *L. rileyi* Schletterer
L. anthidioides Westwood and *L. xylocopae* Burks

L. leucotelus Walker	and *L. propinqua* Schletterer
L. egaia Walker	and *L. coxalis* Kirby
L. opalescens Weld	and *L. signifera* sp. n.
L. mexicana Walker	and *L. cayennensis* Westwood.

Possibly a similar case is with *L. manaica* Roman where the southern form is regarded as belonging to the same species.

In the Americas there is no representative of the groups in which the pronotum bears three transverse carinae or a conspicuous transverse depression in front of the premarginal carina. On the other hand, the American fauna includes many species with a convex pronotum showing no carinae at all and the dorsellum is quite often carinate at the margin, rarely slightly bituberculate (*L. hopei*, *L. pictipyga*), but never really bidentate, which is found in many species of the Old World. Also long and slender teeth on the hind femur occur only in three closely related species (of the *texana*-group) which do not reach South America, but similar forms are commonly encountered in the eastern hemisphere. On the other hand the lower margin of the clypeus often forms only the two lobes, without the median tooth which is present in all species of the Old World. The median tooth is not developed in most species of the *texana*-group, *egaia*-group and *speifera*-group (and in the species of the genus *Polistomorpha*), but mostly conspicuous in the species of the *hopei*-group, *affinis*-group and *cayennensis*-group. Broad convex sternites in the males are known only in the *speifera* and *cayennensis* groups (and in the equally Neotropical *Polistomorpha* species).

Key to the New World species of *LEUCOSPIS*

1 Hind femur extremely stout, on ventral margin with only 4–5 long slender teeth, basal tooth small (Text-figs 36, 41); body robust, ovipositor extremely short. . 2

– Hind femur less stout, on ventral margin with broad basal tooth followed by 7 or more smaller teeth (Text-figs 43–45); body often not very robust, ovipositor never unusually short 4

2 Gaster posteriorly black, with orange cross-bands on broadest part and on first tergite (Text-fig. 37); fore wing mostly dark brown; pilosity on thorax whitish, rather short, on gaster laterally each hair hardly reaching beyond next puncture; thorax laterally and hind legs often reddish; puncturation of body coarser than in alternate; south-east U.S.A. . . . . ***slossonae*** Weld (p. 42)

– Gaster posteriorly with extensive yellow markings consisting of a broad band on fifth tergite and at least another narrower band on sixth tergite (Text-fig. 38); fore wing pale brown but usually slightly darker anteriorly and apically; pilosity otherwise, mostly much longer than in alternate; puncturation not very coarse but often rather dense; south-west U.S.A. and Mexico 3

3 First tergite in both sexes extensively yellow; epipygium in ♀ black; pronotum posteriorly with broad yellow band, its sides and legs extensively red; puncturation on disc of fifth tergite often longitudinally confluent but transversely with interspaces generally broader than half width of punctures; fourth tergite in ♀ medially with punctures in about 4 cross-rows; hairs on pronotum and gaster mainly pale, fairly long, not very dense; wings usually yellowish; in ♂ scape partly yellow . . . . . ***texana*** Cresson (p. 40)

– First tergite in both sexes black but epipygium in ♀ with yellow streaks; sides of thorax mostly black, pronotum posteriorly with narrow yellow band reduced at sides; hind femur apart from upper pale line mainly black but often reddish brown above teeth and at base; puncturation on disc of gaster dense, interspaces usually narrow, fourth tergite in ♀ with punctures medially in about 6 cross-rows; hairs on black part of pronotum black and on anterior part of gaster brown; wings brownish; in ♂ apex of gaster laterad of median depression broadly yellow, scapus black . . . . . ***rileyi*** Schletterer (p. 40)

4 Lower tooth of mandibles long, separated from upper edge by a broad semicircular gap (Text-figs 110, 111, 116, 119; visible even when mandibles closed); propodeum often unusually densely pilose, body often with vivid metallic tinge; pronotum without premarginal cross-carina 5

– Lower tooth of mandibles mostly short and broad, always separated from the upper edge by a triangular excision (Text-figs 53, 73, 81) which is usually shallow (exception: *L. bulbiventris*, Text-fig. 42); propodeum mostly not very densely pubescent (exception: *sumichrastii* (Text-figs 100, 101)); body with or without metallic tinge; premarginal carina of pronotum present or absent 11

5 Upper part of depression of hind coxa with broad smooth area which extends to base and upper edge (Text-fig. 106); ovipositor long; dorsellum not carinate . 6

– Hind coxa punctured in depression, or, if partly smooth, the impunctate area not reaching base of coxa; ovipositor often short; dorsellum posteriorly more or less carinate 7

6 Apex of gaster brown-golden, with unusually thick long pilosity; smooth area of hind coxa confined to upper half of depression; dorsellum weakly convex; hind femur near ventral edge rather densely punctured . . ***mexicana*** Walker (p. 93)

– Apex of gaster dark, obscure metallic, with mainly greyish pilosity which is not thicker than elsewhere on gaster; smooth area of hind coxa extending over two-thirds of depression; dorsellum short but strongly convex; hind femur beneath coarsely and sparsely punctate (Text-fig. 107). . ***cayennensis*** Westwood (p. 92)

7 Dorsellum flat, thickly covered with rather adpressed white pubescence; hind tibia (Text-fig. 113) mainly whitish, externally smooth, sparsely beset with coarse punctures; ovipositor reaching middle of first tergite; posterior tergites dark metallic (♀) . . . . . ***metatibialis*** sp. n. (p. 97)

– Dorsellum bare or with a few inconspicuous hairs, often not flat; hind tibia either not whitish or with dense puncturation externally; ovipositor shorter than above (in species where ♀ known) 8

8 Hind femur unusually slender (Text-fig. 112), together with hind tibia externally coarsely punctured; malar space virtually as long as scapus (Text-fig. 111); depression of hind coxa with distinct impunctate (but finely reticulate) area; first tergite in both sexes virtually as broad as rest of gaster . ***genalis*** sp. n. (p. 94)

– Hind femur broader (cf. Text-fig. 118), puncturation of femur and tibia not coarse; malar space distinctly shorter than scapus (Text-fig. 116); hind coxa punctured in depression, sometimes with small smooth space which is not well delimited; first tergite often narrow 9

9 Propodeum in both sexes with very dense silvery pubescence covering the flat finely punctured surface; in ♀ ovipositor not reaching base of fifth tergite, in ♂ first tergite broader than long but only about 0·6 as broad as gaster posteriorly ***ignota*** Walker (p. 99)

– Propodeum not very densely hairy, its surface very uneven, coarsely punctured and at least anteriorly with some coarse rugae; ♀ unknown, in ♂ gaster otherwise. . 10

10 First tergite in ♂ elongate, less than half as broad as gaster posteriorly which has no unusual pubescence (Text-fig. 114); indicated hind margins of tergites straight; sixth tergite without median keel, spiracles minute . ***clavigaster*** sp. n. (p. 100)

– First tergite in ♂ strongly transverse, only slightly narrower (0·75) than gaster

posteriorly, this with thick golden pubescence, hind margins of tergites 4 and 5 angularly excised (Text-fig. 120), sixth with median keel and rather big spiracles ***addenda*** sp. n. (p. 96)

11 Pronotum with premarginal carina or at least with distinct bare raised cross-line; dorsellum with or without carina at margin 12

– Pronotum regularly punctured posteriorly, without premarginal carina or raised line; dorsellum always with carinate lateral and posterior margin . . . 25

12 Body deep black, non-metallic, with white bands on pronotum, hind coxa, usually also on gaster and scutellum, contrasting with bright red flagellum, tibiae and apex of hind femur; hind coxa in depression extensively smooth (Text-fig. 45); Andes . . . . . ***hopei*** Westwood (p. 44)

– Colour different, never black with contrasting white and red markings; depression of hind coxa often punctured 13

13 Dorsellum convex, punctured or alveolate, but its lateral margin not distinctly carinate; in ♀ ovipositor often long and first tergite mostly with median ovipositorial furrow smooth on bottom, rarely with smooth ridge 14

– Dorsellum carinate laterally and posteriorly (Text-figs 72, 98) or with distinct cross-carina (if this removed from margin); in ♀, if with long ovipositor, first tergite with median ridge and diverging broad furrows which are at least partly sculptured on bottom 25

14 Wings in proximal two-thirds blackish; also body mainly black or dark brown, with poor pale markings, if any (reduced to narrow bands on pronotum, scutellum and metapleurum) 15

– Wings brownish, yellowish or subhyaline, not blackish in basal two-thirds; body usually otherwise 16

15 Ovipositor reaching at least to dorsellum; first tergite in ♀ slightly longer than broad; fore wing mostly whitish in apical quarter; scutellum in ♀ usually more than 1·5 times as broad as long (axilla excluded); in ♂ gaster shorter, 2·5–2·7 times as long as first tergite broad . . . . . ***leucotelus*** Walker (p. 48)

– Ovipositor reaching at most to anterior quarter of first tergite (Text-fig. 52), the latter in ♀ usually slightly broader than long; fore wing usually getting paler gradually, apex narrowly subhyaline; scutellum in ♀ usually less than 1·5 times as broad as long; in ♂ gaster more than 3 times as long as first tergite is broad ***propinqua*** Schletterer (p. 46)

16 Hind tibia ending with a distinct solid spine (Text-fig. 43); hind coxa dorso-posteriorly with inner carina which often forms a thin, partly translucent lobe, but no narrow tooth, part below lobe usually extensively smooth; hind femur very densely and rather coarsely punctured 17

– Hind tibia apically truncate (Text-figs 57, 58, 60, 61, 63); hind coxa dorsally with a slender tooth which may be reduced to a tubercle in dwarf specimens, never with broad thin lobe; hind femur usually not very densely punctured . . . 22

17 Body very short and broad (Text-fig. 56), gaster in ♀ at most twice as long as broad, first tergite strongly transverse, little narrower than rest of gaster; malar space at least 0·9 the length of scape (Text-fig. 53) 18

– Body much less robust, gaster in ♀ at least 2·5 times as long as broad, first tergite oblong or only slightly transverse (Text-fig. 49), but always distinctly narrower than rest of gaster; malar space shorter than in alternate 19

18 Thorax and anterior half of gaster predominantly black, with at most narrow yellow markings at hind margin of pronotum, laterally on mesoscutum, posteriorly on scutellum and on metapleura; ovipositor not or hardly reaching anterior half of first tergite; in ♂ sternites 4–6 subequal, slightly transverse, hind margin of the fourth straight . . . . . ***xylocopae*** Burks (p. 60)

– Thorax with richer yellow markings, also first tergite mostly with yellow; ovipositor

longer, reaching at least base of gaster; in ♂ hind margin of fourth sternite slightly emarginate, fifth sternite much more transverse and shorter than the sixth
anthidioides Westwood (p. 59)

19 Dorsellum raised in two tubercles; thorax dorsally black; pubescence extremely short; hind coxa in depression with extensive smooth area nearly or quite reaching base of coxa (Text-fig. 54); ovipositor short, not reaching base of fifth tergite (Text-fig. 55) . . . . . ***pictipyga*** sp. n. (p. 54)

– Dorsellum regularly convex; thorax at least with some yellow markings; pubescence longer; smooth area of hind coxa smaller; ovipositor reaching at least middle of first tergite 20

20 Hind margin of dorsellum with indication of carina; ovipositor reaching thorax (Text-figs 50, 51); propodeum medially shorter than dorsellum (♀); body with rich yellow pattern and mostly red instead of black; occipital carina not reaching temples which are extremely short . . . . . ***santarema*** Walker (p. 52)

– Hind margin of dorsellum smooth, not subcarinate; ovipositor not reaching base of gaster, propodeum medially longer than dorsellum; body predominantly black, only apical half of gaster sometimes more yellow; occipital carina sometimes reaches temples 21

21 Occipital carina reaching distinctly behind eyes; gaster relatively slender (Text-fig. 48), with narrow yellow cross-bands on first tergite basally, on fourth tergite, on the fifth posteriorly and on the sixth and epipygium . ***brasiliensis*** sp. n. (p. 50)

– Occipital carina disappearing beyond ocelli; gaster broad (Text-fig. 49), anteriorly black, extensively yellow only from half of fifth tergite . ***klugii*** Westwood (p. 58)

22 Hind coxa along middle of depression with dense puncturation and long hairs which converge conspicuously towards median line of depression (Text-fig. 58), also dorsal edge with long pilosity; in ♀ first tergite with a smooth median crest rising from submedian depression; pronotum only with posterior pale cross-line
latifrons Schletterer (p. 61)

– Depression (and dorsal edge) of hind coxa rather regularly punctured and clothed with short hairs which are directed uniformly caudad; in ♀ first tergite mostly otherwise, also pale pattern on pronotum mostly different 23

23 Yellow on pronotum strongly expanding laterad but leaving median part anteriorly black (or reddish) (Text-fig. 59); propodeum posteriorly yellow; hind tibia basally in lateral view almost straight (Text-fig. 60); Cuba . ***poeyi*** Guérin-Méneville (p. 68)

– Pale (yellow, white or red) markings on pronotum different: posterior band not expanding laterad and if connected with lateral streak, then another cross-band present anteriorly; propodeum usually black; hind tibia arched in basal half (Text-figs 57, 61, 63) 24

24 First tergite in ♀ with smooth median crest delimited by very shallow submedian depressions (as in *latifrons*); hind femur densely punctured; pronotum only with posterior yellow cross-line but apex of gaster (in ♀) predominantly yellow; Mexico
azteca Cresson (p. 62)

– First tergite in ♀ with well delimited median ovipositorial furrow subdivided by low median ridge; hind femur mostly rather sparsely punctured (Text-fig. 61); pronotum usually with anterior band and mostly bordered with yellow, whitish or red on sides; Canada to C. America . . . . . ***affinis*** Say (p. 63)

25 Hind basitarsus dorsally much shorter than breadth of apex of hind tibia which is slightly obliquely truncate (Text-figs 87, 90); occipital carina interrupted or obliterated sublaterally before reaching eye (Text-figs 88, 91) 26

– Hind basitarsus dorsally at least as long as breadth of tibia (Text-fig. 83), the latter often otherwise than in alternate; occipital carina even laterally conspicuous, although sometimes less distinct in sinuation between lateral ocellus and eye, but again distinct on temples (Text-fig. 82) 28

26 Interocellar area strongly raised above the unusually small ocelli, median ocellus

hidden in postero-lateral view, lateral ocellus about 3 diameters from eye (Text-fig. 91); pronotum anteriorly with round pale spot . ***birkmani*** Brues (p. 79)

– Interocellar area not strongly raised above ocelli which are of normal size (Text-fig. 88), the median visible in postero-lateral view, the lateral closer to eye than above; pronotum without round spot anteriorly 27

27 Apex of gaster, in ♀ including hind part of fifth tergite, golden, with abundant golden pubescence; dorsellum non-metallic, its marginal carina narrow, laminate, regular; pronotum more than twice as broad as long, its yellow premarginal band broadest in the middle; Mexico . . . . . ***auripyga*** sp. n. (p. 80)

– Apex of gaster not conspicuously golden; dorsellum metallic, short, its marginal carina not laminate; pronotum at most twice as broad as long, premarginal yellow band narrowed or interrupted medially; southern South America ***desantisi*** sp. n. (p. 81)

28 Hind tibia truncate at apex, outer spur long (Text-figs 96, 99); median carina of propodeum usually strong, often high or even tooth-like (exception: *sumichrastii*; Text-fig. 101) 29

– Hind tibia apically oblique, ventrally produced into a more or less conspicuous spine, the outer spur on apex of spine rudimentary or indistinct (Text-figs 69, 71, 79, 84); median carina of propodeum low, weak or indistinct 35

29 Hind coxa broadly smooth on its upper half, including dorsal edge (Text-fig. 94); hind femur also very sparsely punctured, mainly pale yellow with dark median streak; ovipositor reaching thorax . . . . . ***speifera*** Walker (p. 85)

– Hind coxa at least laterally on dorsal edge with abundant punctures; hind femur otherwise 30

30 Basal half of fore wing blackish, apex whitish; body very slender, including hind legs (Text-fig. 99); ovipositor reaching thorax, first tergite in ♀ with diverging dorsal furrows . . . . . ***imitans*** sp. n. (p. 83)

– Fore wing otherwise, never so dark; body not very slender, hind legs much broader; ovipositor not reaching middle of first tergite, latter in ♀ without dorsal furrows . 31

31 Propodeum with unusually dense pilosity (Text-fig. 100), hairs on median area directed mainly caudad; broad apex of gaster clothed with thick golden pubescence; ovipositor barely half as long as hind tibia, not reaching middle of the strongly convex fifth tergite (Text-figs 100, 101); Mexico . ***sumichrastii*** Cresson (p. 89)

– Propodeum with sparser pilosity, hairs medially directed headwards or, if median carina high, sidewards; apex of gaster not broadly golden-clothed; ovipositor longer than half the hind tibia, fifth tergite in ♀ convex only basally . . . 32

32 Pronotum with premarginal carina indicated by bare line; thoracic dorsum not very densely punctured; hind coxa in depression with narrow smooth streak; malar space long 33

– Pronotum without a trace of premarginal carina, as well as mesoscutum densely punctured; hind coxa in depression regularly densely punctured; malar space short 34

33 Head bright cupreous; malar space slightly shorter than scapus; first tergite in ♀ even in basal half with scattered punctures, posteriorly regularly punctured and pilose; hind margin of fourth tergite angulate; fifth tergite strongly swollen, ovipositor not reaching its base (Text-fig. 96) . . . ***nigripyga*** sp. n. (p. 86)

– Head dark purplish; malar space virtually as long as scapus; first tergite in anterior two-thirds almost without punctures, with two sublateral depressions, submedially at apex with patches of dense white hairs; hind margin of fourth tergite (♀) virtually straight; fifth tergite weakly swollen, dark purplish, ovipositor reaching its base (Text-fig. 105) . . . . . ***versicolor*** sp. n. (p. 87)

34 Ovipositor reaching hind margin of first tergite; interantennal area with distinct median keel; fore wing intensively infumate; Florida, Mexico ***robertsoni*** Crawford (p. 89)

– Ovipositor not reaching anterior third of fifth tergite; interantennal area without keel; fore wing weakly infumate; South America . ***enderleini*** Ashmead (p. 90)

35 Hind coxa dorso-posteriorly with a broad obtuse-angular thin lobe (Text-figs 67, 69, 71); scutellum (as far as known) without yellow colour; in known forms ♂ with petiolate gaster; ♀ with unusual hairy fascia on gaster 36

– Hind coxa instead of lobe with a conspicuous tooth (Text-fig. 74) which may be less distinct in dwarfs (under 6 mm); scutellum usually at least posteriorly yellow; ♂ and ♀ otherwise 37

36 Only ♂ known, its gaster unusually petiolate (Text-figs 64–66), first tergite 1·5 times as long as broad; hind femur with interspaces nearly as broad as punctures; Mexico . . . . . ***bulbiventris*** Cresson (p. 69)

– Only ♀ known: fourth tergite with thick whitish hairs which converge sideways to median cross-line of tergite (Text-fig. 68); hind margin of fifth tergite and sometimes also apex of gaster with denser pilosity; gaster without yellow markings; S. America . . . . . ***manaica*** Roman (p. 69)

37 Dorsellum bare, subtriangular, 2·0–2·3 times as broad as long, with deep and broad crenulate furrow along margin (Text-fig. 72); hind femur very broad, 1·72–1·84 times as long as broad, teeth excluded (Text-fig. 74) *and* interspaces of punctures on upper mesepimeron dull, obliquely strigose; ovipositor sometimes not reaching base of gaster 38

– Dorsellum at least sparsely hairy, more plain, admarginal groove shallow; hind femur mostly much more slender and, if about as broad as above (in *pulchriceps*), then interspaces of punctures on upper mesepimeron smooth and shiny; ovipositor always reaching thorax 39

38 Ovipositor nearly reaching base of gaster or still more forward; vertical length of eye often slightly greater than breadth of frontovertex (0·95–1·11 : 1; Text-fig. 73); first tergite in ♀ usually with two yellow spots posteriorly; N.E. Argentina to Trinidad . . . . . ***egaia*** Walker (p. 72)

– Ovipositor shorter, not reaching basal third of first tergite; length of eye slightly less (0·93–0·99) than breadth of frontovertex (♂ ♀); first tergite in ♀ without yellow spots; Argentina . . . . . ***coxalis*** Kirby (p. 71)

39 Interspaces of punctures on convex upper mesepimerum quite or virtually smooth, shiny *and* hind femur relatively broad (Text-fig. 79), teeth excluded at most twice as long as broad (mostly broader) 40

– Interspaces on mesepimerum dull, distinctly subhorizontally striate; hind femur at least 2·1 times as long as broad, teeth excluded (Text-fig. 83) 41

40 Interspaces of mesepimerum quite smooth; hind femur broader, mostly 1·80–1·86 times as long as broad; narrow yellow line on posterior margins of pronotum and scutellum, in ♀ gaster with fifth tergite black but a yellow band connecting both halves of sixth tergite across epipygium dorsally; Argentina ***pulchriceps*** Cameron (p. 73)

– Interspaces of punctures on mesepimerum shallowly striate; hind femur about twice as long as broad (Text-fig. 79); scutellum with broad yellow band (Text-fig. 78), pronotum with short anterior and long posterior band, in ♀ fifth tergite and epipygium dorsally mainly black; Colombia . . ***colombiana*** sp. n. (p. 74)

41 Thorax with yellow lines of subequal breadth bordering almost completely pronotum, and lateral and posterior margins of mesoscutum and of scutellum (Text-fig. 76); hind leg relatively broader; S. Brazil . . . . . ***aliena*** sp. n. (p. 78)

– Yellow pattern on thorax different, generally much reduced on mesoscutum; hind leg relatively slenderer (Text-fig. 83) 42

42 Mesoscutum all dark metallic but scutellum extensively yellow except for narrow dark anterior margin extending along median line backwards (Text-fig. 77); pronotum at most with posterior yellow band; S. Brazil to N. Argentina ***signifera*** sp. n. (p. 76)

– Mesoscutum and scutellum posteriorly with yellow bands, pronotum often with anterior band shortly indicated in middle (Text-fig. 75) . ***opalescens*** Weld (p. 77)

THE *TEXANA*-GROUP

This group includes three extremely close species, viz. *Leucospis texana* Cresson, *L. rileyi* Schletterer and *L. slossonae* Weld and is rather isolated in the New World fauna of the genus. The nearest relatives seem to be the African species of the group near to *L. tricolor* Kirby. Both groups share the short stout body and extremely swollen hind femora, armed with only a few very long teeth (Text-fig. 36). The ovipositor sheaths are relatively short, in the American species unusually short and of the same length in the three species. This and some other characters suggest that the speciation must have occurred relatively recently. The American species are known from a rather limited area, the southernmost parts of the U.S.A. and Central America.

Leucospis texana Cresson

Leucospis texana Cresson, 1872 : 31–32, "♂". Lectotype ♀, U.S.A.: Texas (ANS, Philadelphia).

Dr B. D. Burks kindly sent me a female compared with the type material and pointed out that the species actually was described from a female and a male (see Weld, 1922 : 11) and not only from the male sex as given by Cresson (1872 : 31) and Weld (1922 : 13). Cresson's description of the apex of the gaster would apply better to a male, although Weld's statement about the 'type' and 'paratype' (p. 13) actually implies a designation of the female as the lectotype (cf. also Peck, 1963 : 895).

L. texana is in many respects close to *L. rileyi* but I think that it is clearly a different species, for I could not find any intermediate forms in the characters used in the key above. However, only few specimens could be examined.

BIOLOGY. Unknown.

DISTRIBUTION. U.S.A.: Texas; Mexico. Schletterer (1890 : 254) mentions also Georgia, but a misidentification for *L. slossonae* is possible, as also is the record North Carolina by Brimley (1938 : 421) and repeated in Peck (1963 : 895).

MATERIAL EXAMINED.

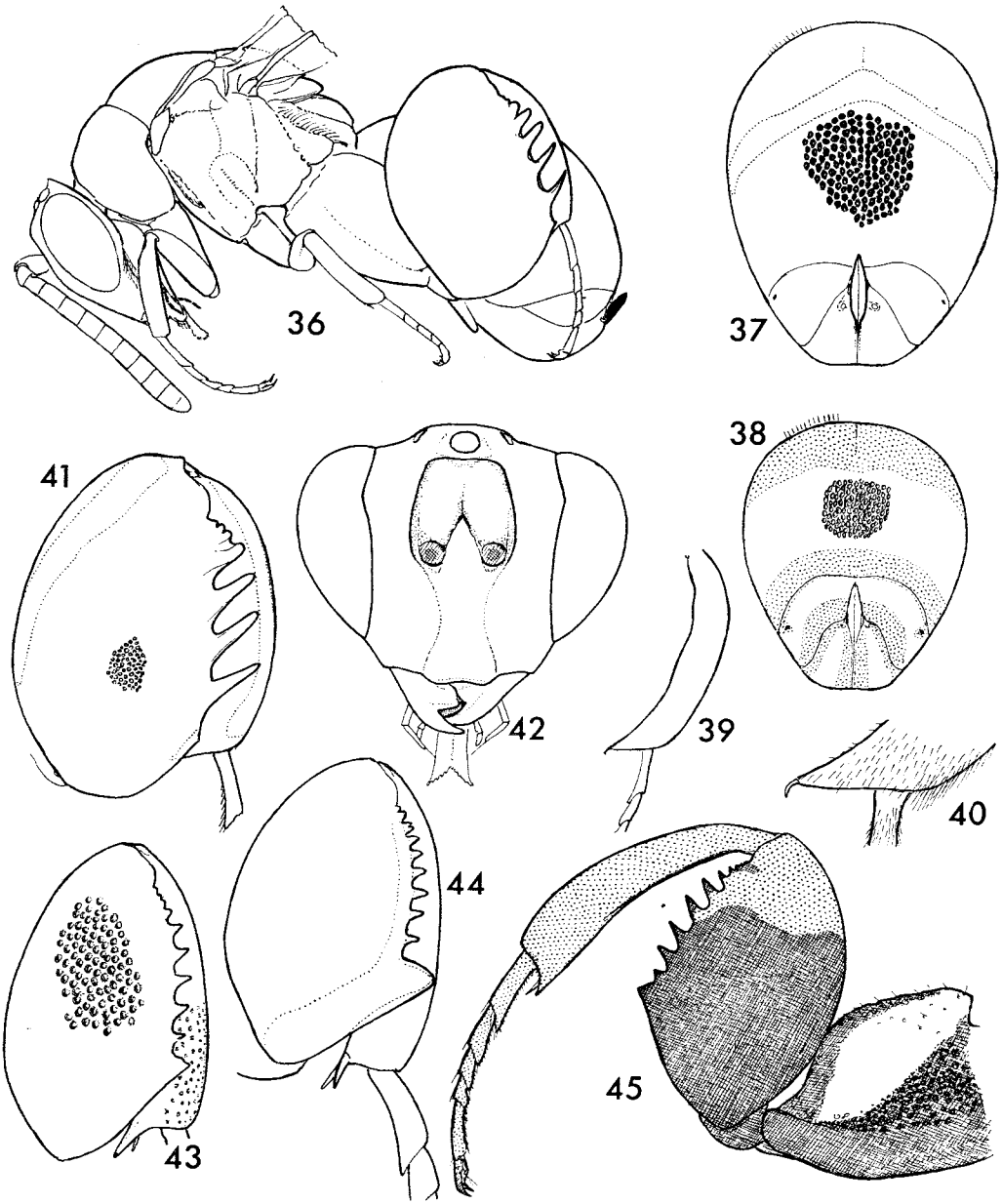
U.S.A.: Texas, Austin, 1 ♀ (USNM). MEXICO: Durango, Sombrerete, 2000 m, 2.vii.1961, R.40 Los Angeles, 1.vii.1961, 2 ♀ (*R. & K. Dreisbach*) (DE, Davis; EM, East Lansing).

Leucospis rileyi Schletterer

(Text-figs 38–41)

Leucospis Rileyi Schletterer, 1890 : 254–256, ♂. Holotype ♂, MEXICO: Cordoba, Veracruz (MHN, Geneva) [examined].

At first I regarded *L. rileyi* as a mere form of *L. texana* Cresson, but the different pattern of pale markings which are in general also more reduced than in *texana*



FIGS 36–45. American *Leucospis*. 36, 37. *L. slossonae*. 36, body of ♀ (ovipositor black); 37, gaster of ♀ in posterior view. 38–41. *L. rileyi*. 38, gaster of ♀ in posterior view; 39, 40, hind tibia and its more magnified apex; 41, hind femur and tibia. 42. *L. bulbiventris*, head. 43. *L. santarema*, hind femur and tibia. 44. *L. sumichrastii*, hind femur and tibia. 45. *L. hopei*, hind leg with white, black and red (dotted) colour indicated.

suggest that they both may be good species. It was mainly the additional material of *rileyi* from D. E. Davis, California, which helped to assess better the range of variation. Yellow markings on the thorax are mostly narrower than in *texana*, in one male they are reduced to narrow lines at hind margins of pronotum and scutellum only.

BIOLOGY. Unknown.

DISTRIBUTION. Mexico, Honduras, Salvador.

MATERIAL EXAMINED.

Type data given in synonymy.

MEXICO: no locality, vi. 1863, 1 ♂ (*Sumichrast*) (MNHN, Paris); M., San Luís Potosí, 5 mls W. of Xilitla, 22.vii.1954, 1 ♂ (*Univ. Kans. Mex. Exped.*) (SM, Lawrence); Nayarit, Ahuacatlan, vii. 1951, 1 ♀, 1 ♂ (*P. D. Hurd*) (CIS, Berkeley; BMNH); Guanajuato, 20 mls W. of Lingres, N. Leon, 8.xi.1946, 1 ♂ (*Van Dyke*) (CAS, San Francisco); Jalisco, 13 mls S.E. Plan de Barrancas, 8.vii.1963, 1 ♀ (*Parker & Stange*) (DE, Davis); Morelos, Tequesquitengo, 15.vii.1961, 1 ♂ (*Dreisbach*) (EM, East Lansing); Jautepec, 31.vii.1963, 1 ♀, 1 ♂; Veracruz, 5 mls N.E. of Tinaias, 18.viii.1963, 3 ♂ (*Parker & Stange*) (DE, Davis); Michoacan, Patzquaro, 31.viii.1939, 1 ♀ (SM, Kansas); Guerrero, Tierra Colorado, 650 m, x. 1904, 1 ♂ (*H. H. Smith*) (BMNH); Oaxaca, 10 mls S.E. of Tapanatepec, 1 ♂ (*Parker & Stange*) (DE, Davis); Chiapas, 28 mls W. of Cintalapa, 9.iv.1962, 3 ♀, 6 ♂ (*Parker & Stange*) (DE, Davis). HONDURAS: Tegucigalpa, 21.vii.1917, 1 ♀ (*F. J. Dyer*) (DE, Davis). SALVADOR: 2 mls S. of Queazaltepeque, 17.vii.1961, 1 ♂ (*M. E. Irwin*) (DE, Davis).

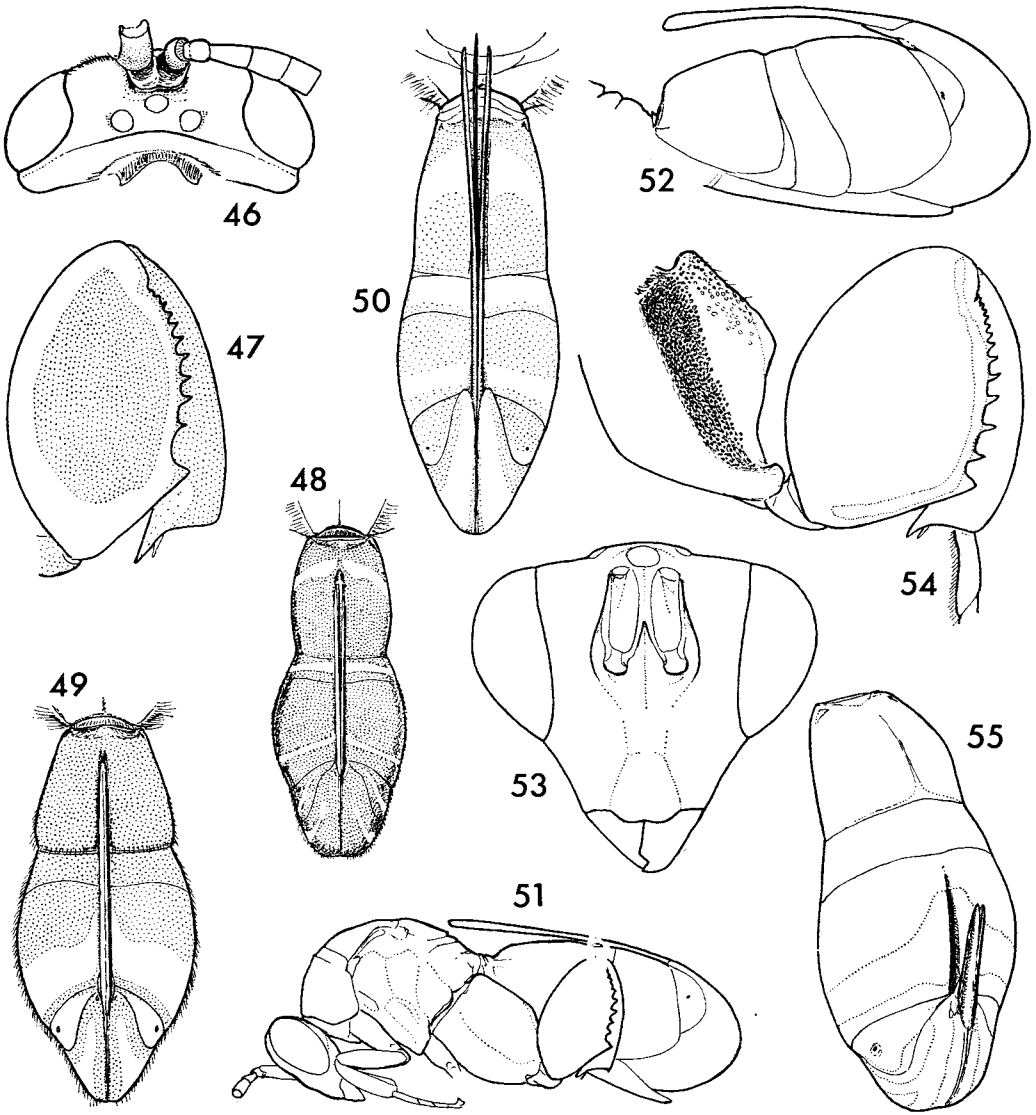
Leucospis slossonae Weld

(Text-figs 36, 37)

Leucospis slossonae Weld, 1922 : 11–13, figs 5, 10, 14, ♀ ♂. Holotype ♀, U.S.A.: Florida, Capron (USNM).

I examined two paratypes of this species kindly sent to me from the CU, Ithaca and several specimens compared with the holotype by C. J. Weld and B. D. Burks.

At first glance *L. slossonae* looks much darker than the two other species of the group and usually is slightly larger, male 6·8–9·2 mm, female 7·4–9·5 mm. In addition to the orange-red markings mentioned in the key, there is in the male sometimes a small spot in the middle of the posterior part of the gaster, just above the apical depression, the smooth bottom of which is surrounded by scattered punctures so that the puncturation is not delimited abruptly. The markings in smaller males often are more yellow and wings less infuscate. In the body colour and geographical distribution the species shows an analogy with the dark-winged and red-coloured subspecies *floridana* Cresson of *Leucospis affinis* Say, but *L. slossonae* has also a different colour pattern of the gaster, which suggests that it



FIGS 46–55. American *Leucospis*. 46–48. *L. brasiliensis*. 46, head in dorsal view; 47, hind femur and tibia; 48, gaster of ♀. 49. *L. klugii*, gaster of ♀. 50, 51. *L. santarema*. 50, gaster of ♀, 51, ♀. 52. *L. propinqua*, gaster of ♀. 53. *L. anthidioides*, head. 54, 55. *L. pictipyga*. 54, hind leg; 55, gaster of ♀ in oblique dorsal view.

is more than a subspecies of *L. texana* Cresson. The problem certainly needs more study.

BIOLOGY. Parasite of *Anthidiellum* sp., Apidae (Burks, 1967).

DISTRIBUTION. U.S.A.: Alabama, Georgia, Florida.

MATERIAL EXAMINED.

U.S.A.: Alabama, Mobile, 19.x.1939, 3 ♀, 2 ♂ (*E. C. Van Dyke*) (CAS, San Francisco); Georgia, Chessar's Island, viii. 1922, 3 ♀ (CU, Ithaca); G., Tifton, 1 ♂, paratype of *slossonae* (CU, Ithaca); G., 8 mls S. of Waycross, vii. 1953, 1 ♂ (*E. S. Ross*) (DE, Davis); G., Billy's Island, Okefenokee Swamp, vi. 1912, 3 ♂ (CU, Ithaca); Florida, Bradenton; F., Gainesville; F., Lake Placid, Highland County; F., Larkins; F., Coconut Grove; F., Cocoa; F., Capron; F., Welaka; F., Naples; F., Everglades; F., Miami; iii.–v., vii., viii., xii., 12 ♀, 24 ♂ (various depositories).

THE *HOPEI*-GROUP

In the species of this group the mandibles have a small triangular notch, the lower margin of clypeus has a median tooth (though sometimes weak), the pronotum usually bears a distinct premarginal carina, the dorsellum is not distinctly or not completely and weakly carinate at the margin, the hind coxa dorso-posteriorly thin, sharp, sometimes suggesting a broad lobe but never bearing a narrow tooth, the hind femur is externally rather coarsely punctured, the apex of hind tibia produced into a strong spine bearing at apex a rudiment of the outer spur and in female, if the ovipositor is long, the first tergite has a single median groove. The species belonging here are *L. hopei* Westwood, *L. propinqua* Schletterer, *L. leucotelus* Walker, *L. brasiliensis* sp. n., *L. santarema* Walker, *L. pictipyga* sp. n., *L. klugii* Westwood, *L. xylocopae* Burks and *L. anthidioides* Westwood. Some of them are rather different in appearance, e.g. *leucotelus* and *propinqua* with blackish wings, *anthidioides* and *xylocopae* (which may, eventually, form a subgroup; parasites of *Xylocopa* species) with short broad body, but there is always a link with the other species, in the case of the *anthidioides* subgroup it is *L. klugii* which has also rather short body but already much shorter malar space than *anthidioides* and resembles more *pictipyga* in some respects. *L. anthidioides* was separated as genus *Exochlaenus* by Shipp (1894*b*) but with the other species known nowadays there is no reason for such a separation, even on a subgeneric level, as recognized already by Weld (1922 : 3).

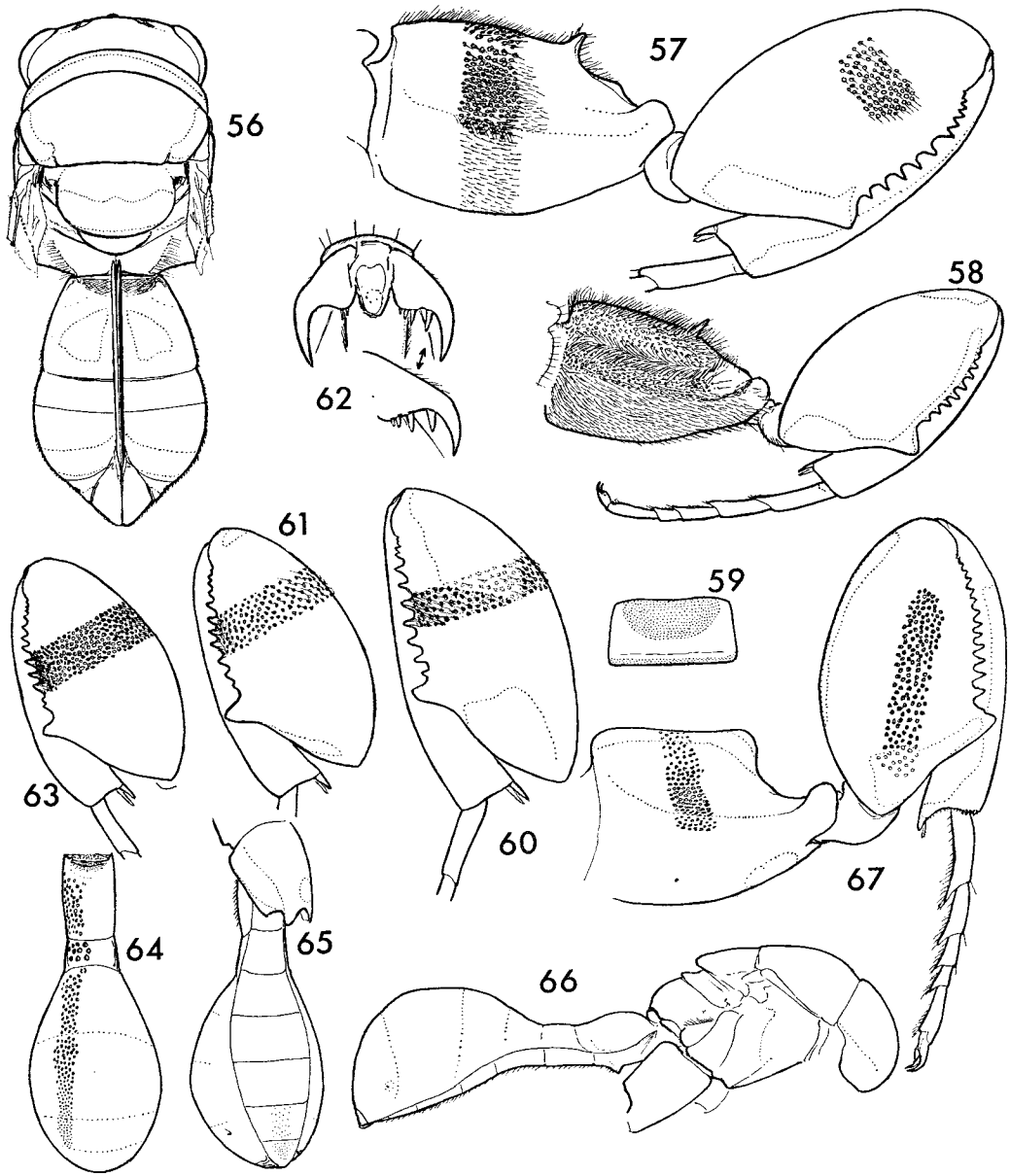
Leucospis hopei Westwood

(Text-fig. 45)

Leucospis Hopei Westwood, 1834 : 215–216, ♂. LECTOTYPE ♂ (here designated), CHILE: Valparaiso (UM, Oxford) [examined].

Leucospis Hopei var. *obscurascens* Strand, 1911*a* : 99, ♂. Holotype ♂, CHILE: Concepción (MNHU, Berlin) [examined]. **Syn. n.**

Westwood originally stated (1834) that the types were in Oxford, but later (1839), when he saw Klug's material (this and Westwood's probably coming from the



FIGS 56–67. American *Leucospis*. 56. *L. anthidioides*, body of ♀. 57. *L. azteca*, hind leg (holotype). 58. *L. latifrons*, hind leg. 59, 60. *L. poeyi*. 59, colour pattern on pronotum; 60, hind leg (lectotype). 61. *L. affinis affinis*, hind femur and tibia. 62, 63. *L. affinis dubiosa*. 62, mid claws, the inner one showed also in different view; 63, hind femur and tibia. 64–67. *L. bulbiventris*, ♂. 64, 65, gaster in dorsal and oblique ventral views; 66, lateral view of body; 67, hind leg.

same lot sent by Meyen), he mentioned also Berlin, where a male was labelled 'Type' and '*rufipes*' a manuscript name given by Klug. I designate as lectotype a male from Valparaiso, mentioned in 1834 by Westwood.

The pale markings (Westwood, 1839: pl. 3, fig. 3) are sometimes reduced, but this has no taxonomic importance and anyway, the male described by Strand as var. *obscurascens* is well within the range of variation. In some specimens the white on the thorax is reduced to a narrow line on the pronotum and on the gaster reduced almost completely. Sometimes also the red colour is reduced and in a small male (5.5 mm) the hind femur is completely black.

This is a distinctive species, mainly due to its unusual colour and is well recognizable already from Schletterer's key.

BIOLOGY. *L. hopei* is known as a parasite of the bee *Megachile rancaguensis* Friese. Janvier (1933 : 295–298) described its ovipositing into the cells of the bee containing prepupae in cocoons and described and figured (fig. 34) its larva.

DISTRIBUTION. Peru, Chile, Argentina. Mainly confined to the Andes; in Chile also in the coastal regions.

MATERIAL EXAMINED.

Type data given in synonymy.

PERU: Cuzco, 1849, 12 ♀, 4 ♂ (*Gay*) (MNHN, Paris). CHILE: Punta Moreno nr Antofagasta; Coquimbo region: La Serena, La Junta, Los Choros, Rivadavia, Illapel; Aconcagua region: Rio Blanco; Limache; Valparaiso region: Casa Blanca, Olmué; Santiago region: El Peumo, Estero d. Templo, Las Condes, Pudahuel, Quilicura, La Rinconada-Maipú, San Bernardino; Rancagua; Prov. O'Higgins, Tonlemo; Cordillera Curicó, Los Queñes, La Jaula, 1300 m; Linares; Concepción; Los Angeles; Angol; and the following which I could not locate: Marga-Marga, Baños de Cauquau, Quilacora, Chubut, Calera, Novara; apparently common throughout Central Chile; x.–xii., i.–iii., 63 ♀, 109 ♂ (various depositories). ARGENTINA: Mendoza, Uspallata, i. 1947, 1 ♀ (*Willink*); Las Vegas, nr Potrerillos, 1966, 1 ♂ (*Stange*); San Juan, Leonuto, nr Callingasta, 2550 m, vii. 1966, 1 ♀ 3 ♂ (*Willink & Stange*) (IML, Tucumán); Rio Negro, Bariloche, i. 1968, 1 ♀ (*Naumann*) (NM, Vienna), El Bolsón, 1 ♀ (*J. Foerster*) (SM, Lawrence); Paso Flores, iii. 1963, 1 ♀ (FCNM, La Plata); N.W. Patagonia, xii. 1919, 1 ♀ (*H. E. Box*) (BMNH); Chubut, Esquel, 5.xii.1950, 3 ♀, 6 ♂ (*Andrae*) (IML, Tucumán); Pto. Pirámides P. Valdez, 17.i.1968, 1 ♀ (*L. Stange*) (IML, Tucumán).

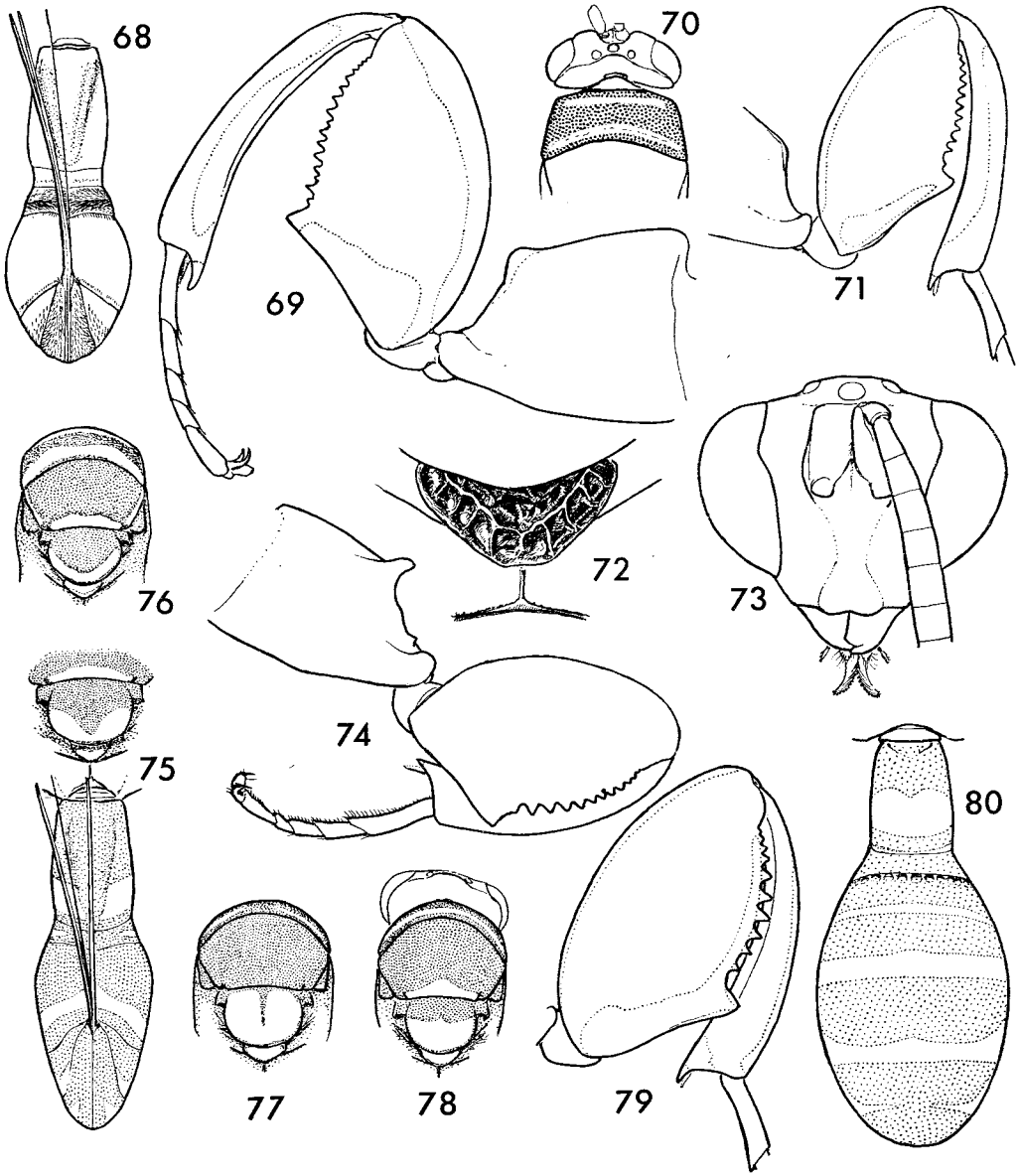
Leucospis propinqua Schletterer

(Text-fig. 52)

Leucospis propinqua Schletterer, 1890 : 277–279, ♀. LECTOTYPE ♀ (here designated), BRAZIL: Santa Catarina, Blumenau (NM, Vienna) [examined].

I traced only one of the original syntypes and designate this as lectotype.

The species is very close to *L. leucotelus* Walker and in spite of being collected quite often in some parts of south-eastern Brazil, its hosts are not yet known.



FIGS 68–80. American *Leucospis*. 68–71. *L. manaica*. 68, gaster of ♀; 69, hind leg; 70, head with pronotum (all from holotype); 71, hind leg in a ♀ from Santa Catarina. 72. *L. coxalis*, dorsellum. 73, 74. *L. egaia*. 73, head; 74, hind leg. 75. *L. opalescens*, part of thorax and gaster in ♀ (holotype) with indicated markings. 76. *L. aliena*, markings on thoracic dorsum. 77. *L. signifera*, ditto. 78–80. *L. colombiana*. 78, markings on thoracic dorsum; 79, hind femur and tibia; 80, gaster of ♂.

DISTRIBUTION. Ecuador, Brazil, Paraguay, Argentina.

MATERIAL EXAMINED.

Type data given in synonymy (but Schletterer, 1890, had syntypes also from Obidos and Sao Paulo).

ECUADOR: Guayaquil, 1 ♀ (*Buchwald*) (NM, Vienna). BRAZIL: Taperinha nr Santarem, ix. 1927, 1 ♀ (*Zerny*) (NM, Vienna); Paraná, Rondón, 28.x.1957, 1 ♀ (*Plaumann*) (BMNH); Itatiaya, 1927, 1 ♀ (*Seitz*) (ZS, Munich); Guanabara, Represâ Rio Grande, x. 1967, 1 ♀ (*Alvarenga*) (Townes); Santa Catarina, Nova Teutonia, x.–iv., 132 ♀, 1 ♂ (*Plaumann*) (various depositories); Rio Grande do Sul, São Leopoldo, 1896, 1 ♀ (ZS, Munich). PARAGUAY: Alto Paraná, 1 ♀ (*Schade*) (MCZ, Cambridge). ARGENTINA: Misiones, Villa Lutecia nr San Ignacio, 1910, 1 ♀ (*Wagner*) (MNHN, Paris); Loreto, 1 ♀ (*A. Ogloblin*) (FCNM, La Plata).

Leucospis leucotelus Walker

Leucospis leucotelus Walker, 1852 : 41, ♀. LECTOTYPE ♀ (here designated), BRAZIL: Pará (BMNH, London) [examined].

Leucospis apicalis Cresson, 1872 : 30, ♀. LECTOTYPE ♀ (here designated), MEXICO (ANS, Philadelphia) [examined].

I examined one of the two syntypes of *L. apicalis* (No. 1797.1) and designate it as lectotype. It is conspecific with the only original specimen (lectotype) of *L. leucotelus*, as assumed already by Schletterer (1890 : 274) and Roman (1920 : 6).

The specific name is accepted in its original form, although probably incorrect in ending, which should be leuco-*tela*, if as an adjective; it might be meant as a substantive in apposition and then acceptable, although then *-telum* would be more correct.

Although generally dark-coloured this species, as in *L. propinqua* Schletterer, often has the face pale medially.

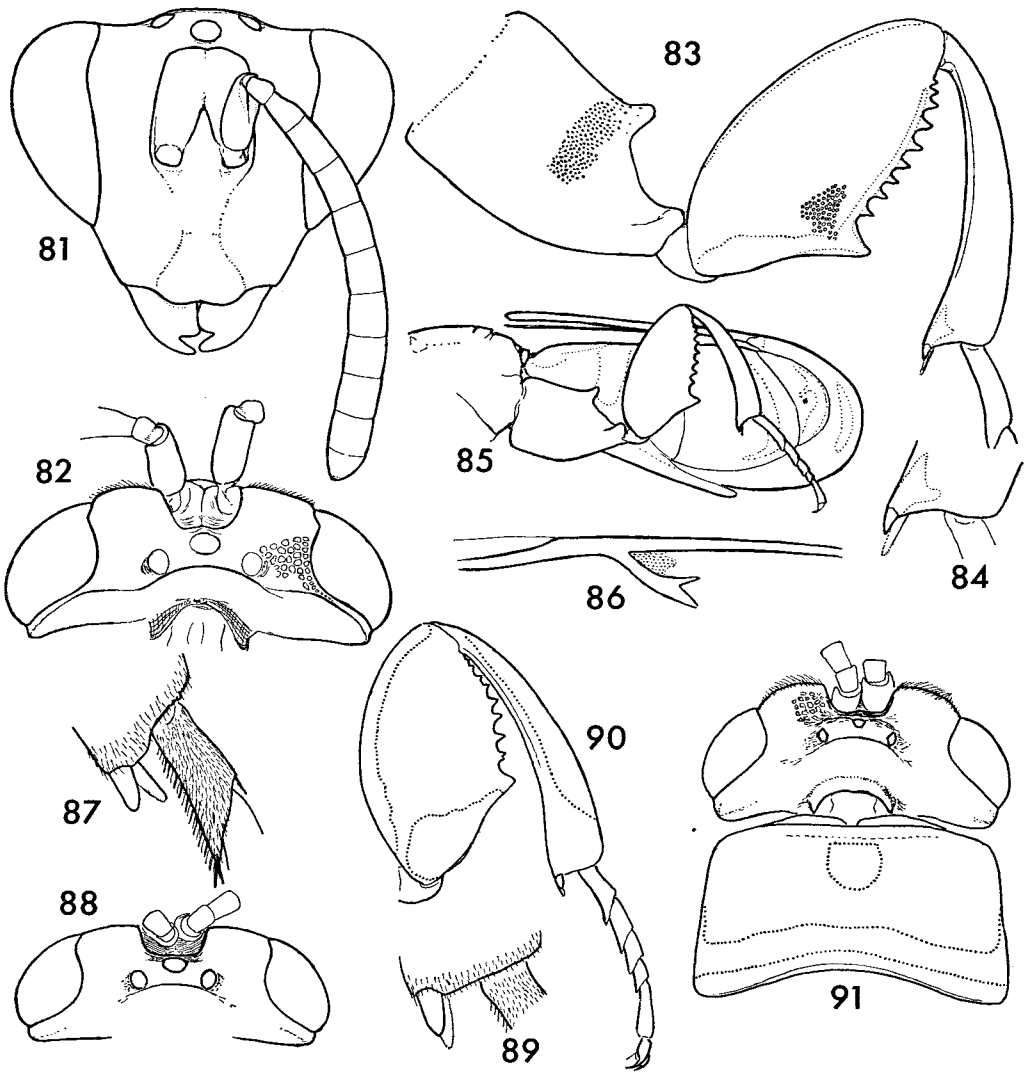
BIOLOGY. Hosts unknown. This and the preceding species mimic in body and colour various wasps. Several of these 'models' are listed by Ducke (1910 : 460).

DISTRIBUTION. Mexico, Guatemala, Panama, Canal Zone, Colombia, Ecuador, Guayana, French Guiana, Brazil.

MATERIAL EXAMINED.

Type data given in synonymy.

MEXICO: Guerrero, Acapulco, ix., 1 ♀ (*H. H. Smith*) (BMNH). GUATEMALA: Moca, Guatalon, 1000 m, 1931, 1 ♀ (*Bequaert*) (MNHU, Berlin). PANAMA: Lino, 1 ♀ (MNHU, Berlin). CANAL ZONE: Fort Clayton, iii. 1944, 6 ♀, 1 ♂ (*Frick*) (CAS, San Francisco). ECUADOR: Tena, iv. 1923, 1 ♀ (*F. X. Williams*) (BBM, Honolulu); Guayaquil, iii. 1923, 1 ♀ (*Buchwald*) (TM, Budapest). COLOMBIA: Dept. Boyaca, Muzo, vi. 1936, 2 ♀ (*Bequaert*) (MCZ, Cambridge). GUYANA: Bartica, 1 ♀ (TM, Budapest). FRENCH GUIANA: 1 ♀ (TM, Budapest); Cayenne, 2 ♀; Bartioz, 1 ♀



FIGS 81–91. American *Leucospis*. 81–86. *L. opalescens*. 81, 82, head in facial and dorsal (slightly oblique) views; 83, hind leg; 84, apex of hind tibia; 85, gaster of ♀; 86, venation. 87, 88. *L. auripyga*. 87, apex of hind tibia and basitarsus; 88, head. 89, 90. *L. desantisi*. 89, apex of hind tibia; 90, hind leg. 91. *L. birkmani*, head and pronotum.

(MCSN, Genoa). BRAZIL: Manaos, vii. 1930, 1 ♀ (*Molnár*) (TM, Budapest); Obidos, 2 ♀ (partly *Austen*) (TM, Budapest and BMNH); Goyaz, 1 ♀ (MNHN, Paris); Amazonas, Alta de Chia on River Tabajos, 100 miles S. of Santarem, 1 ♀ (*Bates*) (BMNH); Pará, Belém, v. 1924, 1 ♀ (*F. X. Williams*) (BBM, Honolulu); Pará, Benevides, x. 1918, 1 ♀ (*Klages*) (CM, Pittsburgh); Mato Grosso, Corumba, 1 ♀ (EI, Zurich); Mato Grosso, Cerrado, 1 ♀ (*Richards*); Santa Catarina, Nova Teutonia, 4 ♀ (*Plaumann*) (BMNH). PERU: Satipo, 600 m, viii. 1940, 1 ♀ (*Weyrauch*) (IML, Tucumán).

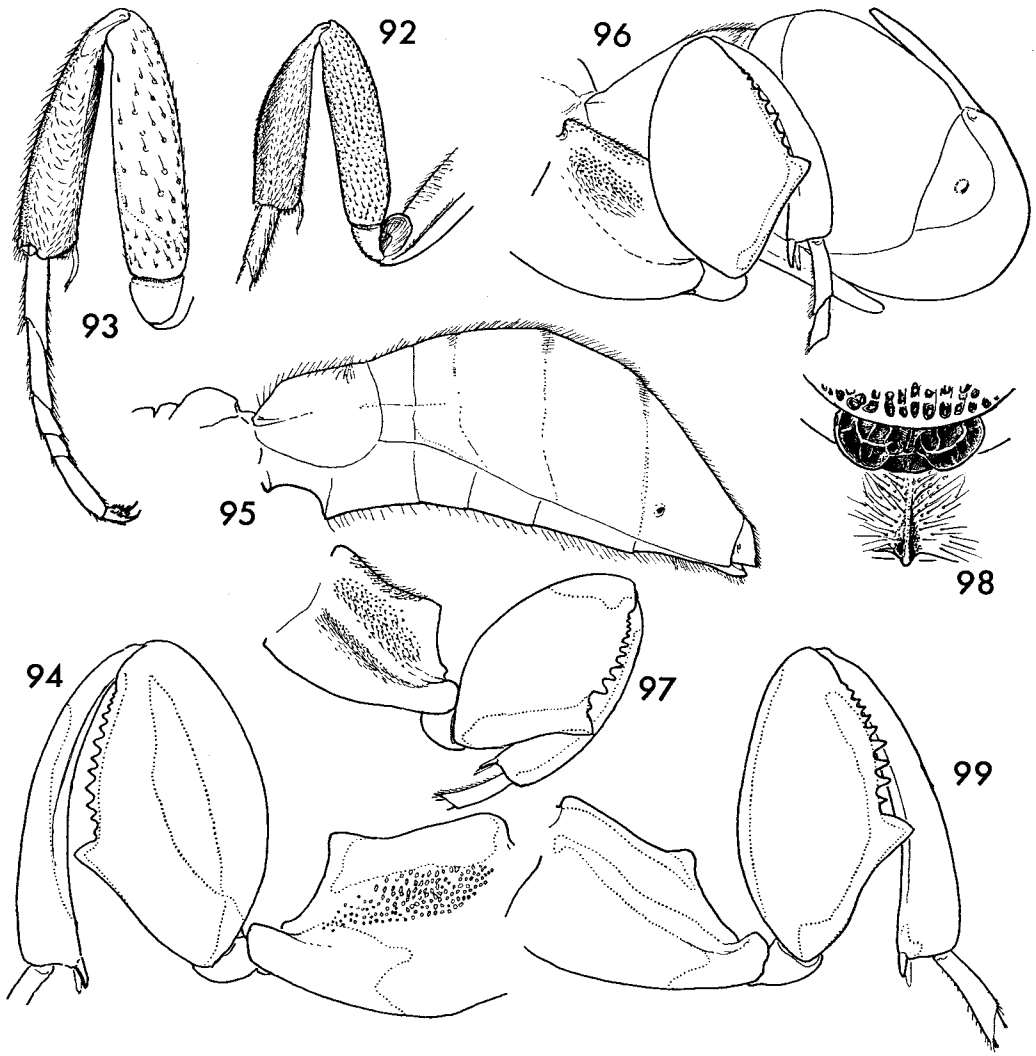
Leucospis brasiliensis sp. n.

(Text-figs 46–48)

♀. 8·0–11·5 mm. Black, without conspicuous metallic tint; pale yellow are: scapus beneath, narrow premarginal line on pronotum, narrow hind margin of scutellum, narrow oblique cross-band anteriorly on first tergite, medially on fourth tergite, at hind margin of the fifth, medially broadened curved lines on sixth tergite (avoiding spiracle), vertical streak on epipygium, inner side of fore tibia, anterior edge of mid tibia, dorsal edge of hind coxa meeting with postero-lateral and ventral maculae, hind femur along edges (narrowed at teeth) and hind tibia ventro-apically. Fore wing yellowish brown, paler to subhyaline at hind margin. In paratype two spots at anterior margin of pronotum suggest another band, also lateral margins of meso-scutum and hind margin of metapleurum narrowly yellow but apical streaks of gaster narrower.

Head as broad as pronotum posteriorly, dorsally about 2·1 times as broad as long (Text-fig. 46). Occipital carina moderate, extending as far as eyes, but the very short temples hardly carinate; POL about 1·1 times OOL; ocellar triangle 2 : 1, median ocellus not depressed but surrounded by distinct groove; frontal protuberances moderate; scrobes carinate even at ocellus, separated from it by narrow groove. Vertex rather regularly punctured, with indication of rugae radiating from lateral ocellus laterally. Face finely vertically rugulose-punctured, dull, with short dense pubescence. Head in facial view 1·2 times as broad as high, height to width of lower face as 56 : 36. Relative measurements (same scale): width of frontovertex 39, scrobes 24, eye 43 : 26 (moderately emarginate), malar space 8·5, width of mouth 27, length of scape 17, height of lower face 29. Clypeus fully 1·2 times as broad as high, vertically rugulose-punctured, weakly convex, lower margin laterally finely reflexed, bluntly bilobate and with a broad median tooth. Scapus about 2·3 times as long as broad. Flagellum plus pedicellus about 1·15 times as long as breadth of head, distinctly clavate, apically nearly twice as broad as pedicellus; first flagellar segment about 1·7 times, fifth 1·1, eighth about 0·8 times as long as broad, clava fully 1·5 times as long as broad. Antenna in smaller paratype more clavate.

Puncturation of thorax rather fine, dense, but on lateral parts of mesoscutum posteriorly and on scutellum interspaces reaching one-quarter to one-third width of punctures, on scutellar disc even broader and nearly smooth; pubescence short. Pronotum with narrow premarginal carina, hind margin only weakly carinate, nearly straight; sides converging, distinctly concave, anterior corner prominent; lateral panel broadly moderately concave, lower corner subrectangular-rounded. Mesoscutum posteriorly hardly more coarsely punctured than anteriorly, very shallowly depressed submedially; parapsidal vestiges shorter than their distance from outer margin. Scutellum about 1·28–1·40 times as broad as long, fairly convex, not distinctly depressed before apex. Dorsellum fully 3 times as broad as long, strongly regularly convex, dorsally punctured with interspaces as on scutellum, hairs sparse; not carinate. Propodeum moderately hairy, hairs on median area directed forwards; medially about 1·5 times as long as dorsellum, low median carina distinct, plicae straight. Mesopleural depression deep; upper mesepisternum and epimerum regularly punctured, interspaces smooth and on disc about as broad as punctures. Fore femur and tibia not carinate dorsally. Hind coxa very broad, laterally about 1·3 times as long as broad; dorsal edge sparsely punctured, nearly straight,



FIGS 92–99. American *Leucospis*. 92. *L. egaia*, fore femur and tibia. 93–95. *L. speifera*. 93, fore leg; 94, hind leg; 95, gaster of ♂. 96. *L. nigripyga*, hind leg and gaster of ♀. 97. *L. versicolor*, hind leg. 98, 99. *L. imitans*. 98, dorsellum and median carina of propodeum; 99, hind leg.

anteriorly broad, on inner side carinate, posteriorly with a subacute translucent lobe; below lateral edge anteriorly extremely densely punctured and hairy, in depression also a streak of dense puncturation but just above lateral edge punctures sparse and in upper part of depression broad smooth area narrowing forwards. Hind femur, excluding teeth, 1·8 times as long as broad, moderately convex, densely and rather coarsely punctured, densely hairy, on disc with dense subdecumbent hairs directed towards ventro-basal edge and with sparser semi-erect hairs directed more ventrad; basal tooth broad (Text-fig. 47), followed by 10–13 smaller teeth. Hind tibia apically produced into long spine. Apex of stigmal vein in fore wing rounded, much shorter than the moderately long uncus.

Gaster (Text-fig. 48) slightly longer than head plus thorax and 2·4–2·6 times as long as broad, distinctly regularly swollen in middle of the part behind first tergite; dorsum in profile showing moderate convexity of first tergite and of combined fourth and fifth tergites. First tergite fully 1·2 times as long as broad, with deep and rather narrow median groove not quite reaching basal fovea, otherwise regularly convex and very densely punctured, dull, pubescence short and dense. Punctured part of third tergite dorsally half as long as fourth tergite which is hardly one-fourth as long as the first; its sides diverging backward and in lateral view hardly expanding ventrad, hind margin hardly produced medially. Fifth tergite fully 1·3 times as broad as the first, combined with fourth medially hardly as long as first, dorsally broadly grooved, hind margin wide-angularly emarginate. Ovipositor reaching hind half of first tergite; sheaths slightly curved and broadened apically.

♂. 9 mm. Colour as in ♀ but gaster with arched band on first tergite, one narrow band on broadest part and with small transverse spot on sixth tergite at apex. Flagellum plus pedicellus fully 1·2 times as long as breadth of head, slightly clavate. Gaster about 2·3 times as long as broad, behind first tergite broadly fusiform, dorsally rather regularly, moderately coarsely punctured and shortly pubescent, interspaces smooth, narrow. First tergite slightly transverse, its sides slightly diverging, hind margin submarginate; basal fovea very short, not deep; dorsum moderately convex, punctured. Second tergite exposed, strongly transverse, crowded punctures medially in 4–5 cross-rows. Suture between the fourth and fifth tergites completely obliterated; sixth tergite medially convex, without keel, apical margin slightly raised but laterally without auricles. Epipygium very short, strongly transversely depressed behind middle, without keels, apical part shiny though hairy and with extremely fine punctures, apex rounded. Sternites narrow, flat, densely and relatively finely punctured; third transverse, fourth slightly, fifth and sixth distinctly elongate; last sternite slightly longer than broad, medially shallowly depressed, apex rounded, in middle subtruncate.

BIOLOGY. Unknown.

Holotype ♀, BRAZIL: State Rio Grande do Sul (*Stieglmayr*) (NM, Vienna).

Paratypes. BRAZIL: same data as holotype, 1 ♀ (BMNH); Santa Catarina, 4.ii.1956, 2.ii.1960, 2.xii.1962, 2 ♀, 1 ♂ (*Plaumann*) (♀ ERI, Ottawa; ♂ BMNH).

Leucospis santarema Walker

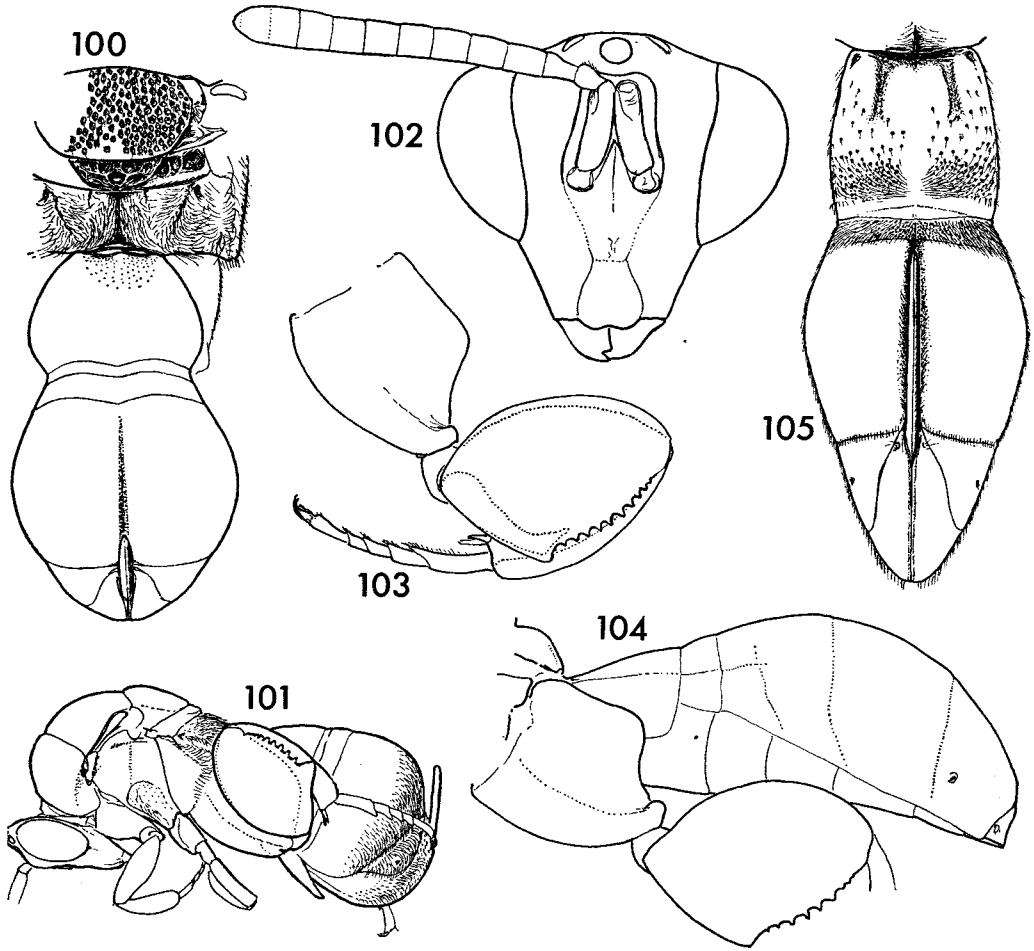
(Text-figs 43, 50, 51)

Leucospis Santarema Walker, 1860 : 20–21, ♀. LECTOTYPE ♀ (here designated), BRAZIL: State Pará, Santarem (BMNH) [examined].

The apparently single original specimen designated as lectotype. Here a few more characters in addition to the poor original description.

♀. 9 mm. Without metallic tint, with very rich yellow markings including whole face and temples.

Head slightly broader than pronotum, dorsally 2·3 times as broad as long, with occipital carina high medially, low laterally, weak on short temples; ocellar triangle 2·6 : 1, its surface



FIGS 100–105. American *Leucospis*. 100, 102. *L. sumichrastii*, holotype. 100, part of thorax and gaster dorsally; 101, body in lateral view; 102, head with antenna. 103, 104. *L. enderleini*. 103, hind leg; 104, gaster, hind coxa and femur in ♂. 105. *L. versicolor*, gaster of ♀.

low, with weak carina diverging on either side of median ocellus; vertex punctured and hairy except laterad of each ocellus, there with some radiating striae; fine groove laterad and anterior to median ocellus, latter separating it from distinct scrobal carina. Frontal protuberances low; interantennal lobe carinate only above. Head in facial view 1·27 times as broad as high, densely clothed with moderately long hairs. Relative measurements: height of head 49·5, width of frontovertex 33·5, lower face 31·5, eye 35·0 : 22·5, malar space 8·5, mouth width 25. Inner orbit weakly but distinctly emarginate. Clypeus about 1·1 times as broad as high, subtriangular, lower margin with semicircular lateral lobes and small median tooth. Inner edge of mandibles, above the triangular notch, subemarginate. First flagellar segment 1·35, second 1·4 times as long as broad.

Thorax densely punctured, hairs semi-erect, thin, of medium length. Pronotum with two rows of punctures between premarginal carina and the hardly raised and nearly straight hind margin, sides in dorsal view straight, slightly converging. Mesoscutum shallowly depressed submedially, very narrow interstices with weak microscopical cross-striation. Scutellum fairly flat, 1·56 times as broad as long (excluding axillae). Dorsellum transversely crescentic, about 3 : 1, weakly convex, with crowded punctures bearing weak sparse hairs, apically in middle subcarinate. Propodeum medially (sculptured part) shorter than dorsellum, median carina indistinct, plicae conspicuous only posteriorly. Upper mesopleurum with regular puncturation, rather narrow interspaces smooth. Fore femur dorsally with blunt edge, tibia nearly rounded but ventro-externally carinate. Depression of hind coxa above lateral edge with a streak of crowded puncturation; hairs directed towards lateral edge but nearer to the edge more towards apex. Hind femur densely coarsely punctured; hind tibia also rather coarsely and not very densely punctured, apex with narrow spine.

Gaster (Text-fig. 50) nearly 1·2 times as long as rest of body, 2·5 times as long as broad, slightly broadened posteriorly (width of first and fifth tergites as 1·2 : 1·0; pubescence uniform, not forming fasciae. First tergite medially with broad impunctate ovipositorial furrow, otherwise 1·2 times as long as broad. Hind margins of third and fourth tergites subangulate, the fourth about 4 times as broad as long, medially flat, with about 5 transverse rows of punctures; fifth medially 0·41 as long as the first. Ovipositor reaching scutellum, apex of sheaths rounded.

♂. Unknown.

BIOLOGY. Unknown.

DISTRIBUTION. Brazil.

MATERIAL EXAMINED.

Type data given in synonymy.

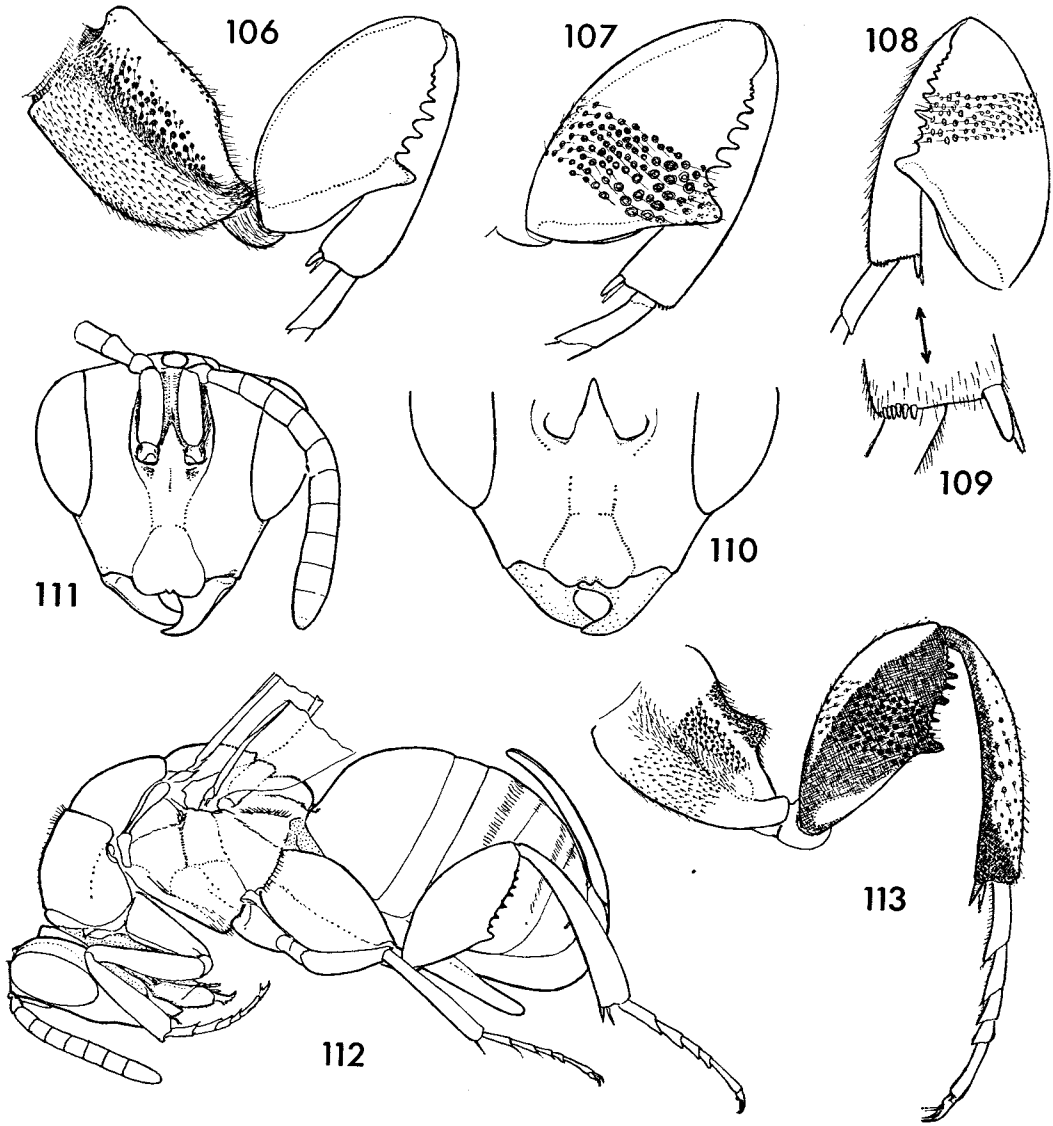
BRAZIL: 'Amazon', 1861, 1 ♀ (*Bates*) (BMNH).

Leucospis pictipyga sp. n.

(Text-figs 54, 55)

♀. 9·5–11·5 mm. Black with faint metallic violaceous tint; lemon-yellow are: spot on scapus, narrow line posteriorly on metapleurum, upper edge and apex of hind coxa, narrow line along ventral edge of hind femur and mainly hind half of gaster, with black reduced to anterior half of fifth tergite, a narrow line at its hind margin, a dot around spiracle and black line at hind margin of sixth tergite, epipygium on both anterior and posterior (ovipositorial) margin and a median streak from below up to level of spiracle. Upper edge of hind femur and tibia apically often brownish. Fore wing yellowish brown, hind wing subhyaline except at front margin.

Head hardly narrower than pronotum, dorsally about 2·3 times as broad as long; occipital carina touching lateral ocelli; temples distinct though not carinate, slightly longer than diameter



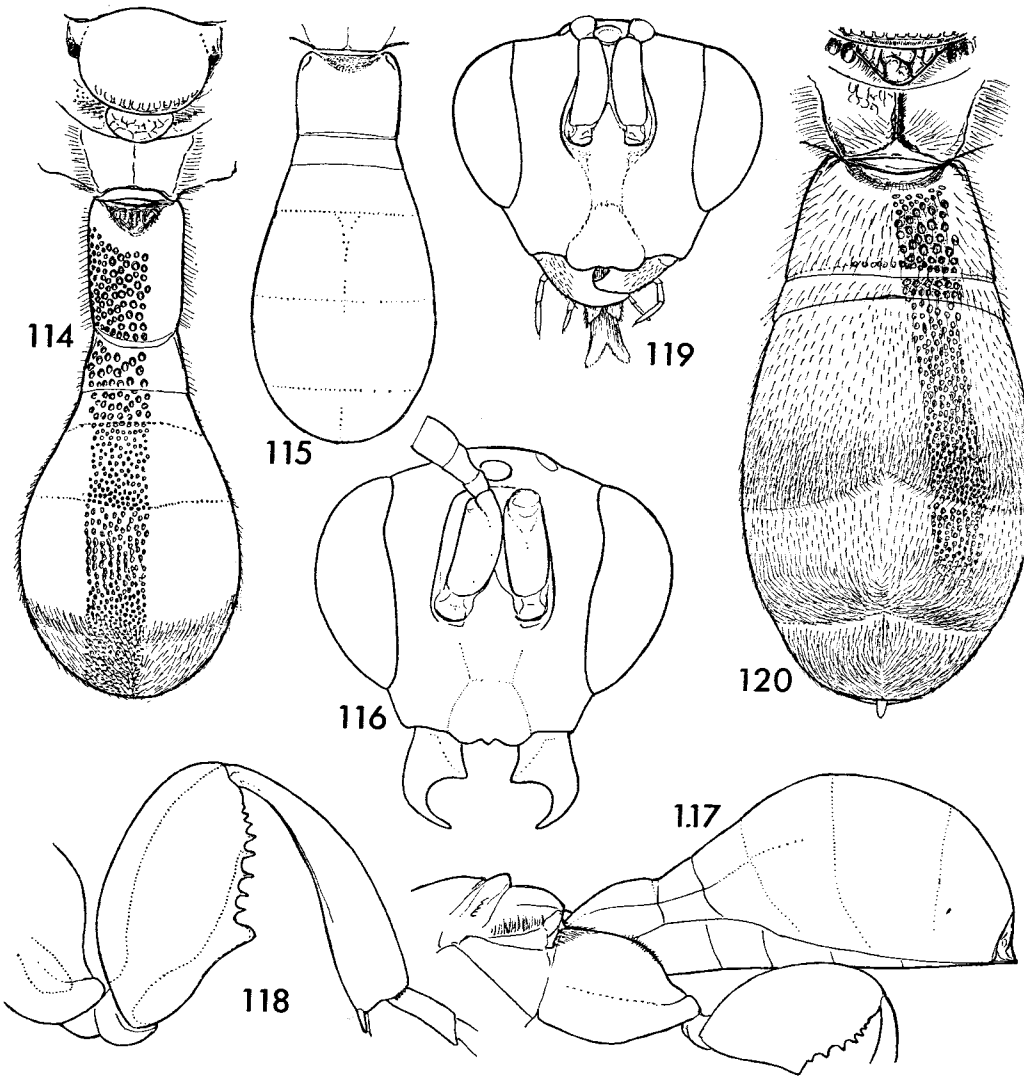
FIGS 106–113. American *Leucospis*. 106. *L. mexicana*, hind leg. 107–110. *L. cayennensis*. 107, hind femur and tibia; 108, ditto (of holotype of *distinguenda*); 109, apex of hind tibia; 110, lower part of head. 111, 112. *L. genalis*. 111, head with antenna; 112, body of ♀. 113. *L. metatibialis*, hind leg.

of ocelli; POL about 1·1 times OOL; ocellar triangle about 3 : 1. Scrobes touching median ocellus, carinately margined except at rounded frontal protuberances where carina becomes vague. Face and frons dull, densely rugulose-punctured, vertex more coarsely so, except narrowly laterad of each ocellus; pubescence extremely short, pale; interantennal area distinctly elevated in median line. In facial view head 1·25 times as broad as high (holotype 73 : 58). Relative measurements: frontovertex above weak emargination of eyes 44, lower face 42, its height 30, scrobes width 22, eye 41 : 23, malar space 12, width of mouth 32. Scapus stout, about 2·2 times as long as broad; flagellum plus pedicellus about 1·15 times as long as breadth of head, moderately clavate, apically 1·6 times as broad as pedicellus; first flagellar segment about 1·5, second 1·4, sixth 1·08, eighth 0·85 times as long as broad.

Puncturation on thorax rather fine and very dense, only on scutellum coarser and with some interspaces but these not completely smooth; pubescence extremely short. Pronotal hind margin finely carinate, premarginal carina thin, distinct in median two-fourths; collar otherwise convex, lateral margins straight, hardly converging, corners rounded; lateral panel not more hairy than collar, puncturation slightly obliterated in the rather shallow depression; lower corner wide-angular, rounded. Mesoscutum posteriorly flattened but not depressed, vestiges of parapsidal furrows very short. Scutellum nearly 1·4 times as broad as long, anteriorly slightly convex, along hind margin narrowly depressed, shallowly groove-like, margin itself microscopically strigulose, about as broad as punctures; axilla rather flat, sloping. Dorsellum raised into two tubercles, posteriorly not distinctly carinate, surface dull, very irregularly punctured-rugulose; also sides of metanotum irregularly punctured and partly hairy. Propodeum medially hardly half as long as scutellum, median carina weak; median area delimited by straight plicae, rather regularly punctured, finely hairy, hairs directed forward; lateral areas longer, hairs directed sideways. Femoral depression of mesopleurum moderate; interspaces between punctures on upper episternum with traces of fine irregular puncturation, broader interspaces on epimerum smooth. Narrowed part of claw of mid tarsi with 3–4 additional teeth. Hind coxa fully 1·1 times as long as high, dorsal edge coarsely punctured and shortly hairy, anteriorly rounded but thin posteriorly where forming an obtuse lobe; depression with smooth streak expanding caudad, sharply contrasting with dull densely and finely punctured lower half of depression, bearing decumbent hairs arranged as in *L. santarema*, anteriorly below dorsal edge punctures partly obliterated. Hind femur (Text-fig. 54) very stout, very densely punctured, broad basal tooth followed by 9–12 much slenderer and mostly shorter teeth. Apex of hind tibia produced in spine, actual outer spur rudimentary.

