

A TAXONOMIC STUDY IN SPALANGIA LATR. (HYMENOPTERA, CHALCIDOIDEA)

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Introduction

The species belonging to the genus *Spalangia* Latr. (Fig. 1) are mainly primary parasites of synanthropic and other flies, and in various parts of the world they have been studied mostly in connection with their possible use as biological control agents. Although in economic entomology special attention has been paid to more than one species, the taxonomy of the genus has lagged far behind, even in countries of Western and Central Europe and in North America. Since there has been so far published no workable key to species, workers are often puzzled with problems of naming species correctly. Very few of them were aware, also, of the world distribution of certain species, which were then referred to under more than one name in different continents.

To improve this situation, at least as far as the Central European material is concerned, I tried first to find the true limits of the European species. Then I studied, as far as possible, the types of all the described species, or tried to get information about them and thus to learn how to name the individual species correctly. In this work started several years ago, I soon realized the necessity of study on a much larger scale, for many species concerned proved to be distributed over enormous distances, some of them all over the world, and not in every case the oldest name was given the species in Europe. It was necessary to provide information on species known in North America and elsewhere. It is hoped that in most cases the oldest available and correct name has been found, though not all questions by far could be settled to my satisfaction and only relatively few non-European species could be taken in consideration.

In this paper I present a revision of the European species of *Spalangia*, of the North American species (here, however, the material at disposal was not fully sufficient in some instances), and am reviewing what is known about the species described from all the other parts of the world. As far as the African species are concerned I give a key to what is known from that continent, as well as the South Asian and South American species, with descriptions of several new ones.

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Systematic position of the genus

The genus *Spalangia* is usually considered a member of the family Pteromalidae, in which it has given its name to a subfamily of its own: Spalangiinae.

Haliday, 1833, was the first author to establish for this genus an independent tribe called then Spalangiae, including apart from *Spalangia* Latr. also some foreign elements. Westwood, 1839 (p. 66), named the group "Subfamily? Spalangiides" and Förster, 1856, attributed the group already the status of a family (Spalangoidae). The subsequent authors mostly took the group as a family near to, or a subfamily within, the Pteromalidae, but

often included also various other genera in it, as the present *Cerocephalinae*, or even some *Diparinae* and *Asaphini* (e. g. Thomson, 1876; Ashmead, 1904). Whenever the affinity of *Spalangia* to the *Pteromalidae* was discussed, these groups were not taken in consideration however. Nevertheless it may be worth to note some of these opinions. Thus Parker and Thompson, 1928, after a thorough comparative study of the larval instars

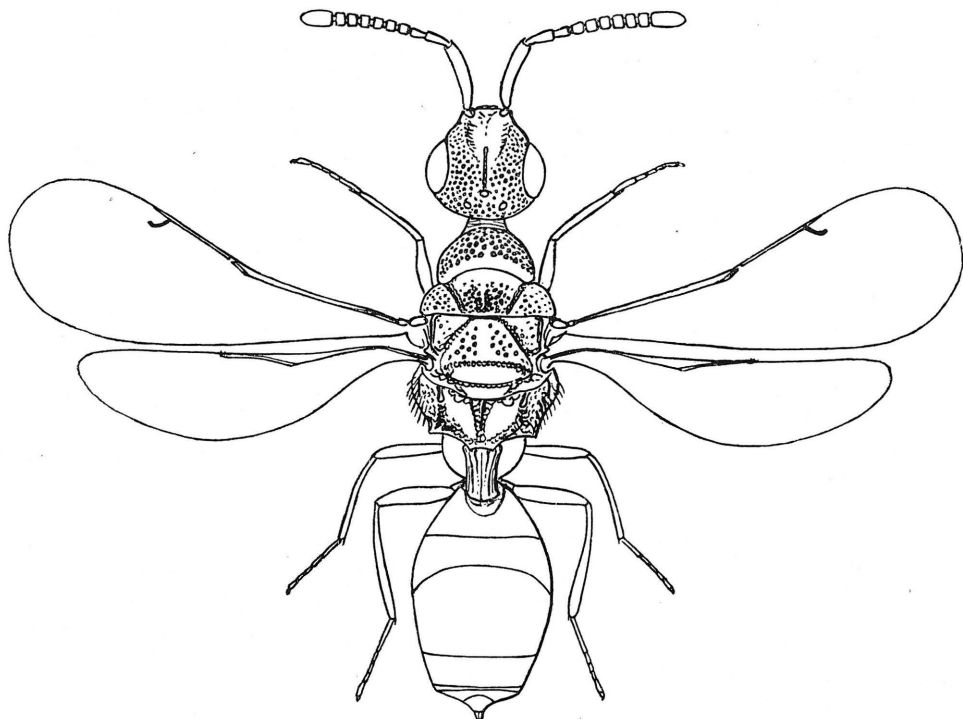


Fig. 1. *Spalangia nigripes* Curt., female.

and eggs of various Chalcid flies say (p. 438): "Les *Spalangia* sont placés systématiquement avec la famille *Pteromalidae*, mais ce ne sont pas de vrais *Ptéromaliens*, ni par la morphologie larvaire, ni par la morphologie de l'adulte." Simmonds, 1952 (p. 533), expresses a similar view. Also Domenichini, 1953, in his comparative study of the Chalcid abdomen seems to have found no close relation to the *Pteromalids* (p. 110): "Gli *Spalangiidæ* costituiscono un gruppo a sè stante, la cui posizione riesce difficile per ora." He uses the term 'family' evidently on the authority of Mr. Novitzky.

So the reference of *Spalangia* to an independent family would seem justified and some morphological characters (e. g. distribution of mesopleural impressions) are quite singular and support this view. I do not want, however, to settle this question here and am leaving it to a future

paper dealing with higher taxa, when also the range and the natural limits of the group are more precisely known.

Anyway the genus *Spalangia* Latr. seems to have its most closely allied forms among the members of the subfamily Cerocephalinae, which also lack the ring segments in the antennae.

Genus *Spalangia* Latreille

Spalangia Latreille, 1805, Hist. nat. Crust. Ins. **13**: 227—228. Type-species (by monotypy):

Spalangia nigra Latreille.

Prospalangia Brèthes, 1915, An. Soc. cient. Argent. **79**: 314. — **N. syn.** Type-species (orig. design.): *Prospalangia platensis* Brèthes.

I have not seen the type material of *Prospalangia platensis* Brèthes, but from the description it is clear enough that it is a *Spalangia*. Obviously Brèthes was misled by Ashmead who alleged the male antenna to be 12-segmented.

Description of the genus.

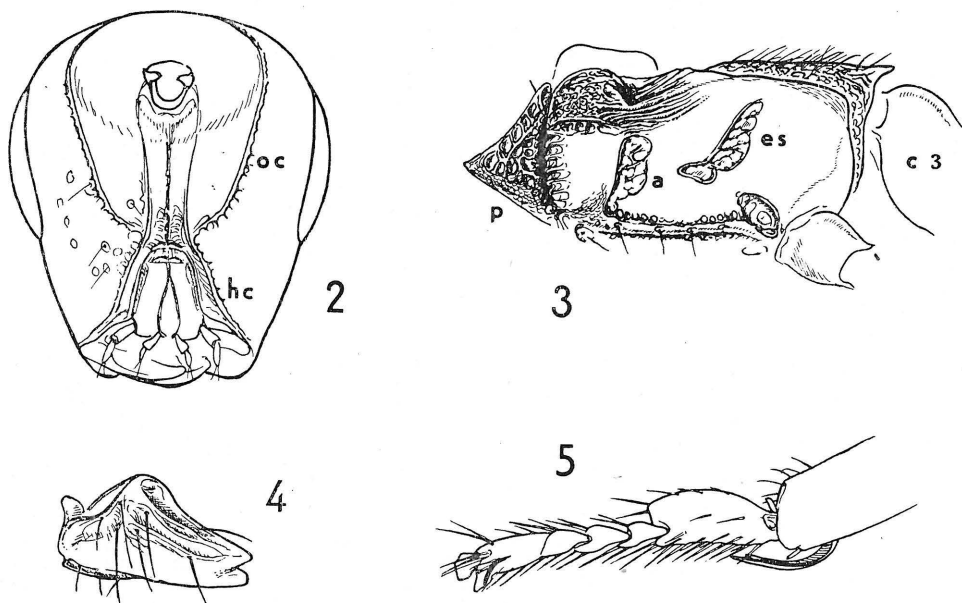
Head subprognathous, subtriangular to elongate, covered (as well as thorax) with sparse to dense piliferous punctures; occiput massively margined (Fig. 2); eyes pubescent; stemmaticum delimited mostly by fine engraved line (indistinct in densely punctate species or partly effaced in some others), connecting outer margins of lateral and front ocellus; face with median crenulated groove from ocellus down to scrobes, the latter never deep; clypeus forming a transverse ribbon between the more or less protruding antennal sockets; labrum large; mandibles narrow, bi-toothed (Fig. 4); palpi bisegmented; genae more or less long (their length measured from eye to anterior end of antennal socket), not excavated, sulcus mostly distinct. Antennae inserted just above the mandibles, far below the ocular line, 11071, or 1107(2) when clava vaguely bisegmented; in female pedicellus longer than first funicle segment, invertedly so in male; funicle segments mat, usually extremely shortly pubescent (rarely with longer hairs), longitudinal sensillae poor, often indistinct.

Thorax long, more or less depressed. Pronotum large, its collar semiglobose to subpentagonal, often immargined; its neck (collum) horizontal, mostly rugulose, separated from collar by deep transverse furrow. Mesoscutum with complete crenated parapsidal furrows, prescutum usually with coarse sculpture on disc. Scutellum flat or nearly so, frenum mostly well delimited by a cross-row of coarse punctures. Propodeum subhorizontal, large, coarsely alveolate along median line, this row usually doubled; submedian areae smooth; sides and a subapical cross-band mostly coarsely rugose; nucha short or indistinct; spiracular sulcus shallow; spiracle hidden in a deep short slot. Prepectus rather large, triangular. Mesopleura (Fig. 3) flat, more or less smooth, often with rugosity in the anterior oblique (or vertical) impression, the oblique episternal scrobe (sometimes connected with the former) and in a strip along precoxal suture running forward from precoxal fovea; mesepimerum shield-like, its posterodorsal margin laminately overlapping the rugoso-punctate metapleura. Wings hairy, and ciliate at margin; forewing with costal cell very narrow, submarginal vein dilated in a short prestigma; marginal vein very long, slender, postmarginal and stigmal veins very short. Legs strong but not unusually thickened except the more or less inflated hind coxa; trochanters large; hind tibia with one strong spur; basitarsus of fore leg enlarged (Fig. 5), in hind leg very long.

Abdominal petiole usually long, with longitudinal carinae; gaster oval, moderately vaulted, usually smooth and nearly bare above, with some hairs on flanks and at apex only; first tergite with excavated basal fovea to receive the petiole; tergites 2 and 3 large, the third usually larger than the first, the second short, with hind margin broadly emarginate; ovipositor sheaths subexserted.

Body black including antennae, coxae, femora and tibiae, often with metallic tinge; sometimes tibiae shortly at base and at apex, and tarsi proximally, more or less testaceous.

In terminology I am not introducing new terms and most of those that are less common in the group are explained by Fig. 3 (e. g. the mesopleural impressions). In abdomen I use the term gaster, and count gastral tergites only at the part beyond petiole.



Figs. 2—4. *Spalangia nigroaenea* Curt., female: Fig. 2. Back side of head; *oc* = occipital carina, *hc* = hypostomal carina. Fig. 3. Mesopleura and prepectus (*p*) of left side; *a* = anterior oblique impression, *es* = episternal scrobe, *c3* = hind coxa. Fig. 4. Right mandible. Fig. 5. *Spalangia nigra* Latr.: Left fore tarsus.

Host-relations, life-history and habits

As far as the evidence is at hand, all *Spalangia* species develop as parasites, mainly of Diptera, though individual records mention also some Lepidoptera or Hymenoptera as hosts. Most species are known as parasites of various flies breeding in dung, droppings, carrion, decaying or living plant tissues, etc. Systematically these hosts belong mostly to Muscidae, to a lesser degree to some other families, such as Calliphoridae, Sarcophagidae, Syrphidae, Ulidiidae, Drosophilidae, Chloropidae, Trypetidae, etc. Incidentally but rarely some species may become hyperparasitic, if a suitable dipterous puparium cannot be found owing to scarcity. For complete host records compiled both from the previous literature and all the newer sources being at disposal to the author, see under the *Spalangia* in question and below in this paper in the Host-parasite catalogue. In spite of the numerous ascertained data it has been so far impossible to divide the *Spalangia* species into ecological groups that would correspond to similar groups defined by morphological characters.

More than once it was ascertained that this or another *Spalangia* played an important role in reducing the number of synanthropic flies like *Musca*, *Stomoxys*, *Lyperosia*, etc., or of *Oscinella* in another case, and experiments were undertaken to state whether the parasite could be successfully used in biological control of those pests. Most comprehensive work, in which parasitization of up to 64.3 p. c. (Lindquist) was ascertained, was carried out by Richardson (1913) and Pinkus (1913) in North America with *S. (muscidarum* Rich. =) *nigroaenea* Curt., by Johnston and Bancroft (1920) and Johnston and Tiegs (1921) with the same species in Australia, by Handschin [1932, 1934] with *S. (sundaica* Grah. =) *nigroaenea* Curt. and (*orientalis* Grah. =) *endius* Walk. on *Lyperosia* in Java and Northern Australia, by Lindquist (1936) with *S. (stomoxysiae* Grt. =) *endius* Walk. on *Lyperosia irritans* L. in Texas, by Simmonds (mainly 1952—1954) with *S. drosophilae* Ashm. on *Oscinella frit* L. in Canada, etc. These papers provide us with the principal data on development and habits of species in question and evaluate their economic importance.

The eggs are laid singly through the skin of the host puparium, on the body of the nymph. The primary larva which hatches in about two days, is white, 13-segmented, elongate-oval in shape, of a common Pteromalid type (though termed "planidium" owing to its mobility by Richardson, 1913). It moves actively and rapidly to find a suitable place on the host body where it inserts its chitinous mandibles—it then develops as a subsessile ectoparasite under the puparial skin. The existence of small ventro-lateral lappets on most segments of the fully grown larva described and figured by Brèthes, 1915 (p. 317) in *S. platensis*, by Parker, 1924 (pl. 24, fig. 163) in *S. nigroaenea* and by Simmonds, 1952 (p. 534) in *drosophilae*, suggests however some moving within the puparium.

The number of larval instars is not certain: *S. nigroaenea* is said to have two to four. The first-instar larva of this species has (according to Parker, 1924) four pairs of open spiracles; one between the first and second thoracic segments, and on the first three abdominal segments. In the later instars there are nine pairs of spiracles.

The length of development varies greatly and the main factor seems to be the temperature. At midsummer temperatures of Central Europe, U.S.A. or Australia, the developmental period lasts about three weeks, whilst at low temperatures, in countries with a more severe climate or in cooler periods of the year, it may take several months, sometimes also because of the diapause carried out in stage of the fully grown larva; the diapause is, however, not always caused by the temperature factor only—see Simmonds, 1946, Riggert, 1935. The whole development and pupation takes place within the host puparium and the parasite is thus better protected against drought or other influences than an unparasitized host itself. The adult *Spalangia* bites a hole in the puparium and leaves it, males appearing generally earlier than the females, which usually prevail in the progeny; from unfertilized eggs only males develop. Mating takes place shortly after emergence, usually in dung or other milieu in which the host lived. The adult *Spalangia* may live several months, but in summer

the average length of life is not much more than two weeks. The preferred foods are mostly the body liquids of the host. As often with the Pteromalids, a special sucking tube is constructed to lead the blood of the host to the surface of the puparial skin, where it is licked by *Spalangia*.

The females move very easily on their wings. In *S. nigroaenea* Curt. (Handschin, 1932) they are positively phototropic, whereas the males are attracted by the dark and by dry dung where they search for females before mating. In *drosophilae* Ashm. (Simmonds, 1954) the females are attracted to dampness, to soil level, where in grasses the host material is likely to be found. The *Spalangias* possess (to some degree) the habit of "possuming" (death-feigning), i. e. they drop when in danger, pretending to be dead, drawing the appendages together and after a while they quickly resume activity in order to escape.

Various species are known from all parts of the world and some of them, especially those associated with synanthropic flies, were spread, obviously with the culture of man, over enormous distances, and are often cosmopolitan in distribution. Certain species were also intentionally introduced into new countries to control various flies (*Spalangia cameroni*, *drosophilae*, etc.).

Review of the species described to 1961

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|--|--|
| 1805 <i>nigra</i> Latreille — France | <i>grotiusi</i> Girault — Australia |
| 1820 <i>gonatopoda</i> Ljungh — Sweden | <i>australiensis</i> Girault — Australia |
| 1828 <i>polita</i> Say — U.S.A. | <i>virginica</i> Girault — Australia |
| 1832 <i>flavipes</i> Fonscolombe — France | <i>tarsalis</i> Brèthes — Argentina |
| 1833 <i>hirta</i> Haliday — Britain | <i>metallica</i> Fullaway — Guam Is. |
| 1834 <i>fuscipes</i> Nees — Germany | 1915 <i>parasitica</i> Girault — Australia |
| 1839 <i>nigripes</i> Curtis — Britain | <i>platensis</i> (Brèthes) — Argentina |
| <i>nigroaenea</i> Curtis — Britain | 1916 <i>muscidarum</i> var. <i>stomoxysiae</i> Girault |
| <i>endius</i> Walker — Galapagos Is. | — U.S.A. |
| 1850 <i>homalaspis</i> Förster — Germany | 1917 <i>jallax</i> Masi — Seychelles |
| <i>rugulosa</i> Förster — Germany | <i>philippinensis</i> Fullaway — Philippines |
| <i>hyaloptera</i> Förster — Germany | 1920 <i>muscarum</i> Girault — U.S.A. |
| <i>leptogramma</i> Förster — Germany | <i>muscidarum</i> var. <i>texensis</i> Girault — |
| <i>erythromera</i> Förster — Germany | U.S.A. |
| <i>umbellatarum</i> Förster — Germany | 1929 <i>punctulaticeps</i> Girault — Australia |
| <i>spuria</i> Förster — Germany | 1931 <i>shakespearei</i> Girault — Australia |
| <i>subpunctata</i> Förster — Germany | 1932 <i>orientalis</i> L. Graham — Australia |
| 1851 <i>astuta</i> Förster — Germany | <i>sundaica</i> L. Graham — Java |
| 1884 <i>chontalensis</i> Cameron — Nicaragua | <i>abenabooi</i> Girault — Australia |
| 1887 <i>drosophilae</i> Ashmead — Florida | 1933 <i>mors</i> Girault — Australia |
| <i>aenea</i> Provancher — Canada | <i>muscophaga</i> Girault — Australia |
| 1894 <i>rugosicollis</i> Ashmead — U.S.A. | <i>kingstonensis</i> Girault — Australia |
| <i>haematobiae</i> Ashmead — U.S.A. | <i>epos</i> Girault — Australia |
| 1896 <i>impuncta</i> Howard — Antilles | <i>marxi</i> Girault — Australia |
| 1901 <i>lanaiensis</i> Ashmead — Philippines | <i>shakespearei</i> Girault — Australia |
| 1904 <i>brasiliensis</i> Ashmead — Brazil | 1940 <i>melanogastra</i> Masi — Somaliland |
| 1905 <i>formicaria</i> Kieffer — Luxembourg | 1951 <i>atherigonae</i> Risbec — Senegal |
| 1910 <i>bakeri</i> Kieffer — Brazil | <i>pennisetae</i> Risbec — Senegal |
| <i>cameroni</i> Perkins — Hawaii | <i>rhizoperthae</i> Risbec — Senegal |
| <i>simplex</i> Perkins — Hawaii | 1952 <i>seyrigi</i> Risbec — Madagascar |
| 1913 <i>muscidarum</i> Richardson — U.S.A. | |
| <i>afra</i> Silvestri — Nigeria | |

Of these species *gonatopoda* Ljungh, *polita* Say, *flavipes* Fonscolombe, *aenea* Provancher, *metallica* Fullaway, *pennisetae* Risbec and *rhizoperthae* Risbec have been or are removed from the genus *Spalangia* as reviewed at the end of this paper (p. 502). Of the remaining 53 names one is a junior homonym and at least 18 were previously, or are dropped here, as synonyms, some further 6 names are probable synonyms, while one or two species had to be revived on the other hand. The total number of species (plus subspecies), with 8 described as new in this paper makes today 42, from which 27 are certainly good species in the author's opinion (most of the Girault species could not be examined).

I. Holarctic species

In the Palaearctic and Nearctic Regions have been ascertained the following species (with their known distribution within the area):

<i>S. rugulosa</i>	Europe	Centr. Asia		
<i>S. irregularis</i>		Near East		
<i>S. nigra</i>	Europe		N. America	(+ Hawaii)
<i>S. nigroaenea</i>	Europe	Centr. Asia	N. America	(+ elsewhere)
<i>S. slovacae</i>	Europe			
<i>S. cameroni</i>	Europe	Centr. Asia		(+ elsewhere)
<i>S. endius</i>	Europe	Centr. Asia	N. America	(+ elsewhere)
<i>S. nigripes</i>	Europe	Centr. Asia	N. America	
<i>S. crassicornis</i>	Europe			
<i>S. e. erythromera</i>	Europe			
<i>S. e. brachycephala</i>	Europe		? N. America	
<i>S. subpunctata</i>	Europe	(+ N. Africa)		
<i>S. haematobiae</i>			N. America	(+ ? Hawaii)
<i>S. fuscipes</i>	Europe			(+ ? elsewhere)
<i>S. drosophilae</i>			N. America	(+ Centr. Amer.)

Key to Holarctic species

- 1 Pronotum with an isolated crenulate cross-line (Figs. 17, 23, 26, 30) consisting of close punctures in front of hind margin; disc of collar more or less smooth, impunctate 2
- Pronotum without any distinct isolated cross-line (sometimes, however, with a cross-impression with deeper and denser, mostly rugose punctures here) 7
- 2 Pronotal collar bordered anteriorly (Fig. 17) by a narrow groove setting off the ridge-like margin (best seen when lightened from behind) 3
- Collar rounded off anteriorly, without any distinct ridge 4
- 3 Collar (Fig. 17) subpentagonal, nearly plain between ridge and cross-line; in female all funicle segments mostly oblong and gena longer than eye length, head also oblong *nigroaenea* Curt.
- Collar subglobose (Fig. 23), distinctly arched; female distal funicle segments subquadrate, gena shorter than eye length and head hardly longer than broad; only Europe *slovaca*, sp. n.
- 4 Antero-lateral parts of collar rugose or crowdedly rugoso-punctate, but discal triangle smooth, sometimes with shallow longitudinal groove (Fig. 26) *cameroni* Perk.
- Antero-lateral parts of collar umbilicately punctate, with wide or narrow smooth interspaces 5

- 5 Collar semiglobose, vaulted, with cross-line often subangularly curved (Fig. 30); umbilicate punctures sparse and rather regularly scattered, mostly large; distal funicle segments in female slightly transverse, in male quadrate . . . **endius** Walk.
- Collar less vaulted, cross-line parallel to hind margin, puncturation much denser . . . 6
- 6 Umbilicate punctures on head and pronotum very dense except sometimes a small triangle on collar disc, cross-line formed by umbilicate punctures not smaller than those on disc; pronotum subpentagonal (Fig. 14); body including wings hirsute; cf. *nigra*, 9.
- Interspaces between punctures on head and pronotum generally wide, in places wider than punctures themselves; pronotum (Fig. 23) with an arched, almost semiglobose collar which is more or less ridge-like on anterior margin where the dense umbilicate punctures border on the steep and smooth anterior side; cross-line formed by punctures smaller than those on disc; cf. *slovaca*, 3
- 7 Pronotum (and head) very densely punctate or rugoso-punctate, interspaces much narrower than punctures themselves (Figs. 8, 12, 13, 14) . . . 8
- Pronotum (and head) sparsely punctate, or sometimes with partial longitudinal rugosity in a cross-band . . . 10
- 8 Antennal scapus dull, granulate (Fig. 7); crowded irregular puncturation on head and pronotum usually without any interspaces (Fig. 8) . . . **rugulosa** Först.
- Scapus more or less shiny, at least on inner side; puncturation on head not crowded, with distinct smooth interspaces . . . 9
- 9 Pronotum umbilicately punctate (Fig. 14) with narrow smooth interspaces; scapus longitudinally striate . . . **nigra** Latr.
- Pronotum crowdedly, very irregularly rugoso-punctate (Fig. 12), interspaces indistinct; scapus finely granulated on outer side, subglabrous on the inner; Near East **irregularis**, sp. n.
- 10 The semiglobose pronotum and head nearly regularly set with large round punctures, interspaces smooth and shiny, about as wide as punctures; mid and hind tarsi black; female: head as long as wide, thick, distal funicle segments transverse (Fig. 1) . . . **nigripes** Curt.
- Pronotum less densely punctate, often more or less rugulose; head of female mostly oblong . . . 11
- 11 Body (head included) strongly depressed, flattened, not exceeding 1.6 mm. in length; scutellum without cross-line (or this indicated only by one or two punctures laterally); female head in profile about three times as long as thick, scapus very short, second funicle segment almost ring-like, much smaller than the third (Fig. 54); male: flagellum covered with hairs about as long as width of segments, first funicle segment four times as long as the short pedicellus (Fig. 53); North and Central America . . . **drosophilae** Ashm.
- Body not extraordinarily flattened, usually longer; scutellum with or without cross-line; not as above for female and male . . . 12
- 12 Pronotum short, more or less rugose (Fig. 39), at least with some longitudinal rugae in a transverse subcaudal belt (indistinct in some small specimens); cross-line on scutellum always complete; tarsi mainly testaceous basally; female distal funicle segments transverse . . . 13
- Pronotum larger, subglobose (Figs. 45, 47, 52), with scattered punctures (these very coarse in some larger specimens) on the polished or finely alutaceous ground, always without coarse rugae; in smaller specimens cross-line on scutellum wanting or interrupted; tarsi mainly dark; in larger females distal funicle segments not or hardly transverse . . . 14
- 13 Antennae and legs in female unusually thick, particularly flagellum very compact (Fig. 35); third funicle segment about 1.5 times as wide as long; gaster broad, tergites quite smooth; head oblong, rather coarsely punctured, interspaces not much wider than the punctures; pronotum often with indicated median longitudinal rugose groove; only basitarsi pale, usually hind basitarsus above shorter than three following segments combined; male antenna also thick; associated with *Lasius fuliginosus*, Europe . . . **crassicornis**, sp. n.