Gaster (Text-fig. 55) hardly longer than head plus thorax, about twice as long as broad. Pubescence rather short, not forming fasciae. First tergite about 0·7 as broad as the sixth, about as long as broad; its base shortly impunctate, puncturation on disc anteriorly as coarse as on scutellum, posteriorly denser and finer, on sides as fine as on next visible segment; depressed median groove percurrent, shallow. Fourth tergite more than one-third as long as the first, its hind margin nearly straight, medially at the shallow median groove with punctures in about 15 transverse rows. Fifth tergite nearly regularly convex, dorsally with deep ovipositorial groove which is narrowed anteriorly. Ovipositor sheaths extending over two-thirds to three-quarters of fifth tergite.

♂. 7·2–11·0 mm. In colour similar to ♀ but gaster with transverse yellow band in middle followed by a similar black and another yellow band, then second black band connected with longitudinal stripe nearly reaching apex of sixth tergite, this tergite also with sublateral black streaks and black around spiracle; apical sternites and epipygium yellow, latter with black spot above. Flagellum plus pedicellus nearly 1·3 times as long as breadth of head in bigger specimens. Gaster longer than head plus thorax, broadly fusiform, densely punctured. First tergite 0·7 as broad as gaster, slightly transverse, hind margin slightly emarginate, dorsum convex, basal fovea narrow and short. Second exposed tergite strongly transverse, much shorter than the following which is fused with the others, segmentation suggested by marginal yellow bands, only sixth tergite also sculpturally. Epipleurae of tergites 2 and 3 unusually high. Hind margin of sixth tergite not raised, without lateral auricles. Epipygium without keels, bisegmented, anterior two-thirds rather coarsely punctured, convex, apical third cres-



FIGS 114–120. American *Leucospis*. 114. *L. clavigaster*, part of thorax and gaster of ♂. 115–117. *L. ignota*. 115, gaster of ♂ dorsally; 116, head with mandibles; 117, gaster, hind coxa and femur of ♂ in lateral view. 118–120. *L. addenda*. 118, hind leg; 119, head; 120, part of thorax and gaster of ♂, dorsal view.

centic, slightly shiny, extremely finely punctured, extremely finely and shortly pubescent, apex convex, narrowly rounded. Sternites medially depressed, narrow, the third transverse, fourth to sixth distinctly elongate, subequal in length; seventh (last) less elongate, apex narrowly rounded.

BIOLOGY. Unknown.

Holotype ♀, ARGENTINA: Prov. Santa Fé, Rosario-Alberdi, 20.iv.1913 (*J. Hubrich*) (ZS, Munich).

Paratypes. ARGENTINA: Prov. Santa Fé, Rosario district: Alvear, Alberdi, Quirgin., Pagan., ii.–v., xi. 1912–1919, 9 ♀, 9 ♂ (*J. Hubrich*) (ZS, Munich and BMNH).

This species is very close to, although clearly different from, *L. santarema* Walker and *L. klugii* Westwood; but unlike them, *L. pictipyga* sp. n. has shorter pubescence, particularly on the thorax. In that it resembles more *L. brasiliensis* sp. n. and the two dark-winged species, *L. leucotelus* Walker and *L. propinqua* Schletterer.

Leucospis klugii Westwood

(Text-fig. 49)

Leucospis Klugii Westwood, 1839 : 249, pl. 3, fig. 1, ♂. LECTOTYPE ♂ (here designated), MEXICO (MNHU, Berlin) [examined].

The apparently single original specimen is designated as lectotype. I have seen both males which Schletterer had for study (1890: 257–259). The female has not previously been described.

♀. 8·8 mm. Black; with pale yellow: scapus, narrow band at posterior margin of pronotum, narrow hind margin of scutellum, hind corner or margin of metapleurum, apex of hind coxa ventrally, hind femur along ventral margin and generally distal two-fifths of gaster, including nearly half of fifth tergite but excepting narrow black margins of tergites and epipygium (also along ovipositor); dorsally at base of fifth tergite often a small yellow spot. Wings subhyaline, slightly yellowish brown at anterior margins. Pubescence of body yellowish, rather long.

Head dorsally 2·4 times as broad as long; occipital carina sharp, touching lateral ocelli but disappearing outside of them; scrobal carina weak, indistinct at ocellus; frontal protuberances low. Head in facial view 1·26 times as broad as high, face weakly convex, interantennal lobe not carinate medially, genae converging at about 60 degrees; lower margin of clypeus produced, bilobed, median tooth not distinctly developed. Relative measurements: head height 52, frontovertex width 39, scrobes 20 (their margins not extending below toruli), lower face width 36, height 27, eye 34·0 : 21·5, malar space 12·5, mouth width 25, scapus 17; flagellum plus pedicellus about 1·14 times the breadth of head, moderately clavate, distal funicular segments slightly transverse.

Pronotum with raised swollen premarginal carina; sides hardly converging, subconcave; lateral panel low, very shallowly depressed. Dorsellum very transverse, slightly convex, except for posterior smooth half, with dense piliferous punctures; no trace of carina. Propodeum medially nearly 1·5 times as long as dorsellum, moderately densely hairy, hairs directed forwards; median carina and plicae narrow, weak. Hind coxa in depression punctured, less densely so at dorsal edge and posteriorly with smooth area.

Gaster about twice as long as broad (Text-fig. 49), very densely punctured and hairy, apex in dorsal view subacuminate. First tergite narrower than gaster posteriorly as 0·8 : 1·0, 1·1 times as broad as long; basal fovea strongly reduced, hind margin of tergite straight, sides diverging; dorsally with smooth ovipositorial furrow. Hind margin of fourth tergite medially

subangulate; fifth tergite in median line moderately depressed, here 0·8 as long as first tergite, 1·85 times as broad as medially long.

♂. As redescribed by Schletterer (1890), in structure similar to *L. pictipyga* described above. Gaster with apical yellow bands on tergites 4 and 5, the sixth broadly yellow but with a black streak at each spiracle and a small spot medially above, sometimes connected with basal black band. In the ♂ from Mazatlán the gaster looks broader because its apex is more broadly rounded.

L. klugii is in many respects intermediate between *L. pictipyga* sp.n. and the two following species, which differ in still shorter body, broader gaster and longer genae.

BIOLOGY. Still unknown.

DISTRIBUTION. Mexico, Costa Rica.

MATERIAL EXAMINED.

Type data given in synonymy.

MEXICO: Sinaloa, 5 mls N. of Mazatlán, viii. 1964, 1 ♂ (*Martin*) (BMNH); San Luís Potosí, Valles, 29.viii.1956, 1 ♀ (*Dreisbach*) (EM, East Lansing); Colima, Playa de Oro, 11 mls N.W. of Manzanillo, viii. 1970, 1 ♀ (*M. S. & J. S. Wasbauer*) (CIS, Berkeley); Guerrero, Xucumanatlan, 2200 m, vii., 1 ♀ (*H. H. Smith*) (BMNH); Yucatan, Temax, 1 ♂ (*Gaumer*) (BMNH). COSTA RICA: Dept. Puntarenas, Palmar, v. 1960, 3 ♀ (*D. O. Allen*) (USNM and MCZ, Cambridge).

Leucospis anthidioides Westwood

(Text-figs 53, 56)

Leucospis Anthidioides Westwood, 1874 : 135, pl. 25, fig. 7, ♀. LECTOTYPE ♀ (here designated), BRAZIL: Amazonas (UM, Oxford) [examined].

The apparently single original specimen is designated as lectotype.

L. anthidioides was separated from *Leucospis* Fabricius by Shipp (1894*b* : 245) as genus *Exochlaenus* Shipp. The present revision shows that Shipp's genus has no justification, for there is no real and distinct gap between the species-group in which *anthidioides* belongs and the other species of the genus.

The male is similar to that of *L. xylocopae* Burks; both have last sternite emarginate in middle, sixth sternite subquadrate, but the fifth is distinctly transverse, the fourth still more transverse and its hind margin slightly emarginate; in *xylocopae* the fifth sternite is subequal to the sixth and also the fourth is hardly transverse.

BIOLOGY. Reared from *Xylocopa submordax* Cockerell, Apidae, in Trinidad.

DISTRIBUTION. Trinidad, Surinam, N. Brazil.

MATERIAL EXAMINED.

Type data given in synonymy.

TRINIDAD: St Augustine, ex *X. submordax*, 1963, 20 ♀, 2 ♂ (*F. D. Bennett*) (BMNH and USNM). SURINAM: Paramaribo, 1 ♀ (*Heller*) (MNHU, Berlin). BRAZIL: Aripo, Savannah, 31.x.1937, 1 ♀ (BMNH); Pará, Itaituba, 1 ♀ (MCSN, Genoa).

Leucospis xylocopae Burks

Leucospis xylocopae Burks, 1961 : 537–540, figs 1–4, ♀ ♂. Holotype ♀, BRAZIL: Sao Paulo State, Usina Esther nr Cosmopolis (USNM).

Dr Burks kindly sent me paratypes for examination. *L. xylocopae* is very close to *L. anthidioides* Westwood and very similar, except that the yellow markings are less extensive and usually also the ovipositor is shorter. In the specimens examined the first tergite is always without yellow markings, its puncturation is slightly finer, pilosity more erect and thinner than in *anthidioides*. The second tergite is medially slightly produced. The apical processus of the stigmal vein in the fore wing usually less distinct than in *anthidioides*. Compare also notes on the sternites in the male under *anthidioides*.

BIOLOGY. Reared from *Xylocopa nogueirai* Hurd & Moure, Apidae (Burks, 1961).

DISTRIBUTION. Brazil, Paraguay.

MATERIAL EXAMINED.

BRAZIL: Sao Paulo State, Usina Esther nr Cosmopolis, 1 ♀, 1 ♂, paratypes (BMNH); Mato Grosso, Aquidauana, xii. 1919, 1 ♀ (CU, Ithaca). PARAGUAY: San Bernardino, 3 ♀ (*Fiebrig*) (NM, Vienna and BMNH).

THE *AFFINIS*-GROUP

The few species belonging here are *L. latifrons* Schletterer, *L. azteca* Cresson, *L. affinis* Say and *L. poeyi* Guérin-Méneville, mostly confined to North and Central America, only *L. latifrons* spreading as far south as Bolivia. They are all very similar in appearance, with a relatively slender body and in the females the ovipositor reaching about or beyond the base of the gaster, with relatively weak metallic tint which is more distinct only on the head, mainly in and above the scrobes. The lower tooth of the mandibles is separated by a rather small notch, the lower margin of clypeus has a median tooth (as the *hopei*-group). The metanotal dorsellum is coarsely punctured, never distinctly carinate posteriorly. The hind coxa bears dorsally a tooth, the hind femur has many small teeth following the larger basal one (as in all other groups except the *texana*-group), the tibia is almost perpendicularly truncate at apex, with the outer spur well developed (difference from the closely related *hopei*-group and the *egaia*-group), the hind coxa never extensively smooth, always bearing dorsally a rather narrow tooth which bears some punctures, but may be less distinct in unusually small specimens.

Leucospis latifrons Schletterer

(Text-fig. 58)

Leucospis latifrons Schletterer, 1890 : 259–261, ♂. Holotype ♂, MEXICO: Temax, N. Yucatan (BMNH) [examined].

Leucospis decorata Weld, 1922 : 24–25, ♀. Holotype ♀, COSTA RICA: Juan Vinas (USNM). **Syn. n.**

I studied the holotype of *L. latifrons* and had specimens identified as and compared with the holotype of *L. decorata* by Dr Burks. The pale markings are yellow in most specimens identified as *decorata* and whitish in the holotype of *latifrons* but otherwise there is no difference. The closely related *L. affinis* Say shows a similar variation.

I have seen also most of the specimens identified as *L. azteca* by Schletterer. They clearly belong to the same species as *latifrons*, which I find rather puzzling, as Schletterer was an acute observer otherwise. He probably had this lot and *latifrons* at different times and could not compare them properly, because he compares *L. latifrons* with *L. klugii*, a very different species.

L. latifrons is very similar to *L. affinis* from which it differs mainly by the unusual pilosity of the hind coxa (Text-fig. 58) and in having the pale markings on the thorax usually much more reduced, on the pronotum to a narrow line posteriorly on the premarginal carina, with the sides always black. However, some small males (of 5 mm) from Mexico may be difficult to place with certainty as the hairs in the depression of the hind coxa are less conspicuous, although even then they clearly converge towards the deepest median part of the depression where the puncturation is much denser than on the streak just below and (especially) above. In these males the penultimate tergite usually bears a narrow median whitish line, whilst in *affinis* there is an oval spot instead; the gaster is more narrowed at base than in *L. affinis*, with the first tergite distinctly elongate, usually about 1.2 times as long as broad, whilst in *L. affinis* this tergite is at most as long as broad, usually slightly transverse in the small specimens.

BIOLOGY. Not yet known.

DISTRIBUTION. Mexico, Guatemala, Costa Rica, Colombia, Bolivia.

MATERIAL EXAMINED.

Type data given in synonymy.

MEXICO: No locality, 1862, 2 ♀ (*Biart*), vi. 1863, 1 ♀ (*Sumichrast*) (MNHN, Paris); N. León, W. of El Cercado, 6.vi.1951, 1 ♀ (*P. D. Hurd*) (BMNH); S. Luís Potosí, 5 mls W. of Xilitla, 800 m, 22.vii.1954, 1 ♂ (*Univ. Kans. Exp.*) (DE, Davis); Nayarit, Pichon, 5.vii.1956, 1 ♂ (*R. & K. Dreisbach*) (EM, East Lansing); Jalisco, Tequilla, 19.vii.1954, 1 ♀ (*J. W. McSwain*) (CIS, Berkeley); Guerrero, Xucumanatlan, 250 m, 1 ♀, 4 ♂ (*H. H. Smith*) (BMNH); State Vera Cruz, Orizaba, 1862, 2 ♀ (*Biart*) (MNHN, Paris), 1871, 1 ♀ (*Bilimek*) (NM, Vienna); Cordoba, 1 ♀, 1 ♂, '*azteca* det. Schletterer' (MHN, Geneva), vii. 1966, 2 ♀, 5 ♂ (*Buckett & Gardiner*) (MCZ, Cambridge; BMNH); Yucatan, Chichén Itza, 6.iv.1965, 1 ♀ (*O. W. Richards*)

(BMNH); Chiapas, Pico de Soconusco, 3. viii., 1 ♀ (*Purpus*) (MNHU, Berlin); 13–16 mls N.W. of Comitan, 3.iii.1953 & 3.viii.1952, 1 ♀, 3 ♂ (*Bechtel & Schlinger, Gilbert & MacNeil*) (CIS, Berkeley; BMNH)); Pan-Amer. Hway, Rio de la Venta, 6.viii. 1956, 1 ♀ (*J. W. MacSwain*) (CIS, Berkeley). GUATEMALA: Antigua, 23.vi.1923 (*E. G. Smyth*) (USNM). COSTA RICA: San José, 6 ♀, 1 ♂ (DEI, Eberswalde; EI, Zurich; TM, Budapest; ZS, Munich); Turrialba, 700 m, 4 ♀, 2 ♂ (DEI, Eberswalde; MCSN, Genoa; USNM); San Pedro de Montes de Oca, 2.v.1932 (*Ballou*) (BMNH). COLOMBIA: Dept. Boyaca, Muzo, 900 m, vii.1936, 1 ♀ (*J. Bequaert*) (MCZ, Cambridge). BOLIVIA: Coroico, 1 ♀ (BMNH).

Leucospis azteca Cresson

(Text-fig. 57)

Leucospis azteca Cresson, 1872 : 33–34, ♀. LECTOTYPE ♀ (here designated), MEXICO (ANS, Philadelphia) [examined].

I designate as lectotype the only syntype I could examine (no. 1799.1), although Weld (1922 : 27) mentioned 'Type.—Cat. No. 1799 and two paratypes', but apparently did not label or otherwise specify that she meant a certain specimen out of the three syntypes as lectotype.

L. azteca seems to be a good species but I have not seen any other specimen except for the lectotype. It is certainly close to *L. affinis* Say and still closer to *L. latifrons* Schletterer. From *L. affinis* it differs by the relatively slenderer and longer antennae (in female flagellum plus pedicellus 1.19 times as long as breadth of head); the yellow colour of pronotum reduced to a narrow cross-line on the premarginal carina, although the sides of the mesoscutum are also yellow-bordered and the epipygium is extensively yellow, i.e. there is no apparent reduction of the yellow markings otherwise; the first tergite has a median smooth crest delimited on sides by a flat depression, much as in *L. latifrons* Schletterer; hind femur externally fairly densely punctured, much more densely than in any of the several hundreds of *L. affinis* I have examined. *L. azteca* differs from *L. latifrons* in lacking the long and unusually arranged pilosity of the hind coxa, but otherwise the two are very similar and *latifrons* has been frequently misidentified as *azteca* by many authors, including Schletterer. The punctuation, particularly of the depression of the hind coxa, is fairly dense and regular, much as in *L. affinis dubiosa* Cresson. At first I thought that the two may be conspecific, yet the first tergite in the female of *dubiosa* is much like that in *L. affinis*, i.e. with the median double ovipositorial furrow which is well delimited on its sides.

BIOLOGY. Not known.

DISTRIBUTION. Mexico.

Leucospis affinis Say

(Text-figs 61–63)

Leucospis affinis Say, 1824 : 63–64, ♀♂.

As several subspecies are recognized the synonymy and some other data are given below under the relevant names.

L. affinis is the commonest and most widely spread North American species and so it is not surprising that it shows fairly wide variation. The length of body in the specimens examined is in the female 3·9–11·5 mm, in the male 3·6–9·8 mm, the dwarfs coming, possibly, from smaller hosts at less favourable conditions. The body in general is fairly slender but some southern specimens (e.g. from Concepcion Bay, Lower California, Mexico) are rather robust, the gaster in the female being only 1·8 times as long as broad, compared with the average 2·5 times as long as broad (a similar case is known to me in the southern specimens of *L. dorsigera* Fabricius in the Mediterranean subregion). At the same time the apex of the gaster may be narrowly or broadly rounded. The puncturation also shows the greatest deviations in the south: in many specimens from Lower California the punctures on the face are conspicuously less crowded than normally and in some dark Mexican forms (attributed below to ssp. *dubiosa* Cresson) the puncturation of hind femur and coxa is unusually dense.

The colour varies greatly but generally keeps to a certain pattern, apart from the red which normally replaces black on the base of gaster, on hind coxae, on antennae and rarely on some other parts of the body (although rufinism seems to be rather rare in *L. affinis*). In the average form the following parts are pale yellow: scapus beneath, pronotum dorsally along posterior and lateral margins and on a cross-band anteriorly, mesoscutum laterally, scutellum posteriorly, metapleurum dorso-posteriorly, all knees, tibiae except fore and mid ones externally and hind tibiae except along the ventral edge, hind femur beneath basally and along dorsal edge towards apex; in the female the first and fifth tergite with a cross-band posteriorly, the fourth tergite and epipygium with vertical streaks; in the male the first, fourth and fifth tergites posteriorly with a cross-band, the sixth tergite with median elongate spot. In the female the yellow may spread to cover most of the pronotum except a quadrangular cross-band on the disc, to form two submedian spots on mesoscutum and one on upper mesepisternum, and yellow is most of the scapus, metapleurum, the femora and tibiae, then all gastral segments except narrow margins; in the male all the gastral segments except the second tergite and epipleurum of the first may bear broad bands, the sixth tergite may have a large deltoid yellow area. The lessening extent of the pale markings is apparent first on the gaster, where the cross-bands may be interrupted medially whilst the mesoscutum still retains the submedian spots. In the darkest form the lateral lines on pronotum become narrow, the anterior band is reduced to a short line or a double spot (in *affinis affinis*, e.g. in two males from Nevada, both under 4 mm, in which also the gastral bands are much reduced and on the fourth tergite to mere transverse spots on either side), or may disappear completely (in

affinis dubiosa from Mexico), so that the pronotum bears only the narrow premarginal line.

The northern dark specimens usually retain the yellow colour of the markings (except in one male from Stockton, Manitoba and one female from Mt Sainte Marie, Quebec in which they are whitish), but also many southern specimens, mainly from lower altitudes, are yellow-marked, the latter usually very extensively yellow. The latter specimens were sometimes identified as 'var. *poeyi*', but the true *L. poeyi* Guérin-Méneville is a different Cuban species. These predominantly yellow specimens usually have the pubescence on the face golden instead of white, but because of intermediate forms, this is not regarded of much importance.

In the darker forms coming mainly from the higher mountainous altitudes of the south-west of the U.S.A. and of Mexico the yellow colour usually is replaced by whitish. The white appears sometimes first on the legs, but many specimens show gradual weakening of yellow to creamy white. Often partly yellow specimens occur together with the white ones.

All the above specimens show a weak to moderate infumation of the wings but in general the eastern specimens have darker infuscation.

A more conspicuous and to some extent still puzzling trend in variation may be observed on the specimens from the south-east of the U.S.A., mainly from Florida. Already in some specimens from Falls Church, Virginia (near Washington, D.C.) and from California (Newman, Whitewater Canyon, Riverside) and Arizona (Phoenix) the yellow colour turns more or less to orange and in the Virginian ones the wings are darker than usual. In all these places the orange form occurs together with the normal yellow-marked form, but in all specimens from Florida the markings are almost uniformly orange-red (rather pale orange only in one female from Homosassa, Citrus County) and the wings are conspicuously infuscate, reminding one much of *L. slossonae* Weld and *L. robertsoni* Crawford, not mentioning some similar forms in the Aculeates. Morphologically I cannot find anything that could help in solving the problem, whether to regard this Floridan form a variety of *L. affinis* or as a subspecies. Having seen the mentioned specimens which I regard as intermediate, I am not quite sure about the allopatric character of this var. *floridana* Cresson, as it was described. Having no evidence to the contrary I am inclined to accept the view of some of my American colleagues who regard *floridana* as a subspecies of *L. affinis* Say.

I have similar reasons for regarding also the Mexican form with rather reduced pale markings and more densely punctured hind femur and coxa as subspecies *dubiosa* Cresson. In this case, however, there is still less evidence as the material is very scarce. Perhaps somebody, who will have access to a still richer material from the relevant regions, will check and correct my conclusions.

Key to the subspecies of *L. affinis*

a Hind femur (and coxa) externally densely punctured, interspaces mostly narrower than punctures (Text-fig. 63); pale yellow markings much reduced, on pronotum usually only narrow premarginal line present, sometimes anterior cross-line indicated in the middle; Mexico, Salvador . . . ***affinis dubiosa*** Cresson (p. 67)

– Hind femur not very densely punctured, interspaces mostly much broader than punctures (latter at most as dense as indicated in Text-fig. 61); pale markings mostly more extensive, on pronotum anterior cross-band always partly present; distribution more northerly . . . . . b

b Pale markings yellow to whitish; infuscation of wings moderate; from Canada to Mexico but not in Florida . . . . . ***affinis affinis*** Say (p. 65)

– Markings orange-red or orange; wings fuscous; Florida and adjacent regions ***affinis floridana*** Cresson (p. 66)

Leucospis affinis affinis Say

(Text-fig. 61)

Leucospis affinis Say, 1824 : 326–327, ♀♂. Types, U.S.A.: Pennsylvania (lost).

Leucospis subnotata Westwood, 1834 : 215, ♀. LECTOTYPE ♀ (here designated), CANADA: Nova Scotia, Halifax (UM, Oxford) [examined].

Leucospis fraterna Say, 1836 : 269–270, ♀♂. Types, U.S.A.: Indiana (lost).

Leucospis Druraei Westwood, 1839 : 251–252, ♀. Type(s), [NORTH AMERICA] (lost).

Leucospis basalis Westwood, 1839 : 264, ♀♂. LECTOTYPE ♀ (here designated), [NORTH AMERICA] (MNHU, Berlin) [examined].

Leucospis Canadensis Walker, 1860 : 17–18, ♂. LECTOTYPE ♂ (here designated), CANADA (BMNH) [examined].

Leucospis bicincta Viereck, 1906 : 227, ♂. Holotype ♂, U.S.A.: Arizona, Oak Creek Canyon (SM, Lawrence).

The type material of *affinis* and *fraterna* seems to be lost (cf. Peck, 1963 : 892). One female standing (together with two more) under *L. subnotata* in the original Westwood collection in Oxford and the only one fitting the description and bearing the right data, was selected as lectotype, similarly as in the case of *L. basalis*, where the male was labelled as paralectotype. I have, however, not found any trace of the original material of *L. druraei*, which should have come to the British Museum collections from the Entomological Society of London, but was not recorded by Walker, 1846, while the specimen mentioned by him from Ohio is still preserved, under *affinis*, along with one original male specimen of *L. canadensis*, labelled as lectotype by Dr Burks during his visit to London in 1970.

I could not examine the holotype of *L. bicincta* Viereck, but as my observation of the range of variation confirms the assumption of Weld (1922 : 27) and of Gahan (*in* Peck, 1951 : 593, where actually synonymized), I regard *bicincta* a synonym of *L. affinis affinis* Say, although the development of the white colour instead of yellow may be connected with some climatic conditions. Apart from the two Canadian specimens mentioned above and from the slightly different Lower Californian specimens, the darker form with more or less reduced and white markings comes mainly from the mountainous regions of south-western North America, viz. from eastern California (Inyo County), Nevada (Washoe, Pershing and Lyon Counties), Arizona (Yuma County, Phoenix, Globe, Huachuca Mts, Tucson, Pima and Cochise Counties, Chiricahua Mts), New Mexico (Eddy County, Hidalgo County), Texas (Big Bend National Park), and Mexico: Sonora (Magdalena, Ciudad Obregon), Chihuahua (Chihuahua) and Coahuila (Saltilla).

Apparently it was this subspecies (*L. affinis affinis*) which was studied by

Snodgrass, in particular the thorax (1910 : pl. 8, figs 35–39, pl. 15, fig. 15) and the male gaster and genitalia (1941 : 36–37, pl. 8, figs Q–T).

BIOLOGY. Parasite of Megachiline bees, occasionally including their Stelidine parasites. The following list of the hosts repeats those listed by Peck (1963; there the relevent references) and by Porter (1972) and includes a few new ones marked with an asterisk* after the name: *Anthidium marginatum* (Say), *Ashmeadiella* sp., *Ashmeadiella aridula astragali* Michener*, *Dianthidium pudicum consimile* (Ashmead), *Hoplitis producta* (Cresson), *Megachile brevis* Say, *M. inermis* Provancher, *M. montivaga* Cresson, *M. relativa* Cresson, *M. rotundata* (Fabricius)*, *Osmia atriventris* Cresson, *O. californica* Cresson*, *O. lignaria* Say*, *O. pumila* Cresson, *O. rostrata* Sandhouse*, *O. simillima* Smith, *Stelis sexmaculata* Ashmead, *Stelis* sp.

DISTRIBUTION. Southern Canada, U.S.A. (except Florida), Mexico; Hawaii (?introduced).

MATERIAL EXAMINED.

Type data given in synonymy.

CANADA: S. Manitoba, S. Ontario (e.g. Ottawa, Shetland, Ridgeway), S. Quebec. U.S.A. (several hundreds of ♀, ♂): Oregon, Idaho, California, Nevada, Utah, Colorado, New Mexico, Arizona, Kansas, Texas, Mississippi, Illinois, Indiana, Ohio, New York, Vermont, Massachusetts, Connecticut, Pennsylvania, Maryland, Virginia, North and South Carolina, Georgia. MEXICO: Baja California (nr La Paz, San Ignacio, Agua Verde, Cataviñia, San Quintin, Concepcion Bay), Sonora (nr Cocorit, Alamos, Minas Nuevas, Morrison, Magdalena, Guaymas, San Bernardo, Ciudad Obregon, Estacion Llano), Chihuahua (Ciudad Camarge, Chihuahua, Calaices), Coahuila (nr Saltillo), Durango (nr Alamillo), San Luís Potosí (and Lepatillan, 3000 m), Guanajuato. HAWAII: Oahu, Ewa, 7.vii.1964, 1♀ (*J. W. Beardsley*) (BBM, Honolulu).

Leucospis affinis floridana Cresson

Leucospis affinis var. *floridana* Cresson, 1872 : 33, ♀ ♂. Syntypes, U.S.A.: Florida (ANS, Philadelphia).

I have not seen the type-material but have examined several specimens identified as *floridana* (mostly as subspecies of *L. affinis*) by Weld, Gahan and Burks.

The variation and the intermediate forms between *L. affinis affinis* and *L. affinis floridana* are mentioned above. Additionally I examined a female from Tampico, Mexico, which seems to agree with the typical Floridan specimens.

BIOLOGY. There are no definite host records known to me concerning this form, but Porter (1972) in his paper on the Floridan *Leucospis*, although speaking about *L. affinis* as a species and in general terms, mentions also a bee of the genus *Ashmeadiella* which may concern a new record.

DISTRIBUTION. South-east U.S.A., mainly Florida; Mexico.

MATERIAL EXAMINED.

U.S.A.: Georgia, St. Simons Island, Fairchild, 1 ♀ (BMNH); Florida, Altamont; F., Archbold Biol. Station, Highlands County; F., Homosassa, Citrus County; F., Key West; F., Larkins; F., Paradise Key; F., St. Augustine (various depositories). MEXICO: Tampico, 1 ♀ (MNHN, Paris).

Leucospis affinis dubiosa Cresson

(Text-figs 62, 63)

Leucospis dubiosa Cresson, 1872 : 34, ♀. Holotype ♀, MEXICO (ANS, Philadelphia) [examined].

Cresson (1872) noted that *L. dubiosa* 'may prove to be only a variety of *azteca*' and Schletterer (1890 : 282) synonymized *dubiosa* with *azteca*, but I find them different in the shape of the first tergite in the female. Weld (1922 : 10, 27) places *dubiosa* as a good species without any comment, but in the key she separates it from *L. azteca* on the less extensively yellow gastral apex and hind femur, apart from smaller size and the hardly shorter ovipositor. In the shape of the ovipositorial furrow on the first tergite (in female), which in my experience does not seem to vary much, I find *dubiosa* very similar to *L. affinis* and cannot separate them except on the denser puncturation of the hind leg and the reduced pattern on the pronotum. The female from Alamos shows a short anterior yellow cross-macula on pronotum, the holotype female of *dubiosa* has it only indicated, the other female lacks it completely as well as all the males. In the Salvador male the pale pattern is much reduced (body size only 5·2 mm), with apical third of gaster black, but the two Alamos males (7·5–8·0 mm) have the fifth tergite posteriorly broadly bordered with yellow, the sixth tergite extensively yellow and even the epipygium partly yellow. Such a pattern might correspond, in the female, with something as described for *L. azteca*. The Mitla male is intermediate between the two extremes. To conclude, I assume that the shape of the first tergite excludes *azteca* as a different species, while *dubiosa* is a subspecies of *L. affinis* Say.

BIOLOGY. Unknown. In Mexico collected on *Donnellsmithia hintonii* M. & C.

DISTRIBUTION. Mexico, Salvador.

MATERIAL EXAMINED.

Type data given in synonymy.

MEXICO: Sonora, Alamos, 5.ix.1970, 1 ♀, 2 ♂ (*R. M. Bohart*) (MCZ, Cambridge and BMNH); Nayarit, Ahuacatlan, vii. 1951, 1 ♂ (*P. D. Hurd*) (CIS, Berkeley); Guerrero, Rincon, 900 m, ix., 1 ♀ (*H. H. Smith*) (BMNH); Oaxaca, Mitla, 2000 m, 29.vii.1962, 1 ♂ (*Milliron*) (ERI, Ottawa). SALVADOR: Quezaltepeque, 23.vi.1963, 1 ♂ (*Cavagnaro & Irwin*) (MCZ, Cambridge).

Leucospis poeyi Guérin-Méneville
(Text-figs 59, 60)

Leucospis Poeyi Guérin-Méneville, 1845 : 414, ♀. LECTOTYPE ♀ (here designated), CUBA (MCSN, Genoa) [examined].

The following characters are from the lectotype.

♀. 9 mm. Black, with metallic tint distinct only on head; following parts lemon-yellow: scapus, pedicellus and base of third antennal segment, pronotum except for crescentic black macula anteriorly (Text-fig. 59), lateral margins of mesoscutum, scutellum except basal third, propodeum except along base, metapleurum, broad cross-band on first and fifth tergite, epipygium narrowly at apex along ovipositor, fore and mid femora except basally, all tibiae, hind coxa very broadly ventro-apically, hind femur broadly at base and at apex; antennal flagellum except medially, then pronotum anteriorly and mesoscutum on disc, partly reddish instead of black, also black of coxae and femora mostly replaced by red, as well as epipygium. Fore wing mainly yellowish brown, including venation, apical fifth in the lectotype slightly but conspicuously infumate.

Interantennal lobe with median carina indistinct. Antennal flagellum distinctly attenuate basally, flagellum plus pedicellus 1·82 times as long as height of head (breadth not possible to measure owing to damage by *Anthrenus*), seventh flagellar segment 1·1 times as long as broad, eighth quadrate. Hind femur basally beneath with distinct inner crest. Hind tibia dorsally in basal half hardly arched (Text-fig. 60). Otherwise very similar to *L. affinis* Say.

I think that *L. poeyi* is a good species, together with Cresson (1872), whose redescription fits well the typical form, and Dr P. Alayo (of Havana, Cuba), who informs me that they have ten specimens 'of this rare species'. On the other hand, Schletterer (1890 : 285) dropped *poeyi* as a synonym of *L. affinis* Say, which reflected eventually in a subsequent misinterpretation of the name *poeyi* for a rich yellow southern variety of *L. affinis*, e.g. by Weld (1922 : 27). The latter form of *affinis* always has an anterior yellow cross-band on the pronotum, whilst in *L. poeyi* the pronotal pattern is different, showing only the posterior yellow band which expands strongly laterad but the anterior band is missing. Morphologically, however, the two species are very similar. Apart from the somewhat longer antennae in *L. poeyi* the differences are given in the key above.

BIOLOGY. Reared from *Megachile poeyi* Guérin-Méneville (Hym., Apidae) (Cresson, 1872).

DISTRIBUTION. Cuba.

THE *EGAIA*-GROUP

The common characters are: lower tooth of the mandibles separated by a triangular notch; lower margin of clypeus mostly without median tooth; occipital carina complete though strongly sinuate on either side; pronotum mostly without premarginal carina; dorsellum at hind margin distinctly carinate, more or less flat; fore femur and tibia with distinct dorsal carina; hind femur with strong basal tooth followed by many small ones; hind tibia apically distinctly produced into a spine, with the outer spur either rudimentary or simply forming apex of the spine; gaster in both sexes slender, narrowed anteriorly, ovipositor mostly long, first tergite in female with strongly diverging ovipositorial furrows.

The species belonging here may be separated in two subgroups: one with *L. bulbiventris* Cresson and *L. manaica* Roman, in which the triangular notch separating

lower tooth of the mandibles is rather deep (Text-fig. 42) and the hind coxa shows dorsally a low blunt lobe, whilst in the second subgroup there is a distinct tooth. To the second subgroup belong *L. egaia* Walker, *L. coxalis* Kirby, *L. pulchriceps* Cameron, *L. colombiana* sp. n., *L. signifera* sp. n., *L. opalescens* Weld and *L. aliena* sp. n. The species come from Central and South America; their hosts are not known.

Leucospis bulbiventris Cresson

(Text-figs 42, 64–67)

Leucospis bulbiventris Cresson, 1872 : 29–30, ♂. Holotype ♂, MEXICO (ANS, Philadelphia) [examined].

Weld (1922 : 4) placed this species with a query into the genus *Polistomorpha* Westwood, but that was not correct. Although only one male is known, *L. bulbiventris* apparently belongs to the *egaia*-group and within this is nearest to *L. manaica* Roman. From most species of the *egaia*-group Cresson's species differs mainly in the aberrant form of the male gaster, the relatively less dense puncturation of the body (mainly on the pronotum and hind femur) and in the relatively longer lower tooth of the mandibles the form of which slightly reminds one of the *cayennensis*-group; in the latter the notch is semicircular, not triangular. I find similar form of the mandible in the Venezuelan female which I classify as *L. manaica* Roman. It may be even possible that *L. manaica* is the female sex of *L. bulbiventris*, however unusual and great the difference between them may seem. I am unable to resolve the question from the poor material available.

BIOLOGY. Unknown.

DISTRIBUTION. Mexico.

Leucospis manaica Roman

(Text-figs 68–71)

Leucospis manaica Roman, 1920 : 9–10, fig. 1a, ♀. Holotype ♀, BRAZIL: State Manaos, Rio Negro W. of Sitio Cataporanga (NR, Stockholm) [examined].

I have had difficulties in understanding the variation of this species, mainly because its holotype is slightly different from the few other available specimens. At one stage I regarded the females from Santa Catarina as a different species, with the gaster distinctly more narrowed at apex, the body more densely punctured and hind femur relatively narrower (Text-fig. 71) than in the holotype of *L. manaica* (Text-fig. 69), although the latter was relatively well described and figured by Roman. Quite recently I was able to examine another female, from Venezuela, which is rather intermediate in the form of the gaster but is, on the other hand, clearly more pubescent on the sides of thorax, on the propodeum and on the gaster than any other specimen. This seems to suggest that the range of variation is wider than I thought before.

There also may be a rather distinct sexual dimorphism. Judging from the form of the mandibles (Text-fig. 42) and some other features I cannot exclude the possibility that *L. manaica* is the female of *L. bulbiventris* Cresson, known from one male from Mexico, but more material and information is needed to be sure.

In view of all these difficulties I give here a redescription of *L. manaica*.

♀. 8·7–10·5 mm. Black with faint to conspicuous metallic tint, mainly green to violaceous; yellow are: scapus beneath, narrow bands anteriorly and posteriorly on pronotum (sometimes also laterally), mesoscutum posteriorly between parapsidal vestiges, fore femur dorso-apically, fore tibia at least internally, mid and hind coxa dorsally, small spot on hind coxa ventro-apically, mid knee, separated streaks on hind femur along dorsal edge and another ventrally between base and large tooth, hind tibia dorsally except at base. Antennal flagellum basally (at least beneath) and apically red, also tegulae (sometimes sides of thorax) and tarsi reddish. Wings moderately infumate, fore wing more intensively so along anterior margin.

Head slightly broader than pronotum posteriorly, dorsally 2·05–2·10 times as broad as long; occipital carina very low sublaterally, conspicuous on temples above, high behind ocelli; temples narrow. POL about 1·6 times OOL; ocellar triangle about 2·5 : 1, usually with slight ridge between median and lateral ocellus and a depression at occipital carina; vertex very densely deeply punctured-reticulate except laterad of each ocellus (more at median); frontal protuberances moderate, scrobal carina above them strong, usually angulate in front of median ocellus. Head in facial view about 1·22 (1·17–1·27) times as broad as high, face dull, densely rugulose-punctured, pubescence extremely short, whitish. Interantennal area with distinct keel. Relative measurements: height of head 67, width of frontovertex 45, face below antennae 45, breadth of scrobes 28, height of lower face 30·5, eye 48 : 32, inner orbit conspicuously emarginate; malar space 10, mouth 35. Clypeus nearly 1·4 times as broad as high, lower margin medially shallowly emarginate and depressed, without median tooth, margin of rounded lateral lobes carinately raised. Mandibles with notch separating lower tooth relatively large. Scapus about 2·5 times as long as broad. Flagellum plus pedicellus 1·23–1·35 times as long as breadth of head, slightly clavate, apically nearly 1·8 times as broad as pedicellus; first flagellar segment usually 1·6, second 1·5, fifth 1·2, eighth 0·95, clava 1·7–1·8 times, as long as broad.

Pronotum without premarginal carina (this slightly indicated in holotype) but hind margin slightly carinate; surface convex, often very densely punctured (less densely so in holotype), transverse thin separations of punctures higher than longitudinal ones, in places suggesting fine cross-carinae; hind margin of pronotum broadly emarginate, sides slightly to distinctly converging forwards, straight; lateral panel broadly concave, lower corner obtusely subangulate. Mesoscutum not depressed, deeply and very densely punctured, hairs very short and thin; parapsidal vestiges slightly longer than their distance from outer margin. Scutellum 1·1–1·3 times as broad as long, moderately convex, along hind margin barely depressed and with a row of deeper punctures. Dorsellum about 3 times as broad as long, lunulate, hind margin regularly arched and distinctly carinate; dorsally bare, apart from admarginal crenulate groove with shallow sculpture. Propodeum medially about as long as dorsellum, moderately dense longish hairs (worn off in holotype) directed forwards on median area; median carina distinct, plicae anteriorly obliterated. Mesopleural depression fairly deep, mainly smooth on bottom; upper mesepisternum very densely irregularly punctured, upper mesepimerum with interspaces faintly subhorizontally strigose and on disc sometimes as wide as punctures; interspaces on metapleurum smooth. Upper edge of fore femur and tibia carinate but externo-ventral edge of tibia blunt. Hind coxa moderately densely punctured and hairy, hairs in depression short, directed downwards; upper edge blunt anteriorly, sharp and thin posteriorly where forming a low translucent lobe; meso-ventral edge of coxa slightly curved. Hind femur (Text-figs 69, 71) excluding the outstanding basal tooth usually 2·10–2·18 times (in holotype 1·88 times) as long as broad (small 10–13 teeth included), basal tooth in about two-fifths of length; outer surface usually fairly densely and not coarsely punctured. Apex of hind tibia produced into

a spine; basitarsus dorsally about 1·3 times as long as breadth of tibia. Apical processus of stigmal vein of fore wing distinctly shorter than uncus, latter slightly shorter than its distance from postmarginal vein.

Gaster slender, about 1·25 times as long as rest of body and in holotype 2·6 times, in other specimens 2·8–2·9 times as long as broad; its pubescence short but fairly dense, puncturation dense. First tergite 0·60–0·65 times the width of fifth tergite, 1·6–1·8 times as long as broad, dorsally with broad median crest which sometimes is slightly carinate except anteriorly, separating broad ovipositorial furrows considerably diverging forwards, reaching at sides level slightly below the short lateral keels at base of tergite. Third tergite narrow, slightly punctured laterally. Fourth tergite medially slightly elevated and subcarinate, here about 5·5 times shorter than first tergite; very densely clothed with white hairs which conspicuously converge sideways towards the median cross-line of tergite; hind margin subangulate medially. Fifth tergite medially about half the length of the first, broadly grooved except anteriorly, in profile hardly convex dorsally, hairs at its hind margin noticeably denser, adpressed, suggesting a fascia. Sides of apex of gaster in dorsal view rather blunt in holotype (Text-fig. 68), or converging nearly straight from middle of fifth tergite. Ovipositor reaching scutellum, sides of sheaths subparallel, apex rounded-subacuminate.

♂. Unknown.

BIOLOGY. Unknown.

DISTRIBUTION. Venezuela, Brazil.

MATERIAL EXAMINED.

Type data given in synonymy.

VENEZUELA: Las Trincheras, 4.xi.1891, 1♀ (*Meinert*) (UZM, Copenhagen). BRAZIL: Santa Catarina, Nova Teutonia, 9.iii.1936, 23.x.1944 and 19.xi.1955, 3♀ (*F. Plaumann*) (BMNH).

Leucospis coxalis Kirby

(Text-fig. 72)

Leucospis coxalis Kirby, 1885 : 243, ♀. LECTOTYPE ♀ (here designated), ARGENTINA: Buenos Aires (BMNH) [examined].

Leucospis bicanaliculata Cameron, 1909 : 420–421, ♀ ♂. LECTOTYPE ♀ (here designated), ARGENTINA: Mendoza (BMNH) [examined]. **Syn. n.**

Leucospis denticoxa Strand, 1911*a* : 97–98, ♀ ♂. LECTOTYPE ♀ (here designated), ARGENTINA: Mendoza (MNHU, Berlin) [examined]. **Syn. n.**

Leucospis denticoxa var. *pedata* Strand, 1911*a* : 98, ♀. LECTOTYPE ♀ (here designated), ARGENTINA: Mendoza (MNHU, Berlin) [examined]. **Syn. n.**

Leucospis denticoxa var. *melanosa* Strand, 1911*a* : 98, ♀ ♂. LECTOTYPE ♀ (here designated), ARGENTINA: Mendoza (MNHU, Berlin) [examined]. **Syn. n.**

L. coxalis. The apparently single original female, figured in 1886 by Waterhouse (pl. 169, fig. 1) is designated as lectotype. It is conspecific with *L. bicanaliculata*, of which three females and one male are preserved, two of the females being labelled 'type' by Waterston; one of these selected as lectotype. Similarly lectotypes were designated for the three names published by Strand (1911*a*: 97–98), who mentioned also various degrees of reduction of the yellow pattern and proposed two of the names for the darker forms.

I think that this is a good species, although very close to *L. egaia* Walker. The reliability of various separating characters (mainly of the relatively broader frontovertex) is discussed under the latter name. In the males *L. coxalis* seems to have the colours on head relatively duller, with the puncturation on frons gradually getting finer downwards.

BIOLOGY. Reared from unidentified Megachiline bee.

DISTRIBUTION. Argentina.

MATERIAL EXAMINED.

Type data given in synonymy.

ARGENTINA: Prov. Salta, nr El Jardín, 2.x.1968, 1 ♀ (*C. C. Porter*) (MCZ, Cambridge); Yacochuya, nr Cafayate, xii. 1969, 1 ♀ (*Willink, Terán & Stange*), iv. 1970, 1 ♀ (*Stange & Porter*) (BMNH & IML, Tucumán); Angastaco, xii. 1968, 1 ♀ (*Willink & Stange*) (IML, Tucumán); Prov. Tucumán, Quebrada de Lules, iv. 1966, 2 ♂ (*Stange*) (IML, Tucumán); Trancas, San Pedro do Colalao, ii. 1953, 1 ♀ (*Arnau*) (BMNH); La Rioja, Tinogasta—Chilecito, 10.ii.1966 (*Porter*) (MCZ, Cambridge); Chilecito, 18.iv.1972, 1 ♂; nr Angulos, 18.xii.1971, 1 ♀, 1 ♂ (*Stange & Porter*) (IML, Tucumán); Mendoza, 27.xi.–6.xii.1906, paralectotypes of *denticoxa* and var. *melanosa*, 1 ♀, 2 ♂ (*Jensen-Haarup*) (MNHU, Berlin), 1200 m, ex Megachiline bee, 1 ♀, 1 ♂ (TM, Budapest); Agrela, ii. 1966, 1 ♀ (*Stange*) (IML, Tucumán); Buenos Aires, ii. 1955, 1 ♀ (EM, East Lansing), 1 ♀ (*J. Bosq*); José C. Paz, 2.iv.1962, 2 ♂ (*Ogloblin*) (all FCNM, La Plata); Ensenada, iii. 1951, 1 ♂ (Townes); La Plata, xii. 1965, i. 1966, 3 ♀, 7 ♂ (*H. & M. Townes*) (Townes & BMNH).

Leucospis egaia Walker

(Text-figs 73, 74)

Leucospis Egaia Walker, 1860 : 20, ♀. LECTOTYPE ♀ (here designated), BRAZIL: Amazonas, Tafe (= Ega) (BMNH) [examined].

Leucospis Tapayosa Walker, 1860 : 21, ♀. LECTOTYPE ♀ (here designated), BRAZIL: Tapajos (BMNH) [examined]. **Syn. n.**

The single type-specimens preserved are designated as lectotypes. They are conspecific.

L. egaia usually is more brightly metallic on the head and parts of the thorax than the very close *L. coxalis* Kirby and seems to be different from the latter, being also more northerly in distribution. The most reliable separating characters are summed up in the key. The female specimens from the State Santa Catarina in Brazil have, on average, a relatively longer ovipositor than the more northerly specimens and this makes them, in this respect, more easily recognizable as *egaia*. However, whilst most other specimens show a greater difference in the relative width of the frons, in these Santa Catarina specimens the eye is 1.0–1.04 times, in one case only 0.95 times, as long as the breadth of the frontovertex, and the hind

femur is 1·80–1·84 times as long as broad (teeth not included), i.e. relatively slender, for the figure varies in the species between 1·72 and 1·84. Still more difficult to separate are the males, in which sometimes the most reliable character seems to be careful measurements of the head, although the figures are very close, i.e. in *egaia* the length of the eye is 1·00–1·03 times the breadth of the frontovertex, but in another case only 0·98. The same figures for the males of *L. coxalis* are 0·94–0·95. In *L. egaia* the coarse piliferous punctures on frons mix with the finer puncturation more downwards, and do not become gradually finer as in *L. coxalis*.

BIOLOGY. Host unknown.

DISTRIBUTION. Mexico, Guatemala, Costa Rica, Panama, Colombia, Ecuador, Peru, Venezuela, Trinidad, Guyana, French Guiana, Brazil, Bolivia, Argentina.

MATERIAL EXAMINED.

Type data given in synonymy.

MEXICO: Vera Cruz, Minatitlan, 21.ix.1961, 1 ♀ (*R. & K. Dreisbach*) (EM, East Lansing). GUATEMALA: El Salto, Excuintla, 28.vi.1934, 1 ♀ (*F. X. Williams*) (BMNH). COSTA RICA: Pacuare, 1 ♀, 1 ♂ (USNM). PANAMA: Trinidad Rio, 25.iii.1912, 1 ♂ (USNM). COLOMBIA: Dept. Meta, Restrepo, 500 m, viii. 1936, 4 ♀ (*J. Bequaert*) (MCZ, Cambridge & BMNH). ECUADOR: Bucay, 300 m, 7.x.1922, 1 ♀ (*F. X. Williams*) (BBM, Honolulu); 15 mls S. of Santa Rosa, El Oro, 23.i.1955, 1 ♀ (*Schlinger & Ross*) (CAS, San Francisco). PERU: Monson Valley, Tingo Maria, x-xii. 1954, 4 ♀, 2 ♂ (*Schlinger & Ross*) (CAS, San Francisco). VENEZUELA: San Esteban nr Puerto Cabello, i. 1940, 1 ♀ (*Anduze*) (Townes). TRINIDAD: Maracas Valley, vii. 1945, 1 ♀ (*Callan*) (USNM). GUYANA: Mazaruni, 23.viii.1937, 1 ♀ (*Richards & Smart*) (BMNH); New Amsterdam, vii. 1923, 1 ♀ (*F. X. Williams*) (BBM, Honolulu). FRENCH GUIANA: Cayenne, i, iii. 1917, 2 ♀ (CM, Pittsburgh). BRAZIL: Pará, Belém, vi. 1924, 1 ♀ (*F. X. Williams*) (BBM, Honolulu); Guaruja, Ilha Santo Amaro, iv. 1912, 1 ♀ (*Bryant*) (BMNH); Sao Paulo, 1 ♂ (TM, Budapest); Santa Catarina, Nova Teutonia, ii-vi., xi., 1935–1955, 9 ♀, 2 ♂, (*Plaumann*) (BMNH; MCZ, Cambridge; Townes); Blumenau, 1 ♀ (TM, Budapest). BOLIVIA: Santa Cruz, Buena Vista, vii. 1972, 3 ♂ (*Porter*) (IML, Tucumán; BMNH). ARGENTINA: Corrientes, Santa Ana, 2.v.1971, 1 ♀ (*Porter & Stange*) (IML, Tucumán). Without data, 1 ♀, possibly syntype of *tapayosa*, labelled '*Tapayosa* Wlk.' (UM, Oxford).

Leucospis pulchriceps Cameron

Leucospis pulchriceps Cameron, 1909 : 419–420, ♀. LECTOTYPE ♀ (here designated), ARGENTINA: Mendoza (BMNH) [examined].

Leucospis formosifacies Strand, 1911*a* : 95–97, ♀ ♂. LECTOTYPE ♀ (here designated), ARGENTINA: Mendoza (MNHU, Berlin) [examined]. **Syn. n.**

Leucospis elegans Weld, 1922 : 17–18, ♀. Holotype ♀, ARGENTINA : La Rioja (CU, Ithaca) [examined]. [Junior primary homonym of *Leucospis elegans* Klug, 1834.] **Syn. n.**

Leucospis weldae Burks, 1961 : 541. Proposed as a replacement name for *L. elegans* Weld, 1922. **Syn. n.**

I examined both original syntypes of *L. pulchriceps* and selected the lectotype. I also examined the original couple of *L. formosifacies* and compared them with the holotype of *L. elegans* Weld. They are all conspecific.

The pale markings are mostly yellow, more rarely ivory white. Otherwise the black parts (usually with metallic tint) are often red instead anteriorly on the pronotum and in a streak in the depression of hind coxa.

BIOLOGY. Hosts not yet known.

DISTRIBUTION. Argentina.

MATERIAL EXAMINED.

Type data given in synonymy.

ARGENTINA: Prov. Salta, Angastaco, xii. 1968, 1 ♂, El Carmen, ii. 1967, 1 ♀ (*Willink, Stange & Terán*) (IML, Tucumán); Catamarca, Pirquitas, ii. 1958, 1 ♀ (*Colbach*); La Cienaga, 15.xi.1969, 1 ♀; Los Nacimientos de Abajo, iii. 1969, 1 ♀ (*Willink, Terán & Stange*) (IML, Tucumán); Prov. Tucumán, Amaicha del Valle, xii. 1965, xi. 1966 (*H. & M. Townes, Stange*) (IML, Tucumán; Townes; BMNH); Santiago del Estero, Rio Salado, 1 ♀ (*Wagner*) (FCNM, La Plata); Termas de Rio Hondo, iv. 1970, 1 ♀ (*Stange & Porter*) (IML, Tucumán); La Rioja, Famatina, xi. 1969, 1 ♂; La Torre, iii. 1970, 10 ♀, 3 ♂; Villa Union, 21.iv.1972, 1 ♀ (*Porter, Stange, Terán & Willink*) (IML, Tucumán; BMNH); Patquia, 1932-3, 1 ♀ (*Hayward*) (BMNH); San Juan Castaño Nuevo, Valle Calingasta, 13.ii.1966, 1 ♀, 1 ♂ (*Porter*) (MCZ, Cambridge) (*Willink & Stange*) (IML, Tucumán); Caucete, 10.xii.1971, 2 ♀, 5 ♂ (*Stange & Porter*) (IML, Tucumán); Mendoza, xii. 1906, 1 ♂ (*Jensen-Haarup*) paralectotype of *formosifacies* (MNHU, Berlin); Chacras de Coria, xii., i. 1907, 1908, 3 ♀, 3 ♂ (*Jörgensen & Jensen-Haarup*) (UZM, Copenhagen).

Leucospis colombiana sp. n.

(Text-figs 78–80)

♀. 9–11 mm. Black with weak mainly violaceous tinge which is more apparent on head, pronotum and mesopleurum, subalar area more bluish, vertex at carina and sides of propodeum green; pale lemon-yellow are: scapus except above, a short anterior and a complete posterior band on pronotum, hind margin of mesoscutum between parapsidal vestiges (broadest medially), scutellum except basal two-fifths, dorsellum, broad triangle on upper mesepisternum, metapleurum along hind margin, mid and hind coxa on dorsal edge, dorsal edge of fore femur and tibia, line on mid tibia anteriorly, dorsally on hind tibia (this also on apical spine) and hind femur, latter also along ventral margin, then first tergite with two large triangular maculae posteriorly, fifth tergite with band near hind margin bent ventrally forwards, sixth tergite and epipygium with curved vertical lines. Wings moderately infumate but darker fuscous along anterior margin, less so at apex.

Head hardly broader than pronotum, dorsally nearly 2·4 times as broad as long; temples extremely short but distinct owing to occipital carina which is dorsally, inside of eye margins, very low. Vertex densely punctured-reticulate, except narrowly outside lateral ocelli and a broader smooth depression on either side of median ocellus; POL about 1·43 OOL, ocellar triangle about 2·6 : 1, without ridge between mid and lateral ocellus. Frontal protuberances low; emargination of eyes weak; scrobal carina dorsally sharp. Head in facial view 1·31 times

as broad as high; face very densely rugulose-punctured, pubescence very dense, white, short; interantennal area not keeled; sculpture on lower face more longitudinally rugulose; clypeus about 1·2 times as broad as high, lower margin bilobed, hardly reflexed, without median tooth. Notch of mandibles small. Relative measurements: width of head 87, frontovertex 49, scrobes 24, lower face between eyes 48·5, its height 33, eye 45 : 31, malar space 15, mouth 33. Flagellum plus pedicellus nearly 1·2 times as long as breadth of head, moderately clavate; first flagellar segment distinctly constricted in basal half, slightly longer than pedicellus, fully 1·4 times, second 1·8 times, fifth 1·4, eighth 0·95, clava fully 1·6 times, as long as broad.

Pronotal sides arcuately converging, hind margin broadly emarginate, dorsum regularly convex, densely punctured, interspaces distinct though narrow, not shiny owing to faint microscopic cross-striation; lateral panel deeply depressed, lower corner nearly rectangular. Mesoscutum convex, puncturation as on pronotum. Scutellum 1·2 times as broad as long, weakly regularly convex, hind margin slightly produced, without admarginal depression. Dorsellum nearly 3 times as broad as long, subangularly crescentic, flat, hind margin sharply narrowly carinate, narrowly translucent; dorsally beset with piliferous punctures slightly smaller than those on scutellum. Propodeum medially barely longer than dorsellum, median carina vague, plicae indicated by blunt convexities; pubescence fairly dense, in middle directed forwards. Violaceous upper mesepimerum with punctures as coarse as on metapleurum, interspaces silky shiny, at higher magnification with extremely fine subhorizontal striation; mesopleural depression deep, almost reaching level with lower end of epicnemial depression, edge behind latter depression with narrow but distinct interspaces. Metapleurum dorsally with subrectangular tooth projecting caudad. Fore femur and tibia dorsally strongly carinate. Hind coxa dorsally with a flat area tapering apicad, to slender translucent flat tooth; very densely punctured and pubescent even in depression which is nearly twice as long as broad, with hairs directed uniformly towards apex of lateral edge. Hind femur moderately slender (Text-fig. 79), densely regularly punctured, with short dense pubescence directed to ventral edge which has large narrowly triangular basal tooth and 10–13 small teeth. Hind tibia externally densely finely punctured, outer spur on apical spine short but conspicuous. Stigmal vein of fore wing with terminal processus slightly broader than and about twice as long as uncus.

Gaster about 2·8 times as long as broad, slightly constricted behind first tergite, densely punctured and clothed with short regular pubescence. First tergite 0·7 the width of gaster, itself 1·4 times as long as broad; diverging ovipositorial furrows reaching base inside of blunt latero-basal keels; top of median keel smooth. Fourth tergite posteriorly subangulate, medially about one-sixth as long as the first, its median ridge finely grooved; ventro-laterally tergite twice as long as dorsally. Fifth tergite medially about 4 times as long as the fourth, finely grooved. Ovipositor straight, sheaths apically hardly broadened, reaching apex of propodeum.

♂. 5·3–6·0 mm. Head and thorax with pattern similar to ♀ but yellow on tibiae slightly reduced. First tergite dorsally broadly yellow, hind margins of tergites 3–5 with yellow bands, sixth tergite in middle with a band expanding laterally forwards but sometimes interrupted in median line; also sternites 2–4 broadly yellow (on following ones interrupted medially). Propodeum and first tergite partly red instead of black; antenna more reddish beneath than in ♀ and relatively slightly shorter, distal funicular segments distinctly transverse. For dorsal aspect of gaster see Text-fig. 80. Sternites 3–7 transverse, the fourth about 2·4 times, the seventh (last) nearly 1·8 times as broad as long, trapezoidal, barely longer than breadth of its truncate apex; sternites up to fifth distinctly convex, sixth medially broadly depressed, seventh depressed in triangular basal area not reaching apex, its surface rather densely and finely punctured whilst the preceding sternites are very coarsely and not densely punctured.

BIOLOGY. Unknown.

DISTRIBUTION. Colombia, Venezuela.

Holotype ♀, COLOMBIA: Dept. Magdalena, Rio Frio, 27.iii.1927 (*G. Salt*) (BMNH). Paratypes. COLOMBIA, Dept. Cundinamarca, Villeta, 1936, 2 ♂ (*J. Bequaert*)

(MCZ, Cambridge & BMNH); Cucuta, 18–20.vii.1930, 1 ♂ (*H. J. MacGillavry*) (ZM, Amsterdam). VENEZUELA: between La Paz and Concepción, 16.vii.1930, 1 ♀ (*H. J. MacGillavry*) (ZM, Amsterdam).

Leucospis signifera sp. n.

(Text-fig. 77)

♀. 9·5–10·0 mm. Black, with faint dark greenish tint on head, propodeum and metapleurum and slightly bluish tinge, sometimes more conspicuous, on upper mesopleurum; pale yellow are: spot on scapus, narrow line at hind margin of pronotum interrupted medially (sometimes much reduced), scutellum except very narrowly basally and in median line anteriorly (very characteristic for the species, Text-fig. 77), dorsellum except basally, vertical spot on upper mesepisternum, cross-band near hind margin of first tergite, sometimes similar narrow line at hind margin of fifth tergite and small line beneath on sixth tergite, then narrow line along front edge of fore and mid tibia, narrow dorsal edge and a ventral spot apically on hind coxa and, more conspicuously, along dorsal and ventral edge of hind femur which has also a longitudinal streak on inner side; narrowly spine of hind tibia. Base of antenna sometimes reddish. Wings with veins indicated by infumate lines, moderately infumate along anterior margin, mainly fore wing, otherwise subhyaline.

Morphologically very similar to *L. colombiana* sp. n. described above; most characters apply to both species. Head dorsally about 2·3 times as broad as long; occipital carina high, beyond ocelli lowered but not interrupted, sharp dorsally on the very narrow temples; POL fully 1·2 times OOL, ocellar triangle 2·5 : 1. Head in facial view 1·28 times as broad as high; inner orbit of eyes conspicuously emarginate; face fairly convex, vertically rugulose-punctured, extremely shortly pubescent; interantennal and supraclypeal area medially convex but not carinate. Relative measurements: height of head 49, width of frontovertex 37, scrobes 28·5, lower face width 34·5 and height 23·5, eye 33 : 22, malar space 9, mouth 24. Clypeus 1·15 times as broad as high, subtriangular, lower margin subincised medially, broadly bilobed, surface slightly depressed at excision. Upper edge of mandibles broadly truncate, notch separating lower tooth not very deep. Scapus about 2·5 times as long as broad; flagellum plus pedicellus combined 1·18 times as long as breadth of head, slightly clavate, apically 1·7 times as broad as pedicellus; first flagellar segment 1·35, second nearly 1·5, eighth 0·9, clava 1·6 times as long as broad, subacuminate.

Puncturation of thorax regular, dense, not very coarse, narrow interspaces everywhere present. Pronotum convex, without a trace of premarginal carina, hind margin moderately carinate, broadly emarginate; in dorsal view sides convergent, straight to slightly convex. Scutellum weakly convex, 1·18–1·24 times as broad as long, not depressed at hind margin. Dorsellum about 3 times as broad as long, crescentic, margined with distinct laminate upturned carina, this medially lowered; admarginal groove broadened and deep medially; dorsal surface coarsely punctured, moderately hairy. Propodeum medially not or slightly longer than dorsellum, relatively densely hairy; plicae obliterated. Upper mesepisternum irregularly and rather densely punctured, interspaces microreticulate; upper mesepimerum less densely and more coarsely punctured, interspaces on disc half as broad as punctures or broader, dull, finely obliquely strigose. Hind femur relatively slender, basal tooth situated in basal third of femur, strong, followed by 9–11 small teeth.

Gaster: first tergite 0·63–0·67 the width of the broadest part and itself 1·4–1·5 times as long as broad; part beyond first tergite broadest just behind its first third. Ovipositor reaching anterior margin of propodeum.

♂. 9–10 mm. In colour as ♀ but pronotum, mesopleurum and gaster (except second sternite which is extensively yellow sublaterally) without yellow markings. Inner edge of scape not sharp. First tergite subdepressed, with parallel-edged sides, fully 1·35 times as long as broad and only 0·44 times as broad as the long-oval carapace of remaining segments; pubescence of

first tergite long, puncturation coarse, dense. Rest of gaster nearly twice as long as broad, second and third tergites well separated, with very coarse lengthened punctures, shortly hairy; following tergites much more finely densely punctured. Epipygium slightly depressed across middle. Fourth and fifth sternite (fourth and third from apex) convex, distinctly transverse, moderately densely but coarsely punctured. Last sternite about as long as broad, at apex broadly rounded to subtruncate. Dorsally apex of gaster distinctly more densely punctured than in *L. colombiana*; punctures deep, crowded, their bottoms bright green.

BIOLOGY. Unknown.

DISTRIBUTION. South Brazil, Argentina, Paraguay.

Holotype ♀, BRAZIL: Santa Catarina, Nova Teutonia, 6.iii.1939 (*F. Plaumann*) (BMNH).

Paratypes. BRAZIL: Santa Catarina, Nova Teutonia, i. 1959, 1 ♀ (*F. Plaumann*) (Townes). ARGENTINA: Prov. Santa Fé, Rosario district, xi. and xii. 1916, 1917, 2 ♀, 2 ♂ (*J. Hubrich*) (ZS, Munich; BMNH). PARAGUAY: Villarica, 7. iv., 1 ♂ (*F. Schade*) (MCZ, Cambridge).

Leucospis opalescens Weld

(Text-figs 75, 81–86)

Leucospis opalescens Weld, 1922 : 15–17, ♀. Holotype ♀, BRAZIL: Chapada (USNM) [examined].

The two females mentioned below agree relatively well with the holotype, although being of 9 and 13 mm in length respectively and showing slight deviation in colour. Both have on pronotum a transverse yellow spot anteriorly, the bigger one the posterior band not interrupted in the middle. In all three the pale yellow band on scutellum widens more or less laterad. Otherwise morphologically they are extremely close to *L. signifera* described fully above, which may prove, eventually, a southern subspecies of *L. opalescens*. Another morphologically very similar species is *L. aliena* sp. n. which has, however, relatively shorter legs and shows a rather constant and different yellow pattern. More material and information is needed to check my conclusions, although they seem to be correct at the present time.

The male is still unknown.

BIOLOGY. Host unknown.

DISTRIBUTION. BRAZIL.

MATERIAL EXAMINED.

Type data given in synonymy.

BRAZIL: Pará, 1 ♀ (*Agassiz & Bourget*) (MCZ, Cambridge); Urucum, Corumba, xii. 1919, 1 ♀ (*Cornell Univ. Exped.*) (CU, Ithaca).

Leucospis aliena sp. n.

(Text-fig. 76)

This species is morphologically, except for the form of the hind legs (and except for the yellow pattern), very close to *L. opalescens* Weld and *L. signifera* sp. n. As a detailed description of *signifera* is given above, mainly only the different features of *aliena* are mentioned here.

For some time I was not sure whether *L. aliena* represented a really different species, but all five females are fairly constant in colour and structure and occur in the same place with *L. signifera*. I think therefore that the two cannot form, for example, different subspecies of the same species, although I do not regard the geographical separation (allopatry) the only way of speciation, as some authors apparently do.

♀. 7·3–8·8 mm. Metallic tinge changing with views but head mainly dark green to bluish, violaceous to blue on thoracic and gastral dorsum (blue particularly inside the punctures) and upper mesopleurum (epimerum usually violaceous to purplish on interspaces and green in punctures) and brighter green on propodeum. Pale yellow markings characteristic on thorax (Text-fig. 76), pronotum anteriorly, posteriorly and more or less laterally, lateral and posterior margins of mesoscutum, scutellum postero-laterally, dorsellum, then metapleurum at propodeum; legs marked similarly to *L. signifera*.

Head dorsally about 2·4 times as broad as long; POL about 1·3 times OOL. Head in facial view about 1·33 times as broad as high. Relative measurements in holotype: height of head 49, breadth of frontovertex 38·5, lower face 35, scrobes 20, eye 33 : 22·5, malar space 9, mouth 24. Flagellum plus pedicellus combined 1·13–1·18 times as long as breadth of head.

Pronotum and mesoscutum very densely punctured; scutellum less densely so, with interspaces up to one-third to one-half the width of punctures, interspaces shallowly strigose, sublaterally and anteriorly bearing dense fine piliferous punctures. Pronotum with hind margin barely carinate, without premarginal carina, sides distinctly converging. Scutellum 1·19–1·26 times as broad as long. Dorsellum lunulate, about 3 times as broad as long, its margin very narrowly laminate and translucent, dorsum nearly flat, punctured and slightly pubescent, with a deeper row basally. Upper mesepisternum densely beset with mixture of coarser and finer piliferous punctures, interstices with some oblique striation; upper mesepimerum sparsely punctured, interspaces with microscopic subhorizontal to oblique (in lower part) striation, slightly dull.

First tergite about 1·25 times as long as broad, dorsally with broad ovipositorial furrows diverging forwards. Anterior and posterior margins of fourth tergite subparallel; tergite one-fourth as long as fifth tergite, medially with 6–7 transverse rows of punctures at fine slot-like groove. A similar median groove on fifth tergite which is here about 0·6 times as long and 1·6 times as broad as first tergite (laterally much longer).

♂. Unknown.

BIOLOGY. Unknown.

Holotype ♀, BRAZIL: State Santa Catarina, Nova Teutonia, 30.i.1955 (*F. Plaumann*) (BMNH).

Paratypes. Same locality as holotype, 8. ii., 9. iii. and 16. iv. 1936, 4♀ (*Plaumann*) (BMNH).

THE *SPEIFERA*-GROUP

The species differ from the preceding *egaia*-group in having the body generally less densely punctured, usually with distinct shiny though narrow interspaces between the punctures;

therefore their metallic colours seem sometimes brighter. Furthermore the fore femur is less distinctly carinate and is less flattened, fore tibia is more slender and not carinate dorsally, hind coxa has sometimes some less densely punctured or even smooth parts, the smaller teeth of hind femur are often less numerous and hind tibia is almost perpendicularly truncate at apex (Text-figs 87, 89), with a distinct angle between its apical margin and the often short and stout outer spur. In the last character, as well as in the broad sternites of the males, this group is similar to the *cayennensis*-group.

The group may be separated into two subgroups. The first (*birkmani*-subgroup) includes *L. birkmani* Crawford, *L. auripyga* sp. n. and *L. desantisi* sp. n. and may be separated on the account of the weaker occipital carina, which is distinct only behind the ocellar area and of the shorter basitarsus of hind tarsi. In the second subgroup the occipital carina is much more distinct and the hind basitarsus is at least as long, measured on dorsal edge, as the breadth of the hind tibia at apex. This *speifera*-subgroup includes *L. imitans* sp. n., *L. speifera* Walker, *L. nigripyga* sp. n., *L. versicolor* sp. n., *L. sumichrastii* Cresson, *L. robertsoni* Crawford and *L. enderleini* Ashmead.

Although the species are so numerous (and rather distinctive) no biological data on them are known.

Leucospis birkmani Brues

(Text-fig. 91)

Leucospis birkmani Brues, 1925 : 23–25, ♀. Holotype ♀, U.S.A.: Texas, Lee County, Fedor (MCZ, Cambridge) [examined].

This species may be easily recognised at first glance by the round whitish spot anteriorly on pronotum and the unusually small ocelli with strongly raised space between them. Otherwise *L. birkmani* is closely related to *L. auripyga* sp. n. and to *L. desantisi* sp. n., more remotely also to the other species of the *speifera*-group.

BIOLOGY. Hosts not yet known. Imago from May till October.

DISTRIBUTION. South-western U.S.A. (California, Arizona, New Mexico, Texas), Mexico.

MATERIAL EXAMINED.

Type data given in synonymy.

U.S.A.: California, Truckee, Prosser Creek, 9.ix.1966, 1 ♂ (DE, Davis); C., San Diego County, Warner Springs, Julian, Scissors Crossing, Borrego Palm Canyon, vii.–viii., 3 ♀, 1 ♂ (DE, Davis; MCZ, Cambridge; DE, Riverside); C., Riverside County, Deep Canyon, vi. 1963, 1 ♀ (DE, Riverside); Arizona, Maricopa County, Apache County, San Carlos, Pima County, Cochise County, Mt. Lemmon, Tuscon, Nogales, Huanacha Mts, Bisbee, v.–x., 32 ♀, 15 ♂ (various depositories, incl. DE, Riverside and CIS, Berkeley); New Mexico, Eddy County, Guadalupe Mts., 1 ♀ (BMNH); Texas: Davis Mts, Chisos Mts, 2 ♀ (various depositories). MEXICO,

Baja California: San Ignacio, Mesquital, Todos Santos; Sonora: Rio Mayo, Ciudad Obregon, Durango: Nombre de Dios, v.–x., 3 ♀, 7 ♂ (mainly CAS, San Francisco; DE, Davis; MCZ, Cambridge; SM, Lawrence; USNM; BMNH).

Leucospis auripyga sp. n.

(Text-figs 87, 88)

♀. 9·5 mm. Black with moderate metallic tinge, mostly dark violaceous but in places purplish to brighter cupreous or bluish to greenish, apex of gaster mainly golden, broad furrows on first tergite golden-cupreous; pale yellow markings: scapus, narrow band posteriorly on pronotum, very narrow posterior margin of mesoscutum, anterior side of fore tibia, mid knee, narrowly basal edge and apically lateral edge of hind coxa, upper edge and ventro-basal streak of hind femur, hind tibia except at ends; reddish is callus of propodeum, dorsum of first tergite, partly hind coxa, ovipositor sheaths basally. Antennae beneath and legs also partly reddish. Wings distinctly yellowish brown, darker at anterior margin. Pubescence of body white, short, except apically on gaster where brassy-golden.

Head as broad as pronotum posteriorly, in dorsal view 2·5 times as broad as long; temples very short but distinct. Vertex punctured except just outside of each ocellus; occipital carina not high and disappearing shortly beyond ocelli; POL sub-equal to OOL; ocelli not small, their triangle 2·4 : 1, between median and lateral ocellus weakly raised; scrobal carina sharp, near to median ocellus; frontal protuberances moderate. In facial view head 1·35 times as broad as high (Text-fig. 88); face broad and fairly convex, moderately densely and rather shortly pubescent, interantennal lobe with distinct carina. Relative measurements: width of head 69, height 51, width of frontovertex 40·5, of lower face 38, its height 23, width of scrobes 20, eye 36 : 24, its inner orbit moderately emarginate; malar space 11·3, width of mouth 27, length of scape 18. Clypeus hardly broader than high, sub-triangular; lower margin narrowly smooth, with low lobe on each side, emarginate and depressed in middle. Scapus about 3·3 times as long as broad. Flagellum slightly clavate, apically 1·6 times as broad as pedicellus, latter slightly longer than broad; flagellum plus pedicellus combined hardly longer than breadth of head; first flagellar segment slightly longer than pedicellus and slightly shorter than following segment, this slightly elongate; fifth flagellar segment subquadrate, distal ones slightly transverse; clava about 1·7 times as long as broad, apex rounded.

Thorax densely punctured, narrow interspaces with microscopic cross-reticulation which is obliterated on disc of scutellum. Pubescence dorsally very short, inconspicuous. Pronotum convex, without carinae; hind margin broadly emarginate; sides straight, weakly converging; lateral panel posteriorly, moderately broadly depressed, with short vertical keel separating spiracular emargination; lower corner rounded, obtuse-angular. Mesoscutum not depressed, regularly punctured; vestiges of parapsidal furrows hardly as long as their distance from lateral margin. Scutellum (without sloping diverging axillae) 1·2 times as broad as long, fairly convex, admarginal row of punctures posteriorly hardly impressed. Dorsellum bare, alveolate, semicircularly margined with high carina, fully 3 times as broad as long; sides of metanotum with a row of coarse foveae. Propodeum in middle elevated and slightly longer than dorsellum, median carina sharp and fairly high, arched, hairs at carina pointing mainly laterad as in all species with unusually high median carina; plicae distinct only posteriorly; bottom of postspiracular furrow dull, densely punctured, not subdivided. Femoral depression of mesopleurum fairly deep; upper mesepimerum with nearly smooth interspaces, its punctures coarser and less dense than the irregular puncturation of upper mesepisternum. Fore tibia dorsally rounded, femur dorsally edged but not carinate, ventrally rounded. Hind coxa moderately stout, rather densely clothed with long hairs which in depression point obliquely downward; puncturation dense but looser just above lateral edge and still sparser in a strip below dorsal edge; this edge narrowed posteriorly into a thin, long, slightly raised lobe. Hind

femur, tibia (Text-fig. 87) and tarsus as in *L. birkmani*, but femur externally slightly more densely punctured and with yellow, not whitish markings. Fore wing: apical processus of stigmal vein broader and longer than uncus.

Gaster in shape much as in *L. birkmani*: first tergite with two broad diverging dorsal furrows which are punctured on bottom; tergite about 1·1 times as long as broad, about 0·8 as broad as posterior half of gaster, nearly twice as long as fifth tergite medially; ovipositor reaching scutellum. Puncturation in general denser than in *birkmani*, on fourth tergite dense also in basal half and pilosity forming a thick silvery fascia on fourth tergite, a golden fascia posteriorly on fifth tergite and thickly covering apex of gaster behind spiracles (of sixth tergite); on fourth and fifth tergites hairs directed obliquely downward, on epipygium mainly backwards but with a belt parallel to ovipositor with hairs directed downward. Epipygium on ventral side with a dark purplish line parallel to ovipositor.

♂. Unknown.

BIOLOGY. Host unknown.

Holotype ♀, MEXICO: Oaxaca, 2 mls N.W. of Tamazulapan, 2000 m, 28.vi.1961 (*Univ. Kans. Mex. Exped.*) (SM, Lawrence).

Leucospis desantisi sp. n.

(Text-figs 89, 90)

♀. 7·6–10·5 mm. Black with conspicuous metallic tinge varying from bright or brassy-green (upper mesepimerum, broad hind margins of first, fourth and fifth tergites and apex of gaster) to dark violaceous; yellowish are scapus beneath, band at hind margin of pronotum (sometimes interrupted medially), lateral and posterior margins of mesoscutum, usually hind margin of metapleurum, fore and mid knees above, upper edge of fore tibia, hind femur along dorsal edge and more broadly triangularly at base, hind tibia except at ends; red are antennae except apically, pronotum broadly anteriorly submedially (sometimes reduced, sometimes extended to broad band connected submedially with posterior yellow band; the latter in holotype), sometimes also sides of propodeum and hypopygium of gaster reddish. Fore wing infumate, dark brownish along anterior margin with a pronounced spot apically at end of shady line from stigmal vein.

Head slightly narrower than pronotum posteriorly, in dorsal view about 2·3 times as broad as long. Occipital carina moderate, not reaching far laterad beyond ocelli; temples immargined and rather narrow. POL : OOL as 12 : 11; ocellar triangle nearly 2·5 : 1, space between lateral and median ocellus moderately elevated; vertex laterad of ocelli densely punctured, some punctures longitudinally confluent. Scrobal carina uninterrupted, but not high where touching median ocellus; frontal protuberances moderate. Face finely rugulose-punctured, a few coarser punctures interspersed at sides not conspicuous; slightly shiny, pubescence extremely short. Interantennal lobe medially sharply edged to carinate, supraclypeal area only weakly convex. In facial view head about 1·24 as broad as high. Relative measurements: width of head 75, frontovertex 46, width of scrobes 25, of lower face 44, its height 27, eye 40 : 25, its inner orbit hardly emarginate; malar space 12, width of mouth 33, scapus 20. Clypeus about 1·4 times as broad as high, its produced lower margin broadly bilobed, medially excised and impressed. Scapus about 3 times as long as broad. Flagellum plus pedicellus hardly longer than width of head, weakly clavate, apically about 1·4 times as broad as pedicellus; first flagellar segment hardly longer than pedicellus, slightly longer than broad; second about 1·2 times, eighth about 0·8 times as long as broad, middle ones subquadrate to slightly transverse; clava 1·6–1·8 times as long as broad.

Pilosity of thorax extremely short, puncturation moderately dense, including scutellum, very dense on pronotum submedially; interspaces narrow, dull, with distinct microrecticulation.

Pronotum convex, without carinae, hind margin broadly emarginate, sides distinctly converging and slightly concave; lateral panel with very shallow broad depression, lower corner slightly wide-angular, rounded. Mesoscutum moderately convex, slot-like vestiges of parapsidal furrows nearly as long as their distance from lateral margin. Scutellum moderately convex, 1·2–1·3 times as broad as long, sides distinctly declivous (as well as axillae), more densely punctured in 1–2 rows along apical margin; interspaces on disc microrugulose, not broader than 0·3 the punctures. Dorsellum coarsely but not deeply punctate-reticulate, punctures in a row along margin which is formed by a carina separating punctured dorsum from subvertical posterior wall; latter with some oblique rugae descending mesad; dorsal part about 4 times as broad as long, sometimes with weak transverse carina. Propodeum in middle about 1·8 times as long as dorsellum, about 0·3 the length of scutellum; median carina weak anteriorly where the whole punctured surface is raised, posteriorly forming in profile a tooth; plicae slightly distinct posteriorly; pubescence moderate, on median area directed obliquely forwards (diverging). Mesopleural depression fairly deep, upper mesopleurum with mixture of coarser and finer punctures, interspaces on upper mesepimerum smooth. Upper margin of fore femur moderately sharply edged, on fore tibia rounded. Hind coxa in depression almost regularly and densely punctured, interspaces mostly much narrower than punctures, except apically; pubescence short, directed obliquely downwards; dorsal edge punctured, weakly hairy, anteriorly blunt, posteriorly with indication of a low lobe, this not very thin. Hind femur (Text-fig. 90) 1·7 times as long as broad (teeth included), weakly convex; interspaces smooth, on disc generally narrower than punctures which are mainly rather fine with intermixed coarser punctures. Hind tibia externally regularly densely punctured and microreticulate, dull; apex truncate, inner spur rather broad, outer spur stout, not long (Text-fig. 89).

Gaster slightly longer than head plus thorax combined, 2·4 times as long as broad, weakly inflated behind third tergite. First tergite hardly longer than broad, with two broad diverging dorsal furrows, broadly elevated between them but carinate only posteriorly; submedially and then sublaterally (beyond furrows) extremely densely punctured, posteriorly with dense silvery pubescence. Third tergite dorsally with crowded punctures in 8–9 transverse rows but not very hairy. Fourth tergite dorsally about a quarter as long as the first, extremely densely hairy, in particular in broad belt along posterior margin. Fifth tergite dorsally flat (none of tergites grooved medially), submedially more than twice as coarsely punctured as the fourth, hind margin with a band of thick hairs; tergite laterally nearly twice as long as dorsally. Ovipositor close to subhorizontal dorsum of gaster, tip reaching propodeum.

♂. 5·5–9·6 mm. In general, as darker form of ♀, metallic tinge weaker, but head often mainly bright cupreous, also propodeum, then hind margins of fourth and fifth tergites; pale yellow are: transverse band posteriorly on pronotum, narrowly interrupted medially and tapering laterad, narrow lateral and broader posterior margin of mesoscutum; legs as in ♀.

Head as broad as pronotum anteriorly, in dorsal view 2·25 times as broad as long, but relatively less transverse in small specimens. Eye 1·58 times as long as broad, nearly 3·8 times as long as malar space. Propodeum about twice as long as dorsellum, median carina in middle raised into high tooth. Gaster moderately expanding behind first tergite, nearly 2·2 times as long as broad, broadest part 1·47 times the breadth of first tergite; the latter 0·9 times as long as broad, convex, hind margin straight, basally impunctate; disc coarsely but not very densely, apex very densely and finely punctured; hairs fairly long, directed backwards, but subapically directed towards median line and apically forwards, here fairly dense. Margins of fused tergites on carapace indicated by finer sculpture and by bands of thick pubescence. Second and third tergites very densely punctured, punctures coarser basally; third tergite slightly longer than the second. Fourth and fifth tergites with punctures less crowded except along hind margins where covered by thick decumbent pale yellow pubescence which appears metallic mainly due to bright metallic surface beneath. Sixth tergite regularly punctured (as disc of the fifth), hairs thin and extremely short; apex laterally with apical carina expanding into rounded auricles. Epipygium hardly depressed transversely, apex narrowly rounded. Apex of last sternite rounded, medially subtruncate; surface depressed along middle; also penultimate sternite broadly depressed, particularly posteriorly, broader than long; preceding (fifth)

sternite very shallowly depressed, sparsely punctured and strongly transverse as the more basal sternites.

BIOLOGY. Unknown.

DISTRIBUTION. Paraguay, Argentina.

Holotype ♀, ARGENTINA: Catamarca, La Cienaga, 15.x.1969 (*Terán, Willink & Stange*) (IML, Tucumán).

Paratypes. PARAGUAY: Villa Rica, xi., 1 ♀ (*F. Schade*) (MCZ, Cambridge). ARGENTINA: Salta, Yocochua nr Cafayate, 16.iii.1969, 1 ♀ (*Porter*) (BMNH); Alemanía, 27.iv.1970, 1 ♀ (*L. Stange & C. Porter*) (IML, Tucumán); Catamarca, Pirquitas, 13.ii.1958, 1 ♂ (*Colbach*) (BMNH); Tucumán, El Siambón, xii. 1945, 1 ♂ (*Olez*) (IML, Tucumán); Amaicha del Valle, 30.xii.1965, 1 ♂ (*H. & M. Townes*) (Townes); Chaco de Santa Fé, Rio Las Garzas, 25 km E. of Ocampo, 1903, 1 ♀ (*Wagner*) (MNHN, Paris); Santiago del Estero, Rio Salado, 1 ♀ (*Wagner*) (FCNM, La Plata); nr Icaño, Rio Salado, 2 ♀ (*Wagner*) (BMNH); La Rioja, La Torre, 7.iii.1970, 1 ♀ (*Porter & Stange*) (BMNH); Villa Unión, 23.iv.1972, 1 ♂ (*Porter*) (IML, Tucumán).

This species is very close to *L. birkmani* Brues and *L. auripyga* sp. n. from Mexico and the south-western U.S.A.

Leucospis imitans sp. n.

(Text-figs 98, 99)

♀. 10–12 mm. Body black with weak metallic tint which is dark greenish on sides and posteriorly on thorax and on basal half of gaster and more violaceous (if distinct) on head and pronotum; yellow lines border scape beneath, metapleurum posteriorly, hind coxa dorsally, laterally and its apex beneath, hind femur dorsally and ventrally, fore tibia anteriorly, mid knee; hypopygium pale ochreous; tarsi more or less testaceous. Ovipositor sheaths and base of gaster reddish. Wings black at anterior margin, slightly violaceous; hind margin much paler, apex broadly subhyaline, narrow margin whitish.