- Legs and antennae not unusually thick and compact (Figs. 40, 43; 37, 38, 44), third funicle segment in female less transverse; gaster slenderer, tergites in larger specimens always minutely granulate-alutaceous; puncturation on head usually much sparser; pronotum always without any median groove; tarsi mainly testaceous except tips, hind basitarsus longer above than three following segments together; not myrmecophilous **erythromera** Först.
- 14 Scutellum mainly with complete cross-line, at least in female; punctures on head and thorax often coarse; female flagellum very slender in dorsal view, first funicle segment twice as long as broad or nearly, distal ones subquadrate to slightly oblong, clava narrow, long; in male funicle segments 2 to 7 clearly oblong, usually about 1.5 times as long as broad; body size 2.5 mm. in average; Europe, Central Asia, North Africa **subpunctata** Först.
- Scutellum with cross-line wanting or broadly interrupted, rarely complete, then very faint; puncturation on head and thorax usually fine, only on pronotum sometimes punctures wide and shallow, interspaces then more or less alutaceous; female flagellum mostly weakly clavate, shorter, distal funicle segments distinctly transverse and clava shorter 15
- 15 Body 2 mm. or a little more; scutellum usually feebly convex; in female antenna longer, first funicle segment clearly elongate, the following subquadrate, distal ones slightly transverse; in male funicle segments 2 to 7 distinctly elongate; tarsi often pale basally; North America **haematobiae** Ashm.
- Body size inferior to 2 mm.; scutellum flat (Fig. 52); female antenna shorter, first funicle segment subquadrate, the following ones increasingly transverse; in male funicle segments 2 to 7 subquadrate; tarsi dark; Europe **fuscipes** Nees

The species are arranged below according to their similarity and presumed relationship: first the species with dense coarse sculpture, *rugulosa*, *irregularis* and *nigra* ("nigra-group"); then "*nigroaenea*-group" with distinct pronotal cross-line, viz. *nigroaenea*, *slovaca*, *cameroni*, *endius*; then the species without that cross-line and with always developed frenal cross-line on the scutellum: *nigripes*, *crassicornis* and *erythromera*; and at last the "*fuscipes*-group", with frenal cross-line weak or lacking: *subpunctata*, *haematobiae*, *fuscipes* and *drosophilae*.

***Spalangia rugulosa* Förster**

Spalangia rugulosa Förster, 1850, Verh. naturh. Ver. preuss. Rheinl. 7: 507—509; ♂.

The type of this species is deposited in the Förster collection in Vienna. It is a male pinned to a flat rectangular piece of pith and labelled: "♂. Or. Ex." in Förster's handwriting, then "Germania", "Collect. G. Mayr" and "Sp. rugulosa Förster Type". I have added another label reading Lectotypus. The specimen lacks both left wings, right hindwing and three distal segments of the mid right tarsus.

S. rugulosa Först. is a valid species closely allied to *nigra* Latr., from which *rugulosa* differs mainly by the characters given in the key.

Female. — Head except bottom of scrobes which is almost smooth and shiny, crowdedly and rather irregularly coarsely punctate (even on temples), dull, slightly oblong (34:31; 30:27; Fig. 6), with genae considerably converging and prominent large eyes; eye longer than gena (16:13); head in lateral view rather thick (34:18),

with temple about twice narrower than eye (5.5:10.5); distance eye — occipital carina about twice shorter than eye length; genal sulcus obliterate in crowded punctures; antennal socket moderately raised. Scapus [fig. 7] mat, granulated, rather slender, as long (26) as 5.5 following segments combined; pedicellus as long as 1.5 following segments; first funicle segment distinctly longer than broad, the second and third quadrate, distal funicle segments very slightly transverse; clava as long as 2.7 preceding segments, rather broad (5:11).

Pronotum (Fig. 8) semiglobose, immargined, crowdedly irregularly punctured except a narrow strip at hind margin, punctures along this smooth strip deeper, indicating thus a crenate line; the same crowded sculpture on mesoscutum, here except the alutaceous anterior part which is usually hidden under the pronotum; no smooth median carina. Scutellum with crenate cross-line delimiting the frenal posterior quarter, with disc smooth, but coarse punctures and often some alutaceous sculpture sublaterally; frenum hardly broader than metanotum. Propodeum with complete median carina, adcarinal alveolae larger in anterior half; plicae indistinct; spiracular sulcus crenate; nucha very short and smooth; lateral fimbriae rather dense; postero-lateral corners acute. Prepectus irregularly, coarsely rugose; anterior half of mesopleura irregularly longitudinally striate, posterior half nearly smooth. Forewing yellowish, hairy on upper surface of basal cell; postmarginal vein in length subequal to stigmal vein and to prestigma. Trochanter of hind leg without callus above.

Abdominal petiole about 1.8 times as long as wide, deeply incised submedially on anterior margin. Third gastral tergite three times as long as the second at meson, minutely granulate-alutaceous, as well as the following segments, on which the sculpture is arranged more transversely.

Dense hairs of the body black; body black, rarely with a faint metallic tinge on head and thorax; tarsi also black, anterior basitarsus brown. Length 3.1—3.8 mm.

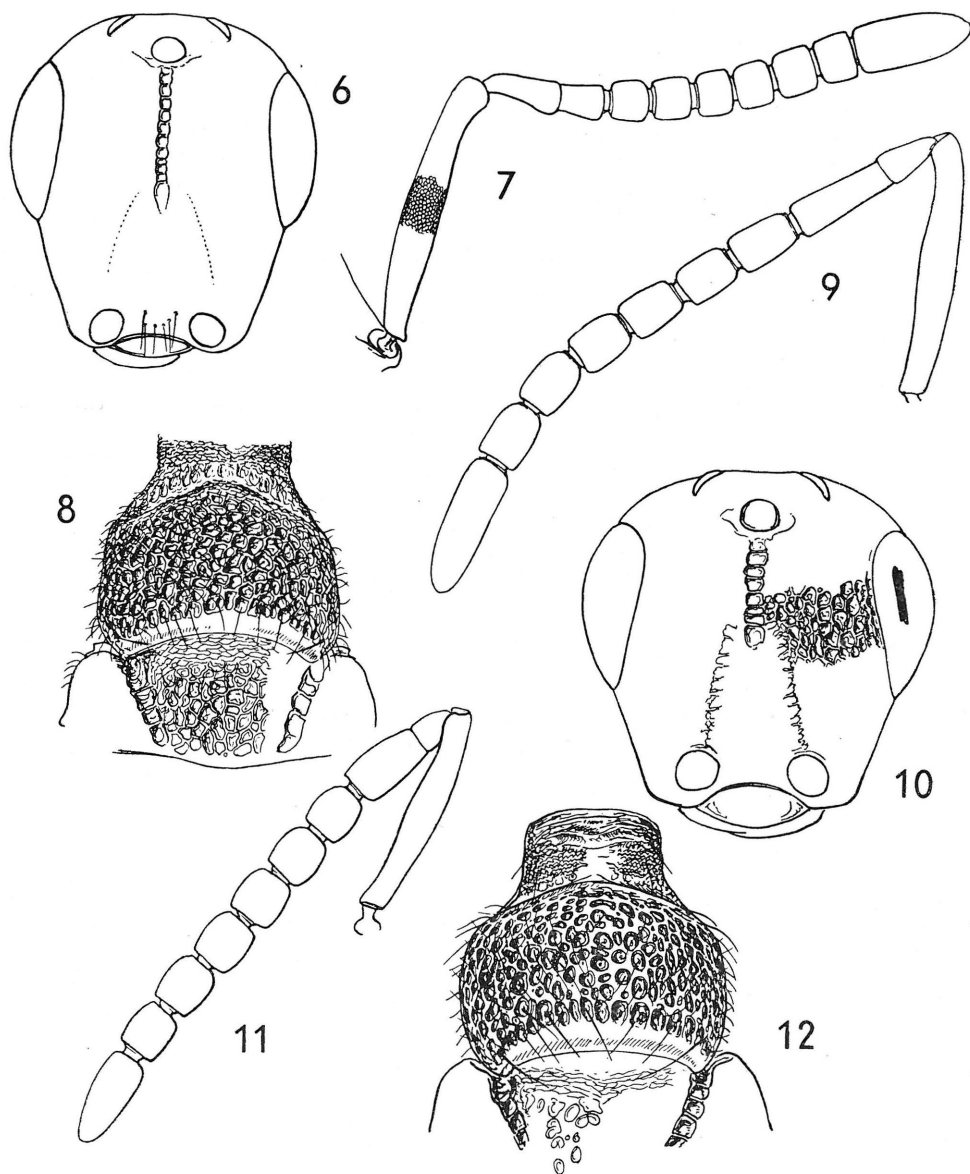
Male: — Head about as long as broad, subpentagonal (Fig. 10); bottom of scrobes minutely granulated; gena shorter than eye in relation 11:15. The fine granulation of the dull scapus obliterate on inner side; scapus (Fig. 9) as long as 3.5 following segments combined; pedicellus twice as long as wide at apex, $3/5$ the length of the first funicle segment, which is three times as long as broad; second funicle segment 1.6 times as long as broad, the following ones very slightly decreasing in length, all oblong and not much angular in outline, last one still 1.3 times as long as broad; clava slightly longer than two preceding segments together, about 3.5 times as long as broad. Punctuation on pronotum and mesoscutum still more rugose and more irregular than in female. Abdominal petiole twice as long as wide. Fine sculpture on gastral tergites very vague, hardly visible. Length 3.1 mm.

Variation concerns mainly (as far as may be judged from ten specimens I have seen all in all) the irregular puncturation and the body length. In one female four tarsal segments of fore and mid tarsi are brown instead of black. Also the hairs of the body may be paler in some specimens, as it is in one female on the gaster.

Host: Muscidae: *Muscina stabulans* Flin. (ascertained in Uzbekistan by Mrs. V. Sytchevskaya).

Distribution: Europe (Germany, France, Switzerland, Czechoslovakia, Yugoslavia) and Central Asia (USSR-Uzbekistan).

Material examined. — Germany: Aachen, the type (Förster). — France: Le Puy en Velay, 5. V. 1931 (Maneval). — Switzerland: Genève — Peney, 3. III. 1889 (Tournier). — Czechoslovakia: Praha—Sv. Prokop, fowl droppings, VII. 1910 (Zeman). — Yugoslavia: Croatia, Krapina N of Zagreb (Mus. Budapest); Ruma NE of Belgrade (Dr. Hensch; Mus. Budapest); Belgrade, X. 1924 (Voukassowitch, coll. Brit. Mus.). — USSR, Uzbekistan: Denau, ex *Muscina stabulans*, 19. IX. 1958 (V. I. Sytchevskaya).



Figs. 6—10. *Spalangia rugulosa* Först.: Fig. 6. Head of female. Fig. 7. Antenna of female (with sculpture partly indicated). Fig. 8. Pronotum and mesoscutum of female. Fig. 9. Male antenna. Fig. 10. Head of male.
Figs. 11—12. *Spalangia irregularis*, sp. n., male: Fig. 11. Antenna. Fig. 12. Pronotum.

Spalangia irregularis, sp. n.

This species seems to belong near *S. rugulosa* Först. and *S. nigra* Latr., but differs from both mainly by the very irregularly rugose-punctured pronotum while the head is rather regularly punctured with polished interspaces and by the longer abdominal petiole and shorter male antennae apart from some minor characters.

Female (included additionally, therefore with the reference to the description of the male sex a specimen of which is also taken as holotype of the species). — Head slightly longer than broad (34:32), clothed with dense and rather long pubescence, as well as thorax; dense pucturation on genae as irregular as on the pronotum; genal sulcus distinct only just beneath the eye, gena hardly longer than eye width; anterior malar margin (base of the mandible) in side view perpendicular to the frons plane; otherwise as in the male. Scapus distinctly thickened in the middle, as long as 5 following segments combined; pedicellus 2.3 times, first funicle segment 1.7 times as long as broad, following segments hardly increasing in width, second funicle segment still 1.1 times as long as broad, distal ones quadrate; clava scarcely longer than two preceding segments taken together. Thorax as described for the male, but pronotum slightly flattened along middle and mesoprescutum with a fine longitudinal carina and nearly smooth in front of the punctured part. Abdominal petiole fully twice as long as broad, with longitudinal carinae more regular than in the male. Gaster smooth, second tergite deeply emarginate, in the middle fully three times shorter than the third. Length of body 3.6 mm.

Male. — Head subtrapezoidal, slightly transverse in dorsal view (33:36), with puncturation umbilicate but not very coarse, interspaces smooth and on frons about as broad as punctures, at eyes and on genae often much denser; in profile head longer than thick in relation of 33:19, with frons almost flat and temple rather broad, 7:13 in relation to eye width; eye oval (13:17), not distinctly bordered by a groove as in *nigra*; gena as long as eye width, sulcus indistinct; antennal socket hardly raised; scrobes shallow and smooth on bottom. Antennal scapus (Fig. 11) relatively slender and equally narrowed to both ends, as long as 3.6 of following segments, rather shiny, on inner side finely granulate distally, on the outer side sculpture more longitudinal. Pedicellus about 1.6 times as long as broad, narrower and 1.5 times shorter than first funicle segment; this twice as long as broad; following segments subequal, hardly decreasing in width, all slightly longer than broad; clava long-oval, shorter than two preceding segments together (9.5:11.5).

Pronotum rather equally arched (Fig. 12), without any abrupt margin anteriorly, very densely rugose-punctured except for the strip at hind margin which is smooth; punctures very irregular in form and size, on disc with narrow polished interspaces, sublaterally, laterally and anteriorly without interspaces; sculptural part delimited behind by a deeper crenulate cross-groove. Disc of mesoprescutum densely coarsely punctured, in a cross-band in front of the punctures finely transversely rugulose. Axillar furrows coarsely crenate. Scutellum with frenal cross-line slightly arched, disc sublaterally punctured, frenum taking more than one fourth of the whole length. Propodeum: double alveolate row complete and of almost equal width everywhere; median carina complete, weakly raised anteriorly; submedian areae smooth but rather small; plicae laterales irregular and weak but distinct, moderately curved whilst strongly converging toward nucha which is smooth, emarginate, short; lateral parts coarsely rugose-punctured, fimbriae not very dense, postero-lateral corners short and broad, though sharpangular. Prepectus coarsely, irregularly but shallowly alveolate. Mesopleura on disc impressed as in *nigra*, bottom but almost smooth, blunted precoxal edge segregating the mesosternum distinct only in anterior half. Forewing with several hairs on cubital fold basally and some hairs scattered just beneath distal half of submarginal vein; prestigma when measured to subhyaline break at base of marginal vein shorter than stigmal vein which is distinctly bent and as long as the postmarginal one; marginal vein 5.5 times as long as the stigmal (22:4), somewhat narrowed and rather weakly sclerotized in the middle. Hind trochanter without distinct callus above.

Abdominal petiole about 2.3 times as long as broad, with some 6—7 dorsal, irregular, more or less converging longitudinal carinae. Gastral tergites smooth, the second very broadly emarginate, in the middle about 2.3 times as long as the third.

Body hirsute, black; basal two to three segments of all tarsi testaceous; the second subhyaline, their pubescence mostly whitish. Length (head drooping), 3.1 mm. (the holotype) to 3.3 mm.

Host unknown.

Distribution: Near East (Israel), Cyprus.

Holotype (male) labelled: "B K XIV 104", "Palaestina, Kirjat Anawim, 20. V. 1931, Bodenheimer". Deposited in the National Museum, Prague, No. 25403.

Further material (paratypes; coll. British Museum): Cyprus: Limassol, 1. III. 1934, one female, allotype, and 1. VI. 1934, one male; Cherkas, 5. VI. 1934, one male (all G. A. Mavromoustakis leg.).

***Spalangia nigra* Latr.**

Spalangia nigra Latreille, 1805, Hist. nat. Crust. Ins. 13: 228.

Spalangia hirta Haliday, 1833, Ent. Mag. 1: 334; ♀. — N. syn.

Spalangia rugosicollis Ashmead, 1894, Proc. ent. Soc. Wash. 3: 35, 36; ♀. — N. syn.

Spalangia muscae (nomen nudum) Howard, 1911, The House Fly, p. 90.

This is the type species of the genus, but for a long time it had been a puzzling problem as to which species might be the true *nigra*. The original description is quite inadequate to be unambiguous:

„Spalangie; *spalangia*. Leurs antennes sont insérées au bord antérieur de la tête, fortement brisées, grossissant vers leur extrémité, comme dans les scélions; mais le segment antérieur de leur corselet est allongé et rétréci en devant; la tête est déprimée ou plus large que haute; l'abdomen est ovale“.

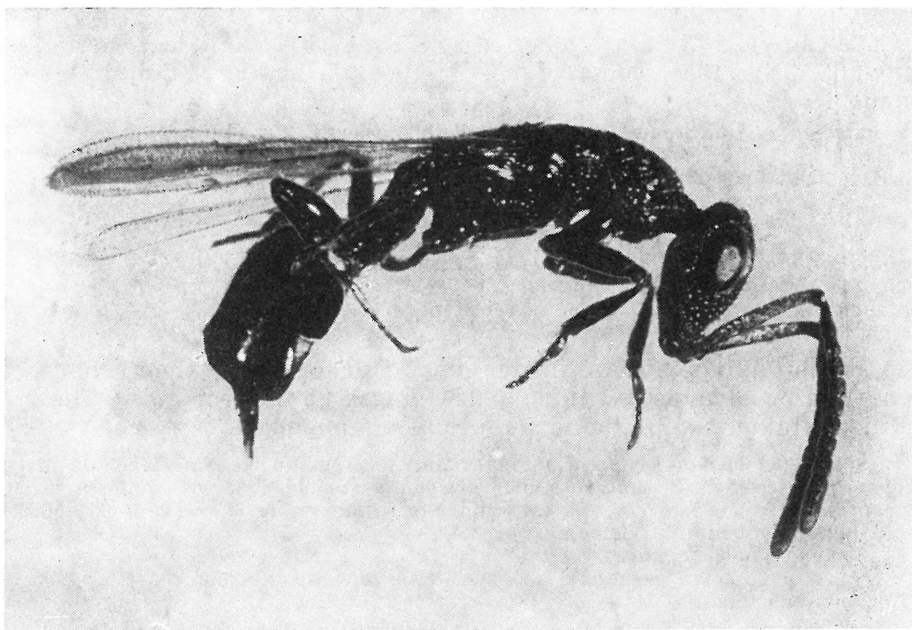
„Spalangie noire; *spalangia nigra*.“

„Noire, pubescente, ponctuée; abdomen lisse, luisant; ailes blanches; tarses bruns. — Aux environs de Paris.“

Therefore I searched for the type material. My inquiries had remained for long without success, however. According to Horn and Kahle, 1935 (Über entomologische Sammlungen, Ent. Beih. Berlin-Dahlem 2: 53, 150), the early collection of Latreille's Hymenoptera was passed via coll. Dejean to M. de Spinola (now in Turin, Italy). Another part of his Hymenoptera was transferred via coll. de Romand and de Saussure to the Muséum d'Histoire Naturelle in Geneva, Switzerland, and still another part, as may be judged from a remark in Encyclopédie Méthodique, vol. 10, p. 443, 1825, must have been at some time in Paris, where the original material of *S. nigra* had been at disposal of Lepeletier, the author of that part in Enc. Méth. ("M. Latreille a bien voulu nous communiquer cette espèce et nous permettre de la décrire d'après nature.").

A search for the types by my friend Dr. Steffan and by Miss S. Kelner-Pillault in the Paris National Museum has remained without success. As Dr. Ferrière kindly informed me, there was no *Spalangia* of Latreille in the Saussure collection in Geneva, too. After a subsequent inquiry from Dr. D. Guiglia in the Genoa Museo Civico di Storia Naturale I learned that there was also no such specimen, but she kindly advised me to address myself to Prof. L. Pardi in the University Zool. Inst. and Museum in Turin. Prof. Pardi then kindly informed me that the part of Spinola's collection pre-

served there actually contained one specimen labelled *Spalangia nigra* and considered the original Latreille type. Its examination and comparison with my specimens according to my manuscript key was carried out there-upon by favour of Prof. A. Goidanich, who also kindly sent me photographs of it (see p. 444), and Mr. S. Novitzky. They wrote me 28th March, 1962:



Photograph of the lectotype of *Spalangia nigra* Latr., deposited in Torino, Italy (taken by Prof. A. Goidanich).

"Das ♀ von Latreille, bezettelt: '*Spalangia nigra* Latr., Coll. Latr., Paris, DD. Chevrier et Imhoff, Suisse' entspricht vollkommen dem Schlüssel von Bouček § 6 (5), d. h. *Sp. hirta* Haliday, insbesondere auch dem handgeschriebenen Zusatz: 'Sometimes in *hirta* specimens occur with more crowded and deeper punctures in place of the cross-row'." Although it may be admitted that there is no real proof of the authenticity of the specimen in question, I believe it to be one of the syntypes of *S. nigra* Latr., in the absence of evidence to the contrary. The words of a subsequent description (Latreille, 1809, Gen. Crust. Ins. 4: 29): "Antennae masculorum corporis longitudine, articulo secundo quam in feminis brevior" clearly witness that Latreille had before him both sexes, more than one specimen, though his original description seems to affect a female only ("antennes ... grossissant vers leur extrémité"). His words "punctata, villosa" fit well the species known otherwise as *hirta* in Europe, although on the other hand the word "nitida" and the figure of the male published in 1809 (pl. 12, figs. 7, 8) would point rather to *nigroaenea*.

The inadequacy of the Latreille original description reflects also in the interpretation of *S. nigra* by the subsequent authors. Before I received the results of the reexamination of the Turin syntype, which is considered here as lectotype, I had been trying to find out what was the most widely accepted concept of the species. Although more or less speculative, the review of it may be of some interest.

Spinola seems to have had a common parasite of synanthropic flies before him, judging from his statement (1808, p. 167): "frequens in excrementibus humanis", as well as Bouché, 1834 [p. 174: "lebt im Herbst in den Puppen der *Musca domestica*, in welchen sie die Nymphe verzehrt."]. The English authors, however, understood under the name *nigra* apparently a different species, and so did also Dalman, who figured the antennae of both sexes and the forewing (1820, pl. 7, figs. 19, 20, 28), which points almost certainly to the species described as *erythromera* by Förster (all these estimations proved to be correct recently when I had an opportunity of checking the collections in question). Haliday's redescription (1833, pp. 334—335) seems also to fit rather *erythromera*, in particular his statement "tolerably abundant . . . in pastures and marshes"—I found *erythromera* common under similar conditions in northern Germany in 1960. Also Nees' redescription in 1834 concerns probably this species, as Förster's conception suggests (according to one female of *erythromera* identified by him as *nigra* in his collection in Vienna). Boheman's redescription fits well neither *nigroaenea* nor *erythromera*, though his words "tarsi omnes fusci vel albidi" (1836, p. 256) could affect the Swedish specimens of the latter species¹). Curtis' interpretation concurs with that of Haliday and also his figure seems to show "*S. nigra*" in the sense of *erythromera*.

I am not quite sure what was understood by Walker under *nigra*, because his interpretation seems to be rather confusing. In 1846 [p. 23] he synonymized his *S. endius* (from the Galapagos Islands; a different species, see below) with *nigra*, and in 1848 also *S. nigripes* Curt. and *nigroaenea* Curt. (both good species).

From the views of the more recent authors it is still worth while noting that Ferrière understood *S. nigra* in the sense of *erythromera*, whilst Masi apparently based his opinion on Spinola's and Bouché's dates judging from his identification of the material reared by Parker and Thompson (1928, p. 438). Specimens from the same lot were determined by A. B. Gahan as *muscidarum* Rich. (= *nigroaenea* Curt.).

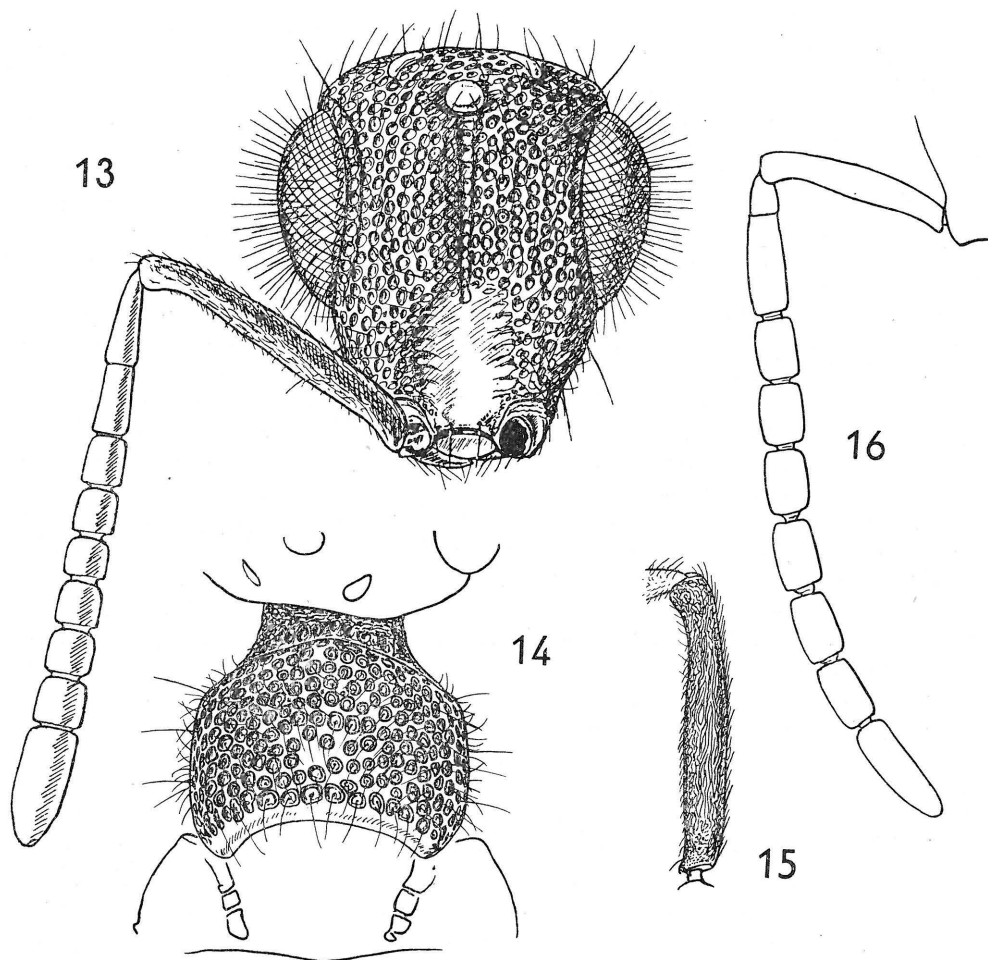
I myself have been identifying the present *nigra* as *hirta* Hal., and understood till 1961 under *nigra* the *erythromera* of this paper, whereas later on, at the end of 1961 and beginning of 1962, the present *nigroaenea*.

Spalangia hirta Hal.—About four years ago I sent my manuscript key to the European species of *Spalangia* to Dr. M. de V. Graham, Oxford, who had at that time the type of *S. hirta* Hal. for examination there from the Haliday collection. He confirmed then the correctness of my inter-

¹) I could see recently that Boheman's specimens of *S. nigra*, as well as those of *nigra* of C. G. Thomson, really belong to *erythromera* Först.!

pretation of the species which had been understood in the same sense by most European authors, e. g. by Förster and Thomson.

In 1958 Dr. O. Peck of Ottawa, Canada, submitted to me for examination some Canadian specimens of the genus, among them several *S. hirta* identified by him as *S. rugosicollis* Ashm. The synonymy of *rugosicollis* and *hirta* was confirmed once more early in 1961 when I received further specimens of *rugosicollis* in exchange from the U. S. National Museum. The latter were identified and compared with the type by the late A. B. Gahan, and belonged invariably, as well as the Canadian specimens, to (*hirta* =) *nigra*.



Figs. 13—16. *Spalangia nigra* Latr.: Fig. 13. Head of female, with antenna. Fig. 14. Pronotum in female. Fig. 15. Antennal scapus in female, with sculpture indicated. Fig. 16. Male antenna.

In 1920 Girault (Proc. U. S. Natl. Mus. 58:213) synonymized *muscae* auct. with *rugosicollis* and as Dr. Burks kindly confirmed to me in 1961, this synonymy is correct. The male of *muscae* mentioned (rather than described; see also Richardson, 1913a:39) by Howard in his book on the house fly and attributed to Girault (who never described it, however), is deposited in the U. S. National Museum.

S. nigra is very near to *S. rugulosa* Först. (the latter known so far only from Europe and Central Asia), with which it may have been sometimes confounded. The latter species differs mainly by the granulated scapus, only slightly raised antennal sockets, and the even denser and very irregular puncturation on head and thorax, without any polished interspaces. Another similar species is also *gemina*, sp. n., spread in the tropics of Africa, South Asia and Venezuela. This species differs from *nigra* mainly by shorter antennae and shorter head in female. A very similar species must be, too, the African *S. afra* Silv. (known to me only from its description), which should have, however, a longer head with very long genae in the female sex, and smaller body size.

Female. — Head (Fig. 13) densely umbilicate-punctured and densely covered with erect hairs, by 1/10 longer than broad (33:30), rather strongly converging toward mouth; in side view about twice as long as thick, with antennal socket abruptly raised; eyes large, prominent; distance eye-occipital carina nearly three times shorter than eye length. Scapus longitudinally striate-rugulose (Fig. 15), fully as long as five following segments combined; second funicle segment slightly oblong, subquadrate in smaller specimens; the following segments subquadrate, distal ones sometimes slightly transverse.

Pronotal collar roundedly pentagonal, immargined in front, crowdedly umbilicate-punctate (Fig. 14), interspaces often broad on disc, caudal cross-line then more or less distinct. Crowded umbilicate punctures on disc of mesoscutum sometimes a little irregular, but only rarely subrugose, always leaving free a longitudinal median carina; impunctate part anterior to it often finely transversely alutaceous. Frenal cross-line on scutellum broad and crenate, disc of scutellum with numerous punctures except at median line; frenum hardly longer than metanotum. Propodeum with double alveolate row broad, slightly narrowed in the middle, reaching down to the short nucha; median carina moderately raised in anterior third; plicae irregular, often indistinct; posterolateral corner sharpangular; lateral fimbriae dense. Mesopleura with rather deeply impressed episternal scrobe, this often connected with the coarsely rugose anterior oblique impression and ventral side set off by a blunted ridge along the precoxal suture. Trochanters of hind legs dorsally with distinct tubercle-like elevation. Basal cell of forewing pubescent.

Abdominal petiole twice as long as broad. Gaster polished, hind margin of second tergite broadly emarginate, third tergite about twice as long as the second at meson.

Body hirsute, black, sometimes with a faint metallic tinge on head and thorax; tarsi testaceous except on tips. Length of stretched body 3—4.5 mm.

Male. — Head slightly shorter than long (32:34). For antenna see Fig. 16. Pedicellus about half the length of first funicle segment, which is three times as long as broad; following funicle segments about twice as long as broad each. Mesoprescutum usually without median carina. Abdominal petiole three times as long as broad, its sides with numerous erect hairs. Ends of all tibiae and shortly base of hind pair usually pale testaceous with the tarsi. Length 2.5—3.7 mm.

Variation. In smaller specimens of *S. nigra* (most of such I examined come from North America; one male from Sweden) the punctures on pronotum often leave more or less free a triangle on disc and thus a caudal cross-line appears more or less distinct. This cross-line is formed

in *nigra* by the same umbilicate punctures as are those on disc and usually cannot be traced in larger specimens with crowded puncturation; even then the narrow interspaces are smooth.

Hosts. Muscidae: *Lyperosia irritans* (L.) in the U. S. A.; *Musca domestica* L. in England (Graham-Smith, 1919) and the U. S. A.; *Phorbia antiqua* (Meig.) in Canada (Perron, 1954, as *Hylemyia antiqua*); *Stomoxys calcitrans* (L.) in Texas (Girault, 1920) and *Stomoxys* sp. in the U. S. A.; Trypetidae: *Dacus cucurbitae* Coq. in Hawaii; *Rhagoletis completa* Cress. [= *suavis* auct.] in the U. S. A. Also *Pyrallis farinalis* (L.), Lepidoptera, is quoted as host of *S. (rugosicollis =) nigra* from North America, probably based on misidentification; or, *nigra* may have been there hyperparasitic through a Tachinid. A similar *Spalangia* sp. was ascertained in Japan on the Tachinid *Centeter cinerea* Aldr., parasite of *Popilia japonica* Newm. (Clausen et al., 1927).

Distribution: Europe (Britain, Sweden, Germany, France, Switzerland, Italy, Czechoslovakia, Austria, Hungary, Yugoslavia), North America [U. S. A. from Connecticut to Texas and Kansas; Canada: Ontario, Quebec] and Hawaii (Cameron, 1881; Severin, Severin and Hartung, 1914).

Material examined. — Britain: Cambridge, Ent. Field Lab., Storey's Way, 13. V. 1934 (G. C. Varley), ex pupar. of Anthomyid B', 6. VIII. 1954 (C. D. Putnam); Lymington, S. H., 26. V. 1954 (J. A. and D. J. Clark). — Sweden: Närke, Örebro district, 1. VI. 1943 and 1. VII. 1953 (A. Jansson); Närke, Adolfsberg, 29. and 30. V. 1955 (A. Jansson); Hälsingland, Loos, 15. VI. 1939 (O. Sjöberg). — Germany: Karlsruhe, 9.—10. IV. 1928 (Hohndorf); München, VII. 1959 (F. Bachmaier); Irgernsee in S. Bavaria, 18. VIII. 1855 (Kriechbaumer); Berlin, 18. VI. 1952 (Bischoff); Halle a. d. Saale (Erichson); Leipzig-Rochlitz, 10. VIII. 1888 and 5. VII. 1890 (R. Krieger); Leipzig-Connewitz, 9. VIII. 1890 (A. Reichert); Dresden, 16.—17. VIII. 1858 (Reinhard). — Czechoslovakia: Svádov near Ústí nad Lab., 6. IV. 1943 (Pawlik); Sebužín nad Lab., 28. VI. 1957 (Bouček); Brník near Libochovice, 18. VI. 1943 (A. Hoffer); Řevnice near Praha, VI. 1952 (L. Masner); Praha, 6. V. 1930 (Macek), IV. 1952 (L. Masner), 10. IX. 1948 and 6. V. 1956 (Bouček), IV. 1954 (Hostounský); Praha-Podhoř, 1. VIII. 1944 (Hoffer); Hradec Králové, VIII. 1916 (J. Sekera), VIII. 1947, 2. VII. 1957 and VII. 1959 (Bouček); Velký Vřeštov, 8. VII. 1957 (Bouček); Moravia, Brno, 3. VIII. 1940, VII. 1942, IV. 1943 (Šnoflák); Moravany, 15. VIII. 1941 (Šnoflák); Čejč, VII. 1940 (Hoffer). — Austria: Waidhofen a. d. Ybbs, 9. IV. 1952 (Novitzky). — Switzerland: Creux-de-Genthod near Geneva, 6. VIII. 1902 (Frey-Gessner). — Hungary: Vác-Tudósdomb; Budapest. — Yugoslavia: Ruma NE of Belgrade (Mus. Budapest). — North America, U. S. A.: Manhattan, Ks., 7. II. 1931, ex *Rhagoletis suavis*; Virginia, East Falls Church, VI. 1929 (L. H. Weld); Riverton, N. Y., 10. VI. 1922 (T. H. Frison). — Canada: Ottawa, Ont., 5. V. 1941 (O. Peck); Hemmingford, Ont., 22. VII. 1925 (G. H. Hammond); St. Jean, Queb., ex *Hylemyia antiqua*, 15.—22. IX. 1953 (P. Perron).

Spalangia nigroaenea Curtis

Spalangia nigroaenea Curtis, 1839, Brit. Ent. **16**: fol. 740, p. {2}; ♂.

Spalangia homalaspis Förster, 1850, Verh. naturh. Ver. preuss. Rheinl. **7**: 505—507; ♂. —

N. syn.

Spalangia astuta Förster, 1851, Verh. naturh. Ver. preuss. Rheinl. **8**: 1—2; ♀. — **N. syn.**

Spalangia muscidarum Richardson, 1913, Psyche, **20**: 38—39; ♂♀. — **N. syn.**

?*Spalangia abenabooi* Girault, 1932, Hymenoptera, Thysanoptera Nova Australiensis II, p. {1}.

Spalangia sundaica L. F. Graham, 1932, Pamphl. Austral. Counc. sci. ind. Res. **31**: 22, 24; ♀♂. — **N. syn.**

?*Spalangia mors* Girault, 1933, Some Beauties Inhabitant not of the Boudoirs of Commerce ..., p. {1}.

As already mentioned elsewhere Dr. Riek of Canberra, Australia, was kind enough to compare my manuscript key and specimens with what is preserved in the Curtis collection in Melbourne. He wrote back to me on 27th May, 1959: "In the series of four females under *nigra* the first, which is labelled male, is on a larger whiter-coloured card. This specimen differs from the other three and keys to *?nigroaenea* in your key. The remaining three females key to *nigra*. The reserved specimen under *nigroaenea* in the Curtis collection keys to *nigra* and I consider it identical with three specimens above it. It would seem that at some time these two specimens have been displaced and this is borne out to some extent by the placement of pin holes in this cabinet drawer." Then he mentioned some small differences in wing venation of the specimen keying to *?nigroaenea* in my manuscript (*nigra* of the quoted letter equals *erythromera* of this paper), but these deviations occur in the other specimens I have examined and are of no taxonomic value.

I believe thus the first mentioned specimen pinned under *nigra* and labelled male in the Curtis collection be the actual type of *nigroaenea* Curtis. In the original description Curtis says [fol. 740, p. [2]]: "A male in Mr. Shuckard's collection, and I have seen another elsewhere". The metallic tinge, often so pronounced in this species, length of body, and pale tarsi fit well the short original description. Further evidence in support of the correctness of this concept is taken from a male of this species labelled *nigroaenea* by Walker in P. Cameron's collection deposited in the Berlin Zoological Museum. The name *nigroaenea* was mentioned for the first time in 1829 in Curtis' "A Guide to an Arrangement of British Insects", but the description was published only ten years later.

S. homalaspis Först.—In the Förster collection in Vienna there are two pins, one with one, the other with four males of this species, on a block of pith, both pins bearing the label "Or. Ex." in Förster's handwriting apart from the name and the usual labels of the Mayr collection. I selected and designated as lectotype the former one, reading also "Boppard Or. Ex. ♂.". Förster says at the end of the original description (1850, p. 507): "Ziemlich selten in der Nähe von Aachen, auch bei Boppard am Rhein", so the lectotype is apparently the male mentioned as collected at Boppard. Some further male specimens also labelled *homalaspis* were seen in a part of the Förster collection (probably of a later origin) deposited in the Berlin Zoological Museum.

S. astuta Först.—The type material consists of two pins, one bearing a label "♀ Or. Ex." in Förster's handwriting and two females pinned to a block of pith; the other pin bears one female only and is labelled "Var. a. ♀", apart from the usual collection labels. I marked red the pith below the female furthest removed from the pin at the mentioned couple and designated it as lectotype of *astuta*. It is the female sex to *homalaspis*, both being conspecific with *nigroaenea*. The other labels it bears are "Aachen", a small square green label, then "Collect. G. Mayr" and "*Sp. astuta* Förster Type", as usual in the Förster collection of the Vienna Museum.

S. muscidarum Rich.—Through the courtesy of Dr. O. Peck, Ottawa, and Dr. C. F. W. Muesebeck and Dr. B. D. Burks of the U. S. National

Museum I was enabled to examine materials of this species coming from the type locality (of *muscidarum*) as well as from Uvalde, Texas, where most experiments with this species were carried out. Specimens were determined as *muscidarum* by Girault, Lindquist, Muesebeck and Peck. They confirm the opinion that this species is identical with *nigroaenea*. Already the late A. B. Gahan was well aware of the occurrence of the same species both in North America and Europe (he knew it as *muscidarum*), as may be seen from the paper by Parker and Thompson, 1928 (p. 438).

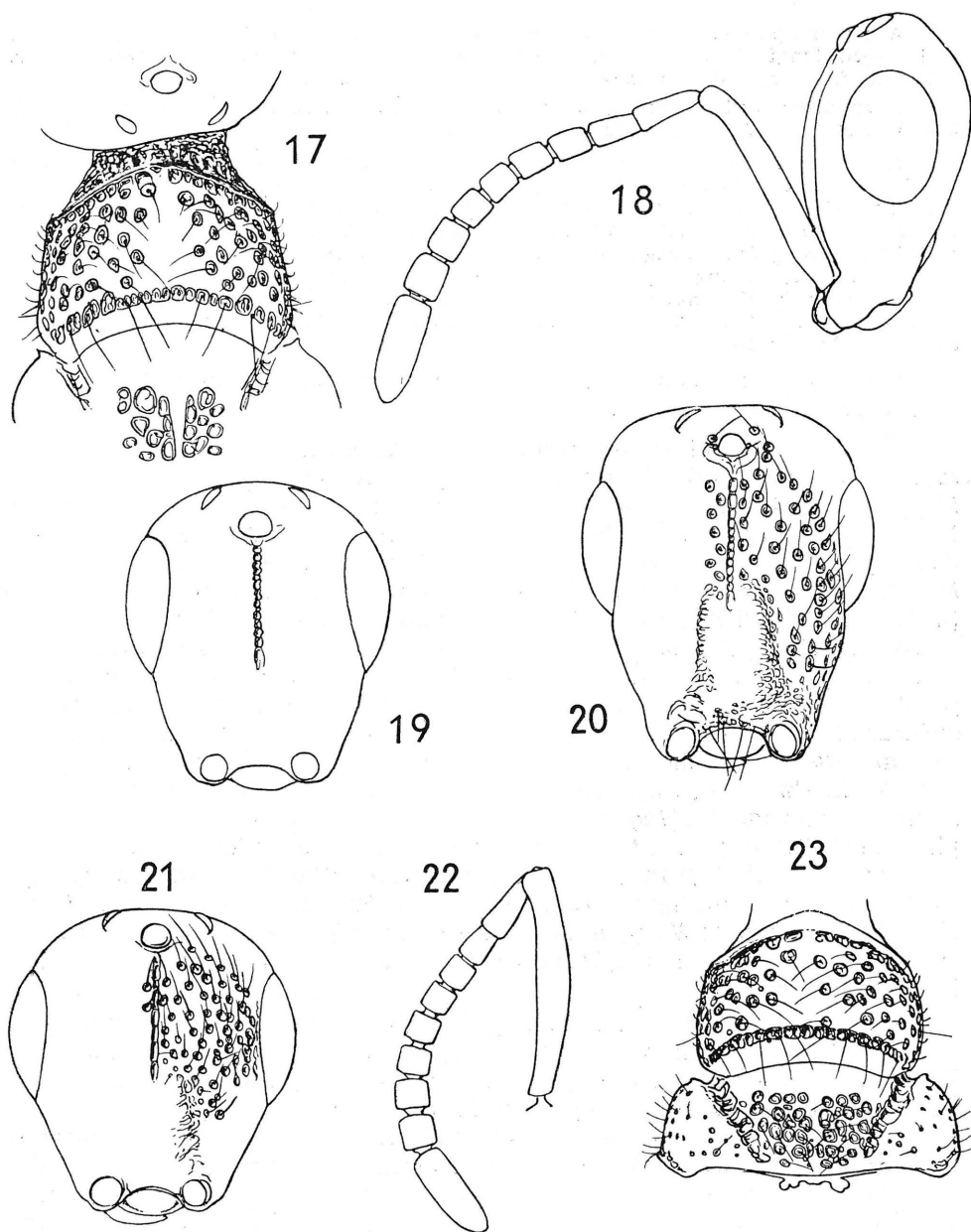
For comments on *S. abenabooi* Grlt. and *mors* Grlt. see below (Australian species . . . , p. 493).

Spalangia sundaica L. Graham is most probably also nothing else than one of the synonyms of *S. nigroaenea* Curt., as the presence of the latter in Australia and the original description accompanied by the figure on p. 24 suggest. If that figure is accurate enough, *sundaica* should differ from *nigroaenea* only by a very slightly shorter head and somewhat shorter funicle segments of the female antenna. The head may have been drawn, however, in a slightly oblique view, and if the antenna was mounted on a slide, it might have been slightly compressed and hence appearing broader than in a fresh specimen. I consider these differences too trifling to warrant the validity of a species which in all other structures agrees so well with the cosmopolitan *S. nigroaenea*.

S. nigroaenea Curt. may be easily recognized by the characters given in the key, of which the flat, subpentagonal, distinctly margined pronotum is most characteristic. It is one of the most widely distributed species of the group with isolated pronotal cross-line, and often of a rather vividly metallic colour.

Female. — Head umbilicately punctured with interspaces generally about as wide as punctures themselves, in outline (Figs. 19, 20) distinctly longer than broad (32:25); genae feebly converging toward mouth; eyes moderately prominent, their longer diameter as long as gena; genal sulcus clearly cut. In side view head (Fig. 18) not thick (32:15), temple behind centre of eye very narrow, nearly three times as narrow as shortest eye diameter (3.5:9); antennal socket weakly raised but protruding forward. Scapus rather shiny, superficially rugulose, very slender, as long as $5\frac{1}{2}$ following segments combined; pedicellus longer than first funicle segment as 7:4.5, the latter about twice as long as broad, the following funicle segments decreasing in length, distal ones usually still slightly oblong, rarely quadrate; clava very narrow, as long as 2.3—2.5 preceding segments together, usually distinctly bisegmented.

Pronotum (Fig. 17) with deep caudal crenulate cross-line parallel to hind margin; collar subpentagonal, distinctly ridged anteriorly except a narrow interruption at meson, the ridge bordered by a row of punctures; disc smooth mesad, the submedian parts with scattered umbilicate punctures becoming denser and denser on the sides, often rugose on lateral panels. Impunctate part of mesoprescutum polished, sculptured disc very densely umbilicate-punctate, with a smooth median line. Scutellum smooth except one to three punctures in lateral corners, with distinct frenal cross-line, frenum forming a transverse belt usually narrower than $\frac{1}{3}$ of scutellar length, but somewhat broader than the metanotum. Propodeum with regular double median row of small alveolae, median carina developed only anteriorly, where it expands triangularly, it is hardly raised however; plicae rather irregular, bordered inside by transverse dots; spiracular furrow irregular, the sublateral area outside it dull, more or less rugose-punctured; lateral callus not very densely hairy, postero-lateral corners short, narrow, but blunted at apex; nucha short, smooth. Basal cell of forewing and basal and cubital folds, bare; stigmal vein strongly curved, shorter than the prestigma. Trochanter of hind leg with moderate callus above.



Figs. 17—20. *Spalangia nigroaenea* Curt.: Fig. 17. Pronotum in female. Fig. 18. Head in female, with antenna. Figs. 19 and 20. Head in two females; showing the range of variation.

Figs. 21—22. *Spalangia slovaca*, sp. n.: Fig. 21. Head of female. Fig. 22. Female antenna. Fig. 23. Pronotum and mesoscutum. [All three figures designed from the holotype.]

Abdominal petiole somewhat expanded anteriorly, about 1.7 times as long as broad, with 7–10 longitudinal carinae, laterally with some erect hairs. Gastral tergites extremely finely granulate at magnification of about 60 times.

Body often with a strong bronzy lustre; tarsi testaceous except tips. Length 2.9–3.8 mm. (average 3.1 mm. while body stretched).

Male. — Head only as long as broad, with considerably protruding eyes. Scapus hardly 1.5 times as long as eye length, about as long as the following three segments combined; first funicle segment about 3.5 times as long as broad, as long as clava, about 2.5 times as long as pedicellus and by 1/3 longer than the second funicle segment; this and the following funicle segments subequal, each fully twice as long as broad. Abdominal petiole fully as long as propodeum, about 2.3 times as long as broad, with abundant hairs laterally. Phallus intensively sclerotized, dark brown, very narrow and long, about as long as width of gaster and 6.5 times as long as broad. Length of body (while stretched) 2.5–3.5 mm.

Variation is not great and most points are included in the description above.

Hosts: Calliphoridae: *Chrysomya dux* Esch., Ch. (= *Pycnosoma*) *rufifacies* Macq. and *Ch. varipes* Macq. in Australia; ?*Lucilia sericata* Meig. in the U. S. A.; *Lucilia* sp. in France and another sp. in Australia; *Neopollenia stygia* F. and *Paracalliphora augur* L. in Australia. — Muscidae: *Lyperosia exigua* Meij. (= *Haematobia serrata* Ril. How.) in Texas; *Musca domestica* L. in Czechoslovakia, South of the European U. S. S. R., the U. S. A., Mauritius, Australia and New Zealand; *Musca domestica vicina* Macq. in Uzbekistan; *Musca fergusoni* Jhnst. et Bancr. and *M. hilli* Jhnst. et Bancr. in Australia; *M. sorbens* Wd. in Uzbekistan; *M. terraereginae* Jhnst. et Bancr. and *M. vetustissima* Walk. in Eastern Australia; *Ophyra anthrax* Meig. in Uzbekistan; *Phaonia corbeti* Mall. in the Solomon Islands; *Phaonia querceti* Bché. in Uzbekistan; *Stomoxys calcitrans* L. in the U. S. A., in Czechoslovakia and in Nyasaland (here with “?” at species name). — Phoridae: ?*Megaselia iroquoiana* Mall. in the U. S. A. — Sarcophagidae: *Ravinia striata* F. in Uzbekistan; *Sarcophaga dux* Thoms. (= *misera* auct.), *S. frontalis* auct., *S. impatiens* Walk. and *Sarcophaga* sp. in Australia and another *Sarcophaga* sp. in France. — Tachinidae: *Paratheresia claripalpis* (Wulp) in Peru (*Spalangia nigroaenea* here hyperparasitic!). — In some countries *Stomoxys calcitrans* seems to be the principal host of *S. nigroaenea*.

The above data are taken mostly from the literature: those concerning the U. S. A. were summarized by Peck, 1951 (except *Haematobia serrata* listed by Richardson, 1913), those from Australia by Johnston and Bancroft, 1920 [all under *muscidarum*²⁾], the data from France come from Parker and Thompson, 1928, the fresh data from Soviet Uzbekistan were rendered by Mrs. V. I. Sytchevskaya, for whom I determined her rich bred materials. Very detailed accounts of the bionomics of this species in North America were published by Pinkus, 1913, and by Richardson, 1920. In Europe the egg

²⁾ The data are not always fully reliable, sometimes because of misidentification of the parasites. According to a figure on p. 103 in Johnston and Tiegs, 1921 (Proc. R. Soc. Queensl., 33) the data of these authors seem to refer rather to *S. endius* Walk. (= *orientalis*) than to *S. nigroaenea* (= *muscidarum*). Girault, 1932, names the figured species *abenabooi* (see below).

and the larval instars were studied and thoroughly described (and figured; under *S. nigra*) by Parker, 1924.

Distribution: Europe (Britain, Sweden, Germany, Czechoslovakia, Austria, Hungary, Bulgaria, France, South of the European U. S. S. R.), Central Asia (Uzbekistan), Cyprus, Africa (Madeira, Canaries Islands, Egypt, Sudan, Nigeria, Nyasaland, S. Rhodesia, S. Africa, Mauritius), Sunda Islands (?), Australia, North America (Canada; U. S. A. from New York to Illinois, Texas and California), Central America (Mexico, Haiti) and Argentina in South America. A cosmopolitan species.

Material examined. — Sweden: Närke, Örebro, district, 1. VI. 1943 (A. Jansson). — Germany: Aachen (Förster); Boppard (Förster); Karlsruhe-Beiertheim, 15. IV. 1927 (Hohndorf); Ascholding in Oberbayern, in dung, 10. IX. 1959 (Kühlhorn); Berlin; Leipzig-Rüdernsdorf, 26. VII. 1890 (R. Krieger); Dresden, VIII. 1858 (Reinhard). — Czechoslovakia: Bohemia, Revnice near Praha, ex *Musca domestica* and *Stomoxys calcitrans* in rabbit dung, 22. VIII. 1952 (L. Masner); Praha-Hvězda, 3. IX. 1942 (Roubal); Moravia, Čejč, 24. VII. 1944 (Šustera); Pouzdřany, 5. IX. 1946 (A. Hoffer). — Hungary: Budapest. — Bulgaria: Zlatni Piasacy at Varna, VII. 1957 (Bouček). — European part of the U. S. S. R.: Stavropol, N. Caucasus, ex *Musca domestica*, VI.—XI. 1936. — Uzbekistan: Bukhara; Termez; Yangi-Yer; Tashkent; Andijan; from the hosts listed above reared in 1953—1959 (by V. I. Sytchevskaya). — Cyprus: Mandria, 16. VII. 1937 (Mavromoustakis). — Madeira (Wollaston). — Canaries Is.: Tenerife, Guimar (R. Frey; coll. A. Jansson). — Egypt: Siwa, 5. IX. 1935 (J. Omer-Cooper). — Sudan: Khartoum, ? Muscid fly, 22. III. 1915 (R. Cottam). — S. Nigeria: ex Muscid, 1. IV. 1916 (W. A. Lamborn). — Nyasaland: Namwara, ex pupa *Musca ? domestica*, I. 1932; ex pupa of Dipteron, 23. II. 1932; Naimtunda Estate, ex pupa of *Stomoxys ? calcitrans*, III. 1932 (all W. A. Lamborn). — S. Rhodesia: Gatooma, ex *Musca humilis* Wd., II. 1928 (A. Cuthbertson). — South Africa: Cape Town, Milnerton, 14.—28. VII. 1925 (R. E. Turner). — Mauritius: ex pupa of *Musca domestica*, 1930 (D. d'Emmerez de Charmoy). — Canada: Ottawa, Ontario, 23. IX. 1911. — U. S. A.: Forest Hills, Mass., XI. 1912 (J. H. Paine); Bloomington, Ill., from housefly, IX. 1909; Chatsworth, Los Angeles, Cal., ex *Stomoxys calcitrans*, 24. VII. 1951; Uvalde, Tex., 14. VI. 1921 (D. C. Parman) and 20. V. 1933 (A. W. Lindquist). — Mexico: Orizaba, XII. 1887 (H. H. S. and F. D. G.; Cameron's *M. name petiolata*). — Haiti: ex *M. domestica* (Myers). — Argentina: Tucumán, I. 1906 (Vezényi).

***Spalangia slovac*, sp. n.**

This species belongs together with *nigroaenea* Curt., *cameroni* Perk. and *endius* Walk. to the group with distinct caudal cross-line on the pronotum, and is most nearly allied to *nigroaenea*. From this species *slovaca* differs mainly by the characters used in the key.