Head slightly narrower than pronotum posteriorly, in dorsal view about 2·6 times as broad as long, temples extremely short but distinct. Vertex closely punctured, outside of lateral ocellus with fine rugae diverging forwards; occipital carina sharp and continuous on temples down to lower third of eyes; POL : OOL as 14 : 12; ocellar triangle 2·4 : 1, ocelli of normal size but space between them strongly raised on either side behind median ocellus; laterad of median ocellus smooth triangular space; sharp scrobal carina separated by narrow groove. Frontal protuberances not high but subrectangular. Head in facial view 1·10–1·12 times as broad as high; face finely densely rugulose-punctured, pilosity thin and extremely short; supraclypeal area fairly convex, interantennal lobe with keel. Relative measurements: head width 82, frontovertex 47, breadth of scrobes about 24 (not sharply delimited at toruli where broadest), lower face 41, its height 34, eye 50·0 : 29·5, emargination of inner orbit slightly indicated; malar space 17, width of mouth 33. Clypeus slightly broader than high, sides strongly diverging, distinctly convex except for depression at emargination of lower margin, this margin hardly produced, with low lobes but no median tooth. Scapus 1·35 times as long as malar space (relative length 23), fully 3 times as long as broad, virtually bare. Flagellum hardly clavate, combined with pedicellus about 1·2 times as long as breadth of head; pedicellus slightly elongate, hardly shorter than following segment, this slightly shorter than second flagellar segment which is about 1·3, the sixth 1·06, clava about twice, as long as broad; last two funicular segments subquadrate.

Thorax very densely reticulate-punctured, thin pubescence extremely short. Pronotum without carinae, convex; hind margin broadly emarginate, sides distinctly converging and subsinuate; lateral panel less densely punctured, fairly depressed, lower corner nearly right-angular, rounded. Mesoscutum without distinct depressions, almost regularly punctured; vestiges of parapsidal furrows about as long as distance from lateral margin. Scutellum 1·20–1·25 times as broad as long, regularly moderately convex, puncturation leaving narrow and nearly smooth interspaces on disc; axillar sutures strongly converging, dorsum of axilla depressed, slightly sloping. Dorsellum (Text-fig. 98) non-metallic, bare, alveolate, faint median carina separating nearly circular halves reminding one of wings because of sublamellate lateral margin; margin shorter and lowered medially. Propodeum medially about 1·7 times as long as dorsellum, here strongly elevated with high median carina forming a subrectangular tooth posteriorly; coarse hairs diverging sideways from carina; plicae distinct but low anteriorly. Femoral depression of mesopleurum fairly deep, convex part densely punctured, interspaces smooth. Legs rather slender. Fore femur dorsally distinctly edged, fore tibia dorsally and ventrally rounded. Hind coxa densely punctured, but pubescence very short; dorsal edge relatively narrow, posteriorly with thin translucent subrectangular tooth; depression rather flat, densely punctured except narrowly at apex behind tooth; lateral edge with thick pubescence, at edge basally a deep depression. Hind femur (excluding teeth) 2·3 times as long as broad (Text-fig. 99), basal tooth very strong, followed by 8–10 small teeth; externally coarsely densely punctured. Hind tibia laterally fairly densely punctured, externo-ventral carina ending hardly a breadth of tibia before apex, latter weakly oblique, outer spur distinct; basitarsus dorsally slightly longer than breadth of tibia. Hind claws not pectinate. Fore wing: apical processus of stigmal vein fully as long as and slightly stouter than uncus.

Gaster about 3 times as long as broad and distinctly longer than head plus thorax combined. First tergite about 0·7 the maximum breadth of gaster, 1·5 times as long as broad, dorsally with two diverging broad furrows which are substrigose on bottom; median crest not punctured; laterad of furrows puncturation becoming sparse and coarse laterally, dense and fine posteriorly. Fourth tergite slightly transversely depressed, densely punctured and with dense short pubescence, hairs directed obliquely backwards; dorsally with fine median elevated line; hind margin medially subangularly produced. Fifth tergite inflated, dorsally only slightly more than half as long as the first, convex, except for shallow median depression, very densely regularly punctured and hairy. Ovipositor reaching base of gaster.

♂. 9 mm. Very similar to ♀ but metallic colours still duller; yellow streaks missing on metapleurum and ventrally on hind coxa, but present dorsally on hind tibia.

Gaster nearly 2·7 times as long as broad, first tergite barely more than half as broad as the long spindle-shaped rest of gaster. Sides of first tergite subparallel, hind margin broadly emarginate, basal fovea very small; tergite 1·3 times as long as broad, densely punctured as well as following segments on which the segmentation of carapace is suggested by zones of crowded finer puncturation at apex of each segment. Second segment well separated, transverse but nearly as long as the third. Sixth tergite in posterior view with corners slightly produced downwards as slender teeth. Epipygium weakly convex, not transversely depressed. Sternites broad, not delimited by a keel on sides, third to fifth decreasingly transverse, convex; the sixth subquadrate, with sides converging slightly caudad, concave along median line; last sternite still more concave than the preceding (its apex missing).

BIOLOGY. Host unknown. This *Leucospis* mimics certain wasps with black bodies and wings whitish at apex, in a similar way as *L. leucotelus* Walker and *L. propinqua* Schletterer.

DISTRIBUTION. Paraguay, Argentina.

Holotype ♀, ARGENTINA: Prov. Salta, Orán, Abra Grande, 18.iv.–5.v.1969 (*C. Porter*) (MCZ, Cambridge).

Paratypes. PARAGUAY: San Bernardino, 3.iii.1906, 1♀ (*Babarczy*) (TM,

Budapest). ARGENTINA: Salta, nr Pocitos, 28.iv.1968, 1 ♀ (*C. Porter*) (BMNH); Misiones, Leandro N. Alem Inst. Alberdi, 17.–19.xi.1969, 1 ♂ (*C. Porter*) (IML, Tucumán).

Leucospis speifera Walker

(Text-figs 93–95)

Leucospis speifera Walker, 1860 : 21–22, ♀. LECTOTYPE ♀ (here designated), BRAZIL: Amazonas, (Ega =) Tefe (BMNH) [examined].

The only original specimen known of *speifera* is designated as lectotype.

The species is close to *L. imitans* sp. n., but has much more brightly coloured body with sparser puncturation. In the female the first tergite is about 1·5 times as long as broad, dorsally with median ridge separating the two broad furrows, these slightly diverging, ridge and furrows mesad smooth and shining, but the tergite densely punctured laterad of the furrows posteriorly and with thick hairs converging towards the apex of the median ridge; hind margin of the first tergite rather broadly smooth. The male was previously unknown.

♂. 9·5 mm. Body mainly metallic purplish black, with following parts bright cupreous: face except below eyes, temples, axillae, sides of metanotum and of propodeum, upper mesopleurum, hind coxa except dorsally, first tergite, hind margins of tergites 3 to 5 and their sides (here less bright); pale yellow, as in ♀: scape, lateral and posterior margins of pronotum, hind margin of mesoscutum, fore and mid knees, tibiae and tarsi, hind coxa dorsally and ventro-apically, hind femur except median streak, hind tibia dorsally and apically, hind tarsus. Fore wing brownish, fairly dark along anterior margin.

Head dorsally fully 2·3 times as broad as long, in facial view 1·13 times as broad as high; frontal protuberances moderate but rectangular in lateral view; ocelli of medium size. Relative measurements: head width 65, frontovertex 38, lower face 33, its height 27, eye 39·0 : 25.5, malar space 11, flagellum plus pedicellus 1·16 times as long as breadth of head, hardly subclavate, middle segments subquadrate.

Thorax rather coarsely regularly punctured, interspaces distinct, generally one-quarter to one-third the width of punctures, with microscopic cross-reticulation which is nearly obliterated on scutellar disc. Scutellum not depressed at hind margin. Dorsellum bare, narrowly crescentic, with raised marginal carina and more raised median cross-ridge separating broad alveolae in two rows. Propodeum medially fully twice as long as dorsellum, raised, with strong median carina which is elevated in middle into obtuse tooth; puncturation coarse, hairs not dense, directed obliquely sideways from median carina; plicae high. Upper mesopleurum posteriorly (epimerum) with nearly smooth interspaces, anteriorly interspaces beset with minute punctures. Fore femur dorsally hardly edged, tibia rounded. Hind coxa behind basal carina laterally narrowly depressed, at base of lateral edge finely punctured and hairy, beneath only very sparsely punctured and smooth, shiny; lower half of depression punctured, upper (yellow) half smooth, including dorsal edge which forms posteriorly a partly translucent tooth-like lobe. Otherwise as in ♀ (for legs see Text-figs 93, 94).

Gaster (Text-fig. 95) hardly longer than head plus thorax, about 2·5 times as long as broad, dorsally subfusiform, all tergites distinct, though third to sixth fused, but indicated by colour and much finer puncturation at hind margins. First tergite about 1·2 times as broad as long, 0·73 the breadth of gaster, with extremely short immargined basal fovea with two submedian reticulate swellings on its bottom; more coarsely punctured than following tergites; of these relatively coarsely punctured are the second and sixth, remaining tergites only basally so. Second tergite slightly longer than third, both together shorter than the first, this longer than

the fifth but shorter than the sixth which has raised, expanding hind margin, but not distinct auricles laterally. Epipygium convex, very densely punctured, with dense dark hairs, appearing nearly bisegmented as the basal part has higher hind margin than base of apical half; latter posteriorly narrowly rounded; no longitudindal keels. Last two sternites shallowly depressed, last one apically narrowly rounded, each about as long as broad; preceding sternites convex, basad increasingly transverse, more and more coarsely punctured.

BIOLOGY. Host unknown.

DISTRIBUTION. Colombia, Surinam, Brazil.

MATERIAL EXAMINED.

Type data given in synonymy.

COLOMBIA: Dep. Meta, Restrepo, 500 m, 26.viii.1936, 1 ♂ (*J. Bequaert*) (MCZ, Cambridge). SURINAM: Republiek, S. of Paramaribo, x.–xi.1968, Malaise trap, 3 ♀ (*D. C. Geijskes*) (RNH, Leiden and BMNH).

Leucospis nigripyga sp. n.

(Text-fig. 96)

♀. 7·8–8·5 mm. Black with faint metallic tint, mostly bluish or greenish on thorax and gaster but more cupreous on head, axillae, partly on mesopleurum and epipygium; yellow are: scape beneath, antero-lateral corner and a line posteriorly on pronotum, narrow hind margin of mesoscutum, fore and mid knees above, narrow line anteriorly on fore tibia and along ventral margin of hind femur; testaceous to dark reddish are: base of antenna, sides and hind margin of pronotum, tegulae, thoracic pleurum narrowly below tegula and above hind coxa, dorsellum, sides of propodeum, all coxae at least above (in holotype legs more extensively reddish); hypopygium and lower margins of fifth tergite pale brown. Fore wing blackish brown along anterior margin, infuscate along cubital vein, but otherwise only weakly infumate.

Head narrower than mesoscutum (58 : 64 in holotype), dorsally about 2·5 times as broad as long; occipital carina nearly half diameter behind lateral ocelli, sharp, running down the temples till below centre of eyes. POL : OOL as 11 : 8; ocellar triangle about 2·4 : 1; vertex moderately coarsely punctured, upper carinate margin of scrobes nearly one diameter from median ocellus, sharp even at moderate frontal protuberances; these appearing subrectangular in dorsal view. Head in facial view 1·16 times as broad as high; face rugulose-punctured, slightly shiny, narrow interstices smooth; lower face with scattered coarser punctures bearing longer hairs than the dense, subdecumbent, very short white pilosity; interantennal area slightly convex, with weak median carina. Relative measurements: height of head 50, width of frontovertex 32, of scrobes 18·5, lower face breadth 29, its height 24, eye 32 : 21, malar space 13, width of mouth 19. Clypeus 1·1 times as high as broad; lower margin broadly bilobed, without tubercle in median depression. Scapus fully 2·5 times as long as broad, inner ventral lamina apically moderately high. Flagellum plus pedicellus combined nearly 1·2 times as long as breadth of head (68 : 58, i.e. index 1·17 in holotype), hardly thickened distally, basal flagellar segments slightly oblong, seventh and eighth subquadrate.

Puncturation on thorax moderately coarse (coarsest on scutellum), interspaces often broader than half diameter of puncture, microscopically transversely reticulate, slightly dull; premarginal carina indicated by slightly raised impunctate line; hind margin not carinate; sides in dorsal view slightly concave, distinctly converging towards head; middle of pronotum convex; lateral panel rather thickly hairy below the impunctate depression, lower corner slightly less than 90 degrees, narrowly rounded. Mesoscutum posteriorly not depressed; vestige of parapsidal furrow deep, about as long as distance from outer margin of sclerite. Scutellum about 1·33

times as broad as long, fairly convex at median line which is partly impunctate; not depressed at hind margin. Axilla small, depressed, lateral margin carinate. Dorsellum broadly crescentic, less than 3 times as broad as long, margin strongly carinate; dorsally bare and alveolate, with indication of a pair of diverging keels; sides of metanotum coarsely crenulate. Propodeum medially hardly twice as long as dorsellum and slightly less than half as long as scutellum, rather hairy; median area irregularly rugose, uneven, median carina moderately raised behind middle. Femoral depression of mesopleurum deep; interspaces of punctures on upper episternum fairly shiny though obliquely striate, on epimerum and metapleurum nearly smooth. Hind coxa 1·24–1·28 times as long (measured at lateral edge) as broad (high); dorsal edge punctured and hairy, anteriorly blunt but posteriorly thin and sharp and forming a lamellate rounded lobe; depression in upper part with narrow smooth strip, otherwise punctured and moderately hairy, interspaces in middle about as broad as punctures but broader near lateral edge; hairs mainly directed to median line but just above lateral edge turned towards the edge; coxa below lateral edge with impunctate area. Hind femur (Text-fig. 96) moderately coarsely punctured, microreticulation on interspaces very shallow; basal tooth very broad, followed by about 9 small teeth. Apex of hind tibia ventrally slightly broadly produced, outer spur about as long as half breadth of tibia. Fore wing: apical processus of stigmal vein rounded, very short.

Gaster about as long as head plus thorax and fully twice as long as broad. First tergite about 0·8 the width of the fifth (broadest), about as long as broad; impunctate at base and with percurrent smooth raised median line; densely punctured and hairy posteriorly, punctures becoming sparser and coarser on disc. Fourth tergite longest medially due to wide-angular produced hind margin, densely punctured, punctures medially in about 8 transverse rows; hairs thin as elsewhere. Fifth tergite regularly punctured, interspaces not reaching half breadth of punctures; dorsum of tergite anteriorly strongly swollen, then rather steeply sloping caudad, medially broadly grooved; sides regularly convex. Ovipositor sheaths extending over three-quarters of fifth tergite.

♂. Unknown.

BIOLOGY. Unknown.

DISTRIBUTION. Guyana, Paraguay.

Holotype ♀, PARAGUAY: Borja, vi. 1935 (*F. Schade*) (NM, Vienna).

Paratypes. GUYANA: Blairmont, xi. 1923, 1 ♀ (*F. X. Williams*) (BBM, Honolulu). PARAGUAY: Asuncion, 5.x.1904, 1 ♀ (*Vezényi*) (TM, Budapest).

L. nigripyga sp. n. is very close and similar to *L. versicolor* sp. n. from which it differs in female mainly by the strongly inflated fifth tergite with ovipositor in oblique position (as for example in the Mediterranean *L. biguetina* Jurine). It may prove more difficult to separate the males which are not yet known.

Leucospis versicolor sp. n.

(Text-fig. 97)

♀. 8·5–9·3 mm. Black with metallic tinge in places conspicuous: vertex posteriorly dark cupreous, anteriorly purplish, face bright green-brassy to cupreous or slightly bluish; thoracic dorsum and sides mainly dark purple with bottoms of punctures vivid violaceous; axillae, propodeum and upper mesepisternum and thorax ventrally bright green to brassy, as well as coxae and first tergite; densely punctured band on fourth tergite green, rest of gaster purplish. Pale yellow: scape, posterior cross-line and lateral border of pronotum, hind margin of mesoscutum, apex of hind coxa externally, hind femur ventro-basally and at apex, all knees, line anteriorly on fore tibia and hind tibia dorsally; flagellum reddish, basally pale testaceous;

tibiae and tarsi more or less reddish brown. In paratype pronotum, sides of thorax, propodeum and legs mainly rufous instead of black. Wings distinctly infuscate along anterior margins.

Head hardly broader than pronotum, dorsally about 2·3 times as broad as long. Occipital carina percurrent down on temples to below middle of eyes, at edge dorsally microscopically striate, running about one-third diameter behind lateral ocelli; temples extremely short. POL : OOL as 12·5 : 9·0, ocellar triangle about 2·1 : 1. Occipital neck separated from occiput by rather narrow and nearly smooth groove, its sides dorsally raised, expanded, minutely striate. Vertex coarsely and not very densely punctured, small depressed areas outside of lateral ocelli and in front of median ocellus smooth, latter ocellus half its diameter from scrobes; scrobal carina sharp, forming at moderate frontal protuberance a low tooth which bears short carina at the angle. Face finely punctured with slight rugosity, with scattered coarser punctures; pubescence extremely short; interantennal lobe bluntly carinate, supraclypeal area convex. Head in facial view nearly 1·2 times as broad as high, relative breadth 71, frontovertex 37, face below antennae 31, height of lower face 27, breadth of scrobes 21, eye 39 : 27, its inner orbit shallowly emarginate; malar space 16, width of mouth 20. Clypeus slightly convex, 1·1 times as high as broad; lower margin produced, sublaterally raised, medially depressed and slightly emarginate, usually with a weak median tooth. Upper inner edge of mandibles broadly truncate, notch small, lower tooth not reaching level with truncate edge. Antennal flagellum subfiliform, combined with pedicellus 1·1 times as long as breadth of head; pedicellus dorsally elongate, about as long as first flagellar segment; flagellar segments 2–5 subequal, about 1·25 times as long as broad, eighth quadrate; clava subacuminate, hardly shorter than two preceding segments combined.

Puncturation of thorax not very dense, interspaces often as broad as punctures, dull, microscopically cross-striate; pubescence thin, short. Pronotum convex, premarginal carina indicated by slightly raised and more or less impunctate line, hind margin not raised, broadly emarginate, sides converging; lateral panel in moderately deep depression nearly impunctate, posteriorly with short vertical carina, lower corner rectangular, slightly rounded. Mesoscutum convex; vestiges of parapsidal furrows as long as their distance from lateral margin. Scutellum moderately convex, not depressed at margin, fully 1·4 times as broad as long; interspaces distinctly striolate in arch along base and sides which are converging caudad; axillae unusually small. Dorsellum bare, about 3·3 times as broad as long, with coarse dots and deep arched fovea on either side along the raised sublaminate margin; this margin slightly produced over propodeum and lowered medially. Propodeum very coarsely sculptured but puncturation indistinct; median carina high, 1·5 times as long as dorsellum; between carina and high plicae some irregular longitudinal carinae behind basal row of coarse alveolae; deep postspiracular fovea closed posteriorly by high carina; pubescence fine, laterally dense, at median carina directed sideways. Femoral depression of mesopleurum deep; interspaces on upper mesepimerum smooth. Fore femur dorsally subcarinate, externally nearly smooth; fore tibia dorsally and laterally rounded. Hind coxa below dorsal edge, above lateral edge and particularly ventrally, extensively smooth, not punctured, but dorsal edge punctured and densely hairy, posteriorly ending with smooth obtuse lobe; depression on broad median streak rather sparsely punctured with short hairs directed towards apex. Hind femur 1·6 times as long as broad (teeth including), rather sparsely and moderately coarsely punctured; laminate basal tooth followed by 9 small and not very slender teeth (Text-fig. 97). Hind tibia externally rather densely punctured, at apex slightly obliquely truncate, outer spur longer than half width of tibia; basitarsus dorsally nearly 1·5 times as long as width of tibia. Fore wing: apical processus of stigmal vein hardly developed, uncus slender, distinct.

Gaster slightly longer than head plus thorax, dorsally about 2·4 times as long as broad, apex appearing subacuminate. First tergite hardly 0·75 the breadth of the fifth, about 1·1 times as broad as long, almost without any punctures over basal two-thirds and broadly along median line, anteriorly sublaterally on each side with deep longitudinal depression (furrow); punctures densest near hind margin where bearing thick white pubescence directed obliquely caudad, towards median line. Fourth tergite with hind margin straight, surface finely and very densely punctured and pubescent, hairs directed obliquely sideways. Fifth tergite distinctly longer

than the first, moderately swollen, convex except for deep percurrent ovipositorial groove; dorsally coarsely punctured, punctures elongate and partly confluent, becoming much finer and very dense at hind margin and laterally where also pubescence is very dense. Sixth tergite and epipygium less densely pubescent and more regularly, mostly moderately coarsely punctured. Ovipositor reaching base of fifth tergite.

♂. Unknown.

BIOLOGY. Unknown.

Holotype ♀, FRENCH GUIANA: Kourou, 1914 (*R. Benoist*) (MNHN, Paris).

Paratype. 1 ♀, BRAZIL: Amazonas, Rio Purus, Hyutanahan, ii. 1922 (*S. M. Klages*) (CM, Pittsburgh).

In the key this species comes nearest to *L. nigripyga* sp. n. but seems to be close also to *L. speifera* Walker, *L. robertsoni* Crawford and to *L. enderleini* Ashmead, i.e. to species with unusually raised median carina of the propodeum.

Leucospis sumichrastii Cresson

(Text-figs 100–102)

Leucospis ***Sumichrastii*** Cresson, 1872 : 31, ♀. Holotype ♀, MEXICO (ANS, Philadelphia) [examined].

Only one female is known of this distinctive species which belongs to the *speifera*-group, in which it seems to be closely related to the species with rather short ovipositor, viz. *L. nigripyga* sp. n., *L. versicolor* sp. n., *L. robertsoni* Crawford and *L. enderleini* Ashmead. *L. sumichrastii* has a narrow smooth streak on hind coxa (in the upper part of the depression) and very long genae as *L. nigripyga* and *L. versicolor*, but differs from both in many other characters including the shape and pilosity of the propodeum and gaster, as indicated in Text-figs 100 & 101 and given in the key. Under the thick hairs (which is an unusual character within the group) the pale red propodeum shows some coarse rugae, the submedian ones probably analogous to the raised keels in *L. enderleini* and *L. robertsoni*, but the median carina is very low.

BIOLOGY. Unknown.

DISTRIBUTION. Mexico.

Leucospis robertsoni Crawford

Leucospis robertsoni Crawford, 1909 : 51–52, ♀ ♂. Holotype ♀ (?), U.S.A.: S. Florida (USNM).

Dr Burks kindly submitted specimens compared with the type-material.

The species has been known only from the south-eastern U.S.A., where all specimens show a more or less extended rufinism, which is not known to me to occur in the Mexican specimens. In these also the orange-red bands on the pronotum posteriorly, on hind femur dorsally and ventro-basally and on hind tibia are yellow.

I do not think, however, that this difference is significant enough to point to different subspecies.

BIOLOGY. Host not yet known.

DISTRIBUTION. South-east U.S.A. (Florida, Alabama), Mexico.

MATERIAL EXAMINED.

U.S.A.: Alabama, Gulf Shores, 23.iv.1968, 1 ♂ (*H. & M. Townes*) (Townes); A., Mobile, 19.x.1939, 1 ♀, 1 ♂ (*Van Dyke*) (CAS, San Francisco); Florida, Highlands, Hammock County, St. Pk., Larkins, Lake Placid, Miami, Naples, iv., viii., 7 ♀, 4 ♂ (various depositories). MEXICO: Sonora, 16 mls N.E. of Ciudad Obregon, v. 1961, 1 ♂ (*Howden & Martin*); Sinaloa, Mazatlan, 6.viii.1964, 5 ♂ (*Mason*) (both ERI, Ottawa); Nayarit, Ahuacatlan, vii. 1951, 1 ♂ (*P. D. Hurd*) (CIS, Berkeley); Veracruz, Minatitlan, viii.-ix. 1961, 1 ♀ (*Dreisbach*) (EM, East Lansing); Morelos, Hujintlan, viii. 1956, 1 ♀ (*Dreisbach*) (BMNH).

Leucospis enderleini Ashmead

(Text-figs 103, 104)

Leucospis enderleini Ashmead, 1904 : 405, pl. 31, fig. 1, ♀. Holotype ♀, BRAZIL: Santarem (USNM).

Leucospis metallica Weld, 1922 : 13–14, ♀. Holotype ♀, BRAZIL: Sao Paulo (USNM).

After a comparison of the types, Burks (1961 : 541) recognized that *L. metallica* was the same species as *L. enderleini*. Dr Burks kindly sent me the (only) paratype of *L. metallica* for examination, which enabled me to include the species properly in the key and recognize further specimens, among them the hitherto undescribed male.

♂. 8·2 mm. Pale markings of body mostly whitish yellow. Face dull, finely rugulose-striate, pubescence extremely short, white, not conspicuous. Propodeum in middle fully twice as long as dorsellum, median carina very high in middle, in profile broadly tooth-like, basally on each side accompanied by submedian carina converging to middle of median carina and enclosing raised triangular area. Fore femur dorsally distinctly edged, tibia more rounded. For hind leg see Text-fig. 105; hind femur basally with inner and outer carina, outer one obliterated basad. Gaster hardly longer than head plus thorax combined, not strongly narrowed basally, but first tergite separated from the rest by shallow transverse furrow. Puncturation coarse on first tergite, becoming finer towards apex of gaster, fine and dense particularly at hind margins of fourth and fifth tergites (broadest part of gaster) where covered by denser pilosity. First tergite about 0·8 times as long as broad, punctured down to hind margin, basal fovea fairly deep and large, nearly semicircular, nearly reaching middle of tergite, margined by stout carina; bottom of fovea anteriorly with two short diverging keels. Second tergite exposed, nearly as long as the third which is completely fused with the following ones. Sixth tergite dorsally longer than fifth, medially depressed and with obtuse median keel; postero-lateral corners slightly projecting but not expanded into auricles. Epipygium transversely depressed but depression traversed by median keel and limited laterally by converging supracercal keels; apex rounded. Sternites anteriorly well visible in lateral view for the epipleural part of carapace is rather narrow; they are convex, much more coarsely punctured than tergites, coarseness decreasing caudad, as well as convexity of sternites:

second, third and fourth strongly transverse, subequal in length, fifth still fully e as broadwict as long and subdepressed medially, sixth shallowly depressed and less transverse; seventh (last) sternite slightly transverse, shallowly concave, apex rounded.

In the female from Carnuaru (Brazil), which agrees in essential characters with the mentioned paratype of *metallica*, the following deviations are found.

Body only 6·5 mm. Gaster more compressed from sides, therefore narrower, 2·45 times as long as broad, first tergite nearly 1·1 times as long as broad, fifth tergite 0·85 times as long as broad, pilosity white, bands at apical margins of fourth and fifth tergite silvery (not golden); ovipositor slightly longer, reaching basal quarter of fifth tergite. Colour of body generally dark metallic, fifth (and first) tergite except near base of ovipositor (where bright green) mainly dark cyaneous to purplish black, bottoms of punctures bright blue; mesoscutum laterally and posteriorly regularly bordered with pale yellow. Wings dark greyish to blackish infumate (not yellowish brown).

In spite of these discrepancies I have no doubt that the specimen is within the range of variation of the species.

This species has the body still more compact than the closely related but more northerly *L. robertsoni* Crawford, has a more convex mesoscutum and broader hind femora, whilst the puncturation of the body is distinctly finer and denser, the infumation of the wings generally weaker. The outer spur of the hind tibia is very long, although still shorter than the inner spur.

BIOLOGY. Host not known.

DISTRIBUTION. Brazil, Argentina.

MATERIAL EXAMINED.

BRAZIL: State Pernambuco, Carnuaru, 900 m, iv. 1972, 1 ♀ (*Alvarenga*) (ERI, Ottawa). ARGENTINA: Santiago del Estero, Rio Salado, 1 ♀ (*Wagner*) (FCNM, La Plata); Cordoba, 1 ♂ (*W. M. Davis*) (MCZ, Cambridge); Cordoba, Calamuchita, 12.i.1938, 2 ♀ (FCNM, La Plata and BMNH).

THE *CAYENNENSIS*-GROUP

The species of this group are rather different looking in the shape of the body but all are distinctly metallic-coloured, partly quite vividly so, with extremely short pubescence (at least on head and thorax), the pronotum has no cross-carina, the clypeal margin usually bears a median tooth (indistinct in *L. clavigaster*); in the males the exposed sculptured parts of the sternites are very broad and, in particular, all the species have the same rather unusual form of the mandibles quite unique within the genus: the lower tooth is narrow and long and separated from the inner edge by a broad semicircular emargination, apparent even if the mandibles are closed (Text-figs 110, 111, 116, 119). This feature may have some connection with the biology. Although very little is known in this respect, the evidence suggests that the species parasitise bees nesting in mud (or adobe) walls and not as do many other species of the genus, viz. in various stalks of plants, in reeds, twigs, branches and timber. This form of the mandibles may be a more effective tool for the emerging *Leucospis*.

The *cayennensis*-group includes the type-species of *Metallopsis* Westwood but I do not regard it useful to call the group a subgenus, because some other groups are not so readily separated. It includes *Leucospis cayennensis* Westwood, *mexicana* Walker, *genalis* sp. n., *addenda* sp. n., *metatibialis* sp. n., *ignota* Walker and *clavigaster* sp. n.; all confined to Central and South America.

Leucospis cayennensis Westwood

(Text-figs 107–110)

Leucospis (*Metallopsis*) *Cayennensis* Westwood, 1839 : 264–265, pl. 4, fig. 4, ♂. LECTOTYPE ♂ (here designated), FRENCH GUIANA: Cayenne (MNHU, Berlin) [examined].

Leucospis tomentosa Kirby, 1883 : 70, ♀. LECTOTYPE ♀ (here designated), WEST INDIES: St Thomas (BMNH) [examined].

Leucospis distinguenda Schletterer, 1890 : 269–271, ♀. Holotype ♀, BRAZIL: Santa Catarina, Blumenau (NM, Vienna) [examined]. **Syn. n.**

The size of the body varies greatly, in female 8·5–12·5 mm, which affects to some extent also the sculpture, whilst the relatively poor markings change only slightly. In my opinion the only specimen known as *L. distinguenda* is nothing but a dwarf of *L. cayennensis*. It shows a relatively coarser sculpture, mainly on the first tergite, and hind femur appears slenderer, its upper margin being less arched.

I selected the lectotype of *L. tomentosa* out of three original specimens. It was rightly synonymized with *L. cayennensis* by Schletterer (1890 : 266, 269) who, on the other hand misunderstood and incorrectly synonymized *L. mexicana* Walker with *cayennensis*.

BIOLOGY. Hosts not known for certain, but one specimen was reared from a mud cell, 'possibly of a bee', in Guayana.

DISTRIBUTION. Mexico, Guatemala, Honduras, Nicaragua, Costa Rica, Panama, St. Thomas, Trinidad, Colombia, Ecuador, Peru, Venezuela, Guayana, French Guiana, Brazil.

MATERIAL EXAMINED.

Type data given in synonymy.

MEXICO: Colima, Volcano, 1 ♀ (BMNH); N. Yucatan, Temax, 1 ♀ (*Gaumer*) (BMNH); Chiapas, Rio de la Venta, Pan-Am. Highway, 6.viii.1956, 3 ♀, 17 ♂ (*J. W. MacSwain*) (CIS, Berkeley). GUATEMALA: no locality, 1 ♀ (*Stole*) (EI, Zurich); Retalhulen, 1 ♀ (NM, Vienna); El Salto, Escuintla, vi. 1934, 1 ♀ (*F. X. Williams*) (BBM, Honolulu). HONDURAS: San Pedro Sula, 1 ♀ (MCSN, Genoa), 1891, 1 ♂ (*Kugel*) (BMNH). NICARAGUA: nr Bluefields and Wasta, 6 ♀ (*Schramm*) (MNHU, Berlin). COSTA RICA: Palmar, Dept. Puntarenas, 1 ♂ (*Allen*) (MCZ, Cambridge); Turrialba, 1 ♀ (*Heyne*) (DEI, Eberswalde). PANAMA: Tuipo, viii. 1922, 1 ♀ (*Chapin*) (MCZ, Cambridge); Gatun Lake, Cano Saddle, v. 1923, 1 ♀ (*Shannon*) (BMNH); Potrerillos, ii. 1935, 1 ♀ (DE, Davis); Darien, 1 ♀ (*Geay*) (MNHN, Paris). CAÑAL

ZONE: Fort Clayton, v. 1944, 1 ♀ (*Frick*) (CAS, S. Francisco). COLOMBIA: Rio Frio, xii. 1923, 1 ♀ (*Gowdey*), iv. 1927, 4 ♀ (*Salt*) (BMNH); Chiriguana Distr. nr Lake Sapatoza, 1924, 1 ♀ (*Allen*) (BMNH); Dept. Boyaca, Muzo, 900 m, vii. 1936, 25 ♀, 5 ♂ (*Bequaert*) (MCZ, Cambridge & BMNH); Baranquilla, vii., 1 ♀ (*Bequaert*) (MCZ, Cambridge). ECUADOR: Guayaquil, 1920, 2 ♀ (*Buchwald*) (TM, Budapest). PERU: Yurac, 67 mls E. of Tingo Maria, 1954, 1 ♀ (*Schlinger & Ross*) (CAS, S. Francisco). VENEZUELA: Barinas, 1 ♀ (*Anduze*) (MCZ, Cambridge). TRINIDAD: '*mexicana*', 1 ♀ (Coll. Marshall, TM, Budapest); St. Augustine, xi. 1947, 1 ♀ (*Callan*) (BMNH). GUYANA: Bartioz, 1 ♀, Pevas, 1 ♀ (MCSN, Genoa); Kartabo, vii. 1924, 1 ♀ (CM, Pittsburgh); Mazaruni, from a mud cell of a ?bee, viii. 1937, 1 ♂ (*Richards & Smart*) (BMNH); N.W. Distr., Mabaruma, iv. 1929, 1 ♀ (*Myers*) (USNM). FRENCH GUIANA: Cayenne, iii. 1917, 1 ♀ (CM Pittsburgh). BRAZIL: "Guayana" (Amapá?), Villanova, x. 1900, 1 ♀ (*Ducke*) (NM, Vienna); Pará, Ilha de Marajó, Soure, 1 ♀ (*Betram*) (MNHU, Berlin); Santarem, 1 ♀ (*Bates*) (UM, Oxford); Taperinha nr Santarem, vii. 1927, 3 ♀ (*Zerny*) (NM, Vienna), iv.–vi. 1919, 18 ♀, 6 ♂ (*Klages*) (CM, Pittsburgh & BMNH); Alter do Chão nr Santarem, 1 ♀ (*Bates*); Tapajoz, 2 ♀, paralectotypes of *tomentosa* (*Bates*) (BMNH); Amazonas, 1 ♀ (*Bates*) (UM, Oxford); Rio Purus, Hyutanahan, 3 ♀ (*Klages*) (CM, Pittsburgh); Guarityba, Distr. Federal, iv. 1932, x. 1934 (*Silva*) (IBUR, Rio de Janeiro); Santa Catarina, Blumenau, 1 ♀ (*Hetschko*) (NM, Vienna); Nova Teutonia, ii. 1936, xii. 1953, 2 ♀ (*Plaumann*) (BMNH).

Leucospis mexicana Walker

(Text-fig. 106)

Leucospis Mexicana Walker, 1860 : 20, ♀. LECTOTYPE ♀ (here designated), MEXICO (BMNH) [examined].

Schletterer (1890 : 265, 269) regarded *L. mexicana* as a synonym of *L. cayennensis* Westwood, apparently after examination of some specimens identified as such by some previous author, probably mainly by P. Cameron. One of these specimens is preserved in TM, Budapest and is undoubtedly *cayennensis*. Even Cameron, however, was not sure about his identification (as revealed by his statement; 1883 : 76–77), for he could not examine the type material of *mexicana*, and his figure (1883, pl. 4, fig. 11) clearly shows that he mistook *cayennensis* for *mexicana*. On the other hand Cresson's description (1872 : 30) seems to fit *mexicana*. I have not seen his material but there are two specimens in the Paris Museum, also coming from Sumichrast from Mexico, which are true *mexicana*. I re-examined also Strand's specimen (1911*a* : 95); he identified the species correctly.

The differences between the two closely related species are given in the key above. It may be stressed that apart from the unusual pubescence of the gastral apex in *mexicana* the puncturation of hind femur is denser and less coarse, the pubescence of the propodeum slightly less dense, the dorsellum less convex and therefore

appearing relatively longer than in *cayennensis*. The male shares all these characters (until now undescribed; body length 8·5 mm).

BIOLOGY. Host unknown.

DISTRIBUTION. Mexico.

MATERIAL EXAMINED.

Data of the lectotype given in synonymy.

MEXICO: not localized, 1 ♀ (MCSN, Genoa), vi. 1863 (*Sumichrast*), 1 ♀, 1 ♂ (MNHN, Paris); Durango, Presidio [de San Nicolas] and Ciudad (*Forrer*), 2 ♀ (BMNH; MNHU, Berlin); Guerrero, Tierra Colorada, 650 m (*H. H. Smith*), 1 ♀ (BMNH).

Leucospis genalis sp. n.

(Text-figs 111, 112)

♀. 7·2 mm. Black, with weak metallic tinge, but gaster posteriorly except basal bands on tergites 3–5 golden to brassy; pale yellow are narrow bands at hind margin of pronotum and mesoscutum, apex of lateral edge of hind coxa, very narrowly all knees, dorsal edge and basal half of ventral edge of hind femur. Antennae black; legs apically more or less brownish; ovipositor sheaths reddish. Wings slightly brownish yellow, more intensively so near the venation.

Head distinctly narrower than pronotum posteriorly (52·5 : 57·5), dorsally about 2·3 times as broad as long. Occipital carina not high, disappearing half way between ocelli and eye; temples subparallel, nearly one-third the length of eye in dorsal view; POL about 0·9 OOL, ocellar triangle about 2·2 : 1, bluntly elevated between median and lateral ocellus. Scrobes above transversely striate, not carinately bordered. Vertex rugose-punctured, rugae radiating laterad from ocelli; face rugulose-punctured, slightly shiny only on convex disc of supraclypeal area; interantennal lobe not carinate; pubescence whitish, extremely short and not very dense, longer hairs sparse. In facial view head 1·14 times as broad as high (Text-fig. 111), height to shortest distance between eyes (below antennae) as 46 : 30, relative width of frontovertex 34, eye 27·5 : 17·0, its inner orbit not emarginate; malar space 11·5, width of mouth 26. Clypeus as broad as high, its lower margin conspicuously produced, bilobate with very small median tooth; relative distance of lower margin from toruli 25. Mandibles with deeply semicircular broad gap separating sharp lower tooth. Scapus ventrally densely punctured, about 3 times as long as broad, relative length 14. Flagellum plus pedicellus combined about 1·15 times as long as breadth of head, weakly clavate; pedicellus hardly longer than broad, first flagellar segment about 1·5, sixth 1·1, clava twice, as long as broad; two preclaval segments subquadrate.

Puncturation of thorax very dense, coarsest on mesoscutum where some punctures are transversely confluent; interspaces very narrow, without microsculpture; pubescence mostly extremely short but longer on pale band of pronotum and laterally on scutellum. Pronotum convex, without any carinae; sides in dorsal view converging, straight, hind margin broadly emarginate; lateral panel above convex, shallowly depressed along the broadly rounded lower margins. Mesoscutum convex; vestiges of parapsidal furrows very short. Tegula with punctures along inner margin only, disc impunctate, shiny, faintly alutaceous. Scutellum 1·2 times as broad as long, convex, with a row of coarser alveolae at hind margin; hairs directed forward, very conspicuous laterally. Dorsellum subtriangular, about twice as broad as long, bare, coarsely alveolate, its margin with raised sublamellate carina, metanotum sublaterally with a row of large foveae. Propodeum medially about 1·8 times as long as dorsellum, the irregular high median carina and plicae distinct; at base coarsely irregularly clathrate-alveolate and except just at base densely punctured and densely hairy. Upper mesepimerum coarsely

punctured, broad interspaces smooth. Upper edges of fore femur and tibia rounded. Hind coxa dorsally and laterally extremely densely punctured and with short hair, in depression a broad impunctate streak not reaching basal one-sixth, the streak with indicated microreticulation; depression about 2·5 times as long as broad; dorsal edge posteriorly indicating blunt tooth. Hind femur (Text-fig. 112) very slender, basal tooth in middle, followed by six broadly separated narrow teeth; puncturation externally irregular, some punctures very coarse. Puncturation of hind tibia externally very coarse and rather sparse, apically denser and less coarse; apex of tibia truncate, outer spur fairly long, inner spur acuminate. Hind basitarsus dorsally about as long as apical breadth of tibia. Fore wing: stigma clavate, apical processus broader than uncus and about as long.

Gaster with subparallel sides, dorsal outline (in profile) conspicuously convex; puncturation dense, coarsest on first tergite where about as coarse as on pronotum but slightly less dense. First tergite slightly shorter than broad, not narrower than any of the following ones; dorsally regularly convex and punctured. Tergites 3, 4 and 5 along hind margins increasingly broadly depressed, dorsally of relative length 10, 19 and 18 respectively (first tergite 40); third finely, fourth and fifth more deeply but not very broadly grooved medially; third tergite very shortly pilose, the fourth and fifth with conspicuous vivid pale golden to brassy hairy bands, with stoutish hairs at base of distal depressions directed ventrad instead of caudad; similar thick hairs on sixth tergite and epipygium directed caudad. Ovipositor sheaths curved, tapering apically, hardly shorter than hind tibia, reaching nearly to base of fourth tergite.

♂. 8·5 mm. Very similar to ♀, particularly in colour and in sculpture of head, thorax and in the legs. Mesoscutum slightly shiny only on the disc, sublaterally interspaces dull, with irregular transversely rugose microsculpture. Gaster slightly longer than thorax, broad, about 1·5 times as long as broad, with all tergites dorsally exposed, though third to sixth with margins fused (but indicated). First to third tergite with dark pilosity, first and second very coarsely irregularly punctured to alveolate; third basally also with relatively coarse punctures; following tergites finely densely punctured but each, decreasingly, basally more coarsely and less densely so; fourth to sixth tergite plus epipygium with dense adpressed golden pubescence forming transverse bands, as hairs on each tergite anteriorly are directed sideways, then in a band directed caudad and at hind margin towards median line which is marked particularly on fifth and sixth tergite as a keel, weaker on epipygium. First tergite nearly twice as broad as long, 0·85 as broad as fourth (broadest) tergite, medially strongly convex, high, basal fovea extremely short but distinct, hind margin straight. Apex of gaster blunt, but epipygium rather narrow, transversely depressed in middle, with raised subparallel edges inside of spiracles; apex subangularly produced. Sides of sixth tergite posteriorly without distinct auricles. Last sternite densely punctured, nearly flat, only shallowly grooved medially, about as long as broad, its sides converging, apex emarginate. Penultimate sternite broadly depressed in middle, about twice as broad as long. Preceding segments flat, sparsely coarsely punctured, strongly transverse.

BIOLOGY. Host unknown.

DISTRIBUTION. Brazil, Paraguay.

Holotype ♀, PARAGUAY: Villarica (*F. Schade*) (MCZ, Cambridge).

Paratypes. BRAZIL, State Sao Paulo: Jundiai, 1897 and 1899, 2 ♂ (*Schrottky*) (MNHU, Berlin and BMNH).

L. genalis sp. n. has the apical golden pubescence as in *L. mexicana* Walker and the two species are similar in colour. Apart from the differently shaped dorsellum, *L. genalis* is plumper, has more slender legs and in the male is nearer to *L. ignota* Walker, to the following species (*L. addenda*) and perhaps to some other closely related species known mostly only in the females. Namely, the second tergite in the male is dorsally not only visible, but very heavily sculptured,

whilst in *L. cayennensis* Westwood and in *L. mexicana* it is weak, concealed under the first tergite, without sculpture.

Leucospis addenda sp. n.

(Text-figs 118–120)

♂. 8 mm. Black, with dark bluish, greenish or purplish tinge, but bright red-golden on broad apex of gaster from middle of fifth tergite and a broad band posteriorly on fourth tergite; pale yellow are: scapus beneath, narrow cross-band posteriorly on pronotum (arched along hind margin), hind margin of mesoscutum between short parapsidal vestiges, a line on dorsal edge of fore tibia, mid knee, a spot posteriorly on lateral edge of hind coxa, hind femur and tibia dorsally, femur also ventrally but spot not reaching apex. Mandibles basally rufous. Wings brownish yellow, marginal and postmarginal vein darker brown.

Head as broad as pronotum anteriorly, dorsally crescentic, fully 2·3 times as broad as long; temples not very short, slightly longer than breadth of median ocellus. Occipital carina not high but reaching behind inner margins of eyes, then becoming blunt; vertex densely reticulate-punctured, with some rugae converging towards temples; POL subequal to OOL; ocelli not large, their triangle about 2·5 : 1, lateral ocelli touching occipital carina, median ocellus not separated from scrobes which is not carinate above. Frontal protuberances rather high and in anterior view bordered by a tooth-like elevation of scrobal margin, the latter as far from eye as breadth of scrobes above. Head in facial view 1·18 times as broad as high (Text-fig. 119); face rather swollen but depressed between toruli and eyes, lower face flat, interantennal area convex and bluntly ridged medially. Pubescence extremely short, narrow interstices of rugulose puncturation smooth. Relative measurements: height of head 60, width 71, frontovertex 44, scrobes 21·5, lower face 40, its height 30, eye 39·0 : 24·5 (inner orbit hardly emarginate), malar space 12, mouth 37, scapus 21. A small broadly triangular area below eye and reaching middle of malar space without punctures but with extremely fine granulose reticulation. Lower clypeal margin moderately produced, lateral lobes semicircular, median tooth short and broad. Antennal flagellum slightly clavate, together with pedicellus nearly 1·2 times as long as breadth of head; distal funicular segments transverse, basal ones elongate.

Thorax very densely punctured, on mesoscutal disc punctures coarser, interstices raised and slightly shiny, elsewhere dull. Pronotum without premarginal carina, hind margin emarginate, sides slightly concave; lateral panel shallowly depressed, hind margin above semicircularly emarginate. Scutellum fully 1·3 times as broad as long, slightly convex, with impressed cross-row of punctures at hind margin which is narrowly impunctate. Dorsellum bare, irregularly alveolate (bottom of alveolae smooth), subtriangular, sides with laminate carina which is slightly lowered in middle; sides of metanotum with crenulate furrow. Propodeum medially about 1·7 times as long as dorsellum; median carina in middle high and swollen, rugose on top; median area with coarse rugose puncturation, basally with some longitudinal irregular rugae, hairs not long and not dense, radiating forwards and sideways from apex of median carina; irregular plicae conspicuous. Interspaces of punctures on upper mesepimerum subhorizontally striate. Fore femur and tibia not distinctly carinate dorsally. Hind coxa: depression in posterior half with longitudinal smooth area surrounded by sparse punctures, otherwise densely hairy but hairs even dorsally unusually short, longest being the hairs at lateral edge; dorsal edge behind broadened base narrow but blunt, not carinate. Hind femur (Text-fig. 118) externally densely and rather finely punctured, with interspersed much coarser punctures. Hind tibia externally densely punctured, apex truncate; basitarsus dorsally hardly as long as breadth of tibia; claws weakly curved. Fore wing: apex of stigmal vein broad, rounded, much shorter than the slender uncus.

Gaster (Text-fig. 120) nearly 1·9 times as long as broad, broadest in three-fifths, moderately narrowed forwards. First tergite about 0·7 times as long as broad and about 0·7 the breadth of posterior part of gaster; basal fovea very small; dorsum convex, coarsely punctured, laterally

with pale keel separating the densely punctured epipleurum. Second tergite narrowly exposed, punctured, its epipleurum about as long as high. Following tergites more or less fused, generally more densely punctured in broad band at hind margins, this less apparent on third tergite; epipleura not separated. Fourth and fifth tergites posteriorly, sixth tergite wholly densely punctured and golden, covered with long decumbent golden hairs which converge arcuately towards median line; most apparently so on sixth tergite which has a median keel; at base of fifth tergite keel indicated by a smooth strip; hind margin of fourth tergite broadly excised; hind margin of the sixth not elevated, without lateral auricles. Epipygium slightly transverse, broadly transversely depressed, median keel barely indicated; a slight longitudinal elevation above cerci; hind margin rounded, not swollen. Last two sternites golden, moderately depressed, last sternite along middle, the sixth (penultimate) transversely so; last sternite slightly broader than long, sides strongly converging, apex narrowly truncate and subemarginate; penultimate sternite more than twice as broad as long, preceding sternites still more transverse, their puncturation increasingly coarser towards base of gaster, as well as degree of convexity.

♀. Unknown.

BIOLOGY. Host unknown.

Holotype ♂, BRAZIL: Minas Geraes, Passa-Quatro, Las Tronqueras, 1904 (*Wagner*) (MNHN, Paris).

Before I examined the holotype of *L. sumichrastii* Cresson I thought that the male described here as *L. addenda* might belong to the former species. *L. addenda*, however, clearly belongs to the species with the lower tooth of the mandibles separated by a semicircular gap (Text-fig. 119), whilst this tooth in *sumichrastii* is separated by a triangular notch (Text-fig. 102). In the *cayennensis*-group *L. addenda*, together with *L. clavigaster* sp. n., has only a moderate pilosity on the propodeum, as stressed in the key; all the other species of that group have the propodeum unusually densely pubescent.

Leucospis metatibialis sp. n.

(Text-fig. 113)

♀. 6·4–7·4 mm. Black, with weak metallic tinge on thorax and gaster but head bright cupreous; whitish yellow are scapus beneath, sometimes pronotum at hind margin, mesoscutum along lateral and posterior margins, a broad spot on upper mesepisternum, narrow line dorsally on fore tibia and basal part of mid tibia, sometimes a lateral line on hind coxa, broad dorsal and short ventral streaks on hind femur, hind tibia broadly along dorsal edge and indistinctly hind margin of pronotum; antenna except apically, then pronotum and propodeum or even metapleurum, reddish; fore and mid legs and gaster beneath reddish brown. Wings moderately infumate, slightly darker along anterior margin.

Head hardly narrower than pronotum posteriorly (52 : 53), dorsally 2·00–2·15 times as broad as long; occipital carina not high, disappearing laterad of ocelli; temples rather broad, distinct, nearly one-third as long as eye in dorsal view, subparallel; POL about 0·9 the OOL, ocellar triangle about 2 : 1, with fine carina from lateral ocellus to centre of median ocellus. Scrobal margins hardly carinate at frontal protuberances and at median ocellus. Vertex punctured with longitudinal rugae in front of lateral ocelli; face finely rugulose-punctured, dull but slightly shiny on vertically convex supraclypeal area where interspaces are more conspicuous; median carina of interantennal lobe not distinct; pubescence whitish, moderately short. In facial view head 1·16 times as broad as high, height to shortest distance between eyes (below antennae)

as 44·5 : 29·5, relative width of frons above the indicated emargination of orbits 35, maximum breadth of scrobes 18, eye 29 : 18, malar space 8, width of mouth 24. Clypeus 1·25 times as broad as high, broadly bilobed lower margin with small median tooth; surface of clypeus more distinctly and more coarsely vertically rugulose than lower face on sides; relative distance between lower clypeal margin and antennal toruli 22. Mandibles with slender lower tooth separated by deep semicircular gap from upper subtruncate edge. Scapus ventrally about 2·4 times as long as broad, relative length 13. Flagellum plus pedicellus combined about 1·34 times as long as breadth of head, moderately clavate, clava nearly twice as broad as pedicellus; first flagellar segment about 1·3 times as long as broad, fifth and sixth subquadrate, eighth about 0·9 times as long as broad; clava subacuminate, twice as long as broad.

Puncturation on thorax very dense and transversely confluent, on scutellum more polygonal, interspaces extremely narrow, without microsculpture; pubescence extremely short. Pronotum without carinae, hind margin also not carinate; sides in dorsal view slightly converging and in middle distinctly emarginate, surface along median line flat; lateral panel flattened, its lower corner broadly rounded, obtuse-angular posteriorly. Mesoscutum not depressed posteriorly; vestiges of parapsidal furrows as long as their distance from lateral margin. Broad part of tegula smooth. Scutellum 1·15 times as broad as long, apical margin not set off, apex broadly rounded; sides with dense short hairs. Dorsellum about 3 times as broad as long medially, margined with narrow upturned lamina; surface flat, densely finely punctured and covered with thick argenteous subdecumbent hairs directed towards sides. Propodeum medially half as long as scutellum, median carina and plicae fine but distinct, surface densely pubescent; hairs white, on median area posteriorly directed laterad, anteriorly directed forwards. Femoral depression of mesopleurum fairly deep; upper mesepimerum coarsely punctured, broad interspaces smooth. Upper edges of fore femur and tibia rounded. Hind coxa in depression with a smooth streak not reaching basal fifth, otherwise at lateral edge and at dorsal edge anteriorly extremely densely punctured, short hairs below the streak directed downwards; dorsal edge with dense short pubescence, posteriorly with a short but not extremely thin dorsal lobe. Hind femur flattened, unusually narrow, rather irregularly coarsely punctured with intermixed finer punctures, interspaces generally as broad as punctures; basal tooth situated in middle, narrow, followed by unequal small teeth about 8 in number. Hind tibia externally with very sparse coarse punctures and some interspersed fine punctures on broad interspaces (Text-fig. 113); apex subtruncate, outer spur stout, conical.

Gaster about as long as head plus thorax combined, about 2·5 times as long as broad, very slightly narrowed at fourth tergite. Pubescence anteriorly short, on fourth and following tergites double, with sparse outstanding longish hairs and very dense short subdecumbent stoutish hairs appearing argenteous. Dorsum smoothly convex in profile. First tergite about 1·1 times as long as broad, fairly densely punctured with a smooth narrow median groove; third tergite with median depression, submedially punctures crowded in about 7 transverse rows. Fourth and fifth tergite dorsally subequal in length and width, broadly grooved medially, each distinctly transversely depressed before hind margin, hairs just before the depression directed obliquely sideways, in hind part of depression backwards. Sixth tergite and epipygium less densely pubescent than the fifth. Ovipositor sheaths curved along convex dorsum of gaster, its apex acuminate and curved downward, reaching anterior half of first tergite.

♂. Unknown.

BIOLOGY. Unknown.

DISTRIBUTION. Bolivia, Argentina.

Holotype ♀, ARGENTINA: Salta (*Steinbach*) (BMNH).

Paratypes. ARGENTINA: Salta, Alemaría, 27.iv.1970, 1 ♀ (*Stange & Porter*) (IML, Tucumán). BOLIVIA: Santa Cruz, 4.vii.1972, 1 ♀ (*Porter*) (BMNH).

This species is unique in having the dorsellum densely covered by subdecumbent white hairs.

Leucospis ignota Walker

(Text-figs 115–117)

Leucospis ignota Walker, 1860 : 22, ♂. LECTOTYPE ♂ (here designated), [COLOMBIA] (BMNH) [examined].

Leucospis tolteca Cresson, 1872 : 34, ♀ ♂. LECTOTYPE ♀ (here designated), MEXICO (ANS, Philadelphia) [examined]. **Syn. n.**

Leucospis cupreo-viridis Westwood, 1874 : 135, pl. 25, fig. 5, ♀. LECTOTYPE ♀ (here designated), COLOMBIA: Santa Martha (UM, Oxford) [examined]. **Syn. n.**

When describing *L. ignota*, Walker did not mention any locality, but already Schletterer (1890 : 289) pointed out that the species must be American. I found in the old register of the British Museum (Natural History) that Walker's specimens were purchased in 1858 with a lot coming from different parts of the world, but among these only from 'New Grenada' (= Colombia) in the New World. Subsequently I recognized the syntypes of *L. ignota* as belonging to the same species as *L. cupreoviridis* Westwood which also comes from Colombia.

L. tolteca was described from several specimens and as Weld's statement about the 'type' (1922 : 15) applies to the whole lot, I designate the only female which was sent to me for examination from the original material (Cat. No. 1801) from Philadelphia as lectotype. As I presumed from specimens identified as *tolteca* by Weld, Gahan and Burks, it is the same as *ignota*.

The antennal scapus of the male is curved, with anterior side conspicuously concave.

BIOLOGY. Host unknown, but some specimens were collected at 'adobe' (mud) walls, presumably at the nesting sites of host bees.

DISTRIBUTION. Mexico, Honduras, Colombia, Venezuela, Trinidad, Guayana, Brazil, Peru, Argentina.

MATERIAL EXAMINED.

Type data given in synonymy.

MEXICO: no locality, vi. 1863, 2 ♀ (*Sumichrast*) (MNHN, Paris); Nayarit, nr San Blas, ii.1964, 2 ♀ (*Irwin & Schlinger*) (UC, Riverside); San Luis Potosí, El Salto, 600 m, vi. 1961 (*Univ. Kansas Mex. Exp.*) (SM, Lawrence); Puebla, Petlalcingo, xi. 1963, 1 ♂ (*Michelbacher*) (CIS, Berkeley); Guerrero, Tierra Colorada, 700 m, 1 ♂ (*H. H. Smith*) (BMNH); Tabasco, Teapa, 1 ♀ (*Smith*) (BMNH); N. Yucatan, Temax, 1 ♀, 5 ♂ (*Gaumer*) (NM, Vienna; BMNH). HONDURAS: data illegible, on adobe wall, 1 ♀, 1 ♂ (*Cockerell*) (BMNH); San Pedero Sula, 1 ♂ (MCSN, Genoa); Zamorano, xi. 1946, 2 ♀, 5 ♂ (*Cockerell*) (USNM). COLOMBIA: no data, 1 ♀, paralectotype of *ignota* (BMNH), 2 ♀ (UZM, Copenhagen); Rio Frio, xii. 1923, 1 ♀ (*Gowdey*) (BMNH); Dept. Boyaca, Muzo, vi. 1936, 4 ♀, 3 ♂ (*Bequaert*) (MCZ, Cambridge; BMNH). VENEZUELA: Aroa, xii. 1910, 2 ♀, 2 ♂ (*Carriker*) (USNM); Mundo Nuevo, foothills N. of Irapa, Sucre, xii. 1944, 1 ♀, 2 ♂ (*Donald*) (BMNH); Maracay, Aragua, 1 ♀; San Esteban, Fal., xii. 1939, 1 ♀, 2 ♂ (*Anduze*) (CU, Ithaca; Townes); Barinas and Barinilas, 3 ♀ (*Anduze*) (MCZ, Cambridge). TRINIDAD: Preysal, on *Borreria verticillata*, i. 1945, 1 ♂ (*Callan*) (BMNH). GUYANA: Kartabe,

1920, 1 ♀ (*Wheeler*) (MCZ, Cambridge); Mazaruni, ix. 1937, 1 ♀ (*Richards & Smart*) (BMNH). BRAZIL: no locality, 1 ♀, 5 ♂ (UM, Oxford); 'Bahia', 1 ♂ (BMNH). PERU: Pucallpa, Loreto, vi. 1962, 1 ♀, 1 ♂ (*Van Velzen*) (EM, East Lansing). ARGENTINA: Salta, Payogasta, i. 1966, 3 ♀, 59 ♂ (*Porter*) (MCZ, Cambridge; BMNH); Misiones, Estacion Exp. Loreto, 1 ♀ (*Oglobin*) (FCNM, La Plata); Rosario District: Granja, Sal.-Alv., Alberdi, 1912–1920, 1 ♀, 5 ♂ (*Hubrich*) (ZS, Munich).

Leucospis clavigaster sp. n.

(Text-fig. 114)

♂. 7 mm. Black, with dark metallic tinge which is brighter greenish or cupreous on vertex and face (bluish on frons), propodeum and sides of thorax, basal tergites, fourth and fifth tergite posteriorly and on the sixth except basally; yellow are: scapus, narrow lines anteriorly and posteriorly on pronotum, hind margin of mesoscutum, base of first tergite, dorsal edge of hind coxa, fore and mid knees, narrowly hind femur on dorsal edge and ventro-basally, hind tibia subbasally; tarsi pale testaceous. Wings moderately brownish, slightly darker along anterior margin.

Head dorsally about 2·15 times as broad as long, about as broad as pronotum; temples very short but distinct. Occipital carina complete, medially strongly inflexed forward, touching ocelli; ocellar triangle strongly raised, about 2·6 : 1; POL : OOL as 11·5 : 7·5; frontal protuberances rounded in dorsal view but scrobes strongly carinate, not touching median ocellus. Head in facial view 1·2 times as broad as high, face slightly swollen, supraclypeal area not raised, median keel between antennae blunt but distinct. Relative measurements: width of head 58, frontovertex 34, scrobes (width) 15, lower face 32·5, its height 23, eye 34 : 22 (inner orbits hardly emarginate), malar space 6·5, mouth 26, scapus 15. Clypeus flat, about 1·2 times as broad as high, lower margin weakly produced, medially depressed, hardly emarginate. Flagellum rather strongly clavate, subapically nearly twice as broad as pedicellus, both parts combined nearly 1·2 times as long as breadth of head; pedicellus subglobose; first flagellar segment obconical, about 1·6 times as long as broad, slightly longer than the second, the following segments subequal in length but increasing in width, eighth slightly transverse, clava subacuminate, nearly as long as two preceding segments combined.

Pronotum strongly transverse, dorsally weakly convex, sublaterally nearly flat; hind margin broadly emarginate, sides barely converging, straight; premarginal carina indistinct; lateral panel fairly concave, a small adspiracular area separated by a short vertical carina, lower corner obtuse-angular. Mesoscutum strongly convex, puncturation dense, very narrow interspaces partly raised in short transverse rugae, otherwise microscopically cross-striate. Scutellum nearly flat, fully 1·2 times as broad as long, in posterior half interspaces with longitudinal striation and punctures partly confluent; not depressed at hind margin which is subangularly produced medially; axillar furrows strongly converging. Dorsellum semicircular-crescentic, margin carinate; surface slightly convex, coarsely punctured and with some hairs, at marginal carina alveolate. Propodeum medially raised and 1·7 times as long as dorsellum; median carina and plicae moderate, slightly irregular; median area coarsely rugose-punctured, hairs not very dense, directed headwards. Upper mesepisternum densely punctured, upper mesepimerum less densely so, on disc with smooth interspaces but at metapleural margin with subvertical striae. Fore femur dorsally distinctly carinate, tibia dorsally more bluntly so. Hind leg similar to *L. ignota*, but hind coxa in depression more densely punctured, without impunctate area, dorsal edge ending posteriorly rather abruptly, suggesting an angulate narrowly translucent lobe; hind tibia apically less widened, clearly narrower than dorsal length of basitarsus. Fore and mid claws cleft apically, apart from subbasal comb (as in *ignota*). Fore wing: apical processus of stigmal vein about as long as uncus, but broader.

Gaster strongly clavate (Text-fig. 114). First tergite hardly 0·45 as broad as gaster posteriorly, about 1·3 times as long as broad, parallel-sided, with very short basal fovea, dorsally convex and rather densely punctured. Second tergite transverse, laterally ridged, with narrow epipleurum below the ridge; second and third tergite coarsely punctured whilst the following tergites are only moderately so, with hairs rather long, semidecumbent, mostly directed caudad, but combed towards median line on posterior half of sixth tergite; apical margin of sixth tergite low, without auricles at sides. Epipygium slightly depressed transversely, laterally with fine supracercal carinae, apex smooth, rounded, margin slightly raised. Basal sternites very coarsely punctured, transverse, convex; the fourth and fifth slightly convex, about twice as broad as long each, the sixth medially moderately deeply depressed, the seventh (last) slightly broader than long, apically rounded, depressed subbasally, rather densely and finely punctured and hairy.

♀. Unknown.

BIOLOGY. Unknown.

Holotype ♂, PERU: Monson Valley, Tingo Maria, 29.xi.1954 (*E. I. Schlinger & E. S. Ross*) (MCZ, Cambridge).

At first glance this male looks similar to *L. ignota* Walker, but has more converging genae, more clavate and basally more attenuate antennal flagellum, different pattern of pale markings, the propodeum not densely hairy, the gaster much more narrowly petiolate, with the first tergite longer than broad, the posterior tergites more coarsely punctured, the last two sternites distinctly depressed, etc. The form of the mandibles puts this species definitely into the *cayennensis*-group.

The African, Madagascan and Mediterranean species

The key below includes all species known from the African continent, together with Madagascar and the adjacent islands. As most North African species are distributed also in southern Europe, it was felt convenient to include them in the key but also discuss them in a separate chapter as West Palaearctic (or widely Mediterranean) species, the more so because they belong mostly to different species-groups. There are, however, a few exceptions. Thus the north Sudanese *L. obsoleta* Klug, belonging to the *dorsigera*-group, is treated with the other Mediterranean species of the group. On the other hand the North African *L. miniata* Klug is treated with its kin, the South African *L. incarnata* Westwood. *L. elegans* Klug, the distribution area of which covers fringes of the Palaearctic, Ethiopian and Oriental regions, is discussed with the African species of the *elegans*-group.

Altogether 26 species are keyed out here. They belong to the *elegans*-group, *tricolor*-group, *gigas*-group, *fuelleborniana*-group, *dorsigera*-group and, as 'species solae', i.e. single species not attributable to any group, *L. holubi* sp. n. and *L. namibica* sp. n.

KEY TO THE AFRICAN, MADAGASCAN AND WEST PALAEARCTIC SPECIES OF *LEUCOSPIS*

1 Pronotum with three distinct cross-carinae: discal (anterior) one, premarginal carina and carinate hind margin (Text-figs 121, 140, 143) 2

– Pronotum at most with two carinae, discal carina absent or indistinct; sometimes hind margin not carinate, rarely even premarginal carina absent or vague . . 14

2 Hind coxa with smooth streak in upper half of depression (Text-fig. 136); pubescence of body subdecumbent, short but rather dense; mainly brownish black, whitish markings reduced to anterior line on pronotum, dorsal edge of hind coxa, base of hind femur and in ♀ a band on fourth tergite; Madagascar ***pubescens*** sp. n. (p. 122)

– Hind coxa punctured, without smooth streak; pubescence semi-erect or erect, longer than in alternate; markings otherwise, usually richer; non-Madagascan . . 3

3 Dorsellum at hind margin more or less carinate and usually shortly bidentate; dorsally often without hairs; discal carina of pronotum not high . . . 4

– Dorsellum convex, its margin rounded, not bidentate, dorsally beset with piliferous punctures; if hind margin subcarinate, then discal carina of pronotum high, angulate 8

4 Ethiopian (south of Sahara); hind femur with middle teeth longer than basal tooth which often is not broad, sometimes oblique (Text-fig. 126); discal carina narrowly lamellate, its high translucent margin directed backwards; pubescence of body relatively long; ovipositor not reaching base of fifth tergite ***africana*** Cameron (p. 106)

– Palaearctic or North African (including Sudan); hind femur with middle teeth mostly shorter than basal tooth which is broadly triangular, not oblique (Text-figs 172–175); discal carina mostly otherwise; pubescence short; ovipositor often longer than in alternate 5

5 Discal carina short but subangulately raised, its thin lamellate margin turned backwards; ovipositor sheaths shorter than hind tibia and not reaching base of fifth tergite (Text-fig. 170); upper edge of hind coxa even posteriorly not very thin; hind tibia black but hind femur extensively yellow; in ♂ gaster narrowly petiolate (Text-fig. 169), similar to *africana* . . . ***brevicauda*** Fabricius (p. 141)

– Discal carina low, barely lamellate; ovipositor subhorizontal and longer; upper edge of hind coxa posteriorly very thin, its margin there often serrate; hind femur often mainly black and if more yellow then base and apex yellow (Text-fig. 173); in ♂ gaster basally broader, first tergite transverse 6

6 Ovipositor usually exceeding base of gaster, rarely just reaching it; first tergite in ♀ with smooth ovipositorial furrow broad, even anteriorly; scutellum at base broadly black; hind femur with gaps between basal teeth not very broad, puncturation externally moderately coarse . . ***dorsigera*** Fabricius (p. 142)

– Ovipositor not quite reaching base of first tergite, often much shorter; ovipositorial furrow on first tergite more or less narrowed anteriorly; scutellum wholly yellow or nearly so; partly otherwise 7

7 Hind femur with gaps between basal teeth narrow (as in *dorsigera*), puncturation moderately coarse (Text-fig. 175); ovipositor sheaths reaching hind margin of first tergite, median furrow on this tergite from middle distinctly tapering forwards (Bouček, 1959, figs 16–20); Mediterranean . ***bifasciata*** Klug (p. 146)

– Hind femur with gaps between basal three teeth very broad, teeth oblique, puncturation externally unusually coarse (Text-fig. 174); ovipositor reaching anterior third of first tergite, its furrow broad even anteriorly; Sudan ***obsoleta*** Klug (p. 147)

8 Discal carina weak and straight, slightly lower than premarginal carina which may be slightly arcuate or angulate 9

– Discal carina very strong, at least as high as the premarginal one and both distinctly angulate 10

9 Pubescence unusually long although thin; hind femur slender (Text-fig. 122); pronotal sides converging, concave, shoulders rounded (Text-fig. 121); ovipositor reaching hind fifth of first tergite which has distinct ovipositorial furrow in posterior third; Sokotra . . . . . ***insularis*** Kirby (p. 106)

– Pubescence short, denser but less thin than in alternate; hind femur fairly broad

(Text-fig. 127); pronotal sides subparallel (Text-fig. 129); ovipositor not quite reaching first tergite, furrow developed only on fourth and fifth tergites; Rhodesia ***fallax*** sp. n. (p. 110)

10 Hind femur with strong basal tooth (Text-fig. 130) and externally with very coarse puncturation; white pubescence on face very dense; yellow markings mostly extensive, usually pronotal band extending to premarginal carina, most of scutellum yellow, also hind femur and first tergite in ♀ extensively yellow; Sudan, Egypt . . . . . ***elegans*** Klug (p. 114)

– Hind femur with basal tooth at most about as high as slender middle teeth, often smaller; femur externally often otherwise; pubescence on face usually not very dense; yellow markings much less extensive; usually more southerly species . 11

11 In both sexes middle teeth of broad hind femur the longest, basal tooth oblique and at most as long as the second (Text-fig. 135); ovipositor not quite reaching base of fifth tergite which is medially distinctly longer than the first and gradually sloping caudad; ovipositorial furrow not developed on fourth tergite ***carinifera*** Kriechbaumer (p. 119)

– Basal tooth of hind femur broader, subtriangular, larger than the second, although often not longer than middle teeth; ovipositor sometimes exceeding base of fifth tergite towards head, this tergite dorsally often subhorizontal, never much longer than the first, with puncturation generally coarser, pilosity less dense and more uniform than in alternate; fourth tergite with ovipositorial furrow which often is present also on first tergite (*ornata*) 12

12 In ♀ first tergite with well-defined deep ovipositorial furrow, smooth on bottom, nearly reaching basal fovea; sheaths in normal position reaching about middle of first tergite; in ♂ gastral carapace usually with one cross-band before and another behind broadest part, and with transverse apical macula which only rarely tends to expand forwards at sides; puncturation of hind femur of varying density but usually not very coarse though rather deep . . . ***ornata*** Westwood (p. 116)

– In ♀ first tergite without ovipositorial furrow, although sometimes with a shallow median depression posteriorly; sheaths of varying length but generally shorter than in alternate; in ♂ gastral carapace with arched band just behind broadest place and another transverse macula along apical margin usually expanded forwards at sides; punctures on hind femur usually very coarse and in general sparser than in alternate 13

13 Ovipositor reaching base of fourth tergite, its furrow narrow and rather deep throughout; hind femur relatively slender (Text-fig. 138) ***varicollis*** Cameron (p. 120)

– Ovipositor shorter, hardly reaching basal third of fifth tergite, its furrow broad on the fifth and narrow, groove-like on fourth tergite; hind femur rather broad (Text-fig. 142) . . . . . ***osmiae*** sp. n. (p. 121)

14 Hind femur beneath with large triangular basal tooth followed by many smaller teeth (Text-figs 163, 167) 15

– Hind femur with basal tooth slender, oblique and shorter than long middle teeth (Text-figs 147, 161) 17

15 North African and European; dorsellum bidentate, coarsely sculptured; hind femur unusually flat, very densely punctured as well as hind coxa which has dorsal edge sharp but without tooth (Text-fig. 172); gaster broad basally; in ♀ hind margin of fourth tergite broadly emarginate . . ***biguetina*** Jurine (p. 147)

– South African or Madagascan; dorsellum unarmed; hind femur not unusually flat, puncturation not extremely dense and on hind coxa leaving some streaks impunctate; gaster very narrow at base, hind margin of fourth tergite in ♀ otherwise 16

16 Dorsellum nearly smooth, yellow, its margin swollen and not carinate; scutellum and mesoscutum without yellow; in ♀ ovipositor reaching thorax (Text-fig. 162), long first tergite with two diverging ovipositorial furrows separated by smooth

swollen ridge; hind coxa with smooth streaks; apex of hind tibia produced into long spine (Text-fig. 164); 8–11 mm . . . . . ***holubi*** sp. n. (p. 136)

– Dorsellum rugulose at base, its margin finely carinate; scutellum posteriorly and mesoscutum laterally yellow; in ♀ ovipositor reaching at most to base of fifth tergite (Text-fig. 166), first tergite punctured dorsally, simple; hind coxa with streaks of transverse rugae; apex of hind tibia not spine-like but with distinct spur (Text-fig. 165); 3·0–4·5 mm . . . . . ***namibica*** sp. n. (p. 138)

17 Mesoscutum in anterior third with conspicuous cross-carina; basal tooth of hind femur not much shorter than the second (Text-fig. 161); pronotum transversely depressed in middle; wings blackish with violaceous tint; body red and black; ovipositor reaching base of fifth tergite (Text-fig. 160) 18

– Mesoscutum without cross-carina; basal tooth of hind femur notably shorter than the second; in other respects partly different from alternate 19

18 Thoracic dorsum red, gaster and legs black . ***fuelleborniana*** Enderlein (p. 134)

– Thorax dorsally mainly black, gaster and hind legs reddish . ***reversa*** sp. n. (p. 135)

19 Dorsellum rounded-subconical, not bidentate; in ♀ propodeum without median carina and plicae but with distinct convexity medio-basally; sheaths of ovipositor subhorizontal, never reaching beyond middle of first tergite 20

– Dorsellum posteriorly more or less bidentate, teeth distinct though sometimes blunt; propodeum in ♀ otherwise 21

20 North African; head longer (Text-fig. 158), face about as broad as length of eye; in ♂ orange-yellow bands on gaster narrowed in middle . . ***miniata*** Klug (p. 132)

– South African; head relatively shorter (Text-fig. 157), face distinctly broader than length of eye; in ♂ orange colour on gaster separated into sublateral spots ***incarnata*** Westwood (p. 133)

21 North African (Palaearctic); hind femur moderately swollen (Text-fig. 176); apical spine of hind tibia shorter than breadth of tibia, latter without carina at base; ovipositor longer, reaching at least to hind margin of first tergite . . . 22

– From Ethiopian region; hind femur unusually swollen at base (Text-figs 147–149, 156), if less so, then premarginal carina on pronotum missing; breadth of hind tibia inferior to length of apical spine, base of tibia usually with a keel separating outer and dorsal side; ovipositor always shorter, at most reaching base of fifth tergite; body very short 23

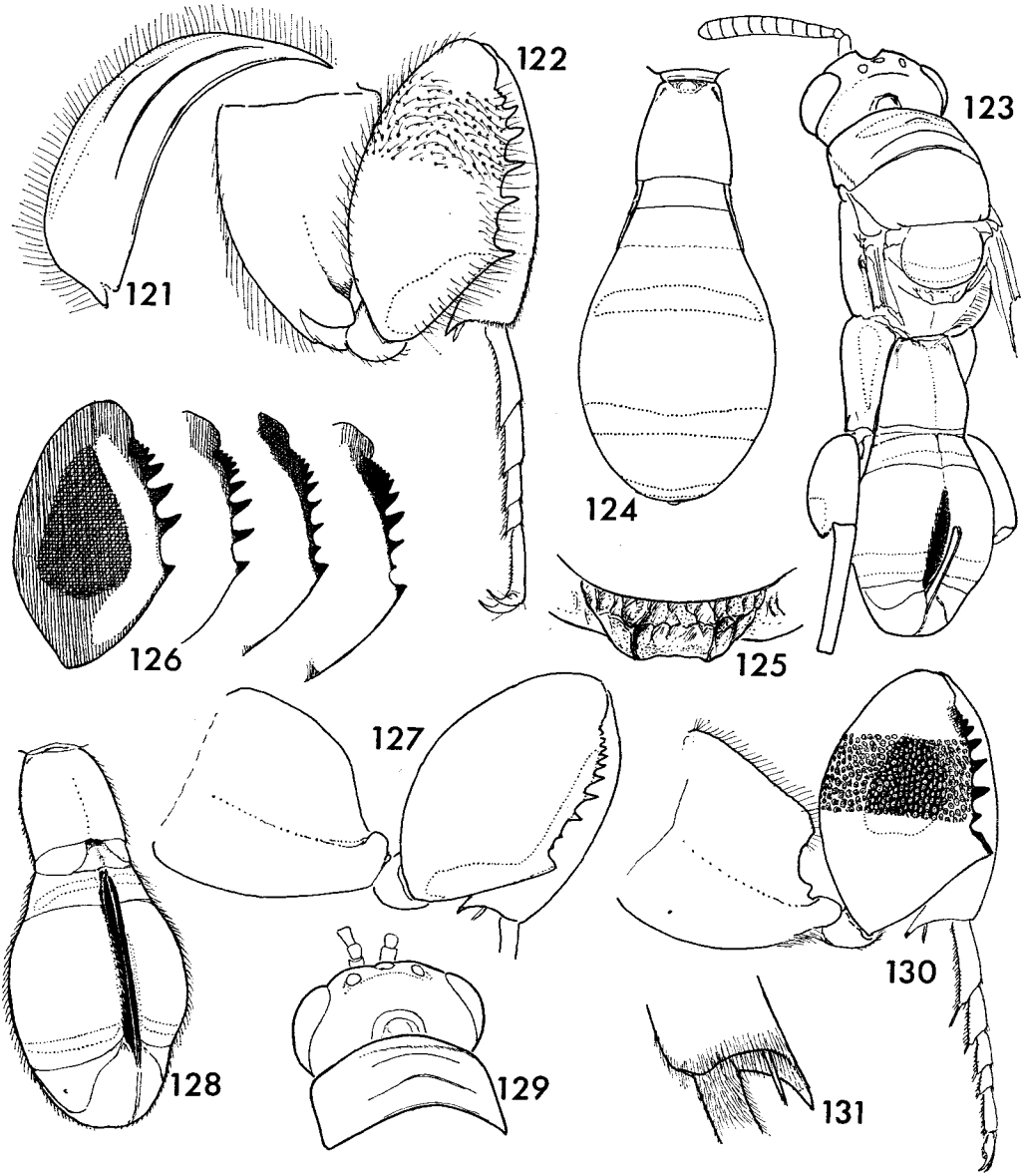
22 Flagellar segments 2–4 in ♀ distinctly elongate, in ♂ sometimes only as long as broad; face long, clypeus strongly produced (Text-fig. 1); in ♀ ovipositor reaching at most to base of first tergite; in ♂ second gastral band usually narrower than the third . . . . . ***gigas*** Fabricius (p. 149)

– Basal flagellar segments in ♀ subquadrate, in ♂ subtransverse; face short, relatively more coarsely rugulose than in alternate, clypeus hardly produced (Text-fig. 185); ovipositor usually fully reaching thorax; in ♂ second and third yellow bands on gaster subequal in extent . . . . . ***intermedia*** Illiger (p. 153)

23 Premarginal carina on pronotum not developed; dorsal edge of hind coxa anteriorly not carinate, not punctured (Text-fig. 147); thoracic dorsum usually without pale markings, wings blackish; ovipositor reaching base of fifth tergite, also fourth tergite in ♀ with ovipositorial furrow (Text-fig. 148) . . ***parvula*** sp. n. (p. 125)

– Premarginal carina distinct; dorsal edge of hind coxa carinate throughout at inner side, usually punctured; thorax often with pale markings, wings often otherwise; fourth tergite in ♀ without ovipositorial furrow but usually with fine median groove, ovipositor often shorter 24

24 In ♀ fifth tergite with ovipositorial furrow shortened (Text-fig. 149), in anterior subhorizontal quarter or third replaced by fine groove; genae and antennae relatively short, flagellar segments 2–4 not or hardly longer than broad; in ♂ gastral carapace with three pairs of oblique pale yellow spots, anterior pair narrowly, second pair broadly separated ***schlettereri*** Schulthess-Schindler (p. 131)



FIGS 121–131. African *Leucospis*. 121, 122. *L. insularis*. 121, pronotum in oblique postero-lateral view; 122, hind leg. 123–126. *L. africana*. 123, body of ♀; 124, gaster of ♂; 125, dorsellum; 126, hind femur and its varying teeth in four different specimens: (from left:) Mamathes in Lesotho, Grahamstown in S. Africa, Congo da Lemba in Zaire and Ibadan in Nigeria. 127–129. *L. fallax*. 127, hind leg; 128, gaster of ♀; 129, head and pronotum. 130, 131. *L. elegans*. 130, hind leg with puncturation partly shown on hind femur; 131, apex of hind tibia, inner side.

– Ovipositorial furrow reaching or nearly reaching base of fifth tergite (Text-fig. 150) which is more regularly declivous; genae and antennae often longer than above; in ♂ gaster with different pattern, anterior maculae often narrow and connected, second and third pairs connected laterally (or more or less reduced) . . . 25

25 Head in facial view short (Text-fig. 152), at least 1·2 times as broad as high, with basal flagellar segments only slightly oblong or (in smaller specimens) subquadrate, flagellum plus pedicellus combined 1·03–1·23 times as long as breadth of head; puncturation of hind femur even in darker-coloured specimens rather fine ***tricolor*** Kirby (p. 126)

– Head in facial view longer (Text-fig. 155), only 1·08–1·15 times as broad as high, with longer genae and basal (and in specimens larger than 6 mm also middle) flagellar segments distinctly oblong, flagellum plus pedicellus 1·22–1·44 times as long as breadth of head; puncturation of hind femur in darker-coloured specimens rather coarse . . . . . ***rostrata*** sp. n. (p. 129)

THE *ELEGANS*-GROUP

The species belonging here always have a very distinct discal carina on the pronotum, often very high and then more or less strongly angulate. The hind tibia is apically produced into a distinct spine but this has concave adtarsal margin, although usually not so strongly as in the Oriental species of the group. On the other hand the Ethiopian species usually have the middle teeth on hind femur relatively slender, thus suggesting an intergrade towards the species-groups with the median teeth the longest.

Apart from the Mediterranean *L. brevicauda* Fabricius treated elsewhere (p. 00), and of the Asiatic species, the following African species belong here: *Leucospis insularis* Kirby, *L. africana* Cameron, *L. fallax* sp. n., *L. elegans* Klug, *L. ornata* Westwood, *L. carinifera* Kriechbaumer, *L. varicollis* Cameron, *L. osmiae* sp. n. and *L. pubescens* sp. n.

Leucospis insularis Kirby

(Text-figs 121, 122)

Leucospis insularis Kirby, 1900 : 13–14, ♀. Holotype ♀, SOKOTRA: Jena-agahan (BMNH) [examined].

L. insularis is a rather distinct species with weak pronotal carinae, swollen rounded dorsellum, fairly slender hind femur and rather long thin pubescence of the body. Only the holotype is known so far.

BIOLOGY. Host unknown.

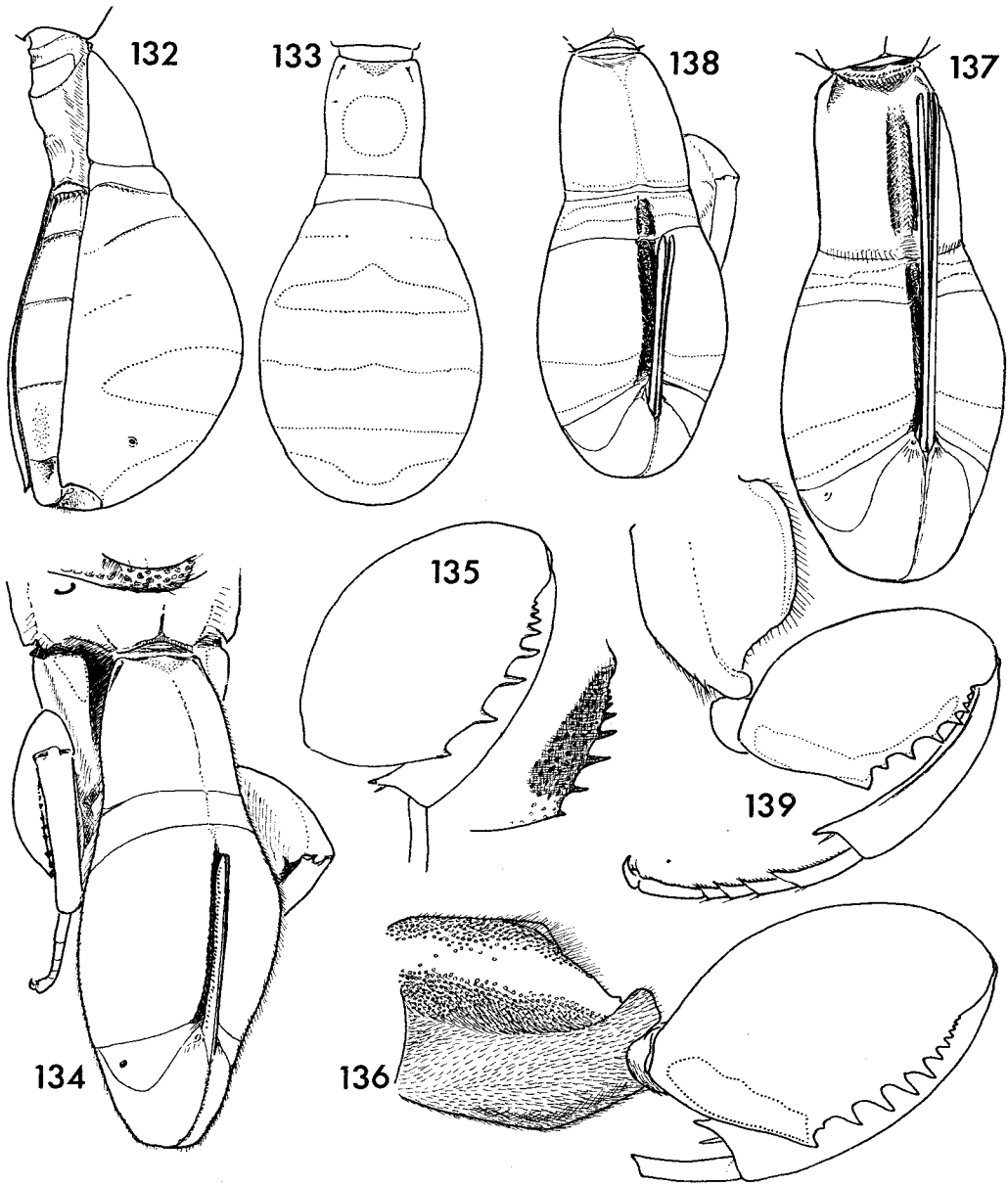
DISTRIBUTION. Sokotra Island.