Female. — Head umbilicately punctate with interspaces generally as broad as punctures, rather densely hairy (hairs everywhere whitish); in facial view slightly oblong (Fig. 21; 30:27.5), subtriangular as genae are rather strongly converging towards mouth. In profile it is about twice as long as thick, eye not large, slightly longer than gena (13:12); the latter with puncturation still denser than on frons and with sulcus indistinct; temple narrower than half the eye width (4:9), with puncturation somewhat sparser. Antennal socket distinctly raised; scrobes relatively deep, its narrowly triangular bottom smooth except between antennal toruli (where it is rugulose). Antenal scapus (Fig. 22) slender, feebly shiny, with fine sculpture arranged somewhat longitudinally, as long as 5.5 following segments combined; flagellum hardly thickened towards the end; first funicle segment about 1.7 times as long as broad, the second only very slightly oblong, the third subquadrate and fourth to seventh quadrate, with rather wide incisures between individual segments; clava three times as long as broad.

Pronotum (Fig. 23) semiglobose, considerably vaulted, with deep crenulate cross-line parallel to hind margin (this smooth), disc smooth in median triangle, with scattered broad punctures sublaterally and with dense umbilicate puncturation laterally; anterior margin of collar margined with an irregular, feeble ridge, bordered by deeper, dense and broad umbilicate punctures. Mesoprescutum also rather densely umbilicately punctured (except anteriorly), with a smooth narrow median line, at the latter punctures deeper and crowded. Scutellum more distinctly vaulted than in *nigroaenea*, otherwise very similar. Double median alveolate row of propodeum strongly narrowed backward, median carina visible only in anterior half; plicae laterales very weak, irregular, more distinct only posteriorly where they converge toward the hardly developed nucha; spiracular furrow very shallow, sculpture beyond it formed by irregular rugulose puncturation, dull; lateral fimbriae dense; postero-lateral corners small, triangular, rather sharp. Wings as in *nigroaenea*, postmarginal vein distinctly shorter than the stigmal, pubescence white. Trochanter of hind leg not distinctly dilated by a callus.

Abdominal petiole about 1.6 times as long as broad. Gastral tergites 1–5 without any distinct microsculpture, third tergite one and half times as long as the second (or nearly), which is only very slightly emarginate behind; ovipositor shortly exerted.

Body black, without metallic lustre; tarsi testaceous except claw segment. Length 2.9–3.4 mm. (the latter the holotype).

Male unknown.

Hosts are not known.

Distribution: Czechoslovakia.

Holotype (female): Czechoslovakia, south-eastern Slovakia, Turna nad Bodvou, 12. VIII. 1948 (Bouček); deposited in the Entomology Department, National Museum, Prague, No. 25402.

Further material (one paratype, female):

South-eastern Slovakia, Somotor, one female, 16. VIII. 1950 (A. Hoffer).

Spalangia cameroni Perkins

Spalangia cameroni Perkins, 1910, Fauna Hawaiiensis 2 (pt. 6): 656; ♀♂.

?*Spalangia melanogastra* Masi, 1940, Boll. Lab. Ent. agr. Portici 3: 295–297; ♂.

Spalangia atherigona Risbec, 1951, Mém. Inst. fr. Afr. Noire 13: 361–363; ♀♂.

N. syn.

I base my interpretation of this species on specimens identified as '*S. cameroni* Perk.' by Dr. Ferrière in the time of his work at the British Museum. They come from the Fiji Islands, where they were reared from *Musca* and *Stomoxys* and agree well with the original description made from the Hawaiian material. They probably were not compared with the types said to be in Hawaii.

From the British Museum I have also several specimens identified as '*S. ?cameroni* Perk.' by Dr. J. F. Perkins, and collected in England. Further evidence gained from the material coming from Europe, Asia and Africa supports the view of the conspecificity of those specimens and of world-wide distribution of this parasite.

Through the courtesy of Miss Kelner-Pillault and Mr. J. R. Steffan of the Paris Muséum National d'Histoire Naturelle I had the opportunity to get information on the type material of *S. atherigona* Risbec, described from Senegal. It proved to be the same as *cameroni*. The only female of this material has been labelled by me as lectotype. In the original description the length of body of the male is given, probably by a printer's

error, as 1.2 mm., whilst the actual length even if the body is not stretched, is about 2.2 mm.

I could not examine the type of *S. melanogastra* Masi, but according to the description it may well be the same as *cameroni*.

S. cameroni Perk. belongs to a group of species with developed pronotal cross-line and within the '*nigroaenea*-group' it appears to be allied to *nigroaenea*, *slovaca* and *gemina*. Last of them (together with another new species from S. Africa) stands nearest to *cameroni*, which differs, however, from *gemina* mainly in its longer antennae and the oblong head in the female sex.

Female. — Head umbilicately punctate with wide interspaces except at inner orbitae and on cheeks (here punctures denser), distinctly longer than broad (Fig. 25: 32:27); genae moderately converging toward mouth and slightly longer than the relatively small eyes (15:13); genal sulcus indistinct; in side view head twice as long as thick (32:16), with width of temple $\frac{3}{5}$ of the eye width; antennal socket distinctly raised. Scapus mat, very finely punctulate-granulate, very slender and long (Fig. 24), equal in length to six following segments combined; pedicellus longer than the first funicle segment as 6.5:4.5; basal funicle segments distinctly elongate, distal ones quadrate; clava nearly three times as long as broad (11:4).

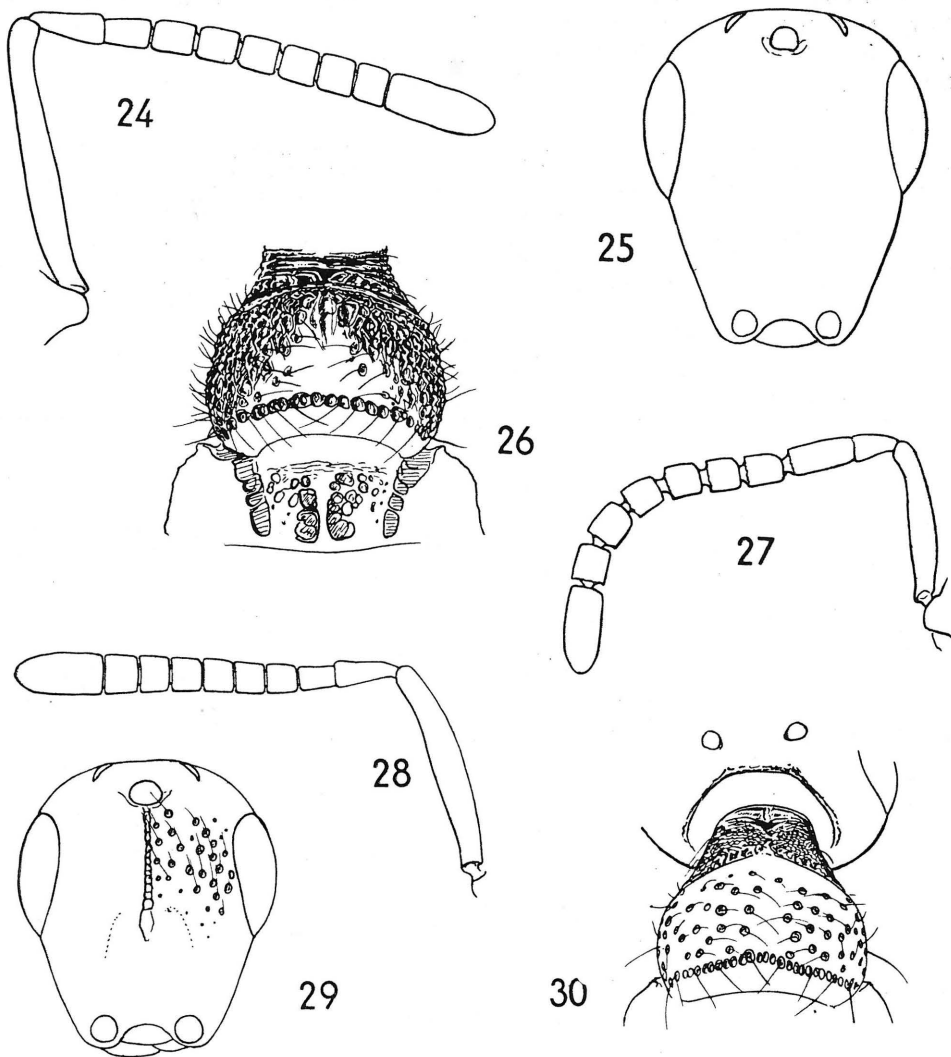
Pronotum (Fig. 26) with distinct caudal crenate cross-line, this parallel to hind margin; collar anteriorly rounded, immargined, surface here and on the sides densely rugose-punctured, leaving a broadly triangular disc smooth, at most with a few scattered punctures only, often with a median, longitudinal, shallow groove; hairs of pronotum mainly placed not on tubercles of sculpture but in pits; pronotal collum transversely rugulose. Disc of mesoprescutum irregularly rugose-punctured with a smooth median line. Scutellum smooth, but with several punctures in lateral corners, with a deep crenate cross-line; frenum occupying a little less than $\frac{1}{3}$ (often $\frac{1}{4}$), forming a belt usually not broader than the metanotum. Propodeum with median double alveolate row strongly dilated anteriorly; submedian smooth areae bordered by crowded puncturation laterally and posteriorly, inside of the regularly arched plicae; these ending at the small, smooth nucha; sublateral areae outside of the rather regular, crenate spiracular furrow, nearly smooth; lateral fimbriae not dense; postero-lateral corner sharply angular. Prepectus large, rugose, triangular, but extended far downward, its anterior margin elevated like a massive blunted edge sending a branch toward tegula. Mesopleura smooth, with anterior impression broad and coarsely crenate, episternal scrobe narrow, crenate, usually dilated into a pit on centre of mesopleura, this pit usually connected by a row of punctures with precoxal pit; precoxal suture edge-like, bordered by irregular punctures. Forewing with basal cell and basal and cubital folds bare; stigmal vein bent, hooklike, hardly shorter than the postmarginal, but fully as long as the prestigma.

Abdominal petiole about 1.8 times as long as broad, maximum width at anterior corners. Gastral tergites usually polished, the second at meson often shorter than half the third tergite.

Body black, sometimes with faint bronzy reflections; tarsi testaceous with black claw segments. Length 2.5—3.3 mm.

Male. — Head as long as wide (30:30), more triangular, the subrugose umbilicate punctures between inner eye orbita and antennal insertion often very shallow, superficial; gena $\frac{2}{3}$ the eye length, rather shiny, interspaces at least, half the width of punctures. Occipital carina meeting hypostomal carina at right angle. Scapus rather shiny, the fine sculpture being more longitudinally rugulose, reaching anterior ocellus, nearly as long as four following segments combined (23:24); first funicle segment about twice as long as pedicellus, twice to 2.5 times as long as broad, and almost 1.5 times as long as the second funicle segment; the latter hardly longer than any of the following five segments which are all oblong, about 1.4 times as long as broad; incisures between the individual segments rather wide. Abdominal petiole about 2.3 times as long as broad. Body more vividly metallic green, legs sometimes bluish; tarsi usually darkened in distal half. Body length (head stretched) 2.4—3 mm.

Variation of *S. cameroni* is not great and its range as to the body length (the measurements should not be influenced by a bent or stretched condition of the body) and density of puncturation is already mentioned above.



Figs. 24—26. *Spalangia cameroni* Perk., female: Fig. 24. Antenna. Fig. 25. Outline of head in facial view. Fig. 26. Pronotum and mesoscutum.
 Figs. 27—30. *Spalangia endius* Walk.: Fig. 27. Male antenna. Fig. 28. Female antenna. Fig. 29. Head of female [sculpture partly indicated as elsewhere in figures of the head]. Fig. 30. Pronotum.

Hosts: Muscidae: *Atherigona quadripunctata* Rossi in Senegal; *Fannia leucosticta* Meig. and *F. scalaris* F. in Uzbekistan; *Hydrotaea dentipes* Flin. in Czechoslovakia; *Lyperosia irritans* (L.) (= horn fly) in Hawaii; *Musca domestica* L. in U. S. S. R. and Mauritius; *M. domestica vicina* Macq. in the Fiji Islands; *Musca* sp. in Hawaii and Fiji; *Ophyra anthrax* Meig. and *Ravinia striata* F. in Uzbekistan; *Phaonia querceti* Bché. in Czechoslovakia; *Stomoxys calcitrans* (L.) in Britain, Czechoslovakia, Nyasaland [the label reads: '?calcitrans'] and in Fiji. — Sarcophagidae: *Coprosarcophaga haemorrhoidalis* Flin. in Uzbekistan. — Trypetidae: *Dacus cucurbitae* Coq. in Hawaii; *Dacus* (*Chaetodacus*) sp. in Fiji. — In Germany *S. cameroni* was reared from settling pools of a sugar factory where *Pegomyia hyoscyami* Pz. predominated, but also more than one other Muscid was present (see Gersdorf, 1960, Zeitschr. angew. Ent. 47:402).

Distribution: Europe (Britain, Sweden, Germany, Czechoslovakia, Hungary, Yugoslavia), Africa (Azores, Morocco, Senegal, Tanganyika, Nyasaland, South Africa, Madagascar, Mauritius, probably also Somaliland), Cyprus, Central Asia (U. S. S. R.: Uzbekistan), South Asia (India, Malaya), Pacific Islands (Hawaii, Fiji), Central America and South America (Brazil). The species was described for the first time from the Hawaiian Islands, but probably also here it was a secondary, introduced element of the fauna. To the Fiji Islands it was introduced intentionally to control the house fly (see e. g. Simmonds, 1929). Although secondarily world-wide in distribution, *S. cameroni* is not yet known from North America or Australia.

Material examined. — England: Herts., Little Gaddesden, ex *Stomoxys*, 1950 (L. C. Stones). — Sweden: Närke, Örebro, Ö. Mark, 20. VIII. 1949 (A. Jansson). — Germany: Ahlem über Hannover, ex Diptera sp. in settling pools of a sugar factory, 1959 (E. Gersdorf); ?Hirschenwidenau, 8. VII. 1959 (Kühlhorn). — Czechoslovakia: Bohemia: Beroun, ex *Stomoxys*, IX.—XI. 1953 (L. Masner); Praha—Řevnice, ex *Stomoxys* in rabbit-dung, 22. VIII. 1952 (L. Masner); Praha—Libeň, VIII. 1959 (Z. Hostounský); Praha—Šárka, 13. IX. 1960 (J. Strejček); Holovousy, ex *Phaonia querceti*, VIII. 1959 (Z. Hostounský); Hradec Králové—Věkoše, in dung, 12. VIII. 1957 (Bouček); Moravia: Pohořelice, ex *Hydrotaea dentipes* in horse droppings, 19. IX. 1956 (F. Gregor); Dolní Věstonice, 5. IX. 1945 (Hoffer); Pouzdrány, 5. IX. 1945 (Hoffer). — Hungary: Szerencs, 1927 (Mus. Budapest). — Yugoslavia: Ruma NE of Belgrade (Hensch; Mus. Budapest). — U.S.S.R., Uzbekistan: Nukus, Termez, Denau, Yangi-Yer; reared from the hosts listed above, in 1957 and 1958 (V. I. Sytchevskaya). — Cyprus: Cherkas, 12. VI. 1934 (Mavromoustakis). — Azores: Fayal, Horta, 11.—14. VII. (Frey). — Morocco: Atlas, Reraia, 29. V.—15. VI. 1926 (Lindberg; coll. Jansson). — Africa, Senegal: M'Bambey, ex *Atherigona quadripunctata* (J. Risbec). — Tanganyika, 1917—1918 (W. A. Lamborn). — Nyasaland: Naimtunda Estate, ex pupa of *Stomoxys ?calcitrans*, III. 1932 (W. A. Lamborn). — South Africa: Port St. John, Pondoland, V. 1924 (R. E. Turner). — Madagascar (Sikora leg.) — Mauritius, ex *Musca domestica*, 1930 (D. d'Emmerez de Charmoy). — W. Aden Prot., Wadi Darreija, SW of Dhala, 4,200 ft., 7.—8. XI. 1937 (H. Scott, E. B. Britton). — India: Calcutta, School Trop. Med., 1936 (C. Strickland). — Malaya, ex *Dacus* sp., 15. XII. 1936 (J. C. Hutson). — Hawaii: Honolulu, coll. Perkins ("cotype"). — Fiji, ex *Musca* and *Stomoxys*, 1928; Suva, ex *Musca* pupa near cow dung, 14. V. 1929 and III. 1932 (H. W. Simmonds). — Solomon Islands: Guadalcanal, 9. III. 1933, ex *Lyperosia exigua* (R. A. Lever). — Central America, British West Indies: St. Vincent (H. H. Smith); Grenada, Chantilly Est Windward side (H. H. Smith); Balthazar, Windward side (H. H. Smith). — South America, Brazil: Pernambuco, 1930 (E. Horváth; Mus. Budapest); Nova Teutonia, VII. 1957 (F. Plaumann); Sao Paulo, 1928 (J. György)

***Spalangia endius* Walker**

Spalangia Endius Walker, 1839, Monogr. Chalc. 2: 96; ♂.

Spalangia muscidarum var. *stomoxysiae* Girault, 1916, Soc. ent. 31: 57—58; ♀. — **N. syn.**

Spalangia philippinensis Fullaway, 1917, Proc. Hawaii. ent. Soc. 3: 292. — **N. syn.**

Spalangia muscidarum var. *texensis* Girault, 1920, Proc. U. S. Natl. Mus. 58: 213.

Spalangia orientalis L. F. Graham, 1932, Pamphl. Austral. Coun. sci. ind. Res. 31: 21. — **N. syn.**

Spalangia stomoxysiae; Peck (in Muesebeck, Krombein, Townes and others), 1951, U. S. Dept. Agr. Monogr. 2: 535.

During my recent visit to the British Museum (after finishing my manuscript of this paper) I succeeded in finding the type male of *Spalangia endius* Walker. It is in good condition and bears a round label reading "James Isle" and another label with "*Spalangia nigra* Latr." and, on its underside, "Stood under this name in old B. M. Coll. C. Waterhouse" (Walker synonymized incorrectly *endius* with *nigra* in 1846). I added a red-rimmed Type-label and my determination label. The specimen is certainly the type of *endius* described from "James's Isle" (Walker, 1839, p. 96) and the same species as *stomoxysiae* Grt., *philippinensis* Fullaway and *orientalis* L. F. Graham. The pronotal cross-line is in the type a little angularly removed from hind margin in the middle as it is in most samples of the species.

I do not hesitate to take the oldest name for the species, as well as elsewhere in this paper, although I am well aware of the limitation concerning "nomina oblita" of Article 23b of the International Code of Zoological Nomenclature. It may be seen in several cases in the present paper that often there is hardly any limit between what may be considered a "generally accepted name" and what may not. And besides, in no case we have to do with "a name that has remained *unused as a senior synonym* ... for more than fifty years".

Of *S. stomoxysiae* I have seen specimens from U. S. A. which were compared with the types by A. B. Gahan in Washington. *S. stomoxysiae* was described originally as a variety of *S. muscidarum* Rich. (a synonym to *nigroaenea* Curt. now) in 1916 and elevated to species rank by Peck, 1951, probably on the authority of the late A. B. Gahan. Dr. Peck also synonymized *muscidarum* var. *texensis* with *stomoxysiae*.

Another synonym of *Spalangia endius* is *S. philippinensis* Fullaway. Mr. Fullaway was kind enough to send me two females of his species and they differ in no way from the North American and European *endius*.

I have not seen the type of *S. orientalis* Graham, which according to Prof. Handschin (in a letter) and according to the data in the original description should be deposited in Canberra, Australia, but could not be found there by our colleague Mr. E. F. Riek. The species was described from Western and Northern Australia³⁾ the paratypes among other localities also from Burnside. The material I have examined from the British

³⁾ in Handschin's paper, to which L. F. Graham's descriptions are annexed as an "Appendix" the two different series of *orientalis* from those two territories are commented on as follows: "Morphological comparison showed differences between the two forms and ... the two forms behaved as entirely distinct species."

Museum and that which I have received through the courtesy of Dr. Riek, Canberra, comes from Burnside also, and was collected there by the same collector (T. G. Campbell) several years later—in 1936. It was determined as *orientalis* (the specimens from the Brit. Museum by Dr. Ferrière) and agrees well with the description.

The Australian *S. orientalis*, as judged from the above material at my disposal, is in my opinion the same species as materials from Europe, Central Asia and North America, which proved to belong to *S. endius* Walk., though most specimens are a little larger than the Australian ones.

As Dr. Burks kindly told me in a letter, there were in the U. S. National Museum several specimens of *stomoxysiae* coming from Australia that had been previously identified by Crawford as *grotiusi* Grt. According to a note by Girault in 1915 (p. 346) the re-examined type of *grotiusi* has, however, a plain-line on the mesoscutum, which is lacking in *endius*.

Spalangia endius belongs to the species group with isolated cross-line on pronotum and is easily recognized by the characters of pronotum and antennae, given in the key.

Female. — Head (Fig. 29) rather sparsely umbilicately punctured, slightly oblong (28:25), in outline with genae moderately converging and shorter than the longer diameter of the non-prominent eyes (10:14). Head in side view twice as long as thick (28:14), with temple half as broad as eye width. Scapus rather mat, granulated (at least externally), quite slender (Fig. 28), fully as long (20) as five following segments combined; pedicellus twice as long as second funicle segment; first funicle segment one and a quarter times longer than wide, the following segments quadrate, distal ones usually slightly transverse; clava as long as 2.5 preceding segments together.

Pronotal collar (Fig. 30) semiglobose, equally rounded, not margined, with distinct caudal crenulate cross-line which is removed from hind margin at meson (often subangularly); collar with scattered umbilicate punctures except along median line, without any ridge or rugosity. Disc of mesoprescutum irregularly rugose-punctured, usually with a smooth median longitudinal line. Scutellum with a few punctures sublaterally in front of the distinct frenal cross-line; frenum occupying 1/3 and forming a belt slightly broader than metanotum. Propodeum with subrectangular to obtuse postero-lateral corners, nucha short and smooth; median alveolate double row strongly narrowed posteriorly, with a fine carina only in anterior half. Forewing bare in basal third, costal cell hairy only in its distal fifth, longer than marginal vein as 35:23; stigmal vein somewhat shorter than prestigma, hook-like, as long as the postmarginal vein.

Abdominal petiole 1.7 times as long as broad. Gastral tergites polished, the third sometimes with a vaguely indicated granulation on disc.

Body black, very rarely with a slight metallic tinge (more often in male than in female); tarsi testaceous except the dark tips. Length 2—3 mm.

Male. — Head hardly shorter than long, with eyes more protruding than in female. Antennal scapus (Fig. 27) about as long as pedicellus plus basal two funicle segments; first funicle segment cylindrical, nearly to fully three times as long as broad, usually less than twice as long as pedicellus, in one Burnside specimen fully twice as long as this; second funicle segment slightly but distinctly longer than broad, the third to seventh hardly longer than broad or quadrate, all with wide incisions between the individual funicle segments; clava about 2.5 times as long as wide, hardly as long as two preceding segments together. Propodeal median double groove subparallel-sided, nucha more distinct than in female; petiole fully twice as long as wide (12:5.5). Phallus rather weakly sclerotized, brown, relatively small, about $\frac{3}{4}$ as long as the abdomen width, not very narrow, 5.5 times as long as broad. Length of body 1.9—2.6 mm.

Variation. In one specimen from the Burnside series the punctures are unusually small, though not denser or sparser, and the pronotal submarginal cross-line is effaced, indicated only by a transverse impression in its place. As in the other species the body is measured while stretched; a bent body may be some 0.3 mm. shorter.

Hosts: Calliphoridae: *Chrysomya albiceps* Wd. and *Ch. megacephala* F. in Tanganyika; Muscidae: *Fannia leucosticta* Meig. and *F. scalaris* F. in Uzbekistan; *Hydrotaea australis* Mall. in Australia, *Lyperosia exigua* Meig. in Northern Australia; *Lyperosia irritans* (L.) (= *Siphona, Haematobia*) in Texas and Hawaii; *Musca domestica* L. in Nyasaland, Mauritius, Philippines, California and Texas; *M. domestica vicina* Macq. and *M. sorbens* Wd. in Uzbekistan; *Ophyra anthrax* Meig. in Uzbekistan, *Orthellia* (= *Cryptolucilia*) sp. in Texas; *Phaonia querceti* Bché. (probably) in Czechoslovakia; *Stomoxys calcitrans* (L.) in Czechoslovakia and Texas; Sarcophagidae: *Coprosarcophaga haemorrhoidalis* Flin. and *Ravinia striata* F. in Uzbekistan, *Sarcophaga effrenata* Wlkr., *S. impar* Aldr. and *S. sueta* Wulp in Texas; Trypetidae: *Ceratitis capitata* (Wied.) and *Dacus dorsalis* Hend. (Dresner, 1954) in Hawaii; *Dacus ferrugineus* F. in India.

Most data come from Texas (Girault, 1916, and Lindquist, 1936 — *S. muscidarum stomoxysiae*), Northern Australia (Handschin, 1932 — *S. orientalis*) and the fresh ones from Uzbekistan, U. S. S. R. (Mrs. V. I. Sytchevskaya). The quoted papers of Lindquist and Handschin give also many biological data particularly concerning habits and longevity of the adult *Spalangia*, number of eggs laid, length of the development period under various temperatures, percentage of parasitization, etc. *S. endius* from *Lyperosia* in Northern Australia (= *orientalis*) was used by Handschin for cross-experiments with a "*Lyperosia*-strain" of *S. sundaica* L. Grah. from Java, and crosses were successful. Crosses with all other specimens of *sundaica* from other hosts produced, however, only males, as if the females had remained unfertilized.

Distribution: Europe (Czechoslovakia), Cyprus, Africa (Madeira, Morocco, Nigeria, Tanganyika, Nyasaland, S. Rhodesia, S. Africa, Mauritius), Asia (Uzbekistan, India, Krakatau), Australia (Western and Northern Australia, Queensland), Pacific Islands (Philippines, Hawaii, New Caledonia, Fiji, Samoa, Galapagos Islands), North America (California, Texas), British West Indies and South America (Argentina). A cosmopolitan species.

Material examined. — Czechoslovakia: Praha-Libeň, VIII. 1959; Holovousy, from *Stomoxys* and probably from *Phaonia querceti*, VIII. 1959 (both Hostounský). — Uzbekistan, U.S.S.R.: Tchimbay; Nukus; Bukhara; Samarkand; Termez; Dzharkurgan; Denau; Yangi-Yer (Янги-Эр); Andijan; many specimens reared from various synanthropic flies listed above, in 1949–1961 (by V. I. Sytchevskaya). — Cyprus: Zakaki, 6. VII. 1934 (Mavromoustakis). — Madeira: Funchal (Frey). — Morocco: Middle Atlas, 3. V. 1961 (P. N. Lawrence). — S. Nigeria, ex ?Muscid puparium, 1. IV. 1915 (W. A. Lamborn). — Tanganyika, 1917–1918 (W. A. Lamborn); Shinyanga, 1958 ex *Chrysomya albiceps* and *megacephala*. — Nyasaland. Namwara, ex *Musca ?domestica*, 1. 1932 (W. A. Lamborn). — S. Rhodesia: Gatooma, II. 1928, ex *Musca humilis* (A. Cuthbertson). — South Africa, Cape Province, Mossel Bay,

II. 1922 (R. E. Turner). — Mauritius, ex *M. domestica*, 1930 (D. d'Emmerez de Charmoy). — Indonesia: Krakatau, 25. I. 1922 (Mus. Buitenzorg). — Australia, Northern Territory, Burnside, Collin's Paddock, III. 1936 (T. G. Campbell); Bridge Creek, 5. IV. 1936 (T. G. Campbell); Marrakai, Duck Ponds, 9. VI. 1936 (T. G. Campbell); S. E. Queensland, Tambourine Mts., 18.—25. V. 1935 (R. E. Turner). — Philippines: Luzon, Benguet, Baguio (C. F. Baker). — Hawaii: "Philippine Spalangia", 2 ♀♀. — Samoan Islands: Apia, Upolu Is., ex puparia *M. sorbens* and *Sarcophaga* sp. (Buxton and Hopkins). — Fiji: Viti Levu, Nasinu, 12. II. 1953 (J. Uluinaceva); Naduruloulou, decayed fruits of *Eugenia mitchelli*, 29. XII. 1951 (B. A. O'Connor). — U. S. A., California: Riverside, ex *Musca domestica*, 15. VII. 1938 (P. H. De Bach). — British West Indies, St. Vincent (H. H. Smith). — Argentina: Tucumán, I. 1906 (Vezényi; Mus. Budapest).

Spalangia nigripes Curtis

Spalangia nigripes Curtis, 1839, Brit. Ent., **16**: fol. 740, p. (2); ♀.

Spalangia hyaloptera Förster, 1850, Verh. naturh. Ver. preuss. Rheinl., **7**: 509—511, ♂♀.

— **N. syn.**

Spalangia formicaria Kieffer, 1905, Berlin. ent. Zeitschr., **50**: 1—2; ♀. — **N. syn.**

Spalangia muscarum Girault, 1920, Proc. U. S. Natl. Mus., **58**: 213—214; ♀. — **N. syn.**

The location of the type of *S. nigripes*, a "female taken by Mr. Shuckard" (as stated by Curtis) is uncertain. The bulk of the Curtis collection being in Melbourne, Australia, I asked our colleague Dr. E. F. Riek of the Division of Entomology, C. S. I. R. O., Canberra, to examine the *Spalangia* specimens deposited there and to compare them with my provisionally determined specimens and my manuscript key. However, Dr. Riek did not find any label reading *nigripes* or any specimen fitting Curtis' description and my conception. Afterwards Dr. Kerrich of London informed me that there was as far as known no Shuckard's collection in the British Museum, nor elsewhere in Britain. The type of *nigripes* is thus believed lost.

My interpretation is based upon the description and comparison of it with all the European species. Curtis' *nigripes* is said to have the length of *nigroaenea* (1.5 line) and "basal joint ochraceous only in the anterior tarsi". A combination of these two characters fits well only one European species, the *hyaloptera* Förster, which falls then as a synonym of *nigripes*. This synonymy is confirmed also by one specimen determined as *nigripes* by Walker, now at the Berlin Zoological Museum.

S. hyaloptera Först. — In the Vienna Museum there are two pins labelled "Or. Ex." in Förster's handwriting, apart from the species name. I have chosen and labelled as lectotype one female pinned together with two more females to a flat piece of pith.

S. nigripes Curt. is recorded as a synonym to *nigra* Latr. by Walker, 1848 (p. 104, together with *nigroaenea*). In Dalla Torre's Catalogue of 1898 (p. 209) it is cited again as a valid species, with an exclamation mark.

S. formicaria Kieff. — Through the kindness of Dr. Schmitz I examined in 1958 the type specimen, described by Kieffer in 1905 from a nest of *Dendrolasius fuliginosus* (Latr.) in Luxembourg. It was glued to a pointed celluloid card, with the ant on another card, and the following labels "5/04 Luxembg. b. Las. fuligin." and "Luxemburg Wasmann". I added a red typus-label, as it was obviously the type (Dr. Schmitz kindly

informed me that there was no other specimen under this name in the Wasman collection). It represents the same species as *hyaloptera* and *nigripes*, and its occurrence in an ant-nest must have been purely accidental (this species was found in Czechoslovakia several times in winter months under old leaves and under bark of old trees).

S. muscarum Grt. — By an exchange with the U. S. National Museum I received a female compared with the type of *muscarum* and identified so by A. B. Gahan. It is identical with *hyaloptera* and *formicaria*, and proves that this parasite of the house-fly is distributed also in North America, although we cannot say whether primarily or introduced.

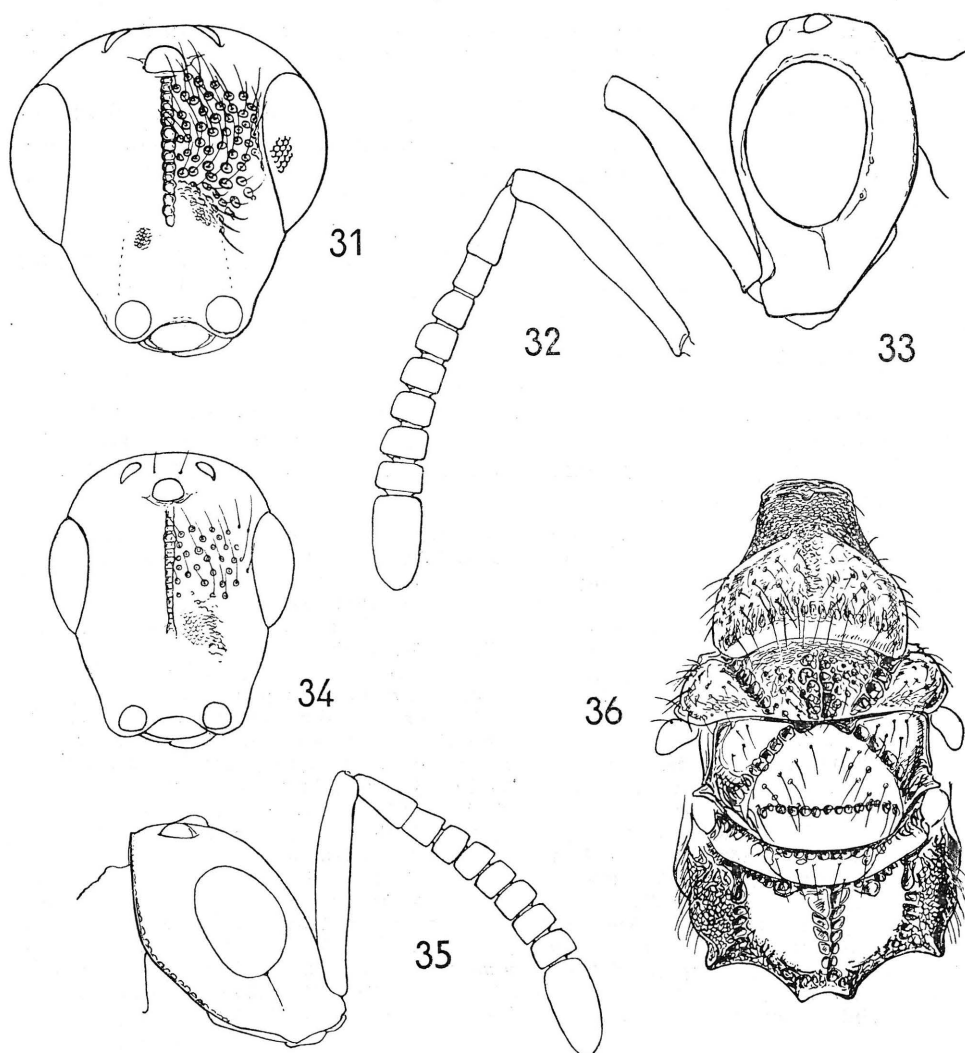
Spalangia nigripes Curt. is a species remarkable by its size, the very short, triangular head with distal funicle segments transverse in the female, and with large scattered punctures on head and pronotum while the latter lacks the caudal crenate cross-line. Although associated with the house fly and other synanthropic flies, as are most species of the group with pronotal cross-line, it belongs morphologically in the neighbourhood of *S. erythromera* Först.

Female. — Head umbilicately punctate with smooth innterspaces generally about as wide as punctures themselves (or less; Fig. 31), rounded-triangular in outline, about as long as broad (31:32), with large prominent eyes and strongly converging cheeks; in side view head very thick (19:31), with temple only half as broad as the small eye diameter (6:12); occipital ridge relatively weakly raised; gena shorter than the small eye diameter as 10:12, its sulcus distinct; antennal socket only slightly elevated. Scapus rather dull, with an irregular, rugulose-granulate sculpture, not very slender (Fig. 32), as long as 5.5 following segments combined; pedicellus 2.5 times as long as wide at its apex, in length equal to two following segments combined; first funicle segment 1.5 times as long as broad, the second subquadrate, the following gradually decreasing in length and very slightly increasing in width, most of them transverse, the distal two funicle segments about 1.5 times broader than long each; clava short and broad, not quite twice as long as broad (9:5), as long as 2.5 preceding segments together.

Pronotum equally immargined, vaulted, semiglobose, with scattered umbilicate punctures except a transverse belt along hind margin; no cross-line; hairs bent and rather adpressed, not very long. Mesoprescutum crowdedly, often irregularly punctate on disc, the smooth longitudinal carina often obliterate. Scutellum with scattered punctures except along middle; frenal cross-line distinct, frenum taking up the caudal third or more, about twice as broad as the metanotum. Propodeum roof-like, with median carina almost angularly raised in anterior third, but fading out posteriorly, where the double alveolate row is narrowed; nucha broad and very short, with coarse longitudinal rugae; submedian area smooth; plicae mostly indistinct; spiracular sulcus shallow, coarsely crenate; callus crowdedly punctate, lateral fimbriae rather dense; postero-lateral corners acute but small. Prepectus large, irregularly alveolate; mesopleura smooth, the usual impressions very deep and coarsely alveolate. Forewing on upper surface below distal half of submarginal vein with some hairs in more than one row and with a row on cubital vein; postmarginal and stigmal veins relatively long, distinctly longer than the prestigma, stigmal vein nearly straight, with a small knob and a distinct uncus turned obliquely to the front wing margin; discal pubescence and marginal ciliation short.

Abdominal petiole about 1.6 times as long as wide, dorsal carinae irregular, particularly in posterior half. Gastral tergites smooth, but a vaguely indicated granulation mostly perceptible; third tergite almost 4 times as long as the second at meson, hind margin of the second deeply emarginate; sides of gaster nearly bare.

Body black including legs; basal segments of fore tarsi usually brown to testaceous. Length 2.5–3.7 mm., usually about 3.5 mm.



Figs. 31—33. *Spalangia nigripes* Curt.: Fig. 31. Head in female. Fig. 32. Female antenna. Fig. 33. Head of male in side view. — Figs. 34—36. *Spalangia crassicornis*, sp. n., female: Fig. 34. Head. Fig. 35. Head (of female) in right side view, with antenna. Fig. 36. Thorax.

Male. — Head shorter than wide in relation 28:31, with eyes still more protruding than in female, in profile rather thick (Fig. 33). Scapus as long as 3.5 following segments united; pedicellus about 2.2 times as long as broad at apex, about $\frac{2}{3}$ the length of the first funicle segment, this 2.6 times as long as broad, equal in length to the following two segments combined; second to seventh funicle segments subequal, usually hardly longer than broad, the distal ones quadrate in smaller specimens; clava not longer than preceding two segments together, about 2.5 times as long as wide. Propodeal nucha somewhat longer than in female. Abdominal petiole twice as long as wide; second gastral tergite with hind margin emarginate as in female. Phallus

pale, very weakly sclerotized, unusually small, at least twice shorter than the abdomen width, only about 4 times as long as broad. In some specimens a faint metallic tinge on dorsum. Length 2—3.1 mm., usually about 2.8 mm.

Variation very small in the bulk of the specimens, the extremely small or large specimens occurring very rarely, and even then the puncturation and the relative length of the antennal segments varying very little.

Hosts: Calliphoridae: *Lucilia* sp. in Switzerland. — Muscidae: *Fannia leucosticta* Meig. and *F. scalaris* F., as well as *Musca domestica vicina* Macq. in Uzbekistan; *Musca domestica* L. in France; unidentified Muscid in Czechoslovakia and the U. S. A. — The bionomics of *S. nigripes* have not so far been studied in detail.

Distribution. Europe (Sweden, Britain, Luxembourg, Germany, France, Switzerland, Italy, Yugoslavia, Austria, Czechoslovakia, Hungary), Central Asia (U. S. S. R.-Uzbekistan), Lebanon and North America (U. S. A.: N. York, Illinois). Probably primarily a European species introduced into other countries.

Material examined. — Sweden: Ostergotland (Boheman, coll. Thomson). — Luxembourg, with *Dendrolasius fuliginosus* (Wasmann; the type of *formicaria*). — Germany: Aachen (Förster; syntypes of *astuta* and *homalaspis*); München, VII. 1959 (Bachmaier); Bernrieder Park, S. Bavaria, 14. X. 1943 (Stöcklein). — France: Le Puy en Velay, 5. X. 1931 (Maneval; coll. Mus. Genève); Esbarres, 20. VII. 1958 (J. Barbier, coll. Granger). — Switzerland: Bäle, "Lab. Geigy, de l'élevage de *Lucilia*" (coll. Ferrière). — Italy: Chiavari, Liguria, X. 1924 (Menozzi). — Yugoslavia: Krapina in Croatia, N. of Zagreb (Mus. Budapest); Kobilja Glava in Hercegovina (Mus. Budapest). — Austria: Wien-Mauer, 5. VII. 1948 (L. Fulmek). — Hungary: Vác-Tudósdomb; Budafok; Budapest; Debrecen; Tompa. — Czechoslovakia: Bohemia, Svádov near Ústí n. Lab. (Pawlik); Roudnice nad Lab., 2. III. 1959 (J. Strejček); Praha-Ruzyně, 6. IX. 1954 (Bouček); Praha-Bubeneč, 30. III. 1959 (Strejčková); Praha-Stromovka, in an old lime tree, X. 1949 (J. Roubal); Praha-Libeň, VI. 1954 and VIII. 1959, in numbers (Hostounský); Praha-Radlice, X, 1961 (J. Strejček); Praha-Davle, chicken-house, IX. 1910 (Zeman); Luka pod Medníkem (J. Roubal); Sobotka, ex Muscids in fowl droppings, IX. 1961 (K. Samšínák); Velký Vřeštov, 8. VII. 1957 (Bouček); Hradec Králové-Věkoše, 16. III. 1943, then VII.—VIII. 1954—1961 (Bouček); Mokré near Opočno in E. Bohemia, 21. VII. 1955 (Bouček); Slovakia: Banská Štiavnica, VI. 1955 (M. Čapek). — Uzbekistan: Samarkand, ex *Fannia scalaris*, 13. VII. 1961; Tchirtchik, ex *Fannia leucosticta*, 1. VIII. 1958; Andijan, ex *Musca domestica vicina*, 25. IX. 1955 [all reared by V. I. Sytchevskaya]. — Lebanon: Aley, 2,700 ft., VII.—VIII. 1945 (A. Sandison). — U. S. A.: Middletown, N. Y., 28. VIII. 1924 (det. by Gahan as *muscarum*).

***Spalangia crassicornis*, sp. n.**

Spalangia erythromera; Kieffer, 1905, Berlin. ent. Zeitschr., **50**: 1; — —; Donisthorpe, 1927, The guests of British ants, p. 92; — —; Donisthorpe, 1938, Ent. Rec., **50**: 74 (nec Förster, 1850).

This myrmecophilous species has been taken erroneously for *S. erythromera* Först., starting with Kieffer, 1905, who overlooked the Förster key of 1851, where *erythromera* was placed correctly. Through the courtesy of Dr. J. Schmitz, curator of the Wasmann Museum, I was enabled to examine the "*erythromera*" specimens determined by Kieffer. They included the female mentioned by this author in 1905 and this, as well as the remaining four females of the series that had been found in the nests of

Lasius fuliginosus in England (by Donisthorpe) and Holland (by Wasmann), proved to belong to a new species, *crassicornis*. I labelled them as paratypes.

S. crassicornis belongs close to the common *Spalangia erythromera* Först., from which it differs mainly by stronger, compact antennae (hence the specific name), by a vague to distinct longitudinal crenate impression on the pronotum, polished abdomen, and some minor characters.

Female. — Head longer than broad in relation 27:24 (Fig. 34), rather densely and coarsely punctate, with punctures on frons often as broad as the polished interspaces, in other places however up three times as broad as punctures, e.g. on genae and temples; gena at mouth, at the side of the antennal socket, coarsely granulate; scrobes very shallow, not exceeding the level of anterior third of eyes, minutely granulate except a smooth elevated median area; forehead strongly vaulted; head in side view (Fig. 35) rather thick (15:27), with temple broad (in relation to eye width as 5:8), eye distinctly oblong (12:8) and longer than gena (12:10); occipital ridge massive; antennal socket strongly protruding forward. Antenna unusually thick, completely dull, granulate (including the scape) and very densely pubescent; scapus fully as long as 6 following segments combined, 5.5 times as long as broad (22:4); pedicellus nearly 2.5 times as long as broad at apex, as long as 2.5 following segments together; funicle broad, its first segment quadrate or hardly longer than broad, all following segments transverse, third to seventh of the same width, quadrangular in outline, with very narrow incisures between individual segments, the seventh about 1.4 times as broad as long; clava broad, rounded at tip, 2.2 times as long as wide and equal in length to pedicellus plus first funicle segment.

Pronotum: neck-part (collum) rather long (longer than half the collar), irregularly granulate; collar broadly crescentic, usually slightly depressed and often rugose to alveolate at median longitudinal line and on a subcaudal cross-belt; hind margin behind this line smooth; piliferous punctures rather sparse, mostly raised, interspaces often uneven. Mesoprescutum (Fig. 36) on disc with crowded irregular rugose puncturation divided in two parts by a median carina. Scutellum with distinct cross-line of punctures, frenum taking up the caudal third; punctures scattered except along middle. Metanotum distinctly shorter than frenum. Propodeum: median carina raised, crest-like in anterior half; double median alveolate row narrow posteriorly and not much broader in front, alveolate here but coarser; submedian areae smooth; plicae indistinct; nucha very short, the rugose cross-belt at its base narrow; spiracular sulcus shallow, crenate; lateral callus irregularly rugose, fimbriae not dense; postero-lateral corners sharply angular but short. Prepectus large, excavated, its bottom irregular, uneven; mesopleura smooth, also bottom of impressions without any fine sculpture. Forewing rather narrow (29:85), pubescence on disc and marginal ciliation rather long; some pilosity also below submarginal vein and on cubital fold, except below prestigma and at the very base of wing; stigmal vein not strongly curved, usually distinctly longer than prestigma. Hind basitarsus above slightly shorter than following three segments together.

Abdominal petiole nearly twice as long as broad, longitudinal carinae (one in median line) posteriorly low and more or less replaced by punctulation. Gaster smooth, usually polished, second tergite with hind margin broadly emarginate, at meson about three times shorter than the large third tergite. Ovipositor sheath tips hardly exerted.

Body deep-black; tarsi usually dark testaceous, particularly the mid and hind ones, with blackish claw segments. Wings subhyaline, only the dark pubescence giving them a shade of infumation. Length 1.9–3 mm. (the type 2.6 mm.).

Male. — Head slightly longer than broad (25:24), with frons more vaulted than in female; gena $\frac{2}{3}$ as long as eye. Antennae long but relatively thick; scapus thickened in the middle, shorter than three following segments combined (20:22); pedicellus twice as long as broad, almost twice as short as first funicle segment; the latter nearly three times as long as broad, the second to seventh funicle segments subequal, each very slightly narrowed at base, oblong, 1.2 to 1.3 times as long as broad; clava as long as two preceding segments together. Pronotum with longitudinal groove

indicated by rugosity. Hind tarsi very slender, basitarsus slightly longer than three following segments combined. Abdominal petiole nearly three times as long as broad, dorsally with median and sublateral carinae less regular than in female. Length 2.6 mm.

I cannot suppress certain doubts as to whether the described male really belongs to *crassicornis*. The pronotal median groove is perceptible but the hind tarsi are as slender as they are in *erythromera*. The antennae are, however, different, being thicker.

Variation is considerable in the female, particularly in body length and the sculpture of individual sclerites. Some specimens even lack the median rugose groove on pronotum.

Hosts: Milichiidae: *Milichia ludens* Wahl. and *Phyllomyza lasiae* Collin (in England; Donisthorpe, 1927, 1938). Both these hosts are myrmecophilous Diptera associated with *Lasius fuliginosus* Latr. *Spalangia crassicornis* was found in the nests of this ant in England (Donisthorpe, 1927 and 1938; under *erythromera*), Holland, Luxembourg (Kieffer, 1905; as *erythromera*), France and Czechoslovakia, and is probably closely bound to this milieu, as Donisthorpe writes (1938, p. 76: "The parasite is only to be found in the nests of *fuliginosus* (as are its hosts), and it is partly on friendly terms with the ants, occasionally tapping antennae with them.").

Distribution: Europe (Sweden, Britain, Holland, Luxembourg, France, Germany, Czechoslovakia, Yugoslavia).

Holotype (female): Řevnice near Praha, with *Lasius fuliginosus*, VII. 1952 (L. Masner leg.). Deposited in the National Museum, Prague, Dept. of Entomology, Cat. No. 25401.

Further material (allotype and paratypes; male and 15 females): Sweden: Skåne, Ö. Broby, VII. 1948, male-allotype, (T. Nyholm; Riksmus. Stockholm). — Britain: England, with *Lasius fuliginosus* (Donisthorpe; coll. Wasmann); Wellington College, 1906, from nest of *L. fuliginosus* (Donisthorpe; coll. Wasmann, Leiden, coll. British Museum and Natl. Mus. Prague); Windsor Forest, with *L. fuliginosus*, 18. IX. 1929 (H. Donisthorpe; coll. Brit. Mus.); Lavernock Glam., VII. 1931 (H. M. Hallet). — Holland: Valkenburg, Aalbuk, bei *L. fuliginosus*, 14. VI. 1911 (Wasmann). — Luxembourg: bei *L. fuliginosus*, VII, 1904, Ahn. (Wasmann; the specimen mentioned as *erythromera* by Kieffer, 1905). — France: Chartrettes, avec *L. fuliginosus*, 6. X. 1944 (Granger). — Germany: Halle a. d. Saale, Nr. 17996 (Erichson); one female without data. — Czechoslovakia: Řevnice near Praha, one paratype with the holotype, with *L. fuliginosus*, VII. 1952 (L. Masner); Praha-Stromovka (coll. Klapálek); Luka pod Medníkem near Praha (J. Roubal). — Yugoslavia: Krapina in Croatia, N of Zagreb (Coll. Mus. Budapest).

Spalangia erythromera Förster

Spalangia erythromera Förster, 1850, Verh. naturh. Ver. preuss. Rheinl., 7: 512—513; ♀.

Spalangia Umbellatarum Förster, 1850, ibidem, p. 513—515; ♀♂. — **N. syn.**

Spalangia spuria Förster, 1850, ibidem, p. 515—516; ♀. — **N. syn.**

The type material of *S. erythromera*, which as well as that of *umbellatarum* and *spuria* was kindly sent to me from the Naturhistorisches Museum in Vienna by Dr. M. Fischer, consists of two females pinned to a flat rectangular piece of pith labelled "♀. Or. Ex." in Förster's handwriting, below is a small green card and below again three labels, one reading "Aachen" and the others "Collect. G. Mayr" and "Sp. erythromera Förster Type", the two last are printed. I designate the female farthest removed from the pin as lectotype (the other syntype is the largest female

of the species I have ever seen, being with the head drooping 3.1 mm. in length). The lectotype lacks left hindwing, left mid leg apart from coxa, and distal two segments of hind left tarsus; head is longer than wide in the relation 28.5:24.

The syntypes of *S. umbellatarum* are represented by two pins with three males on two cubic blocks of pith. I selected and designated as lectotype the singly pinned male bearing an original label "*Spalangia Umbellatarum* m." in Förster's handwriting, and in addition the printed labels "Collect. G. Mayr" and "*Sp. umbellatarum* Förster Type" (the name here written by pen). The lectotype lacks left fore leg and left forewing.

S. spuria Först. I examined four syntypes-females, all pinned to one flat rectangular piece of pith. They are labelled "♀. Or. Ex." in Förster's

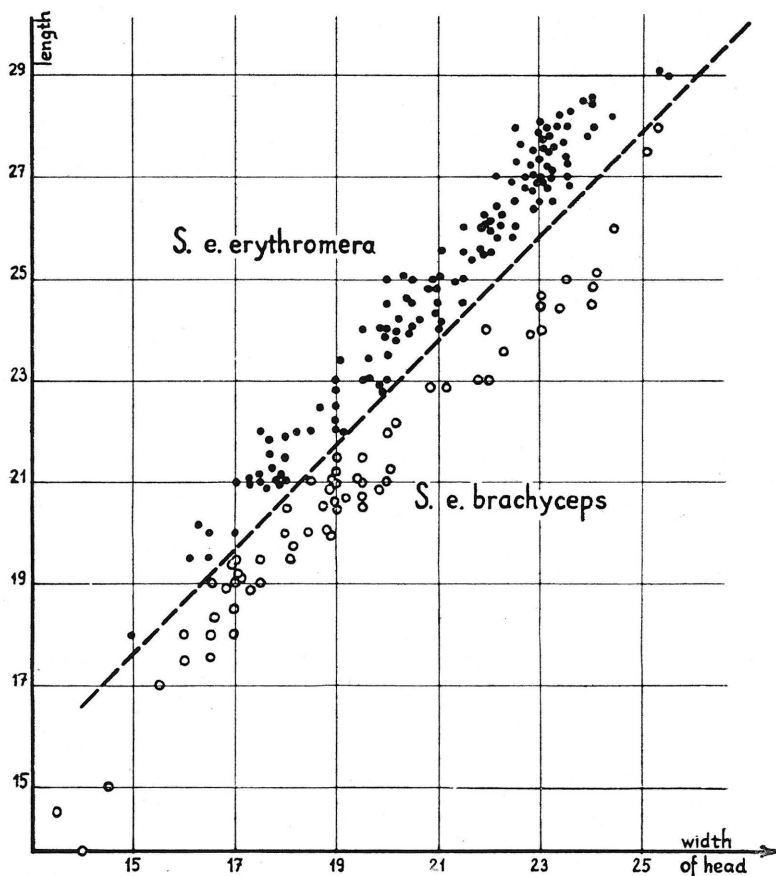


Table I. Scatter diagram, showing variation of head in females of *Spalangia erythromera* Först. Each point represents ratio between length (vertically on the diagram) and width of head (horizontally) of one specimen. The examined material splits into two groups that are separated by a broken line on the diagram: *Spalangia erythromera erythromera* Först. above and *S. erythromera brachycephs*, ssp. n. below.

handwriting (and "Collect. G. Mayr", "Sp. spuria Förster Type" as usual) and all fit well the original description. I selected the perfect female, largest of the four (2.6 mm. with head drooping), to the left near the pin, as the lectotype.

As explained more fully under *S. nigra* Latr., some authors understood the present *erythromera* under that name. For a long time I also have been identifying this species as *nigra* and consequently most of my previous determinations concern in reality *erythromera*.