Leucospis africana Cameron

(Text-figs 123–126)

Leucospis africana Cameron, 1907 : 204–205, ♀. LECTOTYPE ♀ (here designated), SOUTH AFRICA: Cape Province (BMNH) [examined].

In colour this species varies considerably but what is more unusual is the variation of the teeth on the hind femur. In some specimens (e.g. most females from southern



FIGS 132–139. African *Leucospis*. 132, 133. *L. elegans*, gaster of ♂ in ventro-lateral and dorsal views. 134, 135. *L. carinifera*. 134, posterior half of body of ♀; 135, hind femur (and tibia) with teeth in two different specimens. 136. *L. pubescens*, hind leg. 137. *L. ornata*, gaster of ♀. 138, 139. *L. varicollis*, gaster of ♀ and hind leg.

parts of Africa) the first tooth is distinctly smaller than the following tooth, whilst in some other specimens, mostly from Central, West and East Africa the basal tooth of hind femur is at least as strong as the second one and in several cases it is distinctly broader than, although usually not quite as long as, the middle teeth (Text-fig. 126). The discal carina of pronotum in larger specimens often is as strong as the premarginal carina, but in some smaller specimens it may be reduced to a short fingernail-like sculpture, sometimes hardly conspicuous. Length of female 5–9 mm.

♂ (undescribed until now). 4·5–8·0 mm. In colour and shape of head and thorax very similar to ♀. Gaster (Text-fig. 124) petiolate, usually red at base, with two narrow pale yellow bands (front one often reduced at sides) on broadest part of carapace and a broader transverse subapical macula, sometimes divided in two spots. First tergite slightly less than half as broad as carapace, 1·3–1·5 times as long as broad, dorsally beset with very coarse piliferous punctures but basal third impunctate though uneven, separated by transverse furrow or depression, basally on either side with stout longitudinal keel delimited on mesal side by deep furrow, deep triangular basal fovea also well delimited, its sides high. Second tergite transverse, convex, punctured, sublaterally with vague keel, hind margin distinct; third tergite not well delimited dorsally but its hind margin on epipleurum swollen, strongly curved, conspicuous. Epipygium above the strong transverse depression slightly receding down and forwards, therefore hardly visible from above; apical corners of carapace acuminate but closely applied to epipygium, inconspicuous. Sternites narrow, 4–6 elongate; seventh (last) subquadrate, its hind margin rounded-subtruncate.

With the abdomen considerably narrowed at base and in female the fourth tergite with subangulate hind margin, *L. africana* shows some features reminding one of the genus *Micrapion* Kriechbaumer, but I do not think that genus has any closer links with this species-group.

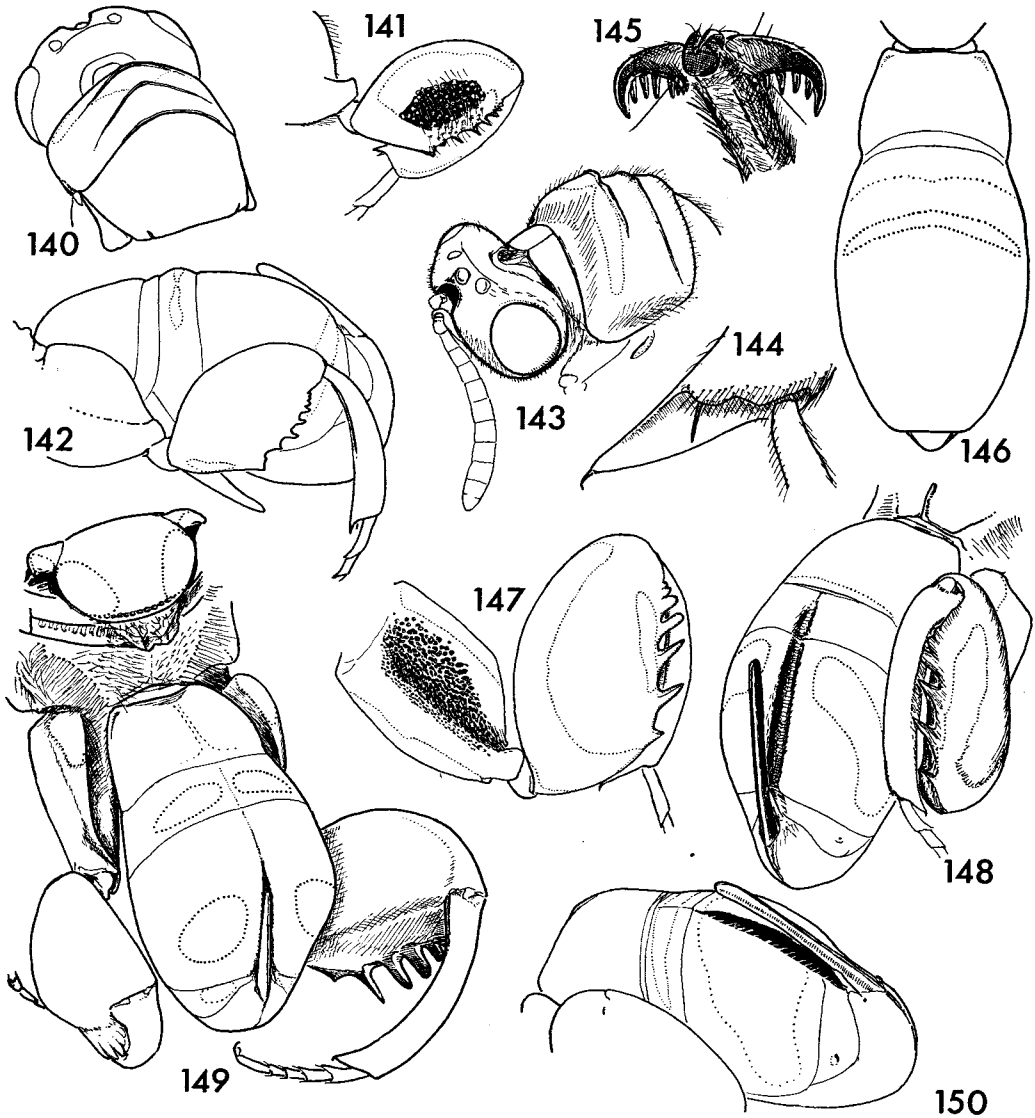
BIOLOGY. In Uganda reared from *Serapista denticulata* (Smith), a Megachiline bee.

DISTRIBUTION. Ghana, Nigeria, Central African Republic, Ethiopia, Kenya, Uganda, Burundi, Zaire, Tanzania, Zambia, Malawi, Rhodesia, Mozambique, South West Africa, Lesotho, South Africa.

MATERIAL EXAMINED.

Type data given in synonymy.

GHANA: Accra, vii. 1941, 1 ♀ (*K. M. Guichard*) (BMNH). NIGERIA: Ibadan, viii. 1947, 2 ♀ (*J. T. Davey, J. L. Gregory*) (BMNH). CENTRAL AFRICAN REPUBLIC: Bozoum, vi. 1914, 1 ♀ (*Tessmann*) (MNHU, Berlin). ETHIOPIA: Eritrea, Adi-Caie, x. 1902, 1 ♀ (*A. Andreini*) (MZU, Florence); Harrar, 1903, 1 ♂ (*B. de Bozas*) (MNHN, Paris). KENYA: Rabai nr Mombasa, 2 ♀, 3 ♂ (*v. Someren*) (BMNH). UGANDA: Bussu, 1910, 1 ♀ (*Bayon*) (MCSN, Genoa); Serere, 8.iii.1938, 1 ♀ (*A. M. Gwynn*) (BMNH); Kampala, i.–iii. 1919–1934, 4 ♀ (*C. C. Gowdey, H. Hargreaves*) (BMNH); Kawanda, iii. 1943, ex *Serapista denticulata*, 1 ♂ (*T. H. C. Taylor*) (BMNH). BURUNDI: Maleka, xii. 1932, 1 ♂ (*L. Burgeon*) (MRAC, Tervuren). ZAIRE: Banana, viii. 1920, 1 ♀ (*H. Schouteden*); Congo da Lemba, i.–iv. 1913, 7 ♀ (*R. Mayné*) (all MRAC, Tervuren); Lubumbashi (= Elisabethville), i.–ii., ix. 1912–1933, 4 ♀, 1 ♂ (*Bequaert, Cockerell*) (BMNH; MRAC, Tervuren; MCZ, Cambridge); Kwango Panzi,



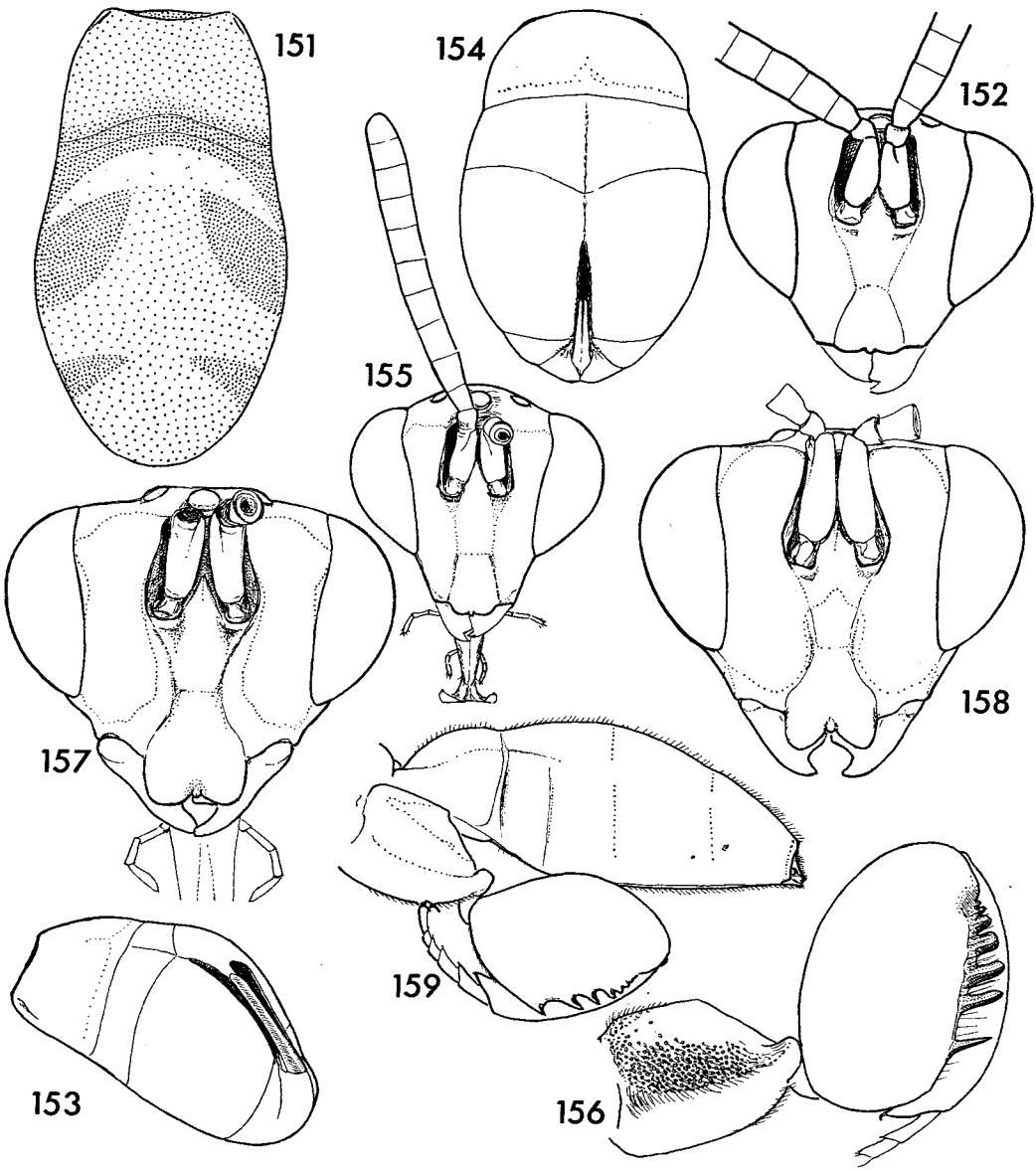
FIGS 140–150. African *Leucospis*. 140, 141. *L. varicollis*. 140, head, pronotum and mesoscutum; 141, hind femur and tibia (in lectotype). 142, 143. *L. osmiae*. 142, hind leg and gaster of ♀ (holotype); 143, head and pronotum. 144–148. *L. parvula*. 144, apex of hind tibia, inner side; 145, hind claws in ♂ from below: outer claw left, inner claw right; 146, gaster of ♂ in dorsal view; 147, hind leg; 148, gaster of ♀ with hind leg. 149. *L. schlettereri*, posterior half of body of ♀. 150. *L. tricolor* (form E), gaster of ♀.

ii. 1939, 1 ♀ (*Bequaert*); Nyangwe, xi. 1910, 2 ♀ (*Bequaert*), 1918, 1 ♀, 1 ♂ (*R. Mayné*), 1920, 1 ♀ (*Ghesquière*) (all MRAC, Tervuren); Kongolo, i. 1911, 1 ♀ (*Bequaert*) (MRAC, Tervuren); Kasongero, Semliki, 17.vii.1914, 1 ♀ (*Bequaert*) (MCZ, Cambridge); Kivu Region, Kadjudju, 1932, 1 ♀ (*Babault*) (MNHN, Paris); Kivu, SW. of Tshibinda, 2000 m, 1937, 1 ♀ (*Ghesquière*), Kalembalembe-Baraka, vii. 1918, 1 ♀ (*Mayné*) (MRAC, Tervuren); Bassin Lukuga, 1934, 1 ♀ (*De Saeger*); Bukama, v.–vi. 1911, 2 ♀ (*Bequaert*); Lualaba, Kabelwe, vi. 1947, 1 ♀ (*M. Poll*) (both MRAC, Tervuren); nr Pweto, 1080 m, i. 1958, 1 ♀ (*Ross & Leech*) (CAS, San Francisco). TANZANIA: Stigi, x. 1917, 2 ♂ (*G. D. H. Carpenter*); Nzoi, Ukambani Country, 1889, 1 ♀ (*Jackson*); Bukavu, viii. 1931, 1 ♀ (*Ogilvie*) (all BMNH); Matengo Hills nr Songea, xii. 1935, 1 ♀ (*Zerny*) (NM, Vienna). ZAMBIA: Mweru, Kaputa, 3.ii.1944, 1 ♂ (NM, Bulawayo); 85 mls W. of Kariba Gorge, vi. 1910, 2 ♀ (*Silverlock*) (BMNH). MALAWI: nr Fort Johnston, 500 m, 1910, 1 ♂ (*Neave*); Zomba, x. 1910, 1 ♀ (*H. Swale*) (both BMNH). RHODESIA: Salisbury, iv. 1903, 1 ♂ (*G. A. K. Marshall*) (TM, Pretoria), ii., vi., 1914, 1919, 1 ♀, 2 ♂ (partly *J. O'Neil*) (SAM, Cape Town; NM, Bulawayo); Insuza River, xii. 1939, 1 ♀ (NM, Bulawayo); Bulawayo, 26.i.1919, 1 ♂ (NM, Bulawayo). MOZAMBIQUE: Delagoa Bay, 1 ♂ (*Monteiro*) (IRSNB, Brussels). LESOTHO: Likhoele, 1 ♂ (*Dieterlin*) (SAM, Cape Town); Mamathes and Sebalabala, xi.–ii., 1942–1957, 7 ♀, 7 ♂ (*Jacot-Guillarmod*) (AM, Grahamstown; BMNH). SOUTH AFRICA: Transvaal, Louis Trichardt, iv. 1932, 1 ♀ (BMNH); Komatipoort, v. 1969, 1 ♀, 2 ♂ (*Starke*) (NCI, Pretoria); Roodeplaat, ii. 1916, 1 ♀ (*Breyer*) (TM, Pretoria); Crocodile Bridge, Kruger Nat. Park. 29.v.1969, 1 ♂ (*Strydom*) (NCI, Pretoria); Lichtenburg, i. 1906 (*Brauns*) (TM, Pretoria); Zululand, N.W. of Ngome, vii. 1967, 2 ♀ (BMNH); Natal, Congella, iii. 1915, 1 ♂ (*Mosely*) (SAM, Cape Town); Amanzimtoti, x. 1931, 1 ♂ (*Ogilvie*) (BMNH); Pondoland, Port St. Johns, v. 1924, 1 ♀, 2 ♂ (*R. E. Turner*) (BMNH); Transkei, Umtata, iii. 1923, 1 ♀ (*Turner*) (BMNH); Cape Province, Lady Grey, i. 1926, 1 ♂ (*R. I. Nel*) (DEI, Eberswalde); Katberg, ii. 1933, 9 ♀, 21 ♂ (*Turner*) (BMNH); Graaf-Reinet, iii. 1969, 1 ♀ (*Starke*) (NCI, Pretoria); Murraysburg, iii. 1931, 1 ♂ (*Mus. Exp.*) (SAM, Cape Town); Ceres, xi. 1920, 1 ♀ (*Turner*); Worcester, xii. 1933, 6 ♀, 2 ♂ (*Turner*); Montagu, x. 1924, 1 ♀ (*Turner*); Swellendam, xi. 1933, 1 ♂ (*Turner*); Ladismith, ix. 1948, 1 ♀, 1 ♂ (*Jacot-Guillarmod*) (all BMNH); Riversdale, x. 1926, 1 ♂ (*Barnard*) (SAM, Cape Town); Oudtshoorn, xii. 1902, 2 ♀ (*Brauns*); Willowmore, 1901–1903, 2 ♀ (*Brauns*) (TM, Pretoria); Grahamstown district, including Table Farm, Hilton, Belmont Valley, 1953-1972, 6 ♀, 4 ♂ (*Jacot-Guillarmod*) (AM, Grahamstown; BMNH); Algoa Bay, iv.–xii. 1896, 2 ♀, 4 ♂ (*Brauns*) (TM, Pretoria).

Leucospis fallax sp. n.

(Text-figs 127–129)

♀. 7·5 mm. Black, with pale yellow and rusty red markings. Yellow are: narrow short line anteriorly on pronotum, narrow cross-bands on fourth tergite and at hind margin of fifth tergite, narrow dorsal edge of fore tibia and streak along toothed edge of hind femur; pale red are: basal third of antenna, pronotum extensively at anterior corners, on sides, less so at hind margin and in median line, then tegula with subalar spot and adjacent narrow part of mesoscutum, whole of metapleurum, then coxae apically, femora dorsally, tibiae mainly (but



FIGS 151–159. African *Leucospis*. 151–153. *L. tricolor*. 151, gaster of ♂ (form E); 152, head of ♀ (form A); 153, gaster of ♀ (form A). 154–156. *L. rostrata*. 154, gaster of ♀ (holotype); 155, head with antenna of ♀ (holotype); 156, hind leg. 157. *L. incarnata*, head in facial view (holotype). 158. *L. miniata*, head of ♀. 159. *L. fuelleborniana*, hind leg and gaster of ♂ in lateral view.

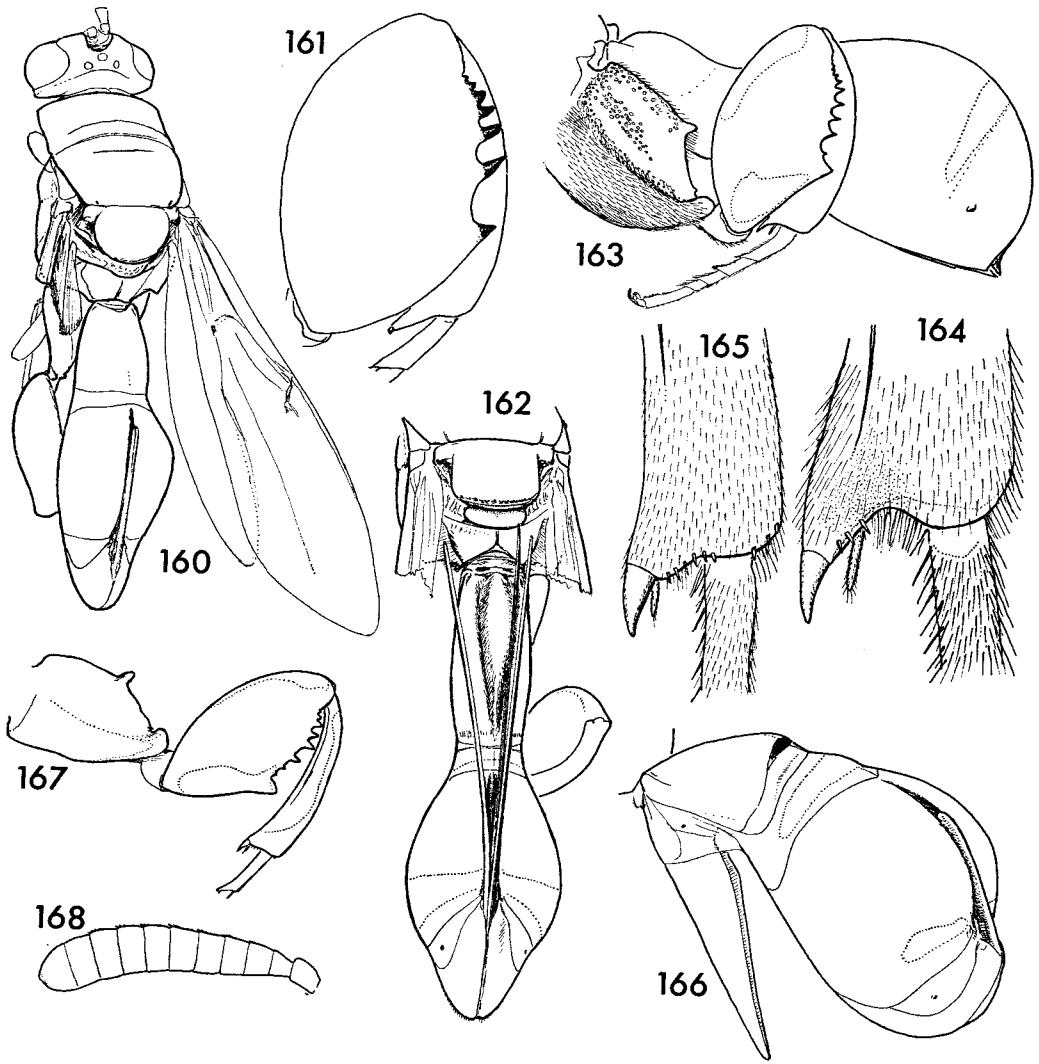
ventral side of hind tibia black), tarsi, first tergite at base and apex, epipygium posteriorly. Fore wing moderately infumate below postmarginal vein and at apex, with small dark spot in angle of stigmal vein.

Head in dorsal view scarcely broader than pronotum, about twice as broad as long; very short temple receding and not distinct because of dense pilosity of eye. Vertex unusually convex, also anterior ocellus situated high, fully one-third its diameter from carinate scrobal margin; occipital carina slightly distinct only between ocelli, hardly different from transverse rugae laterad of ocelli and those between rows of punctures on occiput; ocelli large, their triangle about 2·5 : 1; POL about 2·5 times OOL, the latter about 1·4 times diameter of lateral ocellus. Frontal protuberances low, in side view rounded but scrobal margin sharp. In facial view head 1·3 times as broad as high; inner orbits distinctly broadly emarginate; face fairly convex (as in *L. varicollis*), facial punctures rugulose and not very fine, pubescence dense and not very short; genae strongly converging; interantennal area with distinct keel; lower margin of clypeus not produced, subtruncate at sides, median tooth small but conspicuous. Inner edge of mandibles broadly truncate, lower tooth and notch small, as in *L. varicollis* or *L. ornata*. Relative measurements: width of head 96, frontovertex 58, scrobes 27, lower face 49, its height 32, eye 54 : 38, malar space 13, mouth 33. Flagellum very slightly clavate, combined with pedicellus about 1·2 times as long as breadth of head. Scapus with meso-ventral carina nearly reaching base, in distal half laminate. Pedicellus subglobular dorsally, distinctly shorter than first flagellar segment; latter distinctly narrowed in basal half, almost 1·5 times as long as broad, second segment 1·1 times, the eighth 0·9 times, as long as broad, flagellar segments slightly increasing in breadth but subequal in length.

Thorax very densely punctured, with conspicuous and moderately long pubescence, very narrow interspaces, where present, transversely strigose, dull. Pronotal collar convex, sides subparallel; hind margin broadly emarginate, very finely carinate; premarginal carina distinctly angulate, sharp and rather low but for the middle; discal carina low but sharp, straight, extending over more than median third of collar; lateral panel convex, punctured, its margin posteriorly at spiracle deeply emarginate. Mesoscutum almost regularly reticulate-punctate, slightly depressed in posterior half. Scutellum hardly 1·1 times as broad as long, fairly convex except for narrow depression along hind margin which is narrowly impunctate, arched. Axilla transverse, outer corner of subhorizontal part nearly sharp-angular. Dorsellum swollen-crescentic, densely beset with coarse piliferous punctures, margin not carinate. Propodeum in middle strongly convex; median carina weak, low, plicae more distinct; surface densely punctured, as well as upper mesopleurum and metapleurum; latter not produced at hind wing. Fore femur dorsally rounded, externally with smooth interspaces about as broad as coarse punctures; tibia with distinct dorsal and externo-ventral carinae. Hind coxa (Text-fig. 127) short, stout, about 1·15 times as long as high (lateral view); dorsal edge curved, without tooth, anteriorly broad, posteriorly narrowed and smoothly carinate; outer side everywhere densely punctured, punctures less crowded in upper part of depression. Hind femur moderately broad, first tooth broadly triangular, about as high as the more slender middle teeth; externally with dense and moderately coarse puncturation, narrow interspaces smooth. Hind tibia with subdecumbent and rather dense pilosity, apex almost perpendicularly truncate but running out ventrally into narrow spine; outer spur rudimentary. Fore wing with uncus of stigmal vein more acuminate but not much longer than terminal processus.

Gaster (Text-fig. 128) about as long as head plus thorax, moderately clavate, with distinct whitish pubescence and very dense puncturation. First tergite with narrow impunctate subdepressed median line, otherwise densely punctured, about 0·55 as broad as fifth tergite and about 1·35 times as long as broad, strongly convex at base, fovea hardly indicated; hind margin narrowly emarginate. Fourth tergite short, dorsally with ovipositorial furrow; hind margin suggesting an angle, nearly straight. Fifth tergite dorsally weakly convex, ovipositorial furrow narrow, subhorizontal, tergite in dorsal view 1·15 times as broad as long. Ovipositor sheaths reaching yellow cross-band on fourth tergite. Epipygium in dorsal view broadly rounded.

♂. Unknown.



FIGS 160–168. African *Leucospis*. 160. *L. fuelleborniana*, ♀. 161. *L. reversa*, hind femur and tibia. 162–164. *L. holubi*. 162, posterior half of body of ♀; 163, gaster and hind leg of ♂; 164, apex of hind tibia. 165–168. *L. namibica*. 165, apex of hind tibia; 166, gaster of ♀ approaching position at ovipositing; 167, hind leg; 168, antennal flagellum with pedicellus in ♀.

BIOLOGY. Unknown.

Holotype ♀, RHODESIA: Bulawayo, 1.xii.1924 (*R. H. R. Stevenson*) (NM, Bulawayo).

L. fallax sp. n. is most closely related to *L. varicollis* Cameron, but the carinae on the pronotum are weak, especially the discal one is notably lower (Text-fig. 129), and the vertex is unusually convex. The weaker carinae of pronotum remind one of *L. africana* Cameron; the latter, however, has not the premarginal carina angulate, has the dorsellum bare and subbidentate, the ovipositor still shorter.

Leucospis elegans Klug

(Text-figs 130–133)

Leucospis elegans Klug, 1834 : Dec. 4 : [26], pl. 37, fig. 3, ♀. Holotype ♀, 'ARABIA FELIX' (MNHU, Berlin) [examined].

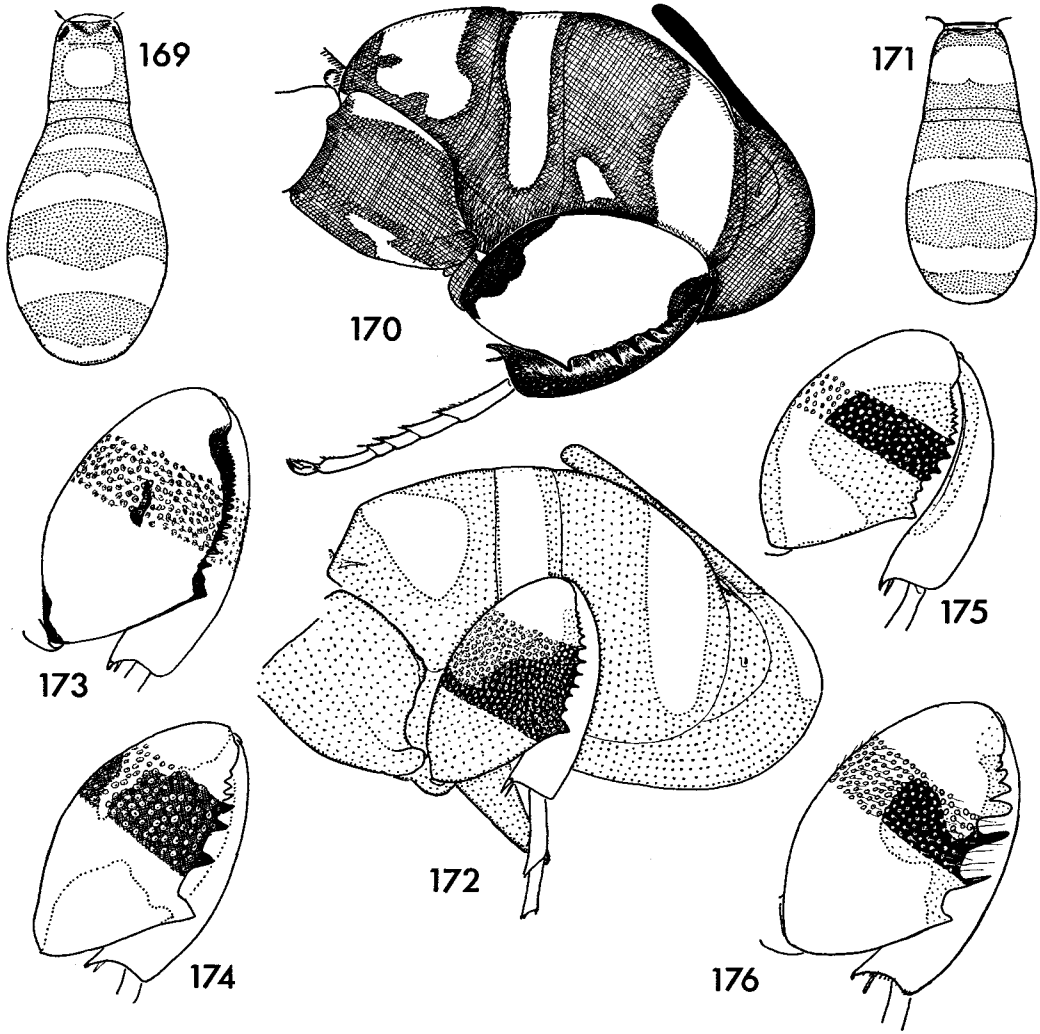
The holotype was redescribed by Westwood (1839 : 248–249) and by Schletterer (1890 : 217–219) but neither of them knew any other material.

The species can be recognized by the unusually coarse puncturation of the hind femur and by the relatively rich yellow markings. The hind coxa is very broad and, as in *L. insularis* Kirby, has the inner side of dorsal edge sharply carinate, the margin of carina narrowly translucent. Pale yellow are the scapes, a broad band on pronotum, most of scutellum (often except narrow base), then broadly dorsal edge of hind coxa, hind femur except disc near apex, all tibiae dorsally, a broad band on the fifth tergite posteriorly, a narrow band on the fourth tergite, two large triangular maculae on the first tergite and apex of the gaster; sometimes also sides of the mesoscutum, dorsellum, part of propodeum, upper mesepisternum and metapleurum are yellow. The similar *L. insularis* has the head less transverse, the pronotal carinae much lower, the hind femur much narrower, apart from the reduced yellow markings and unusually long pubescence. Female 7–11 mm.

♂ (until now undescribed). 6·5–8·0 mm. Colour as in ♀ including broad yellow band on pronotum delimited by angulate premarginal carina and not extending below shoulders; gaster with dorsal macula on first tergite, on carapace a narrow band (expanding forwards in middle) before broadest place, broad second band behind broadest place and extensive subapical macula indented above. Form of gaster shown in Text-figs 132, 133. First tergite between deep but short basal fovea and lateral keel punctured, dorsum rather flat; second tergite very short; third tergite separated from carapace only below lateral keel, hind margin of its epipleurum almost straight. Hind corners of carapace slightly jutting out, auricle-like; epipygium with transverse depression moderately deep. Sternites of medium breadth; third to fifth sternites very slightly longer than broad; the sixth slightly more apparently so, its sublaminate loose hind margin arcuately produced; last sternite concave at base, flat at apex which is truncate with rounded corners.

BIOLOGY. Host unknown. Species probably confined to arid regions.

DISTRIBUTION. Egypt, Sudan, Saudi Arabia, Pakistan.



FIGS 169–176. Mediterranean *Leucospis*. 169, 170. *L. brevicauda*. 169, gaster of ♂ dorsally; 170, hind leg showing the characteristic colour pattern on femur and tibia, and gaster of ♀. 171, 172. *L. biguetina*. 171, gaster of ♂; 172, gaster and hind leg of ♀. 173. *L. dorsigera*, predominantly yellow hind femur and tibia in a ♀ from S.W. Iran. 174. *L. obsoleta*, hind femur and tibia (holotype). 175. *L. bifasciata*, hind femur and tibia. 176. *L. gigas*, hind femur and tibia showing the sparse puncturation in a ♀ from Uzbekistan, Aman-Kutan.

MATERIAL EXAMINED.

Type data given in synonymy.

EGYPT: Tura nr Cairo, v., 1 ♀ (*E. Chakour*) (MCSN, Genoa); El Roda, xi., 1 ♀ (*Alfieri*) (MCSN, Genoa); El Faiyûm, Lake Karun, ix. 1945, 2 ♂ (*R. L. Coe*) (BMNH); Djebel Asfar, 5.vi.1930, 1 ♀ (*A. Mochi*) (MCSN, Genoa). SUDAN: Kosti, 1 ♀ (MCZ, Cambridge). PAKISTAN: Karachi, 6 ♀ (*T. R. Bell*) (BMNH).

Leucospis ornata Westwood

(Text-figs 10, 11, 137)

Leucospis ornata Westwood, 1839 : 252, ♀. LECTOTYPE ♀ (here designated), SOUTH AFRICA: Cape Province (MNHU, Berlin) [examined].

Leucospis tricarinata Schletterer, 1890 : 221–223, ♀. Holotype ♀, 'CONGO, Cap Van Gele' (IRSNB, Brussels) [examined]. **Syn. n.**

L. ornata. The original material consists of two females labelled in identical ways but belonging to two different species. As the description fits partly one, partly the other, I selected as lectotype the female agreeing with Schletterer's interpretation and redescription (1890 : 219–221). The paralectotype belongs to the closely related *L. carinifera* Kriechbaumer.

L. tricarinata. I could not locate the type locality; the label may mean simply north-west Zaire, explored by *Captain Van Gele* (!). Schletterer put *tricarinata* in his key (1890 : 164–166) separately from *ornata* mainly on the allegedly different length of the ovipositor. The holotype of *tricarinata* has, however, the gaster in an abnormal position, with the part beyond the first tergite drooping, slightly approaching the position of the segments during oviposition. This accounts for the tip of the ovipositor (sheaths broken off in holotype) reaching only the apex of the first tergite. The gaster is said to be broader than in *ornata* but that certainly is within the variation.

Otherwise I find the range of variation of *L. ornata* rather wide and it seems to reflect not only the vast area of distribution, with rather varied conditions and at least several different hosts. The variation affects not only colour, but also various morphological characters, including length of pubescence, its density, puncturation and its density, to some extent also the shape of the body and the relative length of the ovipositor.

Apart from the pattern of the yellow markings, in which *L. ornata* shows great similarity to the akin *L. varicollis* and, to some extent also to *L. carinifera,* the general colour mostly is piceous with some parts red, usually including partly on face, all sides and median line on pronotum, sides and middle line on mesoscutum, sides of propodeum with metapleura, more or less the legs, often also parts of the gaster. Rufinistic specimens may be very extensively red. On the other hand the specimens from Hester Malan, together with *L. varicollis* from the same locality, are melanistic, black, with red greatly reduced.

The morphological variation is so puzzling that for some time I regarded at least one form as a different species and hesitated whether *L. tricarinata* was not, after

all, different from *L. ornata*. Most puzzling is one rather slender and large female (12 mm) from Rabai, Kenya, with widespread red colour and unusually long and dense pilosity, subdecumbent on the gaster. Both thorax and gaster are very densely and relatively finely punctured, as well as hind coxa, with the pilosity in places about twice as long as in the average *L. ornata*. Although the ovipositor reaches the propodeum, I do not think now that this specimen is specifically different from another female of the same origin. The latter specimen belongs to another, often extensively red, form represented also by females from Nigeria, Central African Republic, Sudan and South West Africa, possibly from semi-desert conditions. In these the relatively large and slender body has the pubescence of medium length, puncturation of thorax and gaster rather dense though less so than the mentioned aberrant specimen, in many respects more like the typical *tricarinata*, ovipositor reaching anterior half or third of first tergite. The next form, to which also the type of *tricarinata* belongs, has the pubescence still shorter, hind femur more densely and about as coarsely punctured as sides of fifth tergite, body often smaller; it is represented by specimens from Portuguese Guinea, Equatorial Guinea, Gabon, Zaire, and Durban in South Africa. The most sparsely punctured specimens come mostly from South Africa (including the type of *ornata*), with the extremely sparsely ones, at least as to hind femora, from the Springbok district (Hester Malan). In these 'typical' *ornata* the pronotal carinae usually are more angulate, the premarginal one nearer to the discal than to the carinate hind margin of pronotum, but on the whole this is not confined to South African specimens and even among them some have relatively weaker carinae.

The types of variation discussed above are difficult to associate with any geographical or ecological information and very little is known about the hosts. As all gaps seem to be linked by intermediate forms I regard the mentioned variation as intraspecific and classify all those specimens as *L. ornata*.

I hope to have separated correctly *L. ornata* from the closely related species, also in the males, unless the very similar *L. varicollis* is only a subspecies of *ornata*, which I doubt. There is no difficulty in separating the females, but the males are much more troublesome. In *ornata* they usually show the following set of characters.

♂. 7·5–10·5 mm. First tergite relatively broad, 1·29–1·47 times as long as broad; hind femur less broad basally, often rather densely punctured (at least those from Central Africa), bordered with yellow or white mainly along whole dorsal and ventro-basal edges. Gaster mostly with two cross-bands on carapace, apart from apical transverse macula. Wings relatively more, often strongly infuscate, uncus of stigmal vein relatively shorter than in *varicollis* (for that species see under *varicollis*). The two species are recorded from the same host bee and have a considerable overlap in distribution areas.

BIOLOGY. Parasite in nests of Megachiline bees, e.g. of *Lithurge capensis* Friese, *Lithurge* sp. and *Megachile willowmorensis* Brauns. Some of the specimens from Alice, bearing otherwise the same data as those reared from the last named host, are labelled as coming from a 'carpenter bee' (?misidentification of the host).

DISTRIBUTION. Portuguese Guinea, Sierra Leone, Liberia, Ghana, Nigeria,

Sudan, Central African Republic, Equatorial Guinea, Gabon, Zaire, Kenya, Malawi, Rhodesia, South West Africa, South Africa.

MATERIAL EXAMINED.

Type data given in synonymy.

PORTUGUESE GUINEA: Bolama, 1899, 1 ♀ (*L. Fea*) (MCSN, Genoa). SIERRA LEONE: Njala, xi. 1931, 1 ♀ (*E. Hargreaves*) (BMNH); Freetown, xi. 1967, 1 ♀; Kambui Hills, iv. 1968, 1 ♀ (both *D. Owen*) (Townes). LIBERIA: Sengatown, viii. 1926, 1 ♀ (*Bequaert*) (MRAC, Tervuren). GHANA: Ashanti, Obuasi, 23.ii.1907, 1 ♀ (*W. M. Graham*) (BMNH). NIGERIA: Kano, Azare, 4.ix.1925, 1 ♀ (*Lloyd*) (BMNH); Ibadan, 1 ♀ (*Olokemeji*) (USNM, Washington). SUDAN: West Darfur, E. Djebel Murra, Kirima, 1800 m, 20.v.1932, 1 ♀ (*M. Steele*) (BMNH); Juba, 5.xi.1948, 1 ♀ (*J. C. Bradley*) (CU, Ithaca). CENTRAL AFRICAN REPUBLIC: Fort Crampel, 1919, 1 ♀ (*De Gaulle*) (MNHN, Paris). EQUATORIAL GUINEA: Fernando Poo, 1901 (*Conradt*) (MNHN, Paris); Musola, 500–800 m, 1902, 17 ♀, 1 ♂ (*L. Fea*) (MCSN, Genoa). GABON: Ogoué, Ngomo, 1913, 1 ♀; Lambaréné, 1912, 1 ♀ (both *Ellenberger*) (MNHN, Paris). ZAIRE: Eala, vi. 1932, iii. 1935, 2 ♀ (*Corbissier, Ghesquière*); Kisangani (= Stanleyville), ii.1926, 1 ♀ (*Ghesquière*); Leverville, 1928, 1 ♀ (*Tinant*) (all MRAC, Tervuren); Kasai, Tshikapa, iv. 1939, 1 ♀ (*Bequaert*) (BMNH); Haute Uelé, Watsa, 1922, 1 ♀ (*Burgeon*) (MRAC, Tervuren). KENYA: Rabai nr Mombasa, viii. 1930, 2 ♀ (*van Someren*) (BMNH). MALAWI: Chiromo, 1 ♀, 1 ♂ (*R. C. Wood*) (BMNH). RHODESIA: Victoria Falls, i. 1929, ii. 1953, 2 ♀ (NM, Bulawayo); Insuza River, xi. 1949, 1 ♀; Sawmills, ii. 1925, 1 ♀; Penkridge, x. 1927, 1 ♀ (*Stevenson*) (all NM, Bulawayo); Lonely Mine, iv. 1914, 1 ♀ (*H. Swale*) (BMNH); Hot Springs, xii. 1928, 2 ♀ (NM, Bulawayo). SOUTH WEST AFRICA: Zesfontejn, ii. 1925, 1 ♀ (SAM, Cape Town). SOUTH AFRICA: Transvaal, Kaapmuiden, 3.v.1920, 1 ♀, (SAM, Cape Town); Natal, Durban, 1856–60, 4 ♀ (*Quenzius*) (BMNH); Pondoland, Port St. Johns, xii. 1970, 1 ♀ (*M. & H. Townes*) (Townes); New England, xii. 1923, 1 ♀, and Lady Grey, xii.–ii. 1924, 1925, 1 ♀, 2 ♂ (*R. I. Nel*) (BMNH; DEI, Eberswalde); Katberg, 1300 m, ii.–iii. 1933, 2 ♀ (*Turner*) (BMNH); Sundays River, 1 ♀ (*O'Neil*) (BMNH); Somerset East, xii. 1930, 1 ♀ (*Turner*) (BMNH); Alice, xii. 1957, ex *Megachile willowmorensis* and ex 'carpenter bee', 13 ♀, 11 ♂ (*T. S. Taylor*) (BMNH; SAM, Cape Town); Grahamstown, xii.–iv. 1957–1961, 13 ♀ (*Jacot-Guillarmod, Callan, Michener*) (BMNH; AM, Grahamstown; SM, Lawrence); Scorgida, 5.i.1927, 1 ♀ (*Brauns*) (TM, Pretoria); Willowmore, ii.–iv. 1904–1924, ex *Lithurge capensis*, 15 ♀, 18 ♂ (*Brauns*) (TM, Pretoria; BMNH; CAS, San Francisco); Modderfontein nr Willowmore, ii. 1925, 1 ♀, 1 ♂ (*Brauns*) (TM, Pretoria); Swellendam, xi. 1933, 1 ♀ (*Turner*) (BMNH); Hex River, xii.–i. 1883–1885, 2 ♀, 2 ♂ (*L.G.*) (BMNH; SAM, Cape Town); Worcester, xii. 1933, 1 ♂ (*Turner*) (BMNH); Cape Town, 1888, 1 ♀ (SAM, Cape Town); Leipoldtville, Eland's Bay, x. 1948, 1 ♀ (*Mus. Exped.*) (SAM, Cape Town); Namagalieskraal, 24.ii.1925, 1 ♀ (*W. Lignau*) (DEI, Eberswalde); Hester Malan Nat. Reserve, 10 mls E. of Springbok, i. 1972, 1 ♀, 2 ♂ (*Mus. Exped.*) (BMNH).

Leucospis carinifera Kriechbaumer

(Text-figs 134, 135)

Leucospis(?) *carinifera* Kriechbaumer, 1894 : 314–315, ♂. LECTOTYPE ♂ (here designated), MOZAMBIQUE: Delagoa Bay (TM, Pretoria) [examined].

My search for the types of species described by Kreichbaumer in 1894 proved that they all are deposited in TM, Pretoria, from where I received them thanks to Dr van Reenen. The only specimen labelled as the type of *L. carinifera* and fitting the description is, however, not bearing 'Port Natal 24.4.93', as stated, possibly by some mistake, by Kriechbaumer (1894 : 315), but labelled 'Delagoa Bay, Ostafrica, 20.4.93'. I designate this specimen as lectotype and correct the type-locality accordingly.

L. carinifera is similar to several closely related species but relatively easy to recognize by the combination of the characters of the pronotum, dorsellum and the hind femur. Typical for the species is also the first tergite in female (Text-fig. 134) without any furrow but instead often medially raised and with a narrow smooth line; fifth tergite has a very dense pubescence consisting of longer and more erect hairs and shorter semi-decumbent hairs. As to the length of ovipositor *L. africana* Cameron is similar to *carinifera*, but has weaker pronotal carinae and a subbidentate, mostly bare dorsellum and, at least in some specimens, a different form of hind femur.

The range of variation is rather wide, especially in colour, size and shape of body. The body is often extensively reddish, less frequently predominantly black, whilst the red spots or bands appear in places which in richer-marked specimens are yellow. In paler specimens usually most black parts are replaced by red, sometimes with the mesoscutum mostly black and gaster ochreous-red (Mozambique, South Africa). In darker specimens of both sexes the face, pronotum, middle of mesoscutum, pleura of thorax, propodeum and legs may be mainly black and, at the same time, the hind femur very sparsely punctured. Such specimens (e.g. from Aus, Leipoldtville) have generally much coarser puncturation on the mesoscutum than the similar *L. varicollis* Cameron. The male, as usual, is less distinctive, but seems to be safely recognized by the form of the hind femur. I examined also a rather aberrant male from Teita Province in Kenya, with unusually long pubescence.

BIOLOGY. No host record known so far.

DISTRIBUTION. Sudan, Ethiopia, French Territory of the Afars and Issas, Kenya, Malawi, Mozambique, Rhodesia, South West Africa, South Africa.

MATERIAL EXAMINED.

SUDAN: Khor Arbaat Delta, iv.–v. 1926, 1 ♂ (*H. B. Johnston*) (BMNH). ETHIOPIA: Urso, iii. 1917, 1 ♀ (*Kovács*) (TM, Budapest). FRENCH TERRITORY OF THE AFARS AND ISSAS: Djibouti, vii. 1897, 1 ♀ (*Jousseaume*) (MNHN, Paris). KENYA: Teita Province, 11 mls S. of Maktau, 1000 m, 2.xi.1957, 1 ♂ (*Ross & Leech*) (CAS, San Francisco). MALAWI: Chiromo, 1 ♀, 2 ♂ (*R. C. Wood*) (BMNH).

MOZAMBIQUE: Nyaka, ii. 1924, 1 ♂ (*R. F. Lawrence*) (SAM, Cape Town); Caia, nr Feira, Zambesi River, before 1912, 3 ♀, 1 ♂ (*H. Swale*) (BMNH); Rikatla, Delagoa, 1 ♀ (*Junod*) (BMNH); Delagoa Bay, 20.iv.1893, 'type of *carinifera*', 1 ♂ (*Brauns*) (TM, Pretoria). RHODESIA: no locality, 7.i.1914, 1 ♀ (*H. Swale*) (BMNH); Insuza River, xii. 1939, 1 ♀; Premier Mine, xii. 1941, 1 ♂; Penkridge, ix. 1927, 1 ♀ (*Stevenson*) (all NM, Bulawayo); Lonely Mine, iv. 1914, 2 ♀ (*H. Swale*) (BMNH); Bulawayo, iii.–iv. 1923–1924, 4 ♀, 1 ♂ (*Stevenson*) (TM, Pretoria; NM, Bulawayo; BMNH). SOUTH WEST AFRICA: Kaoko Otavi, iii.–v. 1926, 2 ♀, 1 ♂ (SAM, Cape Town); Namutoni, 1914, 1 ♀ (*J. Breyer*) (TM, Pretoria); Okahandja, ii. 1928, 1 ♀ (*R. E. Turner*); Aus, i. 1930, 1 ♀ (*Turner*) (both BMNH). SOUTH AFRICA: Transvaal, Ohrigstad, i. 1963, 1 ♀ (*Capener*) (NCI, Pretoria); Barberton, i. 1898, 1 ♀ (SAM, Cape Town); Komatipoort, vi. 1969, 1 ♀ (*Starke*) (NCI, Pretoria); Pretoria, x. 1947, 1 ♀ (*Jacot-Guillarmod*) (BMNH); Zululand, Mfongosi River, i.–1912, 1 ♂ (*W. E. Jones*) (SAM, Cape Town); Natal, Weenen, ii. 1926, 2 ♀ (*Thomasset*) (BMNH); 12 mls N. of Greystown, ii. 1967, 1 ♀ (*Michener*) (SM, Lawrence); Cape Province, Willowmore, ii.–iii. 1909, 1911, 1 ♀, 1 ♂ (*Brauns*) (TM, Pretoria); Leipoldtville, Eland's Bay, xi. 1948, 1 ♀ (SAM, Cape Town); Bushmanland between Springbok and Pella, x. 1939, 2 ♂ (*Stoff*) (SAM, Cape Town; BMNH).

Leucospis varicollis Cameron

(Text-figs 138, 139)

Leucospis varicollis Cameron, 1909 : 421–422, ♂. LECTOTYPE ♂ (here designated), 'Argentina' [SOUTH AFRICA] (BMNH) [examined].

The apparently single preserved original specimen is designated as lectotype. It lacks the gaster but I found another male, from Rhodesia (restriction of the type-locality), which compares well with the lectotype and Cameron's description of the gaster as well.

The species was described in an article on some parasitic Hymenoptera from Argentina. Cameron made a serious mistake in assuming that the material of this species, actually bearing no locality label, also came from Argentina; he mentioned no locality, however, as he normally did with the other species. The species belongs to a species-group with three strong keels on the pronotum and no such species is known yet from the Americas.

Whilst the females are relatively easy to separate from *L. ornata*, mainly on the shorter ovipositor and the absence of a furrow on the first tergite (Text-fig. 138), the males are extremely similar to that species. Compared with *L. ornata*, they are (in *varicollis*) usually smaller, 4·5–8·3 mm; first tergite narrower and relatively longer, 1·42–1·86 times as long as broad; hind femur (Text-fig. 139) relatively broader near the base, usually bordered by whitish colour along the ventral and dorso-apical edges, or, if completely bordered, the white is narrowed dorso-basally and the pilosity of outer side of femur is rather rough; gaster usually with only one narrow cross-band just behind broadest part and a transverse subapical

spot. Wings relatively less infuscate than in *L. ornata*, uncus of stigmal vein slender, rather long.

BIOLOGY. In South Africa reared from the cells of the Megachiline bee *Lithurge capensis* Friese.

DISTRIBUTION. Central African Republic, Zaire, Kenya, Tanzania, Zambia, Rhodesia, South Africa.

MATERIAL EXAMINED.

CENTRAL AFRICAN REPUBLIC: Bozoum, v. 1914, 1 ♂ (*Tessmann*) (MNHU, Berlin). ZAIRE: Lulua, Kapanga, iv. 1933, 1 ♀ (*G. F. Overlaet*) (MRAC, Tervuren); Nyangwe, 1918, 1 ♀ (*R. Mayné*) (MRAC, Tervuren). KENYA: Rabai, viii. 1930, 1 ♂ (*van Someren*) (BMNH). TANZANIA: Mbamba Bay, iv. 1936, 1 ♂ (*Zerny*) (NM, Vienna). ZAMBIA: Mweru, Kaputa, 3.ii.1944, 1 ♀ (NM, Bulawayo). RHODESIA: Gwaai, 16.i.1927, 1 ♀ (NM, Bulawayo); Lonely Mine, 3.vi.1910, 1 ♂ (*H. Swale*) (BMNH); Bembesi River, 19.ix.1919, 1 ♀ (NM, Bulawayo); Bulawayo, ii., vii., x., 1923, 1924, 2 ♀, 2 ♂ (*Stevenson*) (TM, Pretoria; NM, Bulawayo; SAM, Cape Town); Matoppos, 3.xii.1911, 1 ♂ (*G. Arnold*) (BMNH); Khami, xii. 1931, 1932, 1 ♀, 3 ♂ (NM, Bulawayo). SOUTH AFRICA: Transvaal, W. of Warmbad, ii. 1968, 1 ♀ (*K. V. Krombein*) (USNM, Washington); Cape Province, Queenstown, 1100 m, ii. 1923, 1 ♂ (*R. E. Turner*) (BMNH) Carlisle Bridge, xii. 1971, 1 ♀ (*Bayless*) (BMNH); Grahamstown, iii. 1958, 1♀ (*E. McC. Callan*) (BMNH); Resolution, ii. 1928, 1930, 3 ♀ (*Walton*) (TM, Pretoria; SAM, Cape Town); Graaff Reinet, iii. 1969, 1 ♂ (*Strydom*) (NCI, Pretoria); Willowmore, i.-iii. 1902–1911, partly ex *Lithurge capensis*, 7 ♀, 3 ♂ (TM, Pretoria; BMNH); Modderfontein nr Willowmore, ii. 1923–1929, 3 ♀, 1 ♂ (*Brauns*) (TM, Pretoria); Merweville, i. 1947, 1 ♀ (*H. Zinn*) (SAM, Cape Town); Bullshoek, Clanwilliam, xii. 1956, 1 ♀ (SAM, Cape Town); Hester Malan Nat. Reserve, 10 mls E. of Springbok, i. 1972, 1 ♀, 5 ♂ (*S. Afr. Exped. B.M.*) (BMNH).

Although I hope that I have recognized correctly the damaged type of *L. varicollis*, I must admit that a mistake is possible. With the discovery of the following species which I name *L. osmiae* the matter may be rather complicated, for the until now unknown males of this species may be very similar to those I classify with *L. varicollis* above. The problem can be solved only when both sexes are known and more information is available.

Leucospis osmiae sp. n.

(Text-figs 142, 143)

♀. 5·0–5·5 mm. Black, with poor pale yellow and red markings; whitish yellow are: narrow (sometimes subinterrupted) band anteriorly on pronotum, posteriorly on scutellum, on fourth tergite (sometimes reduced), at hind margin of fifth tergite and a short streak ventrally at base of hind femur; red are, more or less: narrow hind margin of scutellum, tegula, sides of propodeum with parts of metapleura, first tergite (paler at base), ovipositorial furrow on fifth tergite, mainly fore and mid legs except coxae, apex of hind coxa, both ends of hind femur, hind tibia and tarsus. Wings distinctly and rather uniformly infuscate, about as in *L. africana*.

Head as broad as pronotum, dorsally twice as broad as long, with temples rounded and strongly receding but face fairly convex. Vertex not very convex; occipital carina sharp

though low, straight between lateral ocelli, reaching laterad half way between ocellus and eye; ocell-ocular space with several punctures only, otherwise smooth, also triangular areas laterad of median ocellus smooth; POL about 2·3 times OOL. Area between low frontal protuberance, lateral ocellus and eye distinctly convex, interspaces between punctures smooth, distinct and hairs here hardly longer than on face, in dorsal view this area 1·5 times as broad as scrobes which appear as a deep semi-circle; scrobal carina highest above protuberances. Pubescence of eye extremely short; inner orbit not distinctly emarginate. In facial view head about 1·3 times as broad as high, with face vertically punctured-rugulose, rugulae narrow but smooth, pubescence not dense. Otherwise relative measurements and other features much as described in *L. fallax* above.

Thorax as normal in the group. Pronotal sides parallel, carinae very strong, discal one strongest, both discal and premarginal carinae strongly angulate. Mesoscutum very convex. Scutellum hardly broader than long, hind margin arcuate, set off by crenulate admarginal groove, in front of which interspaces on whitish band nearly as broad as punctures. Dorsal surface of axilla not sharply separated from vertical one, outer corner tooth-like. Dorsellum convex, smooth between rather sparse but coarse piliferous punctures; hind margin not distinctly carinate. Sides of metanotum with a row of alveolae separated by longitudinal carinae. Propodeum moderately convex medially, down to petiolar carina hardly twice as long as dorsellum, depressed inside of plicae which are indistinct as well as median carina; interspaces of punctures narrow but distinct. Legs as normal in the group. For hind leg see Text-fig. 142; puncturation of hind coxa less dense in a streak in upper third of depression and just above blunt lateral edge; hind femur with deep punctures, of medium size, interspaces broader than punctures; basal tooth broad and about as high as longest of middle teeth which are rather broadly separated. Stigmal vein of fore wing with uncus parallel to postmarginal vein and more than twice as long as terminal processus of stigmalis.

Gaster (Text-fig. 142) clavate but plump; puncturation on first and fifth tergites with very distinct smooth interspaces though much narrower than punctures; pubescence rather erect, not long. First tergite about 1·3 times as long as broad, fully three-quarters as broad as fifth tergite which is, in median line, hardly longer than the first. Fourth tergite posteriorly slightly angulate, in middle (where yellow) with a cross-elevation, this interrupted by relatively weak ovipositorial furrow; the furrow deeper but rather broad on fifth tergite. Ovipositor not or hardly reaching anterior third of fifth tergite. Apex of gaster rather blunt, very densely and rather finely punctured.

♂. Unknown.

BIOLOGY. Reared from cells of *Osmia globicola* Stadelmann, a Megachiline bee.

Holotype ♀, SOUTH AFRICA; Willowmore, 10.xii.1920, ex *Osmia globicola*, (*Brauns*) (TM, Pretoria).

Paratypes. SOUTH AFRICA, same data as holotype, 3 ♀ (BMNH; TM, Pretoria).

In the form of the head and thorax *L. osmiae* is very similar to *L. varicollis* Cameron (as understood above), but the form of the gaster (Text-fig. 142) is different, very similar to that of *L. africana* Cameron (Text-fig. 123), except that the fourth tergite (in female) is shorter medially, its hind margin less conspicuously angulate and dorsally with shallow but still distinct ovipositorial furrow.

Leucospis pubescens sp. n.

(Text-fig. 136)

♀. 7·0–11·5 mm. Dark reddish to brownish black, head paler reddish; pale yellow markings: narrow cross-band anteriorly on pronotum and another on fourth tergite, narrow streak dorsally on hind coxa, broader one ventro-basally on hind femur; usually also epipygium along middle

and fifth tergite postero-medially. Antennae reddish but infuscate subapically, tarsi reddish, also sheaths of ovipositor but for black apex. Dense short pubescence of body whitish. Wings subhyaline, fore wing very slightly infuscate anteriorly and in lines indicating vanished veins; venation brown, basally yellowish.

Head hardly narrower than pronotum, in dorsal view fully twice (2·0–2·2) times as broad as long; temples very short but distinct. Vertex densely punctured except for small areas just outside of median ocellus; POL twice OOL, ocellar triangle about 3 : 1; occipital carina not high, developed only behind ocelli, touching lateral ones and less than one-third diameter from median ocellus; latter ocellus touching indented scrobal carina which is fine but uninterrupted down to toruli; frontal protuberances low. In facial view head 1·3 times as broad as high; face dull, densely rugulose-punctured, white pubescence dense, short; carina of interantennal area fine, irregular. Clypeus hardly broader than wide, upper margin vague, sides strongly diverging, surface almost flat, lower margin narrowly smooth, hardly produced, lobes very short, median tooth distinct. Inner edge of mandibles broadly truncate, notch small. Relative measurements: height of head 63, width of frontovertex 47, scrobes 24, lower face 42, its height 30, eye 47·0 : 31·5, malar space 11, mouth 33. Flagellum hardly clavate, combined with pedicellus usually fully 1·1 times as long as width of head; first three flagellar segments oblong, middle segments subquadrate, sixth to eighth slightly transverse, clava nearly 1·8 times as long as broad, rounded at apex. In smaller specimens segments relatively shorter than described.

Thorax dull, extremely densely but not very coarsely punctured. Pronotum with three high carinae: arched marginal, angulate premarginal and (highest) discal, latter carina well before middle of collar; sides of collar slightly converging, hardly concave, shoulders conspicuous; lateral panel flat, punctured. Mesoscutum slightly flattened posteriorly, regularly punctured, hairs directed towards middle of anterior margin. Scutellum convex anteriorly, flattened posteriorly, not depressed at broadly rounded hind margin, 1·25–1·35 times as broad as long. Dorsellum short, bare, with coarse but not deep alveolae, posteriorly with a slight carina lowered in middle; sides of metanotum densely pubescent. Propodeum medially about 1·5–2·0 times as long as dorsellum, regularly raised in middle, densely clothed with long hairs; median carina fine, less conspicuous than plicae. Fore tibia with distinct dorsal and externo-ventral carinae, femur not carinate. Hind coxa broad (Text-fig. 136), finely densely punctured and with short pubescence, but a percurrent streak on upper half of depression smooth and shiny; dorsal edge broad, even posteriorly blunt but there on mesal side with fine carina behind dense longer hairs. Hind femur excluding teeth about 1·8 times as long as broad; teeth moderately long, the basal the broadest but middle teeth the longest, fairly distant from each other; outer side rather densely and moderately coarsely punctured. Hind tibia externally fairly densely punctured, interspaces about as broad as punctures; apical spine conspicuous with rudiment of spur on top; externo-ventral carina ending one breadth of tibia before apex, latter about 0·8 the dorsal length of basitarsus. Stigmal vein of fore wing with terminal processus short, uncus of medium length.

Gaster about as long as head plus thorax, densely punctured, dull, posteriorly moderately swollen; pubescence short, subdecumbent, rather uniform. First tergite 1·1–1·3 times as long as broad, anteriorly on either side with stout keel, dense hairs converging towards median keel. Fourth tergite short, medially elevated, with deep ovipositorial furrow, its hind margin hardly angulate. Fifth tergite about three-quarters times as long as broad but distinctly longer than the first; its ovipositorial furrow deep, narrow, not carinate at sides. Ovipositor reaching base of fourth tergite.

♂. 5–9 mm. Very similar to ♀, also in colour, but gaster with laterally reduced pale yellow cross-line before middle of carapace, a more extended band behind middle and apex with broad spot on subvertical part, including base of epipygium, spot broadly emarginate above. Sometimes also first tergite posteriorly with transverse spot and spots on hind coxa and femur broader than in female, often extending beyond basal tooth. Antennae slightly shorter than in ♀. Propodeum medially nearly 3 times as long as dorsellum. First tergite hardly longer than broad, hardly half as broad as broad carapace, hind margin straight. Following exposed

tergite well separated, short; segmentation of carapace dorsally indicated only by yellow markings. Last sternite concave only basally, its apex broadly rounded.

BIOLOGY. Host unknown.

DISTRIBUTION. Madagascar.

Holotype ♀, MADAGASCAR: Tulear Province, Tongobory, 200 m, 27.iii.1968 (*K. M. Guichard & P.D.*) (BMNH).

Paratypes. MADAGASCAR: type-locality, 27. iii. 8.iv.1968, 2 ♀, 10 ♂ (*Guichard & P. D.*) (BMNH); Mahabo, 1 ♀ (*Lamberton*) (USNM); Bekily, vi. 1933, xi.–xii. 1936, i.–v. 1937, 8 ♀, 6 ♂ (one couple *in copula*) (*A. Seyrig*) (MNHN, Paris); Betroka, ii. 1933, 1 ♀; Behara, xi. 1938, iii. 1938, 1939, 3 ♀ (all *A. Seyrig*) (MNHN, Paris).

L. pubescens seems to be a common Madagascan species and rather distinctive. Among the species with three high pronotal carinae it is rather intermediate between the species with strong basal tooth and weak basal tooth on the hind femur.

THE *TRICOLOR*-GROUP

This is a complex of several closely related species which were often considered in the past, judging from the identifications, as forms of one species, *L. tricolor* Kirby. Even today the males are rather difficult to separate, but the females show a few good characters. Most of the recognized species vary greatly in colour. The characters common to the group are as follows.

Lower margin of clypeus with two short lobes and median tooth. Scapus short. Pronotum usually with distinct cross-depression in the middle, discal carina and marginal carina mostly absent (in large specimens a vestigial discal carina sometimes traceable and hind margin of pronotum bluntly carinate), premarginal carina also weak but mostly distinct. Scutellum rather flat, laterally conspicuously produced over a hollow below lateral margin (in postero-lateral view). Dorsellum bituberculate or shortly bidentate. Propodeum slightly longer than dorsellum, mostly with distinct median carina and always with high plicae. Fore femur and tibia without dorsal carina. Hind coxa stout; its dorsal edge broad, rounded, posteriorly without a tooth but its mesal margin usually carinate. Hind femur extremely swollen (Text-figs 147, 156), with few long teeth, the basal one not being the strongest, distal ones smaller and fused. Hind tibia extro-dorsally with a distinct edge delimiting, at least basally, a flat external streak with weak sculpture; apex of tibia with stout spine, outer spur rudimentary, hook-like (Text-fig. 144). Gaster short, broad, sub-oval, high, convex, in female the ovipositor short, mostly oblique, reaching at most to hind margin of the fourth tergite.

The *tricolor*-group seems to be related to *L. africana* Cameron, the *gigas*-group and the New World *texana*-group. In the latter group the ovipositor is extremely short; in the *gigas*-group again much longer than in the *tricolor*-group; *L. africana* has a conspicuous discal carina on pronotum and all of them differ in having more normally shaped hind tibiae.

The group includes *L. parvula* sp. n., *L. tricolor* Kirby, *L. rostrata* sp. n. and *L. schlettereri* Schulthess-Schindler, all confined to the Ethiopian region and probably all developing as parasites of Anthidiine bees.

Leucospis parvula sp. n.

(Text-figs 144–148)

♀. 6–8 mm. Black, with following parts pale to lemon-yellow: vertical streaks along eyes on face, scapus beneath, narrow cross-band anteriorly on pronotum broadened on shoulders but often interrupted before reaching them or still more reduced, spot on upper mesepisternum, upper corner of metapleurum, broad streak obliquely diverging from base of fifth tergite and nearly reaching its postero-lateral corner, hind coxa dorsally and ventro-apically, hind femur broadly along dorsal, basal and ventral margins, fore and mid tibiae dorsally, fore femur with a spot; fore and mid legs and hind coxa beneath usually red, as well as tarsi. Yellow often more reduced, in extreme case pronotum wholly black, streaks on gaster reduced to oblique spots at base of fifth tergite, yellow on hind femur at teeth reduced to a spot. Wings distinctly infuscate but narrowly subhyaline at base and on the folding line in the middle.

Head slightly broader than pronotum, dorsally about 2·2 times as broad as long, with temples extremely short. Occipital carina arcuate, not touching ocelli and not reaching eyes, occiput below carina conspicuously hollowed. POL about or nearly twice OOL; ocellar triangle about 2·7 : 1·0; vertex convex, densely rugose-reticulate; scrobal margin completely carinate, dorsally almost one-third of diameter from ocellus; frontal protuberances moderately convex. Head in facial view less than 1·2 times as broad as high; eye orbits hardly emarginate; pubescence on face short, white, not extremely dense; face convex at median line, interantennal area with low keel; clypeus about 1·2 times as high as broad, lower margin slightly produced, stout median tooth longer than subtriangular side lobes. Relative measurements: head width 64, frontovertex 35, scrobes at toruli 22, lower face 29, its height 30, eye 37·5 : 25·0, malar space 12, mouth 22. Flagellum subfiliform, combined with pedicellus about 1·3 times as long as breadth of head; first flagellar segment hardly longer than pedicellus, slightly oblong; following segments slightly elongate, the eighth transverse; clava subacuminate, about 1·8 times as long as broad.

Thorax densely punctured; narrow interspaces, where distinct (as on scutellum and sublaterally on mesoscutum) microscopically reticulate, dull; pubescence whitish but thin, fairly short. Pronotum transversely depressed, depression delimited anteriorly by arcuate slightly convex swelling and posteriorly by a still vaguer convex cross-line in place of the missing premarginal carina; sides emarginate; lateral panel coarsely punctured and convex (shoulder), except at subangulate lower corner; panel hardly extending backwards beyond middle of collar. Mesoscutum convex; parapsidal vestiges reduced to small pits. Scutellum 1·40–1·48 times as broad as long; hollow below, its side margin very deep. Dorsellum with two broad blunt tubercles sometimes subcarinate posteriorly. Propodeum very uneven, elevated median part bearing high median carina and irregular rugae between deep depressions inside of strong plicae; spiracles broad; pubescence moderate. Furrows separating upper mesepisternum from mesepimerum (this furrow crenulate) and on both sides of metapleurum broad and deep. Hind coxa: depression regularly punctured except dorsally where smooth, also yellow dorsal edge smooth, rounded, without mesal carina; ventral face of coxa basally with small smooth convex area, otherwise rather densely punctured, ventro-mesal edge in middle curved and subcarinate. Hind femur (Text-fig. 147) externally densely finely punctured, partly rugulose. Stigmal vein of fore wing wedge-shaped, terminal processus angulately indicated, uncus long, subparallel to postmarginal vein.

Gaster (Text-fig. 148) long-oval, about 1·9 times as long as broad. First tergite slightly transverse, punctured, interspaces anteriorly in part broader than punctures but much narrower elsewhere, slightly dull owing to very faint reticulation. Fourth tergite densely punctured, medially with distinct ovipositorial furrow tapering forwards; hind margin nearly straight. Fifth tergite convex but arcuately sloping, medially about as long as first tergite and with regular deep ovipositorial furrow; pubescence rather short, puncturation dorsally coarse, interspaces not very narrow. Ovipositor sheaths usually reaching base of fifth tergite, about 0·8 length of hind tibia.

♂. 6·5 mm. As in ♀ of a darker form, with pronotal band reduced to transverse double spot in middle. Gaster black with pale yellow narrow arcuate cross-band in middle; also basal sternites and unsculptured lateral parts of the following sternites (exposed in allotype) pale brown; apex of epipygium red. For shape of gaster see Text-fig. 146. Hind corners of sixth tergite not produced. Sternites narrow, the first and second without unusual features, not punctate, apical margin of the second produced, arched; the third convex, elongate, exposed part not well delimited; fourth to sixth shallowly depressed, fifth nearly twice, sixth 1·5 times as long as broad; last (seventh) sternite depressed only at base, subquadrate with rounded posterior corners.

BIOLOGY. Host unknown.

DISTRIBUTION. Nigeria, Gabon, Zaire.

Holotype ♀, NIGERIA: Umudike, 4.i.1951 (*J. L. Gregory*) (BMNH).

Paratypes. NIGERIA: Ibadan, 1 ♀ (BMNH). GABON: Ogoué, Lambaréné, 1912, 1 ♀, 1 ♂ (allotype) (*R. Ellenberger*) (MNHN, Paris). ZAIRE: Prov. Maniéma, Kindu, 1912, 1 ♀ (*L. Burgeon*) (MNHN, Paris); Lusambo, Sankuru, 1921, 1 ♀ (*J. Ghesquière*); Lulua, Kapanga, iii. 1933, 1 ♀ (*F. D. Overlaet*) (MRAC, Tervuren).

Within the *tricolor*-group, *L. parvula* may be recognized by the absence of the premarginal carina on the pronotum, a very coarse sculpture on the raised median part of propodeum, the absence of the mesal carina dorsally on hind coxa, relatively less swollen hind femur and in the female by the relatively long ovipositor with its furrow extending to the base of the fourth tergite.

Leucospis tricolor Kirby (?aggregate)

(Text-figs 151–153)

Leucospis tricolor Kirby, 1883 : 69, ♂. Holotype ♂, SOUTH AFRICA (BMNH) [examined].

Under *L. tricolor* I classify all specimens which I cannot separate as different species on reliable morphological characters, even in the female sex which normally offers more characters than the males. Some of these specimens look very different but, although their diversity seems to match a certain geographic pattern, in most cases intermediate specimens could be examined which suggest an unusual range of variation. The phenotypic populations probably correspond with certain host species in the region or (less probably in this group) with the aculeate species the relevant form mimics. When better known, some of the forms will possibly be separated as subspecies, but at the present stage I do not regard it justifiable to give them nomenclaturally valid names.

In colour all these forms have the face, sides of thoracic dorsum, usually in a belt from the pronotal shoulder down to dorsellum, then sides of thorax, coxae and femora and, at least partly, base and sides of gaster red; some of these parts often with yellowish markings including the rest of the gaster in varying pattern. Morphologically, as mentioned in the key, antennae and genae are relatively short, pronotum with distinct though low premarginal carina, median part of propodeum weakly convex with median carina indistinct, upper half of depression of hind coxa very sparsely punctured and dorsal edge with distinct mesal carina; in female first tergite shorter than the fifth, the fourth with a fine median groove instead of the ovipositorial furrow and its hind margin varying from straight to medially slightly produced, fifth tergite

with ovipositorial furrow with its tapering apex approaching the base of the tergite and the sheaths of ovipositor extending from three-fifths to three-quarters, in some cases nearly reaching the base, of fifth tergite.

Form A. Most of thorax dorsally black, with dark red pronotum anteriorly, thoracic dorsum more or less on sides as well as sides of thorax and propodeum; antennae black or dark red; most of gaster, at least beyond first tergite, and hind femora externally ochreous to slightly orange-yellow. Wings strongly infuscate, with violaceous tinge; stigmal vein rather stout. Hind margin of fourth tergite in female distinctly angulate medially (Text-fig. 153). Distribution: Senegal, Nigeria, 'Congo' (?Brazzaville), Central Zaire, i.e. possibly region of the tropical forest.

Form B. Thorax, wings and hind femur almost as in form A, but hind femur with small black spot in the middle, gaster more reddish with emerging yellowish spots as follows: a band on fourth tergite narrowly interrupted in middle, two large oval spots on fifth tergite, most of sixth tergite and epipygium except along ovipositor. In male most of carapace of gaster dorsally yellowish deeply divided medially from apex. In female hind margin of fourth tergite medially distinctly produced although slightly less than in form A. Distribution: 'Congo' (?Brazzaville), Zanzibar.

Form C. Wings less strongly infuscate than in A and B (but generally very dark in specimens from Zaire), stigmal vein rather slender. Colour pattern similar to form B but non-black parts paler, bright red combined with pale yellow. Pronotum may or may not have one (posterior) or both yellow cross-lines, similarly thoracic dorsum partly yellow or red. In female fifth tergite extensively yellow (except medially), hind femur externally yellow with narrow black streak from base to centre, often turning red or disappearing at base, sometimes reduced to small central spot. Hind margin of fourth tergite in female slightly produced. As in form B ovipositor sheaths mostly reaching basal third or quarter of fifth tergite. In male gaster on first tergite sometimes with two yellow maculae, on the carapace (fused tergites) with broad arcuate yellow band anteriorly, sometimes subdivided medially, connected laterally with broad yellow areas reaching apex (male from Salisbury; this similar to Congolese male mentioned as form B, but much paler-coloured), but these often separated from belt and more or less split in two lateral spots; median separation of spots may be narrow (male from Somalia). Distribution: broad belt from Sudan and Ethiopia to eastern South Africa, including Katanga in Zaire.

Form D. This may be regarded as 'typical' *L. tricolor* as its holotype belongs here. In most respects similar to form C (also, as to colour pattern, to *L. schlettereri* Schulthess-Schindler), but hind femur is broadly red, usually with elongate black spot above centre and mostly with long dorsal and shorter ventro-basal streaks of pale yellow. First tergite in male without yellow spots, subangulate band at base of carapace sometimes partly interrupted, the two sublateral maculae broadly separated in the middle. Distribution: South Africa.

Form E. This is similar to form D but most specimens are relatively large (♀ 9–10, ♂ 8 mm), extensively bright red on thorax and hind femur, in female first tergite red, the fourth (second exposed) black with whitish cross-band, the fifth black at base and apex but with large broadly lunate macula nearly touching base, as well as sixth tergite and epipygium, bright red; the lunate macula often turns yellow postero-laterally. Ovipositor nearly reaching base of fifth tergite, hind margin of fourth tergite quite straight medially. In the male coming from the same lot unusual bright red pattern on gastral carapace: arcuate anterior crossband medially broadly connected with apex and extending twice into broad lobes laterad (Text-fig. 151). The described extreme form comes from South Africa, reared from *Serapista denticulata* (Smith).

Specimens intermediate in colour, length of ovipositor, straight or curved hind margin of fourth tergite (in female), between forms E and D, come from Grahamstown and Port St. Johns; they are smaller and their host is not known.

At one time I thought of separating the form E and, eventually, form A, as different subspecies. But in the latter case (A) there are too few and yet rather variable specimens available, suggesting manifold intergrades to form B and also

to form C, at least to specimens from Zaire and Uganda, i.e. mainly from the tropical forest regions. The other extreme, form E, seemed different enough before I found the mentioned intermediate forms from South Africa and some others as well, differing more or less in various combinations of characters. Very easily each population could be given a name but it would not solve anything. Perhaps, however, the description of the variation may prove useful to somebody who will have more material and more biological information on this aggregate which, at the moment, I am unable to regard as more than one species.

BIOLOGY. Hosts are Megachiline bees allied to *Anthidium* Fabricius, e.g. *Pachyanthidium cordatum* (Smith) (Kirby, 1883), *P. truncatum* (Smith) in Tanzania, *P. 'bicolor* (Lepeletier)' in Uganda, *Serapista denticulata* (Smith) in South Africa. Two specimens from Kampala, Uganda are also labelled as reared from *Serapista denticulata*, but their small size seems to suggest a misidentification of the host.

Unlike most other species-groups of *Leucospis*, *L. tricolor* seems to mimic in colour its host species.

DISTRIBUTION. Senegal, Sierra Leone, Nigeria, ?Congo (Brazzaville), Zaire, Ethiopia, Somalia, Uganda, Tanzania, Zambia, Rhodesia, Mozambique, South Africa.

MATERIAL EXAMINED.

Type data given in synonymy.

SENEGAL: 1867, 1 ♀, 1 ♂ (form A) (MNHN, Paris; BMNH). SIERRA LEONE: Freetown, xi. 1967, 1 ♀ (A) (*D. F. Owen*) (BMNH). NIGERIA: Azare, 1926, 1 ♀ (A) (*Ll. Lloyd*) (BMNH). 'CONGO' (?BRAZZAVILLE), 2 ♀, 1 ♂ (A-B) (*Dybowski*) (MNHN, Paris). ZAIRE: Eala, 1938, 1 ♀ (A) (*J. Ghesquière*); Katanga, Munuma, 14.vii.1926, 2 ♀ (C) (*Ch. Seydel*); Katompe, Fungar, 18.vi.1911, 1 ♂ (C) (*Bequaert*) (all MRAC, Tervuren). SUDAN: Renk, xii. 1961, 1 ♀ (C) (*Cloudsley-Thompson*) (BMNH). ETHIOPIA: Eritrea, Ghinda, 1 ♀ (C) (*Tellini*) (MZU, Florence); no locality, 1911, 1 ♀ (C); Harrar, 1912, 1 ♀ (C-D) (*?Turner*) (BMNH). SOMALIA: Iscia Baldoa, v. 1935, 1 ♂ (?C) (*A. Mochi*) (MCSN, Genoa). UGANDA: Kampala, iii. 1932, 'ex *Serapista denticulata*', 2 ♀ (C) (*H. Hargreaves*); ix. 1938, ex *Pachyanthidium 'bicolor'*, 4 ♀ (C) (*T. H. C. Taylor*) (BMNH). TANZANIA: Zanzibar, nr Mazi Moja, 1924, 2 ♀ (B) (*H. J. Snell*) (BMNH); Nzoi, Ukambani Country, 1889, 2 ♀ (C) (BMNH); Old Shinyanga, viii–ix. 1951,v. 1954, ex *Pachyanthidium truncatum*, 6♀, 3♂ (C-D) (*E. Burtt*) (BMNH). ZAMBIA: Abercorn, 11.viii.1945, 1 ♂ (B-C) (*H. J. Bredo*) (BMNH). RHODESIA: Salisbury, ix. 1900, 1 ♀ (C), 1 ♂ (B-C) (*G. Marshall*) (BMNH & TM, Pretoria); Chishawasha, ii. 1970, 1 ♀ (C) (*Watsham*) (Watsham); Cashel Valley, 17.i.1970, 1 ♂; Selukwe, 2.i.1941, 1 ♀ (B-C) (NM, Bulawayo); Lonely Mine, 14. iv. 1914, 1 ♂ (?C) (*Swale*) (BMNH); Bulawayo, x. 1923, 1 ♀ (B) (*R. Stevenson*) (BMNH). MOZAMBIQUE: Delagoa Bay, 1 ♀ (*Monteiro*) (IRSNB, Brussels). SOUTH AFRICA: Zululand, M'fongosi, 2 ♂ (?D) (*M. E. Jones*) (SAM, Cape Town); Natal, Weenen, iii.1925, 1 ♀, 1 ♂ (D) (*Thomasset*) (BMNH); Pondoland, Port St. Johns, ix. 1916, 2 ♀ (D-E) (*Swinny*) (TM, Pretoria), xii. 1923, ii. 1924, 1 ♀, 2 ♂ (D)

(*Turner*) (BMNH); Howison's Poort nr Grahamstown, 17.xii.1967, 1 ♀ (E) (*Jacot-Guillarmod*) (AM, Grahamstown); Cape Prov., Villiersdorp, (iv.) xii. 1943, ex *Serapista denticulata*, 3 ♀, 1 ♂ (E) (SAM, Cape Town; BMNH).

Leucospis rostrata sp. n.

(Text-figs 154–156)

♀. 4·3–5·0 mm (form B), 6·5–7·5 mm (forms A, C). In holotype (form A) yellow colour predominant, leaving black only following: scrobes, vertex and occiput narrowly at occipital carina, narrow cross-line on pronotum, antero-median and sublateral parts of mesoscutum, subtriangular area on scutellum basally and not reaching apex, ventral part of mesopleurum, teeth of hind femur; following parts are reddish instead of black: flagellum, prepectus, upper mesepimerum, propodeum, sides of gaster, tergites four and five medially and narrowly along margins, coxae except hind one dorsally, tibiae except externally (fore tibia dorsally) and tarsi. In darker specimens (form C) red is mostly replaced by black, yellow partly by red and markings thus much reduced so that black prevails: face black except sometimes reddish spots laterad of toruli and tiny spots at occipital margin laterad of ocelli; mesoscutum mostly black with small red spots in place of yellow pattern of holotype; whitish yellow reduced to premarginal line on pronotum, lateral spots on scutellum, dorsellum, dorsal spot on hind coxa, two or one spot on hind femur and two interrupted bands on gaster; hind femur mostly black but dorso-apically red, sometimes with apical whitish spot and with similar transverse-triangular spot broadest at base of toothed margin in basal third; gaster black but more or less red at base and along median line, with whitish band narrowly interrupted on fourth tergite and another, broken to two transverse maculae, near apex of fifth tergite. In small specimens (referred to as form B) colour pattern generally intermediate between A and C: black prevailing on mesoscutum, hind coxa and on middle of gastral dorsum centred on fourth tergite; hind femur suffused rufous with black centre. Wings infuscate, moderately in holotype, strongly in form C, in latter case with violaceous tint.

Head slightly narrower than pronotum anteriorly, in dorsal view about 2·4 times as broad as long; occipital carina high medially but low and disappearing before reaching eyes; temple very short, not carinate. POL about 2·2 times OOL; ocellar triangle about 2·7 : 1; vertex with transverse rugae mixed with punctures at eyes, coarsely umbilicate-punctured in front of lateral ocelli. Frontal protuberances rather weak but in some specimens subrectangular at upper scrobes; scrobal carina dorsally arched, removed from ocellus by third of its diameter. Head in facial view 1·08–1·15 times as broad as high; interantennal lobe without keel. Relative measurements: height of head 54, width of frontovertex 34, scrobes 17, lower face 27·5, its height 28, eye 33·5 : 21·5, malar space 12, mouth 20. Emargination of eye weak. Clypeus about 1·2 times as high as broad but mostly not well-defined dorsally, flat, its lower margin slightly produced (Text-fig. 155), middle tooth blunt. Flagellum plus pedicellus 1·22–1·44 times as long as breadth of head (relatively shorter in smaller specimens, form B), subfiliform, apically 1·5 times as broad as pedicellus and 1·2 times as broad as second flagellar segment; first flagellar segment quadrate, second fully 1·1 times, eighth 0·86–0·93 times, clava 1·65–1·80 times as long as broad.

Thorax moderately densely hairy, hairs not long. Pronotum transversely subdepressed, with distinct though not sharp premarginal carina, hind margin not carinate, straight; sides subconcave, slightly converging; interspaces mainly a quarter as broad as punctures, with fine transverse microreticulation; lateral panel moderately convex, with small depression at spiracular indentation. Mesoscutum slightly depressed postero-submedially, interspaces of punctures anteriorly distinctly microreticulate; vestiges of parapsidal furrows less than half as long as

their distance from outer margin. Scutellum 1·32–1·50 times as broad as long, hind margin partly slightly elevated, interspaces narrow and apart from some interspersed tiny punctures, smooth. Propodeum medially steep, convex (sometimes irregularly), median carina and plicae distinct though not high. Upper mesepimerum more coarsely punctured than upper episternum, interspaces narrow, smooth, both parts separated rather by colour than by a furrow. Hind coxa very broad, dorsal edge with mesal carina not very conspicuous; depression in upper part, posteriorly including dorsal edge, smooth, anteriorly with sparse punctures, lower half moderately punctured. Hind femur (Text-fig. 156) at base wide-angular, excluding teeth about 1·65 times as long as broad, teeth very long; puncturation in dorsal half near base rather coarse, average interspaces about half as broad as punctures, smooth. In fore wing apical processus of stigmal vein broader than but only one-third as long as uncus.

Gaster slightly shorter than head plus thorax, relatively longer in darker bigger specimens: in form A 1·49–1·54 times, in B (small) 1·40–1·43 times, in C 1·63–1·73 times, as long as broad. First tergite semiglobose, 1·3–1·5 times as broad as long, posteriorly with indicated median smooth line, otherwise punctured, interspaces slightly narrower than punctures, smooth. Fourth tergite medio-posteriorly distinctly produced, angulate (Text-fig. 154), here more than half as long as first tergite, with fine median groove but without (broad) ovipositorial furrow. Fifth tergite 1·15–1·33 times as broad as the first, strongly convex, basally subhorizontal, posteriorly steeply declining, broad median furrow tapering and very shallow anteriorly; tergite medially about twice as long as fourth tergite. Ovipositor sheaths reaching about middle of fifth tergite.

♂. 4·8–5·0 mm (B), 6·5–7·4 mm (C). Colour pattern similar to ♀ of relevant form (♂ of form A not known). Gaster in dark form (C) black with one pair of pale latero-dorsal spots in middle, in a ♂ a vague spot on flat vertical part of carapace subapically; in form B first tergite rufous with transverse yellowish macula, base of carapace dark, then mainly rufous-yellowish in a vaguely interrupted arch and behind this two large submedian maculae on each side separated by broader median black strip and, transversely, by narrow arcuate black lines. In biggest specimen (from Ladismith, form C) sternites V and VI slightly longer than broad, in the smallest (B) slightly transverse.

The common features of this species are the long antennae and the long head. Otherwise it seems easy to split the material at hand into three forms (A, B, C) and it would be easy to name them. I doubt, however, whether this would be wise, as all three forms come from a relatively small area. The closely related *L. tricolor* Kirby shows how useless and confusing such naming might prove when more material is known.

Biology. Hosts unknown. The variation suggests that several host species, possibly of Anthidiine bees, may be involved.

Distribution. South Africa, South West Africa.

Holotype ♀ (form A), South West Africa: Aus, i. 1930 (*R. E. Turner*) (BMNH).

Paratypes. South West Africa, 1 ♀ (A) with holotype (BMNH). South Africa: Modderfontein nr Willowmore (?), xi. 1920, 1 ♀ (C) (*Brauns*) (TM, Pretoria); Calvinia, 1 ♂ (C) (BMNH); Bulhoek, x. 1950, 2 ♂ (C) (*Klaver-Clanw.*) (SAM, Cape Town; BMNH); Liebendal, xi. 1953, 1 ♀ (C) (SAM, Cape Town); Touwsrivier, 11.xi.1965, 1 ♀ (C) (*C. D. Michener*) (SM, Lawrence); Ladismith, 24.ix.1948, 1 ♂ (C) (*Jacot-Guillarmod*) (BMNH); Willowmore, 25.ii.1902, 1 ♀ (C), iii. 1911, 2 ♀, 2 ♂ (B) (*Brauns*) (TM, Pretoria; BMNH).

Leucospis schlettereri Schulthess-Schindler

(Text-fig. 149)

Leucospis Schlettereri Schulthess-Schindler, 1899 : 250–251, ♀. LECTOTYPE ♀ (here designated), MOZAMBIQUE: Delagoa (EI, Zurich) [examined].

One of the two syntypes designated as lectotype. The BMNH has one male apparently from the same lot (same labels) but not mentioned in the original description.

L. schlettereri is closely related to *L. tricolor* Kirby and the two have been often confused. *L. schlettereri* is best characterized by its relatively small body with rich pattern of red and yellow markings (with the range of variation much narrower than in *L. tricolor*) and, in particular, by its short ovipositor the furrow of which does not reach the broad subhorizontal base of the fifth tergite (Text-fig. 149). In both sexes the hind femur is mostly blackish in a broad median streak, with the dorsal edge brownish to reddish and the ventral edge red but often with a predental and a supradental elongate whitish macula. The predental (basal) macula is sometimes absent, sometimes connected with the distal supradental macula. This pattern may be seen also in the males and helps them associate with the females of this species and separate them from a similar form of *L. tricolor* (form D), in which the whitish streak normally borders broadly the dorsal edge but is absent or greatly reduced ventrally (unless the yellow is much more spread as in form C of *tricolor*).

BIOLOGY. No definite host records known.

DISTRIBUTION. Rhodesia, S. Mozambique, South West Africa, South Africa including Lesotho.

MATERIAL EXAMINED.

Type data given in synonymy.

RHODESIA: Salisbury, ii–iv. 1900, 1 ♀, 1 ♂ (*G. Marshall*) (TM, Pretoria; BMNH); Bulawayo, ix. 1923, 1926, x. 1933, 2 ♀, 1 ♂ (partly *R. Stevenson*) (NM, Bulawayo); Plumtree, i. 1912, 1 ♀ (*G. Arnold*) (TM, Pretoria); Gwai, 16.i.1927, 1 ♀ (NM, Bulawayo). MOZAMBIQUE: Delagoa Bay, Rikatla, 1 ♂ (*Junod*) (BMNH). SOUTH WEST AFRICA: Aus, i. 1930, 1 ♀, 5 ♂ (*R. E. Turner*) (BMNH). LESOTHO: Mamathes, 28.ii.1956, 1 ♀ (*Jacot-Guillarmod*) (BMNH). SOUTH AFRICA: Bechuanaland, 26 mls N. of Postmasburg, x. 1939, 1 ♀ (*Staff*) (SAM, Cape Town); V.-L. Kalahari, Gomodimo, iv. 1930, 1 ♀ (*Mus. Exped.*) (TM, Pretoria); Britstown, xii. 1970, 1 ♀ (*H. & M. Townes*) (Townes); Steynsburg, 1915, 1 ♂ (*Ellenberger*) (MNHN, Paris); Murraysburg District, iii. 1931, 1 ♀; Thee Kloof, Fraserburg District, xi. 1935, 1 ♂; Knersvlakte, Namaqualand, x. 1950, 1 ♂; Strandfontein, ii. 1949, 1 ♀ (mostly SAM, Cape Town); Bloukrans nr Calvinia, xi. 1931, 1 ♀ (*Ogilwie*) (BMNH); Lamberts Bay, xi. 1956, 1 ♀; Leipoldtville, xi. 1956, 1 ♀; Hexrivier, 1 ♀ (*Mus. Exped.*) (SAM, Cape Town); Worcester, i. 1934, 1 ♂ (*Turner*) (BMNH); Swellendam, xii. 1931, 1 ♀ (*Turner*) (BMNH); Grahamstown, Hilton, xi. 1967, i. 1971, 2 ♀ (*Jacot-Guillarmod*) (AM, Grahamstown).

The *GIGAS*-Group

The main characters are mentioned elsewhere (p. 148). The group is close to the African *tricolor*-group but is less homogeneous. Its species have a moderately broad body, with subhorizontal and generally longer ovipositor, the propodeal median carina is mostly missing or vague (at least in females), the hind femur is less inflated, hind tibia without dorso-lateral keel, its apical spine still shorter but with concave tarsal side (not straight as in the *tricolor*-group treated above).

The group may be divided into the *gigas*-subgroup (see the Mediterranean species, p. 149), the *intermedia*-subgroup, the *histrio*-subgroup and the *miniata*-subgroup, differing from the former mainly in the subconical elevated dorsellum; this is bidentate in the *gigas*-subgroup and the *intermedia*-subgroup, weakly convex in the *histrio*-subgroup. Only *L. miniata* Klug and *L. incarnata* Westwood belong here.

Leucospis miniata Klug

(Text-fig. 158)

Leucospis miniata Klug, 1834 : Dec. 4 : [25], pl. 37, fig. 1, ♀. Holotype ♀, Egypt: 'Dscheil el Achterie' nr Alexandria (MNHU, Berlin) [examined].

From the original description it is clear that Klug had only one specimen, the holotype in the present sense. It is a relatively dark-coloured female, with the propodeum only narrowly orange in the middle and the first tergite with two oblique subtriangular spots. Shipp (1894*a* : 16), who apparently examined Westwood's type of *L. rufonotata* rather carelessly, put the latter in synonymy with *miniata*, which was rightly refuted by Masi (1935 : 39) and Mader (1937 : 160–161). They pointed out that Schletterer's concept of the two species was sound, with which I concur. I can confirm as right also Berland's identification of North African specimens (1934*b* : 174) questioned by Bytinski-Salz (1963).

Schletterer (1890 : 210–212) redescribed *L. miniata* and discussed its relationship. Superficially there is a great resemblance to the orange form of *L. gigas* Fabricius, but (apart from the dorsellum) in the female the ovipositor is shorter, it does not reach the very base of the fourth tergite, the latter tergite being dorsally almost as long as the fifth. There is also some difference in the orange pattern: in *miniata* the central quadrangular macula on the mesoscutum nearly touches the scutellum but the latter has at base a black triangular spot, whilst the metanotum and propodeum are extensively orange (the latter parts mostly black in *gigas*).

L. miniata and *L. gigas* are compared mainly because their distribution areas in North Africa are very similar, but otherwise *L. miniata* is much closer to the South African *L. incarnata* Westwood, as may be seen already from the key. In both sexes of *L. miniata* the puncturation of the body is much denser (about as dense as in *L. gigas*) and generally finer, including the lateral depressed streaks of metanotum; the pubescence is generally very short and dense, for example on the disc of the pronotum (which is so densely punctured that it shows no interspaces between punctures) the hairs are only about half as long as width of the flagellum

in the middle. The face is relatively narrower (Text-fig. 158), with genae, in facial view, appearing nearly as long as the part of clypeus produced beyond their level. And in the male the gaster bears, as in *L. gigas*, one broad yellow to slightly orange band on the first tergite, on the carapace two more bands and a broad rounded macula on the sixth tergite, the two bands and macula indented anteriorly in the middle; also epipygium with a transverse macula; sides of carapace (epipleura) extensively yellowish. The fore wing in both sexes slightly but distinctly infuscate apically beyond the stigmal vein (the latter with long slender uncus). Size in female 9–15 mm, male (until now undescribed) 9·5–12·0 mm.

BIOLOGY. Host unknown.

DISTRIBUTION. Morocco, Algeria, Lybia, Egypt, Israel.

MATERIAL EXAMINED.

Type data given in synonymy.

MOROCCO: Tamralta, 1 ♂ (MNHN, Paris). ALGERIA: Oran; El Asnam (= Orléansville); Arzew; Ain-Sefra; Mokladeli; Laghouat; Tilgemt; 15 ♀, 16 ♂ (MNHN, Paris). LYBIA: Cyrenaica, Bersis, W. of Tocra, 26.vii.1957, 1 ♀ (*K. M. Guichard*) (BMNH); Benghasi, v–viii. 1924–1928, 3 ♀ (*G. C. Krüger*) (MCSN, Genoa), 4.iv.1954, 1 ♀ (*Guichard*) (BMNH); Rommel's Pool, 17. viii. 1957, 1 ♀, 1 ♂ (*Guichard*) (BMNH). EGYPT: Meadi, 19.iv.1912, 1 ♀ (*L. H. G.*) (BMNH); 'Amrich', v., 1 ♂ (EI, Zurich). ISRAEL: Jericho, 27.iii. and 4.iv.1909, 1 ♀, 1 ♂ (*F. D. Morice*) (BMNH).

Leucospis incarnata Westwood

(Text-fig. 157)

Leucospis incarnata Westwood, 1839 : 248, ♀. LECTOTYPE ♀ (here designated), SOUTH AFRICA: Cape Province (MNHU, Berlin) [examined].

By his description Westwood validated the name *incarnata* given to the species originally by Klug, to whom the material belonged. No mention was made as to how many specimens there were, hence the single preserved female referred to as 'Klug's Type' by Schletterer (1890 : 214) is designated as lectotype.

The species is very close to the North African *L. miniata* Klug and when compared with that the following characters of *L. incarnata* appear to differ. The puncturation generally coarser and much less crowded, leaving in many places, for example on pronotum sublaterally, on the gastral dorsum and flanks and on hind femora, distinct smooth interspaces which are on average about half as broad as punctures. Consequently also the pilosity is sparser, but conspicuously longer than in *miniata*, on pronotum the hairs being about as long as width of the antennal flagellum in the middle. The face relatively broader (Text-fig. 157), with the clypeal margin distinctly much more protruding compared with the shorter malar space. The male (hitherto undescribed) seems to have the puncturation relatively still sparser, with interspaces on gaster up to as broad as punctures, and the pilosity

still longer. In the two specimens available the black colour is more widespread, the orange-yellow, which forms uninterrupted bands or maculae on scutellum and gaster in *miniata*, here in *incarnata* are broadly separated into sublateral maculae (except narrow separation on the first tergite), elongate in form on scutellum and the sixth tergite; missing on epipygium. Size of female 9·5 mm, male 12 mm.

BIOLOGY. Host unknown.

DISTRIBUTION. South Africa.

MATERIAL EXAMINED.

Type data given in synonymy.

SOUTH AFRICA: Slypsteen, Lowerwaterkloof, Willowmore Distr., x. 1938, 2 ♂ (*S. Afr. Mus. staff*) (SAM, Cape Town; BMNH).

THE *FUELLEBORNIANA*-GROUP

The two species belonging here could be attributed, eventually, as a subgroup to the Indo-Australian *petiolata*-group. From the latter they differ mainly in having a very conspicuous cross-carina on the mesoscutum (Text-fig. 160) which, except laterally, separates the finer anterior puncturation from the much coarser and often transversely rugose puncturation of the subdepressed posterior two-thirds of the sclerite. The premarginal carina on pronotum is distinct, sharp, also hind margin of pronotum usually carinate. In the other characters they agree with the *petiolata*-group (p. 172).

L. fuelleborniana Enderlein and *L. reversa* sp. n. belonging here have blackish wings and seem to be confined to forest habitats.

Leucospis fuelleborniana Enderlein

(Text-fig. 160)

Leucospis fülleborniana Enderlein, 1902 : 17–18, fig. 4, ♀. LECTOTYPE ♀ (here designated), TANZANIA: Langenburg at northern end of the Nyasa Lake (MNHU, Berlin) [examined].

All three original syntypes examined and the best specimen selected as lectotype.

As may be seen already from the key this species looks very distinctive at first glance, more due to its colour than the shape. The latter is not much different from the Oriental *L. petiolata* Fabricius or the African *L. carinifera* Kriechbaumer and its gaster cannot be termed as 'slender petiolate' as Weld did (1922 : 3); she probably mistook a *Micrapion* for *L. fuelleborniana*.

Also the male (hitherto undescribed) is in shape very similar to *L. petiolata* and has the same colour pattern as the female. Hind femur usually slightly more thickened (as in Text-fig. 161). For shape of gaster see Text-fig. 160. Length of body 9·5–12·5 mm (female 10·0–14·5 mm).

BIOLOGY. Host unknown. Probably a species preferring forest or shady habitats.

DISTRIBUTION. Uganda, Tanzania, Mozambique, north-east South Africa, Lesotho.

MATERIAL EXAMINED.

Type data given in synonymy.

UGANDA: Ruwenzori Range, Semliki Forest, Hot Springs, 900 m, viii. 1952, 1 ♀ (*D. S. Fletcher*) (BMNH). TANZANIA: 'NW. Tanganyika', 1910, 1 ♀ (*Grauer*) (NM, Vienna); Ukami District, 1 ♀ (TM, Budapest); Langenburg (= Lumbira), 2 ♀, paralectotypes of *fuelleborniana* (MNHU, Berlin). MOZAMBIQUE: Inhambane, 1 ♂ (*R. F. Lawrence*) (SAM, Cape Town). LESOTHO: Moryo, 1917, 1 ♀ (*H. Junod*) (CU, Ithaca). SOUTH AFRICA: Zululand, Mfongosi, xii. 1911, 3 ♂ (*W. E. Jones*) (SAM, Cape Town; BMNH); Natal, Lake Sibayi, iii. 1968, 1 ♀ (*D. J. Brothers*) (AM, Grahamstown).

Leucospis reversa sp. n.

(Text-fig. 161)

♀. 8·5–14·0 mm. Antennae, head and thorax mainly black, gaster red or brownish red; legs mainly red with fore and mid legs more or less infuscate, hind coxa extensively black from base; prepectus and tegula, sometimes also narrowly front and hind margins of pronotum and a spot on subalar area (below tegula) reddish; ovipositor sheaths and teeth of hind femur black. Wings blackish with slight violaceous tint.

Shape of body very similar to *L. fuelleborniana* Enderlein (Text-fig. 160).

Head hardly narrower than pronotum posteriorly, in dorsal view about 2·3 times as broad as long; temples short, appearing step-like, but not carinate. Occipital carina sharp but not high, laterally disappearing before reaching level with inner eye margin; vertex rather flat, punctured sublaterally, cross-striate posteriorly, ocellar area slightly elevated, ocellar triangle about 2·2 times as broad as high; ocelli large; POL fully 1·2 times OOL; median ocellus separated by a groove from carinate margin of scrobes, carina sharp even on subrectangular frontal protuberances. In facial view head 1·25–1·30 times as broad as high; face with very short dense whitish pubescence, very densely vertically rugulose-punctured, at eyes in addition with microscopic reticulation; also eyes densely pubescent except narrowly at lower end, inner orbits distinctly emarginate; interantennal lobe carinate; clypeus slightly broader than high, with coarse vertical rugosity, its lower margin not produced, side lobes only weakly indicated, depressed, mid tooth distinct, slightly protruding. Relative measurements: width of head 86, frontovertex 44, scrobes 26, lower face 40·5, its height 36, eye 53·0 : 32·5, malar space 13, mouth 34. Lower dent (notch) of mandible small, subtriangular. Flagellum plus pedicellus about 1·3 times as long as width of head, stout-subfiliform; pedicellus dorsally subquadrate, not distinctly cross-depressed at base; first flagellar segment obconical, oblong, second to fifth slightly (decreasingly) elongate, distal segments slightly transverse; clava about 1·7 times as long as broad.

Pubescence of thorax brownish, rather short; puncturation very dense, narrow interspaces present sometimes on scutellum anteriorly, but then dull, microscopically reticulate-granulate. Pronotum with distinct cross-depression delimited anteriorly by a blunt ridge, posteriorly by conspicuous though not very sharp premarginal carina; hind margin distinctly carinate; sides converging in concave curves; lateral panel low, with impunctate but finely reticulate horizontal depression deepened posteriorly where slightly curving up and narrowing to join the pre-

spiracular depression. Mesoscutum with high and mostly slightly curved cross-carina in anterior one-third, separating anterior sloping and more finely punctured part from the coarsely punctured posterior part which is flat, sublaterally slightly depressed. Scutellum about 1·3 times as broad as long, mainly flat but usually more convex anteriorly and partly along median line; hind margin slightly arched, without admarginal depression. Dorsellum moderately convex, densely punctured, hairs not very conspicuous; hind margin rounded, not carinate. Propodeum densely punctured, even laterally not unusually pubescent, medially raised, about 1·7 times as long as dorsellum; median carina slightly elevated in posterior third, plicae also sharp. Both parts of upper mesopleurum, and metapleurum, regularly densely punctured. Outer side of fore femur shiny, only sparsely punctured; tibia with distinct dorsal and ventro-lateral carinae, between them dull, densely finely punctured and pubescent. Fore and mid claws pectinate, hind ones simple but with three very small teeth at base. Hind coxa elongate, dorsal edge rounded, punctured, moderately narrowing caudad, posteriorly with a weak obtuse outer tooth (sometimes only indicated), depression more or less smooth below and in front (basad) of the tooth, sometimes smooth or with sparser punctures along the straight lateral edge, but most of the slightly concave depression punctured; ventro-mesal edge smoothly curved; apical auricle of coxa absent. Hind femur (Text-fig. 161) externally with smooth interspaces about as broad as (or broader than) punctures; teeth of medium length, the second curved and usually slightly longer than the broadly separated basal tooth, fourth to seventh teeth usually fused. Hind tibia externally regularly convex, moderately sparsely punctured; apical spine long, most of its adtarsal side straight, rudimentary outer spur slightly claw-like. Fore wing densely finely pubescent; terminal processus of stigmal vein about half as long as uncus.

Gaster subpetiolate, rather abruptly swollen in middle, short pubescence brownish (appearing pale in certain lights, dark in others); puncturation not very dense, rather regular, absent on a broad belt along hind margin of first tergite and sparse on its flanks. First tergite elongate, 1·30–1·45 times as long as broad, 0·56–0·60 the width of the broadest part. Fourth tergite densely punctured, its hind margin straight. Fifth tergite the longest, as long as broad or slightly longer than broad, with ovipositorial furrow very deep and with its narrow apex reaching base of tergite, its dorsum, in lateral view, distinctly sloping caudad beyond basal third. Ovipositor sheaths nearly reaching base of fifth tergite.

♂. Unknown, but probably recognizable on similar colour pattern and mesoscutal carina.

BIOLOGY. According to a letter from Mr J. Ghesquière the Zairean specimens were reared from *Xylocopa* sp. (Apidae), one of them from a nest in a bamboo stem.

DISTRIBUTION. Liberia, Congo (Brazzaville), Zaire.

Holotype ♀, ZAIRE: Burumbu, ex *Xylocopa* sp., vii. 1925 (*J. Ghesquière*) (MRAC, Tervuren).

Paratypes. LIBERIA: Lenga Town, 15.viii.1926, 1 ♀ (*J. Bequaert*) (BMNH). CONGO (BRAZZAVILLE): Ogoué District, Lambaréné, 1 ♀ (BMNH). ZAIRE: Kasai, Lulouabourg, ix. 1921, 1 ♀ (*J. Ghesquière*) (MRAC, Tervuren).

SPECIES SOLA

Leucospis holubi sp. n.

(Text-figs 162–164)

♀. 11 mm. Piceous black; yellow are: arcuate band on pronotum reaching anterior corners, dorsellum, small spot on upper metapleurum, sublateral longitudinal lines anteriorly on first tergite, cross-bands on the fourth and at hind margin of the fifth tergite, dorsal and ventro-basal

streaks on hind femur; tarsi pale testaceous; pronotum reddish posteriorly. Pubescence of body whitish, short, inconspicuous. Wings brownish, darker infuscate along anterior margin.

Head slightly broader than pronotum posteriorly, in dorsal view twice as broad as long; temples developed though short. Vertex densely umbilicately punctured leaving free only narrow space laterad of each ocellus; ocellar area not raised, ocellar triangle about 2·5 : 1, median ocellus about one-third its diameter from strong scrobal carina and about half its diameter from occipital carina, latter low and disappearing beyond lateral ocelli; POL about 2·1 times OOL; frontal protuberances rather strong. Head in facial view fully 1·3 times as broad as high; face dull, very densely rugulose-punctured, pubescence extremely short; interantennal area hardly raised medially, with smooth blunt keel. Relative measurements: width of head 73, frontovertex 40, scrobes 26, lower face 33, its height 26, eye (inner orbit distinctly emarginate) 44 : 31, malar space 9, mouth 31, scapus 18. Clypeus slightly broader than long, with sides straight, converging upwards, lower margin not produced, depressed on either side of short and broad median tooth, lateral lobes very short. Truncate inner edge of mandible broad, notch small; surface smooth apically, in the middle with shallow longitudinal grooves. Flagellum plus pedicellus 1·3 times as long as breadth of head, subclavate; pedicellus oblong; first flagellar segment basally barely attenuate, about 1·7 times as long as broad, covered with same kind of sensilla as following segments which are decreasing in length, distal funicular segments subquadrate; clava subacuminate, hardly shorter than two preceding segments combined.

Thorax densely punctured, dull, very shortly pubescent, narrow interstices microscopically cross-striate, on mesoscutum interstices slightly raised in transverse rugae. Pronotum with sharp raised straight hind margin and high premarginal carina, in front of the latter distinctly transversely depressed, depression delimited anteriorly by a swelling marked yellow and reaching anterior corners of pronotum; sides broadly emarginate; lateral panel slightly depressed below swollen lateral edge of collar, flat beneath. Mesoscutum, except anteriorly, subdepressed in place of notaular furrows. Scutellum about 1·2 times as broad as long, convex, with impressed line of punctures at smooth hind margin. Dorsellum fully 3 times as broad as long, shiny, swollen, sausage-like, its margin rounded, surface with sparse tiny punctures and microscopic cross-reticulation. Propodeum medially only slightly longer than dorsellum, a quarter the length of scutellum; plicae very distinct but median carina weak though slightly raised posteriorly; median area punctured, hairs very short, but pubescence very dense and conspicuous outside of plicae. Both parts of upper mesopleurum convex, rather densely punctured, interspaces smooth. Metapleurum on disc nearly impunctate. Legs very slender. Fore femur dorsally rounded, tibia dorsally and ventro-externally with a faint carina. Hind coxa extremely densely and finely punctured, with short hairs, along lateral edge subventrally punctures less dense; dorsal edge punctured, broad, posteriorly with small narrow tooth; depression with two percurrent smooth streaks meeting posteriorly, separated by median punctured streak. Hind femur (as in Text-fig. 163) with basal tooth the largest, median teeth rather slender; external surface moderately densely and rather finely punctured, interspaces with very shallow microreticulation. Hind tibia: outer ventral carina nearly reaching apex; latter subemarginate but ventrally produced into long spine with sharp outer spur on top (Text-fig. 164). Stigmal vein of fore wing with long uncus but terminal processus missing.

Gaster (Text-fig. 162) nearly 2·8 times as long as broad, petiolate, posterior part broadly fusiform and densely punctured. First tergite hardly half as broad as gaster, nearly 2·2 times as long as broad, sides subparallel; its dorsum with unusually high smooth swollen median ridge, highest in basal third, separating diverging shallow ovipositorial furrows which are laterally, as well as sides of the tergite, moderately densely punctured; hind margin rather broadly smooth, in middle with tiny excision. Fourth tergite expanding backwards, very short, punctured; its hind margin straight, dorsum with fine groove in median line. Fifth tergite strongly swollen behind middle, narrowing basad, dorsally convex and with deep ovipositorial furrow. Apex of gaster in dorsal view sub-acuminate. Ovipositor reaching dorsellum. Hypopygium reaching level with base of ovipositorial sheaths.

♂. 8–9 mm. Pale lemon-yellow markings on thorax as in ♀ but spot below tegula sometimes

missing, dorsal streak on hind femur sometimes shortened basally, ventral spot shorter, antennal scape pale beneath; gaster with yellow band behind broadest part and a vague median subapical spot; epipygium reddish. On head POL about 2·5 times OOL. In facial view head 1·25 times as broad as high. Relative measurements: width of head 57, frontovertex 32, lower face 26 (below antennae), its height 19·5; eye 35·0 : 24·5, malar space 6·5, mouth 24; clypeus nearly 1·3 times as broad as high. Flagellum subclavate, combined with pedicellus nearly 1·2 times as long as width of head. Propodeum raised medially and here about 1·6 times as long as dorsellum, median carina vague but plicae high. Gaster (Text-fig. 163) hardly shorter than head plus thorax, distinctly petiolate, posteriorly as broad as mesoscutum, narrowest in one-third of length. First tergite subpyriform, convex; except at base and at apex coarsely punctured and hairy; in dorsal view about 1·7 times as long as broad, laterally at base with longitudinal swelling separated by a shallow groove dorsally; hind margin subrectangularly excised in middle; maximum breadth only 0·36, minimum breadth of tergite 0·31 the width of gaster. Third (second exposed) tergite subcarinate at sides, carinae strongly diverging and gradually fading off further back; hind margin of tergite between carinae emarginate, dorsum finely reticulate but nearly without punctures. Carapace about 1·45 times as long as broad, regularly convex, densely coarsely punctured, pilosity rather short. Epipygium apically rounded, sides of sixth tergite not toothed. Sternites very narrow, broadly deeply concave (grooved), last but one about twice, the two preceding ones each about 2·5 times, last sternite only slightly, longer than broad; deep concavity of the last subtriangular, apex of last sternite rounded.

BIOLOGY. Host unknown.

DISTRIBUTION. Madagascar, eastern South Africa.

Holotype ♂, MADAGASCAR: Fort Dauphin, ii. 1937 (*A. Seyrig*) (MNHN, Paris).

Paratypes. MADAGASCAR: Ivondro, i. 1939, 1 ♂ (*A. Seyrig*) (BMNH). SOUTH AFRICA: 'Kaffraria', about 1890, 1 ♀ (*E. Holub*) (NM, Prague).

I cannot suppress some doubt about the origin of the female, being unable to find any other specimen among the rich African material of the genus at my disposal, although the label seems to be genuine and the specimen certainly comes from the collections of E. Holub, a famous Czech explorer of Africa, after whom the species is named. Therefore I designate a male as the holotype.

L. holubi is a very distinctive species, which seems to be remotely related to the *fuelleborniana*-group.

SPECIES SOLA

Leucospis namibica sp. n.

(Text-figs 165–168)

♀. 3·0–4·5 mm (but length of body often appearing less due to squatted position). Piceous black, with following pattern pale yellow or whitish: narrow line on scape beneath, short transverse line anteriorly and narrow lateral edge connected posteriorly along hind margin on pronotum, short lateral margin of mesoscutum at tegula, band on scutellum posteriorly emarginate in middle, dorsellum, postero-dorsal margin of metapleurum, fore knee and tibia on dorsal edge, mid knee and tibia at both ends, ventro-apical spot on hind coxa, hind femur along dorsal edge and ventro-basally, hind tibia extensively on dorsal side (narrowly in middle), all tarsi at base, then cross-bands on fourth tergite of gaster, at apical margin of fifth tergite, vertical lines on epipygium posteriorly. Usually reddish colour accompanies yellow to some

extent on thorax and, more extensively, on legs. Wings subhyaline; fore wing with weak though distinct brownish streak at postmarginal vein and, abruptly, on apical sixth.

Head in dorsal view slightly broader than pronotum posteriorly, twice as broad as long; with short temples strongly receding, rounded. Vertex fairly convex, very coarsely rugose-punctured; occipital carina arched, not high, not reaching beyond lateral ocelli; area between large ocelli not distinctly raised, ocellar triangle about 2·7 : 1; POL about 4 times OOL, latter subequal to diameter of lateral ocellus, median ocellus about half its diameter from arched scrobal carina; frontal protuberances weak, their upper side distinctly sloping. In facial view head nearly 1·2 times as broad as high. Pubescence of eyes extremely short, on face of medium length and density; face vertically rugulose, more densely so beneath, moderately shiny, flat but medially slightly raised, interantennal area with smooth strip on weak keel. Clypeus slightly transverse, subtriangular, its lower margin slightly produced, depressed mesad, side lobes distinct and slightly exceeding short median tooth. Mandibles with lower tooth sharp, short, separated by sharp-angular notch, upper part of edge distinctly emarginate so that mandible appears 3-toothed. Relative measurements: width of head 65, frontovertex 40, scrobes 19, lower face 33, its height 23, eye 38 : 26, malar space 10, mouth 21, scapus 17, pedicellus 7, flagellum 49. Flagellum plus pedicellus about 0·85 times as long as width of head, stout but only subclavate, moderately expanding from base (Text-fig. 168); pedicellus dorsally half as broad as apex of flagellum but distinctly oblong and longer than any of transverse funicular segments of which distal ones are about twice as broad as long; clava 1·2–1·3 times as long as broad, its apex blunt.

Thorax densely punctured, narrow interspaces transversely microscopically reticulate-striate; white pubescence short but hairs conspicuous. Pronotum posteriorly emarginate, sides converging and nearly straight, shoulders slightly obtuse-angular; collar with a slight arched depression, anteriorly not swollen, sublaterally not depressed, postero-medially convex; hind margin slightly carinate, premarginal carina low but distinct, discal carina absent; lateral panel low, with longitudinal depression below blunt lateral edge, lower corner wide-angular, rounded. Mesoscutum convex, with very slight arched depressions indicating notaular furrows which are stressed furthermore by hairs being directed backwards on mid lobe but obliquely sideways laterad of mid lobe of sclerite; parapsidal vestiges short, strongly diverging. Scutellum about 1·2 times as broad as long, moderately convex except for shallow depressed line of punctures at hind margin; puncturation coarse, interspaces distinct though narrow. Axillae fairly declivous. Dorsellum subcrescentic, nearly flat, bare, rugulose sculpture shallow but with some rugae from anterior margin; posterior margin carinate. Propodeum in middle nearly twice as long as dorsellum, with sharp regular median carina; puncturation dense, pubescence moderate but more conspicuous laterad of distinct low plicae. Side of thorax very coarsely, rather densely and regularly punctured on upper mesopleurum and metapleurum, latter not produced at hind wing; mesopleural depression rather deep. Fore femur rounded dorsally but carinate ventrally towards knee; tibia with slight dorsal and ventro-external carinae. For hind leg see Text-figs 165, 167. Hind coxa: dorsal edge punctured, blunt, broad even posteriorly at distinct dorsal tooth; depression dull, piliferous punctures confined to median streak accompanied at sides by streaks of transverse coarse rugulae, lower streak separated from dense puncturation and pilosity beneath by blunt lateral edge; ventro-mesal edge blunt, weakly curved. Hind femur moderately stout, basal tooth the longest, followed by 6–8 smaller teeth which are rather broadly separated from each other except the distal ones. Hind tibia densely punctured, finely densely hairy; external ventral carina extending over three-quarters; apex slightly oblique, with a row of sparse little spines, ventral end slightly produced, outer spur strong; dorsal side of basitarsus distinctly longer than apical breadth of tibia. Pilosity of fore wing only moderately dense; terminal processus of stigmal vein broad, less than half as long as slender uncus which is subparallel to postmarginal vein.

Gaster (Text-fig. 166) about as long as head plus thorax (in normal position), strongly inflated in posterior third, both in dorsal and lateral views; puncturation dense, pilosity white, fairly conspicuous though decumbent or subdecumbent and not long. First tergite 1·3–1·4 times as long as broad, sides diverging caudad, maximum breadth hardly more than half breadth of fifth tergite; hind margin not emarginate; dorsum convex, posteriorly with slightly raised

smooth median line. Fourth tergite with median line raised and about half as long as first tergite; hind margin produced medially in an angle of about 120 degrees. Fifth tergite strongly convex, slightly compressed from the sides, about as long as broad dorsally, with narrow deep ovipositorial furrow reaching to apex of fourth tergite. Sheaths of ovipositor normally hidden in furrow, reaching about basal two-fifths or two-thirds of fifth tergite. Apex of gaster on epipygium with very coarse punctures compared with crowded finer puncturation of sixth tergite.

♂. 3–4 mm. Very similar in colour and shape of body to ♀ but for the still shorter and more clavate antennae and slightly different markings and form of gaster. The latter with pale yellow cross-band (sometimes subinterrupted in middle) in anterior third of expanded carapace and a transverse subapical macula which sometimes is subdivided or narrowly divided in two; also epipygium with small spot. Flagellum plus pedicellus combined about 0·8 times as long as width of head. First tergite in median line shallowly depressed, hind margin broadly emarginate. Second tergite very short, ribbon-like, its hind margin still more emarginate than first tergite. In lateral view highest part of gaster rather abruptly sloping from middle distance between yellow markings, sloping part with shallow median groove and very slight cross-depression, otherwise segmentation not indicated. Apical corners of sixth tergite rounded; epipygium almost hidden in dorsal view, deeply transversely depressed. Basal and apical sternites narrow, middle ones (third to fifth) slightly broader, subquadrate to slightly oblong, fifth slightly depressed, sixth more deeply concave, slightly oblong, its sides converging; seventh (last) oblong about 1·2 : 1, very finely punctured, at base deeply concave, also before subtruncate apex slightly concave.

BIOLOGY. Unknown.

DISTRIBUTION. South West Africa.

Holotype ♀, SOUTH WEST AFRICA: Aus, i. 1930 (*R. E. Turner*) (BMNH).

Paratypes. SOUTH WEST AFRICA: Aus, i. 1930, 14 ♀, 5 ♂ (*R. E. Turner*) (BMNH; USNM; SAM, Cape Town; TM, Pretoria).

The form of the body of *L. namibica*, with rather short ovipositor and angulate hind margin of the fourth tergite in the female, reminds one much of the genus *Micrapion* Kriechbaumer, but on other characters the species cannot be excluded from *Leucospis* Fabricius.

The West Palaearctic species

The species from southern and central Europe are included in the key to the African species (pp. 101–106) and those known from Turkey, the Near East, Central Asia and from the eastern Palaearctic, including Japan, may be identified with the key to the Asiatic and Australian species (pp. 155–162). Otherwise no special key for those Mediterranean species has been prepared and the reader is referred to a recently published key (Bouček, 1959), which is still valid except that *L. turkestanica* Radoszkowski is now regarded as a synonym of *L. dorsigera* Fabricius. The Palaearctic species are treated also by Nikolskaya (1960); the two Japanese species by Habu (1961).

These species belong to three different species-groups, viz. *L. brevicauda* Fabricius and *L. elegans* Klug to the *elegans*-group; *L. dorsigera* Fabricius, *L. bifasciata* Klug, *L. obsoleta* Klug and *L. biguetina* Jurine to the *dorsigera*-group; and *L. gigas* Fabricius and *L. intermedia* Illiger to the *gigas*-group.

THE *ELEGANS*-GROUP

L. elegans Klug, known in the Mediterranean subregion only from Egypt, is discussed elsewhere (p. 144) together with the bulk of the species of the group. Here only the following species is dealt with.

Leucospis brevicauda Fabricius

(Text-figs 169, 170)

Leucospis brevicauda Fabricius, 1804 : 169, ♀. LECTOTYPE ♀ (here designated), 'BARBARIA' = ALGERIA? (UZM, Copenhagen) [examined].

Leucospis Grohmanni Spinola, 1838 : 444–446, ♀♂. LECTOTYPE ♀ (here designated), ITALY: Sicily (MIZS, Turin) [examined].

Leucospis clavata Westwood, 1839 : 256–257, ♀. LECTOTYPE ♀ (here designated), ITALY: Sicily (UM, Oxford) [examined].

Leucospis Fabricii Westwood, 1839 : 257. Holotype ♂, 'BARBARIA'=ALGERIA? (UZM, Copenhagen) [examined].

Leucospis torquata Costa, 1882 : 24, 37, ♂. LECTOTYPE ♂ (here designated), ITALY: Sardinia, Alghero (IZU, Naples) [examined].

The apparently single original specimen of *L. brevicauda* designated as lectotype.

L. grohmanni. I selected the lectotype female from the bulk of the original material consisting of four females and two males in the Spinola collection in Turin in 1969. Some years ago I examined another female, probably from the original material, sent by Spinola to the MNHU, Berlin (Bouček, 1959 : 441). Synonymized with *brevicauda* by Schletterer (1890 : 178, 180–181).

L. clavata. From the two apparently original specimens in the Westwood collection the one labelled 'Sicily, F. W. Hope' is selected as lectotype. Synonymized, as well as the following *L. fabricii*, with *brevicauda* by Schletterer (1890 : 178, 181), although in the latter case with some doubts.

L. fabricii. From the two original males of *L. dispar* Fabricius (see under *L. dorsigera* Fabricius p. 142) in the Copenhagen Museum one belongs to the 'minor' form mentioned by Fabricius (1804 : 169) and became later the type on which Westwood based his *L. fabricii.*

L. torquata. I designate as lectotype the original male specimen bearing the right locality label, 'Alghero'. Although Masi did not see this specimen, he rightly synonymized it with *L. brevicauda* (1935 : 37) and corrected Schletterer's wrong assumption (1890 : 196, 199) that *torquata* might be the same as *L. intermedia* Illiger.

L. brevicauda is a very distinctive species (see the key), and its colour pattern which, although slightly variable, always shows the hind tibia black, in contrast with the extensively yellow hind femur. Some useful characters were mentioned by Schletterer (1890 : 178–181), by Masi (1935 : 37–39), who redescribed the male, and by Bouček (1959 : 437, Fig. 5).

BIOLOGY. Hosts still unknown.

DISTRIBUTION. Portugal (Bouček, 1959), Spain, S. France, Italy (including Sardinia and Sicily), Turkey (Masi, 1935 : 37, mentions a male from 'Armenia?'), Morocco, Algeria, Tunisia.

MATERIAL EXAMINED.

Type data given in synonymy.

PORTUGAL: Lisbon, 2 ♂ (see Bouček, 1959). SPAIN: Tozuelo de Calatrava, Malaga, Barcelona, Calella d. Costa, Mallorca, Palma, vi–vii., 18 ♀, 5 ♂ (BMNH; UM, Oxford; RNH, Leiden; MNHN, Paris). FRANCE: Port du Bouc, Bouches du Rhône, 1 ♀ (*A. Honoré*) (IRSNB, Brussels). ITALY: Reggio Calabria; Sardinia: Assemini, Iglesias, Oristano, Platamona, San Giorgio, Santa Giusta, Sorgono; Sicily: Fonte Ciane, v.–viii. (IZU, Naples; RNH, Leiden; MCSN, Genoa; BMNH). TURKEY: Great Taurus Mts, ix. 1931, 1 ♀ (IEA, Portici). MOROCCO: Sehoul; Tangier (MNHN, Paris; MCSN, Genoa). ALGERIA: Oran, Hammam bou Hadjar, Bône, Langhouat (MNHN, Paris; MCSN, Genoa). TUNISIA: Sfax, 1 ♀ (BMNH).

THE *DORSIGERA*-GROUP

Hind femur below with broad basal tooth followed by 7 to about 15 smaller or at least narrower teeth. Apical spine of hind tibia moderate, its tarsal side concave, top formed by a relatively short outer spur. Upper edge of hind coxa subhorizontal, nearly straight, more or less carinate, posteriorly thin and often broadly lobe-like with the margin usually serrate, but never forming a conspicuous tooth. Pronotum convex, its hind margin raised, premarginal carina sharp, also discal carina usually distinct although then rather low. Dorsellum (of metanotum) more or less bidentate or at least carinate and sub-bilobed (*L. japonica*). In female ovipositor often long, reaching at least base of fifth tergite (*L. biguetina*). In male gaster anteriorly not unusually narrowed, sternites of medium width.

Apart from the West Palaearctic species treated here, viz. *L. dorsigera* Fabricius, *L. bifasciata* Klug, *L. obsoleta* Klug and *L. biguetina* Jurine, the group includes also *L. japonica* Walker, *L. yasumatsui* Habu and *L. aurantiaca* Shestakov treated together with the Asiatic species (pp. 194–197).

Leucospis dorsigera Fabricius

(Text-figs 3, 4, 12–14, 137)

Leucospis dorsigera Fabricius, 1775 : 361, ♀. LECTOTYPE ♀ (here designated), ITALY (UZM, Copenhagen) [examined].

Coelogaster passaviensis Schrank, 1782 : 296. Type(s), AUSTRIA: Passau (?lost). [Binomen for *Coelogaster* Schrank, 1780 : 303–306, pl. 8, fig. 4.]

Leucospis Coelogaster Hochenwarth, 1785 : 344–345, pl. 8, figs 3, 4. Type(s), AUSTRIA (?lost).

Leucospis Coelogaster Gmelin, 1790 : 2740. [Proposed as binomen for *Coelogaster* Schrank, 1780.]

Leucospis dubia Schrank, 1802 : 222, ♂. Holotype ♂, AUSTRIA: Ingolstadt (?lost). **Syn. n.**

Leucospis dispar Fabricius, 1804 : 169–170. LECTOTYPE ♂ (here designated), 'Barbaria' = ALGERIA? (UZM, Copenhagen) [examined].

Leucospis intermedia Spinola, 1808 : 236–238, ♀ ♂. LECTOTYPE ♀ (here designated), ITALY: Liguria (MNHU, Berlin) [examined]. [Junior primary homonym of *Leucospis intermedia* Illiger, 1807.]

Leucospis Fuesslini Hagenbach, 1822 : 45–46, fig. 28, ♀. Types, SWITZERLAND: Basel (?lost).

Leucospis Spinolae Westwood, 1834 : 216–217. [Proposed as replacement name for *L. intermedia* Spinola.]
Leucospis assimilis Westwood, 1834 : 217, ♀. LECTOTYPE ♀ (here designated), EUROPE: '?GERMANY' (UM, Oxford) [examined].
Leucospis Sicelis Westwood, 1834 : 218, ♀. LECTOTYPE ♀ (here designated), ITALY: Sicily (UM, Oxford) [examined].
Leucospis ligustica Nees, 1834 : 17, ♀♂. [Proposed (with description) as replacement name for *L. intermedia* Spinola.]
Leucospis scutellata Spinola, 1838: 441–442, ♀. LECTOTYPE ♀ (here designated), EGYPT (MIZS, Turin [examined].
Leucospis vicina Fonscolombe, 1840 : 186–187, ♂. Type(s), FRANCE: Aix-en-Provence (?lost).
Leucospis Algirica Walker, 1860 : 17, ♀. LECTOTYPE ♀ (here designated), ALGERIA (UM, Oxford) [examined].
Leucospis lepida Chevrier, 1870 : 274–276, ♀♂. LECTOTYPE ♀ (here designated), SWITZERLAND: Bassin du Léman (MCSN, Genoa) [examined].
Leucaspis(!) *turkestanica* Radoszkowski, 1886 : 51, ♀. LECTOTYPE ♀ (here designated), U.S.S.R.: 'Turkestan' (MNHU, Berlin) [examined].

The only available original specimen of *L. dorsigera* is designated as lectotype.

C. passavianus, originally described (Schrank, 1780, and mentioned by the same author again 1781 : 307) under a one-word name *Coelogaster* (see generic synonymy of *Leucospis* Fabricius, p. 28), was, when first mentioned under this binomen, synonymized by its author with *L. dorsigera* Fabricius. Although no original material could be traced, the synonymy seems to be correct and was accepted as such by all subsequent authors.

L. coelogaster Hochenwarth. No original material has been traced but from the illustrated description it is clear to me that the species was *L. dorsigera* Fabricius. Schletterer (1890 : 195, 198) assumed that *L. coelogaster* might be *L. intermedia* Illiger and for some time I agreed with him, mainly because *coelogaster* was described as having 'die Stirn des Hauptes mit zwey gelben Linien' (p. 344). However, on the preceding page Hochenwarth describes the present *L. gigas* Fabricius (calling it *dorsigera*; misidentification) as having four yellow lines on frons and his fig. 1b clearly shows that the inner lines represent the yellow antennal scapes. Consequently his 'two yellow lines' in *coelogaster* are believed to refer to the yellow scapes and not to yellow lines on the frons which is always black in *L. dorsigera* but more or less yellow in *L. intermedia*. All the other characters also fit *dorsigera* better than *intermedia* and I feel sure that Klug (1814 : 69) was right when he placed *coelogaster* in synonymy with *dorsigera*. Hochenwarth did not refer to Schrank's papers; probably he regarded his one-word name as invalid.

L. dubia. I could not trace the original material but the description leaves no doubt that *dubia* was a male of *dorsigera*. Westwood (1839 : 259) placed *dubia* as a variety of *L. dorsigera* but Schletterer (1890) omitted it.

L. dispar. The three Fabrician specimens come from the Kiel (private) collection of Fabricius (kindly submitted by Dr Petersen, UZM, Copenhagen). They are two males and one female with the ovipositor broken off; the female is not accepted as syntype as it does not fit the description ('abdomine cingulis tribus punctoque apicis flavis') well. The male best fitting the description was chosen as lectotype and is the same as *L. dorsigera*, with which it has been regarded as identical since

Klug (1814 : 69). The other male apparently belongs to the 'minor' form of Fabricius (1804 : 170) and as such is labelled as paralectotype of *dispar*, as well as holotype of *L. fabricii* Westwood, because the latter name was based on it. It is the same as *L. brevicauda* Fabricius (see p. 141).

L. intermedia Spinola. The name is preoccupied by *L. intermedia* Illiger, 1807: 130. There are no original specimens in the Spinola collection, but two females, labelled as such, were sent by Spinola to the Berlin Museum and are preserved there. At least one of them was examined by Westwood who, aware of the homonymy, proposed for them *L. spinolae* as a replacement name (1839 : 262). I selected one of them as lectotype. It is labelled 'Spinola S.' (= Spinola sent), not 'Rossi S.' as with the specimens from Rossius. I stress this because Klug (1814 : 68) mentioned two similar specimens received from Rossius ('in Coll. Hoffmannsegg'; now MNHU, Berlin) which are not identical with the two syntypes of *intermedia* Spinola; they should have the ovipositor slightly shorter.

L. fuesslini. Neither of the two original specimens could be traced, but there is no doubt that it is another synonym of *L. dorsigera*, as placed by Dalla Torre (1898 : 409). Hagenbach referred also to fig. 11 in Fuessly, 1783 and refuted Klug's suspicion (1814 : 70) that it might be his *L. bifasciata.*

L. assimilis. Lectotype selected from two syntypes. The name was correctly synonymized with *L. dorsigera* by Schletterer (1890 : 186, 191), along with the following one.

L. sicelis. Three syntypes; the one bearing the correct labels and fitting the description best is selected as lectotype.

L. ligustica, as well as *L. coelogaster* Gmelin and *L. spinolae* Westwood, are replacement names for synonyms of *L. dorsigera.*

L. scutellata. The single preserved type is an extensively yellow *dorsigera*, as recognised already by Schletterer (1880 : 191).

L. vicina. The original specimen(s) could not be traced in the remnants of the Fonscolombe Collection in MNHN, Paris and the species was not in the part of the collection in Aix-en-Provence in 1850 (Schulz, 1911 : 75, 220). Fonscolombe himself regarded *vicina* as probable male sex of what he called *L. intermedia* (1832 : 274; misidentification), i.e. the present *L. dorsigera.* From reading the description I have no doubt that it was *dorsigera*, as suggested also by Berland (1934*b* : 69). *L. vicina* was overlooked by Schletterer (1890).

L. algirica. The only specimen preserved is designated as lectotype. As Schletterer assumed it is a bigger-sized *dorsigera.*

L. lepida. A couple from the original material is preserved in the MCSN, Genoa, where I designated the female as lectotype. It was presented by Chevrier to Gribodo and no other Chevrier syntypes could be traced. Schletterer (1890) synonymized *lepida* with *dorsigera*, which was confirmed by Masi (1935 : 42).

L. turkestanica. The apparently single original specimen is designated as lectotype. Schletterer (1890 : 187, 192) presumed that this might be only a form of *L. dorsigera.* Later on Shestakov (1923 : 99) regarded it as a subspecies of *dorsigera* and more recently Nikolskaya (1952 : 80) and Bouček (1956 : 250; 1959 : 436, 438, 440) accepted it as a good species. Nikolskaya (1960: figs 133, 134) shows some slight

difference from *dorsigera*, mainly in the apex of the aedeagus. I now regard all these differences as variations within the range of one species, as did Masi (1934*a* : 6).

The variation of *L. dorsigera* has been discussed by many authors but some of its more unusual forms are less known or have been mistaken for other species. For example, the southerly female specimens, mainly from Sicily, Algeria and Morocco (mostly in MNHN, Paris) are sometimes of relatively small size, 6–9 mm, with the ovipositor only just reaching the base of the gaster or hardly longer. The gaster is relatively broader and especially its apex is very broadly rounded, which gives them a rather strange appearance. I examined at least ten such specimens and some intergrades and am sure that this is only one of the forms of *L. dorsigera*.

The extent of the yellow colour is fairly variable and was described for example by Schletterer (1890 : 188–190). In the northerly specimens the yellow pattern mostly is much reduced, whilst in the southerly specimens the yellow may be predominant. In Bohemia I collected females even with the scapus completely black. Some specimens from North Africa, however, show a trend which does not seem to have been mentioned yet: the yellow turns more or less orange, as is well known in *L. gigas* Fabricius. I examined one such female from Siwa, Egypt and one male from Barca, Libya. An intermediate form was seen labelled 'Ca.Amara' but I could not locate it.

The morphology of the female and the male gaster of *L. dorsigera* was studied by Domenichini (1953 : 26–27, pl. 1, fig. 3), including the male genitalia (see also Text-figs 12–14).

BIOLOGY. Parasite of various Megachiline bees, but definite host records include until now only *Osmia adunca* (Panzer) (Grandi, 1961 : 295), *O. rufa* (Linnaeus) (= *bicornis* Linnaeus) (Schletterer, 1890 : 161), *Anthidium diadema* Latreille (Fabre, 1886 : 167) and *Anthidiellum strigatum* (Panzer) (Saunders, 1875: xvii), mostly nesting in *Phragmites* or *Arundo* stems. *L. dorsigera* was observed also examining old burrows in timber inhabited by a bee of the genus *Heriades* Spinola (Grandi, 1961 : 288).

DISTRIBUTION. Southern Europe including France, southern half of West Germany, Czechoslovakia, southern European U.S.S.R. (Moldavia, Ukraine), Daghestan and Transcaucasia, then southern Kazakhstan, Turkmenia, Uzbekistan and Tadzhikistan (Nikolskaya, 1960); then North Africa including Morocco, Algeria, Tunisia, Libya, Egypt; Turkey, Syria, Lebanon, Israel, Iraq, Iran and Afghanistan.

MATERIAL EXAMINED.

Type data given in synonymy.

Many hundreds of specimens from nearly all the countries mentioned; more significant seem to be the following. ALGERIA: Biskra; Oran; Chab't el Karkor N. of Beni-Abbès. TUNISIA: Constantine. LIBYA: Bengasi; near Barca, 27.vii.1957, 1 ♂ (*Guichard*) (BMNH). EGYPT: Siwa, 31.viii.1935, 1 ♀ (*Omer-Cooper*) (BMNH); Pyramids. SYRIA: Damascus; Ksara. LEBANON: Alci, 800 m. U.S.S.R.: Uzbekistan, Samarkand.

Leucospis bifasciata Klug

(Text-fig. 175)

Leucospis bifasciata Klug, 1814 : 70, ♀. Holotype ♀, ITALY: Genoa (MNHU, Berlin) [examined].
Leucospis gibba Klug, 1814 : 70, ♀. LECTOTYPE ♀ (here designated), U.S.S.R.: Ukraine, Crimea (MNHU, Berlin) [examined].

L. bifasciata. Klug (1814) originally stated that he had only one specimen, which I have labelled as holotype.

L. gibba was described from two females. Westwood (1839 : 255) refers to one with small yellow lateral spots on the fourth tergite as to 'var. β'; consequently I have chosen as lectotype the female without those spots.

The synonymy and variation is discussed by Bouček (1959 : 440–441, figs 13–21); some characters of the female are mentioned by Masi (1943 : 82–83). In the Crimean specimens (*gibba*), females, the first tergite is more or less raised posteriorly at the ovipositorial furrow. Most other specimens have this part rather low and correspond better to the typical *bifasciata*. I examined intermediate forms from Yugoslavia (Mostar), Daghestan and from Crete. Nikolskaya (1960) did not know of any specimens fitting *gibba* from the U.S.S.R.

The males of *bifasciata* are extremely similar to those of *L. dorsigera* Fabricius. The antenna is more distinctly clavate, flagellum rather spindle-shaped, with the segments more transverse, the second and third flagellar segments subquadrate to slightly transverse, whilst they are almost always slightly oblong in *dorsigera*; flagellum plus pedicellus combined slightly shorter than breadth of the head (slightly longer than breadth of head in *dorsigera*). In most specimens the side lobes of the lower margin of clypeus are low, whilst in *dorsigera* usually they are raised into high oblique keels converging downwards. Hind femur with relatively finer puncturation. I have seen the males of *bifasciata* only from Rhodes and Cyprus.

Also some females of *bifasciata* might be confused with *L. dorsigera*, especially with that form having a slightly shorter ovipositor. I find that even then, however, the ovipositorial furrow on the first tergite in *bifasciata* is always tapering forwards and the hind femur is relatively broader and more densely punctured.

BIOLOGY. Reared from *Anthidiellum strigatum* (Panzer) in Yugoslavia (Fahringer, 1922; specimen examined).

DISTRIBUTION. France, Italy, Yugoslavia, Albania, Greece, Bulgaria, S. Ukraine (Crimea, N. Caucasus), Transcaucasia, Turkey, Cyprus, Israel, Turkmenian S.S.R., Uzbekistan, Tadzhikistan (Nikolskaya, 1960).

MATERIAL EXAMINED.

Type data given in synonymy.

FRANCE (questioned by Berland, 1934*b* : 69): Bouches du Rhône, Port du Bouc, 1 ♀ (*A. Honoré*) (IRSNB, Brussels). ITALY: Oulx, 1 ♀ (MCSN, Genoa); Piemonte, Rosignano, 1 ♀; Venice, 1 ♀ (MCSN, Genoa); Cattolica, viii. 1959, 1 ♀ (*Grünwaldt*) (BMNH); Portici, vii. 1907, 1 ♀ (IEA, Portici). YUGOSLAVIA: Pulj district, Istria, 1917, ex *A. strigatum*, 1 ♀ (*Fahringer*) (DEI, Eberswalde); Hvar Island, vi. 1938, 1 ♀

(IEA, Portici); Mostar, 1 ♀ (*Horváth*) (TM, Budapest); Crna Gora (= Montenegro), vi. 1865, 1 ♀ (MNHN, Paris). ALBANIA: no data, 1 ♀ (MNHN, Paris), 3 ♀ (*Saunders*) (BMNH); Kopliku, 1 ♀ (MCSN, Genoa). GREECE: Attika, 1 ♀ (BMNH); Stavros, viii. 1965, 1 ♀ (*Warncke*) (BMNH); Crete, nr Heraklion, vii. 1955, 1 ♀ (*Schmidt*) (ERI, Ottawa); Candia, vi. 1925, 2 ♀ (*A. Schulz*) (MNHU, Berlin); Rhodes, Kremasti, vi. 1958, 1 ♂ (*Mavromoustakis*) (BMNH). BULGARIA: Sandanski, vii. 1966, 1 ♀ (*Kocourek*). U.S.S.R.: Daghestan, Novyj Biriuzak, vii. 1970, 1 ♀ (*Vorobiov*) (BMNH); Uzbekistan: Samarkand, Tshupan Ata, 2 ♀ (TM, Budapest). TURKEY: Sariseki nr Iskenderun, vii. 1952, 1 ♀ (*Schmidt*) (ERI, Ottawa); Antakya, v–vi. 1960, 2 ♀; Tekirdag, 24 km on Malkara-Ineçik road, viii. 1962, 1 ♀ (*Guichard & Harvey*) (BMNH). CYPRUS: Cherkes, vi–viii. 1934, 4 ♀, 5 ♂; Limassol, ix. 1936, 1 ♀ (*Mavromoustakis*) (BMNH). ISRAEL: Wadi el Kelt nr Jericho, x. 1942, 1 ♀ (*Houška*) (NM, Prague).

Leucospis obsoleta Klug

(Text-fig. 174)

Leucospis obsoleta Klug, 1834 : Dec. 4: [26], pl. 37, fig. 5, ♀. Holotype ♀, SUDAN: Ambikol (= Ambukol) (MNHU, Berlin) [examined].

Schletterer (1890 : 215–217) redescribed the species and Bouček (1959: figs 9, 10) illustrated some of its characters but until now only the holotype is known, which seems to throw some doubt on the validity of the species. I must admit that it might prove to be an extremely aberrant specimen of *L. dorsigera* Fabricius, although it may equally well be a good species. I have seen several Mediterranean specimens of *L. dorsigera* which show slightly similar teeth on the hind femur, but the femur itself was always much broader than in the type of *obsoleta*. The following is an account of some characters (partly used in the key) which might prove reliable.

♀. 6·9 mm. Colour of pale markings whitish, rather extensive, for example pronotum all broadly framed, posterior two-thirds of scutellum white, also dorsellum, but epipygium black. Hairs on face whitish. Middle tooth of clypeus shorter than side lobes. Scapus slender, fully four times as long as broad (in *dorsigera* females of about same size scapus only three times as long as broad); antenna rather slender, flagellum barely clavate. Pre-marginal carina of pronotum weak, on lateral thirds indistinct. Puncturation of thorax and of gaster relatively very coarse. Hind femur rather slender, with teeth 1·73 times, without teeth 2·15 times as long as broad (Text-fig. 174), unusually coarsely punctured (as in *L. elegans* Klug), with only 7 teeth of which three proximal ones are separated by very broad gaps. Gaster with dorsal outline subhorizontal, also ovipositor subhorizontal, reaching about anterior one-third of first tergite; this tergite with ovipositorial furrow not tapering basad.

BIOLOGY. Unknown.

DISTRIBUTION. N. Sudan.

Leucospis biguetina Jurine

(Text-figs 171, 172)

Leucospis Biguetina Jurine, 1807 : 307, pl. 13, fig. 45. LECTOTYPE ♀ (here designated), SWITZERLAND (MHN, Geneva) [examined].

Leucaspis parvicauda Mocsáry, 1879 : 119–120, ♀. LECTOTYPE ♀ (here designated), HUNGARY Budapest-Gellérthegy (TM, Budapest) [examined].

L. biguetina. The female from the original couple was labelled 'type' by Dr Ferrière and is designated as lectotype.

L. parvicauda. I examined the type-material in 1968 and can confirm that Schletterer (1890) was right when he put *parvicauda* in synonymy with *L. biguetina*. On my request Professor G. Szelényi kindly re-examined the types and designated as lectotype the one mentioned above; the paralectotype comes from Jasenova, now in Yugoslavia (cf. Mocsáry, 1877 : 120).

As mentioned elsewhere, *L. aurantiaca* Shestakov is a closely related but different species, separated from *L. biguetina* in the past mainly by the more extensive and orange markings. This might be misleading, for the colour turns orange in some species. I have seen a female of *L. biguetina* from south-eastern Iran which might be regarded as intermediate. In the latter the pale pattern is more extensive than in any other specimen I have seen, for example the hind femur, except for the teeth, is wholly yellow externally. The dorsum of the body in this specimen is slightly orange. Some Italian specimens show an orange shade on the legs again (Masi, 1934*b* : 218–219). The male (Text-fig. 171) was actually described by Spinola (1838 : 443–444) and by Masi (1935 : 38–39).

BIOLOGY. No host record known. Central European populations seem to consist of females only, reproducing parthenogenetically.

DISTRIBUTION. Southern Europe including France, Switzerland, Austria, Czechoslovakia (Bouček, 1959), S. Ukraine (Crimea, N. Caucasus), central European Russia (Pochinki S. of Gorkiy (Nikolskaya, 1960 : 200)), Turkmenia, Tadzhikistan, Transcaucasia, Turkey, Iraq, Iran, Syria, Israel, North Africa.

MATERIAL EXAMINED.

Type data given in synonymy.

SPAIN: Godellea, 1.vii.1921, 1 ♀ (MCZ, Cambridge); Algora N.E. of Guadalajara and Nuevalos nr Calatayud, vii. 1970, 2 ♀ (*Aigner*); Majorca, Palma, 1 ♀ (*A. H. Hamm*) (UM, Oxford). FRANCE: Paris, 1 ♀ (BMNH). SWITZERLAND: Sierre, Wallis, 1 ♀ (ERI, Ottawa). ITALY: Susa; Limone; Coazzo in Piemonte; Tenda in Alpi Maritime; Spotorno nr Albenga; Briga in Liguria; Camigliatello in Sila (Masi, 1934*b*), about 20 ♀ and 5 ♂ (mainly MCSN, Genoa). TURKEY: Amasya, 450 m, vi. 1959, 1 ♀; W. of Kirikkale, vi. 1960, 1 ♀; Kayseri, Erciyes Dagi, 1800 m, vi. 1962, 1 ♀ (*Guichard & Harvey*) (BMNH); Gürün and Orgüp, vi. 1970, 4 ♀, 1 ♂ (*Gusenleitner*) (BMNH). IRAN: Baluchestan, Kuh-é-Taftan, Khach, v–vi. 1938, 1 ♀ (*F. H. Brandt*) (MCZ, Cambridge).

THE *GIGAS*-GROUP

Body always non-metallic, moderately sturdy, with gaster even in males relatively broad basally, in females with ovipositor reaching the first tergite or further forwards. Pubescence of face of medium density. Lower margin of clypeus with median tooth. Pronotum fairly convex, with premarginal carina distinct, discal carina absent. Dorsellum bidentate or unarmed, convex-raised or low. Hind

coxa very broad, densely punctured, dorsal edge rounded anteriorly but strongly narrowed posteriorly, there thin, carinate to subserrate but without any tooth. Hind femur moderately stout; middle teeth the longest, parallel-sided, basal tooth small. Apex of hind tibia produced into stout spine with rudiment of outer spur on top, adtarsal margin of spine concave or subconvex.

The group is close to the *tricolor*-group and the *petiolata*-group (with its African sister-group of *L. fuelleborniana*). The *tricolor*-group differs in still sturdier body, with hind femur still plumper, hind tibia subcarinate dorso-laterally at base, ovipositor always shorter. The *petiolata*-group differs in the pronotum having a conspicuous cross-depression behind a cross-swelling connecting arcuately its anterior corners, denser pubescence on the face and a much slenderer gaster, with first tergite distinctly narrower than the rest and the ovipositor and its furrow not reaching beyond the base of the fifth tergite.

The *gigas*-group is confined to the Old World and several subgroups may be recognized, the characters of which may be summed up in the following key.

1 Clypeus strongly produced beyond level of mouth corners (Text-figs 1, 157, 158) . 2
– Clypeus hardly produced (Text-figs 183, 187) 3
2 Dorsellum distinctly bidentate; widely Mediterranean . . . only ***gigas*** Fabricius
– Dorsellum convex-conical, not bidentate; African . . . ***miniata***-subgroup
3 Dorsellum posteriorly with conspicuous carina forming or suggesting two short teeth; Mediterranean to Asiatic . . . . . ***intermedia***-subgroup
– Dorsellum not distinctly carinate, unarmed; Indo-Australian . only ***histrio*** Maindron

The *intermedia*-subgroup includes only *L. intermedia* Illiger discussed here below and *L. darjilingensis* Mani discussed with the Asiatic species (p. 172).

Leucospis gigas Fabricius

(Text-figs 1, 2, 8, 9, 176)

'Cinips (lugdunaea) nigra, . . .', Tourette, 1780 : 730–747, figs 1–4, ♀.

Leucospis gallica Villers, 1789 : 261. Proposed as valid binomen for a *'Cinips'* described by Tourette, 1780.

Cynips Lugdunaea Gmelin, 1790 : 2653. Proposed as valid binomen for a *'Cinips'* of Tourette, 1780.

Leucospis gigas Fabricius, 1793 : 245–246, ♀♂. LECTOTYPE ♀ (here designated), S. FRANCE (UZM, Copenhagen) [examined]. An alternate name (?) for *L. gallica* Villers, 1789.

Leucospis grandis Klug, 1814 : 66, ♀. Type(s), YUGOSLAVIA: (Fiume =) Rjeka (?lost).

Leucospis varia Klug, 1814 : 67, ♀. LECTOTYPE ♀ (here designated), YUGOSLAVIA: (Fiume =) Rjeka (MNHU, Berlin) [examined].

Leucospis nigricornis Walker, 1834 : 16–17, ♀. Type(s), FRANCE: near Paris (?lost).

Leucospis Shuckardi Westwood, 1834 : 214–215, '♂'. Holotype ♀, 'NORTH AMERICA' (UM, Oxford) [examined].

Leucospis rufo-notata Westwood, 1839 : 245, ♀. LECTOTYPE ♀ (here designated), ITALY: Sicily (UM, Oxford) [examined].

Leucospis Costae Schembri, 1847 : lxxxvii, ♀♂. Types, MALTA (?lost).

Leucaspis quettaensis Cameron, 1906 : 91–92, '♀'. LECTOTYPE ♂ (here designated), PAKISTAN: Quetta (BMNH) [examined]. **Syn. n.**

Leucaspis nursei Cameron, 1906 : 92–93, ♂ ♀. LECTOTYPE ♂ (here designated), PAKISTAN: Quetta (BMNH) [examined]. **Syn. n.**

Tourette (1780) was apparently the first to describe and figure this species (from Lyon, France) but he did not clearly use a binomen and thus no name for the species can be credited to him. This seems to have been evident already to Villers (1789) and to Gmelin (1790), who both independently proposed valid binominal names for Tourette's species. Another name, *L. gigas*, was proposed by Fabricius (1793), who refers not only to Tourette but also to Villers, unnecessarily replacing the validly published *L. gallica* Villers. At that time he was probably not aware of the name proposed by Gmelin and from the way in which he quotes Villers I assume that he may have had only some second-hand information and did not regard Villers' name as valid. In any case, however odd it may seem, the Fabrician name *L. gigas* has been in use ever since and the Villers and Gmelin names have been forgotten. Tourette's paper is rather rare and was not available to the reviser of the group, Schletterer, who wrongly assumed (1890 : 203), probably from Fabricius' reference, that *gigas* was the name originally used by Tourette. Thus he lessened any possible doubts about the validity of the name *gigas*, at least to those authors to whom Tourette's paper was not accessible. I propose to accept, therefore, the well-known name *L. gigas* Fabricius as valid and ask the International Commission on the Zoological Nomenclature to place it on the Official List of the Specific Names in Zoology (Bouček, 1973).

I could not trace any original material of Tourette but from his figures it is unambiguous that his species was what we understand as *L. gigas*, the form with the ovipositor not reaching the base of the first tergite. *L. gallica* and *L. lugdunaea* are names proposed for Tourette's species. Fabricius must have had at least a couple of *L. gigas*, although that male he briefly described most probably did not belong to the species, as no definite record of a male specimen is known from France. He refers to the Bosc Collection the bulk of which is in Paris, but no specimen of *gigas* is there. Dr B. Petersen found, however, one female in the Fabricius Collection in Copenhagen, which in all probability comes from the original material. I designate this female as lectotype of *gigas*.

L. grandis. The original material came from Fiume (= Rjeka). Consequently two females from the Klug collection, regarded as types cannot be accepted as such, for they come from Ragusa (= Dubrovnik). They are old and were mentioned already by Westwood (1839 : 242).

L. varia. The apparently single preserved specimen with the right data and fitting the description is designated as lectotype. The taxonomic status of this and the preceding name is discussed below. Both *varia* and *grandis* were figured as early as 1814 (pls 15, 16) by Ahrens.

L. nigricornis. No orginal material traced. It was probably returned to Paris with the rest of Laporte's material. Although I have similar doubts to those of Schletterer (1890 : 208), mainly what concerns the black head, I accept the synonymy with *gigas* proposed by him. Probably the description was not quite correct.

L. shuckardi. The single type (Westwood, 1834 : 215, 'my example of this species') is a female, as is obvious from the description of the ovipositor, although

its author stated by mistake that it was a 'mas' (= male). It is undoubtedly the same as our *L. gigas*, but Westwood gave its origin as North America, for he received it 'with various insects from that country.' Another specimen from 'North America' identified by Westwood as *shuckardi* is in the MNHU, Berlin and later I saw another female in the MNHN, Paris labelled 'New York'. In spite of this the species is not known to be established in North America and if the labels are right, the specimens must have been introduced from some Mediterranean country. *L. shuckardi* was synonymized with *gigas* by Schletterer (1890).

L. rufonotata. The apparently single preserved original specimen is designated as lectotype. Synonymized with *gigas* by Schletterer (1890), which I can confirm. Shipp (1894) refused it and unreasonably proposed synonymy with *L. miniata* Klug. See also the discussion on the variation below.

L. costae. I could not locate the type-material and doubt if it still exists. The description suggests that Schletterer was right to synonymize it with *L. gigas*.

L. quettaensis. The only original specimen available is designated as lectotype. Cameron stated that it was a female, by mistake, as may be seen from his description of the gaster. It is a slightly but extensively orange-yellow form of *L. gigas* Fabricius.

L. nursei. The original material consists of one male and two females. The male was described in more detail than the female and was labelled already by Waterston as lectotype, which is accepted and now validated. All three specimens belong to *L. gigas*, with the rich markings more or less orange-yellow (more orange on the thorax in the females but with contrasting yellow on the gaster).

Leucospis gigas has been figured many times, for example very nicely as early as 1775 by Sulzer (pl. 27, fig. 11; as '*Vespa dorsigera*') and in 1783 by Fuessly (figs 1–10; as '*Leucospis dorsigera*' [misidentification]). It is a well-known species, although there has been some controversy regarding its forms and the eventual usage of special names for them. Within the family we have here the best known example of the existence of two, in most cases strikingly different, yellow-marked and orange-marked forms, apart from the variation of the extent of the markings, in some cases in connection with the variation of the length of the ovipositor, and the absence of the males in most European populations.

A separation of the orange-marked form (*L. rufonotata* Westwood) from the yellow-marked form on morphological characters proved impossible. The orange colour was once believed to be due to killing by cyanide, which was soon refuted by those who could observe the specimens alive (e.g. Schletterer, 1890 : 159; Schulz, 1905 : 18, 20). The reason for the different colour has not yet been explained. The orange-marked specimens (the male described for example by Masi, 1949 : 91–92) come from a broad belt along the southern line of the distribution area of *L. gigas*, mainly from North Africa (but also Sicily, Malta, some Greek islands) through the Near East and Transcaucasia to Kirghizia (Nikolskaya, 1960), and Iran to north-west Pakistan; a single specimen is known to me from China. The phenomenon seems to have something to do with the temperature or arid conditions of the mentioned regions. Another interesting point was raised by Bytinski-Salz (1963) who found that in Israel the two forms not only seem to be geographically separated

(allopatric) but also that the yellow form is represented only by females, whilst the generally more southern orange form occurs in both sexes. He mentions the brightly orange-coloured females from North Africa where the males usually are paler-coloured, more or less yellowish. This agrees with my findings, but I can add that I have seen also a few males of the yellow form ('typical *gigas*') from the Dalmatian island of Hvar, from Corfu and Penteli (near Athens) in Greece and from the Samarkand district in Uzbekistan. In several cases I have seen both forms from the same locality, as found by Nikolskaya (1960 : 206; Transcaucasia), who described also some other aspects of the variation, including intermediates between the two forms.

The extent of the pale markings is also fairly variable and Klug (1814) based on it, combined with the length of the ovipositor, his *L. grandis* and *L. varia*. In the former, which agrees with the lectotype of *gigas*, the ovipositor generally reaches the base of the first tergite and the pronotum is broadly bordered with yellow also laterally. In his *L. varia* the ovipositor usually does not reach beyond the middle of the first tergite and the pronotum is yellow only anteriorly and posteriorly. Both forms came from the same locality (Rjeka) and because Mader found similar populations on the near island of Krk and other places of the eastern Adriatic coast, he tried (1936 : 289–290) to resuscitate the two Klug names from synonymy, separating also what he regarded as the true *L. gigas* on the colour characters as a third species. I have seen part of his material and can understand his point but cannot agree that these forms are different species. I know many intermediate specimens but the differences between the populations in the same locality can be explained by two or three different hosts, which might account at least for the length of the ovipositor, probably also for certain pattern of the markings. In my opinion they cannot even be called host races.

There is another puzzling feature to which I want to draw the attention of the reader. The hind femur in *L. gigas* is very densely punctured in almost all specimens, except in two from Uzbekistan, a male from Ak-Tash near Tashkent and a female from Aman-Kutan near Samarkand (vi. 1959, *J. Niedl*; Text-fig. 176). The interspaces are shiny, conspicuous, about half as broad as the punctures and also the puncturation of the gaster is equally less dense. Otherwise I cannot find any character which would suggest a separation on the specific level, but they may represent a distinct subspecies.

The variability of *L. gigas* was discussed also by Schletterer (1890), Masi (1935 : 39; 1949 : 91–92) and Nikolskaya (1960).

L. gigas is closely related to *L. intermedia* Illiger and the difference between them is discussed for example by Masi (1935 : 40–41). The superficial resemblance of the orange form led Shipp (1894) to his erroneous synonymization of *L. miniata* Klug with *L. rufonotata* Westwood, which was rightly refuted for example by Masi (1935 : 39) and Mader (1937 : 161). *L. miniata* mainly differs by the characters of the dorsellum and propodeum.

Biology. Parasite of (mainly) Megachiline bees, e.g. *Chalicodoma muraria* (Retzius) (Giraud & Laboulbène, 1877 : 418; Fabre, 1886 : 155 etc), *C. pyrenaica* Lepeletier, *Osmia rufa* (Linnaeus) (both: Fahringer, 1922 : 43, 47), *Osmia* sp.

('*coerulea*', i.e. probably *coerulescens* Linnaeus) (Schletterer, 1890 : 161), *Anthophora garrula* (Rossius) (Fahringer, 1922 : 43, 47). In France (Charente) *L. gigas* was reared along with the parasitic bee *Coelioxys quadridentatus* (Linnaeus) (MNHN, Paris). There is also a rather doubtful record of *Vespula vulgaris* (Linnaeus) (Rondani, 1873 : 231).

The development and behaviour were described and the egg and larva figured by Fabre (1886). Berland (1934*a*) drew attention to the fact that the European populations lack males, which he termed as geographical parthenogenesy. Bytinski-Salz (1963) suggested that in Israel the yellow-black form is mostly parthenogenetic and geographically separated from the southerly (and North African) orange-coloured form in which both sexes normally occur. Since that time single males were found also in Greece and some Dalmatian islands (as already mentioned), but not more northerly.

DISTRIBUTION. Southern Europe up to central France (Berland, 1934*b*), Vienna, North Africa including Morocco, Algeria, Tunisia, Lybia, Egypt, then Israel, Turkey, Iran, Afghanistan, Pakistan, Turkmenian S.S.R., Uzbekistan, Tadzhikistan, N. China (cf. also Nikolskaya, 1960).

MATERIAL EXAMINED.

Type data given in synonymy.

Apart from the material mentioned in earlier papers (Bouček, 1956 : 251; 1959 : 442–443) and considerable further material, mainly from southern Europe, only the following more interesting data are noted. MOROCCO: Timhadit Region, Atlas Mts (BMNH). ALGERIA: Lambeze (MRAC, Tervuren); Laghouat (IRSNB, Brussels); Boghari; Rocher Blanc; Mascara; Oran (MNHN, Paris); El Guerrah (BMNH). TUNISIA: Gafsa, Djebel Atia, Le Kef (MNHN, Paris; NM, Vienna; MRAC, Tervuren). LYBIA: Leptis Magna nr Tripoli; Merg; Benghasi District; Tobruk (BMNH; EI, Zurich). EGYPT: Aswan (BMNH). U.S.S.R.: Turkmenistan, Krasnovodsk, 3 ♀, 1 ♂ of mainly orange form (RNH, Leiden). CHINA: Peking, 1 ♀ (*C. F. Wu*) (BMNH).

Leucospis intermedia Illiger

(Text-fig. 187)

[*Leucospis dorsigera* Fabricius sensu Rossius, 1790 : 80. Material, ITALY (?lost). Misidentification.]

[*Leucospis dorsigera* Fabricius sensu Panzer, 1794 : 15, pl. 17, ♀. Material, SOUTH EUROPE (?lost). Misidentification.]

Leucospis intermedia Illiger, 1807 : 130. [Based on Panzer's figure (1794 : pl. 17) of a female that has been lost.]

Leucospis aculeata Klug, 1814 : 68, ♀. LECTOTYPE ♀ (here designated), U.S.S.R.: S. Ukraine; Crimea (= Tauria) (MNHU, Berlin) [examined].

Leucospis frenata Klug, 1834, Dec. 4 : [25], pl. 37, figs 2, 3, ♀ ♂. LECTOTYPE ♀ (here designated), EGYPT (MNHU, Berlin) [examined].

Leucospis hoplophora Förster, 1851 : 17–18, ♀. Type(s), 'S. EUROPE' (?lost). **Syn. n.**

Leucospis sardoa Costa, 1884 : 35, 57, ♀. LECTOTYPE ♀ (here designated), ITALY: Sardinia, Oristano (IZU, Naples) [examined].

Leucospis sardoa var. *minor* Costa, 1884 : 35, 57, ♀. Holotype ♀, ITALY: Sardinia, Fonni (IZU, Naples) [examined]. **Syn. n.**

With all probability, apart from Rossius' description mentioning the maculate frons, the only reference, with a nice figure, on which Illiger actually based his *L. intermedia*, is Panzer's *L. dorsigera*, female, all the other references probably repeating only the two (see Illiger, 1807 : 130). I could not, however, trace the original material of Rossius, nor that of Panzer, which seems to be lost. Also there cannot be any original material of Illiger, who simply described what he read in Rossius' description and saw in Panzer's figure. In any case it is quite certain that he meant the present species.

L. aculeata. I selected the lectotype from two syntypes in the MNHU, Berlin. The name was correctly put in synonymy with *L. intermedia* by Schletterer (1890).

L. frenata. The lectotype selected from three syntypic females and one male preserved in the MNHU, Berlin; another syntype (possibly two; the second not labelled and in very bad condition) in the Westwood collection in UM, Oxford. The lectotype is the same specimen on the basis of the study of which *L. frenata* was synonymized with *intermedia* by Bouček (1959 : 443).

L. hoplophora. No type-material could be traced (it was probably lost), but the description leaves no doubt that it was the same species as *L. intermedia.* Förster actually compared his species with *intermedia*, but believed it different, on colour characters of the mesoscutum and hind coxae, which are known as variable nowadays. Omitted by Schletterer (1890).

L. sardoa and var. *minor.* Lectotype chosen from two original specimens of *sardoa.* The variety *minor* is a small female of only 6·2 mm in length, of the same species. *L. sardoa* was synonymized with *intermedia* already by Schletterer (1890 : 196, 199), but the variety was not mentioned. The latter was misquoted by Dalla Torre (1898 : 412) as coming from 'Scandin.' (Scandinavia).

This is a well know species, redescribed and commented on by Schletterer (1890 : 195–200), later on for example by Bouček (1959 : 437, 443) and Nikolskaya (1960 : 202–204). The yellow colour may turn slightly orange in some North African specimens (e.g. Benghasi).

BIOLOGY. The only host record of the bee *Osmia emarginata* Lepeletier goes back to Giraud (1858 : 441) but was repeated by several subsequent authors.

DISTRIBUTION. Southern Europe (including S. France, S. Switzerland, Austria, S. Czechoslovakia, Moldavian S.S.R., S. Ukraine), Algeria, Lybia, Egypt, Israel (Bouček, 1956 : 250), Lebanon, Turkey, Iran, Transcaucasia, Turkmenian S.S.R., Uzbekistan, Tadzhikistan (Nikolskaya, 1960 : 204), N. Afghanistan.

MATERIAL EXAMINED.

Type data given in synonymy.

Since the species is well known and often mentioned in faunistic papers only the following more interesting localities are noted. LYBIA: Benghasi (MCSN,

Genoa); Sabratha nr Tripoli (*Guichard*) (BMNH). EGYPT: Pyramids (MCSN, Genoa); without data (RNH, Leiden). LEBANON: Becharré, 1400 m (NM, Vienna).

The Asiatic and Australian species

The area covered by this part of the revision ranges from Asia Minor to the Society Islands in Polynesia, including Siberia, Japan and Australia. The Palaearctic (mainly East Mediterranean) species are included in the key but they are discussed elsewhere (pp. 140–155), except those which are known only from the Asiatic countries.

Altogether 40 species are discussed. They are classified as follows: *L. regalis* as species sola, then the *gigas*-group (only *L. histrio* and *L. darjilingensis*), the *petiolata*-group, the *elegans*-group, the *australis*-group, the *dorsigera*-group (only *L. japonica, L. yasumatsui* and *L. aurantiaca*), the *pediculata*-group, the *aruina*-group and *L. antiqua* as species sola. The *australis*-group is confined to Australia (but not the only one to contain Australian species); *L. regalis, L. antiqua,* the *pediculata*-group and the *aruina*-group are known only from the Indo-Australian region (and some Pacific islands). The *elegans*-group is well represented also in Africa and in the Mediterranean subregion, as well as the *gigas*-group which is, however, poorer in species.