Spalangia erythromera Först. belongs to species without cross-line on pronotum and (in Central European specimens) with pale basal segments of the tarsi. From all the other, similar European species, in particular from the most allied *S. crassicornis* it differs mainly by the characters given in the key above.

In the rich material (more than 250 specimens of both sexes) at my disposal, the species *erythromera* splits morphologically into two forms that I take as subspecies. All the above mentioned synonyms concern only the form referred to here as *S. erythromera erythromera* Först. This nominate form and *S. erythromera brachyceps*, n. ssp. (as I name the new subspecies) obviously share, at least for the greater part, the same geographical area of distribution. They are probably different ecological races, or host races, but no detailed evidence to support this is so far to hand. On the other hand they seem to belong to one species and it is only the scatter diagram (Table I.) evaluating the most striking difference between the two forms, which has persuaded me that the two forms may be readily segregated. The differences between them may be summarized as follows.

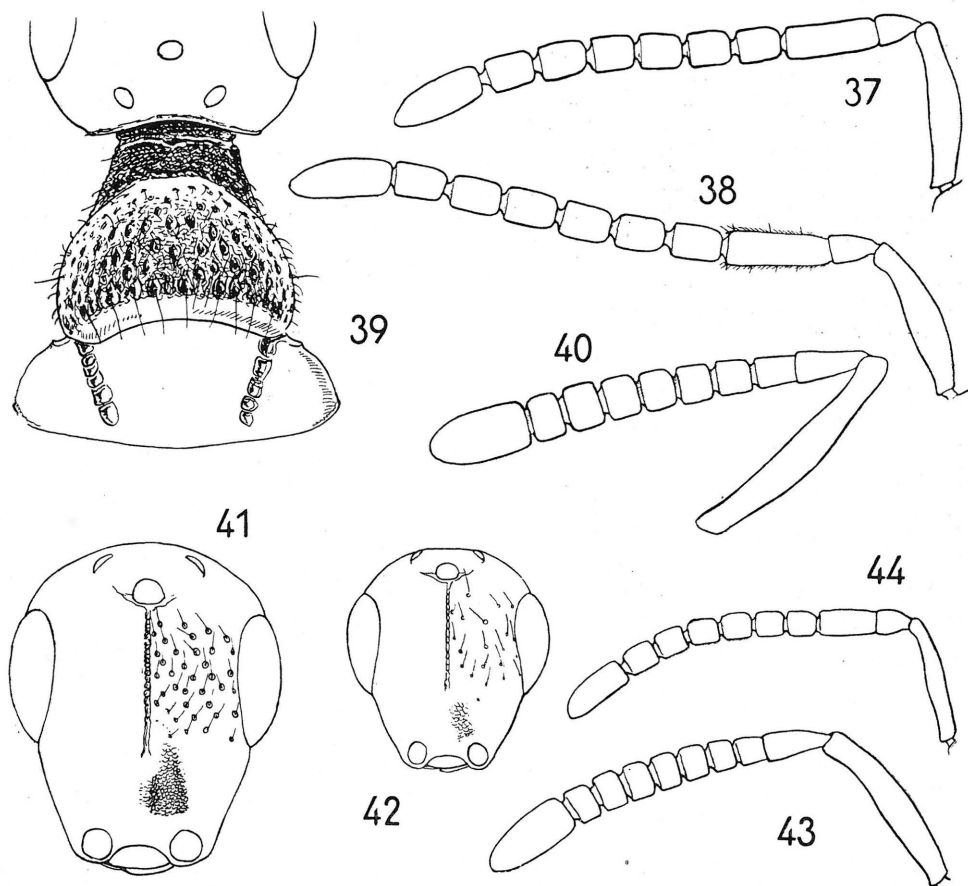
- 1 (2) Female: head clearly longer than broad (Fig. 41), usually about 27:23; genae moderately converging forwards; first funicle segment oblong; body larger, 1.7—3.2 mm. Male: funicle segments always clearly oblong; body size 1.9—2.7 mm.
S. erythromera erythromera
- 2 (1) Female: head hardly longer than broad (Fig. 42), usually about 21:19.5, more convex; genae strongly converging towards mouth; first funicle segment subquadrate (Fig. 43); body smaller, rarely exceeding 2.3 mm. (with head stretched). Male: funicle segments hardly longer than broad, subquadrate; body very small
S. erythromera brachyceps

S. erythromera erythromera Först.

Female. — Head oblong (about 27:23), sparsely punctate with interspaces several times as wide as punctures themselves (Fig. 41); eyes large, moderately prominent, distinctly hairy, about 1.4 times as long as gena; in profile head rather low, exactly twice as long as high, frons hardly vaulted, temple $\frac{1}{3}$ as broad as the small eye diameter; gena smooth, except anterior third which is dull, irregularly rugolose-punctulate, sulcus distinct; antennal socket very slightly elevated; scrobes rather shallow anteriorly and on bottom minutely granulate. Scapus rather slender, fully as long as 5 following segments combined, almost dull, granulate; pedicellus fully 2.5 times as long as wide at apex, equal in length to two following segments combined; funicle segments (Fig. 40) moderately increasing in width and decreasing in length, the first oblong, the second quadrate, the third to seventh gradually more transverse, the last 1.4 times to twice as broad as long; clava oval, relatively short and stout, about 1.7 to 1.9 times as long as wide, hardly as long as three preceding segments together; incisures between individual segments rather wide.

Pronotum collar transverse, subglobose, immargined, set with sparse punctures, these usually lengthened to rugose and dense in a cross-belt before hind margin

(Fig. 39), here in a shallow transverse impression (replacing the cross-line of some species) in front of the smooth hind margin; often an additional alutaceous sculpture perceptible here, on sides or even on disc; no longitudinal impression. Disc of mesoprescutum with impressed area of crowded rugose punctures, divided by a longitudinal crest or carina. Scutellum sublaterally with a few punctures in front of the distinct frenal cross-line; frenum taking up the caudal third or more, forming a belt about 1.5 times as broad as metanotum. Propodeum with double alveolate row strongly converging backward, in front being divided by a raised median carina; submedian areae smooth; nucha very short and low, more strongly declining than the disc, its hind margin archedly emarginate, mostly smooth, also the usual transverse rugose belt at its base reduced to some broad, longitudinal rugae; plicae indistinct; spiracular sulcus shallow, crenate; callus usually irregularly rugose to alveolate, lateral fimbriae rather dense; postero-lateral corner subrectangular, short. Mesopleura mostly smooth except the usual impressions and several longitudinal parallel carinae below wing base, bordered beneath by a blunt ridge between the flat sternal part and the impressed



Figs. 37—41. *Spalangia erythromera erythromera* Först.: Fig. 37. Antenna of a smaller male. Fig. 38. Antenna of a larger male. Fig. 39. Pronotum of a larger female with rugosity pronounced. Fig. 40. Female antenna. Fig. 41. Head in female. Figs. 42—44. *Spalangia erythromera brachycephs*, ssp. n.: Fig. 42. Head in female. Fig. 43. Female antenna. Fig. 44. Male antenna. [All figures same scale.]

pleural part. Forewing shortly hairy on disc, longest marginal ciliae about as long as stigmal vein; basal third of wing blade on upper surface with a streak of longer hairs under distal half of submarginal vein and similar, still longer hairs in one to three rows on cubital fold; base of the latter again bare; prestigma clearly separated by a pale break from marginal vein and hardly as long as the stigmal vein, which is knobbed and bent at apex in form of a goose-head; stigmal vein hardly shorter than the postmarginal.

Abdominal petiole rather stout, about 1.6 times as long as wide, feebly diverging backwards, longitudinal carinae rather irregular and often indistinct on sides, except the strong lateral ridge. Second gastral tergite with hind margin distinctly broadly emarginate, the third fully twice as long as the second at middle and delicately granulate-alutaceous. Ovipositor sheaths shortly exerted, pointed and bent.

Body black, usually without any metallic tint, rarely dark greenish or bluish on head and thorax; tarsi mostly pale testaceous at base. Length 1.7–3.2 mm.; at the average 2.5 mm.

Male. — Punctuation of head and thorax still sparser than in female. Head shorter, about as long as, or hardly longer than, broad, with eyes more prominent and larger, more than twice as long as gena. For antenna see Figs. 37 and 38. Scapus not reaching anterior ocellus, less slender, as long as 2.3 following segments combined; pedicellus rather shiny, about 1.6 times as long as broad, more than twice shorter than the long cylindrical first funicle segment, which is fully three times as long as broad; flagellum filiform, shortly but distinctly pubescent, longest hairs almost as long as half the width of segments (Fig. 38); funicle segments 2 to 7 subequal, distinctly oblong, about 1.5 times as long as wide; clava shorter than two preceding segments together, about 2.7 times as long as wide. Sculpture on pronotum more superficial, often completely obliterate, the rugose punctures in subcaudal transverse depression usually replaced by minute rugosity or alutaceous sculpture. Abdominal petiole about 2.5 times as long as wide; gastral tergites mostly quite smooth. Tarsi darker than in female, often only basitarsus more or less testaceous. Length 1.9–2.7 mm.

V a r i a t i o n of the nominate subspecies is considerable. Apart from the features mentioned in the description such as varying form of the funicle segments in female, the relative length of head shown in upper part of the scatter diagram, and the range of the body size, which in the largest specimens are nearly twice as long as in the smallest ones, there are also considerable differences in the sculpture. In nearly all larger females the pronotum is longitudinally rugose or rugose-punctate in a transverse band just in front of the polished hind margin (the sculptured belt being usually narrowed in the middle). In very small specimens, however, the punctuation may be obliterate or disappear completely, and is then, if ever, replaced by a fine alutaceous sculpture. In such samples often only a slight transverse depression on pronotum combined with paler tarsi and always distinct cross-line on scutellum, allow us to separate them from *S. fuscipes*. In the males, too, the cross-depression on pronotum is often quite vague. Another difficulty is caused by specimens from more severe conditions, e. g. from Northern Europe: their tarsi are often black instead of testaceous.

H o s t s of *S. erythromera erythromera* Först. are not known for certain. Before I knew how to segregate the subspecies *brachycephs* I had noted as hosts those given now there. In Munich, Germany, the nominate subspecies was taken in numbers on windows of a room where carcasses of various animals were prepared for conservation in the collections. In Czechoslovakia I often found it on windows of sties or near dung heaps

together with *S. nigripes*, *nigra* and (rarely) *nigroaenea*. Males often fly on flowering umbellifers. In Central Europe *S. erythromera* is one of the species most frequently met with when we sweep grassy vegetation.

Distribution (*erythromera erythromera*): Europe (Britain, Sweden, Germany, Belgium, France, Austria, Czechoslovakia, Hungary, Roumania, Bulgaria, Yugoslavia and Albania).

Material examined [of *erythromera erythromera*]. — Britain: Norwich, VIII. 1947 (Jones); Cambridge, 17. VII. 1934 (G. C. Varley); Hemel Hempstead, 20.—22. IV. 1957 (R. B. Benson). — Sweden: Skåne, Odensvik, 28. VII. 1947; Södermanland, Tockenön, 25. VI. and 20. VII. 1949; Närke, Adolfsberg, VII.—VIII. 1952, 1953, 1954, 1957; Närke, Latorp, 25. VIII. 1959; Närke, Örebro, 12. VII. 1950 (all. A. Janson); Vb., Hällnäs (Heqvist); Lolland, Toreby (O. Lundblad); Upl., Vallentuna (Heqvist); Sm., Nässjö, 27. IX. 1953 (A. Sundholm). — Belgium: Toillemont, 1934 (L. Decoux). — Germany: Aachen (Förster; syntypes of *erythromera*, *umbellatarum*, and *spuria*, and 1 ♀ identified by Förster as *nigra*); München, 10. VII. 1959 (Bachmaier); Lauvenburg, IX. 1959 (V. Berg); Insel Rügen: Baabe, VII. 1960 (Bouček); Halle a. d. Saale (Erichson); Dresden, 29. VI. 1857 (Reinhard). — Czechoslovakia: Bohemia, Kamenná near Sokolov, 20. VII. 1951 (Bouček); Dvory at Karlovy Vary, 1. VI. 1951 (Bouček); Krásný Studenec near Děčín, 10. IX. 1956 (Bouček); Deblík-Hill near Ústí nad Lab., 15. VI. 1957 (Bouček); Břežany, 3. VII. 1943 (Hoffer); Brníkov at Libochovice, 18. VI. 1943 (Hoffer); Česká Lípa, VI. 1917, (J. Sekera); Malá Skála near Turnov (Obenberger); Frýdštejn near Turnov, 26. VIII. 1960 (Hoffer); Velký Vřeštov, 13. VIII. 1959 (Bouček); Hradec Králové, VIII. 1916 (J. Sekera), 20. VI. 1943, VIII. 1947, 1956—1958 (Bouček); Piletice, 8. VI. 1953 (Bouček); Dobrošov near Náchod, VII. 1955 (Macek); Broumov, VII. 1917 (J. Sekera); Cholutice near Praha, 20. VII. 1941 (Macek); Nehvizdy, 31. VII. 1951 (Hoffer); Davle (Zeman); Stěchovice, VII. 1957 (L. Masner); Křivoklát, 3. VI. 1957 (Hoffer); Rožmitál in Brdy-Hills (Syrovátka); Blatná, IX. 1954 (L. Masner); Horní Sněžná in Šumava Mts., 5. VIII. 1946 (Hoffer); Bučina, 18. VIII. 1946 (Hoffer); Hůrka v Pošumaví, 21. VII. 1954 (Hofer); Čekanice near Tábor, 24. VIII. 1945 (Hoffer); Ratibořské Hory near Tábor, 14. VII. 1945 (Hoffer); Borkovice, 5. VIII. 1954 (Hoffer); České Velenice, 11. VI. 1946 (Hoffer); Moravia, Ubušín, 24. VIII. 1937 (Gregor sen.); Brno, 17. VII. 1942 (Šnoflák); Brno-Řečkovice, 5. VII. 1941 (Šnoflák); Dolní Věstonice, 5. IX. 1945 (Hoffer); Lednice-Nesyt, 10. IX. 1943 (Hoffer); Ježov, 21. VIII. 1942 (Hoffer); Strání, 14. VIII. 1941 (Hoffer); Kobylí, 5. IX. 1943 (Šustera); Slovakia, Banská Štiavnica, 30. VII. 1956 (Čapek); Počúvadlo near Ban. Štiavnica, 20. VII. 1959 (Bouček); Turna nad Bodvou, 6. VII. 1953 (Bouček); Ulič-Stionka, 18. VIII. 1957 (L. Masner). — Austria: Moenichkirchen, 29. VI. 1936 (Macek). — Hungary: Bethlen; Szigetszentmiklós; Ünökö; Rév. — Roumania: Alp. Kudsir, Pagyes, 800 m., 12. VIII. 1913 (Biró); Sebiseul V. — Bulgaria: Rila planina, 18. IX. 1928 (Biró). — Yugoslavia: Podgora near the Tara valley in Durmitor Mts., Montenegro, 30. VI. 1957 (Bouček). — Albania: Ipek, 24. VII. 1917 (Csiki Exped.). — France: Esbarres, C. d'Or, 27. VII. 1958 (J. Barbier).

S. erythromera brachycephs, ssp. n.

In the following description only those characters are mentioned in which *brachycephs* differs from the nominate subspecies.

Female. — Head (Fig. 42) only slightly longer than broad (about 21:19.5 on average), subtriangular, in profile rather thick (12:21), with frons considerably vaulted and eye short-oval (10:7; in ssp. *erythromera* 13:8.5); scrobes very shallow and not reaching level of eye centres, with bottom nearly smooth. Antennal scapus (Fig. 43) as long as six following segments together; pedicellus almost as long as three following segments; first funicle segment quadrate or nearly so, third to seventh increasingly trasverse, the seventh usually at least 1.5 times as broad as long; clava nearly to fully as long as three preceding segments combined. Pronotum often more vaulted than in the

nominate subspecies and a little shorter. Scutellum distinctly though slightly convex, frenum taking up caudal two-fifths. Microsculpture on gastral tergites indistinct. Body size 1.3—2.6 mm.

Male. — I attribute here only with a query four males of small size (1.4—1.6 mm.) with funicle segments 2—7 subquadrate (Fig. 44) and otherwise indistinguishable from the smaller males of the nominate subspecies.

Variation concerns mostly the same body parts as in *erythromera erythromera*, but the sculpture is generally even weaker (obviously in connection with the smaller body size), puncturation sparser and antennal segments are shorter.

Hosts: Muscidae: *Phorbia cinerea* Fall. in Germany; *Ph. platura* (Meig.) (= *cilicrura* Rond.) in Switzerland; *Pegomyia* sp. in Germany. In Bulgaria *S. erythromera brachyiceps* was found associated with horse droppings, in Czechoslovakia it is rather frequently swept from grassy undergrowth of deciduous forests during summer.

Distribution: Europe (Sweden, Germany, Switzerland, Czechoslovakia, Hungary, Bulgaria); ?Canada (Ontario, Saskatchewan) and ?U. S. A.

Holotype: Czechoslovakia, Deblík Hill S of Ústí nad Lab., 15. VI. 1957 (Bouček), one female of 2.0 mm. length; deposited in the Department of Entomology, National Museum, Prague, No. 25.405.

Further material examined (paratypes and allotype): Sweden: Upl., Harparbol Almunge, 26. V. 1944, 1. VI. 1950 and 14. V. 1951 (O. Lundblad); Vb. Hällnäs, 24. VIII. 1955 and 10. V. 1959 (K. J. Heqvist); Närke, Örebro, VI. 1938, 31. VII. 1942 and 21. VII. 1947 (A. Jansson); Närke, Adolfsberg, 1. IX. 1953 and 11. VIII. 1956 (A. Jansson); Hälsingland, Loos, 1948 (O. Sjöberg); Södermanland, Tockenön, 14. VIII. 1950 (A. Jansson). — Germany: Köln am Rhein and Aachen (Förster; coll. Mus. Wien, Berlin); Erlangen, 1. III. 1945, "aus *Pegomyia* spec. und *Helomyia cinerea* Fall." (Eisfelder); Halle a. d. Saale, No. 17172 (Erichson; Mus. Berlin); Dresden, Pilze (Reinhard). — Switzerland: Dieseldorf at Zurich, ex "*Hylemyia cilicrura*" 1948 (coll. Ferrière). — Czechoslovakia: Bohemia, Janov near Děčín, 18. VIII. 1955 (Bouček); Deblík Hill at Ústí nad Lab., 26. VII. 1956 (Bouček); Veltrusy near Praha, 10. IX. 1955 (Bouček); Praha-Suchbát, 1. VII. 1956 (Bouček); Praha-Prokop, 20. IX. (Zeman); Praha-Chuchle, 24. VI. 1955 (Bouček); Kamečná near Sokolov, 15. VII. 1951 (Bouček); Holovousy, 12. VII. 1953 (Hostounský); Velký Vřeštov, 7. VII. 1954 and 10. VIII. 1956 (Bouček); Mt. Klet near Český Krumlov, 10. VIII. 1946 (Hoffer); Dolní Kounice in Moravia, 6. VIII. 1939 (F. Gregor sen.); Pouzdřany, 5. IX. 1945 (Hoffer); Dolní Věstonice, 5. IX. 1945 (Hoffer); Slovakia, Štúrovo, 20. IX. 1947 (Hoffer); Banská Štiavnica, VIII. 1956 (Čapek); Počúvadlo near Banská Štiavnica, 20. VII. 1959 (Bouček); Brehovo near Michalany, 14. VIII. 1956 (Hoffer); Ulič, 12. VIII. 1957 (L. Masner). — Hungary: Szöd, 8. VIII. 1920 (Biró); Vencsellő, 29. VII. 1921 (Horváth); Budapest-Hüvösvölgy, 4. VII. 1929 (Biró). — Bulgaria: Rila planina, horse droppings, 6. IX. 1928 (Biró).

All the material mentioned are females. The four males come from Czechoslovakia: Bohemia, Trabice Hill at Ústí nad Lab., 28. VI. 1957 (Bouček); Štěchovice near Praha, VII. 1957 (L. Masner); Ratibořské Hory near Tábor, 14. VII. 1945 (A. Hoffer); Piletice near Hradec Králové, 22. VI. 1953, the allotype (Bouček leg.).

Only with hesitation I attribute to this subspecies also three specimens from Canada: Ottawa, Ont., 1 ♀, 17. VII. 1941 (O. Peck); Snowden, Saskatchewan, 1 ♀ and 1 ♂, 28. VII. 1944 (O. Peck). The females (bent) are 1.2 and 1.4 mm. in length, with tarsi testaceous, relation of length and width of head 16:15 and 17:16, respectively. I am unable to find any reliable character which would segregate them specifically. Another female belonging to the Riksmuseet in Stockholm bears the data U. S. A., Cown. Groton, 15. VI. 1948 (A. Jansson).

Spalangia subpunctata Förster

Spalangia subpunctata Förster, 1850, Verh. naturh. Ver. preuss. Rheinl., 7: 516—518; ♀
Spalangia leptogramma Förster, 1850, ibidem, 7: 511—512; ♀. — **N. syn.**
? *Spalangia haematobiae* Ashmead, 1894, Proc. ent. Soc. Wash., 3: 35, 37; ♀.

The type of *S. subpunctata* is a female labelled “♀ Or. Ex”, then it bears a small square green label, then: “Germania” and as usual in the Förster collection in the Vienna Museum “Collect. G. Mayr” and “Sp. subpunctata Förster Type”. Only the first label is written by Förster himself. I added a red one reading Lectotypus. The specimen lacks antennae, fore left leg beyond trochanter, left-hand wings and abdomen, and is pinned (scutellum and right pleurae bored through) to a long piece of pith. It fits well the original description. The minutely striated mesopleura (“mesopleuris subtilissime striatis” in the original description) may be seen clearly.

S. leptogramma is represented in the Vienna Museum by the type female pinned to a low quadrangular piece of pith and is labelled “♀. Or. Ex. Coeln” in Förster’s handwriting. In addition it bears a small square green label, then “Collect. G. Mayr”, “Sp. leptogramma Förster Type” and now my red lectotype label. It lacks only the antennae and I should have used the name *leptogramma* for the species if there were not some difficulties: Namely, Förster classified *leptogramma* in 1851 (p. 4) together with *fuscipes* Nees under “A. Die mittleren Glieder der Geissel bei dem ♀ breiter als lang”, whereas *subpunctata* as having those funicle segments “... so lang wie breit”. The original description reads, however (1850, p. 511): “... das 2—5te Glied von gleicher Länge und ungefähr eben so lang als breit, oder die letzte Dimension wenigstens nicht merklich überwiegend”. The defective lectotype of *leptogramma* cannot be examined in this respect properly, but according to the other characters it belongs rather here than to *fuscipes*, which has shorter antennae in the female.

Oddly enough, also the lectotype of *leptogramma*, as well as that of *subpunctata* possesses the character of delicately striated mesopleurae, though this is rather uncommon in the other specimens I have seen.

Spalangia subpunctata is relatively less common than most European species of the genus. It is very near to the American *S. haematobiae*, from which it differs mainly by even greater size of body, mainly coarser puncturation, still more slender antennae, at least in female, by the more often complete cross-line on scutellum, and dark tarsi, as emphasized in the key above. I keep *subpunctata* and *haematobiae* as different species, but when additional, much richer material of the two forms is examined, the segregation of them may become very difficult and may prove not to be justified, as is suggested by the existence of some transitional specimens. It is possible that the whole complex *subpunctata-leptogramma*, *haematobiae* represents only one extremely variable species, but I hesitate to drop *haematobiae* until there is confirmation of the synonymy by rearing.

Female. — Head with sparsely scattered small piliferous punctures (when larger then more or less umbilicate), in dorsal view slightly oblong (28:23 in lectotype of *subpunctata*, 24:20 in lectotype of *leptogramma*), genae converging, hardly shorter than eye, this mostly feebly prominent; in profile head about twice as long as thick, temple

twice narrower than the eye and with piliferous punctures very small; genal sulcus distinct, gena rugose at mouth and the hardly raised antennal socket. Antenna very slender; scapus slightly shiny, granulate-rugulose on outer side, often nearly smooth on inner side, as long as five following segments combined; pedicellus almost three times as long as broad, equal in length to two following segments; funicle slightly compressed from the sides, its first segment in side view about 1.4 times, in dorsal view mostly twice, as long as broad; the second slightly oblong, the following ones subquadrate or also slightly oblong; clava three to four times as long as broad.

Pronotum semiglobose, immargined, equally but moderately arched, without any subcaudal cross-line or cross-impression, its surface polished or finely alutaceous and sparsely set by piliferous punctures which may be broad and deep, especially in larger specimens. Mesoprescutum crowdedly punctured on discal, mostly reversed-triangular area which is sometimes deeply impressed and subdivided by an irregular median carina. Scutellum very feebly convex, almost flat; frenum mostly separated by a distinct though shallow crenulate cross-line, taking up in length the distal quarter or hardly more, slightly longer than metanotum. Propodeum with median carina distinct mostly only in anterior $\frac{2}{5}$, alveolate row often simple in distal half; nucha very short, smooth; spiracular groove shallow, crenate; lateral fimbriae not very dense; postero-lateral corners short, subrectangular. Mesopleura (except in impressions) smooth or delicately striate-alutaceous to minutely striate. Forewing rather slender (29:81), bare on upper surface in basal quarter, with several hairs under prestigma; stigmal vein bent with distinct uncus, as long as postmarginal vein but shorter than prestigma; longest marginal ciliation slightly longer than stigmal vein.

Abdominal petiole about 1.5 times as long as wide, its sides subparallel, dorsally with about seven longitudinal carinae, out of them one median; submedian carinae mostly converging backwards. Gaster delicately reticulate-alutaceous, in some specimens quite vaguely. Ovipositor sheaths subexserted.

Body black, in some specimens with slight metallic tint, greenish or bluish, on thoracic dorsum; tarsi black; wings subhyaline or slightly yellowish.

Length (measured with head stretched forward) mostly 2.3–3.1 mm., in extreme cases 1.8 mm. (one specimen from Uzbekistan) or 3.7 mm. (two females from Morocco).

Male. — Head as long as wide, puncturation still sparser and very fine; antennal scrobes very shallow and short. Scapus fully as long as three following segments combined; pedicellus about 1.5 times as long as broad; first funicle segment 1.5 times as long as pedicellus and 2.5 times as long as broad; the following segments 2 to 7 usually 1.5 times as long as broad; clava equals preclava plus $\frac{2}{3}$ the preceding sixth funicle segment. Pronotum mostly polished, with piliferous punctures fine and very sparse. Cross-line on scutellum often interrupted. Postero-lateral corners of propodeum blunted. Abdominal petiole hardly longer than in female, longitudinal carinae usually more pronounced. Metallic tint of body mostly distinct, greenish. Length (head stretched) 2.1–2.7 mm.