KEY TO THE ASIATIC AND AUSTRALIAN SPECIES OF *LEUCOSPIS*

1 Body including legs very vividly metallic, mainly violaceous, sides greenish, vertex sometimes golden; dorsally fairly shiny; pronotum in front of sharp premarginal carina transversely depressed; teeth of hind femur (Text-fig. 177) not long but the first shorter than middle teeth; hind coxa smooth in depression, with slender dorsal tooth . . . . . ***regalis*** Westwood (p. 162)

– Body not vividly metallic; if tinged with fairly bright metallic colour, then pronotum otherwise and hind femur with basal tooth the strongest and hind coxa otherwise. 2

2 Hind femur with three to four long slender teeth (apart from fused distal teeth) but basal tooth usually smaller than following teeth (Text-figs 179, 182, 190, 193); pronotum without discal cross-carina; body non-metallic; apex of hind tibia obliquely produced into a spine 3

– Hind femur with many small teeth, basal tooth stronger and broader than any of the following or, if about as large, pronotum with conspicuous discal carina; body sometimes with metallic tinge; apex of hind tibia truncate or produced into a spine 13

3 Frons partly yellow or, if black (♂ *gigas*), dorsellum bidentate; dorsal edge of hind coxa posteriorly thin but without tooth; pronotum in front of premarginal carina not depressed or very weakly so; ovipositor reaching at least to apex of first tergite (*gigas*), this tergite dorsally with single or double ovipositorial furrow; in ♂ gaster barely constricted subbasally, hind margin of first tergite broadly emarginate 4

– Frons without yellow; dorsellum posteriorly always rounded; hind coxa dorso-posteriorly not thin, often with a low tooth; pronotum in front of premarginal carina distinctly transversely depressed; ovipositor reaching at most to base of fifth tergite; gaster in ♂ subbasally constricted, hind margin of first tergite straight 7

4 Hind margin of dorsellum rounded; depression of hind coxa medio-posteriorly with impunctate area, puncturation above rather sparse; first tergite in ♀ with two broad ovipositorial furrows diverging forward and separated anteriorly by broad coarsely punctured ridge; India to Queensland . . . ***histrio*** Maindron (p. 164)

– Hind margin of dorsellum emarginate or bidentate; hind coxa usually without distinct impunctate area, puncturation in depression dense, only in its upper part interspaces sometimes as broad as punctures; first tergite in ♀ with smooth parallel-sided ovipositorial furrow which may be subdivided by blunt median keel but this is not punctured; south-west Asia to India 5

5 Hind femur externally very finely punctured; dorsellum posteriorly slightly emarginate; in ♀ first tergite with narrow and strongly converging yellow streaks (Text-fig. 181) . . . . . ***darjilingensis*** Mani (p. 172)

– Hind femur coarsely punctured; dorsellum distinctly bidentate; first tergite in ♀ broadly yellow laterad of ovipositorial furrow 6

6 In ♀ flagellar segments 2–4 subquadrate, in ♂ subtransverse; face short (Text-fig. 187), lower margin of clypeus only slightly produced; ovipositor reaching to base of gaster or further forward; body smaller, up to 13 mm . ***intermedia*** Illiger (p. 153)

– Flagellar segments 2–4 in both sexes distinctly longer than broad or the fifth sometimes subquadrate in ♂; face longer (Text-fig. 1), lower margin of clypeus conspicuously produced and raised, strongly bilobed; ovipositor generally shorter, often not reaching base of gaster; body up to 15 mm . ***gigas*** Fabricius (p. 149)

7 Interocellar area traversed by high ridge parallel to occipital carina and highest between lateral and median ocellus, ocelli unusually small (Text-figs 185, 186), set very deep, lateral ocellus at least 1·8 times its diameter from median ocellus, this separated from scrobes by transverse striae; mesoscutum in posterior two-thirds more shallowly, coarsely and less densely punctured than anteriorly; gaster red except apically; Philippines. 8

– Interocellar area not unusually raised, ocelli not very small, not set deep, the lateral hardly more than its diameter from median ocellus; mesoscutum and gaster often otherwise 9

8 7 mm; sculpture on mesoscutum posteriorly only slightly obliterated; scrobal margin in front of median ocellus not conspicuous, merging with transverse striae; apical processus of stigmal vein less than half as long as uncus, wings weakly infumate . . . . . ***pulchella*** Crawford (p. 180)

– More than 12 mm; sculpture on mesoscutum posteriorly considerably obliterated; scrobal margin sharply carinate in front of ocellus; apical processus of stigmal vein more than half as long as uncus, wings dark brownish ***banksi*** Weld (p. 180)

9 Gaster in both sexes dorsally sparsely punctured (Text-fig. 192), interspaces on broadest part mostly broader than punctures; body mainly black, wings dark violaceous; tooth of hind coxa conspicuous, upper part of depression and dorsal edge of coxa mostly without punctures (Text-fig. 193); mesoscutum in posterior two-thirds usually much more shallowly and less densely punctured than anteriorly, punctures usually transversely confluent 10

– Gaster densely punctured, interspaces never broader than punctures, but if relatively broad and coxa as in alternate, then wings much paler and body with yellow markings 11

10 Pilosity of body blackish, short, propodeum laterally with greyish hairs; hind femur and tibia externally rather sparsely punctured; puncturation on mesoscutum posteriorly partly effaced, on first tergite in ♀ with broad interspaces but with median smooth streak rather reduced (Text-fig. 192); pale markings absent or at least poorer than in alternate, absent (?always) on hind femur; Solomons, New South Wales . . . . . ***nigerrima*** Kohl (p. 181)

– Pilosity mainly whitish, only on vertex and thoracic dorsum partly dark, on propodeum laterally very conspicuous, white, much longer than length of spiracle;

hind femur and tibia externally densely and rather finely punctured, puncturation on mesoscutum distinctly deeper than in alternate, on first tergite in ♀ less sparse but leaving a broad median streak impunctate; white markings: scapus beneath, two pronotal lines, apex of propodeum, two points postero-laterally on first tergite and ventro-basal and dorso-apical streaks on hind femur; New Britain, New Ireland . . . . . ***buchi*** Hedqvist (p. 181)

11 Body, except the dark brown or black head, with rich orange-yellow and reddish markings, pronotum mainly yellow except for median transverse spot, hind femur broadly yellow at base and below dorsal edge, first tergite extensively yellow posteriorly; Australia. . . . . ***atriceps*** (Girault) (p. 178)

– Body less extensively pale-marked; mostly more northerly 12

12 Malar space 0·17–0·19 the length of eye (Text-fig. 188), about as long as breadth of second flagellar segment; hind coxa in depression extensively punctured, dorsal edge externally often with distinct sublamellate tooth; hind femur moderately coarsely and not very densely punctured, yellow colour forming (mostly) separated broad streaks ventro-basally and dorso-apically; in ♂ broad part of gaster with two yellow bands, the anterior broader; China to Japan . ***sinensis*** Walker (p. 179)

– Malar space 0·22–0·30 the length of eye, at least 1·2 times as long as breadth of second flagellar segment (Text-fig. 189); hind coxa in depression dorso-posteriorly more or less smooth, tooth often indistinct; hind femur densely finely punctured; yellow or whitish markings usually more reduced than in alternate; from India and Philippines to Queensland . . . . . ***petiolata*** Fabricius (p. 174)

13 Hind femur behind basal tooth with more or less irregular, often not very small teeth (Text-figs 212, 219); apex of hind tibia truncate or acuminate 14

– Hind femur behind basal tooth with a comb of very minute regular teeth (Text-figs 225, 233); hind tibia not produced into a spine 27

14 Pronotum: discal carina absent or weak and if conspicuous, it is never unusually raised, nor its margin directed backwards; even premarginal carina sometimes weak 15

Note: species with medium discal carina may be run both ways.

– Discal carina of pronotum high and, even if short, subangulately raised, with margin highest in the middle and directed backwards (Text-figs 194, 198); premarginal and marginal carinae also high, very conspicuous 36

15 Hind coxa dorsally with distinct tooth, below the tooth densely punctured; dorsellum bidentate; ovipositor reaching base of gaster or nearly; Australia. . 16

– Hind coxa without distinct dorsal tooth or, if a tooth indicated, the area just below extensively smooth; dorsellum not distinctly bidentate, except in some Palaearctic (Mediterranean) species; ovipositor often shorter; mostly non-Australian (exceptions: *L. girault*i, *L. aruina*) 19

16 Scutellum at median line with extremely fine puncturation, dull, but laterally coarsely punctured; dark parts of body bright metallic green, red or blue ***morawitzi*** Schletterer (p. 190)

– Scutellum medially nearly as coarsely punctured as laterally; body often non-metallic 17

17 Pale markings red-orange; spots on scutellum, if large, broadly connected (sometimes absent); pronotum with transverse spot or band anteriorly; first flagellar segment very narrow basally and much longer than pedicel; dorsellum with short teeth; first tergite in ♀ dorsally with two broad diverging ovipositorial furrows which are densely punctured on bottom; in ♂ median carina of propodeum raised into high tooth . . . . . ***australis*** Walker (p. 193)

– Pale markings at least in part yellowish orange or ochreous; pronotum posteriorly with broad band produced forward medially and laterally; scutellum with two elongate and usually separated maculae; first flagellar segment at most 1·3 times as long as pedicel; teeth of dorsellum sharp; first tergite in ♀ with one median

smooth ovipositorial furrow; in ♂ median carina of propodeum only moderately raised in middle 18

18 Darker parts of body bright metallic (as in *morawitzi*); dorsal tooth of hind coxa broad, rounded; ovipositorial furrow on first tergite in ♀ distinctly expanded anteriorly . . . . . ***rieki*** nom. n. (p. 191)

– Body non-metallic; tooth of hind coxa usually sharp; ovipositorial furrow on first tergite hardly broadening anteriorly . . . . . ***bioculata*** sp. n. (p. 192)

19 Hind tibia ending with a spine which bears on top rudimentary outer spur (Text-figs 170, 220); hind coxa broad, densely punctured, dorsal edge posteriorly thin, sharp, subserrate (Text-fig. 172); ovipositor subhorizontal, reaching at least to base of fifth tergite, often longer; northerly or Palaearctic species 20

– Hind tibia apically truncate, with distinctly separated outer spur (Text-figs 222, 225, 233); hind coxa usually more slender, in any case dorsal edge broad, flat or rounded, usually not forming posteriorly a thin crest (Text-figs 228, 231, 235; exception: *L. micrura*, Text-fig. 236); ovipositor oblique, never quite reaching base of fifth tergite; Indo-Australian species 25

20 Hind femur basally with lunate cross-band (Text-fig. 219); dorsellum short, on each side with diverging dorsal carina; hind coxa rather narrow; apex of hind tibia with distinct spine; discal carina on pronotum usually not indicated; ovipositor reaching thorax, first tergite in ♀ with double furrow subdivided by smooth ridge which is anteriorly much broader than each branch of furrow; N. India to Japan ***japonica*** Walker (p. 194)

– Hind femur either more extensively yellow or basal spot not crossing to dorsal edge; dorsellum bidentate or at least with high and less regular carina; hind coxa broader (Text-fig. 172), apex of hind tibia less produced; discal carina on pronotum absent or present; ovipositor sometimes shorter, first tergite in ♀ otherwise 21

21 Pronotum without discal carina; dorsellum distinctly bidentate; ♀ gaster notably inflated, ovipositor reaching only to base of fifth tergite, first tergite without ovipositorial furrow 22

– Pronotum with distinct discal carina, usually embedded in black colour; dorsellum subbidentate; ovipositor reaching at least posterior part of first tergite, this in ♀ with distinct ovipositorial furrow 23

22 West Palaearctic; pale markings yellow; thorax and gaster densely punctured, hind coxa in depression and first tergite medially almost without interspaces, hind femur with very narrow ones; in ♀ fourth tergite in middle distinctly less than half as long as first tergite (up to 0·4 : 1); sheaths of ovipositor slightly longer than hind tibia . . . . . ***biguetina*** Jurine (p. 147)

– North Chinese; markings pale orange; body, in particular the gaster, sparsely punctured; first tergite with smooth median streak, submedially with interspaces almost as broad as punctures; hind coxa extensively smooth in depression, hind femur with interspaces nearly as broad as punctures; in ♀ fourth tergite in middle distinctly longer than half (about 0·6) of first tergite; sheaths slightly shorter than hind tibia . . . . . ***aurantiaca*** Shestakov (p. 196)

23 First tergite in ♀ with ovipositorial furrow strongly tapering forwards, ovipositor reaching at most to hind third of first tergite; in ♂ lobes of clypeus very low, rounded, their outer margins rugulose, hardly raised; basal flagellar segments subquadrate or slightly transverse; hind femur generally broader than in alternate, at most 1·6 times as long as broad (Text-fig. 175) . ***bifasciata*** Klug (p. 146)

– First tergite in ♀ with furrow not narrowed anteriorly, ovipositor reaching at least middle of first tergite (usually reaching thorax); in ♂ side lobes of clypeus triangular, outer margins distinctly raised, usually lamellate and converging at angle less than 120 degrees; basal flagellar segments usually distinctly longer than broad; hind femur slenderer 24

24 Hind femur shiny, interspaces at least as broad as punctures, often extensively yellow (Text-fig. 173); West Palaearctic . . . ***dorsigera*** Fabricius (p. 142)

– Hind femur dull, densely punctured, interspaces distinctly narrower than punctures (Habu, 1961 : 84, fig. 12); yellow colour strongly reduced; N. China ***yasumatsui*** Habu (p. 196)

25 Hind coxa dorsally rounded and hardly more than one-third as broad as concave dorso-lateral depression; body non-metallic; pubescence on face silvery; dorsal edge of fore tibia carinate; hind basitarsus dorsally much longer than fifth tarsal segment; fore wing with darker apical spot 26

– Hind coxa with broad flat or weakly convex hairy dorsal side which is at least half as broad as the flat dorso-lateral face (depression); body usually with metallic tint; pubescence on face usually yellowish; dorsal edge of fore tibia often rounded; hind basitarsus dorsally barely longer than fifth tarsal segment; fore wing nearly uniformly infumate, without apical spot 34

26 Hind femur with small teeth unusually minute, regular, comb-like (Text-figs 225, 233) 27

– Hind femur with irregular teeth behind the basal one (Text-figs 222, 235, 236). . 31

27 Lateral ocellus in both sexes virtually one diameter from eye; ovipositor about 1·3 times as long as hind tibia and its furrow virtually reaching base of fifth tergite (Text-fig. 227); Philippines . . . . . ***williamsi*** sp. n. (p. 199)

– Lateral ocellus at least 1·3 times its diameter from eye; ovipositor only slightly longer than hind tibia, or shorter, its furrow not nearly reaching base of fifth tergite (Text-fig. 229) 28

28 Ovipositor less than half as long as hind tibia, directed obliquely dorso-caudad (Text-fig. 234); median ocellus in both sexes more than half diameter from scrobal margin; dorsellum usually subbidentate but hind margin not distinctly carinate; India . . . . . ***pyriformis*** (Weld) (p. 202)

– Ovipositor about as long as hind tibia, directed obliquely forwards (Text-figs 229, 232); median ocellus much nearer to scrobes than in alternate; dorsellum posteriorly carinate, bidentate 29

29 Premarginal carina of pronotum weak, not sharp; ovipositor slightly longer than hind tibia, its furrow on fifth tergite about twice as long as the ungrooved part of tergite; hind coxa in lateral view at least 1·35 times as long as high (Text-fig. 228); Java . . . . . ***calligastri*** (Ferrière) (p. 200)

– Premarginal carina of pronotum sharp, distinct, although embedded in yellow band; ovipositor only about as long as hind tibia and its furrow at most 1·5 times as long as the basal ungrooved part of tergite; hind coxa about 1·2 times as long as high (Text-fig. 231) 30

30 Dense hairs on face (apart from scattered longer hairs) thin and short, not much longer than hairs laterally on eyes; ovipositor reaching above yellow cross-band on fifth tergite and this place strongly convex (Text-fig. 230); pubescence of body shorter, puncturation less dense; Malaysia, W. Indonesia ***pediculata*** Guérin-Méneville (p. 201)

– Pubescence on face appearing much longer, mainly owing to abundant longer hairs; ovipositor not exceeding yellow band, gaster shorter and less convex at tip of ovipositor (Text-fig. 232); pubescence of body longer, denser, puncturation also slightly denser than in alternate; north-east Australia ***giraulti*** nom. n. (p. 201)

31 Hind coxa in depression extensively smooth; in ♀ subvertical ovipositor only half as long as hind tibia (Text-fig. 235), gaster petiolate, shortly ovoid posterior part covered dorsally with fifth tergite, its ovipositorial furrow confined to vertical posterior part . . . . . ***globigera*** sp. n. (p. 202)

– Hind coxa in depression punctured; in ♀ ovipositor much longer, its furrow extending over more than two-thirds of dorsal surface of fifth tergite. 32

32 Hind femur (? always) red with yellow dorsal streak and dark teeth; ovipositorial

furrow of fifth tergite (and sheaths) about twice as long as ungrooved base of tergite . . . . . ***micrura*** Schletterer (p. 204)

– Hind femur mainly black with dorsal and ventral yellow streaks; ovipositorial furrow longer than in alternate 33

33 Ovipositor (and its furrow) about five times as long as ungrooved base of fifth tergite, distinctly longer than hind tibia; yellow band of fifth tergite in ♀ near hind margin; sides of mesoscutum often without yellow; in ♂ first tergite subglobose, with convex sides, hardly longer than broad . ***maculata*** Weld (p. 198)

– Ovipositor (and its furrow) hardly four times as long as ungrooved part of fifth tergite, hardly longer than hind tibia; yellow band of fifth tergite in ♀ removed from apex, intersecting ovipositorial furrow in about its middle; in ♂ first tergite conspicuously longer than broad, its sides subparallel . ***bakeri*** Crawford (p. 198)

34 Hind coxa ventro-basally smooth, further on sparsely finely punctured (Text-fig. 241); hind femur fairly broad, densely punctured; fore tibia flattened, with distinct dorsal carina; Solomon Islands . . . . ***niticoxa*** sp. n. (p. 207)

– Hind coxa beneath regularly punctured, without smooth area; hind femur more slender than above; fore tibia not flattened, its dorsal edge rounded . . . 35

35 Hind femur very slender (Text-fig. 237); body black with bluish tinge and contrasting lemon-yellow markings; propodeum without distinct median or submedian ridges; ♂ unknown . . . . . ***sedlaceki*** sp. n. (p. 206)

– Hind femur less slender (Text-fig. 239); body often extensively reddish, bluish tint then confined to black parts; propodeum with distinct median and two submedian keels which are sometimes very high, particularly in ♂ ***aruina*** Walker (p. 205)

36 Hind femur unusually slender (Text-fig. 240); dorsellum flat, shiny, apex excised; apex of hind tibia truncate, outer spur conspicuous; body slender, bluish, gaster in middle abruptly inflated, posteriorly in ♀ depressed, ovipositor not quite reaching base of fifth tergite . . . . . ***antiqua*** Walker (p. 208)

– Hind femur much broader; dorsellum otherwise, not shiny; hind tibia apically produced into a spine, with rudiment of outer spur on its apex; body often otherwise 37

37 Mesoscutum dull, deeply regularly punctured, interspaces not confluent into transverse rugae; wings often paler-coloured or, if blackish, then at least face with thick silvery pubescence; body often with rich pale markings . . . 38

– Mesoscutum more or less shiny (exception: *funerea*), with puncturation often rather shallow and with interspaces always raised into distinct cross-rugae; fore wing more or less blackish, often with violaceous tint; body often black or with poor markings 46

38 Discal carina of pronotum, as well as premarginal carina, regularly slightly arched, space in front and behind carina about at same level; northerly and Palaearctic cf. 20

– Discal (as well as premarginal) carina medially subangulately raised, forming top of a slope declining forward whilst space behind carina is low, nearly hollow in side view (Text-fig. 206) 39

39 West Palaearctic; hind femur yellow except dorso-basally; ovipositor short, not reaching base of fifth tergite; in ♂ gaster strongly clavate (Text-fig. 169), narrow basal part less than half as broad as apex . . ***brevicauda*** Fabricius (p. 141)

– Otherwise; hind femur, if extensively yellow, not dark dorso-basally; ovipositor always longer and in ♂ gaster less narrowed basally 40

40 Westerly (to India); wings pale yellowish, body with rich yellow pattern: pronotum, scutellum, hind femur and first tergite mainly yellow; ovipositor not reaching middle of first tergite on which ovipositorial furrow does not reach base; hind femur very coarsely and in ♀ densely punctured (Text-fig. 130) . ***elegans*** Klug (p. 114)

– Oriental, i.e. Indian and more easterly species; wings and colour otherwise; ovi-

positor longer, its furrow on first tergite (♀) nearly or just reaching base; hind femur less densely and less coarsely punctured 41

41 Antenna in ♀ short, second flagellar segment slightly, following ones more apparently transverse; whitish are: scapus beneath, a band on pronotum, lateral margins of mesoscutum, spots on scutellum, metapleurum, hind coxa at base and on dorsal edge, hind tibia dorsally (Text-fig. 196); wings subhyaline; India
bombayensis Mani (p. 183)

– Antenna in ♀ longer, flagellar segments 2–5 longer than broad; body often with different pattern and bigger; wings more distinctly infumate 42

42 Hind femur very coarsely and sparsely punctured, relatively slender (Text-fig. 210); pronotum with arcuate yellow band connecting anterior corners and discal carina, interspaces of punctures sublaterally conspicuous, smooth; scutellum with yellow band posteriorly, mesoscutum with lateral bands and often with 2 spots anteriorly; first tergite dorsally nearly as coarsely punctured as scutellum
malaica Schletterer (p. 183)

– Hind femur much less coarsely and more densely punctured, relatively broader (Text-figs 195, 201); yellow pattern different, pronotum with less distinct interspaces; first tergite less coarsely punctured 43

43 Body with conspicuous white pilosity which is particularly dense and long dorsally on first tergite in ♀ (Text-fig. 194), in some views covering surface, posteriorly on gaster consisting of longer and shorter hairs; in both sexes frons with extremely dense silvery hairs; first tergite in ♀ anteriorly steeply raised, ovipositorial furrow narrowing anteriorly; wings dark, with violaceous tinge; pale pattern very variable
guzeratensis Westwood (p. 182)

– Body less conspicuously pubescent, first tergite in ♀ with much shorter hairs and less raised anteriorly, ovipositorial furrow hardly narrowed; gaster posteriorly with simple pilosity; wings often otherwise 44

44 Hind femur basally with lunate yellow band (Text-fig. 201; as in *japonica*); wings very dark, violaceous; first tergite densely coarsely punctured, carinate margin of ovipositorial furrow anteriorly rather low; deep fovea at anterior edge of mesopleura below prepectus 6–7 times as long as broad; femora mainly black
femoricincta sp. n. (p. 184)

– Hind femur only ventro-basally yellow; wings brownish, without conspicuous violaceous tint; first tergite much less coarsely although densely punctured, margins of ovipositorial furrow anteriorly unusually raised; deep fovea below prepectus broader, shorter; mid femur bright red but fore and hind femur mainly black 45

45 Fore wing with distinct darker macula at apex; transverse spot on pronotum linear, narrow (Text-fig. 206); reflexed part of epipygium in ♀ in dorsal view longer than fifth tergite medially, this tergite black or with narrow yellow band; body at least 10·5 mm . . . . . ***robusta*** Weld (p. 185)

– Fore wing nearly regularly infumate; transverse spot on pronotum angulately produced forward, posteriorly emarginate; epipygium of ♀ in dorsal view about as long as fifth tergite medially, this tergite with broader band; 9 mm
procera Schletterer (p. 186)

46 Gaster (in ♀) bright red; pronotum anteriorly with 2 small yellow lines converging forward; ocelli unusually small, set deep below interocellar and occipital carinae (Text-fig. 200); hind coxa in depression densely punctured (Text-fig. 199); wings dark violaceous; Philippines . . . . . ***ventricosa*** sp. n. (p. 188)

– Gaster black, sometimes with poor yellowish pattern; pronotal spots otherwise or missing; ocelli not unusually small, although sometimes deep below carinae; hind coxa in depression often partly impunctate; wings sometimes otherwise . 47

47 Thin pubescence of body blackish, very short, inconspicuous, on face greyish to whitish; body shiny black, wings dark violaceous; interspaces on first tergite in

both sexes (except at hind margin) several times as broad as punctures; New Guinea to Solomons . . . . . ***violaceipennis*** Strand (p. 189)

– Pubescence at least on thorax and hind coxae whitish, more conspicuous; body sometimes with spots on pronotum, scutellum and hind legs or even on gaster; interspaces of punctures often narrower 48

48 Thorax at least on mesoscutum slightly shiny, puncturation less dense, pronotum with distinct interstices, first tergite with interspaces at least as broad as punctures; ovipositor reaching thorax; body often with pale spots on pronotum, scutellum, hind femur and gaster (mainly fifth tergite); New Guinea ***moleyrei*** Maindron (p. 187)

– Thorax dull, puncturation very dense even on mesoscutum, interspaces near ovipositorial furrow on first tergite (Text-fig. 203) at most half as broad as punctures; ovipositor reaching middle of first tergite; body often with poorer pattern 49

49 Face extremely densely clothed with silvery pubescence which in most views completely hides surface of frons; in ♀ first tergite also very densely hairy, surface nearly hidden in slightly lateral view, interspaces very narrow; more westerly, mainly Indian . . . . . cf. 43 (***guzeratensis***)

– Face densely but very shortly pubescent, sculpture well visible; in ♀ first tergite with pubescence very short, not covering surface which has interspaces generally half as broad as punctures; thorax and legs usually without pale markings; Moluccas . . . . . ***funerea*** Schletterer (p. 187)

Species Sola

Leucospis regalis Westwood

(Text-figs 177–178)

Leucospis regalis Westwood, 1874 : 135, pl. 25, fig. 6, ♀. Type ♀, Philippines: Camiguin (?lost).

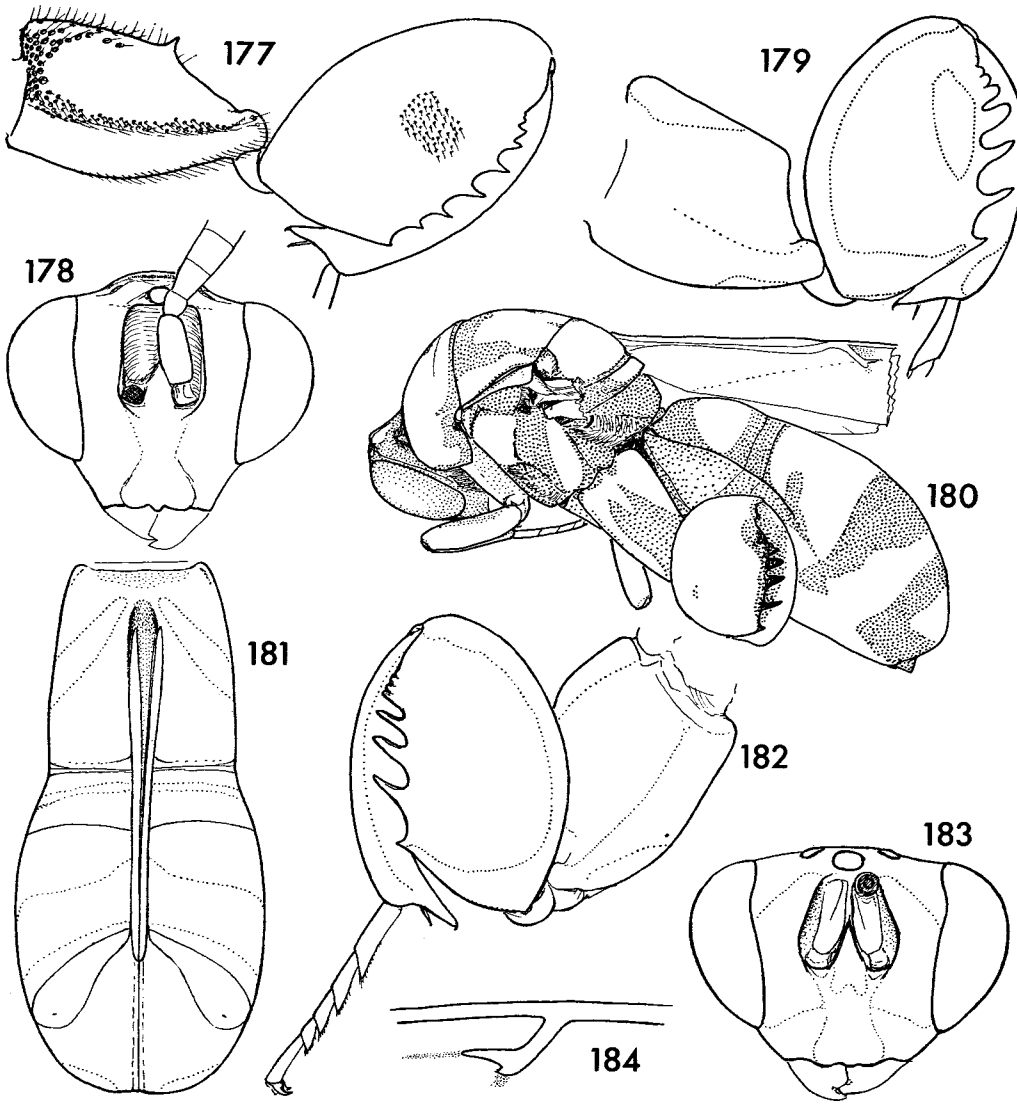
Leucospis viridissima Enderlein, 1912 : 144–146, ♀. Holotype ♀, Sri Lanka (Ceylon): Pankulam (DEI, Eberswalde) [examined]. **Syn. n.**

The type of *regalis* belonged to the Hamburg Museum but was probably destroyed during the second world war, as Professor H. Weidner kindly informed me. The Philippinese specimen mentioned below fits the original description very well. The holotype of *viridissima* differs from the typical *regalis* in having the vertex concolorous with the thorax, i.e. vividly violaceous (not green as stated by Enderlein), but I cannot find any morphological difference. In the Ceylonese form the deeply set parts of vertex show traces of bright green colour, suggesting possible variation.

Within the genus and among the Oriental species *L. regalis* Westwood is close to the *petiolata*-group but differs from it mainly by the unusually bright metallic colour, raised laminate hind margin of scutellum, a slender dorsal tooth on hind coxa and also the teeth on the hind femur being relatively short.

Biology. Nothing known.

Distribution. Philippines, Sri Lanka.



FIGS 177–184. Indo-Australian *Leucospis*. 177, 178. *L. regalis*. 177, hind leg; 178, head in facial view. 179, 180. *L. histrio*. 179, hind leg; 180, a ♂ from the Rennell Island, in oblique lateral view. 181–184. *L. darjilingensis*. 181, gaster of ♀; 182, hind leg; 183, head in facial view; 184, part of venation with stigmal vein (fore wing).

MATERIAL EXAMINED.

Type data given in synonymy.

PHILIPPINES: Panaon Island, xii. 1915, 1 ♀ (*Bötcher*) (MHN, Geneva).

THE *GIGAS*-GROUP

The group is discussed more fully elsewhere. In the Indo-Australian region it is represented only by *L. histrio* Maindron and *L. darjilingensis* Mani. The latter is close to *L. intermedia* Illiger which, together with *L. gigas* Fabricius, spreads from the Mediterranean subregion into many West Asiatic countries. Both these species are treated above (pp. 149–155).

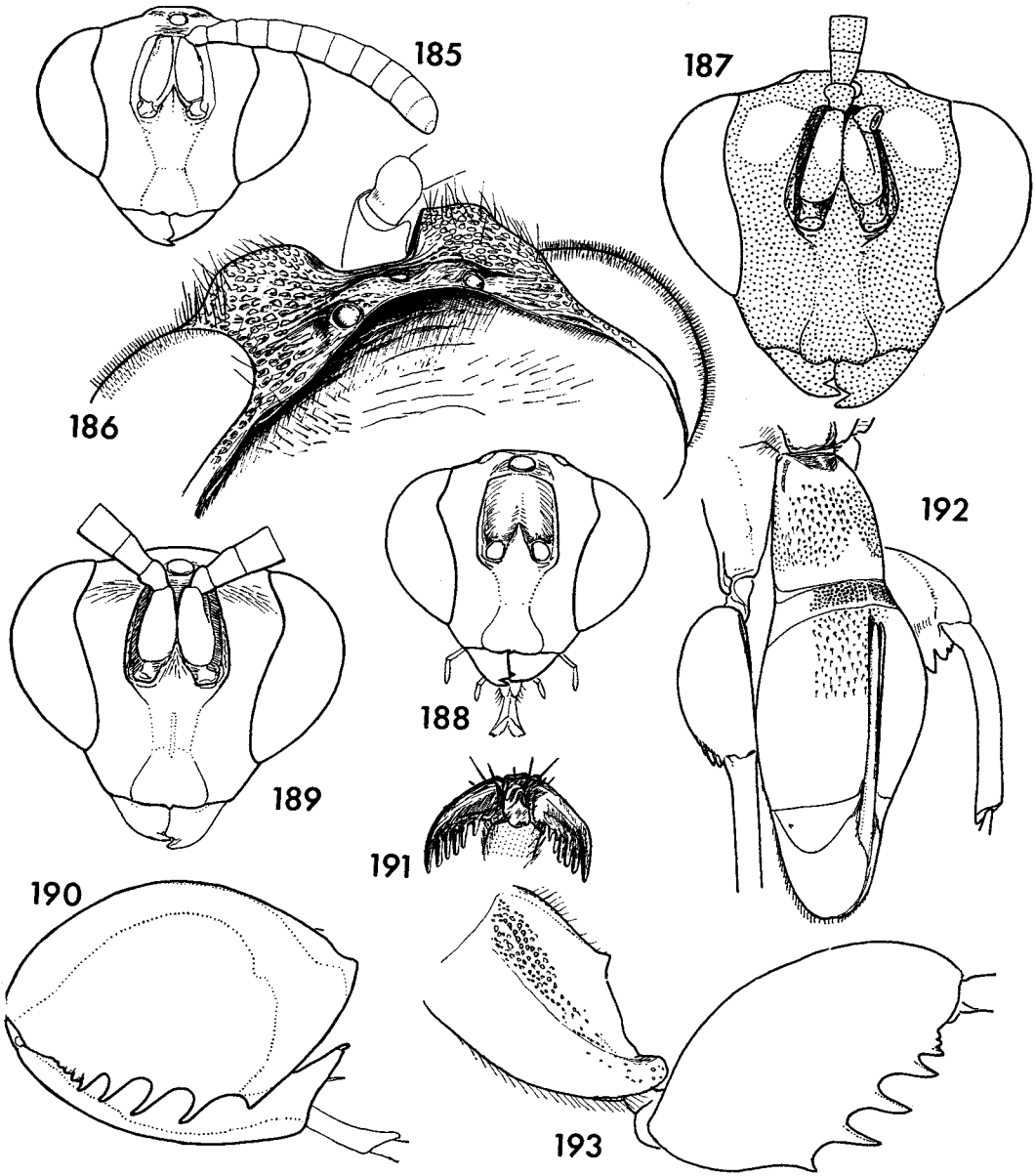
Leucospis histrio Maindron

Leucospis histrio Maindron, 1878 : cxxx.

The synonymy is given below under the relevant subspecific names.

L. histrio is fairly variable in size and colour, but less apparently in morphological characters. The females are 6·0–12·5 mm long, the males 6–10 mm. The colour mostly follows the same pattern: the frons has always the yellow spots (like the Mediterranean *L. intermedia* Illiger) and the only notable variation is due mainly to the slight reduction in general of the yellow markings, which were described for example by Schletterer (1890 : 246, under *macrodon*), by Weld (1922 : 23, under *ornatifrons*) and by Mani (1935 : 243–244, *indica* and 245, *meenakshiae*). One Papuan female (Mt Lamington Distr.) has the yellow on gaster beyond the first tergite reduced to tiny dorsal spots posteriorly on the fifth tergite (cf. also Brues, 1918 : 118-119, as *L. macrodon*). All these forms are regarded as belonging not only to one species but cannot be split even on a subspecific level. The Australian specimens, however, show at first glance a very broad yellow band just behind middle of the gaster (on the fifth tergite in female, on the fourth tergite in male), whilst the preceding tergite is all black or bears only small vestiges of a band. These specimens also tend to rufinism on some parts of the head, thorax and legs, mainly the hind margin of the pronotum and scutellum in front of the apical yellow band are red. The latter specimens also show, at least those at my disposal, some deviation in having usually a relatively broader face and relatively more convex dorsal part of the epipygium in females, at the base of the sheaths. The lower face in these Australian specimens (measured between inner eye margins and height between lower edges of antennal toruli and the clypeal margin) is 1·51–1·65 times as broad as high, but this partly overlaps with some specimens coming from various countries ranging from India to the Solomons, in which these figures are 1·46–1·66. Also some other characters vary slightly but give no support for separating the populations on the specific level. For example the ovipositorial sheaths in some females hardly reach the base of the gaster, in some others they reach the scutellum, which, to some extent, is also due to the position of the mobile gastral segments.

As to the colour I find another major deviation from the known variation only



FIGS 185–193. Mediterranean and Indo-Australian *Leucospis*. 185. *L. pulchella*, head (holotype). 186. *L. banksi*, dorsum of head showing the small ocelli (holotype). 187. *L. intermedia*, head. 188. *L. sinensis*, head. 189–191. *L. petiolata*. 189, head; 190, hind femur and tibia (holotype of *amauroptera*); 191, outer (left) and inner (right) claws of mid tarsus. 192, 193. *L. nigerrima*. 192, ♀ gaster; 193, hind coxa and femur.

in two male specimens (Text-fig. 180) from the Rennell Island. They are predominantly yellow, all yellow spots and bands being unusually extended, but otherwise I cannot separate them morphologically from the other specimens of *L. histrio*. Dr B. Petersen (of Copenhagen) tells me that there are some similar cases in the other groups of Hymenoptera of the Rennell Island which are regarded as endemic subspecies. A further study and more evidence may prove that such a segregation better serves our needs, but for the time being I do not wish to name this form, not knowing the females and not being able to separate for example the specimens from the other islands of the Solomons from the Malayan or Indian specimens, even at the subspecific level.

L. histrio probably ranges in the northern parts of the Indian subcontinent with the mainly Mediterranean *L. intermedia* Illiger and both species are similar in colour and stature. *L. histrio*, however, differs from *L. intermedia* in having generally finer puncturation, for example much finer on the hind femora, and the dorsellum is not armed. Another similar species, the North Indian *L. darjilingensis* Mani, has a much shorter ovipositor.

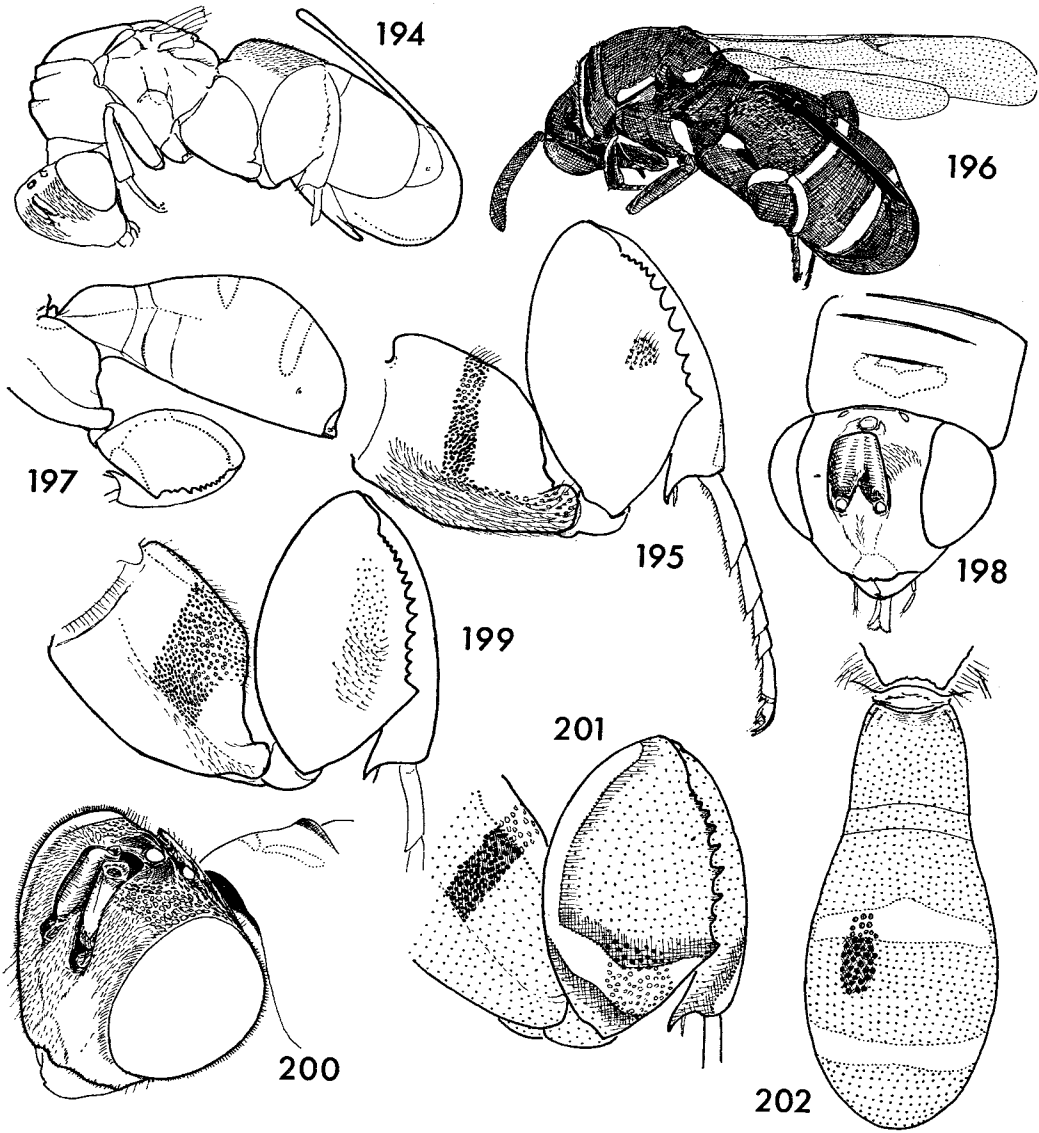
KEY TO THE SUBSPECIES OF *L. histrio*

1 Hind margin of pronotum and scutellum in front of apical yellow band (or spots) red; in ♀ fifth tergite with very broad yellow band but fourth tergite mostly black; Australia . . . . . ***histrio vespoides*** (Girault) (p. 170)
– At least scutellum black apart from yellow band or spots; in ♀ yellow band (if present) on fifth tergite not much broader than a similar band on the fourth tergite; non-Australian 2
2 Body predominantly black; India to Solomons . ***histrio histrio*** Maindron (p. 166)
– Body predominantly yellow; Rennell Island in the Solomons. ***histrio*** subsp.? (p. 170)

Leucospis histrio histrio Maindron

(Text-fig. 179)

Leucospis histrio Maindron, 1878 : cxxx, ♀. Types ♀, MALUKU: TIDORE ISLAND (?lost; ?Paris).
Leucospis macrodon Schletterer, 1890 : 244–247, ♀. Types ♀, SULAWESI, MALUKU, NEW BRITAIN (?TM, Budapest). **Syn. n.**
Leucospis erythrogastra Cameron, 1903 : 93–94, ♀. LECTOTYPE ♀ (here designated), BORNEO: Kuching (BMNH) [examined]. **Syn. n.**
Leucospis rufitarsis Strand, 1911*b* : 168–169, ♀. Holotype ♀, NEW GUINEA: Finschhafen (MNHU, Berlin) [examined]. **Syn. n.**
Leucospis ornatifrons Weld, 1922 : 22–24, ♀. Holotype ♀, PHILIPPINES: Manila (USNM) [examined]. **Syn. n.**
Leucospis malabarensis Brues, 1925 : 27–28, ♀. Holotype ♀, INDIA: North Malabar (MCZ, Cambridge) [examined]. **Syn. n.**
Polistomorpha indica Mani, 1935 : 243–244, figs 1a–c, '♀'. Holotype ♂, INDIA: Yercaud (ZSI, Calcutta) [examined]. **Syn. n.**
Leucospis meenakshiae Mani, 1935 : 244–246, figs 1a, b, ♀. Holotype ♀, INDIA: Madras Presidency, Tanjore (ZSI, Calcutta) [examined]. **Syn. n.**
Leucospis assamensis Mani, 1936 : 339–340, ♀. Holotype ♀, INDIA: Assam, Sibsagar (ZSI, Calcutta) [examined]. **Syn. n.**



FIGS 194–202. Indo-Australian *Leucospis*. 194, 195. *L. guzeratensis*. 194, body of ♀; 195, hind leg. 196. *L. bombayensis*, ♀ body with whitish pattern. 197, 198. *L. procera*. 197, ♂ gaster with hind leg; 198, head and pronotum of ♀. 199, 200. *L. ventricosa*. 199, hind leg; 200, head and part of pronotum, partly showing sculpture, pubescence and small ocelli. 201, 202. *L. femoricincta*. 201, hind leg; 202, gaster of ♂.

L. histrio. I could not trace the type-material, although Dr Hedqvist told me that he had seen it in the Paris museum. As it is known now to me, however, that this is the only Moluccan species with yellow spots on the frons mentioned in the original description, I have no doubt about the identity of *L. histrio.*

L. macrodon. The type-material belonged to the museums in Hamburg and Budapest (Schletterer, 1890 : 246). Professor H. Weidner of Hamburg informed me that their types were destroyed during the second world war and in Budapest no syntypes could be found by Professor G. Szelényi. Nevertheless I feel sure that *macrodon* is the same as *histrio*, as already presumed by Schletterer (1890 : 244), who actually included the type-locality of *histrio* in the paragraph about the distribution of his *macrodon.* He was reluctant to accept Maindron's names because Maindron's descriptions mention only colour characters.

L. erythrogastra. The only original specimen known is designated as lectotype. It is the same as *histrio*, as well as the holotype of *L. rufitarsis* which is an unusually big female.

I have examined also the holotypes of *L. ornatifrons, L. malabarensis, P. indica, L. meenakshiae* and *L. assamensis* and found them conspecific with *L. histrio* and belonging to the same subspecies as the nominate form.

The variation of *L. histrio histrio* is mentioned above. It is interesting to add that the normally yellow colour of the body markings may turn red-orange, as is proved by one female from Mount Apo, Mindanao. Already Schletterer (1890 : 246, under *macrodon*) recorded such a specimen.

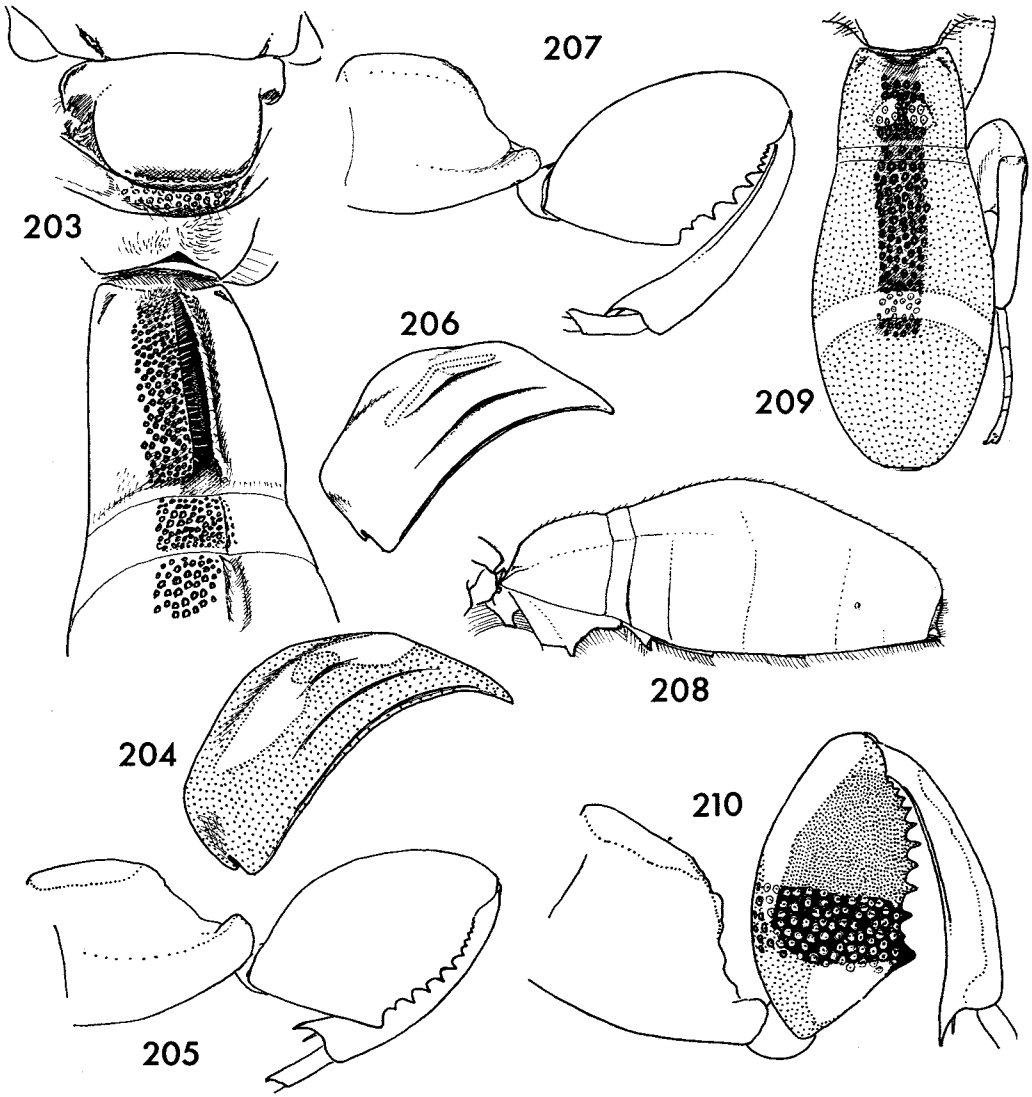
BIOLOGY. Reared from *Megachile* sp. in West Malaysia and observed at the entrance to a nest of *Ctenoplectra chalybea* Smith (both Hym., Apidae) in New Guinea (Friese, 1909 : 208, as *Leucaspis* sp.; specimens examined).

DISTRIBUTION. India, Bangladesh, Sri Lanka, Burma, S. China, Thailand, Malaysia, Philippines, Sumatra, Java, Sulawesi, Moluccas, New Guinea, New Britain, Solomon Islands.

MATERIAL EXAMINED.

Type data given in synonymy.

INDIA: Ammathi, S. Coorg, 1952, 1 ♀ (*Nathan*) (Townes); Coimbatore, 1 ♀, 1 ♂ (*Nathan*) (ERI, Ottawa); Sikkim, 1 ♀ (*Bingham*) (MNHU, Berlin). BANGLADESH: Dacca, 8.vii.1945, 1 ♀ (*D. Leston*) (BMNH). SRI LANKA: no locality, 1872, 1 ♀ (*Thwaites*) (UM, Oxford). BURMA: Maymyo, v. 1899, 1 ♀ (*Bingham*) (BMNH). CHINA: Canton, 1 ♂ (*Mell*) (MNHU, Berlin). THAILAND: Chiangmai, Fang, 500 m, iv. 1958, 1 ♀ (*T. C. Maa*) (BBM, Honolulu). WEST MALAYSIA: Island Penang, Batu, from dead tree, 5.vii.1958, 1 ♀ (*H. T. Pagden*) (BMNH); Selangor, Kuala Lumpur, 3 ♀ (*Pendlebury*) (BMNH); Pahang, Genting Sempah, 1947, ex *Megachile* sp., 1 ♀ (*H. T. Pagden*) (BMNH). EAST MALAYSIA: Sarawak, Boruco, 1866, 1 ♀ (*G. Doria*) (MCSN, Genoa); Mt. Matang, 1 ♀ (*Bryant*) (BMNH). PHILIPPINES: Mindanao, Mt. Apo, Sibulan River, 650 m, 1 ♀ (*Clagg*); Los Baños, iv. 1923, 1 ♀ (*Bagayong*) (MCZ, Cambridge). SUMATRA: Pakanbaru, 1963, 1 ♀ (*Milton*) (RNH, Leiden); Bengkalis Island, 1885, 1 ♀ (*Maindron*) (MNHN, Paris). JAVA: 1 ♀ (*Handschin*); Djampang Mts, 1 ♀ (*Besser*) (BMNH). KANGEAN ISLAND:



FIGS 203–210. Indo-Australian *Leucospis*. 203. *L. funerea*, ♀, part of thorax and part of gaster, with sculpture partly indicated. 204, 205. *L. moleyrei*. 204, pronotum in oblique postero-lateral view; 205, hind leg. 206. *L. robusta*, pronotum. 207, 208. *L. violaceipennis*. 207, hind leg; 208, gaster of ♂ in lateral view. 209, 210. *L. malaica*. 209, gaster of ♂; 210, hind leg.

Tambajangan, iii. 1936, 1 ♀ (*Walsh*) (BMNH). NEW GUINEA: West Irian, Rainoi, iv. 1879, 1 ♀ (*D'Albertis*) (MCSN, Genoa); Klamono Oilfields, viii. 1948, 1 ♀ (*Lieftinck*) (RNH, Leiden); Hollandia, vii. 1938, 1 ♀ (*Toxopeus*) (RNH, Leiden); Etnabaai, xi. 1939, 1 ♀ (RNH, Leiden); Territory of New Guinea, Astrolabe Bay, Mt Hansemann and Stephansort, 1897, 4.iv.1901, 2 ♀, 1 ♂ (*Biro*) (TM, Budapest); Balyer River, 1000 m, ix. 1969, 1 ♀ (*Hirashima*) (BBM, Honolulu); Huon Gulf, Simbang, 8.x.1898–1.iii.1899, 8 ♀ (*Biro*) (TM, Budapest); Geraima, 800 m, i. 1968, 1 ♀ (*Sedláček*); Wau, 1200 m, ii. 1970, 1 ♀ (*Sedláček*) (BBM, Honolulu); Bulolo, 1969, 1 ♀ (*Dobanaba*) (BMNH); Papua, Monda Buna District, 1943, 1 ♀ (*Bodenstein*) (CU, Ithaca); Mt Lamington District, vii. 1927, 1 ♀ (*C. T. McNamara*) (AM, Sydney); Kokoda, 400 m, 1933, 1 ♀ (*Cheesman*) (BMNH). NEW BRITAIN: Kakatra, 12.iii.1897, 1 ♂ (*Dahl*) (MNHU, Berlin; cf. Enderlein, 1901 : 217, as *L. macrodon*). SOLOMONS: 2 ♀, 1 ♂ (*Woodford*) (AM, Sydney); Guadalcanal, Kukum, 2 ♀; Ruavatu, 1 ♀, Savo, Reko, 1 ♀ (BMNH); Lavoro, 1 ♀ (*C. E. Hart*) (AM, Sydney); Fulakora, 1 ♀ (*Mann*) (MCZ, Cambridge); Florida Island, Siota, iii. 1945, 1 ♀ (*G. E. Bohart*) (CAS, San Francisco).

Leucospis histrio subsp.?

(Text-fig. 180)

See above in the discussion of the variation of *L. histrio*.

MATERIAL EXAMINED.

SOLOMONS: Rennell Island, Hutuna, 20.xi.1953, 1 ♂ (*J. D. Bradley*) (BMNH); Matagua, 30.xi.1969, 1 ♂ (*Christiansen*) (UZM, Copenhagen).

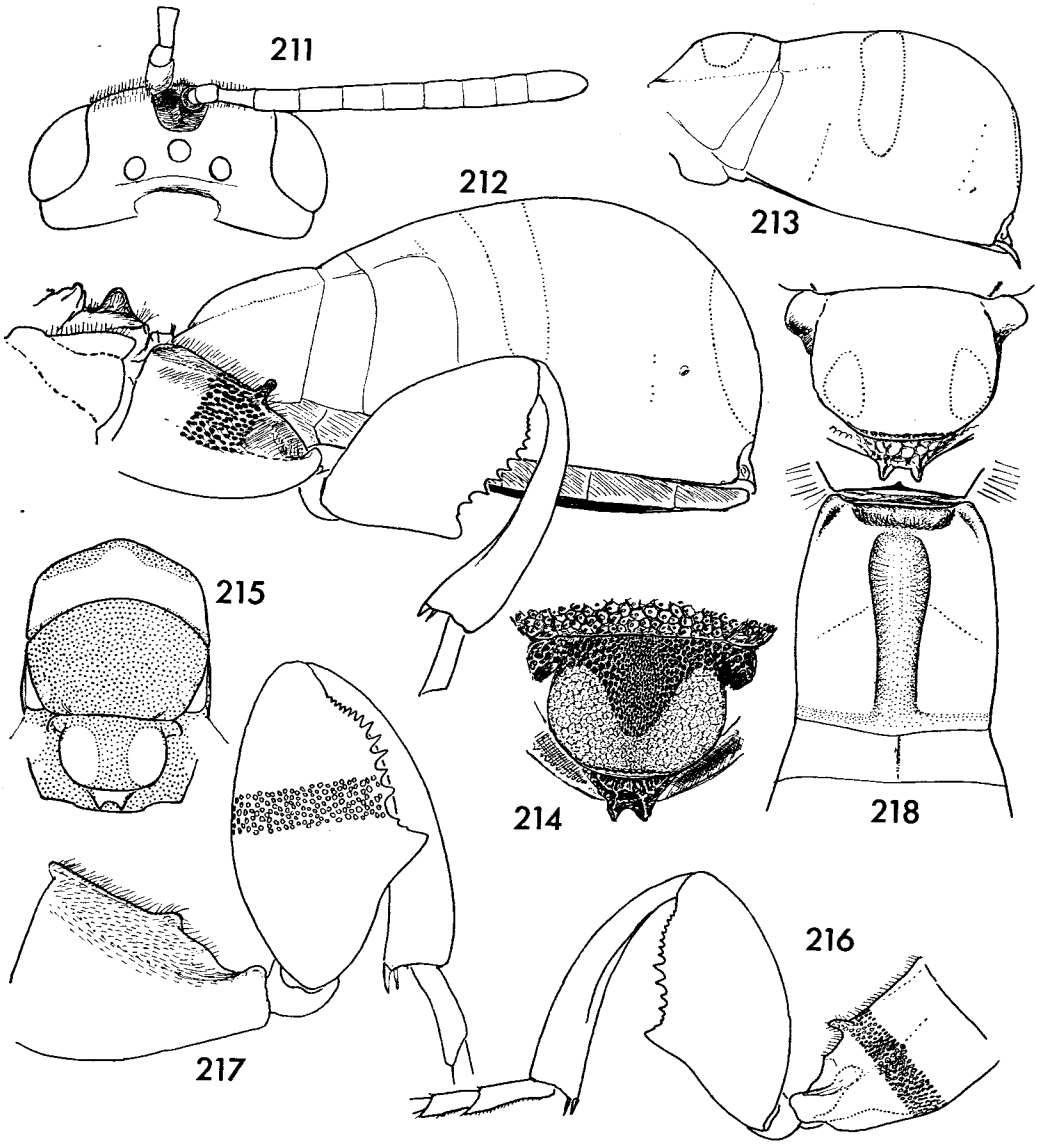
Leucospis histrio vespoides (Girault) **comb. n., stat. n.**

Parexoclaenus vespoides Girault, 1915 : 355–356, ♀. Holotype ♀, AUSTRALIA: Queensland, Brisbane (QM, Brisbane).

Parexoclaenus bomboides Girault, 1922 : 48–49. Type ♀, AUSTRALIA: Queensland, (Nelson =) Gordonvale, near Cairns (lost). **Syn. n.**

Girault's material of *P. vespoides* and *P. bomboides*, of the conspecificity of which I was first informed by Dr E. F. Riek, was compared with my manuscript key by Mr E. Dahms in the Queensland Museum, who found them agreeing with *histrio* of my key. The original specimen of *vespoides* was mentioned as holotype by Girault himself (1915), but no details were given about the material of *bomboides*. Mr Dahms kindly informed me that there was one single specimen of *bomboides* (mentioned above as lectotype), which is, however, missing from its tag. There is a second specimen, equally bearing Girault's identification label as *bomboides*, but of later origin: N. Queensland, Gordonvale, November 1920. In case that some doubt should arise in future about the synonymy, the Gordonvale specimen could be regarded as neotype, but I do not consider it necessary to designate it as such at present.

I found also many specimens identified as *P. vespoides* by Waterston in the BMNH, all of them fitting well the original descriptions both of *vespoides* and *bomboides*.



FIGS 211–218. Australian *Leucospis*. 211, 212. *L. australis*. 211, ♀ head with antenna; 212, ♂, gaster and hind leg in a slightly ventro-lateral view. 213, 214. *L. morawitzi*. 213, gaster of ♂; 214, scutellum, dorsellum, axillae and part of mesoscutum with sculpture and colour indicated. 215, 216. *L. bioculata*. 215, thorax pattern; 216, hind leg. 217, 218. *L. rieki*. 217, hind leg; 218, parts of thorax and gaster of ♀.

The Australian specimens of *L. histrio* show a uniformity in colour which does not occur in the more northerly and westerly specimens attributed in this paper to the nominate subspecies. Consequently the Australian form is regarded as a different subspecies, as mentioned above.

BIOLOGY. Host unknown. The difference in the colour between this and the nominate subspecies suggests that the host bee may be different, or the 'model' wasp is different.

DISTRIBUTION. Australia: Queensland.

MATERIAL EXAMINED.

AUSTRALIA: Queensland, Cape York, v. 1902, 1 ♀ (*G. Turner*) (BMNH); Q., Bundalberg, 1 ♀ (BMNH); Q., Endeavour River, 1 ♀; Q., Mackay, 1891–1900, 21 ♀, 2 ♂ (*G. Turner*) (BMNH); Q., Tambourine Mountain, 1 ♀ (*W. H. Davidson*) (CSIRO, Canberra).

Leucospis darjilingensis Mani

(Text-figs 181–184)

Leucospis darjilingensis Mani, 1937 : 294–295, ♀. Holotype ♀, INDIA: Darjeeling (ZSI, Calcutta) [examined].

I have not seen any other specimen except the holotype (no other specimen has been recorded), but *L. darjilingensis* apparently is a good species close to *L. histrio* Maindron and *L. intermedia* Illiger. From these species it differs by the characters mentioned in the key and by the following.

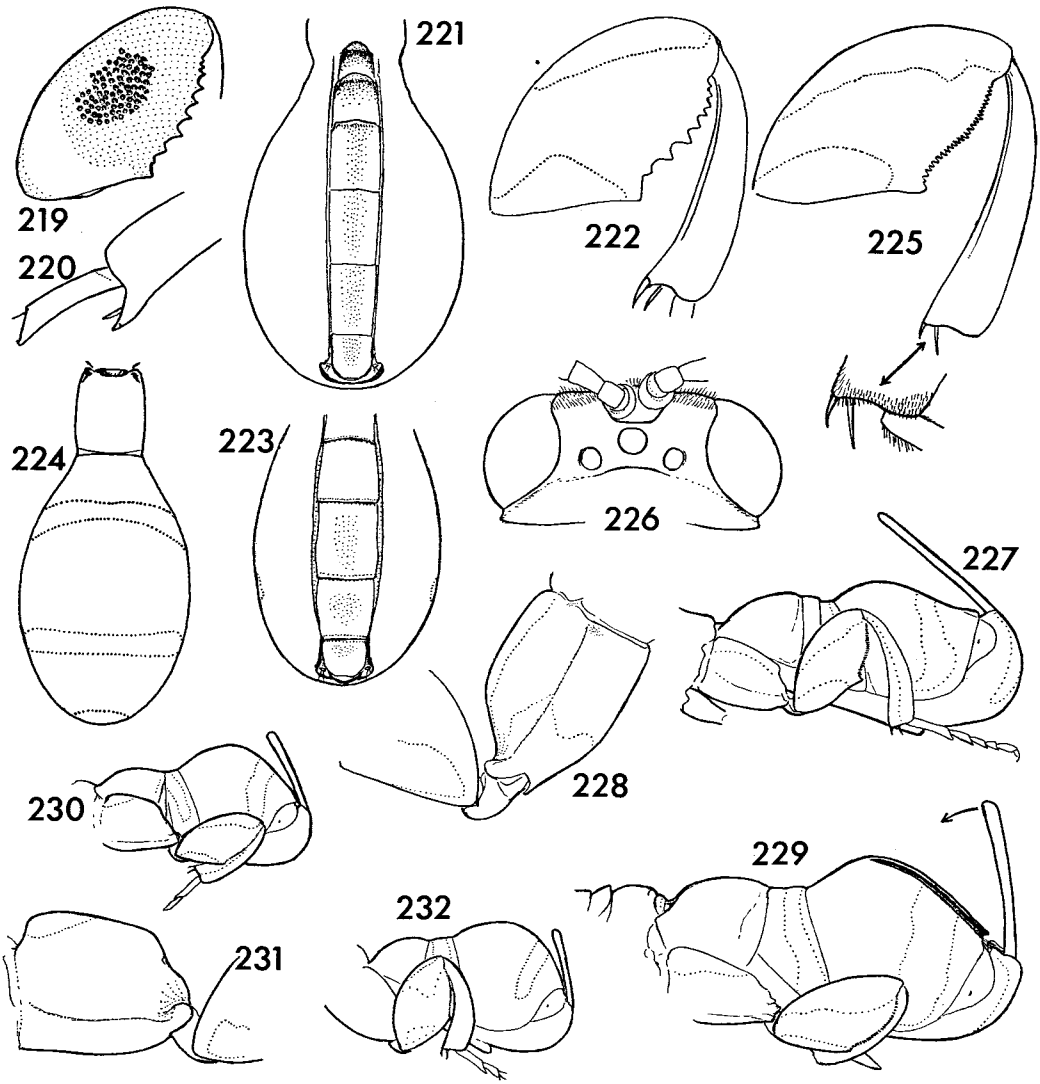
Antenna relatively short, distal segments beginning with the fourth flagellar transverse, the third subquadrate; flagellum combined with pedicellus very slightly shorter than breadth of head (in *histrio* distinctly longer). Frontovertex distinctly broader than maximum diameter (height) of eye and the head in facial view is rather transverse (Text-fig. 183), similar to *L. intermedia* Illiger (Text-fig. 187). Hind femur very finely punctured externally, punctures finer than in *histrio*. First tergite in female bears two yellow streaks converging more distinctly towards outer margins of the base of the single ovipositorial furrow (Text-fig. 181).

BIOLOGY. Host unknown.

DISTRIBUTION. North India.

THE *PETIOLATA*-GROUP

The species of this group have long teeth on hind femur, the pronotum with a shallow but conspicuous transverse depression between arcuate anterior and posterior (this in place of the premarginal carina) swellings or ribs which are usually marked with yellow; the body without metallic tinge. The hind tibia is produced apically into a distinct spine. In these characters the species agree mostly with the *gigas*-group, but in that group the concave band on pronotum is not distinct, the hind coxa has the dorsal edge posteriorly very thin but not toothed, the ovipositor is longer, etc., as mentioned in the key, couplet 3.



FIGS 219–232. Indo-Australian *Leucospis*. 219, 220. *L. japonica*, hind femur and apex of hind tibia. 221. *L. maculata*, gaster of ♂ in ventral view. 222–224. *L. bakeri*. 222, hind leg; 223, gaster (except base) of ♂ in ventral view and 224, in dorsal view. 225–227. *L. williamsi*. 225, hind leg, with apex of tibia more enlarged; 226, head dorsally; 227, gaster of ♀, with hind leg. 228, 229. *L. calligastri*. 228, hind coxa (and base of femur); 229, gaster of ♀. 230, 231. *L. pediculata*. 230, gaster and hind leg in ♀; 231, hind coxa. 232. *L. giraulti*, ♀, gaster and hind leg.

Some of the species of the *petiolata*-group are very close to each other and, probably owing to the wide distribution, very variable. The group includes *L. petiolata* Fabricius (? aggregate), *L. atriceps* (Girault), *L. sinensis* Walker, *L. pulchella* Crawford, *L. banksi* Weld, *L. nigerrima* Kohl and *L. buchi* Hedqvist.

Leucospis petiolata Fabricius (? aggregate)

(Text-figs 189–191)

Leucospis petiolata Fabricius, 1787 : 285. LECTOTYPE ♀ (here designated), INDIA: 'Coromandel' (UZM, Copenhagen) [examined].

Leucospis atra Fabricius, 1798 : 259. LECTOTYPE ♀ (here designated), 'INDIA ORIENTALIS' (UZM, Copenhagen) [examined]. **Syn. n.**

Leucospis Aruera Walker, 1860 : 18–19, ♀. LECTOTYPE ♀ (here designated), INDONESIA: Aru Island (BMNH) [examined]. **Syn. n.**

Leucospis semirufa Walker, 1862 : 346, ♀. LECTOTYPE ♀ (here designated), SULAWESI: Makassar (UM, Oxford) [examined]. **Syn. n.**

Leucospis amauroptera Schletterer, 1890 : 242–244, ♂. Holotype ♂, SULAWESI: Bantimoerang (SMT, Dresden) [examined]. **Syn. n.**

Leucospis similis Enderlein, 1901 : 217–219, ♂. Holotype ♂, NEW GUINEA: Milne Bay (MNHU, Berlin) [examined]. **Syn. n.**

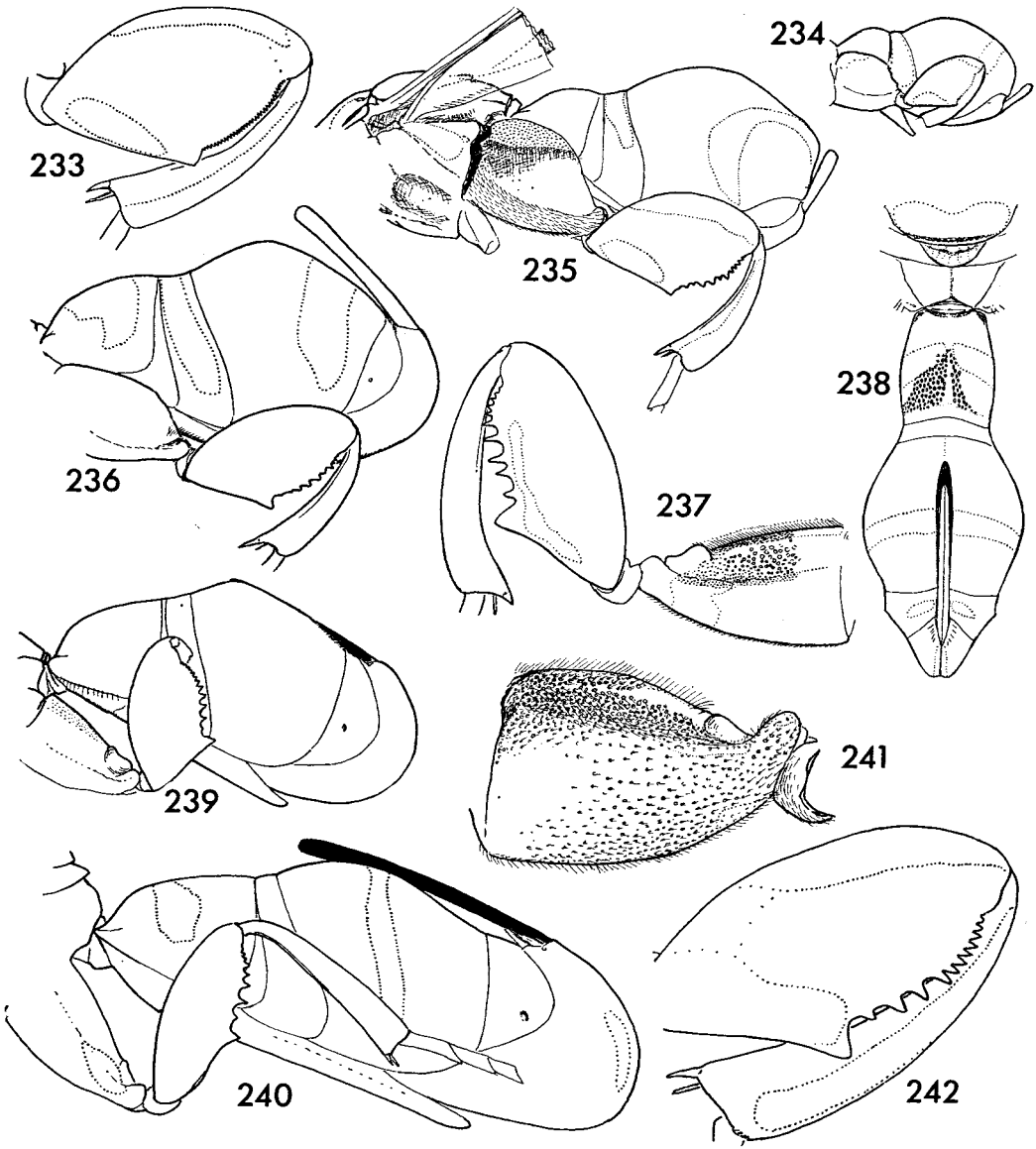
Leucospis feminina Strand, 1911*b* : 169–170, ♀. Holotype ♀, NEW GUINEA: Finchhafen (MNHU, Berlin) [examined]. **Syn. n.**

Leucospis indiensis Weld, 1922 : 20–21, ♀. Holotype ♀, INDIA: Coimbatore (USNM) [examined]. **Syn. n.**

The original material in each case apparently consists of single specimens which are designated as lectotypes where the original author did not specify how many specimens he had. I found or can confirm that the above names are synonyms. *L. amauroptera* was suspected to be a synonym of *L. petiolata* already by Roman (1920 : 10). Masi (1935 : 41) thought that *L. indiensis* was the same species as *L. banksi*, with which I do not agree, and described the male of *indiensis* (i.e. actually of *L. petiolata*). Schletterer (1890 : 290–291) believed that *L. atra* mentioned by Walker (1841 : 217), apparently by mistake as coming from Africa, was different from Fabricius' *L. atra* described from India. One of the specimens of Walker, a male, is still preserved in the BMNH, labelled as the original specimen by Waterston and 'Madras', in agreement with a Walker's later statement (1846 : 2). It is the same as *L. atra* Fabricius.

This is a very variable species, as seems to have been known already to Schletterer (1890), Cameron (1907 : 596) and Roman (1920 : 10). For some time I believed that two species were involved, the second species being *L. aruera* Walker, of more easterly distribution and of more extensive yellow pattern. It is still possible that my conclusions are not quite right, as some new evidence and still richer material may prove. I base my present view on the following findings.

The westerly specimens of *L. petiolata* usually have poor whitish markings consisting of two narrow arcuate lines (which are narrowly raised, rib-like) on the pronotum, a transverse spot on the propodeum, a line bordering dorsal edge of the hind femur and a shorter one basally at the ventral edge, apart from narrow



FIGS 233–242. Indo-Australian *Leucospis*. 233. *L. pediculata*, hind leg. 234. *L. pyriformis*, ♀, gaster and hind leg. 235. *L. globigera*, ♀, part of thorax and gaster. 236. *L. micrura*, ♀, gaster and hind leg. 237, 238. *L. sedlaceki*. 237, hind leg; 238, gaster of ♀. 239. *L. aruina*, gaster of ♀. 240. *L. antiqua*, ♀, lateral view of gaster with hind leg. 241, 242. *L. niticoxa*, hind coxa end femur (same scale).

lines more or less developed on all tibiae. In the female the first tergite has a small spot laterally behind middle, a crossline at hind margin of the fifth tergite and often narrow longitudinal lines dorsally on the epipygium. The gaster in the male lacks the spots on the first tergite but bears dorsally two narrow cross-bands. In the types of *petiolata* and *semirufa* the gaster is mostly red, whilst the types of *atra* and *indiensis* have a black gaster. The red form is widespread in eastern India, Burma, southern China and a part of the Indonesian islands, including for example Sulawesi (= Celebes). The form with black gaster and reduced, mostly whitish markings (one female from S. India has the pronotal lines yellow), occurs mainly in the southern part of India, in some places together with the black form, as for example in Coimbatore (two specimens with red gaster among many black ones) or in the Madras region (type of *petiolata*; the region called previously 'Coromandel Coast'). A further reduction of the pale markings may be observed in the specimens from the southernmost India and Sri Lanka (= Ceylon). They are black, including the gaster, but the latter retains the mentioned whitish markings whilst the propodeal macula and lines dorsally on hind femur and on all tibiae are mostly absent. In most of these specimens the puncturation and pilosity of the hind femur is relatively denser, but on the propodeum again sparser than in the more northerly specimens. Although intermediate forms are known, there seems to be some correlation with the geographic provenience, but not sufficient enough, in my opinion, to separate these populations as geographic subspecies.

Also the more easterly forms of *L. petiolata* seem to follow a certain pattern. As already mentioned, in the western part of the archipelago, for example in Sulawesi (lectotype of *L. semirufa*, etc.) and Java, the gaster often is extensively red, sometimes completely, sometimes with the apex beyond the fifth tergite (in female) black. The yellow markings may be still reduced but in many specimens they expand retaining the pattern. In the female the lateral spots on the first tergite extend mesad, in the male the first tergite sometimes shows first paler hind margin submedially but mostly a double yellow spot appears posteriorly near to the median line, i.e. not laterally as in the female. With spreading yellow colour the following pattern may be reached: scapus, broad bands of pronotum connected laterally, mesoscutum with lateral streaks and two submedian oblique-triangular spots, broad double spot on scutellum, double spot on dorsellum, large spot on propodeum, metapleurum, all tibiae dorsally, hind coxa dorsally (starting from a little spot anteriorly and in the type of *amauroptera*) or even slightly at apex, hind femur broadly except for centre and the toothed edge, gaster in female with broad band on the fifth tergite posteriorly. This form, which may be regarded as the true *aruera*, also has the wings usually less infumate and more brownish than the continental and more westerly forms of *L. petiolata*. It is distributed from Singapore through Java and Borneo to Papua in New Guinea and to northern Queensland in Australia, probably centring around the Banda Sea and the Arafura Sea. However, mainly the New Guinean populations partly show again some reduction of the yellow colour, thus resembling more the westerly form mentioned as the true *petiolata*. The submedian spots of mesoscutum and spots on hind coxa disappear and the spots or lines on premarginal carina of pronotum, on

scutellum, first tergite (in female) and hind femur are more or less broadly separated (as for example in the type of *L. feminina*) or, in male, the spots on the first tergite disappear while the two cross-bands on pronotum are still complete (type of *similis*), or the reduction may reach a similar pattern as described for the Ceylonese population. In one male from the Buru Island (Indonesia, Banda Sea) the yellow is still more reduced than in those from eastern New Guinea, viz. to a mere short and interrupted line anteriorly on pronotum and a tiny double spot on the propodeum, otherwise the whole body is black.

The different position of the spots on the first tergite in the males and females, along with the slightly different colour of the wings, to some extent also with the mostly whitish and more reduced markings on one side and the yellow and more extended markings on the other, seemed to suggest that two species may be involved (as already mentioned, *petiolata* and *aruera*). But I have not seen a male which would fit the *petiolata* form and have the lateral spots on the first tergite, so common in the females. Probably this is just a case of sexual dichroism. And I could not find anything in the morphology that would really help. There is some variation in the length of the malar space (mentioned elsewhere; relatively longer than in *L. sinensis* Walker); the puncturation of the body, especially of the gaster may be coarser or finer, sometimes relatively shallower on the mesoscutum of some specimens; the pronotal cross-ribs may be well defined or lower and partly obliterated by puncturation. However, I was unable to find any gaps in the variation of these characters and, therefore, regard all the forms mentioned as belonging to one variable species.

Biology. No host records available. The wide distribution and variation of *L. petiolata* may reflect different host bees or different 'model' wasps in different regions.

Distribution. Sri Lanka, India, Bangladesh, Burma, Thailand, S. China, Philippines, Malaysia, Indonesia (but no record from Sumatra until now), New Guinea, Queensland.

Material examined.

Type data given in synonymy.

Sri Lanka: Colombo; Kandy; Kahalla, Katugastota C.P., vi–x., 7 ♀ (*Karunaratne, Uzel, Wiskwar*) (BMNH; ERI, Ottawa; NM, Vienna). India: Malabar Coast, Walayar Forests and Mahé; Nilgiri Hills; Coimbatore; Pondichéry, Karikal, iv–x. 1858–1963, 21 ♀, 13 ♂ (various depositories); Sikkim, 2 ♀ (*Bingham*) (MNHU, Berlin). Bangladesh: Dacca, 1 ♀ (BMNH). Burma: Bhamo; Pegu; Nedon, Ataran River; Tavoy; Mergui, 8 ♀, 4 ♂ (*Bingham, Fea*) (MNHU, Berlin; MCSN, Genoa). Thailand: Nan, xii, 1 ♂ (*Cockerell*) (BMNH). China: Amoy, 1 ♂ (MNHN, Paris). Hong Kong: Yuen Long District; Sai Kung Station, 1964–5, 1 ♀, 2 ♂ (*Voss*) (BBM, Honolulu). Macau: 1 ♀ (*Kershaw*) (BMNH). Philippines: Luzon, Los Baños, ix. 1916, 1 ♀ (*Williams*) (BBM, Honolulu); 1927, 2 ♀ (*Pedroso, Ramos*) (MCZ, Cambridge). West Malaysia: Selangor, Serdang, 1 ♀ (BBM, Honolulu); Perak, Kwala-Kangsar, 1902, 1 ♀ (*Grubauer*) (NM, Vienna); Malata, Kuala Lumpur, 1933, 1 ♂ (*Pendlebury*) (BMNH). Singapore: vii. 1967, 1 ♀ (*Roche*) (BMNH).

BORNEO: Sabah, Babagon, xi. 1968, 1 ♀ (*Roche*) (BMNH); Mowong, viii. 1907, 1 ♀ (*Muir*) (BBM, Honolulu); Sintang, 1910, 5 ♀ (DEI, Eberswalde; MNHU, Berlin). JAVA: Soekaboemi, 1933, 1 ♀ (*Le Moult*) (BMNH); Goenoeng Tjibodas, Tjampea, iv. 1935, 1 ♀ (*v. d. Vecht*) (RNH, Leiden); Tjikarang, Djampang Mts, 1937, 1 ♀ (*Walsh*) (BMNH). BALI: 2 ♀, 1 ♂ (*Gribodo*) (MCSN, Genoa). KANGEAN ISLANDS: Bujutan, 1936, 1 ♂ (*Walsh*) (BMNH); Paliat Island, 1 ♀ (*Walsh*) (BMNH). SULAWESI: Tomohon, 800 m, 1 ♂ (*Dupont*); Gorontalo, 1 ♀; 'South Celebes', 1936, 1 ♀, 3 ♂ (*v. d. Vecht*) (RNH, Leiden); Patunuang, 1 ♀ (BMNH). BURU: Balu-balu 1 ♂ (*Wegner*) (BMNH). AMBON: v. 1908, 1909, 2 ♀, 1 ♂ (*R. C. L. Perkins*) (BMNH). GESER ISLAND (east of Ceram): 1901, 1 ♂ (*Kühn*) (NM, Vienna). MISOOL: 1948, 2 ♂ (*Lieftinck*) (RNH, Leiden). NEW GUINEA: Irian Barat, Sorong, 1948, 1 ♂ (*Lieftinck*) (RNH, Leiden); Hollandia, vii. 1938, 3 ♀ (*Toxopeus*) (RNH, Leiden); Territory of New Guinea, Madang District, Wanuma, 700 m, 1 ♀ (*Krauss*); Balyer River, 1000 m, ix. 1969, 1 ♀ (*Hirashima*) (BBM, Honolulu); Star Range, 1260 m, 1959, 1 ♀ (*Sibil*); Ifar, ix. 1959, 1 ♀ (*Hejningen*) (RNH, Leiden); Mt Lamington District, vii. 1927, 1 ♂ (*C. T. McNamara*) (AM, Sydney); Simbang, Huon Gulf, 1899, 3 ♀, 3 ♂ (*Biro*) (TM, Budapest); Papua: Mafulu, 1300 m, 1933, 1 ♀ (*Cheesman*) (BMNH). AUSTRALIA: Queensland, Cape York, 1 ♀ (NM, Vienna); Q., Cairns, iv. 1902, 1 ♀, 1 ♂ (*Turner*); Q., Mackay, 1 ♀ (*Turner*) (BMNH).

Leucospis atriceps (Girault) **comb. n.**

Parexoclaenus atriceps, Girault, 1925 : [3], ♂. Holotype ♂, AUSTRALIA: Queensland, Inglewood (QM, Brisbane).

I could not see the type-material but Dr E. F. Riek (of Canberra) kindly lent me a specimen compared with the type.

Morphologically this species is extremely close to *L. petiolata* Fabricius but in appearance more similar to *L. sinensis* Walker. *L. atriceps* seems to be usually of smaller size (female 8–11, male 8·0–9·5 mm) than *sinensis* and, except on head, with much more extensive orange-yellow markings. This is most extensive in a female from Port Darwin in which the hind femur, apart from black teeth, is wholly yellow, whilst the other specimens bear a central darker spot. Like *L. sinensis* also *L. atriceps* has generally a more conspicuous premarginal carina on the pronotum (best seen in an oblique posterior view) but, apart from the colour, it differs in having a relatively longer malar space which is 0·270–0·305 the length of eye. The pubescence on the face is yellowish to almost whitish.

I think that *L. atriceps* is a good species, although very close to the North Australian form of *L. petiolata* mentioned above. So far I have had no difficulty in separating the two but a richer material and new evidence may modify my conclusion in the future.

BIOLOGY. Unknown.

DISTRIBUTION. Northern Territory of Australia, Queensland, New South Wales.

MATERIAL EXAMINED.

AUSTRALIA: Northern Territory, Port Darwin, 1 ♀ (*J. J. Walker*) (BMNH); Queensland, Halifax, v.–vi. 1919, 10 ♀, 2 ♂ (*F. X. Williams*) (BBM, Honolulu); Q., Rockhampton, 2 ♀ (BMNH); New South Wales, Narrabri, 15.iii.1960, 1 ♂ (*Nikitin*) (BMNH); N.S.W., Gatton, 11.v.1931, 1 ♂ (CSIRO, Canberra).

Leucospis sinensis Walker

(Text-fig. 188)

Leucospis Sinensis Walker, 1860 : 18, ♀. LECTOTYPE ♀ (here designated), CHINA: Shanghai (BMNH) [examined].

Leucaspis okinawensis Matsumura, 1912 : 164–165, pl. 52, fig. 13, ♀. Type(s), RYUKYUS: Okinawa (EIHU, Sapporo). **Syn. n.**

Leucospis fuliginosa Weld, 1922 : 18–20, pl. 2, fig. 11, ♀. Holotype ♀, JAPAN (CU, Ithaca) [examined]. **Syn. n.**

The single known original female of *L. sinensis* is designated as lectotype. It was compared with the holotype of *L. fuliginosa* and found to be conspecific, and was as a matter of fact very similar to it as well as to another female from Yokohama, Japan. *L. fuliginosa* was put in synonymy with *okinawensis* by Habu (1962) after this was suggested by Watanabe (1946 : 80). Dr Habu kindly sent me three specimens of *okinawensis* for comparison.

Habu (1962 : 175–177, pl. 3, fig. 4; pl. 7, fig. 6; figs 326–329, 331, 332, 335, 338, 340; 1966 : 240–241, figs 15a-c, 16a-b) figured and redescribed in detail this species, along with a discussion of its variation. *L. sinensis* is very close to *L. petiolata* Fabricius and *L. atriceps* (Girault) but may be separated from these two species mainly by its larger and rather robust body, relatively short malar space and the more conspicuous premarginal carina of the pronotum. Whilst in *L. petiolata* this carina is mostly obliterated and replaced by a raised but blunt rib, in *sinensis* it appears as a thin sharp line, especially in an oblique view from behind. The yellow markings of the body are usually bordered with or partly replaced by reddish or orange, thus for example the hind margin of the pronotum is mostly reddish, which is very rare in the related species. The pubescence on the face is mostly golden but in the Chinese (continental) specimens it is mostly whitish, being slightly yellow only near the mouth.

BIOLOGY. Habu (1962 : 177) records as host *Isodontia nigella* (Smith) (= *Sphex nigellus*) (Hym., Sphecidae) mentioned in a paper by Yamamoto (1959).

DISTRIBUTION. China, Taiwan, Ryukyus, Japan (see also Habu (1962; 1966)).

MATERIAL EXAMINED.

Type data given in synonymy.

CHINA: Nanking, 20.vii.1924, 1 ♂ (*Illingworth*) (BBM, Honolulu); Zi-ka-wei, 28.viii.1924, 1 ♀ (*Piel*) (BMNH). TAIWAN: no locality, 1965–6, 1 ♂ (*Chin-kin-yu*) (ERI, Ottawa). RYUKYUS: Okinawa, Chizuka, 2 ♂ (*G. E. Bohart & Harnage*) (DE, Davis); Okinoerabu, Ooyama, vii. 1963, 2 ♂ (*C. M. Yoshimoto*) (BBM,

Honolulu). JAPAN: 1 ♀ (UM, Oxford); Yokohama, vii. 1923, 1 ♀ (BBM, Honolulu); Kanaya (? nr Tokyo), viii–x. 1952, 2 ♀, 1 ♂ (*Minamikawa*) (NIAS, Tokyo); Kyushu, Kagoshima, 7.ix.1911, 1 ♂ (*Sauter*) (DEI, Eberswalde).

Leucospis pulchella Crawford

(Text-fig. 185)

Leucospis pulchellus Crawford, 1914 : 457–458, ♀. Holotype ♀, PHILIPPINES: Luzon, Los Baños (USNM) [examined].

The holotype is a small specimen, probably a dwarf and may prove to belong to the same species as the following *L. banksi* Weld when more material is known. I separated it in the key from *banksi* on some characters but I do not think that they are very reliable. The type, as is common in smaller specimens, has the puncturation relatively sparser and coarser than *L. banksi*, the interspaces on the fifth tergite are nearly as broad as the punctures. Also the hind coxa shows fewer punctures and the tooth dorso-posteriorly is only vaguely indicated. Both these characters were used already by Weld (1922 : 9).

BIOLOGY. Unknown.

DISTRIBUTION. Philippines.

No other material is known apart from the holotype.

Leucospis banksi Weld

(Text-fig. 186)

Leucospis banksi Weld, 1922 : 21–22, ♀. Holotype ♀, PHILIPPINES: Luzon, Los Baños (USNM) [examined].

As mentioned above this species may prove to be synonymous with *L. pulchella* Crawford.

Apart from the holotype kindly submitted from the USNM, I examined another female nearly of the same size and hardly different in colour or structure. The species seems to have a similar colour variation as the typically coloured *L. petiolata* Fabricius (with reddish gaster): red of the gaster rather uniform with abruptly black apex beginning with hind margin of fifth tergite, or this tergite irregularly getting darker posteriorly. The first tergite has sometimes posteriorly the lateral whitish spots (as in *pulchella*) and has the interspaces sublaterally, hardly to distinctly broader than the punctures. Although being of nearly the same size as the holotype, the other female seems to show some characters intermediate between the holotypes of *banksi* and *pulchella*.

BIOLOGY. Unknown.

DISTRIBUTION. Philippines.

MATERIAL EXAMINED.

Type data given in synonymy.

PHILIPPINES: Palo, Loyte, 1.xii.1957, 1 ♀ (BBM, Honolulu).

Leucospis nigerrima Kohl

(Text-figs 192, 193)

Leucaspis nigerrima Kohl, 1908 : 316–317, pl. 3, figs 13, 21, 22, ♂. Holotype ♂, SOLOMONS (NM, Vienna) [examined].

Hitherto known only in the male sex. The female is similar, in particular in the form of head, thorax, the relatively sparse puncturation of the gaster, the black colour of the body, including the wings. Its further characters are mentioned in the key which puts the species in the *petiolata*-group. Additional characters are as follows.

♀. 12·0–14·5 mm. Body non-metallic, black, but the diverging transverse crests on pronotum sometimes paler brownish, also swelling posteriorly on propodeum sometimes pale; first tergite posteriorly with sublateral small yellowish spots (missing in ♀ from New South Wales); antennae and legs completely black, hind coxa internally brownish. Pilosity of body blackish, therefore inconspicuous. Lower face 1·1 times as broad as high. Punctures on posterior half of mesoscutum very shallow, mostly transversely confluent but surface with distinct microreticulation. Hind coxa in depression sparsely punctured along lateral edge and basally (Text-fig. 193), broad dorsal edge only with scattered sparse punctures. First tergite dorsally with interspaces mostly about twice as broad as punctures, or broader (Text-fig. 192). Loose punctures medially on fourth tergite in about 5 transverse rows. Convex part of fifth tergite with interspaces mostly broader than punctures, shiny, although with traces of microreticulation.

BIOLOGY. Host unknown.

DISTRIBUTION. Solomon Islands, New Hebrides, New South Wales.

MATERIAL EXAMINED.

Type data given in synonymy.

SOLOMONS. xi. 1931, 1 ♀ (*Lever*) (BMNH); Bougainville, Mt Balbi, 2000–2400 m, iii. 1968, 1 ♀ (*Tawi*) (BBM, Honolulu); Guadalcanal, Tenaru River, i. 1945, 1 ♀, 3 ♂ (*G. E. Bohart*) (CAS, San Francisco); Veisali Tenamba, 29.viii.1934, 1 ♂; Lavoro, 4.ix.1934, 1 ♂ (*H. T. Pagden*); Taperanje, xii.1953, 1 ♀ (*J. D. Bradley*) (BMNH); Honiara, iv. 1966, 1 ♀ (*G. L. Bush*) (MCZ, Cambridge). NEW HEBRIDES: Espirito Santo, 11.v.1944, 1 ♀ (*A. L. Beatty*) (CU, Davis). AUSTRALIA: New South Wales, 2 ♀ (BMNH; TM, Budapest).

Leucospis buchi Hedqvist

Leucospis buchi Hedqvist, 1968 : 153–156, figs 1–4, ♀ ♂. Holotype ♀, NEW BRITAIN: Komgi (UZM, Copenhagen) [examined].

L. buchi is extremely close to *L. nigerrima* Kohl and may prove to be only a subspecies of the latter when more material is known. It differs from *L. nigerrima* mainly in whitish, longer and more conspicuous pubescence and denser puncturation.

BIOLOGY. Host unknown.

DISTRIBUTION. New Britain and New Ireland (Hedqvist, 1968).

The *ELEGANS*-Group

This group is similar to the *petiolata*-group but the species have the pronotal carinae distinctly raised in the middle, including the short discal carina, and the sides of the pronotum are convex, the lateral panel not being depressed. Another important character is the form of the teeth of the hind femur, which shows greater similarity to the species-groups classified further below.

The group is widely distributed in the Old World and includes in the Indo-Australian region the following species: *Leucospis guzeratensis* Westwood, *L. bombayensis* Mani, *L. malaica* Schletterer, *L. femoricincta* sp. n., *L. robusta* Weld, *L. procera* Schletterer, *L. funerea* Schletterer, *L. moleyrei* Maindron, *L. ventricosa* sp. n. and *L. violaceipennis* Strand. *L. elegans* Klug, with its area of distribution spreading from Egypt and the Sudan to Pakistan, is treated with the African species above (p. 114).

Leucospis guzeratensis Westwood

(Text-figs 194, 195)

Leucospis Guzeratensis Westwood, 1839 : 253–254, pl. 3, fig. 2, ♀. LECTOTYPE ♀ (here designated), INDIA: Bombay region, Gujarat (UM, Oxford) [examined].

Leucospis bengalensis Weld, 1922 : 32–33, ♀. Holotype ♀, INDIA: Bengal (USNM) [examined]. **Syn. n.**

Leucospis ramakrishnai Mani, 1935 : 248–249, fig. 4, ♀. Holotype ♀, INDIA: Bihar, Pusa (ZSI, Calcutta) [examined]. **Syn. n.**

Polistomorpha paivai Mani, 1936 : 338–339, ♂. Holotype ♂, INDIA: Purneah District, Katihar (ZSI, Calcutta) [examined]. **Syn. n.**

Leucospis bengalensis var. *mackenziei* Mani, 1936 : 339, ♀. Holotype ♀, INDIA: Chapra (ZSI, Calcutta) [examined]. **Syn. n.**

The only known type-specimen of *guzeratensis* is designated as lectotype. It agrees with the interpretation of Schletterer (1890 : 224–226), although his synonymization with *L. petiolata* Fabricius was wrong. The lectotype belongs to a form with moderately poor pale markings and fits the original description well except that also the scutellum has indicated spots postero-laterally. Also *L. bengalensis*, with var. *mackenziei*, *L. ramakrishnai* and *P. paivai* are only mere forms of *L. guzeratensis* which is unusually variable in the extent of the whitish markings. The complete pattern includes scape beneath, two bands on pronotum, lateral streaks on mesoscutum, two spots on scutellum and on base of the first tergite, two bands on gaster, then metapleurum, dorsum of hind coxa, apex of fore femur, broad band basally and dorsally on hind femur and all tibiae dorsally. It may be reduced to a different degree, but the variation does not seem to depend on the provenience of the specimens which all share the characters used in the key.

It is possible that also *L. bombayensis* Mani is only a dwarf form of *L. guzeratensis*, but I have not seen enough material to be sure.

BIOLOGY. Unknown.

DISTRIBUTION. Pakistan, India, Burma.

MATERIAL EXAMINED.

Type data given in synonymy.

PAKISTAN: Karachi, 1909–1910, 4 ♀ (BMNH); Hyderabad, 25.ix.1969, 1 ♀ (EU, Matsuyama). INDIA: Deesa nr Bombay, 5 ♀, 3 ♂ (BMNH); S. Malabar, Walayar Forests, viii. 1956, 1 ♀ (*Nathan*) (Townes); South India, e.g. Coimbatore, Nilgiri Hills, Dohnavur, Koyampattur in Madras State, iv.–xii., 8 ♀, 7 ♂ (BMNH; ERI, Ottawa; ZM, Amsterdam; Townes); 'Bengal', 1 ♀ (BMNH); Sikkim, 3 ♀, 1 ♂, Bingham (MNHU, Berlin). BURMA: Mandalay, 1 ♂, Bingham (MNHU, Berlin).

Leucospis bombayensis Mani

(Text-fig. 196)

Leucospis bombayensis Mani, 1935 : 246–248, figs 3a, b, ♀. Holotype ♀, INDIA: Bombay (ZSI, Calcutta) [examined].

Apart from the shorter antennae (used in the key) this form shows relatively coarser and less dense puncturation of the body than *L. guzeratensis* Westwood, but the pilosity on the first tergite appears in certain views relatively long and dense. The holotype of *bombayensis* and the other female mentioned below are unusually small, 5 mm in length. They may prove to be just dwarf specimens of *L. guzeratensis*, but more material and evidence is necessary to be sure.

BIOLOGY. Unknown.

DISTRIBUTION. India.

MATERIAL EXAMINED.

Type data given in synonymy.

INDIA: Nasik, 1 ♀ (*Comber*) (BMNH).

Leucospis malaica Schletterer

(Text-figs 209, 210)

Leucospis malaica Schletterer, 1890 : 230–231, ♀. LECTOTYPE ♀ (here designated), MALUKU: Ambon (=Amboina) (NM, Vienna) [examined].

The male is similar to the female in colour and sculpture but its gaster has one arcuate band in the middle and a double dorsal spot on the first tergite. Otherwise the gaster resembles that described below in *L. procera* Schletterer, except that it is less narrowed anteriorly (Text-fig. 209), the first tergite being distinctly transverse, the second still shorter, the third tergite separated only at sides on the high epipleurum, the last sternite apically subtruncate and its apex laterally slightly expanded, rounded, the sternite itself slightly elongate, the median depression still shallower. The first sternite with a high slender tooth. 7·0–8·5 mm.

In the *elegans*-group, *L. malaica* is the only species which at least in some females shows both a microscopic puncturation and traces of a microscopic engraved

reticulation on the interspaces of the punctures on the sides of the gaster. In the other species of the group the microscopic puncturation, of varying density, is distinct but the extremely fine reticulation is missing.

BIOLOGY. Host not known.

DISTRIBUTION. Indonesia: Sulawesi, Moluccas.

MATERIAL EXAMINED.

Type data given in synonymy.

SULAWESI: Gorontalo, 2 ♀, 1 ♂ (RNH, Leiden); S. Sulawesi, xii. 1936, 1 ♀ (*v. d. Vecht*) (RNH, Leiden); Patunuang, i. 1896, 1 ♀ (*Frühstorfer*) (NM, Vienna). MALUKU: Ambon, x.–xii., i.–v., 25 ♀, 5 ♂ (*Doleschall, Wegner, Winkler*) (BBM, Honolulu; BMNH; NM, Vienna; RNH, Leiden).

Leucospis femoricincta sp. n.

(Text-figs 201, 202)

♀. 9·0–11·5 mm. Black, with following pattern lemon-yellow: scape partly beneath, arcuate band on discal carina of pronotum mostly not reaching anterior corners, lateral margin of mesoscutum, apical band on scutellum, two oblique spots at base of first tergite, bands on fourth tergite and (broader) at hind margin of fifth tergite, hind coxa dorsally, a lunate cross-band at base of hind femur (hence the name; Text-fig. 201) and on its dorsal edge except basally, fore and mid femora apically and all tibiae more or less dorsally (mid tibia often black in middle, hind tibia at base). Wings brown, rather regularly infumate.

Head about as broad as pronotum posteriorly, in dorsal view nearly 2·1 times as broad as long, with conspicuous though rounded temples and strong frontal protuberances. Occipital carina strongly arched, disappearing between ocellus and eye, touching lateral ocellus, not high because forming hind wall of conspicuously raised interocellar area; this area coarsely rugose-punctured, ocelli very small and set very deep, their triangle nearly 3 : 1, lateral ocellus about twice its diameter from median ocellus; POL : OOL as 20 : 13; vertex punctured but depression outside of lateral ocellus smooth to striate, smooth depression on either side of median ocellus and smooth groove half its diameter wide separating it from high carina of the scrobes. Head in facial view about 1·33 times as broad as high; eyes hardly emarginate; face fairly convex, densely punctured-rugulose; pubescence short, dense, white; convex inter-antennal area with median keel; clypeus slightly transverse, convex, lower margin barely produced, lobes smooth, slightly shorter than median tooth; malar space in middle almost smooth, at eye microscopically granulate. Relative measurements: height of head 65, width of frontovertex 50, lower face 43, its height 31·5, eye 46 : 34, malar space 12, width of mouth 35, scape 22; flagellum plus pedicellus about 1·1 times as long as breadth of head, subclavate; middle segments subquadrate, pedicellus slightly oblong and hardly shorter than first flagellar segment which is strongly constricted basally, slightly shorter than the second, this only slightly oblong.

Thorax (and gaster) moderately coarsely, regularly and densely punctured, with narrow but slightly shiny interspaces which show only in places and at high magnification a fine microscopic reticulation. Pronotum strongly convex in median line, with three sharp carinae; sides slightly converging, nearly straight, vertically convex, not forming a ridge, lateral panel not depressed. Mesoscutum without distinct submedian depressions, regularly punctured, without cross-rugae. Scutellum nearly 1·3 times as broad as long, very weakly convex, posteriorly flat, at hind margin with a row of deeper, coarser and denser punctures. Dorsellum strongly transverse, beset with coarse piliferous punctures, convex, not carinate though in

middle hind margin rather sharp. Propodeum medially about 1·5 times as long as dorsellum, median carina indistinct, plicae weak, surface densely coarsely punctured, hairs not dense. Upper mesopleurum with smooth interspaces which are rather broad on epimerum but very narrow on episternum. Fore femur externally shiny, sparsely punctured, dorsally bluntly edged; tibia with blunt dorsal and sharper ventro-external carina. Hind coxa punctured, dorsally less densely so but without smooth area; depression broad; dorsal edge narrowing caudad and with thin carina at its inner side, without tooth. Hind femur moderately coarsely and rather sparsely punctured, otherwise see Text-fig. 201. Hind tibia with externo-ventral carina ending a breadth of tibia before apex, latter with distinct spine and rudimentary outer spur. Stigmal vein of fore wing with apical processus about one-third as long as uncus.

Gaster slightly broadened behind middle, here barely 1·4 times as broad as first tergite; latter about 1·3 times as long as broad, dorsally very densely punctured but with very short pubescence, with parallel-sided ovipositorial furrow almost smooth on bottom. Fourth tergite with slight swelling in yellow band. Fifth tergite shorter than first, ovipositorial furrow shallow and broad, its median length slightly inferior to length of remaining part of gastral apex in dorsal view, this narrowly rounded. Ovipositor reaching basal third of first tergite.

♂. 10 mm. As ♀ but transverse band on pronotum short, gaster black with two yellow cross-bands marking hind margins of fourth and fifth tergites (Text-fig. 202). Antenna shorter, middle and subapical segments distinctly transverse, flagellum plus pedicellus combined only 0·95 as long as breadth of head. Propodeum fully twice as long as dorsellum, median carina and plicae conspicuous, straight. Gaster more narrowed anteriorly, posteriorly fully 1·6 times as broad as first tergite; latter subquadrate, dorsally moderately convex, rather dense coarse puncturation almost reaching the straight hind margin; basally with strong lateral folds set off by deep short furrows. Second tergite dorsally visible, punctured, fully half as long as third tergite the hind margin of which is discernible only on the high epipleurum. Apical corners of sixth tergite not produced. Epipygium short, strongly transversely depressed. First sternite with moderate tooth; fourth sternite (its sculptured part) 1·2 times, fifth 1·3, sixth 1·15 times as long as broad, all flat, densely coarsely punctured; sixth sternite slightly narrowed caudad, its hind margin broadly emarginate; last sternite 1·25 times as long as broad, in median line shallowly depressed, hind margin medially subtruncate, at sides rounded.

BIOLOGY. Host unknown.

Holotype ♀, VIETNAM (NORTH): Hoa Binh, vii. 1918 (*R. V. de Salvaza*) (BMNH).

Paratypes. CHINA: Macao, 1 ♀, 1 ♂ (*Kershaw*) (BMNH). VIETNAM (NORTH): with holotype, 1 ♀ (BMNH); Hoa Binh District, 1927, 1 ♀ (*A. de Cooman*); Cho-Ganh, 1 ♀ (*L. Duport*) (MNHN, Paris). VIETNAM (SOUTH): Annam, Ten Sin, xi. 1916, 2 ♀ (*de Salvaza*) (BMNH).

L. femoricincta seems to be most closely related to *L. malaica* Schletterer, *L. procera* Schletterer and to *L. robusta* Weld, differing from all three mainly by the smaller ocelli with the transversely raised interocellar area and by the characteristic pattern on hind femur, reminding one of *L. japonica* Walker.

Leucospis robusta Weld

(Text-fig. 206)

Leucospis robusta Weld, 1922 : 33–35, ♀. Holotype ♀, SINGAPORE (USNM) [examined].

This form is very similar to *L. procera* Schletterer but seems to be specifically different, although not much is known about the range of variation. The pale pattern varies between yellow and whitish, the mid femora seem to be always

bright red. I have not seen great deviations from the colour described by Weld (1922 : 35). Also the male is very similar but its gaster has two yellow bands marking the apical margins of fourth and fifth tergite (posterior band narrowed to interrupted medially); scape almost black. Compared with some males of *L. guzeratensis* Westwood of about the same extent of pale markings, it shows apart from the much less conspicuous pubescence and different wings (with apical macula), the pronotal band shifted more forwards (Text-fig. 206) and the spot basally on hind femur confined to the ventral side. Otherwise it has similarly medially depressed sternites, but these are narrower, the fifth and sixth about twice as long as broad each; last sternite not distinctly expanded subapically.

BIOLOGY. Unknown.

DISTRIBUTION. West Malaysia, Singapore, Sumatra, Borneo.

MATERIAL EXAMINED.

Type data given in synonymy.

WEST MALAYSIA: Johore, G. Lambak, 300 m, 27.xi.1970, 1♀ (*C. G. Roche*) (BMNH). SUMATRA: Bengkalis Island, 1 ♀ (*Maindron*) (MNHN, Paris). BORNEO: without data, 1 ♂ (BMNH).

Leucospis procera Schletterer

(Text-figs 197, 198)

Leucospis procera Schletterer, 1890 : 228–229, pl. 5, fig. 2, ♀. Holotype ♀, JAVA (MNHU, Berlin) [examined].

Leucospis littoralis Roepke, 1919 : 30–33, figs 1–3, ♀. Holotype ♀, JAVA: 'Batavia Kust' (BMNH) [examined]. **Syn. n.**

The two holotypes of *L. procera* and *L. littoralis* proved to be conspecific. Until now the male was unknown.

♂. 5·5 mm. Yellow colour reduced to: scape, tiny spots at side end of discal carina on pronotum, postero-lateral margin of scutellum, dorsal band in middle of gaster, dorso-lateral band in three-quarters of gaster nearly interrupted medially, spot on hind coxa dorso-basally and on legs similarly to ♀ except that they are mainly red instead of black (disc of hind femur black).

Sculpture and pubescence as in ♀, face with yellowish, dense but short pubescence. Gaster (Text-fig. 197) elongate-pyriform, very densely and rather regularly, moderately coarsely punctured. First tergite about as long as broad, slightly narrowed basad, dorsally weakly convex, hind margin subemarginate, narrowly impunctate. Second and third tergites subequal in length, short, third only vaguely delimited dorsally, both together less than half as long as broad, but their epipleura distinct, high, dorsally delimited by distinct carina. Fourth and fifth tergites indicated only by yellow bands. Sternites narrow, the first with high ventral tooth, hind margins of following sternites raised, surface concave, fifth and sixth distinctly elongate, seventh (last) subquadrate, posteriorly rounded, its surface medially broadly depressed.

BIOLOGY. Host unknown.

DISTRIBUTION. Indonesia (Sumatra, Sumbawa), North Borneo.

MATERIAL EXAMINED.

Type data given in synonymy.

BORNEO: West Coast Residency, Ranau, 500 m, 28.ix.–7.x.1958, 1 ♀ (*T. C. Maa*) (BBM, Honolulu). SUMATRA: Bengkalis Island, 1885, 1 ♀ (*Maindron*) (MNHN, Paris); P. Sebesi, 11.vi.1955, 1 ♀ (*A. M. R. Wegner*) (ZMU, Leiden). SUMBAWA: west, iv–v. 1927, 1 ♂ (*Rensch*) (MNHU, Berlin).

Leucospis funerea Schletterer

(Text-fig. 203)

Leucospis funerea Schletterer, 1890 : 247–249, ♀. LECTOTYPE ♀ (here designated), MALUKU: Ambon (MNHU, Berlin) [examined].

This species has distinct short cross-rugae between the deep and dense punctures on the disc of mesoscutum. The dull sculpture reminds one of some species classified in the key with couplets 42–45. The examined specimens are mostly black, only one female has a yellow band at the hind margin of the fifth tergite and two tiny dots in front of the discal carina on the pronotum. This suggests some variation in colour, probably similar to *L. moleyrei* Maindron. The only male I examined has two small yellow spots on the pronotum and a small spot ventro-basally on hind femur. The gaster is similar to the other species of this group; the first tergite has narrow interspaces dorsally, the hind margin of the fourth tergite is indicated laterally by a vague smooth line, margin of the fifth tergite laterally and dorsally by a change in density of the punctures which are finer on the base of the sixth tergite. The sternites are relatively narrow, medially depressed, the last sternite fully 1·5 times as long as broad, slightly expanding posteriorly, its apex broadly rounded, subtruncate. Length of body 11·5 mm (in female 12–16 mm).

BIOLOGY. Still unknown.

DISTRIBUTION. Maluku.

MATERIAL EXAMINED.

Type data given in synonymy.

MALUKU: Ambon (= Amboina), 1 ♀, paralectotype of *funerea* (*Rosenberg*) (MNHU, Berlin); Ambon, Waai, i., ii., x. 1964, 2 ♀, 2 ♂ (*A. M. R. Wegner*) (RNH, Leiden and BMNH).

Leucospis moleyrei Maindron

(Text-figs 204, 205)

Leucospis Moleyrei Maindron, 1878 : cix–cx, ♀. LECTOTYPE ♀ (here designated), NEW GUINEA: Tjendravesih, Dorey (MNHN, Paris) [examined].

Leucospis Kriegeri Enderlein, 1901 : 215–216, ♀. LECTOTYPE ♀ (here designated), NEW GUINEA: Milne Bay (MNHU, Berlin) [examined]. **Syn. n.**

Leucospis nocticolor Strand, 1911*b* : 162–163, ♂. Holotype ♂, NEW GUINEA: Irian Barat, Taua (MNHU, Berlin) [examined]. **Syn. n.**

Leucospis simillima Strand, 1911*b* : 169, ♀. LECTOTYPE ♀ (here designated), NEW GUINEA: Finschhafen (MNHU, Berlin) [examined]. **Syn. n.**

I found in the Paris Museum two females from the original material of *L. moleyrei*, which were acquired in 1878 from Raffray and Maindron. The better preserved specimen is designated as lectotype.

L. kriegeri. Two original specimens, the bigger designated as lectotype. It differs from the lectotype of *moleyrei* in having the scutellar spots reduced to small dots, then hind coxa, femur and first and fourth tergite are black, without markings; the puncturation on thorax and hind coxa is slightly less dense. The paralectotype of *kriegeri* has the scutellum black but hind coxa is dorsally yellow. Apparently some markings may be absent; for example the scutellum in the lectotype of *moleyrei* has spots broadly separated, in the paralectotype united, in both the first tergite with small to moderate subbasal spots. The slightly yellowish facial pubescence of *moleyrei* is white in *kriegeri* but I do not think that this is of any taxonomic importance in this species. Further variation is seen in smaller specimens like those belonging to the Budapest Museum and the holotype of *L. nocticolor*. These specimens bridge also any gap between *moleyrei*, *kriegeri* and *simillima*, the lectotype of which is again a large female. The variation in *L. moleyrei* seems to be analogous to that in *L. histrio* Maindron.

BIOLOGY. Hosts still unknown.

DISTRIBUTION. New Guinea (West Irian, Territory of New Guinea and Papua).

MATERIAL EXAMINED.

Type data given in synonymy.

NEW GUINEA: West Irian, Hollandia, 2 ♀ (RNH, Leiden); Territory of New Guinea, Madang, 1941, 1 ♀ (*O'Connor*) (BMNH): T.N.G., Astrolabe Bay, including Stephansort and Mt Hansemann, 1897, 5 ♀ (*Biro*); T.N.G., Tami, Nugudu, 1 ♀ (*Biro*) (TM, Budapest); T.N.G., Finschhafen, 1 ♀ paralectotype of *simillima* (MNHU, Berlin); T.N.G., Simban, Huon Gulf, 1898–1899, 6 ♀, 4 ♂ (*Biro*) (mainly TM, Budapest); T.N.G., But, ii. 1910, 1 ♀ (*Schoede*) (MNHU, Berlin); Papua, Kapakapa, 1891, 2 ♀ (*Loria*) (MCSN, Genoa); P., Milne Bay, 1 ♀ paralectotype of *kriegeri* (MNHU, Berlin).

Leucospis ventricosa sp. n.

(Text-figs 199, 200)

♀. 13 mm. Black, non-metallic, gaster red; pale yellow are: scapus beneath, two converging short lines anteriorly on pronotum nearly meeting by narrow tips, a spot on dorsal edge of hind coxa at base, knees dorsally, fore tibia along dorsal edge and small spots externally on tips of mid and hind tibiae; tarsi brown. Wings blackish with violaceous tinge.

Head hardly as broad as pronotum, dorsally nearly 2·5 times as broad as long; temples short, indistinct. Occipital carina high but disappearing at eyes, on ocellar area accompanied by another parallel carina between the unusually small ocelli, hiding median ocellus from behind and lateral ones in facial view (Text-fig. 200); lateral ocellus twice its diameter from median ocellus; vertex laterally transversely rugose-punctured, area at side of lateral ocellus smooth, larger smooth area antero-laterally of median ocellus, this ocellus about one-third its diameter from high scrobal carina; POL : OOL as 1·25 : 1; frontal protuberances rather low. Head in facial view 1·43 times as broad as high; pubescence of face short and fairly dense, punctura-

tion irregularly rugulose, not very fine; interantennal area with smooth median ridge which is carinate more dorsally; eye orbit barely emarginate. Relative measurements: height of head 72, width of frontovertex 58, scrobes 29, lower face 51, its height 32, eye 54 : 38, malar space 11·5, mouth 40, scape 25. Lower margin of clypeus very slightly produced, with semicircular small lateral lobes and triangular median tooth.

Pubescence of thorax whitish, short; puncturation relatively fine but unequal, interspaces mostly smooth, only anteriorly on mesoscutum with some microscopic cross-striation and laterally on scutellum with scattered minute punctures. Pronotum strongly transversely convex; slightly swollen arcuate anterior ridge connected medially with angulately raised discal carina, also premarginal and marginal carina strongly raised; sides dorsally subconcave, slightly converging; lateral panel dorsally not delimited, except for small adspiracular space all slightly convex, very coarsely horizontally rugose-punctured, lower corner obtuse-angular. Mesoscutum with transversely raised rugae, slightly depressed submedially posteriorly and here with deep coarse punctures; notaular furrows anteriorly indicated; vestiges of parapsidal furrows deep but short. Scutellum nearly 1·3 times as broad as long, fairly convex, at deep admarginal crenulate furrow with a shiny strip of obliterated sculpture. Dorsellum extremely short, forming a swollen band with piliferous separated punctures; shorter than propodeum medially; sides of metanotum with a row of foveolae. Propodeum very coarsely irregularly punctured, with short hairs; plicae not conspicuous; postspiracular furrow with strong cross-ridge just behind middle, hind fovea with very short and extremely fine dense pubescence, hairs grey. Upper mesopleurum densely coarsely punctured, interspaces smooth. Fore femur not carinate but fore tibia with distinct dorsal and externo-ventral carinae. Hind coxa nearly regularly and fairly densely punctured, pubescence short; dorsal edge moderately broad anteriorly, narrowing caudad and with increasingly high though irregular inner carina, dorsal edge in two-thirds still nearly as broad as hind basitarsus; no dorsal tooth indicated; depression broad, fairly concave. Hind femur (Text-fig. 199) sparsely and not coarsely punctured, shiny; also hind tibia externally rather sparsely finely punctured; apex distinctly produced into a spine.

Gaster distinctly longer than head plus thorax combined, slightly higher than broad, even anteriorly very broad; puncturation generally not very dense, pubescence inconspicuous, extremely short. First tergite 0·8 as broad as gaster posteriorly, about 1·2 times as long as broad; simple median ovipositorial furrow smooth on bottom, delimited by raised carinate margins; sublaterally interspaces much broader than punctures, denser at smooth hind margins. Third tergite not depressed, sparsely coarsely punctured (in middle nearly smooth) but with crowded line of punctures along the subangulate hind margin; medially with subcarinate shallow ovipositorial furrow. Fifth tergite with much coarser puncturation, ovipositorial furrow expanding and shallower posteriorly, in median line tergite about two-thirds as long as first tergite. Ovipositor reaching dorsellum.

♂. Unknown.

BIOLOGY. Unknown.

Holotype ♀, PHILIPPINES: Camarines Sur, Mt Iriga, 500–600 m, 19.iv.1962 (*H. Torrevillas*) (BBM, Honolulu).

Leucospis violaceipennis Strand
(Text-figs 207, 208)

Leucospis violaceipennis Strand, 1911*b* : 169, ♀. Holotype ♀, NEW IRELAND: Lamasong (MNHU, Berlin) [examined].

By its black colour and rather sparse puncturation (at least on the gaster) *L. violaceipennis* shows a great similarity to *L. nigerrima* Kohl, although both belong to different species-groups. Within the *elegans*-group *L. violaceipennis* seems to be closest to *L. moleyrei* Maindron.

♂. 9·5–11·0 mm. Without any pale markings, as in ♀. Gaster (Text-fig. 208) with third tergite separated only on sides below the lateral keel (on epipleurum), fourth and fifth tergites are completely fused, base of the sixth indicated by a slight depression. Density of punctures increasing caudad, first tergite submedially and sublaterally with interspaces distinctly broader than punctures, medially narrower than punctures. Epipygium extremely densely punctured, subvertical, with a strong transverse depression. Lateral corners of sixth tergite not protruding. Second sternite with distinct angular tooth; third sternite transverse; fifth and sixth sternites each 1·7–1·8 times as long as broad; seventh (last) sternite about 1·2 times as long as broad before middle, subapically slightly widened, apex broadly rounded, surface of sternite slightly depressed basally and along middle posteriorly, fairly densely punctured but hairs very short.

In ♀ fifth tergite medially shorter than the first (ratio 5 : 7), submedially with interspaces about as broad as punctures, their brown or black short hairs barely reaching beyond the puncture.

BIOLOGY. Hosts unknown.

DISTRIBUTION. New Guinea, Solomon Islands.

MATERIAL EXAMINED.

Type data given in synonymy.

NEW GUINEA: no other data, 1 ♀ (*J. L. Froggatt*) (BMNH). SOLOMONS: Bougainville, 1 ♀ (MCSN, Genoa), 2 ♀ (TM, Budapest); Buin, I.i.1971, 1 ♀ (*Daniels*) (AM, Sydney); Santa Isabel Island, Buala, 2.iii.1965, 1 ♀ (*E. S. Brown*) (BMNH); Savo Island, Reko, 26.ii.1934, 1 ♀ (*H. T. Pagden*) (BMNH); Guadalcanal, i.1921, 2 ♀ (*Kuschel*) (BBM, Honolulu); 1000–1600 m, xii. 1934, 2 ♀ (*C. Bird*) (BMNH); Lame, nr Mt Tatuve, 300 m, 18.v.1960, 1 ♀ (*O'Brien*); Honlara District, Kokum, 1956, 3 ♀ (*E. S. Brown*); 18.iv.1963, 1 ♀ (*P. Greenslade*); Tapenanje, xii. 1953, 4 ♀, 2 ♂ (*J. D. Bradley*) (all BMNH); San Cristobal Island, Goge, vii. 1965, 2 ♀ (*E. S. Brown*) (BMNH).

THE *AUSTRALIS*-GROUP

The hind coxa has a distinct dorsal tooth in which this group differs from all the other species of the Indo-Australian fauna except *L. regalis* Westwood; the latter species has, however, quite a different hind femur. The American *affinis*-group shows more resemblance but has unarmed dorsellum.

The group includes four Australian species, viz. *L. morawitzi* Schletterer, *L. rieki* nom. n. [= *regalis* (Girault)], *L. bioculata* sp. n. and *L. australis* Walker. The latter species has a synonym in *Exoclaenoides uncinctus* Girault, regarded by Girault as a separate genus. I can only agree with Weld (1922 : 3, 5), who synonymized it with *Leucospis* Fabricius.

Leucospis morawitzi Schletterer

(Text-figs 213, 214)

Leucospis Morawitzi Schletterer, 1890 : 237–239, ♀. Holotype ♀, 'AUSTRALIA' (MNHU, Berlin) [examined].

This species is easily recognizable by the unique puncturation of the scutellum (Text-fig. 214), and from most other species also by its beautiful metallic tinge.

The pronotum is not distinctly depressed transversely, its hind margin hardly elevated, also the premarginal carina is very low, vague, as is a vestigial discal carina. The face is unusually coarsely rugulose-punctured. Hind coxa everywhere coarsely densely punctured and with short pubescence, the broad dorsal edge posteriorly with distinct tooth. The ovipositor nearly reaches the base of the first tergite. The wings dark brown, nearly blackish at the anterior margin; apical processus of stigmal vein about as long as uncus. Length 6·0–9·5 mm. For the male see Text-fig. 213.

BIOLOGY. Unknown.

DISTRIBUTION. Australia: Western Australia, South Australia, New South Wales.

MATERIAL EXAMINED.

Type data given in synonymy.

AUSTRALIA: Western Australia, Dongara, x. 1935, 2 ♀ (*R. E. Turner*); W. A., Yanchep, 32 mls N. of Perth, i. 1936, 1 ♀ (*A. Raymond*); W. A., Perth, i. 1936, 1 ♂ (*Turner*); W.A., Bullsbrook, nr Pierce, 13.i.1966, 1 ♀ (*O. W. Richards*); W.A., Merredin, xii. 1935, 1 ♂ (*Turner*); W.A., Dedari, 40 mls W. of Coolgardie, i.1936, 1 ♀ (*Turner*); W.A., Yallingup, 1914, 1 ♀, 2 ♂ (*Turner*) (all BMNH); W.A., Bunbury, xii. 1938, 1 ♂ (*A. Snell*) (AM, Sydney); W.A., King George's Sound, 2 ♀ (AM, Sydney); South Australia, Port Lincoln, 1 ♀ (AM, Sydney); New South Wales, Sydney, Berowra, 11.xii.1923, on *Angophora* flowers, 1 ♀ (*Nicholson*) (BMNH); N.S.W., Sydney, Wahroonga, 1923, 1 ♀ (*Carter*) (BMNH); 'Australia', 2 ♀, 2 ♂ (UM, Oxford; BMNH).

Leucospis rieki nom. n.

(Text-figs 217, 218)

Exoclaenoides regalis Girault, 1926 : [1]. LECTOTYPE ♀ (here designated), AUSTRALIA: Victoria, Bamawn (QM, Brisbane). [Junior secondary homonym of *Leucospis regalis* Westwood, 1874.]

Mr Dahms kindly helped in designating the single known orginal female type of *E. regalis* as lectotype and pointed out that the name of the type-locality, originally given as 'Damawn', was corrected by Girault (1928 : [3]) to Bamawn.

There is no doubt that this species belongs to the genus *Leucospis* Fabricius, but within the genus its name is preoccupied by *L. regalis* Westwood, 1874 (see p. 162). I rename the species after my friend and colleague Dr E. F. Riek (of Canberra), who helped me in recognition of the Australian species along with Mr E. C. Dahms (of QM, Brisbane).

Girault in his short description omitted the metallic colour of the species, by which it differs from the otherwise very close *L. bioculata* sp. n., as may be seen in the key above. In addition, I find only that the spots of the scutellum are smaller in *L. rieki* (Text-fig. 218), the yellow on the first tergite (female) reduced to two oblique spots anteriorly, whilst the markings on the fifth tergite and epipygium

are larger. Perhaps all these differences might be within the range of variation of one species, but for the metallic colour which is so strong as in *L. morawitzi* Schletterer.

BIOLOGY. Unknown.

DISTRIBUTION. Australia: Victoria, New South Wales.

MATERIAL EXAMINED.

AUSTRALIA: New South Wales, Bogan River, 1 ♀ (*J. Armstrong*) (CSIRO, Canberra).

Leucospis bioculata sp. n.

(Text-figs 215, 216)

♀. 11·0–12·5 mm. Black, without metallic tint, but following parts pale ochreous-yellow: scapus except dorsally, broad band on pronotum extending subtriangularly forward in middle and on sides, a spot on either side of mesoscutum at wing, two elongate oval spots on scutellum (hence the name; Text-fig. 215), dorsellum, metapleurum, fore and hind coxae apically (mainly beneath), all knees and fore and mid tibiae on inner side, hind femur at base beneath, hind tibia except ventrally, hind tarsus basally, first tergite very broadly except median furrow, fifth tergite with a crossband in anterior quarter, epipygium dorso-apically. Fore wing slightly brownish, but strongly infuscate along anterior margin.

Head hardly broader than pronotum, in dorsal view about 2·2 times as broad as long; temples conspicuous, slightly receding, about quarter of dorsal length of eye. Vertex densely rugose-punctured; occipital carina low, distinct only behind ocellar area which is barely raised; ocellar triangle about 3 : 1, POL about twice OOL; carinate scrobal margin about 0·3 diameter from median ocellus; scrobes dorsally narrower than distance from eye (ratio 16 : 22); frontal protuberance moderate; emargination of eye orbit inconspicuous. Head in facial view 1·24–1·30 times as broad as high; interantennal area with carina extending ventrad into a smooth strip; lower face medially flat; clypeus rounded-subtriangular, its lower margin moderately produced, side lobes semicircular, median tooth shorter, triangular. Relative measurements: head width 92, frontovertex 54, scrobes (just above toruli) 28, lower face width 56, its height 34, eye 51 : 33, malar space 14, mouth 46. Flagellum very slightly clavate, combined with pedicellus less than 1·2 times as long as breadth of head; pedicellus dorsally slightly oblong, scarcely shorter than first flagellar segment which is constricted at base and shorter than following segment; latter segment about 1·9 times, eighth flagellar segment hardly 1·1 times as long as broad; clava 1·9 : 1, not acuminate.

Pronotum densely punctured, convex, sides hardly converging, hind margin slightly emarginate and weakly carinate, premarginal carina low and sometimes (as in holotype; 11 mm) vague; no discal carina; lateral panel most deeply depressed below middle of blunt lateral edge, bottom of depression almost impunctate but dull, finely reticulate; lower corner rounded. Mesoscutum densely reticulate-punctured, some thin transverse septa indicating cross-carinulae; surface convex but notaular furrows suggested by weak depressions; parapsidal vestiges about twice as long as axilla, not slot-like. Scutellum almost flat, subquadrangular, about 1·2 times as broad as long, sides parallel; apex slightly produced and separated by shallow crenulate depression; interspaces of punctures narrow and without conspicuous sculpture. Dorsellum bare, alveolate, its margin carinate and produced in two sharp teeth; sides of metanotum coarsely punctured and hairy as median area of propodeum. Propodeum medially about as long as dorsellum; median carina low; plicae low, distinct, anteriorly expanding in triangular impunctate area; postspiracular furrow shallow, moderately hairy. Sides of thorax densely punctured, narrow interspaces smooth. Upper end of metapleurum with blunt tooth. Fore

femur with coarse puncturation externally, not carinate dorsally; tibia subcarinate dorsally and ventro-laterally. Hind coxa (Text-fig. 216) densely punctured, pubescence of medium length; dorsal side flat anteriorly, narrowing caudad, with slender oblique tooth bearing piliferous punctures; depression of coxa narrow, most densely punctured in upper half; meso-ventral edge strongly curved. Hind femur densely punctured; basal tooth rather sharp, strong, following teeth small, the middle the longest. Hind tibia at apex slightly obliquely truncate, outer spur not very small; external carina developed along three-fifths. Fore wing with stigmal vein curved, uncus as long as or slightly longer than terminal processus.

Gaster subconstricted at apex of first tergite, behind first third of fifth tergite slightly narrowing towards the broadly rounded apex; dorsum nearly plain. Pilosity (as on thorax) short, semi-erect to erect. Puncturation dense, mainly coarse, but much finer on first tergite, especially at the parallel-sided ovipositorial furrow which is smooth on bottom. First tergite slightly longer than broad, its breadth subequal to dorsal length of fifth tergite; latter with rather shallow dorsal furrow, its length distinctly inferior to its distance, medially, from apex of gaster. Spiracles situated in upper third of height of gaster (lateral view), lower end of exposed part of sixth tergite slightly below middle. Ovipositor sheaths about reaching base of gaster.

♂. 6–11 mm. Colour as in ♀ but tarsi paler, in small specimens scutellar spots connected in posterior half; gaster: first tergite with broad dorsal band, third and fourth with epipleura mainly pale yellow, fourth tergite also with a band dorsally; sixth tergite posteriorly with reversed-cordiform macula; a small spot on epipygium; also sternites 1–4 mainly pale. Basal flagellar segments less elongate than in ♀, the second only 1·4 times as long as broad. Gastral tergites dorsally fused almost without trace, basal ones separated only below the double-curved epipleural carina. Apical corners of sixth tergite shortly tooth-like; epipygium with shallow transverse depression, apex rounded. First sternite strongly conical but tooth blunt at apex; sternites 2–5 decreasingly transverse, sixth and seventh (last) subquadrate, fourth sternite hardly depressed medially, fifth to seventh increasingly depressed; last very deeply so, its apical margin narrowly emarginate, the raised sublateral horizontal areas very densely hairy.

BIOLOGY. Unknown.

Holotype ♀, AUSTRALIA: Western Australia, Waroona, 17.xii.1909 (*G. F. Berthoud*) (BMNH).

Paratypes. Same locality as holotype, 22. ii.1908, 30.i.1909 and 24.ii.1910, 2 ♀, 1 ♂ (allotype) (*Bethoud*) (MNHN, Paris and BMNH); Capel District, 18 mls S. of Bunbury, 7.i.1957, 1 ♂ (*A. Snell*) (AM, Sydney).

Very close to *L. rieki* nom. n. but lacks metallic colour.

Leucospis australis Walker

(Text-figs 211, 212)

Leucospis australis Walker, 1871 : 57, ♂. LECTOTYPE ♂ (here designated), AUSTRALIA: South Australia (BMNH) [examined].

Leucospis Darlingii Westwood, 1874 : 134–135, pl. 25, fig. 4, ♀. LECTOTYPE ♀ (here designated), 'AUSTRALIA' (UM, Oxford) [examined]. **Syn. n.**

Exoclaenoides uncinctus Girault, 1915 : 356–357, ♀. Holotype ♀, AUSTRALIA: Queensland, Brisbane (QM, Brisbane). **Syn. n.**

Exoclaenoides mutilloides Girault, 1921 : 189. LECTOTYPE ♀ (here designated), AUSTRALIA: Queensland, Brisbane (QM, Brisbane). **Syn. n.**

In each case the original material is apparently represented by single specimens which are designated as lectotypes except in *uncinctus*, the author of which stated that he had only one specimen.

I feel sure that *australis* and *darlingii* are different sexes of the same species. I could not see the type of *uncinctus* but have seen a female which fits almost exactly the detailed description of colour by Girault. Mr E. Dahms (of Brisbane) kindly sent me drawings he made from its type and from the type of *mutilloides* (and co-operated in the designation of the single original female of *mutilloides* as lectotype) and Dr Riek kindly submitted a female compared with the latter. Morphologically they cannot be separated from *darlingii* (= *australis*), but differ slightly in colour, having, in the type of *mutilloides*, the pronotal red-orange band reduced to a small transverse spot and the maculae on the first tergite reduced to small lateral spots, whilst the band on the fifth tergite and apex of gaster are very extensively orange. On the other hand, in the type of *uncinctus*, the pronotal band is complete and partly double, the maculae on the first tergite are large but the bands on the fifth tergite and at apex are only moderately broad. Some of the specimens which I have seen are rather intermediate. Therefore I think that all of them belong to one species, although, for the time being, I am unable to explain why the colour markings do not spread correspondingly on the mentioned parts of the body.

The orange markings vary greatly also in the male. In the one redescribed by Strand (1911*b* : 163, 168) it spreads for example over the whole apical half of the gaster. I compared this male with the type of *australis* and with that described by Schletterer (1890 : 249–251). Length of body 6·3–10·0 mm, female 10·0–15·5 mm.

BIOLOGY. Host unknown.

DISTRIBUTION. Australia.

MATERIAL EXAMINED.

Type data given in synonymy.

AUSTRALIA: no data, 1 ♂ (EI, Zurich); 1870, 1 ♂ (*Higgin*) (UM, Oxford); 'N. Australia', 3 ♂ (BMNH); New South Wales, Blue Mts, i. 1934, 1 ♀ (*K. K. Spence*) (CSIRO, Canberra); N.S.W., Sydney, 1 ♀ (BMNH); Victoria, Melbourne, 1 ♂ (*Rolle*) (MNHU, Berlin; cf. Strand, 1911*b*).

THE *DORSIGERA*-GROUP

This group is treated elsewhere (pp. 142–148) but it seems appropriate to mention here the Asiatic species, *L. japonica* Walker, *L. yasumatsui* Habu and *L. aurantiaca* Shestakov.

Leucospis japonica Walker

Leucospis japonica Walker, 1871 : 56–57, ♀. LECTOTYPE ♀ (here designated), JAPAN (BMNH) [examined].

Leucospis exornata Walker, 1871 : 57–58, ♀. LECTOTYPE ♀ (here designated), HONG KONG (BMNH) [examined]. **Syn. n.**

Leucospis japonica var. *formosana* Strand, 1911*a* : 98–99, ♀. LECTOTYPE ♀ (here designated), TAIWAN: Taihanroku (MNHU, Berlin) [examined]. **Syn. n.**

Leucospis orientalis Weld, 1922 : 28–29, ♀. Holotype ♀, CHINA: Soochow (USNM) [examined]. **Syn. n.**

L. exornata is the same species as *L. japonica* as presumed already by Schletterer (1890 : 227), although he examined only one specimen of *japonica* and could not see the types. The lectotypes of the two are hardly different even in extension of the yellow markings, except that the narrow lines bordering mesoscutum laterally are missing in *japonica*, as one could expect in a more northerly specimen. In southern specimens the yellow colour is more spread, forming eventually a cross-band on the pronotum and often the basal macula of hind femur is connected with the spreading dorso-apical streak. The latter form was described as var. *formosana* and is within the range of variation of the species (cf. also Masi (1932 : 33–36), Watanabe (1946 : 80) and Habu (1962 : 175)). In many species the yellow colour is more spread on specimens from warmer countries, but this spreading is gradual, probably caused by temperature and does not seem to have any taxonomic importance.

The holotype of *L. orientalis* is a specimen of *japonica* with unusually pale (discoloured) markings. Weld (1922) compared *orientalis* with *L. affinis* Say, which seems peculiar; probably she ran her specimen through the key to the New World species in Schletterer (1890).

The species is well redescribed by Masi (1932 : 33–36, figs 1, 2) and by Habu (1962 : 170–175; pl. 3, fig. 3, pl. 7, fig. 5, figs 322–325, 330, 333, 334, 336, 337, 339) who cites also the previous literature. Ashmead (1904*b* : 147) was the first to describe the male.

It is interesting that also in this species specimens occur in which the yellow of the markings may turn orange, as is well known in the Mediterranean *L. gigas* Fabricius. I have seen two females from West Tien-Mu-Shan in China, with markings orange and the wings darker than usual and one female from Nepal (westernmost locality!) with orange-red markings, including two elongate submedian spots on the mesoscutum, but otherwise similar to another female from Assam, in which orange are: a small transverse spot anteriorly and a cross-band posteriorly on the pronotum, slightly lateral margins of mesoscutum, macula on scutellum posteriorly, two oblique spots on the first tergite (female), a cross-band on fifth tergite, dorsal edge of hind coxa and hind femur with the usual lunate basal cross-fascia and a dorso-apical spot.

BIOLOGY. The hosts are mainly the Megachiline bees, but also Sphecidae and Eumenidae were recorded. Habu (1962 : 174) lists all previous records (with references) which include the bees *Megachile disjunctiformis* Cockerell, *M. nipponica* Cockerell, *M. sculpturalis* Smith, *Osmia excavata* Alfken and *O. taurus* Smith, then the Sphecids (*Sceliphron inflexum* Sickmann =) *Chalybion japonicum* (Gribodo), *Isodontia nigella* (Smith) and an unidentified Sphecid, and the Eumenid wasp (*Rhynchium mandarineum* Saussure =) *Anterhynchium flavopunctatum* (Smith). He repeats also the observation of Iwata (1933 : 14) that the larva of *Leucospis japonica* could not develop on another Eumenid species (*Ancistrocerus fukaianus*

Schulthess) and a similar case with *Odynerus quadrifasciatus* Fabricius published in a Japanese paper by Yamamoto. The latter two cases suggest that the record of '*Rhynchium mandarineum*' should be checked. It is possible with the Sphecids, for example, that their cells are used by some solitary bee which is the actual host of the *Leucospis* parasite.

Iwata (1933 : 14–15) also describes the way in which *L. japonica* oviposits, and describes its larva.

DISTRIBUTION. Littoral Province of U.S.S.R. (Nikolskaya, 1960), Korea (Watanabe, 1946), Japan, China, Taiwan, Nepal, India (Assam).

MATERIAL EXAMINED.

Type data given in synonymy.

JAPAN: Tokyo; Matsuyama; Kamakora (various depositories). NORTH KOREA(?): Gan Chuen-Fu, Anshunfu, 1 ♀ (*Cavalerie*) (MNHN, Paris). CHINA: Peking, ix. 1928, 1 ♂ (BMNH); Tsing-Hua, vii. 1928, 1 ♀ (CU, Ithaca); Kiaochow (Kwai-Tcheu), Pin-Fu, 6 ♀ (*Cavalerie*) (MNHN, Paris); Province Kiangsu, 13 ♀, 1 ♂ (BMNH; MNHN, Paris); Suchow, 1 ♀ (CU, Ithaca); Shanghai, 2 ♀ (MNHN, Paris); Hangchow, 1925, 2 ♀ (*Pichon*) (MNHN, Paris); Honan, West Tien-Mu-Shan Mts, vi. 1935, 2 ♀ (*Höne*) (MNHU, Berlin); West Yunnan, Ta-li-fu, viii. 1914, 1 ♂ (*Mell*) (MNHU, Berlin). TAIWAN: Fuhusho; Kosempo; Paroe, Paiwan District; Hoozan; Taihanroku; Taihorin; Taihorinsho, i, v–x.1908–1912, 26 ♀, 13 ♂ (*H. Sauter*) (DEI, Eberswalde; MNHU, Berlin; BMNH; NM, Vienna; MCSN, Genoa). NEPAL: Godavari, 1700 m, R. Botanical Garden, 23.vii.1967, 1 ♀ (*Canad. Nepal Exp.*) (ERI, Ottawa). INDIA: Assam, Khasia Hills, 1 ♀ (EI, Zurich).

Leucospis yasumatsui Habu

Leucospis yasumatsui Habu, 1961 : 83–85, figs 8–13, ♀. Holotype ♀, CHINA: Shansi Province, Henlingshan-Peihungkaokow (ELKU, Fukuoka).

Professor Y. Hirashima could not find the type-material of this species which, according to Dr A. Habu, should be deposited in ELKU, Fukuoka. The characters used in the key above are taken from Habu's description and figures.

BIOLOGY. Host unknown.

DISTRIBUTION. North China.

Leucospis aurantiaca Shestakov

Leucospis aurantiaca Shestakov, 1923 : 96–98, figs 1, 2, ♀. Holotype ♀, CHINA: Alashan, Dyn-juan-in (ZI, Leningrad).

I could not see the type (Shestakov had only one female collected 18.vi.1908) but Dr Trjapitzin (ZI, Leningrad) kindly enabled me to examine another specimen collected in the type-locality and mentioned by Nikolskaya (1960 : 202).

Very close to *L. biguetina* Jurine, but differs mainly in the following characters in addition to those mentioned in the key above.

Pale orange markings very extensive including scape (pedicellus and base of flagellum pale reddish), whole of pronotum, scutellum (except axillae) and legs (except small black spots at base of coxae), median quadrangle and broad sides of mesoscutum, upper mesepisternum, metapleurum and most of first, fourth and fifth tergites and epipygium. Frontal protuberances very weak. Premarginal carina on pronotum obliterated. Scutellum fairly convex. Propodeum medially raised, median carina weak among coarse and very irregular alveolate sculpture including several stronger rugae. Toothed margin of hind femur suggesting a lobe subapically (Shestakov, 1923 : fig. 1; Nikolskaya, 1960 : 201, fig. 126).

BIOLOGY. Unknown.

DISTRIBUTION. North China.

MATERIAL EXAMINED.

CHINA: Alashan, Dyn-juan-in, 22–27.vi.1908, 1 ♀ (*Kozlov*) (ZI, Leningrad).

THE *PEDICULATA*-GROUP

Some species of this group have the small teeth behind the broad basal tooth of hind femur extremely small and regular, in the form of a comb (Text-figs 225, 233). One of these species, when described, was put in a separate genus, *Epexoclaenoides* Girault (1915, with *E. bicinctus* Girault as type-species). Weld (1922 : 4, 35), without actually knowing the type-species, accepted the genus as valid and described in it another, rather aberrant species (*pyriformis*) and added its gastral characters to the generic characteristics. However, with more species known, both the form of the gaster and of the teeth on the hind femur proved useless for separating even a species-group. For example, *L. globigera* sp. n. has almost identical form of gaster as *L. pyriformis* (Text-figs 234, 235), but the teeth are irregular, not comb-like. On the other hand they are minute and regular in *L. pediculata*, slightly irregular in *L. williamsi* (Text-fig. 225) and quite irregular, as in most *Leucospis* species, in *L. micrura*, *L. bakeri* and *L. maculata* (Text-figs 235, 236).

The following characters of the species-group, partly also used in the key, may be stressed.

Genae short, strongly converging. Pronotum convex, premarginal carina always distinct, short discal carina often so, though not angulately raised. Dorsellum at margin slightly to distinctly carinate, shortly bidentate or bituberculate. Hind coxa without dorsal tooth, dorsal edge even posteriorly rather broad, its sloping edge blunt or, rarely (*L. micrura*), subserrate. Hind tibia apically subtruncate, outer spur conspicuous, not rudimentary. Gaster in both sexes subpetiolate, distal part distinctly inflated, in female dorsally obliquely sloping, reflexed ovipositor reaching at most near to base of fifth tergite, sometimes very short.

The group seems to be most related to the *dorsigera*-group, at least on the pronotal, dorsellar and hind leg characters, but differs mainly in the form of gaster and apex of hind tibia. It is known only from the Indo-Australian region and includes *L. bakeri* Crawford, *L. maculata* Weld, *L. williamsi* sp. n., *L. calligastri* (Ferrière), *L. pediculata* Guérin-Méneville, *L. giraulti* nom. n. (= *bicinctus* Girault), *L. pyriformis* (Weld), *L. globigera* sp. n. and *L. micrura* Schletterer.

Leucospis bakeri Crawford

(Text-figs 222–224)

Leucospis bakeri Crawford, 1914 : 457–458, ♀. Holotype ♀, PHILIPPINES: Luzon, Los Baños (USNM) [examined].

Leucospis gonogastra Masi, 1932 : 36–38, figs 3, 4, ♀. LECTOTYPE ♀ (here designated), TAIWAN: Kankau (DEI, Eberswalde) [examined]. **Syn. n.**

In addition to the holotype of *L. bakeri* I examined also the female specimen mentioned by Weld (1922 : 30) from Cuias Panay. From the two 'cotypes' of *gonogastra* I selected as lectotype the one described by Masi (1932) as having the yellow markings more extended. The male was described by Weld (1922 : 30).

The species is extremely close to *L. maculata* Weld, but always seems to have the mesoscutum yellow-marked, and the first tergite is different. In the female its median line appears carinate, in the male (Text-fig. 224) the tergite is relatively narrower, distinctly longer than broad, its sides subparallel. The posterior part of gaster is relatively narrower, but the sternites in the male (Text-fig. 223) broader, less elongate. The female of *bakeri* seems to have the discal carina on pronotum less distinct and the orange-yellow band on the fifth tergite intersects the sheaths at about the middle. *L. bakeri* is slightly smaller, more slender and less dark than *L. maculata*.

BIOLOGY. Host unknown.

DISTRIBUTION. Taiwan, Philippines (cf. Hedqvist, 1968 : 153), Borneo.

MATERIAL EXAMINED.

Type data given in synonymy.

TAIWAN: Kankau, 1 ♀ (*Sauter*), paralectotype of *L. gonogastra* (DEI, Eberswalde). PHILIPPINES: Cuias Panay, 1 ♀ (*McGregor*) (CU, Ithaca); Luzon, Los Baños, vii, ix. 1916, 2 ♀, 1 ♂ (*F. X. Williams*) (BBM, Honolulu); Luzon, Acupan, Benguet, 1 ♀ (*C. S. Banks*) (MCZ, Cambridge); Luzon, Bataan Prov., Dinalupihan, W. of Culo, 16.ix.1945, 1 ♀ (*R. Dow*) (MCZ, Cambridge); Luzon, Abatan, Buguias, 60 km S. of Bontoc, 1800–2000 m, 1.vi.1964, 1 ♀ (*Torrevillas*) (BBM, Honolulu). BORNEO: Kudat, 9.–18.ix.1927, 5 ♀, 1 ♂ (*C. B. K. & H. M. P.*) (BMNH).

Leucospis maculata Weld

(Text-fig. 221)

Leucospis maculata Weld, 1922 : 30–32, ♀, Holotype ♀, WEST MALAYSIA: Penang (USNM) [examined].

The BMNH has a female of this species from Penang, the type-locality, almost identical with the holotype, except that the pale markings are slightly more reduced, missing on the mesoscutum. At first I regarded these specimens as a form of *L. bakeri* Crawford, but the discovery of the male convinced me that two close species are involved. Unlike *L. bakeri* the female has the first tergite not carinate but

instead with a narrow impunctate strip slightly broadening caudad and the yellow cross-band on the fifth tergite is situated near the hind margin and intersects the base of the sheaths. The male was previously unknown.

♂. 7·3 mm. Colour pattern as in ♀ but gaster with orange cross-bands, one at one-third of broad part, second at two-thirds and with round spot above epipygium apically. Propodeal plicae very strong, high, accompanied by perpendicular short rugae. Gaster (Text-fig. 221) slightly longer than and as broad as thorax. First tergite about as long as broad, subglobose, strongly convex, except in basal quarter (which is impunctate) with dense coarse and mostly rugose puncturation which becomes sparser posteriorly and much finer and sparser laterally. Rest of gaster covered by a dorsally undivided ovoid carapace; its base with suggested median keel and conspicuous short lateral (epipleural) keels; epipleura high, basally with raised margins of second and third tergites; apical corners of sixth tergite not distinct; exposed part of epipygium rounded, strongly depressed transversely, cercus behind tiny vertical carina. Sternites very narrow (Text-fig. 221): the first with high transverse carinate tooth; following ones shallowly depressed medially, third to fifth and seventh only anteriorly so; fifth 1·5 times as long as broad, seventh (last) hardly longer than broad, its surface apically slightly convex, apical margin semicircular.

BIOLOGY. Host unknown.

DISTRIBUTION. West Malaysia.

MATERIAL EXAMINED.

Type data given in synonymy.

WEST MALAYSIA: Selangor, Bukit Kutu, 13.ix.1929, 1 ♂ (*H. M. Pendlebury*) (BMNH); Island Penang, Batu Feringgi area, 26.i.1960, 1 ♀ (*H. T. Pagden*) (BMNH).

Leucospis williamsi sp. n.

(Text-figs 225–227)

♀. 8·0–10·5 mm. Brownish black but following parts ochreous-yellow: scape, two cross-bands on pronotum, lateral margins of mesoscutum, scutellum except on disc and basally, metapleurum, cross-band on fourth tergite, another band just behind middle of fifth tergite, vertical streaks on epipygium, apical halves of fore and mid femora, all tibiae except beneath, all tarsi, hind coxa dorsally and in distal parts along lateral and ventral edges, hind femur on ventro-basal and broad dorsal streaks. Antennal flagellum brownish to reddish. Fore wing slightly infumate, more intensively so at venation and in apical fifth; venation and tegulae dark testaceous.

Head hardly broader than pronotum, in dorsal view (Text-fig. 226) nearly 2·2 times as broad as long; occipital carina not high and disappearing behind lateral ocelli; lateral ocellus 1·0–1·1 its diameter from eye. Ocellar triangle about 2·2 : 1·0, POL : OOL as 13 : 6; median ocellus about 0·25 its diameter from scrobal margin. Head in facial view about 1·36 times as broad as high. Face densely covered with slightly brownish pubescence, longer hairs rather abundant and even short hairs distinctly longer than hairs on eyes. Interantennal lobe with weak carina. Relative measurements: width of head 70, of frontovertex 34, face below antennae 27·5, eye 42 : 30, malar space 6·5, width of mouth 22, distance between toruli and lower margin of clypeus 23; the latter with broad median tooth exceeding low lateral lobes. Antennal flagellum subfiliform, combined with pedicellus about 1·2 times as long as width of head; proximal flagellar segments distinctly elongate, the fifth and sixth subquadrate.

Premarginal and discal carina on pronotum distinct, the premarginal sometimes less conspicuous owing to yellow band; lateral panel of pronotum not carinately set off, its fovea not

very deep. Mesoscutum densely punctured, the extremely narrow interspaces on disc with some transverse microreticulation but not raised transversely. Dorsellum with two moderate elevations separated by median depression, hind margin with faint carina. Propodeum medially about twice as long as dorsellum, with weak median and plical carinae; median area with moderately thick hairs directed mostly headwards; hind margin very slightly curved. Straight subvertical groove dividing upper mesopleurum narrow and shallow. Hind femur nearly 1·8 times as long as broad, outer surface smooth between moderately dense punctures; small teeth of the comb slightly irregular (Text-fig. 225).

Gaster (Text-fig. 227) distinctly longer than head plus thorax combined, clavate. First tergite at least 1·2 times as long as broad and about 0·6 the breadth of the fifth tergite; the latter with deep ovipositorial groove virtually reaching base of tergite, the yellow cross-band of which crosses about middle of rather long sheaths of ovipositor. Puncturation of gaster relatively coarse, interspaces narrow but distinct; first tergite with raised smooth median line.

♂. 6·3–8·7 mm. Very similar to ♀ but gaster relatively more clavate, first tergite more globose and less than half as broad as gaster posteriorly. Carapace of united tergites 1·7–1·8 times as long as broad. Last sternite basally deeply excavated, its apex truncate to subemarginate medially and smooth at margin.

BIOLOGY. The specimens collected by F. X. Williams were probably all reared from the nests of *Calligaster williamsi* Bequaert (Eumenidae, Hym.), as mentioned by him in his paper on the Oriental wasps (1919 : 163; the host then recorded as *Calligaster cyanoptera* (Saussure)).

DISTRIBUTION. Philippines.

Holotype ♀, PHILLIPINES: Luzon, Los Baños, ix. 1916 (*F. X. Williams*) (BBM, Honolulu).

Paratypes. PHILIPPINES, 1 ♀ (*R. H. R. Stevenson*) (BMNH); Los Baños, ix. 1916, iii., vii.–ix. 1917, 19 ♀, 4 ♂ (*F. X. Williams*) (BBM, Honolulu and BMNH); Palawan Island, Puerto Princessa, 15.iv.1915, 1 ♂ (*H. H. Blakemore*) (CAS, San Francisco).

Leucospis calligastri (Ferrière) **comb. n.**

(Text-figs 228, 229)

Epexoclaenoides calligastri Ferrière, 1938 : 357–359, ♀ ♂. LECTOTYPE ♀ (here designated), JAVA: Mt Gedeh, Tapos (BMNH) [examined].

Ferrière himself labelled, though not published, one female as Type and this is now designated as lectotype, whilst his 'cotypes' become paralectotypes.

BIOLOGY. Host: *Calligaster cyanoptera* Saussure (Hymenoptera, Eumenidae) (Ferrière, 1938 : 357).

DISTRIBUTION. Java.

MATERIAL EXAMINED.

JAVA: Mt Gedeh, Tapos, 800 m, ex nest of *Calligaster*, coll. 15. vii., emerged 11.vii.1932; another lot iv.1933, labelled 'ex *Zethus*', paralectotypes of *calligastri*, 10♀, 1 ♂ (*J. v. d. Vecht*) (BMNH), 3 ♀, 1 ♂ (*J. v. d. Vecht*) (RNH, Leiden); Mt Salak, Tjianten, 26.iii.1939, 1 ♀ (*J. v. d. Vecht*), Mt Salak, ex *C. cyanoptera*, 2.v.1937, 4 ♀, 1 ♂ (*F. Dupont*) (RNH, Leiden).

Leucospis pediculata Guérin-Méneville

(Text-figs 230, 231, 233)

Leucospis pediculata Guérin-Méneville, 1835 : pl. 67, fig. 7, ♂; 1844 : 413–414, ♀. LECTOTYPE ♀ (here designated), JAVA (MNHN, Paris) [examined].

The type-material must have consisted originally of both sexes, for the figure validating the name clearly shows a male, whilst the actual description mentioning the female, and based apparently on the same material, was published only nine years later (for the dates of publication of Guérin-Méneville's plates and of the text see van der Vecht, 1957). Nowadays only one female is preserved and this is accepted as lectotype. The original label on the pinned lectotype shows a small sketch of the female gaster, with parts of gaster mounted alongside, which seems to exclude the possibility that Guérin-Méneville might confuse the sexes. His published figure of the male is inexact only in the placement of the second yellow band on the thorax, probably due to the pinning of the specimen. That reflected in the slightly misleading description of Guérin-Méneville's figure of the male by Westwood (1839 : 254; cf. also Schletterer, 1890 : 29), mentioning a band on mesoscutum. Further, still deeper confusion was caused by Schletterer (1890 : 291), who under *L. pediculata* quoted by mistake Guérin-Méneville's description of *L. poeyi*, including the locality 'Cuba'.

L. pediculata is very close to the Australian *L. giraulti* nom. n. Apart from the apparently allopatric distribution, *L. pediculata* differs by the generally dark colour of the body, darker infumation of the wings and the slightly slenderer and less pubescent body.

BIOLOGY. Unknown; probably also a parasite in wasp nests.

DISTRIBUTION. India, Burma, Malaya, Singapore, Java.

MATERIAL EXAMINED.

Type data given in synonymy.

INDIA: Coimbatore, x. 1955, 1 ♀ (*P. S. Nathan*) (Townes). BURMA: Bhamo, xi. 1886, 1 ♀ (*L. Fea*) (MCSN, Genoa). MALAYA: Kuala Lumpur, 27.viii. 1933; 1 ♀, 20.v.1935, 3 ♀ (*H. M. Pendelbury*); 24.ii.1928, 1 ♀ (*H. T. Pagden*) (BMNH); Johore, G. Pulai, 17.ii.1969, 1 ♀ (*C. G. Roche*) (BMNH). SINGAPORE, 14.v.1968, 1 ♀, 2 ♂ (*C. G. Roche*) (BMNH). JAVA: Semarang, 1905, 3 ♀, 1 ♂ (*E. Jacobson*) (RNH, Leiden); Dramaga, 25.v.1965, 1 ♀ (*J. E. Lukavsky*) (ERI, Ottawa).

Leucospis giraulti nom. n.

(Text-fig. 232)

Epexoclaenoides bicinctus Girault, 1915 : 357–358, ♀. Holotype ♀, AUSTRALIA: Queensland, Brisbane (QM, Brisbane). [Junior secondary homonym of *Leucospis bicincta* Viereck, 1906 : 227.]

I have not seen the type but since this is the only Australian species and the material at my disposal also comes from Queensland I have no doubt about the

identity. The material of the British Museum (Natural History) was identified already by Waterston as *E. bicinctus*, but the latter name is preoccupied in the genus *Leucospis* Fabricius.

Girault (1915) mentions the size of the female as 9 mm; they may be much smaller, 6·5–9·0 mm, the male 6 mm. The species is extremely close to *L. pediculata* Guérin-Méneville from which it differs mainly in longer pubescence of the face and a tendency to rufinism of dark-coloured parts of body, in both sexes (hitherto found in all specimens examined). The face is thickly covered with a mixture of shorter and longer hairs, the longer ones being very numerous and even the shorter ones on frons are about or nearly as long as the much sparser hairs on the subhorizontal frontovertex.

L. giraulti was figured in Tillyard (1926 : 273, pl. 21, fig. 9, as '*Exoclaenoides cinctus* Gir.') and in Riek (1970 : fig. 37. 25G).

BIOLOGY. Recorded as a parasite of *Pison* sp. (Hym., Sphecidae) by Riek (1970 : 918).

DISTRIBUTION. Australia: Queensland.

MATERIAL EXAMINED.

AUSTRALIA: Queensland, Cairns, vii. 1904, 1 ♀ (*R. C. L. Perkins*) (BMNH); Q., Halifax, 12.iv.–30.vi.1919, 5 ♀ (*F. X. Williams*) (BBM, Honolulu); Q., Townsville, 27.ii.1902, 1 ♂ (*F. P. Dodd*) (BMNH); Q., Mackay, xii.–i., iii.–v.1891, 1899, 1900, 1902, 10 ♀, 1 ♂ (*G. Turner*) (BMNH).

Leucospis pyriformis (Weld) comb. n.

(Text-fig. 234)

Epexoclaenoides pyriformis Weld, 1922 : 35–37, pl. 2, fig. 7, pl. 3, fig. 20, ♀ ♂. Holotype ♀, INDIA: Bihar (USNM).

This species is very characteristic by its relatively short body with short ovipositor in the female.

BIOLOGY. Parasite of *Xenorhynchium nitidulum* (Fabricius) and *Rhynchium* sp., Eumenidae, Hymenoptera (Mani, 1936; 1937).

DISTRIBUTION. Pakistan, India (from Bombay to Bengal and Karikal).

MATERIAL EXAMINED.

PAKISTAN: Hyderabad, i. 1973, in nest of *Xenorhynchium nitidulum*, 1 ♂ (*Mrs H. Spurway*) (RNH, Leiden). INDIA: without data, 1 ♀ (BMNH); Bihar, Pusa, 5 xii. 1914, 1 ♀ (BMNH); Karikal Territory, Karumbargaram, vi. 1951, 1 ♀ (*P. S. Nathan*) (ERI, Ottawa).

Leucospis globigera sp. n.

♀. 5·0–5·8 mm. Black, sometimes dorsally on thorax and gaster with very slight bluish tint; flagellum (at least apically), sides of pronotum, scutellum, dorsellum and partly propodeum and legs reddish instead of black; whitish yellow are: scape, on pronotum arcuate band anteriorly

and shorter straight posterior band, sides of mesoscutum, apex of scutellum, metapleurum, broad band on fourth tergite and strongly curved band on either side posteriorly from ovipositorial furrow to middle of lateral margin of fifth tergite, broad streak dorsally and short one ventrally on hind coxa, hind femur ventro-basally and dorsally (except base), all knees, tibiae and tarsi but fore and hind tibia infuscate ventrally. Wings subinfumate, fore wing infuscate anteriorly beyond stigmal vein and in apical fifth.

Head distinctly broader than pronotum, dorsally 1·9 times as broad as long, with distinct slightly rounded temples but low frontal protuberances. Occipital carina arched, not high, disappearing laterad of ocelli; vertex very coarsely punctured; ocellar triangle not raised, about 2·3 : 1; POL : OOL as 12·0 : 5·5; median ocellus nearly one-third its diameter from carinate scrobes. Head in facial view 1·32 times as broad as high; face rather flat, densely punctured-rugulose, pubescence moderately dense and long (longer semi-erect hairs numerous), rather long also on eyes; interantennal space with blunt median keel; lower margin of clypeus barely produced, median tooth broad, lateral lobes short. Relative measurements: width of head 53·5, frontovertex 28, scrobes 17·5, lower face 22·3, its height 19, eye 30·5 : 23·0 strongly converging malar space 6, width of mouth about 19, scape 13; flagellum plus pedicellus about 1·05 times as long as breadth of head. Scapus about 2·4 times as long as broad, broadest at two-fifths; flagellum broad, distinctly attenuate basad; pedicellus slightly elongate, shorter than first flagellar segment which is distinctly elongate; penultimate segments slightly transverse.

Thorax: pubescence conspicuous though short; puncturation dense, rather regular, dots largest (with flat bottoms) on scutellum and then on disc of mesoscutum, interstices very narrow. Pronotum: hind margin nearly straight, sides barely converging; premarginal carina distinct, sharp, but hind margin not distinctly carinate, discal carina absent; surface nearly plain sublaterally, in anterior yellow band hardly raised; sides bluntly edged, lateral panel shallowly concave, lower corner broadly rounded. Mesoscutum distinctly transverse, weakly regularly convex; notaular furrows not traceable; parapsidal furrows shorter than their distance from obtuse lateral corners. Scutellum 1·20–1·26 times as broad as long, fairly convex, hind margin behind yellow band distinctly depressed. Disc of dorsellum rugulose, separated from laminate margin by broad furrow subdivided in alveolae. Propodeum convex and regularly punctured, sparsely hairy; median carina longer than its distance from plica posteriorly. Upper mesopleurum and metapleurum nearly regularly densely coarsely punctured. Fore tibia dorsally with distinct though blunt carina. Hind leg rather short (Text-fig. 235), coxa in depression posteriorly extensively smooth, the area subdivided in middle by some punctures. Hind femur externally very densely punctured, punctures partly confluent, separated by short longitudinal rugae; basal tooth broad and short, median teeth irregular. Hind tibia: externo-ventral carina not quite reaching apex, outer spur as long as half breadth of tibia.

Gaster short, distinctly petiolate, similar to that of *L. pyriformis* (Weld) (Text-fig. 234). First tergite slightly elongate, about 0·4 times as broad as body of gaster, convex, dorsally very densely punctured except for hind margin and base; basal fovea vague. Second tergite concealed, third visible only laterally (epipleurum), fourth tergite less than one-third as long as the first, hind margin dorsally straight but laterally obliquely extending caudad. Fifth tergite broadly globose (hence the specific name), slightly longer than broad, dorsally with dense umbilicate punctures of unequal size and short hairs; ovipositorial furrow confined to its subvertical posterior slope, tergite at top of furrow slightly swollen. Sixth tergite and epipygium visible only laterally. Ovipositor sheaths hardly half as long as hind tibia.

♂. Unknown.

BIOLOGY. Probably a parasite of a solitary Vespid.

Holotype ♀, WEST MALAYSIA: Kuala Langat, Tumbok Estate, v. 1917, reared from a mud cell (attached) of a ?wasp (BMNH).

Paratypes. 1 ♀ same data as holotype (BMNH). NORTH BORNEO: Forest Camp 19 km N. of Kalabakan, 30.x.1962, 1 ♀ (*Y. Hirashima*) (BBM, Honolulu).

This species is very similar and closely related to *L. pyriformis* (Weld), formerly classified with *Epexoclaenoides* Girault (now regarded a synonym of *Leucospis* Fabricius), but differs, apart from the V-shaped yellow band on the gaster and some structural characters, mainly in having the teeth on the hind femur irregular, not minute. *L. globigera* shares this character with the following species, *L. micrura* Schletterer, and it is mainly on the basis of these intergrades that *Epexoclaenoides* is sunk in synonymy.

Leucospis micrura Schletterer

(Text-fig. 236)

Leucospis micrura Schletterer, 1890 : 232–233, ♀. Holotype ♀, MALUKU: Ambon (= Amboina) (NM, Vienna) [examined].

I compared the holotype with the larger specimen mentioned below (10 mm) and could not separate them as different species, although the latter has the sloping postero-dorsal margin of hind coxa slightly serrate.

When the present paper was in galley the BMNH received two females of a *Leucospis* which runs to *L. micrura* Schletterer in the above key, except that the hind femur is mainly black, not red. I think that these specimens may represent an undescribed species, rather than an aberrant form of *micrura*. They fit well Text-fig. 236 but when compared with the Sulawesi specimen (the holotype of *micrura* having been returned to NM, Vienna), they show a distinctly denser puncturation of the body, extremely dense especially on the hind femur which is quite dull, but rather convex externally. Body length only 6·2 and 7 mm respectively. WEST MALAYSIA: Johore, G. Lambak, 27.xi.1970 (*C. G. Roche*).

BIOLOGY. Unknown.

DISTRIBUTION. Sulawesi, Moluccas.

MATERIAL EXAMINED.

Type data given in synonymy.

SULAWESI: Bonthain, Wawa Karaeng, 1100 m, ix–x. 1931, 1 ♀ (*G. Heinrich*) (MNHU, Berlin).

THE *ARUINA*-GROUP

All species of this group have a relatively slender body, including the legs. The pronotum is not distinctly depressed transversely, the carinae very low; the dorsellum is laminately carinate, often subbidentate, dorsally flat; the hind leg is slender, femur with large basal tooth and rather broad, well separated following smaller teeth; most distinctive is the hind coxa: it is unusually elongate, with flat or moderately convex but always rather broad dorsal side, instead of dorsal edge (Text-fig. 239).

Nothing is known about the biology but the species belonging here, i.e. *L. aruina* Walker, *L. sedlaceki* sp. n. and *L. niticoxa* sp. n., are confined to the Australian

subregion, ranging from Maluku to north-eastern Australia and the Solomons. The New Caledonian *Leucospis antiqua* Walker is closely related to the *aruina*-group, but differs in having a distinct discal carina on pronotum.

Leucospis aruina Walker

(Text-fig. 239)

Leucospis Aruina Walker, 1860 : 19, ♂. LECTOTYPE ♂ (here designated), SUNDAS: Aru Island (BMNH) [examined].

Leucospis mysolica Kirby, 1883 : 69–70, ♀. Holotype ♀, MALUKU: Mysol Island (BMNH) [examined]. **Syn. n.**

Leucospis muiri Brues, 1925 : 25–27, ♂. Holotype ♂, NEW GUINEA: Papua, Laloki (MCZ, Cambridge) [examined]. **Syn. n.**

Exoclaenus miltoni Girault, 1926 : [1], ♀. LECTOTYPE ♀ (here designated), AUSTRALIA: Queensland (Nelson =) Gordonvale (QM, Brisbane). **Syn. n.**

The types of *aruina*, *mysolica* and *muiri* were studied and compared with the other material mentioned below. The original material of *aruina* consists of one male but there is a female, possibly of the same lot, in UM, Oxford, similarly as in the case of *mysolica*, in which, however, Kirby states that the description was made from one female, now labelled as holotype.

I base my interpretation of *E. miltoni* on a female identified by Dr E. F. Riek, who examined the Girault types and also on the information received from Mr E. Dahms, who compared the type with my key and agreed that it runs to *aruina*. The single original specimen of *miltoni* is accepted as lectotype, in co-operation with Mr Dahms, who informed me that the specimen was labelled as type by Girault himself, but bears as locality name 'Gordonvale H.Q., May, 1920', whilst Girault stated that *miltoni* came from 'Nelson, May, 1920, *Dodd*'. According to Mr Dahms Nelson is an earlier name of Gordonvale, near Cairns.

The females from the Solomon Islands have the yellow band on the broadest part of gaster narrower and shifted forward to the level with the tip of the ovipositor, but otherwise I cannot distinguish them from the other specimens.

In the male of *L. aruina* the exposed (sculptured) part of the sternites is unusually narrow, all sternites appear longer than broad; the middle ones to penultimate fully twice as long as broad; basal sternite has a high lamellate tooth; last sternite is hardly expanded posteriorly, its postero-lateral sides are slightly reflexed upwards; hind corners of sixth tergite are tooth-like but not very long.

BIOLOGY. Host: *Megachile ?rangii* Cheesman, Apidae, in the Solomon Islands.

DISTRIBUTION: E. Indonesia (Maluku, Sundas, West Irian), New Guinea, Solomons, Queensland.

MATERIAL EXAMINED.

Type data given in synonymy.

MALUKU: Mysol, 1 ♀, 1 ♂ (*Wallace*) (UM, Oxford). SUNDAS: Aru, 1 ♀ (UM, Oxford). NEW GUINEA: Irian Barat, Sorong, x. 1948, 1 ♀ (*Lieftinck*) (RNH,

Leiden); Madang District, Wanuma, 700 m, viii. 1968, 1 ♂ (*Krauss*) (BBM, Honolulu); Papua, Milne Bay, 1 ♀ (*Micholitz*) (MNHU, Berlin). SOLOMONS: Florida Island, Siota, iii. 1945, ex *Megachile ?rangii*, 2 ♀ (*G. E. Bohart*) (CAS, San Francisco); Small Nggela, Hanavaivine, Florida Grp., viii. 1968, 3 ♀ (*O'Brien*) (BBM, Honolulu and BMNH). AUSTRALIA: Queensland, Cape York, 1 ♀, 1 ♂ (NM, Vienna).

Leucospis sedlaceki sp. n.

(Text-figs 237, 238)

♀. 8·2 mm. Black with steel-bluish tint most apparent on thorax; pale lemon-yellow are: scapus beneath, broad arcuate band on pronotum (narrowed in middle), broad band indented in middle on scutellum posteriorly, upper mesepisternum, metapleurum, broad narrowly interrupted band on middle of first tergite, narrower band interrupted by ovipositorial furrow just behind middle of fifth tergite, narrow band dissolved in two submedian and two post-spiracular spots on sixth tergite, narrow line along ovipositor on apex of gaster (epipygium), apex of hind coxa ventrally and a streak along ventral (toothed) edge of hind femur. Wings nearly uniformly dark brown.

Head distinctly broader than pronotum (70 : 65), dorsally 2·3 times as broad as long, with distinct though short temples. Occipital carina not high but reaching to behind eyes, nearly touching lateral ocelli, sublaterally not very sharp; vertex even laterad of paired ocelli rugulose-punctured, ocellar triangle weakly convex, about 2·6 : 1; POL : OOL as 11·5 : 9·0; ocelli of normal size, median one separated from curved scrobal carina by narrow groove; frontal protuberances moderate. Head in facial view 1·39 times as broad as high; face densely but not very finely punctured, only on lower face punctures rugulose, with dense whitish pubescence of medium length; inner orbits distinctly emarginate. Relative measurements: height of head 50, width of frontovertex 37, scrobes 33, lower face 36·5, its height 25, eye 39 : 26, malar space 10·5, width of mouth 27, scape 17·5; flagellum plus pedicellus 83, i.e. nearly 1·2 times as long as breadth of head. Interantennal area distinctly raised with sharp median keel above. Lower margin of clypeus hardly produced, its lobes very low, median tooth obtuse, low. Malar space in front of indicated suture with slightly depressed strip of fine granulate-reticulate sculpture slightly expanding at eye. Pedicel dorsally distinctly elongate (1·3 : 1), about as long as first flagellar segment. Flagellum slightly clavate, segments mainly oblong, seventh and eighth subquadrate, second distinctly longer than first (nearly 1·5 : 1); clava about 1·7 times as long as broad.

Thorax with extremely short dark pubescence and rather fine and very shallow puncturation; interspaces on mesoscutum and scutellum up to nearly as broad as punctures, extremely finely granulate-reticulate. Pronotum rather short and strongly transversely convex, in middle with faint transverse depressed belt more apparent in slightly concave sides; hind margin slightly emarginate and very finely carinate; premarginal carina indicated by narrow very slightly raised strip of minute reticulation, hind margin of strip more abrupt but not distinctly carinate; sides of pronotum distinctly converging; lateral panel low, distinctly depressed below ridged upper margin. Mesoscutum: notaular grooves anteriorly indicated by arcuate lines between deeper punctures; vestiges of parapsidal furrows shorter than their distance from posterior corner which is about 125 degrees. Scutellum 1·44 times as broad as long, fairly convex, punctured impressed line at hind margin very narrow. Dorsellum semicircular, flat, bare, coarsely alveolate along raised-carinate margin. Propodeum medially distinctly longer than dorsellum, very convex, punctured; pubescence black, thin, short; median carina weak, about as long as its distance posteriorly from the conspicuous plica. Upper mesopleurum more densely punctured than metapleurum, microscopic reticulation distinct on metapleurum but indistinct on mesepimerum. Legs slender; fore femur and tibia dorsally terete. Hind

coxa fairly slender, dorsal densely hairy face nearly as broad as depression which is rather narrow, not very densely punctured, with (partly impunctate) streak of sparser coarser punctures below dorsal edge; posteriorly with slight oblique raised carina instead of auricle, indicating an improper dorsal tooth. Hind femur very slender (Text-fig. 237), with very large basal tooth and slender, well separated smaller teeth. Hind tibia with externo-ventral carina extending over three-fifths of length, apex slightly produced into a broad spine, outer spur short. Apical processus of stimal vein of fore wing about half as long as uncus.

Gaster strongly clavate, constricted at hind margin of first and fifth tergites, then subacuminate; therefore of a rather unusual shape (Text-fig. 238); pubescence extremely short. First tergite 1·34 times as long as broad, dorsally convex, posteriorly with median impunctate streak, apical margin and basal fifth also impunctate. Third tergite very densely and much more finely punctured than the first or fifth tergite; hind margin straight. Fifth tergite most convex laterally in the middle and dorsally at anterior end of the deep and steeply ascending ovipositorial furrow, ending 1·5 times length of fourth tergite from its apex. Sixth tergite visible dorsally, with raised spiracles. Ovipositor sheaths slightly longer than hind tibia.

♂. Unknown.

BIOLOGY. Unknown.

Holotype ♀, NEW GUINEA: Territory of New Guinea, 6 km W. of Wau, Nami Creek, 1700 m, 10.vi.1962 (*J. Sedláček*) (BBM, Honolulu).

A very distinctive species, named in honour of its collector. The colour and the shape of the body of *L. sedlaceki* reminds one very much of *L. antiqua* Walker from New Caledonia but morphologically the species is much closer to *L. aruina* Walker.

Leucospis niticoxa sp. n.

(Text-figs 241, 242)

♀. 11·5 mm (slightly curved: 11 mm). Black with steel-bluish tint most distinct on thorax; yellow pattern: arcuate bands on pronotum anteriorly and on scutellum posteriorly, equally broad even in middle, mesoscutum with lateral lines and submedian round spots, broad spots on upper mesepisternum and on metapleurum, a cross-band just behind middle of first tergite broader laterally and interrupted medially, narrow band on middle of fifth tergite, sixth tergite with dorsal transverse spots and smaller spots behind each spiracle, hind coxa apically on lateral and ventral edges, hind femur with larger suffused yellow streak dorso-apically and smaller one at teeth; otherwise legs except coxae reddish, knees and fore and hind tibiae dorsally yellow. Wings weakly infuscate, venation rather pale.