Variation in this species is very wide. Head in some females is oblong in relation 28 : 23, with eyes hardly protruding from the outline, in two *Durmitor* females the proportions are, however, only 26 : 24 as eyes are distinctly protruding (in this case I cannot find any character that would persuade me that these Yugoslavian specimens belong to different species or subspecies, as I did in *S. erythromera*). The above description of the antennae fits well most specimens of about 2.7 mm. in length. In smaller ones, as in the mentioned female of 1.8 mm. reared with another of 2.6 mm. from *Physiphora demandata* in Uzbekistan, all funicle segments may be quadrate, including the first; in the larger female of the two the first funicle segment is slightly longer than broad, abdominal petiole with median carina raised and gastral tergites polished; the accompanying males belong invariably to *subpunctata*. The varying puncturation has already been mentioned. In the large females from Czechoslovakia (Somotor; 3.3 mm.) and from Morocco (3.6 and 3.7 mm.) it is very coarse and

rather dense sublaterally on pronotum. The punctures on the disc of mesoprescutum are liable to form a vague transverse punctured belt anteriorly. The fine striation of the mesopleurae is often indistinct or completely effaced, at least in most places (obviously the same affects the North American *haematobiae*). I believe that it has no greater taxonomic value than e.g. the alutaceous sculpture visible on pronotum in some specimens. In the males variability affects mainly the size of body, the relative length of the funicle segments and the sculpture. In a few smaller specimens it is difficult to draw a firm line between those attributed to *subpunctata* and those identified as *fuscipes*.

Hosts: Syrphidae: *Syrirta pipiens* L. in Caucasus (European U. S. S. R.). — Ulidiidae: *Physiphora demandata* F. in Uzbekistan. In Czechoslovakia most specimens were found on pastures associated with sheep and cattle droppings.

Distribution: Europe (Sweden, Britain, France, Germany, Poland, Czechoslovakia, Hungary, Yugoslavia, Bulgaria, South of European U. S. S. R.); Central Asia (U. S. S. R.-Uzbekistan); North Africa (Morocco).

Material examined. — Sweden: Oskarhamn, Virkvarn, 16. VI. 1961 (Heqvist); Småland, Baskemölla, 20. VII. 1951 (Heqvist); Närke, Adolfsberg, 19. VII. 1954 (A. Jansson); Närke, Örebro, Ö. Mark, 21. and 24. VIII. 1951 (Jansson). — Britain: Cambridge, 16. IV. 1934 (G. C. Varley). — France: Agay, Var, V. 1927 (Obenberger). — Germany: Aachen, type of *subpunctata* (Förster); Köln am Rhein, type of *leptogramma* (Förster); München, VII. 1959 (F. Bachmaier). — Poland: Kielce (Pongrácz; Mus. Budapest). — Czechoslovakia: Bohemia, Karlovy Vary-Dvory, 23. IV. 1951 (Bouček); Doksany, 15. VII. 1943 (Hoffer); Kytín in Brdy-Mts., VII. 1959 (J. Macek); Praha-Chuchle, 11. VII. 1955 (Bouček); Lysá nad Lab., 13. VIII. 1942 (Hoffer); Slovakia, Piliš Hill near Slovenské Nové Mesto, paddock, 13. IX. 1950 (Hoffer); Somotor, 28. VI. 1949, 6. VII. and 16. VIII. 1950 (Hoffer), 24. VI. 1952 (Kocourek); Kevežď, 15. IX. 1950 (Hoffer). — Hungary: Duka-Csöröghegy; Vác-Tudósdomb. — Bulgaria: Rila planina, 18. IX. 1928 (Biró; Mus. Budapest). — Yugoslavia: Ruma NE of Belgrade (Hensch; Mus. Budapest); Podgora in Durmitor Mts., 26.—30. VI. 1958 (Bouček). — South of the European U. S. S. R.: Caucasus, Stavropol, ex *Syrirta pipiens*, VIII.—IX. 1936 (Tshebotaevitsh). — Uzbekistan: Termez, ex *Physiphora demandata*, 7. V. 1957 (Sytchevskaya). — Morocco: Fès, 29.—30. III. 1932 (R. Meyer); Tanger, V. 1896 (Mus. Genève).

***Spalangia haematobiae* Ashmead**

Spalangia haematobiae Ashmead, 1894, Proc. ent. Soc. Wash., **3**: 35, 37, ♀.

?*Spalangia impuncta* Howard, 1896, Journ. Linn. Soc. Lond. Zool. **26**: 140—141; ♀.

My interpretation of this species is based on one female compared with the type and identified as *haematobiae* by C. F. W. Muesebeck. It comes from Uvalde, Texas, where it was reared by A. W. Lindquist (1936, p. 1154, as "*drosophilae*"?). Several additional specimens were sent to me for examination by Dr. O. Peck from Canada. They do not allow, however, a sufficient examination of the variability range of *haematobiae* and neither am I quite sure about the validity of this form as a species, nor do I feel justified in sinking it as a synonym of *subpunctata*. All the differences I could find in examining those specimens are listed in the key above and I can hardly add anything important to it. Therefore I also do not give a description of *S. haematobiae* Ashm.

For *S. impuncta* How. see below, p. 000.

Host: Muscidae; *Lyperosia* (= *Siphona*, *Haematobia*) *irritans* (L.) in the U. S. A.

Distribution: North America (U. S. A.: New Jersey, Virginia, Texas; Canada: Ontario, Alberta).

Material examined. — U. S. A.: Uvalde, Tex., 29. VI. 1932 (A. W. Lindquist). — Canada: Merivale, Ont., swept from oats, 18. VI. 1945 (O. Peck); Macleod, Alta., ex *Siphona irritans*, VI. 1950 (W. A. Nelson).

***Spalangia fuscipes* Nees**

Spalangia fuscipes Nees, 1834, Hym. Ichneum. affin. Monogr., 2: 270; ♂♀.

There is a general opinion that all the Nees types were lost, partly already before the second world war, and the rest during it. So appears the information from Germany, where they were deposited first and for long in Bonn, but at last evacuated to the Castle of Poppelsdorf, where they were completely destroyed in the second world war. According to Dr. M. de V. Graham's kind information there is, however, a number of specimens coming from the original Nees collection, and sketches of some others, in the Westwood collection in Oxford, but *S. fuscipes* is not present. On the other hand, in the Förster collection in the Vienna Museum there are some specimens that presumably came from the Neesian collection, or, as it is believed, which most probably had been compared with the original material by Förster in early days of his studies round 1840. Among the latter material in Vienna there is a female designated "♀. Or. Ex." in Förster's handwriting and bearing in addition a small square green label, then "Aachen" and "Sp. fuscipes N. det. Förster". The label "Aachen" suggests a later origin, so it cannot have belonged to the Nees original material, though more than once such specimens have been taken for types of some Nees' species. In absence of the types I designate the Förster specimen as plesiotype, and it might become neotype later when the non-existence of the original type material is confirmed. It fits well the original description, as well as a male similarly labelled in the Förster collection (without only the "Aachen" label).

S. fuscipes Nees belongs to a group of species without any cross-line on the pronotum and possesses mostly no distinct cross-line on the scutellum. By the latter character, as well as by the form of the pronotum and by dark tarsi, *S. fuscipes* is allied to the larger *S. subpunctata* (and *haematobiae*) and, on the other hand, to the smaller North American *S. drosophilae*. The latter species, judging from what is known about its host-relations, may be the counterpart of *fuscipes* in the New World. Although certainly very near to each other, these two species may be easily separated (see the key). There are, however, often difficulties with segregation of smaller specimens of *subpunctata*, particularly of males, from larger specimens of *fuscipes*. The differences mentioned in the key are often less striking and the characters less reliable.

Female. — Head smooth with scattered piliferous punctures and moderately long hairs, oblong in dorsal view (Fig. 50; about 20:17), with frons moderately vaulted;

scrobes very shallow, granulated on bottom, not extending above level of anterior quarter of eyes; in profile head twice as long as thick, temple one third the width of eye and with fine occipital ridge; gena two-third as long as eye, sulcus distinct; antennal socket hardly raised. Antenna rather short (Fig. 51); scapus slightly bent, shiny, rugulose, distinctly thickened in middle and at distal end, almost as long (measured always without radícula) as six following segments combined; pedicellus fully as long as two following segments together; first funicle segment subquadrate, the second slightly transverse and usually slightly shorter than the third; all the following segments transverse, distal ones 1.5 times to twice as wide as long, incisures between them rather narrow; clava as long as three preceding segments combined, hardly broader.

Pronotum almost bell-shaped, relatively long, without any cross-line and im-margined; its surface smooth or finely reticulate-alutaceous (Fig. 52) and with shallow rather wide but not dense, piliferous punctures. Mesoprescutum irregularly rugose-punctured on disc, or more or less alutaceous with some irregular, coarse and deep punctures in the middle. Scutellum (Fig. 52) almost flat and glabrous, frenal cross-line mostly indicated laterally, but very vague or (mostly) broadly interrupted in the middle. Propodeum about as in *subpunctata*, but all sculpture weaker and therefore submedian smooth areae larger; nucha smooth; lateral fimbriae sparse; postero-lateral corners subrectangular. Mesopleurae often alutaceous. Forewing usually sparsely hairy on cubital fold and below distal third of submarginal vein; costal cell nearly twice as long as marginal vein (21:11), postmarginal vein shorter than the stigmal; with smaller body size forewing narrower (53:18) and marginal ciliation somewhat longer than in *subpunctata* (but hardly longer than stigmal vein).

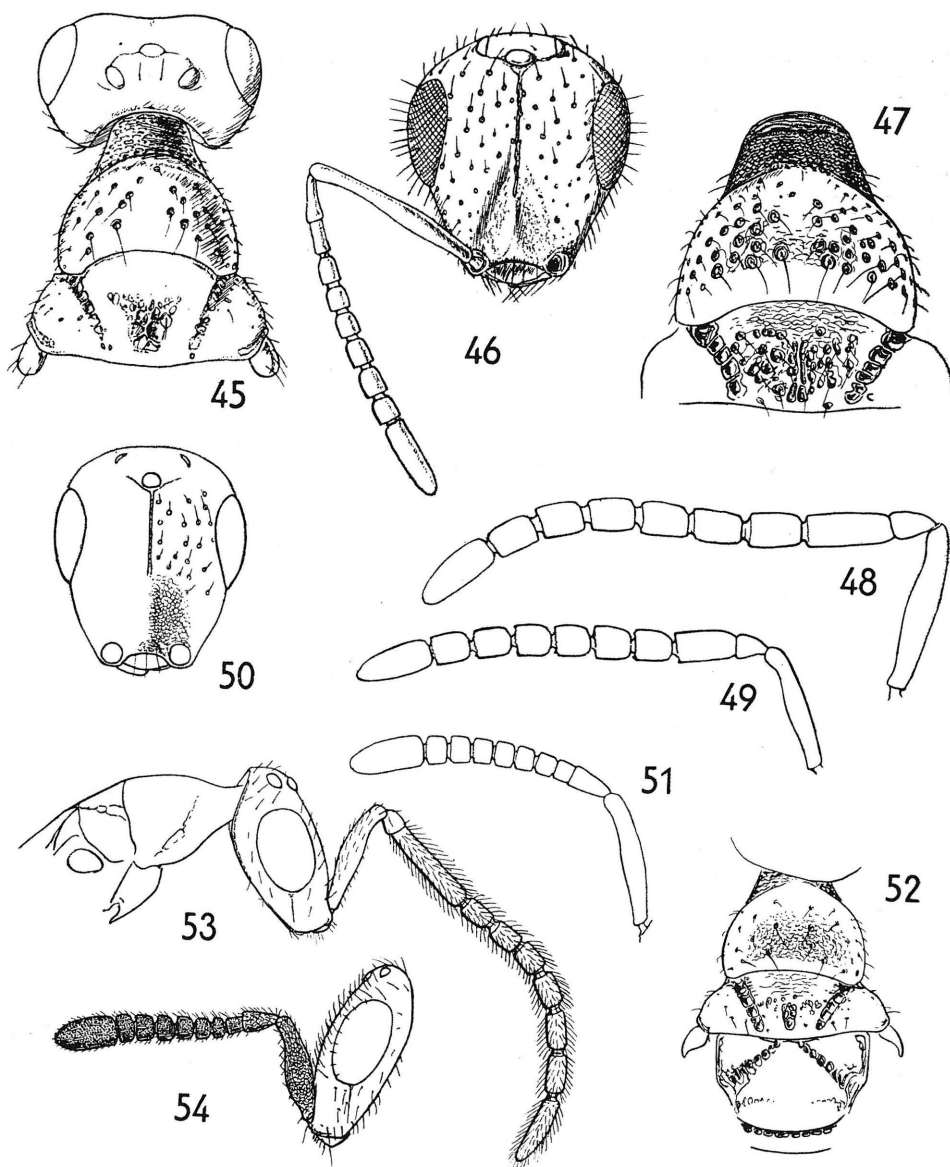
Abdominal petiole about 1.4 times as long as wide, longitudinal carinae usually weak, though more or less distinct in rough granulation. Second gastral tergite nearly twice shorter than the third (at median line), both distinctly alutaceous-reticulate, hind margin of the second tergite distinctly broadly emarginate.

Body black, only rarely with a faint, mostly bluish, metallic tint; tarsi black; wings subhyaline to hardly infumate (owing to the dark pubescence). Length 1.5–2 mm. (measured always with head stretched forward; the plesiotype would be then hardly 1.6 mm.).

Male. — Similar to female but head shorter, usually about as long as broad, with eyes relatively large and protruding. Antenna (Fig. 49) with pedicellus fully half as long as first funicle segment; this mostly twice as long as wide and as well as all the following subquadrate segments rather thick; clava as long as two preceding segments together; flagellum with extremely short pubescence. Punctures and other sculpture weaker than in female, head and thorax often faintly greenish. Length (head stretched!) 1.3–1.8 mm.

Variation concerns mainly the body size, relative length of antennal segments and sculpture. In males there are difficulties with some larger specimens as to whether they belong properly here or to *subpunctata*. The size of body and relative length of the funicle segments does not provide sufficiently reliable distinguishing characters in some individual cases, but no better ones could be found.

Hosts: Chloropidae: *Oscinella frit* (L.) in the European U. S. S. R., Bulgaria and most probably in Germany, if Riggert's record (1931: *Spalangia ?nigra* Latr.) virtually concerns this species. Although the determination was earlier very uncertain, at least Nikolskaya's record of 1937 (p. 17) of *O. frit* does affect undoubtedly *S. fuscipes*. In Czechoslovakia most specimens were swept from grassy vegetation. The record of (*Lasioptera* =) *Thomasiella eryngii* (Perris) as host so often cited in literature and coming from Giraud (1877, in Laboulbène, Ann. Soc. ent. Fr. s. 5, 7: 422; here also: "insectes du Bolet" as hosts!), is probably based upon misidentification.



Figs. 45—48. *Spalangia subpunctata* Först.: Fig. 45. Head, pronotum and mesoscutum in female. Fig. 46. Female head with antenna. Fig. 47. Pronotum and mesoprescutum in female of 3.6 mm. in length (from Maroc). Fig. 48. Male antenna. Figs. 49—52. *Spalangia fuscipes* Nees: Fig. 49. Male antenna. Fig. 50. Head in female. Fig. 51. Female antenna. Fig. 52. Pronotum and mesonotum in female. Figs. 53—54. *Spalangia drosophilae* Ashm.: Fig. 53. Anterior part of body of male, with antenna. Fig. 54. Female head with antenna, in side view. [Figs. 47—54 designed at same scale.]

Distribution: Europe (Sweden, Germany, France, Czechoslovakia, Austria, Hungary, European U. S. S. R.-Russia, Ukrain. S. S. R., Moldav. S. S. R.; Roumania, Bulgaria); Asia Minor (Turkey); North Africa (Algeria).—The species has not been recorded for certain from outside the West-Palaearctis, but a very similar form was seen from Brazil (Mannaos, 1930, Molnár leg.) and East Africa (Uganda, Arusha, 1905, Katona leg.; with the preceding in the Budapest Museum), and also Masi's *Spalangia fallax* from the Seychelles and the West-Indian *S. impuncta* How. must be most closely allied (types seen additionally; *fallax* Masi is certainly a different, good species, and probably also *impuncta* How. which may be, however, the same as *haematobiae* Ashm.). As the ascertained host is known over temperate Eurasia and North America and *S. fuscipes* surely is not bound to one host only, the actual geographical distribution area of *fuscipes* may be much wider than it is known today.

Material examined. — Sweden: Närke, Adolfsberg, IX. 1948, 10. VI. 1952 and 27. V. 1955 (Jansson); Småland, Bolmstad, IX. 1954 (Ringdahl); Bl. Sjöarp, 23. V. 1957 (Heqvist); Gotska Sandön, 28. VI. 1953 (Heqvist). — Germany: Aachen, the plesio-type (Förster); Dresden (Reinhard). — Czechoslovakia: Bohemia, Trabice-Hill S of Ústí nad Lab., 28. VI. 1957 (Bouček); Brník at Libochovice, 18. VIII. 1943 (Hoffer); valley between Noutonice and Kováry NW of Prague, 6. VI. 1953 (Bouček); Choteč near Prague, 28. IV. 1955 (Bouček) and 30. IV. 1955 (Diribek); Radotín, 24. III. 1953 (Bouček); Praha-Suchbát, 18. VII. 1955 and 1. VII. 1956 (Bouček); Praha-Podhoř, 7. VII. 1944 and 24. V. 1953 (Hoffer); Řeporyje, 7. VI. 1950 (Hoffer); Vrané nad Vltavou, 4. V. 1930 (Macek); Lysá nad Lab., 8. VI. 1950 (Hoffer); Hradec Králové, IV. 1945 and 18. VII. 1955 (Bouček); Týniště nad Orli, 10. VIII. 1959 (Bouček); Vrchoviny, 12. VI. 1937, and Dobrošov near Náchod, VII. 1956 (Macek); Moravia, Mikulov, 4. VII. 1952 (Hoffer); Slovakia, Vieska nad Žitavou, 1. VII. 1952 (Bouček); Štúrovo, at Danube, 1. VII. 1947 (Hoffer); Kamenica nad Hron., 11. V. 1960 (Bouček); Banská Štiavnica, VI. 1952 (Bouček); Rimavská Sobota, 12. VI. 1908 (Szabó); Košice, 14. and 31. V. 1952 (Kocourek); Slovenské Nové Mesto, Piliš-Hill, 25. IV. 1952 (Bouček) and 31. V. 1952 (Hoffer); Somotor, 24. VI. 1952 (Kocourek); Ladmovce-Baba, 23. and 27. VI. 1952 (Kocourek). — Austria: Siegenfeld, 20. VI. 1935 (Macek). — Hungary: Budapest; Etyek; Maria-besnyő; Piliscsaba; Püspökladány; Szöd; Vác-Todósdomb. — Roumania: Tasnad, 8. VII. 1928 (Biró); Sebiseul V. — Bulgaria: Kneja, pupa of frit fly, 21. V. 1960 (Z. Samfirov); Küleftse, 24. VII. 1908 (Biró). — Moldavian S. S. R.: Kotovskoe, 29. VI. 1960 (Talitzki); Kishinev, 25. V. 1960 (Talitzki). — Ukrainian S. S. R.: Odessa environments, VI. 1957 (Diabola). — Turkey: Ankara, 24. V. 1925 (Biró). — Algeria: Oran, 28. V. 1958 (J. Barbier); Cap Falcon at Oran, 11. X. 1958 (J. Barbier).

***Spalangia drosophilae* Ashmead**

Spalangia drosophilae Ashmead, 1887, Trans. Amer. ent. Soc., **14**: 199; ♀.

My interpretation of this species is based on specimens from Dr. Simmonds' studies in Canada, obtained through exchange with the British Museum, as well as on some others that were received through exchange between the U. S. National Museum and the Prague National Museum. The latter specimens had been identified by the late A. B. Gahan (and so were the original Simmonds specimens).

So far *S. drosophilae* is known only in North and Central America and has not been found in Europe, where, as expressed above, it seems to be represented by its counterpart, the allied *S. fuscipes* Nees. From the latter *S. drosophilae* is easily distinguished by the still smaller size of the

body, which is also much more flattened, by the still shorter antennae in female and the unusually slender and long, hairy antennae in male, with very long first funicle segment, etc.

Female. — Head smooth, with scattered fine piliferous punctures except on foremost part of the very shallow and reduced scrobes, the bottom of which is delicately granulated; in outline it is oblong (18:15), flat, with genae feebly roundedly converging; eye not prominent, nearly twice as long as broad and longer than gena (8:6.5). Head in side view (Fig. 54) very low, nearly three times as long as thick (19:7), temple width about four times smaller than the shortest eye diameter; antennal socket not distinctly elevated. Scapus mat, reticulately granulated, very short and not slender, as long as distance between eyes on frons and fully as long as following five segments combined. Pedicellus longer than first plus second funicle segment; first funicle segment scarcely longer than wide, the second small, transverse (Fig. 54; often nearly twice as broad as long) and distinctly shorter than the third; all following funicle segments transverse; clava as long as three preceding segments together.

Pronotum without subcaudal cross-line, collar immargined, slightly convex and very low, not fully twice as broad as long (11:7), with scattered broad and shallow punctures, except at median line; disc mostly delicately alutaceous; collum separated by distinct, arched cross-groove. Mesoprescutum on disc with vague irregular punctures, liable to extend along median line and sometimes anteriorly into a cross-strip (behind the smooth area covered by pronotum when body stretched). Scutellum flat and mostly completely smooth, sublaterally sometimes with traces of the effaced frenal cross-line. Propodeum horizontal, all usual sculptures shallower and weaker than in other species; median carina widened into a lanceolate smooth area between narrow, finely crenulate grooves, these joining into one median groove in posterior third; plicae indistinct; spiracular sulci narrow; lateral fimbriae sparse; postero-lateral corners blunted. Mesopleura mostly distinctly striated. Wings narrow; forewing with marginal ciliation fully twice as long as stigmal vein; the latter rather abruptly bent and slightly longer than postmarginal vein; subcostal cell twice as long as marginal vein.

Abdominal petiole about 1.3 times as long as broad, longitudinally rugulose-punctured, with two vague submedian carinae converging backward. Second and third gastral segments with an indicated alutaceous granulation, both subequal in length, hind margin of the second hardly emarginate.

Body black; tarsi proximally often more or less pale (perhaps caused by the material used for killing the insect). Length (while head stretched forward, or head length plus thorax from anterior margin of collar to ovipositor tip), 1.4–1.7 mm. (Simmonds, 1952, p. 535, gives 1.5–2.8 mm. for the pupa, not indicating the sex).

Male. — As in all *Spalangia* species head is shorter in male than in female, usually fully as broad as long (16:15). Antenna (Fig. 53) very slender, filiform, flagellum (antenna less scapus) nearly as long as stretched head plus thorax (40:42), densely hairy, hairs almost as long as width of the segment in question; scapus hardly as long as the globular pedicellus plus first funicle segment, which is nearly five times as long as the pedicellus and about six times as long as broad; the following funicle segments slightly increasing in length, the second funicle segment twice, the seventh almost three times as long as wide; clava shorter than preceding two segments combined (as 7:8). Abdominal petiole about twice as long as broad. Length 1.3–1.6 mm.

Variability does not seem very considerable in this species, though the cited range of body length in pupae ascertained by Simmonds would suggest some. I have not seen such different individuals, however.

Hosts. Nearly any living "small pupa enclosed in an outer chitinous wall, with a space between the two" is suitable (Simmonds, 1953, p. 531). In natural conditions as main hosts were found [Drosophilidae:] *Drosophila melanogaster* Meig. in the U. S. A. and [Chloropidae:] *Oscinella frit* (L.); less frequently still some other Chloropids, viz. *Oscinella car-*

bonaria (Loew), *O. minor* (Adams), *O. soror* Macq. and *Meromyza americana* Fitch; all of them ascertained by Simmonds in Canada. In laboratory conditions also *Musca domestica* L. (exceptionally; see Simmonds, 1944, 1953) and an unidentified large Chloropidae sp. (readily) were attacked by *S. drosophilae* and the development successfully achieved. In field conditions *S. drosophilae* attacks extremely rarely, only in lack of suitable dipterous puparia, also some primary parasites of *Oscinella frit*, e. g. the Cynipid *Hexacola* sp. and the Diapriid *Loxotropa* sp. and becomes thus hyperparasitic. Similarly Lindquist, 1936, gives as hosts of *S. drosophilae* in Uvalde, Texas (I have seen also *S. haematobiae* of this origin!), the Braconid *Alysia ridibunda* Say and the Cynipid *Eucoila rufocincta* (Kieff.), while usual hosts were "small dipterous pupae of dung-infesting diptera", also *Lyperosia irritans* (L.). In Trinidad *S. drosophilae* was found hyperparasitic on *Diatraea saccharalis* (F.) through the Tachinid *Paratheresia claripalpis* (Wulp). Another record of a lepidopterous host, of *Recurvaria milleri* Busck from California may be of a similar nature.

Life-history, egg, larval instars, prepupa and pupa of *S. drosophilae*, diapause of the full-fed larva and behaviour of the adult, including host finding and host selection, as well as inter-relationship of this and other parasites of *Oscinella frit*, were thoroughly studied and described by Simmonds (mainly 1946, 1952, 1953a, 1953b, 1954) in Canada, with the main goal to evaluate the role of *S. drosophilae* and to introduce it, eventually, as a controlling agent against the mentioned pest in England.

Distribution: North America (Canada: Ontario; Eastern U. S. A. to Illinois, Texas and California) and Central America (Trinidad, B. W. I.).

Material examined. — Canada: Ottawa, Ont., "swept from Buckwheat", 15. VII. 1951 (O. Peck); Belleville, Ont., ex puparium *Oscinella frit*, VII. and VIII. 1942 (F. J. Simmonds), "stock on *Drosophila*, original parents from *Oscinella frit*", VIII.—IX. 1946 (Simmonds). — U. S. A.: Uvalde, Texas, 30. VIII. 1933. (A. W. Lindquist); Lake Tenaya, Calif., ex *Recurvaria milleri*, 22. VII. 1949 (Dom. Par. Lab.).

II. African and Oriental species

The knowledge of the African fauna of the genus *Spalangia* is at its very beginning. Very few species have been hitherto described from this continent: *S. afra* Silvestri (1913) from Nigeria, *S. fallax* Masi (1917) from the Seychelles Islands, *S. melanogastra* Masi (1940) from Somaliland, then in 1951 three species were described by Risbec from Senegal, only one of them, however (*atherigonae*), does belong to the genus *Spalangia* and is a synonym of *cameroni* Perkins (1910), originally known only from the Hawaiian Islands. Dr. Risbec added in 1952 another species, *S. seyrigi* from Madagascar.

As may be seen here, the African (with the few Oriental) species of the genus are rather numerous. On the one hand they include most of the species known from elsewhere as parasites of synanthropic flies, on the other hand there are some additional species confined to the tropics, or even geographically only to Africa.

The following key is intended to cover all species known from this continent (not only the Ethiopian Region), as well as some further species found in nearby contries, such as the Near East or Madeira, Canaries, Madagascar, Seychelles and Mauritius, plus those known from South-East Asia. The two Regions evidently share many common or similar species of the genus.