Morphologically similar to *L. sedlaceki* as described above, with mainly the following differences. Head dorsally 2·5 : 1; occipital carina sublaterally splitting into several carinae uniting again into one on upper temples; POL : OOL as 12 : 9. Head in facial view 1·21 times as broad as high; face extremely densely finely punctured-rugulose; pubescence very short, dense, pale brassy. Relative measurements: height of head 73, width of frontovertex 44, scrobes 28, lower face 42, its height 37, eye 49 : 32, malar space 17, width of mouth 33, scapus 24; flagellum plus pedicellus fully 1·3 times as long as breadth of head.

Thorax with puncturation moderately coarse but very dense, dull, narrow interstices distinctly though extremely finely granulate-reticulate. Dorsum less convex than in *L. sedlaceki*. Lateral panel of pronotum above nearly smooth on bottom, deeply depressed just below strong lateral edge of collar. Mesoscutum: notaular lines indistinct. Scutellum 1·4 times as broad as long; impressed marginal groove with crenulae converging obliquely towards median line. Dorsellum in front of marginal broad crenulate furrow with flat disc very finely rugulose. Median carina of propodeum very high, highest at one-third, shorter than its distance posteriorly from plica. Fore femur laterally flattened, shiny, ventrally distinctly edged; fore tibia

broadened, dull, dorsally with arcuate broad carina. Hind coxa ventrally below lateral edge shiny, sparsely punctured, extremely shortly hairy (Text-fig. 241), at base with impunctate smooth area. Hind leg otherwise (Text-fig. 242) as in *L. aruina*, but tarsus more slender, though still shorter than tibia. Stigmal vein of fore wing apically angulate, without distinct processus; uncus long.

Gaster generally as in *L. aruina*, i.e. posteriorly sides rather regularly converging. Yellow band on broadest part crossing ovipositor at its apex.

♂. Unknown.

BIOLOGY. Unknown.

Holotype ♀, SOLOMONS: Santa Isabel Island, Sukapisu, 900 m, 14.vi.1960 (*C. W. O'Brien*) (BBM, Honolulu).

SPECIES SOLA

Leucospis antiqua Walker

(Text-fig. 240)

Leucospis antiqua Walker, 1860 : 19–20, ♂. LECTOTYPE ♂ (here designated), NEW CALEDONIA (BMNH) [examined].

Leucospis Gambeyi Maindron, 1878 : clxiv–clxv, ♀♂. LECTOTYPE ♀ (here designated), NEW CALEDONIA (MCSN, Genoa) [examined]. **Syn. n.**

The Gribodo Collection in Genoa includes one female and one male from the type-material of *L. gambeyi* Maindron (as mentioned by Masi, 1935); I designate the female as lectotype. A specimen under *gambeyi* in the Paris Museum, coming from the Pérez Collection seems also to have belonged to the original material and is regarded as paralectotype. They are the same as *L. antiqua*.

For some characters of *L. antiqua* see also Brues (1942). As mentioned above with the *aruina*-group, this is a very distinctive species, differing from the above group mainly by the raised discal carina on the pronotum. The key and the text-figure provide further characters. The interantennal lobe is convex, rounded, not acuminate dorsally as in all the other species of the genus. The sculptured part of the sternites in the male is narrow but less strongly so than in *L. aruina* Walker.

Possibly *L. antiqua* and the preceding *aruina*-group are the most primitive species of the genus *Leucospis*.

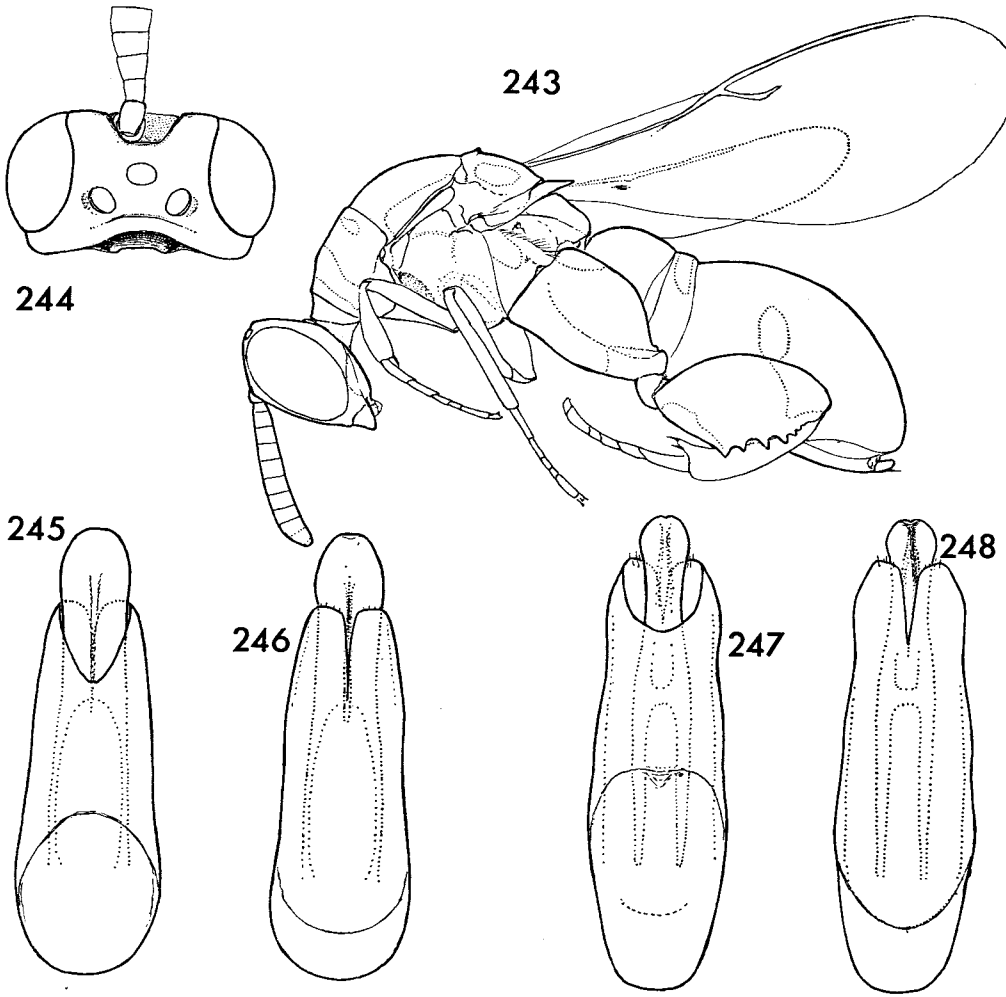
BIOLOGY. Host unknown. The species mimics the wasp *Pachymenes quodi* (Vachal), Vespidae (Brues, 1942 : 154).

DISTRIBUTION. New Caledonia, Loyalty and Society Islands.

MATERIAL EXAMINED.

Type data given in synonymy.

NEW CALEDONIA: without data, 2 ♀; Noumea, 2 ♀, 2 ♂; Anseata, 3 ♀, 2 ♂; Baie Ovemo, 1914, 1 ♂ (BMNH; BBM, Honolulu; MCSN, Genoa; MCZ, Cambridge; MNHN, Paris). LOYALTY ISLANDS: Ouvea, Fayaoue, xii. 1968–i. 1969, 4 ♂ (*Krauss*) (BBM, Honolulu). SOCIETY ISLANDS: Moorea, Afarealtu, vii. 1959, 1 ♀ (*J. Rageau*) (BMNH, London).



FIGS 243–248. 243, 244. *Neleucospis masculina*. 243, body of ♀; 244, head dorsally. 245, 246. *Micrapion clavaforme*, aedeagus in dorsal (left) and ventral views (right). 247, 248. *Polistomorpha fasciata*, aedeagus in dorsal and ventral views.

NELEUCOSPIS gen. n.

Type-species: *Neleucospis masculina* sp. n.

Head stout, width of vertex inferior to length of head; occipital carina arched, high; temples well developed, rounded, longer than malar space; scrobes carinately margined, above one diameter from median ocellus. Antennal toruli slightly below level of centres of eyes, much nearer to eye than to each other. Clypeus transverse, with deep tentorial pits, lower margin of clypeus slightly produced, laterally reflexed, medially slightly depressed and subemarginate. Eyes clothed densely with fairly long pubescence; inner orbit moderately emarginate, lower end of eye broadly rounded; malar space hardly as long as diameter of ocellus. Mandibles short, curved. Labio-maxillary complex as in *Leucospis*, palpi not rudimentary. Antennae short; scapus less than twice as long as broad, hardly twice as long as pedicellus which is dorsally slightly longer than any flagellar segment; flagellum subclavate, its first segment (anellus) narrowest and without sensilla but as all following segments covered with dark semi-erect hairs which are about half as long as segments; funicle and clava among the hairs with subdecumbent whitish trichoid sensilla, generally in about three rows on each segment; clava short, 3-segmented, rounded-subacuminate.

Thorax coarsely densely punctured, very much as in *Leucospis*. Pronotum medially not convex but arched, with faint indication of premarginal carina, in front of it shallowly depressed; in dorsal view sides sub-concave, hardly converging forwards; hind margin of the depressed lateral panel nearly straight. Mesoscutum posteriorly broadly depressed on each side of the middle, anteriorly with broad depressions indicating notaular furrows. Scutellum transverse, at base with short transverse elevation. Dorsellum expanded in a horizontal plate, with straight converging laminate translucent margins, apex bidentate. Propodeum with median carina and plicae, fairly long, punctured, not densely hairy. Upper mesopleurum and metapleurum coarsely punctured. Hind coxa around base, except dorsally, bordered by distinct carina; no dorsal tooth. Hind femur with moderately small unequal teeth, the basal the broadest, as long as middle teeth. Hind tibia apically below produced into stout stylus bearing curved outer spur, latter shorter than inner spur. Tarsi slender. Fore wing similar to *Leucopsis*; marginal vein very short; stigmal vein slender, uncus not long; postmarginal vein about 0·8 the length of costal cell.

Gaster in dorsal view with narrower anterior third and swollen remaining part entirely covered by the enlarged ovoid carapace of fifth tergite; the narrow part formed by slightly swollen and subelongate first tergite and transverse fourth tergite; at sides third tergite may be partly exposed, second tergite is concealed; sixth tergite reduced to narrow band latero-ventrally on each side, ventrally bordering with long horizontal paratergum of epipygium which forms apically on each side a blunt tubercle just below broad cercus. Ovipositor sheaths short (exposed part), in profile slightly curved upwards, slightly protruding beyond teeth of epipygium, but are barely visible from above. Hypopygium ending just before middle of gaster.

This genus, with one species from West Africa, is close to *Leucospis* Fabricius, in which for example the South African *L. namibica* sp. n. suggests some similarity. *Neleucospis* has, however, several peculiar characters which separate it easily from all known species of *Leucospis*. These include the relatively stout head with short antennae, large and richly pilose eyes which make the vertex and face appear unusually narrow, the short transverse elevation on the scutellum, the extremely short marginal vein in the fore wing and, in particular, the peculiar gaster in the female, with its broad part virtually covered by one single tergite and the ovipositor confined to the ventral side. The last character is reminiscent of some *Polistomorpha*, but that is certainly only some convergence in evolution, as all the other characters are very different in the two genera.

Neleucospis masculina sp. n.

(Text-figs 243, 244)

♀. 4·8 mm. Black, with following pale yellow markings: scapus, broad cross-band anteriorly on pronotum and narrow line at hind margin interrupted medially, side margins of mesoscutum, lateral spots on scutellum, dorsellum, spot on metapleurum, dorso-basal and ventro-apical spots on hind coxa, ventro-basal and apical spots on hind femur, fore and mid tibia along anterior edge, fourth (second apparent) tergite dorsally, oblique spot on either side of fifth tergite before middle and small median spot apically; antennal flagellum brown; paler brown are: pedicellus, tarsi, apex of hind tibia, more or less rest of fore and mid femora and tibiae and ovipositor sheaths. Pubescence of body white, moderately long but not dense. Fore wing subhyaline but infuscate anteriorly beyond marginal vein and, rather abruptly, in apical fifth; veins dark brown.

Head hardly narrower than mesoscutum, in dorsal view about 1·75 times as broad as long (Text-fig. 244), in facial view about 1·2 times as broad as high. Lateral ocellus about one diameter from eye. Eye nearly 1·5 times as long as broad, long pubescence above twice as long as beneath. In lateral view frons moderately protruding. Relative measurements: width of head 51, frontovertex 25, POL : OOL as 10·5 : 4·0, ocellar triangle 19 : 9, width of scrobes 20, length of scape 10·5, width of lower face 20, its height 18, eye 35 : 23, maximum length of eye pilosity 2, malar space 3·5, width of mouth 20, combined length of flagellum plus pedicellus 54.

Puncturation on thorax dense, narrow interspaces finely cross-striate, on disc of mesoscutum partly raised and indicating cross-rugae. Scutellum about 1·1 times as broad as long, hind margin arched, produced, admarginal interstices forming fine longitudinal rugae. Dorsellar plate about two-fifths as long as scutellum, with coarse piliferous punctures. Interspaces of punctures on upper mesopleurum extremely narrow, without microsculpture. Hind coxa: dorsal edge rounded, sparsely hairy; depression above with smooth streak widening posteriorly and joining another smooth strip just above lateral edge, space between strips rather coarsely but not densely punctured. Hind femur rather densely and coarsely punctured; lower edge with teeth as in Text-fig. 243; on one femur second tooth is advanced to the first.

Gaster about 1·35 times as long as thorax, very slightly narrower than mesoscutum. First tergite 0·47 the width of the broadest part, itself about 1·2 times as long as broad, rather coarsely punctured, interspaces smooth and dorsally about half as broad as punctures; hind margin straight and only very narrowly impunctate. Fourth tergite fully 3 times as broad as long. Fifth tergite forming the ovoid carapace, dorsally about 1·65 times as long as broad, its punctures posteriorly distinctly coarser than on first tergite, interspaces anteriorly about half, posteriorly about one-third as broad as punctures, posteriorly with traces of microsculpture.

♂. Unknown.

BIOLOGY. Unknown.

Holotype ♀, SIERRA LEONE: Njala, vi. 1936 (*E. Hargreaves*) (BMNH).

MICRAPION Kriechbaumer

Micrapion Kriechbaumer, 1894 : 315–316. Type-species: *Micrapion bilineatum* Kriechbaumer, by monotypy.

Callismicra Kieffer, 1905 : 245, 247–248. Type-species: *Callismicra flavocincta* Kieffer, by monotypy. **Syn. n.**

For a long time *Micrapion* had been misunderstood, which resulted in its synonymization with *Leucospis* Fabricius by Weld (1922 : 3, 5). Only Steffan (1948) recognized it rightly as a valid genus, redescribed it and added to it, at the

same time, three new species and the previously known *Leucospis nyassica* Enderlein. Habu (1962 : 170) regards *Micrapion* as a subgenus of *Leucospis* Fabricius.

Callismicra, described by Kieffer in the Chalcidinae (present Chalcididae), proved rather surprisingly to be a synonym of *Micrapion;* see under *M. flavocinctum* below (p. 221).

The main features of *Micrapion* may be summarized as follows.

Body non-metallic (as in all African Leucospidae), relatively slender. Occipital carina absent or weakly indicated between lateral ocelli. POL always more than twice OOL. Frontal protuberances forming low transverse ridge below vertex level, interrupted by scrobes, in lateral view often appearing tooth-like. Eyes very large, usually all pubescent (exception: *M. richardsi*); inner orbit with shallow emargination. In facial view distinct angle between outer outline of eye and straight gena. Lower face weakly convex in vertical direction, but rather strongly convex transversely; mouth margin nearly straight, with lower depressed margin of clypeus slightly produced, more or less arcuate. Gena posteriorly slightly receding to strong raised hypostomal carina. Mandibles weak, convex, apically thin, externally pubescent, lower margin strongly curved at apex towards two small short teeth. Both maxillary and labial palpi well developed. Antennae rather strong; scapus stout and short, at most about twice as long as broad; pedicel always shorter than first flagellar segment which is narrowed in basal third.

Pronotum without distinct cross-carinae; lateral edge of collar rather sharp. Mesoscutum convex, anteriorly with broad depressions in place of notaular furrows. Dorsellum not toothed. Propodeum with median carina and plicae distinct, median part slightly produced caudad. Hind coxa with weak dorsal tooth, dorsal edge always punctured and rather broad; impunctate parts of depression usually transversely striate. Hind femur with basal tooth the strongest, situated near middle of ventral edge; hind tibia with apex slightly oblique, not spine-like, both spurs distinct though outer spur not distinctly longer than inner one; hind claws strongly curved (Text-fig. 269). Wings as in *Leucospis* Fabricius (Text-fig. 264).

Gaster in both sexes strongly clavate, rather narrow in basal third or half. In ♀ fourth tergite with obtuse median keel finely grooved on top, hind margin more or less strongly angulate, produced towards anterior end of ovipositorial furrow on fifth tergite; this furrow more or less declivous (sometimes subvertical), together with relatively short sheaths; epipygium fused with sixth tergite. In ♂ first tergite narrow, long; second tergite dorsally between epipleural carinae about as long as broad or distinctly elongate (Text-fig. 271); carapace posteriorly often rather abruptly declivous, truncate in lateral view, often concave; exposed parts of sternites laterally keeled, ventral surface usually concave.

The present knowledge of the species (especially in males) is not yet sufficient enough to allow a subdivision into the species-groups, although probably species with relatively longer ovipositor may be separated from the species with shorter ovipositor. The latter would, however, include *M. steffani* sp. n., which seems to represent a 'species sola', differing in several characters, including the relatively short second tergite in the male.

Biological data suggest that the species are parasites of solitary bees of the genus *Ceratina* Latreille (including *Pithitis* Illiger). The *Micrapion* species are known only from the Ethiopian region, including Madagascar.

Key to the species of *MICRAPION*

1 Broad part of gaster and scutellum with smooth interspaces about half as broad as punctures; mesoscutum with two central yellow spots; hind coxa at base below

lateral edge sparsely pubescent and punctured; in ♂ dorsal exposed area of second tergite hardly as long as broad . . . . . ***steffani*** sp. n. (p. 226)

– Gaster and thorax duller, interspaces narrower and mostly with microreticulation (except in dwarfs with relatively coarser puncturation); mesoscutum without central spots; hind coxa basally below lateral edge very densely punctured and with thick silvery pubescence; in ♂ (as far as known) dorsal area of second tergite much longer than broad (Text-fig. 271) 2

2 Pubescence on eyes virtually absent (at 60 × magnification; not worn off) cf. ***richardsi*** sp. n., 10 (p. 223)

– Pubescence on eyes very conspicuous 3

3 Ovipositor nearly as long as or longer than hind tibia; its furrow reaching (or nearly reaching) apex of fourth tergite, anterior end of furrow never marked by auricles (Text-figs 249, 254, 256, 257); in ♂ gastral dorsum rather smoothly curved (Text-fig. 255), not truncate (as far as known) 4

– Ovipositor always distinctly shorter (up to 0·85) than hind tibia, its furrow on fifth tergite not reaching to pointed apex of fourth tergite and anterior end of furrow usually marked by rounded auricles (Text-figs 259, 261, 270); in ♂ apex of gaster in lateral view more or less truncate (Text-fig. 260) and dorsum of second tergite usually elongate 10

4 Apex of fourth tergite in ♀ broad-angular, usually 60–90 degrees, the tergite in median line usually less than half as long as fifth tergite (Text-fig. 249) [♂ unknown] 5

– Apex of fourth tergite in ♀ very acute-angular, angle less than 40 degrees, median length of tergite subequal in length to sheaths of ovipositor 7

5 Puncturation of gaster unusually coarse (Text-fig. 257); ovipositorial furrow wholly bordered by a carina; dorsellum with some longitudinal keels, its hind margin carinate . . . . . ***dalyi*** sp. n. (p. 218)

– Puncturation denser, not unusually coarse; margins of ovipositorial furrow partly not carinate; dorsellum otherwise 6

6 Fore wing extensively blackish at anterior margin; hind coxa in depression densely and rather finely punctured (Text-fig. 252); dorsellum swollen, rather shiny, finely sculptured; hind tibia black . . . . . ***lugubre*** sp. n. (p. 216)

– Wings slightly infumate, blackish only between stigmal and postmarginal veins; hind coxa on lower half of depression mostly impunctate, more dorsally with rather coarse and not dense punctures; dorsellum with coarse dots along anterior and posterior margins; hind tibia dorsally whitish . . ***dolichum*** sp. n. (p. 214)

7 Madagascan; hind coxa in depression mainly impunctate, punctures confined to base and dorsal side; puncturation of body fine; sharp lateral edge of pronotum nearly reaching anterior corner; upper corner of metapleurum forming a blunt tooth at hind wing . . . . . ***flavocinctum*** (Kieffer) (p. 221)

– African; depression of hind coxa extensively punctured in dorso-basal part; puncturation of body relatively coarser; lateral edge of pronotum not sharp near anterior corner; upper corner of metapleurum hardly or not produced . . 8

8 Pronotum dorsally with distinct oblique depressions diverging towards hind corners (as in Text-fig. 265); scutellum and fifth tergite black but first tergite with pale basal spot; in ♂ gaster posteriorly rather moderately declivous, with a pair of sublateral spots . . . . . ***biimpressum*** sp. n. (p. 222)

– Pronotum without distinct oblique depressions; otherwise 9

9 Puncturation of gaster relatively coarser than in alternate (Text-fig. 256); first tergite dorsally with shiny interspaces, shallow median depression posteriorly in ♀ with smooth keel or elevated streak; first tergite black, apical band of fifth tergite about half as broad as length of sheaths; hind femur relatively slender ***clavaforme*** Steffan (p. 220)

– Puncturation of gaster finer; first tergite in ♀ along middle with distinct microreti-

culation, particularly conspicuous on flat impunctate streak extending in distal two-thirds (Text-fig. 253), the tergite with basal yellow spot; narrow apical band of fifth tergite crossing sheaths in their basal quarter; hind femur rather broad, very densely punctured . . . . . . ***punctulatum*** sp. n. (p. 221)

10 Pronotum with conspicuous oblique depressions dorsally (Text-fig. 265); eyes glabrous, without distinct pubescence; stigmal vein of fore wing with long uncus but without distinct terminal processus (Text-fig. 264) . ***richardsi*** sp. n. (p. 223)

– Pronotum without distinct oblique depressions; eyes with conspicuous pubescence; terminal processus of stigmal vein usually developed 11

11 Gaster in ♀ with fifth tergite longer than high or broad (Text-figs 270, 272), ovipositor very short, vertical; hind femur relatively broad . . sp. indet. A (p. 228)

– Gaster in ♀ with fifth tergite about as long as high (Text-figs 259, 261), ovipositor when in furrow slightly oblique, not quite vertical; hind femur often more slender 12

12 Hind femur relatively broad (Text-figs 259, 260); fifth tergite in ♀ with subapical yellow band usually broad, crossing sheaths approximately in their middle; upper basal half of depression of hind coxa extensively punctured ***bilineatum*** Kriechbaumer (p. 225)

– Hind femur more slender than in alternate (Text-fig. 263); partly otherwise . . 13

13 Malar space about half as long as eye, 0·45–0·55 (Text-fig. 264); yellow band of fifth tergite in ♀ narrow, removed from apical margin by more than its breadth, crossing sheaths above middle . . . . . ***nasutum*** sp. n. (p. 224)

– Malar space distinctly less than half length of eye (Text-fig. 261); yellow apical band in ♀ very near to margin, broad, crossing sheaths in median half ***congoense*** Steffan (p. 224)

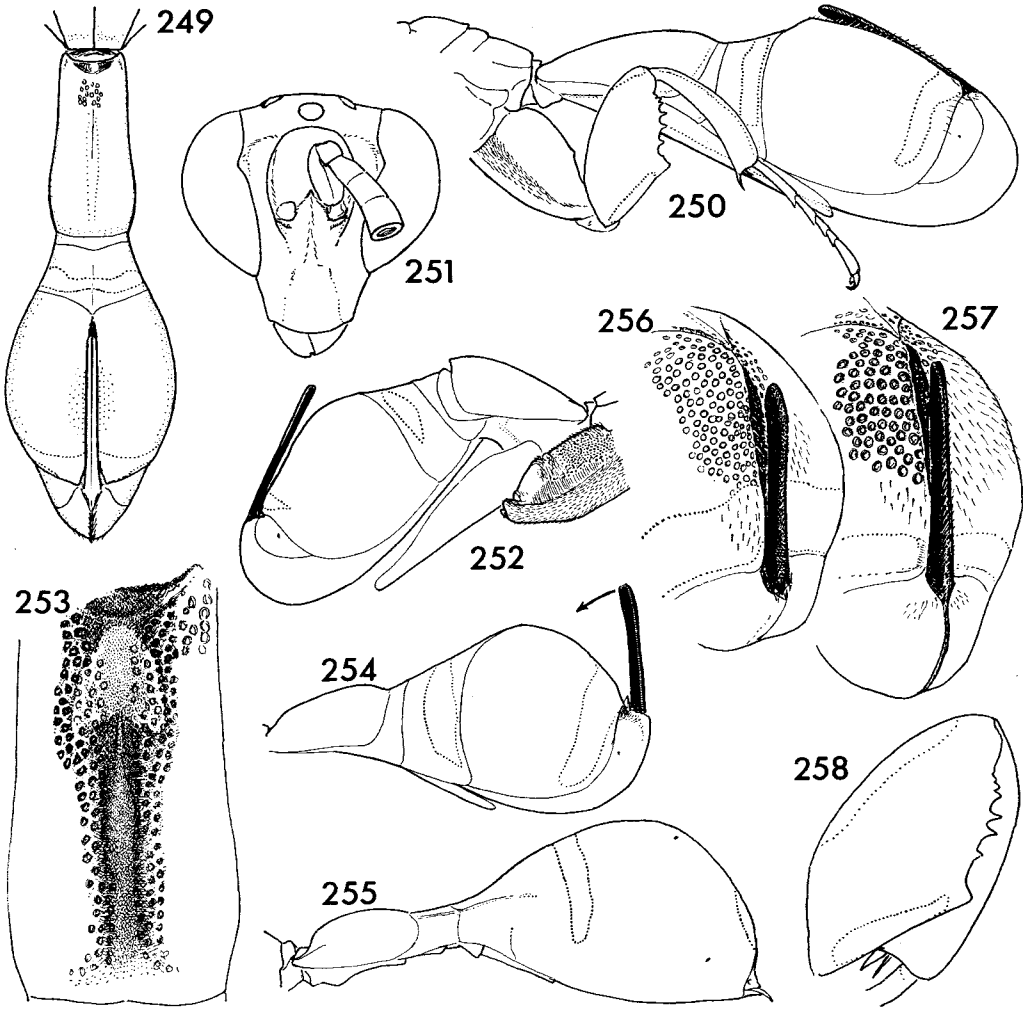
The species are arranged below according to the decreasing length of the ovipositor, which seems to correlate with the increasing length of the median length of the fourth tergite in the females and, apparently, to some extent with the increasing truncation of the gaster in the males.

Micrapion dolichum sp. n.

(Text-figs 249, 250)

♀. 7·8–10·0 mm. Piceous black; more or less reddish are: antennae beneath, sides of pronotum, apex of metapleurum, partly legs (except coxae basally and femora medially) and sometimes gaster beneath basally; whitish yellow are: scapus beneath (partly), anterior and posterior arcuate diverging lines on pronotum, usually narrow line on scutellum, narrow bands on fourth and at hind margin of fifth tergite, all tibiae dorsally, hind femur ventro-basally and dorso-apically, mid and hind tarsi at base. Wings moderately infumate with faintly darker apex and darker brown between stigmal and postmarginal veins.

Head about as broad as pronotum in posterior third, dorsally 2·00–2·15 times as broad as long; temples extremely short but distinct; frontal protuberances low, highest at scrobal margin, slowly descending towards eyes; latter distinctly excised. Vertex moderately convex, only small smooth area outside of lateral ocellus depressed, but space between it and frontal protuberance slightly concave; occipital carina indistinct, indicated by faint, microscopically striate cross-ridge between lateral ocelli, a similar ridge just behind median ocellus; ocellar triangle about 2·9 : 1; POL about 3·5 times OOL; median ocellus separated by smooth groove from scrobal carina, groove one-third of diameter of ocellus broad. Head in facial view very slightly higher than broad. Supraclypeal area moderately convex, interantennal area without distinct keel. Relative measurements: breadth of head 54, frontovertex 31, scrobes 20 (as broad as high), lower face 24·5, its height 25, eye 34 : 22, malar space 10, mouth 16, scape 12; flagellum plus pedicellus 1·36 times as long as width of head, slightly clavate. First flagellar



FIGS 249–258. *Micrapion*. 249, 250. *M. dolichum*, gaster of ♀ in dorsal and lateral (with hind leg) view. 251, 252. *M. lugubre*. 251, head in facial view; 252, gaster of ♀, with hind coxa (sculpture in depression indicated). 253. *M. punctulatum*, first tergite (♀), with sculpture and colour indicated along middle. 254–256. *M. clavaforme*. 254, ♀ gaster; 255, ♂ gaster; 256, apex of ♀ gaster in oblique postero-lateral view, with puncturation at ovipositorial furrow partly indicated. 257, 258. *M. dalyi*. 257, ditto as 256, in paratype (♀ of same size as 256); 258, hind femur and tibia.

segment subconically narrowed basally, nearly 1·5 times as long as subquadrate pedicellus; second flagellar segment very slightly shorter and broader than the first, about 1·25 : 1.

Puncturation on thorax not extremely dense, but narrow interspaces microscopically cross-reticulate, this microsculpture partly obliterated on disc of scutellum; pubescence short but conspicuous, whitish. Pronotum with hind margin slightly arched, finely carinate but premarginal carina not very distinct; carina of lateral margin reaching slightly beyond middle; lateral panel with distinct longitudinal depression. Mesoscutum posteriorly with slight submedian depressions continuing forwards as vague notaular furrows. Scutellum nearly 1·3 times as broad as long, rather flat; row of punctures along hind margin hardly deeper than elsewhere, interstices longitudinally strigose. Dorsellum strongly transverse-crescentic, margin finely carinate, middle slightly swollen, rather shiny, but broad alveolae along anterior and posterior margins. Propodeum in middle nearly 3 times as long as dorsellum, 0·65 of scutellum, 1·3 times as long as distance between median carina and plica posteriorly; median carina higher in middle, with adjacent hairs directed sidewards. Upper mesopleurum and metapleurum regularly punctured with interspaces smooth, generally about one-third as broad as punctures. Hind coxa with broad streak, narrowing caudad, of extremely dense puncturation and silvery pubescence below lateral edge; depression extensively punctured anteriorly, punctures sparser above and reaching lateral edge only basally; impunctate area in lower half transversely striate, postero-dorsally smooth, dorsal tooth low, weak; dorsal edge hardly narrowing posteriorly. Hind femur rather densely and finely punctured, interspaces without distinct sculpture. Fore wing: stigmal vein clavate, terminal processus broad, much shorter than uncus; pubescence rather dense but basal cell partly bare.

Gaster very slender (Text-fig. 249), hardly constricted behind first tergite, apical part broadly fusiform. First tergite about 2·1 times as long as broad, with narrow smooth median carina, otherwise very densely punctured, punctures sparser near to small basal fovea. Second tergite partly exposed at sides. Third tergite very short, its hind margin angulate. Fourth tergite medially raised into a broad finely grooved keel, sublaterally broadly weakly depressed; hind margin angulate at slightly less than 90 degrees; median length nearly 0·7 of maximum width of tergite. Fifth tergite broadest near middle, regularly convex or with slight cross-depression, densely punctured, interspaces at most 0·25–0·30 as broad as punctures, with shallow microscopic reticulation; ovipositorial furrow nearly reaching apex of fourth tergite, its sides lowered, only posteriorly subcarinate. Ovipositor slightly ascending (Text-fig. 250), 1·15–1·20 times as long as hind tibia.

♂. Unknown.

BIOLOGY. Unknown.

Holotype ♀, RHODESIA: Salisbury, xi. 1899 (*G. A. K. Marshall*) (BMNH).

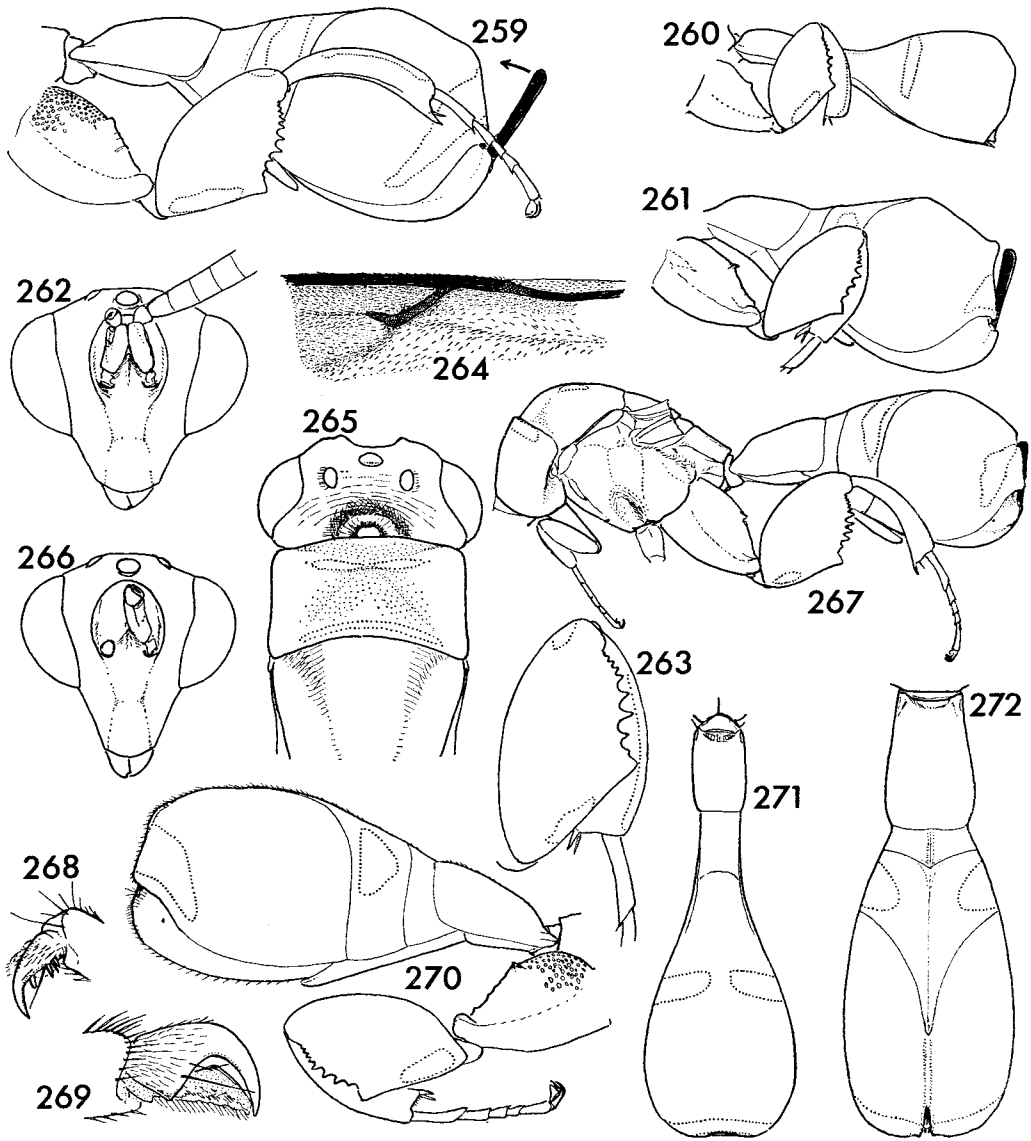
Paratypes. RHODESIA: Salisbury, ii. 1900, 1 ♀ (*G. A. K. Marshall*) (TM, Pretoria). SOUTH AFRICA: Zululand, 20 mls S. of Nolumu Game Reserve, 100 m, sandy scrub, 29.ix.1971, 1 ♀ (*M. E. Irwin*) (NM, Pietermaritzburg).

Micrapion lugubre sp. n.

(Text-figs 251, 252)

♀. 8 mm. Piceous black; with pale yellow: scape, transverse rhomboid spot anteriorly and narrow interrupted line posteriorly on pronotum, medially interrupted band on fourth tergite, band at hind margin of fifth tergite dorsally and large ventrobasal spot on hind femur. Wings dark brown.

Head nearly as broad as pronotum posteriorly, in dorsal view 2·1 times as broad as long; temples extremely short; frontal protuberances appearing high in slightly posterior view, in lateral third strongly sloping towards eyes; eye orbit rather deeply excised (Text-fig. 251). Vertex convex, but depressed between lateral ocellus and eye, slightly so also at median ocellus, concave between median ocellus and protuberance; punctures mostly separated by transverse



FIGS 259–272. *Micrapion*. 259, 260. *M. bilineatum*. 259, gaster and hind leg of ♀; 260, gaster of ♂ (holotype). 261–263. *M. congoense*. 261, gaster and hind leg of ♀; 262, head in facial view; 263, hind femur and tibia. 264, 265. *M. richardsi*. 264, venation of fore wing; 265, anterior part of thorax and head. 266. *M. nasutum*, head in facial view. 267–269. *M. steffani*. 267, thorax and gaster of ♀; 268, outer claw of mid leg; 269, outer claw of hind leg. 270–272. *M.* sp. A. 270, gaster and hind leg of ♀; 271, gaster of ♂ dorsally; 272, gaster of ♀ dorsally.

rugae; occipital carina low but distinct; ocellar triangle about 2·3 : 1; POL 3·2 times OOL; median ocellus half diameter from high scrobal carina. Head in facial view 1·09 times as broad as high. Supraclypeal area strongly convex, medially with smooth raised strip, interantennal area with fine keel. Relative measurements: breadth of head 56, frontovertex 29, scrobes 19, lower face 22·5, its height 25, eye 36 : 24, malar space 10, mouth 18, scapus 13. Flagellum plus pedicellus 1·28 times as long as breadth of head, moderately clavate. Pedicellus dorsally slightly oblong (1·1 : 1); first flagellar segment about 1·4 times as long as pedicellus, itself 1·33 : 1, dorsally in basal third abruptly narrowed, hardly shorter but slightly narrower than the second.

Thorax dull, reticulate puncturation not very coarse but very dense; very narrow interspaces microscopically striate, as in *M. dolichum*; pubescence very short, dark. Pronotum with hind margin barely emarginate but carinate in middle, premarginal carina weak; sides with short carina behind middle; lateral panel rather regularly depressed. Mesoscutum slightly flattened postero-medially, in certain lights notaular furrow traceable anteriorly, indicated by deeper punctures. Scutellum 1·3 times as broad as long, slightly convex, preapical punctured line shallowly impressed. Dorsellum crescentic, margin finely carinate; dorsum swollen and fairly shiny, finely sculptured: shallow longitudinal rugulae intermixed with small punctures. Propodeum medially three times as long as dorsellum, 0·7 times as long as scutellum, 1·7 times as long as distance between median carina and plica posteriorly; median carina straight, regular. Upper mesopleurum dull, dense punctures about twice smaller than on metapleurum. Hind coxa in triangle below base of lateral edge extremely finely and densely punctured, with dense silvery pubescence; depression with extensive dense puncturation, impunctate area transversely striate, dorsal tooth distinct; dorsal edge densely punctured, regularly swollen, barely narrowing caudad. Hind femur densely finely punctured, interspaces shagreened. Stigmal vein of fore wing curved, terminal processus hardly indicated, uncus long; pubescence black and dense even on basal cell.

Gaster very slender, as in *M. dolichum*. First tergite fully twice as long as broad, slightly expanding at three-quarters of length; densely punctured but for three subtriangular areas at base (these microscopically reticulate) and for smooth median line narrowing into a keel anteriorly. In holotype gaster elbowed behind first tergite (Text-fig. 252) suggesting its position at oviposition and exposing both parts of second tergite. Punctured (i.e. normally exposed) hind part of third tergite about 0·3 as long as its width, slightly transversely depressed except for raised median line; hind margin very obtusely angulate (about 140 degrees). Fourth tergite not transversely depressed, slightly raised in median line and with fine groove on top, about 0·6 as long as broad; hind margin arcuately angulate, the very apex at about 50 degrees but angle broadening subapically. Fifth tergite broadest in anterior third, highest in anterior sixth, otherwise regularly convex, densely punctured, narrow interspaces with faint but conspicuous (at 50×) microscopic reticulation; ovipositorial furrow narrowly reaching apex of preceding tergite, slightly edged to slightly carinate anteriorly. For lateral view see Text-fig. 252.

♂. Unknown.

BIOLOGY. Unknown.

Holotype ♀, ZAIRE: Lulua, Kapanga, iv. 1931 (*G. F. Overlaet*) (MRAC, Tervuren).

In the shape of the body this species is very similar to the preceding *Micrapion dolichum* sp. n. and, together with the following species, forms a little group with relatively long ovipositor and only moderately clavate gaster.

Micrapion dalyi sp. n.

(Text-figs 257, 258)

♀. 5·6 mm. Piceous black, with slightly reddish to testaceous sides of pronotum, tegulae, metapleurum, first tergite, legs apart from fore and mid coxae (basally); pale yellow are: scapus

beneath, narrow arcuate anterior and posterior cross-lines on pronotum, vertical macula on side of fourth tergite, narrow band at hind margin of fifth tergite, hind femur ventro-basally, dorsal streak on tibiae, all tarsi. Wings slightly infumate, darker brownish at stigmal vein and in apical sixth of fore wing.

Head distinctly broader than pronotum, in dorsal view twice as broad as long, with temples short and rounded; pronotal protuberances rounded, frontovertex above them not concave; inner orbits of eyes distinctly excised. Occipital carina slightly indicated between ocelli; vertex convex, with impunctate depressions outside of lateral ocelli and in front of median ocellus; puncturation coarse but rugose, not deep, white hairs subdecumbent, conspicuous. Ocellar triangle about 2·6 : 1; POL 2·7 times OOL. Head in facial view 1·16 times as broad as high; facial pubescence conspicuous, dense, silvery; interantennal area broad, rather flat, without distinct keel. Relative measurements: width of head 80, frontovertex 50, scrobes 30, lower face 36, its height 31, eye 49 : 33, malar space 13, mouth 22, scapus 18. Flagellum plus pedicellus slightly longer than breadth of head, distinctly clavate; pedicellus slightly oblong, hardly shorter than first flagellar segment which is slightly longer than the second.

Puncturation on thorax unusually coarse, dense, only on scutellum anteriorly with an impunctate space; walls between punctures mostly with distinct minute striation; pubescence not very short, white, conspicuous. Pronotum: hind margin broadly emarginate and distinctly carinately reflexed; premarginal carina not distinct; sides nearly parallel; lateral panel separated by a ridge, itself rounded-triangular, concave, fully half as high as long before spiracle. Mesoscutum with notaular furrows shallow, broad, distinctly impressed. Scutellum 1·15 times as broad as long, weakly convex, coarse punctures arranged only in six transverse rows, last one forming the admarginal row. Dorsellum rather flat, its margin unevenly carinate, dorsum with sparse irregular longitudinal rugae. Propodeum medially about twice as long as distance between apex of obliterated plica and the distinct median carina; pubescence denser, thinner and slightly shorter than on scutellum or mesoscutum. Upper mesopleurum very densely and coarsely punctured and hairy, punctures more irregular and coarser than on metapleurum. Hind coxa anteriorly below lateral edge with dense argenteous pubescence; depression: impunctate streak not reaching base, expanding apically, upper two-thirds of depression punctured, convex dorsal side more densely so, dorsal tooth vaguely indicated. Hind femur rather narrow (Text-fig. 258), rather densely punctured, interspaces rather shiny. Fore wing: apex of stigmal vein rounded, uncus long.

Gaster hardly constricted behind first tergite, apical part long-oval, all coarsely punctured and with white pubescence, laterally interspaces with transverse striation. First tergite about twice as long as broad, hardly broadening backwards, punctured except for small basal fovea; interspaces smooth, mostly 0·3–0·5 as broad as punctures, narrow median line impunctate. Third tergite short, transversely depressed except for raised median line, hind margin barely angulate. Fourth tergite not depressed, with blunt median crest which is finely grooved; slightly shorter than broad, sides of angulate apex arcuate, at top about at 60 degrees (in holotype; more acutangular in paratype). Fifth tergite broadest slightly behind middle, dorsally less convex (suggesting submedian depressions), ovipositorial furrow reaching apex of fourth tergite, distinctly regularly carinate throughout. Ovipositor sheaths about 1·25 times as long as hind tibia. The Text-fig. 257 is drawn from the paratype; in the holotype the puncturation is relatively still much coarser and sparser.

♂. Unknown.

BIOLOGY. Reared from the cell of a solitary bee of the genus *Ceratina*.

Holotype ♀, KENYA: Kiboko, Hunter's Lodge, ex bee cell collected 12. iii. 1971 (*H. Daly*) (BMNH).

Paratype. KENYA: Rabai nr Mombasa, viii. 1930, 1 ♀ (*van Someren*) (BMNH).

This species, distinctive by its unusually coarse puncturation and carinate ovipositorial furrow, has the sheaths of the ovipositor fairly long, as in the two preceding species, but in some respects seems to form a link with *M. clavaforme* Steffan.

Micrapion clavaforme Steffan

(Text-figs 245, 246, 254–256)

Micrapion clavaforme Steffan, 1948 : 85–86, fig. 1e, ♀. LECTOTYPE ♀ (here designated), GABON: Ogowe, N'gomo (MNHN, Paris) [examined].

Steffan based his description mainly on the specimen designated here as lectotype, whilst his second specimen, from Senegal (cf. his fig. 1e), is regarded and labelled as paralectotype.

This apparently widely distributed species should be recognizable by the key characters mentioned above, but seems to vary considerably. The females of medium size (5–6 mm) have the gaster slightly less convex, of intermediate form between the large females (7–9 mm) and the small ones (4·2–5·0 mm) in which the gastral dorsum is only weakly convex, sometimes even with a slight cross-depression in the middle of the fifth tergite. Also the length of the ovipositorial sheaths varies; in the specimens I measured they are between 0·88 and 1·13 times as long as hind tibia, but suggest that the smaller figures belong mainly to the northerly specimens. The highest figures, above 1.0, are found in specimens from Kenya, the highest figure (1·13) belongs to a female from Mozambique. I find also a slight elevation at the apex of the ovipositorial furrow in two specimens from Salisbury, Rhodesia. Text-fig. 256 is drawn from a specimen as large as the paratype of *M. dalyi*, with which it is compared (Text-fig. 257).

The male has not been described. It is very similar to the female and its form of gaster is shown in Text-fig. 255. It seems of little use to describe it fully, as in the related species the males are still unknown. It shares the form of hind coxa and its puncturation with the female. Length also very variable, 3·4–7·5 mm.

BIOLOGY. Many specimens were reared by Prof. Daly from the cells of solitary bees of the genus *Ceratina* Latreille.

DISTRIBUTION. Senegal, Portuguese Guinea (Bissau), Sierra Leone, Liberia, Ghana, Nigeria, Cameroun, Gabon, Zaire, Rwanda, Sudan, Ethiopia, Kenya, Tanzania, Rhodesia, Mozambique, South Africa.

MATERIAL EXAMINED.

Type data given in synonymy.

SENEGAL: 'No. 61', 1867, 1 ♀, paralectotype of *M. clavaforme*, (*Sichel*); vii. 1929, 1 ♀ (*P. Lesne*) (both MNHN, Paris). PORTUGUESE GUINEA: Bolama, 1899, 1 ♀ (*L. Fea*) (MCSN, Genoa). SIERRA LEONE: Njala, i. 1936, 1 ♀ (*E. Hargreaves*) (BMNH). LIBERIA: Harbel Du River, 1 ♀ (*J. Bequaert*) (MCZ, Cambridge); Menehtoun, 29.viii.1926, 1 ♀ (*J. Bequaert*) (MRAC, Tervuren). GHANA: Weija, 1 ♂ (*K. Guichard*) (BMNH). NIGERIA: Zaria, Samaru, ii. 1973, 1 ♀, 1 ♂ (*J. C. Deeming*) (BMNH); Ibadan, 14.vi.1951, 1 ♀ (*J. L. Gregory*) (BMNH). CAMEROUN: Bambui, nr Bamenda, 1500 m, 5.viii.1966, 1 ♀ (*C. D. Michener*) (SM, Lawrence). ZAIRE: Congo da Lemba, i.–ii. 1913, 1 ♀ (*R. Mayné*) (MRAC, Tervuren); Zambi, 6°S, 12°50'E, 30.vi.1915, 1 ♀ (MCZ, Cambridge); Katentania, v. 1924, 1 ♀ (*C. Seydel*) (MRAC, Tervuren); Katanga, Lufira River, 1100 m, 17.viii.1907, 1 ♀ (*Neave*) (BMNH).

RWANDA: N. of Uvira, iii. 1931, 1 ♀ (*J. Ogilvie*) (BMNH). SUDAN: West Darfur, 1 ♀ (*M. Steele*) (BMNH). ETHIOPIA: no locality, 1850, 1 ♂ (*Schimper*) (MNHN, Paris). KENYA: Voi, 1971, ex *Ceratina*, 4 ♀ (*H. Daly*) (CIS, Berkeley); Kiboko, Hunter's Lodge, 1971, ex *Ceratina*, 1 ♀ (*H. Daly*) (BMNH); Nyeri, 5.x.1922, 1 ♀ (*H. Wilkinson*) (BMNH); Diani Beach nr Mombasa, 3 ♂ (*F. X. Williams*) (MCZ, Cambridge). TANZANIA: Arusha-Chini, 1904, 1 ♂ (*Kittenberger*) (TM, Budapest); Arusha National Park, Momela Lake, 1971, ex *Ceratina* or *Pithitis*, 21 ♀, 9 ♂ & 1 gynandromorph (*H. Daly*) (CIS, Berkeley & BMNH); Old Shinyanga, 18.v.1952, 1 ♀ (*E. Burtt*) (BMNH); Embu, 8.xii.1913, 1 ♂ (*G. Sj. O.B.*) (BMNH). RHODESIA: Salisbury, iv. 1903, 2 ♀ (*G. A. K. Marshall*) (TM, Pretoria & BMNH). MOZAMBIQUE: Pompoue Valley, vii. 1929, 1 ♀ (*P. Lesne*) (MNHN, Paris). SOUTH AFRICA: Natal, Weenen, 1.iii.1937, 1 ♀ (*H. P. Thomasset*) (BMNH); Cape Province, Katberg, ii. 1933, 1 ♂ (*R. E. Turner*) (BMNH).

Micrapion flavocinctum (Kieffer) **comb. n.**

Callismicra flavocincta Kieffer, 1905 : 248–249, fig. 3, ♂. LECTOTYPE ♂ (here designated), MADAGASCAR: Nossi-Be Island (MNHN, Paris) [examined].

Micrapion madecassum Steffan, 1948 : 86–88, figs 1a–1d, ♀♂. LECTOTYPE ♀ (here designated), MADAGASCAR: Bekily (MNHN, Paris) [examined]. **Syn. n.**

C. flavocincta. Two original specimens, one badly damaged but better fitting the description, therefore selected as lectotype; the well preserved paralectotype has a yellow band on the scutellar apex, not mentioned in the original description.

M. madecassum. From the original three females and three males one female and one male were labelled as 'types', the rest as paratypes; the female 'type' is designated as lectotype.

Steffan's good illustrated description together with the above key and the fact that this is the only species known from Madagascar should be sufficient for a safe recognition of the species. Otherwise *M. flavocinctum* is very close to *M. clavaforme.*

BIOLOGY. No host record known.

DISTRIBUTION. Madagascar.

MATERIAL EXAMINED.

Type data given in synonymy.

MADAGASCAR: paralectotypes of *C. flavocincta* and *M. madecassum*, 3 ♀, 3 ♂ (MNHN, Paris); Tulear Province, Tongobory, 27.iii.1968, 1 ♀, 3 ♂ (*K. M. Guichard & P. D.*) (BMNH); Majunga, ii.–iii.1968, 1 ♀ (*Guichard*) (BMNH).

Micrapion punctulatum **sp. n.**

(Text-fig. 253)

♀. 7·5 mm. Very similar to *M. clavaforme* Steffan but differing in following characters. Yellow markings include narrow lateral lines on mesoscutum, upper tip of metapleurum, arrow-shaped spot on first tergite anteriorly, other two bands on gaster rather narrow but that

on fourth tergite meeting in distinct angle medially, band at posterior margin of fifth tergite crossing basal quarter of sheaths.

Head only as broad as pronotum in middle. Ocelli large, lateral one its (maximum) diameter from eye (this seems to vary in *M. clavaforme* in which OOL usually is greater), one diameter from median ocellus. Relative measurements: breadth of head 52, length 25.5, height 48, breadth of frontovertex 28, scrobes 18, lower face 22, its height 25, eye 34 : 22, malar space 10, flagellum plus pedicellus 63.

Pronotum with weak submedian depressions; lateral edge carinate in posterior half. Notaular depressions anteriorly distinct in certain lights. Hind coxa in anterior half of depression above lateral edge with narrow wedge-like streak without punctures but transversely striate, dull; puncturation above distinctly denser than in *M. clavaforme* of same size. Hind femur relatively broad, including teeth 1·81 times as long as broad, basal tooth very broad, middle teeth dense; puncturation very dense and rather fine, surface of femur appearing dull.

First tergite almost exactly twice as long as broad, sublaterally with very dense and finer puncturation than in *M. clavaforme*, along middle (Text-fig. 253) with impunctate but microscopically reticulate streak reaching shallow basal fovea, just behind yellow spot for some distance depressed at sides to appear subcarinate. Fourth tergite: median keel 0·92 times as long as maximum breadth of tergite. Sheaths 0·93 length of hind tibia.

♂. Unknown.

BIOLOGY. Unknown.

Holotype ♀, NIGERIA: Ibadan, Olokemeji (USNM).

Micrapion biimpressum sp. n.

♀. 5·4–6·2 mm. Another species very similar to *M. clavaforme*, hence in the following stress is put on the differentiating characters. Yellow markings: pronotum anteriorly with median transverse spot and tiny spots on shoulders, posteriorly with a line reduced at sides (markings less apparent, though present, in paratype), a dorsal spot anteriorly on first tergite, lateral elongate maculae on fourth tergite, on legs fore and hind knees dorsally, dorsal edge of fore tibia, mid tibia, ventro-basal streak on hind femur and mid and hind tarsi. Fore wing moderately infumate, darker at anterior margin and (abruptly) in apical fifth.

Head distinctly broader than pronotum (41 : 37); eyes with conspicuous pubescence; ocelli of medium size, lateral one by barely more than its longitudinal diameter from eye; POL nearly 2·5 times OOL; vertex fairly convex. Relative measurements: breadth of head 41, length 21, height 37, frontovertex 22·5, scrobes 14, lower face 16, its height 19, eye 22·0 : 12·5, malar space 9, mouth 12, flagellum plus pedicellus 50. First three flagellar segments subquadrate or very slightly elongate; flagellum feebly clavate.

Pronotal sides subparallel, slightly concave in middle; hind margin broadly emarginate; dorsal surface very uneven: raised postero-median area delimited by deep depressions diverging backwards from a small depression at front margin of anterior median macula; lateral edge distinct but not sharp. Notaular furrows distinct in certain lights though otherwise very vague. Dorsellum with conspicuous carina at margin, in holotype dorsally rather flat, with coarse alveolae. Propodeum medially nearly as long as scutellum; plicae slightly diverging forwards. Hind coxa in depression punctured only basad of dorsal tooth, impunctate area produced forwards in form of a wedge above lateral edge, latter basally with very dense argenteous pubescence. Hind femur about 1·8 times as long as broad (teeth included), with moderately dense and rather fine puncturation; interspaces narrow but shiny.

Gaster much as in *M. clavaforme*; first tergite 2·3 times as long as broad, narrow median line smooth, keeled. Sheaths about 0·85 length of hind tibia.

♂. 3·4–7·0 mm. Judging from conspicuous pronotal depressions and relatively smooth dorsal curve of gaster, along with some minor characters, there seems to be little doubt about the conspecificity with the females. Smaller ♂ is black, with subdivided posterior yellow line

on pronotum, mid and fore tibiae and all tarsi yellow; larger one has, in addition, interrupted cross-streak anteriorly on pronotum, smaller dorso-apical and larger ventrobasal maculae on hind femur, narrow vertical lines laterally on two-fifths of gastral carapace and apical elongate maculae sublaterally. Gaster otherwise as in *M. clavaforme*; second tergite medially about as long as broad at base; hairs on lower half of apical depression of carapace directed towards median line.

BIOLOGY. Host unknown.

DISTRIBUTION. Liberia, Nigeria, Cameroun, Zaire.

Holotype ♀, LIBERIA: Monrovia, 1926 (*J. Bequaert*) (MRAC, Tervuren).

Paratypes. LIBERIA: Du River, Camp No 3, 1926, 1 ♀ (*J. Bequaert*) (BMNH). NIGERIA: Lagos, Ikoyi Park, i. 1973, 1 ♂ (*J. C. Deeming*) (BMNH). CAMEROUN: Mabete Victoria, v.–vi. 1949, 1 ♂ (*B. Malkin*) (CAS, San Francisco). ZAIRE: Mayumbe, Makala Ntete, iii. 1922, 1 ♂ (*H. Schouteden*) (MRAC, Tervuren).

Micrapion richardsi sp. n.

(Text-figs 264, 265)

♀. 4·7–5·0 mm. Black, with red anterior margin and sides of pronotum, tegula, prepectus, upper part of thoracic pleura including upper epimerum, apex of propodeum and slightly hind femur; pale yellow markings: anterior (subinterrupted) and posterior cross-lines of pronotum reduced laterally, faintly hind margin of scutellum, broadly interrupted band on fourth tergite, narrow apical band on fifth tergite crossing sheaths below middle, narrow dorsal edge of fore and mid tibiae, ventro-basal streak on hind femur and smaller one dorsally at knee, mid and hind tarsi basally. Fore wing with moderate infumation along postmarginal vein, darker in angle of stigmal vein, and apical fifth.

Head distinctly broader than pronotum (39 : 35); lateral ocellus nearly 1·3 times its long diameter from eye margin, median ocellus more than half its diameter from scrobal carina; POL nearly 2·5 times OOL; sides of scrobes rather strongly converging upwards. Eyes even at strong magnification without distinct pubescence. Relative measurements: breadth of head 85, its length 43, height 76, breadth of frontovertex 52, scrobes 30, lower face 29, its height 37, eye 43 : 34, malar space 20, mouth 22. Inner margins of eyes distinctly converging downwards, excision (above) distinct but not deep. Clypeus fairly convex but at lower margin abruptly depressed and flat.

Pronotum with distinct diverging discal depressions (Text-fig. 265). Otherwise thorax as in *M. congoense*, as well as legs and gaster, except for the following. Terminal processus of stigmal vein of fore wing barely developed (Text-fig. 264). Fifth tergite with ovipositorial furrow not reaching apex of fourth tergite, elevated auricles at apex of furrow distinct although lower than in *M. congoense* and slightly nearer to fourth tergite, at about four-sevenths of distance between base of sheaths and apex of that tergite. Sheaths about 0·82 length of hind tibia.

♂. 5·4 mm. Very similar to ♀; whitish is scape beneath, an interrupted cross-line anteriorly on pronotum and ventro-basal streak on hind femur, but hind margin of pronotum and scutellum black, as well as gaster. Also similar to ♂ of *M. biimpressum*, but different in having eyes virtually bare (not worn off!) and apical half of gaster dorsally slightly more sloping, with hairs on lower half of subapical depression distinctly directed upwards.

BIOLOGY. Reared from *Ceratina* sp.

Holotype ♀, GHANA: Legon, nr Accra, ex *Ceratina* cell, coll. 20. iii., emerged iv.1969 (*O. W. Richards*) (BMNH).

Paratypes. 1 ♀ with the holotype (BMNH), 1 ♂ emerged v. 1969 (*O. W. Richards*) (BMNH).

I think that this is a good species, although the variation in the genus *Micrapion* is rather puzzling. *M. richardsi* has the pronotal depressions similar to *M. biimpressum*, but the form of the female gaster is different, more like that of *M. congoense*, apart from the rather strange lack of conspicuous pubescence on the eyes.

Micrapion congoenese Steffan

(Text-figs 261–263)

Micrapion congoense Steffan, 1948 : 85, ♀. Holotype ♀, ZAIRE: Kiwu Region, Kadjudju (MNHN, Paris) [examined].

I think that this is a good species, although very close to *M. bilineatum* Kriechbaumer. Eventually when more is known it might prove to be a northerly subspecies of *bilineatum*, differing mainly by the more slender hind femora and usually darker colours. In the specimens examined the hind femur is 1·78–2·00 times as long as broad (teeth included), with a more slender femur in smaller specimens. The length of the sheaths varies between 0·62–0·76 the length of hind tibia. Steffan differentiated *M. congoense* from *M.* (*nyassicum* =) *bilineatum* on the lack of the pale markings on the thorax, but I find great variation; in the richer-marked specimens the pronotum has anterior and posterior bands, mesoscutum narrowly bordered lateral margin, scutellum the posterior margin. The length of body in female 4·9–6·9 mm, in male 5·2–6·2 mm. The male has the gaster much as shown in *M. bilineatum* (Text-fig. 260), but the hind femur is more slender.

BIOLOGY. No host records known.

DISTRIBUTION. Zaire, Uganda, Mozambique.

MATERIAL EXAMINED.

Type data given in synonymy.

ZAIRE: Boma, 1.vii.1920, 1 ♀ (*H. Schouteden*) (MRAC, Tervuren); Congo da Lemba, i.–ii.1913, 2 ♀ (*R. Mayné*) (MRAC, Tervuren; BMNH); Nyangwe, xi. 1910, 1 ♀, 1 ♂ (*Bequaert*) (MRAC, Tervuren); Lusambo, 1921, 1 ♂ (*Ghesquière*) (BMNH); Katanga, Tenke, viii. 1931, 1 ♀ (*T. D. A. Cockerell*) (BMNH); Mufungwa Sampwe, xii. 1911, 1 ♀ (*Bequaert*) (MRAC, Tervuren). UGANDA: Kampala, 17.xi.1915, 1 ♀ (*C. C. Gowdey*) (BMNH); Bussu, 1909, 1 ♀ (*Bayon*) (MCSN, Genoa). MOZAMBIQUE: no data, 1 ♀ (*F. Muir*) (BMNH).

Micrapion nasutum sp. n.

(Text-fig. 266)

♀. 4·8–7·0 mm. Black, with red reduced to narrow borders and sides of pronotum, tegula, subalar area, metapleurum, on legs at trochanters and knees, gaster ventro-basally, on apex of first tergite and apex fifth tergite; pale yellow: usually narrow posterior and interrupted

short anterior lines on pronotum, angulate interrupted band on fourth tergite and broad band on fifth tergite crossing upper half of sheaths above red apex, then dorsal edge of fore tibia, apical half of mid tibia, ventro-basal streak on hind femur, hind basitarsus. Sometimes yellow reduced on pronotum anteriorly or, to the contrary, extended, forming lateral lines on mesoscutum, apical band on scutellum, dorso-apical spot on hind femur and on fifth tergite extended, replacing red, to hind margin. Fore wing subhyaline but with abruptly dark apical sixth connected by a line with stigma and a streak along postmarginal vein.

In shape and structure similar to *M. congoense* and *M. bilineatum*. Head below eyes narrower and more produced (Text-fig. 266), in holotype malar space fully 1·1 times as long as width of mouth (other specimens 1·10–1·15 times so) and 0·45–0·55 the length of eye. In lateral view lower face distinctly convex. Head dorsally about 1·9 times as broad as long, in facial view in holotype 1·04 times as broad as high; face with very dense white pubescence. Antenna subclavate.

Pronotum with barely distinct depressions. Puncturation on mesoscutum dense, very narrow interspaces with distinct microreticulation or striation. Hind coxa densely punctured dorsally but in depression only in a reduced wedge-shaped area from base to middle, impunctate parts transversely striate. Hind femur rather densely punctured (slightly more than in average *M. congoense*, less so than in *M. bilineatum*), rather slender, including teeth 1·81–2·00 times as long as broad. First tergite about 1·7 times as long as broad, densely punctured, behind first third medially subdepressed and with elevated smooth median line. Puncturation of fifth tergite moderately coarse, dense, tergite in lateral view slightly longer than high. Sheaths 0·66–0·72 times as long as hind tibia, their furrow steeply ascending, bordered by sharp ridge or carina, this highest below middle and at top which is half way between apex of fifth and the very sharp-angular apex of fourth tergite; top elevation moderate, not auricle-like, furrow strongly narrowed in front of it and obliterated.

♂. 4·6–5·9 mm. Very similar to ♀ in colour (but red more reduced) and shape of head, thorax, legs (but mid tibia all whitish) and wings. Antenna still less clavate, flagellum plus pedicellus about 1·2 times as long as breadth of head. Gaster on broad part with usual interrupted cross-band anteriorly and horse-shoe macula posteriorly. Anterior part very narrow; relative measurements: narrowest part behind first tergite 10·5, broadest part 39, length of gaster 96, first two tergites combined (second measured to its apex on epipleural carina) 33, first tergite 20 : 13, its sides slightly narrowing caudad. Sternites narrow; fourth slightly, fifth and sixth distinctly elongate and broadly concave.

BIOLOGY. Reared from cells of solitary bees belonging to the genus *Ceratina* Latreille.

DISTRIBUTION. Kenya, Tanzania.

Holotype ♀, TANZANIA: Arusha National Park, Small Momela Lake, ex cells collected ii. 1971 (*H. V. Daly*) (BMNH).

Paratypes. KENYA: Lake Naivasha, Fisherman's Camp, ex cells coll. ii. 1971, 1 ♂ (*Daly*) (CIS, Berkeley); S.W. end of Lake Naivasha, in *Tagetes*, ditto, 1 ♀ (*Daly*) (BMNH). TANZANIA: as holotype, 3 ♀, 2 ♂ (*Daly*) (BMNH; CIS, Berkeley); Ngorongoro Crater, Kima Lodge, 2500 m, cell coll. ii. 1971, 1 ♀ (*Daly*) (CIS, Berkeley).

Micrapion bilineatum Kriechbaumer

(Text-figs 259, 260)

Micrapion bilineatum Kriechbaumer, 1894 : 316, ♂. Holotype ♂, MOZAMBIQUE: 'terra firma' (TM, Pretoria) [examined].

Leucospis nyassica Enderlein, 1901 : 219–220, ♀. LECTOTYPE ♀ (here designated), TANZANIA: (Langenburg =) Lumbira (MNHU, Berlin) [examined]. **Syn. n.**

The lectotype of *L. nyassica* is selected from two original females, the one collected in July, 1898; the other, in March, 1898, labelled as paralectotype. I believe that it is the same species as the holotype of *M. bilineatum*, a male, although in the latter the hind femur is not so broad (Text-fig. 260). *L. nyassica* was rightly recognized as a *Micrapion* already by Steffan (1948).

M. bilineatum, as in all species of this genus, is fairly variable and this makes it difficult to be sure about the range of variation and consequently, about the validity of the species. I hope to have found a relatively good character of *bilineatum* in the relatively broad hind femur (in combination with the gaster characters). The femur is, in the specimens examined, 1·58–1·77 times as long as broad (teeth included). The relatively short ovipositor, with reposing sheaths completely hidden in their furrow which is not distinctly marked by auricles, has sheaths 0·76–0·82 times as long as hind tibia. ♀ 5–7 mm, ♂ 5–6 mm.

BIOLOGY. No host known.

DISTRIBUTION. Zaire, Kenya, Tanzania, Zambia, Rhodesia, Mozambique, Angola, South Africa, ? South West Africa (slightly aberrant specimen).

MATERIAL EXAMINED.

Type data given in synonymy.

ZAIRE: Lubumbashi (= Elisabethville), 28.v.1931, 1 ♀ (*De Loose*) (MRAC, Tervuren). KENYA: Naivasha, ix.1939, 1 ♀ (*H. J. A. Turner*) (BMNH); Rabai nr Mombasa, viii. 1930, 1 ♀, 1 ♂ (*van Someren*) (BMNH). TANZANIA: Lumbira (= Langenburg), iii. 1898, 1 ♀, paralectotype of *L. nyassica*, (*Fülleborn*) (MNHU, Berlin). ZAMBIA: 85 mls W. of Cariba Gorge, 24.vi.1918, 1 ♂ (*Silverlock*) (BMNH). RHODESIA: Umtali, iii. 1957 1 ♀ (*N. L. H. Krauss*) (BMNH). ANGOLA: Moçamedes, Sala, 1 ♂ (RNH, Leiden). SOUTH AFRICA: Transvaal, Louis Trichardt, iv. 1932, 1 ♀ (*J. Ogilvie*) (SAM, Cape Town); Zululand, Mfongosi, xii. 1916, 1 ♀ (*W. E. Jones*) (SAM, Cape Town); Gigindhlovu, 15.vi.1926, 1 ♀ (*R. E. Turner*) (BMNH); Otterford Forestry Reserve, Hankey Area, xii. 1967, 1 ♀ (*B. & P. Stuckenberg*) (NM, Pietermaritzburg); Pondoland, Port St. Johns, v. 1923, 1924, 1 ♀, 1 ♂ (*R. E. Turner*) (BMNH); Grahamstown, xii.–iv. 1958–1961, 4 ♀ (*Jacot-Guillarmod & E. McC. Callan*) (AM, Grahamstown; BMNH); Resolution nr Grahamstown, 8.i.1929, 1 ♀ (*A. Walton*) (TM, Pretoria); Algoa Bay, 16.i.–28.ii.1898, 8 ♀, 1 ♂ (*Brauns*) (TM, Pretoria & BMNH). SOUTH WEST AFRICA: Kaoko Otavi, iii. 1926, 1 ♀ (*Mus. Exped.*) (SAM, Cape Town).

Micrapion steffani sp. n.

(Text-figs 15, 267–269)

♀. 6·0–8·5 mm. Black but usually with following parts red: lateral and anterior margins of pronotum, mesepimerum, partly metapleurum, propodeum, first tergite at least posteriorly and apex of hind coxa; whitish yellow are: two cross-lines on pronotum (anterior one shorter, both usually interrupted), two submedian spots and lateral streaks on mesoscutum, hind margin of scutellum, cross-band on fourth tergite interrupted medially, on fifth tergite subtriangular

maculae slightly removed from hind margin, apex of fore femur, hind femur ventro-basally and dorso-apically and hind tibia dorsally. Wings distinctly infumate at venation.

Head about as broad as pronotum, in dorsal view fully 1·7 times as broad as long, with temples distinct though extremely short and rounded; frontal protuberances rather high at scrobes, obliquely receding from middle to shallow excision of eye orbit; space above protuberance concave. Vertex almost regularly convex, densely punctured, mesad partly transversely rugose, often with weak occipital carina between hind ocelli; ocellar triangle about 2·4 : 1, POL about 3 times OOL; median ocellus nearly half its diameter from scrobal carina. Head in facial view about 1·1 times as broad as high. Supraclypeal area fairly convex, median keel distinct above. Relative measurements: head width 104, frontovertex 65, scrobes 38 (height 37), lower face 53 (height 44), eye 61 : 38, malar space 27, mouth 27, length of scapus 23. Flagellum plus pedicellus 1·10–1·15 times as long as breadth of head, distinctly clavate; first flagellar segment narrowed in basal half, hardly longer than the slightly oblong pedicel, second flagellar segment subquadrate.

Puncturation of thorax coarse but less dense than in the other species, interspaces with microscopic cross-striation which is obliterated on broad mesoscutal disc and absent on scutellum; latter with interspaces up to one-third or one-half breadth of punctures, shiny. Pubescence extremely short. Pronotum with hind margin weakly emarginate, premarginal carina usually distinct; sides anteriorly not distinctly carinate; lateral panel rather abruptly depressed below subcarinate edge. On mesoscutum notaular furrow indicated by outer margin of discal spots and by slight depression more anteriorly. Scutellum about 1·25 times as broad as long, weakly convex, crenulate impressed line at hind margin narrow. Dorsellum alveolate, alveolae generally in two transverse rows separated by vague carina which is slightly more raised submedially; hind margin subcarinate, not smoothly curved. Propodeum medially fully 0·8 as long as scutellum. Upper mesopleurum with smooth interspaces between coarse punctures. Hind coxa even in relatively denser puncturation at base below lateral edge with narrow shiny interspaces, hairs not dense, not covering surface; depression nearly smooth (cross-striation usually obliterated), dorso-basal third coarsely punctured, dorsal tooth distinct. Hind femur externally smooth, interspaces mostly broader than punctures. Fore wing: terminal processus of stigmal vein broader than but nearly as long as uncus; pubescence not very dense, short, basal cell bare along cubital hair line, hairs in its upper half not very dense.

Gaster slightly constricted behind first tergite, apical part expanding backwards. First tergite subpyriform, about 1·6 times as long as broad, dorsally convex and rather regularly punctured with smooth interspaces generally nearly half as broad as punctures; posteriorly in middle slightly depressed but median carina hardly indicated. Third tergite ridged medially, hind margin produced about in right angle. Fourth tergite still more distinctly ridged, ridge bearing fine groove; hind margin produced at very sharp angle, median ridge about as long as maximum width of tergite; slight transverse depression submedially at hind margin of yellow band. Fifth tergite broadest in posterior third, dorsally at sharp apex of preceding tergite transversely depressed; coarsely punctured, interspaces mostly more than half diameter of punctures, mostly smooth; ovipositorial furrow rather short, its apex removed from angle of fourth tergite, its sides ridged and forming lobate elevations at apex of ovipositor. Sheaths less than two-thirds length of hind tibia, in normal position only slightly directed forwards. Gaster in lateral view shown in Text-fig. 267.

♂. 5·8–9·0 mm. In colour and sculpture similar to ♀, but puncturation often denser. Petioliform part of gaster reddish only behind first tergite, whitish are: a band on fourth tergite (anterior third of broad part of gaster) broadly interrupted medially, a horseshoe-like line on subvertical sixth tergite. First tergite about 1·3 times as long as broad, hind margin hardly emarginate. Second tergite between lateral keels 0·85 times as long as broad, to about as long as broad (in one specimen clearly longer than broad, which throws some doubts on the validity of this character), keels slightly diverging posteriorly, hind margin distinctly emarginate. In lateral view gaster expanding to apex of fifth tergite; sixth tergite on truncate part with narrow impunctate median line indicating a slight keel. Fourth tergite subquadrate.

BIOLOGY. Reared from nest of *Ceratina truncata* Friese, Apidae.

DISTRIBUTION. South Africa.

Holotype ♀, SOUTH AFRICA: Cape Province, Worcester, xii. 1933 (*R. E. Turner*) (BMNH).

Paratypes. SOUTH AFRICA: as holotype, 1 ♀, 2 ♂ (BMNH); Cape Province: Willowmore, i.–ii., vi.–viii. 1902–1923, partly ex *Ceratina truncata*, 9 ♀, 4 ♂; Sundayriver, 27.xii.1897, 1 ♀ (all *Brauns*) (TM, Pretoria and BMNH); nr Carlisle Bridge, 18.ii.1961, 1 ♀ (*Jacot-Guillarmod*) (AM, Grahamstown); Modderfontein nr Willowmore, 20.ii.1923, 1 ♂ (*Brauns*) (BMNH); Algoa Bay, viii. 1896, 4 ♀, 3 ♂ (*Brauns*) (TM, Pretoria and BMNH); Boskey Dell nr Grahamstown, 24.ix.1967, 1 ♀ (*Jacot-Guillarmod*) (AM, Grahamstown).

The species is named in honour of my friend Dr J. R. Steffan (MNHN, Paris), who was the first to contribute substantially to the knowledge of the genus *Micrapion*.

Micrapion sp. indet. A

(Text-figs 270–272)

Very similar to *M. steffani* sp. n. in the form of head (at least in the male), of hind coxa and femur and in the form of gaster both in female (cf. Text-figs 267, 270, 272) and male (Text-fig. 271). Therefore the following description puts stress on the differences between the two species.

♀. 2·3–4·7 mm. Larger ♀: black, turning red on margins of pronotum, sides of thorax, propodeum, base of gaster and legs; pale yellow are: anterior and posterior band on pronotum, tiny adtegular spot on mesoscutum, posterior band (dilated laterad) on scutellum, broad subtriangular macula on either side of fourth tergite, broad subcrescentic horizontal band on apex of fifth tergite crossing sheaths in nearly their whole length, then all tibiae dorsally, hind femur ventro-basally and with a spot dorso-apically. In small (apparently dwarf) specimen markings anteriorly on pronotum, on mesoscutum and scutellum, on sixth tergite and hind femur missing. Wing infumation as in *M. steffani*.

Head in small specimen (missing in larger one) broader than pronotum as 47 : 41, in dorsal view only 1·74 times as broad as long, strongly regularly convex, convexity of vertex and frons in one smooth curve, protuberances not differentiated. Lateral ocellus nearly twice its diameter from eye, median ocellus one diameter from scrobes, latter barely carinate dorsally. POL about twice OOL. Inner orbits hardly emarginate. Relative measurements: breadth of head 47, height 46, frontovertex 32, scrobes 16·5, lower face 26·5, its height 20, eye 27 : 19, malar space 14, mouth 13. Length of flagellum plus pedicellus 0·95 breadth of head, flagellum strongly clavate, all segments transverse, first flagellar segment slightly shorter than pedicellus, only half as broad as clava; latter only 1·25 times as long as broad, bluntly subacuminate.

Thorax and gaster much as in *M. steffani* but puncturation much denser and accordingly the pubescence. Pronotum dull, very narrow interspaces microscopically cross-striate. On mesoscutum interspaces slightly broader, on disc dull, striate and about a quarter as broad as punctures, posteriorly still broader, broadest anteriorly on scutellum and at hind corners of mesoscutum where slightly shiny. Thorax dull everywhere in the small specimen. With denser puncturation also hind coxa at base of lateral edge densely punctured and fairly densely pubescent, extension of puncturation in the depression about as in *M. steffani*, but impunctate part more distinctly cross-striate.

For gaster see Text-figs 270, 272; puncturation fairly dense.

♂. 3·7–4·0 mm. Anterior pale yellow line on pronotum more or less reduced, present on scutellum, gaster with broad vertical sublateral streaks in front of broadest place and with broad

horse-shoe macula on truncation, in one specimen narrowed in middle (above); narrowest part of gaster red. Infumation of wings faint, sometimes absent. Flagellum slightly clavate' combined with pedicellus 1·17–1·20 times as long as breadth of head. For shape of gaster see Text-fig. 271; very similar to *M. steffani*, but in general more slender anteriorly and puncturation denser.

BIOLOGY. Unknown.

DISTRIBUTION. South West Africa, South Africa.

MATERIAL EXAMINED.

SOUTH WEST AFRICA: Aus. i. 1930, 1 ♀, 3 ♂ (*R. E. Turner*) (BMNH). SOUTH AFRICA: Aliwal North, xii. 1922, 1 ♀ (larger one) (*R. E. Turner*) (BMNH).

I considered the probability of identity with *Micrapion steffani*. The size and the stouter antenna of the dwarf specimen cannot be taken as reliable characters; usually, however, the smaller specimens of the same species have relatively much coarser and sparser sculpture, which is quite to the contrary in this case.

The species is not being named through lack of a suitable holotype; in the larger female the head is missing, the other female is a dwarf and the males often do not show specifically reliable characters.

MISPLACED TAXA

MARRES Walker, 1841 : 217. Type-species: *Marres dicomas* Walker, by monotypy.

Schletterer (1890 : 298–299) treated this genus and its only species described from West Africa as close to *Leucospis* Fabricius. Menon (1949), after having studied the type of *M. dicomas*, concluded however that the species and genus belong to Chalcididae. I can confirm this as correct.

Coelogaster conicus Schrank, 1802 : 222–223. Type(s), AUSTRIA (?lost).

As a consequence of *Coelogaster* Schrank having been put in synonymy with *Leucospis* Fabricius, *C. conicus* was also synonymized, with a query, with *Leucospis dorsigera* Fabricius by Dalla Torre (1898 : 408). The type-material of *conicus* is probably lost but from reading the description I do not think that the species was a Leucospid. The thorax is described as 'golden green', which would suggest rather a Pteromalid.

Leucospis integra Haldeman, 1844 : 53, ♂. Type(s), U.S.A.: ?Pennsylvania (lost).

Already Cresson (1872 : 35) suggested that this species was probably the same as *Chalcis ovata* Say, called nowadays *Brachymeria ovata* (Say). This synonymy was accepted by Ashmead (1904 : 408), who called the species *Chalcis annulata* Fabricius, but not by the more recent American authors; Peck (1963 : 899–900), for example, has *L. integra* among the Unplaced Species. I think, judging from the description only, that Cresson was most probably right. The original material is believed to be lost; it was not among the remnants of the Haldeman types given to Saussure and brought by him to Geneva (see Schulz, 1911 : 75, 149).

NOMINA NUDA AND OTHER UNAVAILABLE NAMES

antigana

Mentioned as '*Leucaspis Antigana* nov. sp.' by Antiga (1885 : 75) and as '*Leucospis antigana* nov. sp.?' by Ceballos (1956 : 208) from Spain. A nomen nudum!

bruchi

Mentioned as '*Leucospis bruchi*' by Schrottky (1913 : 141) and by De Santis (1967 : 215) from the Catamarca province in north-western Argentina. A nomen nudum!

cinctus

Mentioned as '*Exoclaenoides cinctus*' by Tillyard (1926 : 273, pl. 21, fig. 9). Misspelling of *Epexoclaenoides bicinctus* Girault; see *Leucospis giraulti* nom. n. (p. 202).

dorsalis

Misquotation, as '*Leucospis dorsalis*', by Dalla Torre (1898 : 408), of *Leucospis dorsigera* in Lamarck (1817 : 151). Misspelling.

elongata, rufipes

Nomina nuda; first published in synonymy by Westwood (1839: 258, 262).

unipunctata

Mentioned as *Leucospis* '*unipunctata* mihi. Inédite.' first by Spinola (1811 : 147), repeated as a synonym of *L. aculeata* Klug by Westwood (1839 : 247) and as a synonym of *L. intermedia* Illiger by Schletterer (1890 : 195), and so listed by Dalla Torre (1898 : 412). A nomen nudum!

HOST-PARASITE CATALOGUE

EUMENIDAE

Anterhynchium flavopunctatum (Smith)	*Leucospis japonica*
Calligaster cyanoptera Saussure	*Leucospis calligastri*
Calligaster williamsi Bequaert	*Leucospis williamsi*
Rhynchium sp.	*Leucospis pyriformis*
Xenorhynchium nitidulum (Fabricius)	*Leucospis pyriformis*

VESPIDAE

?*Vespula vulgaris* (Linnaeus)	*Leucospis gigas*

SPHECIDAE

Chalybion japonicum (Gribodo)	*Leucospis japonica*
Isodontia nigella (Smith)	*Leucospis japonica, L. sinensis*
Pison sp.	*Leucospis giraulti*

APIDAE

Anthidiellum strigatum (Panzer)	*Leucospis bifasciata, L. dorsigera*
Anthidiellum sp.	*Leucospis slossonae*

APIDAE—*continued*

Anthidium diadema Latreille	*Leucospis dorsigera*
Anthidium emarginatum (Say)	*Leucospis a. affinis*
Anthophora garrula (Rossius)	*Leucospis gigas*
Ashmeadiella aridula astragali Michener	*Leucospis a. affinis*
Ceratina truncata Friese	*Micrapion steffani*
Ceratina spp.	*Micrapion clavaforme, M. dalyi, M. nasutum, M. richardsi*
Chalicodoma muraria (Retzius)	*Leucospis gigas*
Chalicodoma pyrenaica Lepeletier	*Leucospis gigas*
?*Coelioxys quadridentatus* (Linnaeus)	*Leucospis gigas*
?*Ctenoplectra chalybaea* Smith	*Leucospis h. histrio*
Dianthidium pudicum consimile (Ashmead)	*Leucospis a. affinis*
Euglossa ignita Smith	*Polistomorpha fasciata*
Euglossa sp.	*Polistomorpha conura, P. fasciata*
?*Heriades* sp.	*Leucospis dorsigera*
Hoplitis producta (Cresson)	*Leucospis a. affinis*
Lithurge capensis Friese	*Leucospis ornata, L. varicollis*
Lithurge sp.	*Leucospis ornata*
Megachile brevis Say	*Leucospis a. affinis*
Megachile disjunctiformis Cockerell	*Leucospis japonica*
Megachile inermis Provancher	*Leucospis a. affinis*
Megachile montivaga Cresson	*Leucospis a. affinis*
Megachile nipponica Cockerell	*Leucospis japonica*
Megachile poeyi Guérin-Méneville	*Leucospis poeyi*
Megachile rancaguensis Friese	*Leucospis hopei*
Megachile relativa Cresson	*Leucospis a. affinis*
Megachile ?ringii Cheesman	*Leucospis aruina*
Megachile rotundata (Fabricius)	*Leucospis a. affinis*
Megachile sculpturalis Smith	*Leucospis japonica*
Megachile willowmorensis Brauns	*Leucospis ornata*
Megachile sp.	*Leucospis h. histrio*
Osmia adunca (Panzer)	*Leucospis dorsigera*
Osmia atriventris Cresson	*Leucospis a. affinis*
Osmia ?caerulescens (Linnaeus)	*Leucospis gigas*
Osmia californica Cresson	*Leucospis a. affinis*
Osmia emarginata Lepeletier	*Leucospis intermedia*
Osmia excavata Alfken	*Leucospis japonica*
Osmia globicola Stadelmann	*Leucospis osmiae*
Osmia lignaria Say	*Leucospis a. affinis*
Osmia pumila Cresson	*Leucospis a. affinis*
Osmia rostrata Sandhouse	*Leucospis a. affinis*
Osmia rufa (Linnaeus)	*Leucospis dorsigera, L. gigas*
Osmia simillima Smith	*Leucospis a. affinis*
Osmia taurus Smith	*Leucospis japonica*
Pachyanthidium cordatum (Smith)	*Leucospis tricolor*
Pachyanthidium truncatum (Smith)	*Leucospis tricolor*
Serapista denticulata (Smith)	*Leucospis africana, L. tricolor*
Stelis sexmaculata Ashmead	*Leucospis a. affinis*
Stelis sp.	*Leucospis a. affinis*
Xylocopa nogueirai Hurd & Moure	*Leucospis xylocopae*
Xylocopa submordax Cockerell	*Leucospis anthidioides*
Xylocopa sp.	*Leucospis reversa*

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Invalid names including nomina nuda are in *italics*.

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