Tentative key to African and Oriental species

- 1 Pronotum with distinct, isolated cross-line of dense punctures just before hind margin 2
- Pronotum without distinct and isolated cross-line 8
- 2 Pronotal collar anteriorly step-like and margined by distinct ridge (best seen with light falling from behind), its disc more or less smooth, lateral parts umbilicately punctured; cosmopolitan species **nigroaenea** Curt. (see p. 448)
- Pronotal collar anteriorly rounded or very low and then with some transverse rugae; sculpture of disc varied 3
- 3 Mesoprescutum with a distinct cross-line (similar to those on pronotum and scutellum; Fig. 69) and a round fovea behind it on disc; East Africa, Malaya **simplex** Perkins
- Mesoprescutum with more or less irregular punctures or rugosity on disc, but without any distinct cross-line 4
- 4 Pronotal collar on whole surface densely umbilicately punctured, punctures crowded in a cross-belt near hind margin 14
- Collar very sparsely punctured or more or less smooth on disc before subcaudal cross-line, which is thus isolated; punctures sublaterally sparse or rugose-crowded 5
- 5 Pronotal collar (Fig. 30) semiglobose, polished, but almost regularly beset with large piliferous punctures (sparser at median line); distal funicle segments in female slightly transverse, in male subquadrate; cosmopolitan **endius** Walk.
- Collar less arched, either crowdedly rugose on sides or more weakly sculptured and with some transverse rugae anteriorly 6
- 6 Collar somewhat depressed anteriorly and here with irregular transverse rugae; poorly sculptured even on sides, shiny; abdominal petiole unusually slender (male petiole see Fig. 61) **longepetiolata**, sp. n.
- Collar not depressed, but crowdedly rugose-punctured and dull on sides, often with a shallow median groove; abdominal petiole not long 7
- 7 Female: head distinctly oblong (Fig. 25), antennae longer, second funicle segment oblong, distal ones quadrate; male: distal funicle segments clearly oblong; puncturation on frons sparse; cosmopolitan **cameroni** Perkins (and ?*melanogastra* Masi) (see p. 454)
- Female: head hardly longer than wide, antennae shorter (Fig. 56), second funicle segment subquadrate, following ones transverse; male: distal funicle segments hardly longer than broad (Fig. 57) **gemina**, sp. n.
- 8 Scutellum without distinct cross-line; body size about 1.5 mm.; funicle segments in female strongly transverse, head finely and densely punctulate near antennae; forewing narrow; Seychelles **fallax** Masi
- Scutellum with distinct cross-line; body larger; etc. 9
- 9 Pronotal collar feebly convex, long, beset with sparse large punctures, broad interspaces and disc along median line polished or nearly so (Fig. 47); tarsi always dark; antenna in female slender, distal funicle segments oblong; Morocco **subpunctata** Först. (see p. 473)
- Pronotal collar with denser and often very irregular puncturation 10
- 10 Pronotal collar with deep median longitudinal groove in anterior half (Fig. 71); another shallow longitudinal groove usually also on scutellum; abdominal petiole in both sexes unusually long; Madagascar 11
- Pronotal collar without any distinct longitudinal groove 12
- 11 Antennae very long, third funicle segment in female about twice as long as broad, following ones clearly oblong; body size above 3 mm. **seyrigi** Risbec

- Antennae shorter: third funicle segment in female quadrate, following ones slightly transverse; in male distal funicle segments slightly oblong . . . *sulcifera*, sp. n.
- 12 Pronotum very densely, irregularly rugose-punctured, without distinct interspaces (Fig. 12); Near East . . . *irregularis*, sp. n. (see p. 442)
- Pronotum rather regularly umbilicately punctured . . . 13
- 13 Female: head elongate with genae longer than eyes and distal funicle segments quadrate . . . *afra* Silv.
- Female: head as long as broad (Fig. 63), gena much shorter than eye, antennae subclavate and with distal funicle segments strongly transverse (Fig. 62) . . . *obscura*, sp. n.

For *Spalangia cameroni* Perk. see pp. 454—457; for *S. irregularis*, sp. n. see pp. 442—443, for *S. endius* Walk. see pp. 458—461, for *S. nigroaenea* Curt. pp. 448—453, and for *S. subpunctata* Först. see pp. 473—475. The other species are arranged here alphabetically (*afra*, *endius*, *fallax*, *gemina*, *longepetiolata*, *melanogastra*, *seyrigi*, *simplex* and *sulficera*), except *sundaica* Graham which is considered a very probable synonym to *nigroaenea* (see also p. 450). Apart from these species still another one was announced from Africa: *S. pusilla*, by Silvestri, 1914, p. 21, as a parasite of *Drosophila* sp. in Nigeria; as far as known to me this name has remained, however, a *nomen nudum*.

***Spalangia afra* Silvestri**

Spalangia afra Silvestri, 1913, Boll. Lab. Zool. Portici, 8: 134; ♀♂.

Spalangia afra, Silvestri, 1914, Hawaii Board Agr. Forest. Div. Ent. Bull. 3: 120—121, pl. XXI; ♀♂.

According to the original description and figure [Silvestri, 1914, pl. XXI, fig. LIX] this species should be most closely allied to *S. nigra* Latr. Silvestri does not mention the median groove on head running down the front ocellus. If this feature really is not developed in *afra* (in *nigra* it is also sometimes less distinct, disappearing in the dense puncturation), it would be the first case among the species known to me. Apart from this Silvestri's *afra* seems to differ from *nigra* by smaller size of the body and a more elongate head in female with genae distinctly longer than the small eyes. I have seen, so far, neither the type, nor any other specimen of *S. afra* Silv.

Hosts. *S. afra* was reared in Nigeria from the pupae of the Trypetid *Ceratitis anonae* Grah. and was subsequently bred with success on *Ceratitis colae* Silv. and *C. giffardi* Silv. In Zanzibar this *Spalangia* was ascertained in 1936 on an unidentified *Ceratitis* species and in 1937 on *Dacus bivittatus cucumarius* Sack (Bianchi and Krauss, 1937, Hawaii. Planters Rec., 41: 299—306). Another host-record is that of *Dacus ciliatus* Loew.

Distribution: Nigeria, Zanzibar.

***Spalangia endius* Walker**

This cosmopolitan species was ascertained also in Africa, viz. in Madeira, Morocco, Nigeria, Tanganyika, Nyasaland, Southern Rhodesia, South Africa and in Mauritius. For more detailed data see above pp. 458—461.

Spalangia fallax Masi

Spalangia fallax Masi, 1917, Novit. Zool., **24**: 194—195; ♀.

This species was described in 1917 from the Seychelles Islands and has not been mentioned in literature since. *S. fallax*, the type of which is deposited in the British Museum in London is closely allied to *S. fuscipes* Nees and to *S. drosophilae* Ashm. The head is slightly longer than in *fuscipes*, densely and distinctly though minutely punctured anteriorly, as already mentioned in the original description. The thorax is strongly flattened, nearly as in *drosophilae*, but the female antenna (male unknown) is different: scapus is relatively longer, in relation to pedicellus as 9.5 : 4 (11 : 4 in *drosophilae*); then the head is converging more strongly towards mouth, tarsi are pale, wings much narrower than in *fuscipes* or *drosophilae*, etc.

Spalangia gemina, sp. n.

This species is closely related to *S. cameroni* Perk., but its body is somewhat stronger, more densely pubescent, antennae in both sexes shorter, distal funicle segments in female distinctly transverse, in male subquadrate; head is shorter, in female hardly longer than broad, subtriangular, pronotum duller, with hairs generally situated on tubercle-like elevations of the sculpture.

Female. — Head in facial view subtriangular, almost as wide as long (30:31), with large, moderately prominent eyes and straightly converging genae; frons densely umbilicately punctate, interspaces very narrow to about as wide as punctures (on disc); scrobes relatively deep, transversely ribbed in deepest (lateral) parts, smooth in the middle except fine rugosity between antennal toruli. In side view head about twice as long as thick, outline in median $\frac{3}{5}$ almost parallel-sided; eye oval (17:12), its orbitae furrow-like; gena shorter than eye width (10:12), crowdedly, almost rugosely punctate; antennal socket hardly raised; temples also densely rugoso-punctate between orbital carina and weak occipital carina. Antenna short, very slightly thickened at tip; scapus rather dull, granulate, slender, fully as long as 5 following segments combined, but only 1.3 times as long as the eye; pedicellus fully twice as long as wide, about 1.2 times as long as first funicle segment, this 1.5 times as long as broad; second funicle segment quadrate, following ones transverse, the seventh 1.3 to 1.5 times as broad as long; clava almost as long as three preceding segments together, less than 2.5 times as long as broad.

Pronotal collum transversely carinaceous; collar not margined anteriorly, with very deep, arched, coarsely crenate cross-line off hind margin; all surface before this furrow coarsely reticulate-rugose, except a more or less low triangle just at cross-line, piliferous punctures elevated, tubercle-like and mostly situated on highest points of sculpture; disc sometimes with a shallow longitudinal groove. Mesoprescutum with median longitudinal raised carina dividing two large irregular impressions posteriorly and rugulose-punctate areae anteriorly. Scutellum with coarse cross-line in posterior quarter and several punctures sublaterally. Metanotum as short as frenum. Propodeum with double alveolate row triangularly expanded anteriorly; median carina in front half only, not high; plicae very low, vague, discernible in posterior $\frac{2}{3}$ only, bordered on inner side by a belt of shallow irregular puncturation; nucha very short, with deep alveolae at its base; spiracular furrows very narrow, deepened into a fovea posteriorly; a smooth streak outside of stigmal slot; lateral fimbriae not dense; postero-lateral corner short, subrectangular. Prepectus similar to that of *S. cameroni*. Mesopleura horizontally carinaceous below subalar pit, smooth behind and beneath, except the alveolate bottom of anterior oblique impression, often connected by a broad punctate

belt above precoxal edge with the deep precoxal pit, and except the triangular episternal scrobe; the latter mostly connected by a crenate line with precoxal pit. Forewing mainly bare on upper surface below submarginal vein; longest marginal ciliation about as long as prestigma, this longer than the short, abruptly bent stigmal vein, post-marginal vein shorter than the stigmal.

Abdominal petiole about 1.4 times as long as broad, almost parallel-sided, bare, with distinct carinae, the median replaced by two, separated by a groove similar to the others. Gaster slender-ovate, polished, second tergite distinctly emarginate, in the middle half as long as the third. Ovipositor sheaths scarcely exerted.

Body black, hardly with any metallic tinge; tarsi pale testaceous except dark claw segments. Length (measured while body stretched with head forward; with head drooping usually 0.3—0.4 mm. less) 3.1—4.1 mm., the holotype 3.5 mm. (with head drooping 3.2 mm.).

Male. — Head slightly shorter than broad (27:28.5), thicker (16:27, distinctly thicker than in *cameroni*) at centres of eyes, but rather abruptly less thick (in side view) below eye level behind; genae dull, crowdedly punctate. Scapus scarcely as long as four following segments combined, its length to the flagellum (plus pedicellus) as 18:58; pedicellus in profile almost 1.5 times as long as broad, first funicle segment twice as long as broad and about 1.7 times as long as pedicellus; funicle segments 2 to 7 subequal, each quadrate to very slightly oblong, hardly narrowed at proximal end, broadly separated from each other; longest hairs of the pubescence not exceeding one-quarter of the segment width; clava as long as two preceding segments combined, about 2.5 times as long as broad. Length 2.6—3.5 mm.

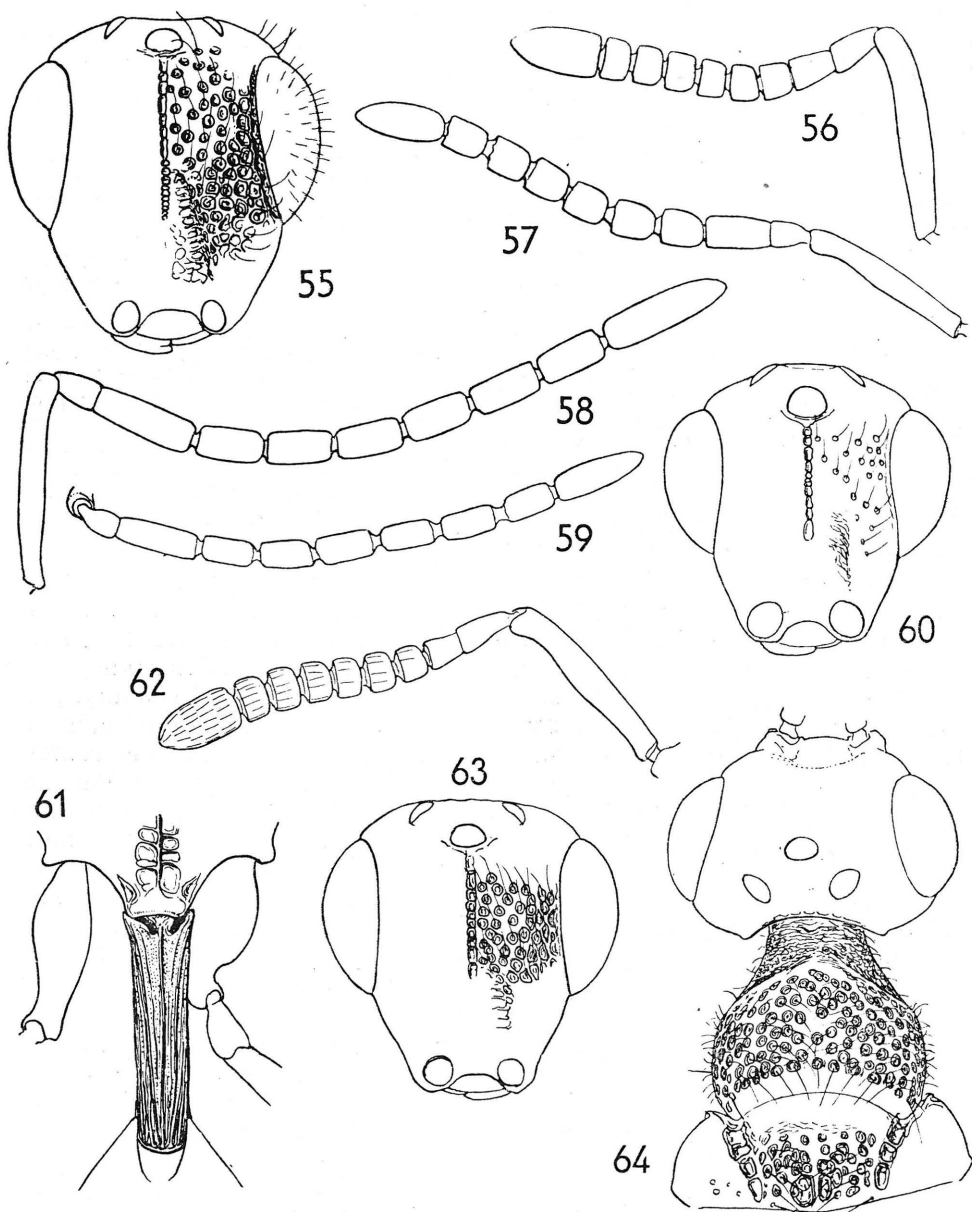
Intra-specific variation not great. In some specimens, in particular in males the shiny part of collar disc large as in *S. cameroni*, in some females pronotum dull all over. Propodeal double alveolate row in Siam males posteriorly deeper and wider than usual (males small).

Hosts. Pupae of *Dacus dorsalis* Hend. (Trypetidae) in Malaya; in Venezuela this *Spalangia* was reared as a hyperparasite from the Tachinid *Metagonistylum minense* Tns. and in Mauritius *S. gemina* was reared from *Citrus* attacked by the Trypetid *Pardalaspis cyanescens* auct. Further host records are the Lepidoptera *Adisura atkinsoni* Moore in India and, probably, *Cryptophlebia pallifimbriana* auct. in the Fiji Islands; in both cases probably hyperparasitic through a Tachinid.

Distribution: Mauritius, South Asia (India, Siam, Malaya), Fiji and tropical South America (Venezuela). Obviously widely distributed in tropical countries.

Holotype (female): Mauritius, No. 537, "ex tomato and Citrus infested by *Pardalaspis cyanescens*", 14. II. 1959 (L. A. Moutia leg.). Deposited in the collections of the British Museum (Natural History).

Further material (paratypes and allotype): Mauritius: 3 ♀♀ and 2 ♂♂ (including allotype) with the holotype; 1 ♀ and 1 ♂ same origin, "ex tomato pamplemousses". — India: Calcutta, School Trop. Med., 1 ♂, 1936 (Dr. C. Strickland); Bangalore, ex *Adisura atkinsoni* on *Dolios*, 1 ♀, I. 1960 (C. I. S. C.—I. S.); Coimbatore, from fly pupa, 2 ♀♀, 31. XII. 1913 (Y. R. Coll.), from rotting gourd, 1 ♀, 20. II. 1915, from rotting tomatoes, 2 ♂♂, 27. VIII. 1925 (A. F. M. Coll.). — Siam: "Reared No. A 919", 3 ♂♂. — Malaya: Serdang, Entom. Div. Agric. Dept., 2 ♀♀, ex *Dacus dorsalis* pupae, No. 03651; ex fruit of *Elaeis guineensis* Jacq., 1 ♀, 19. IX. 1930 (H. G. Corbett); Kuala Lumpur, 1 ♀, ex maggot on *Capsicum*, 6. VII. 1937 (Ent. Div. Agric. Dept.), 5 ♂♂, ex Muscids, nos. 23—25, 53, 1939 (Inst. Medical Res.). — Fiji: Viti Levu, Tailevu coast, "ex *Cryptophlebia pallifimbriana*", 1 ♀, XI. 1954 (B. A. O'Connor). — Venezuela: Maracay, 430 m. alt., 4 ♀♀, hyperparasite, ex pupa of *Metagonistylum minense* in laboratory, III. 1951 (H. E. Box). — All specimens except four paratypes which are in the National Museum in Prague are deposited in the British Museum, London.



Figs. 55—57. *Spalangia gemina*, sp. n.: Fig. 55. Female head. Fig. 56. Female antenna. Fig. 57. Male antenna.

Figs. 58—61. *Spalangia longepetiolata*, sp. n., male: Fig. 58. Antenna (holotype). Fig. 59. Antennal flagellum of male from Tanganyika. Fig. 60. Head in facial view (holotype). Fig. 61. Abdominal petiole.

Figs. 62—64. *Spalangia obscura*, sp. n., female: Fig. 62. Antenna. Fig. 63. Head. Fig. 64. Head, pronotum and mesoscutum.

***Spalangia longepetiolata*, sp. n.**

The species described herewith as *longepetiolata* differs from all species of the genus known to me by its unusually long abdominal petiole. Otherwise it stands near to *S. cameroni* Perk. in the "*nigroaenea*-group", by its irregularly sculptured pronotum, the collar of which always possesses irregular transverse rugae anteriorly.

Female. — Unknown.

Male. — Head in facial view (Fig. 60) as long as wide, with very large protruding eyes, which are almost as long as width of frons (14:16); the latter sparsely scattered with umbilicate punctures denser at orbitae; ocelli large, the lateral separated from the median by space narrower than diameter of the latter. In side view head nearly twice as long as thick (28:15), with occipital carina subangularly raised before its lower end, gena with distinct sulcus, slightly shorter than eye width (10:11); antennal socket distinctly raised. Antenna (Figs. 58 and 59) very slender, scapus $\frac{3}{4}$ the width of head but shorter than three following segments combined (21:22), flagellum alone (with pedicellus) fully 2.5 times as long as width of head (72:28); pedicellus twice as short as first funicle segment which is three times as long as broad (in the holotype), second to seventh funicle segments subequal, twice as long as broad each; clava shorter than two preceding segments together (13:14), though slender.

Thorax twice as long as broad. Pronotum with distinct, deep subcaudal cross-line, anteriorly immargined but often with one or two transverse rugae at front margin of collar and usually depressed behind them; its disc uneven, beset with some to numerous scattered punctures, its sides more distinctly, but irregularly rugose or rugoso-punctured; collum rather shiny, separated from collar on sides by deep impressions. Disc of mesoprescutum crowdedly rugoso-punctate, without median line; parapsidal furrows very deep. Frenal cross-line of scutellum consisting of coarse punctures and segregating hind third: disc on sides with several punctures. Metanotum distinctly shorter than frenum. Propodeum with complete weak median carina and double alveolate row broad, hardly narrowed in the middle; nucha short but distinct; spiracular sulcus rather broad and deep, lateral plicae indistinct, postero-lateral corner bluntly angular. Prepectus not large, alveolate, its antero-ventral side carinaceously margined. Mesopleura smooth except rugae at subalar pit; anterior impression and episternal scrobe very broad but shallow, alveolate. Legs very slender and long; hind coxa in profile nearly three times as long as thick; hind trochanter about twice as long as broad. Forewing with dense pubescence, also cubital fold and a streak on distal upper surface of basal cell with abundant hairs; marginal ciliae about twice as short as stigmal vein (in holotype), the latter shorter than the postmarginal, moderately bent and slightly knobbed; pre-stigma about three times as short as stigmal vein, separated by pale break from the marginal vein.

Abdominal petiole (Fig. 61) unusually long, far surpassing hind coxa, almost five times as long as broad and fully as long as propodeum width at postero-lateral corners, parallel-sided, its carinae fine and straight, even on sides; one median carina. Gaster polished, with third postpetiolar tergite very large, along middle almost three times as long as the slightly emarginate second tergite.

Body black with a slight greenish lustre; tarsi brownish, dark. Wings slightly infusate. Length 3.2 mm. (holotype), paratypes (body stooped but measured as if stretched:) 2—2.8 mm.

Variation, as far as may be judged from the four males being at my disposal, is likely not to be small, as the mentioned length of body suggests. It results in somewhat shorter antennae, more poorly pubescent wings and much weaker sculpture in smaller specimens. The first funicle segment in the male of 2 mm. is only 2.5 times as long as broad and the following segments about 1.7 times as long as broad each, then the marginal ciliation of the forewing is as long as stigmal vein, this hardly twice

as long as prestigma, the sculpture of body is more superficial, feeble, etc. The male from Tanganyika (2.6 mm.) is very distinctly greenish metallic on head and thorax.

Host: unknown.

Distribution: Central and East Africa (Rwanda, Tanganyika, Abyssinia), Yemen.

Holotype (male): Abyssinia, Lake Dembel, I. 1912 (Kovács leg.); deposited in the Budapest Nat. Hist. Museum.

Further material (paratypes, males; deposited in the National Museum in Prague, the Central Africa Museum, Tervuren, Belgium and in the British Museum in London, respectively): Rwanda: "contref. Est Muhavura, 2100 m.", 28. I. 1953 (P. Basilewsky). — Tanganyika Territory: Ngorongoro, Rest Camp, 2400—2500 m., 6.—19. VI. 1957 (P. Basilewsky and N. Leleup, Mission Zool. I. R. S. A. C. en Afrique orientale). — Yemen, Wadi Dhahr NW of Sanaa, ca. 7,900 ft., 21. I. 1938 (H. Scott and E. B. Britton).

Spalangia melanogastra Masi

Spalangia melanogastra Masi, 1940, Boll. Lab. Ent. agrar. Portici, 3: 295—297; ♂.

I could not examine the type of this species described from one male from Somaliland. The original description of *melanogastra* suggests, however, a great similarity to *S. cameroni* Perk. Most probably the two are conspecific. *S. cameroni* is a species widely distributed all over the world (see pp. 454—457).

Spalangia obscura, sp. n.

This species is similar to *hirta* Hal. and judging from the original description and figures of *S. afra* Silv. probably most nearly allied to this latter species. All three species are densely umbilicately punctured on head and thorax, but lack distinct cross-row before the hind margin of the pronotum (indicated sometimes in *nigra* only). *S. obscura* differs from both *nigra* and *afra* chiefly in having much shorter head and antennae in the female.

Female. — Head in facial view (Fig. 63) rounded-triangular, only as long as broad (29:29), densely umbilicately punctate, with very narrow interspaces and dense hairs which are not very long; frons distinctly vaulted; scrobes rather shallow, smooth in broad median streak but shallowly broadly rugoso-punctate on sides above antennal toruli. Head in profile rather thick (16:29), temple rather sparsely punctured and occipital carina low, in side view nearly four times narrower than eye, this very large, short-oval (15:11); gena shorter than eye width (10:11), with distinct sulcus; antennal socket weakly raised. Antenna (Fig. 62) not long, distinctly widened toward tip; scapus longitudinally striate, rather dull, fully as long as five following segments combined; pedicellus fully twice as long as wide, about 1.6 times as long as first funicle segment, this 1.2 times as long as broad, the second to seventh funicle segments transverse, the second about 1.2 times, the seventh almost twice as broad as long, all broadly separated from each other, increasing in width; clava hardly twice as long as wide, shorter than three preceding segments together.

Pronotal collum dull, granulate-rugulose, with broad piliferous punctures before the collar; this (Fig. 64) rather long (13:21), nearly parallel-sided, immargined anteriorly, without distinct regular cross-line posteriorly (punctures here, however, deeper), all over densely umbilicately punctate except the smooth belt at hind margin, interspaces at median line distinct, broad, otherwise very narrow, laterally even indistinct. Mesoprescutum densely rugoso-punctate and impressed at median carina. Scu-

tellum with distinct, coarsely crenate cross-line, umbilicately punctate except in median third; frenum forming a narrow belt taking one-fifth, not broader than metanotum. Propodeum with median double alveolate row moderately narrowed in the middle, median carina not raised; lateral plicae distinct behind spiracles, arched, bordered by crenate furrow on inner side, lateral parts beyond the coarsely alveolate, shallow spiracular furrow deepened in a broad fovea behind, irregularly rugoso-alveolate; postero-lateral corner sharply angular, but blunted. Mesopleura smooth on elevated parts, with coarse subalar rugae, impressions alveolate; anterior oblique impression connected sculpturally by a groove at precoxal edge with round precoxal pit and with broad, sinuate episternal scrobe. Hind trochanter above with distinct callus. Forewing with abundant hairs on cubital fold and below distal half of submarginal vein; longest marginal ciliae slightly longer than stigmal vein; the latter strongly bent, about as long as prestigma, postmarginal vein hardly longer.

Abdominal petiole fully twice as long as broad, parallel-sided, with numerous erect hairs laterally; longitudinal carinae defining a median groove, sublateral carinae weak and less regular. Gaster ovate, polished, second tergite broadly emarginate posteriorly, in the middle as long as space between basal fovea and hind margin of first tergite and almost three times shorter than the third. Ovipositor tip hardly exerted.

Body black, without distinct metallic lustre; tarsi of all legs testaceous, more or less infusate at claws. Length 2.9–3.1 mm. (the larger female is the holotype).

Male unknown.

Host: unknown.

Distribution: Malaya, Philippines.

Holotype (female): Philippines, Luzon, Balbatan. Deposited in the National Museum Prague, Cat. No. 25.404.

Further material (one female, paratype): Malay Pen., Pahang, Fraser's Hill, 4,000 ft., 29. V. 1932 (H. M. Pendlebury); deposited in the British Museum.

***Spalangia seyrigi* Risbec**

Spalangia seyrigi Risbec, 1952, Mém. Inst. sci. Madag., **E 2**: 384–386; ♀.

Also this species is not known to me but from the original description (the type could not be found in the Paris National Museum, neither in Tervuren) which mentions only briefly some of the important characters. According to the figure on p. 385 the type has probably a plain longitudinal groove on the pronotum, as has also *S. sulcifera* described here below as new; the two species should be very similar to each other; in *seyrigi*, however, the antennae are much longer, the third funicle segment still about twice as long as broad while it is quadrate in *sulcifera*.

Described from Madagascar. Host unknown.

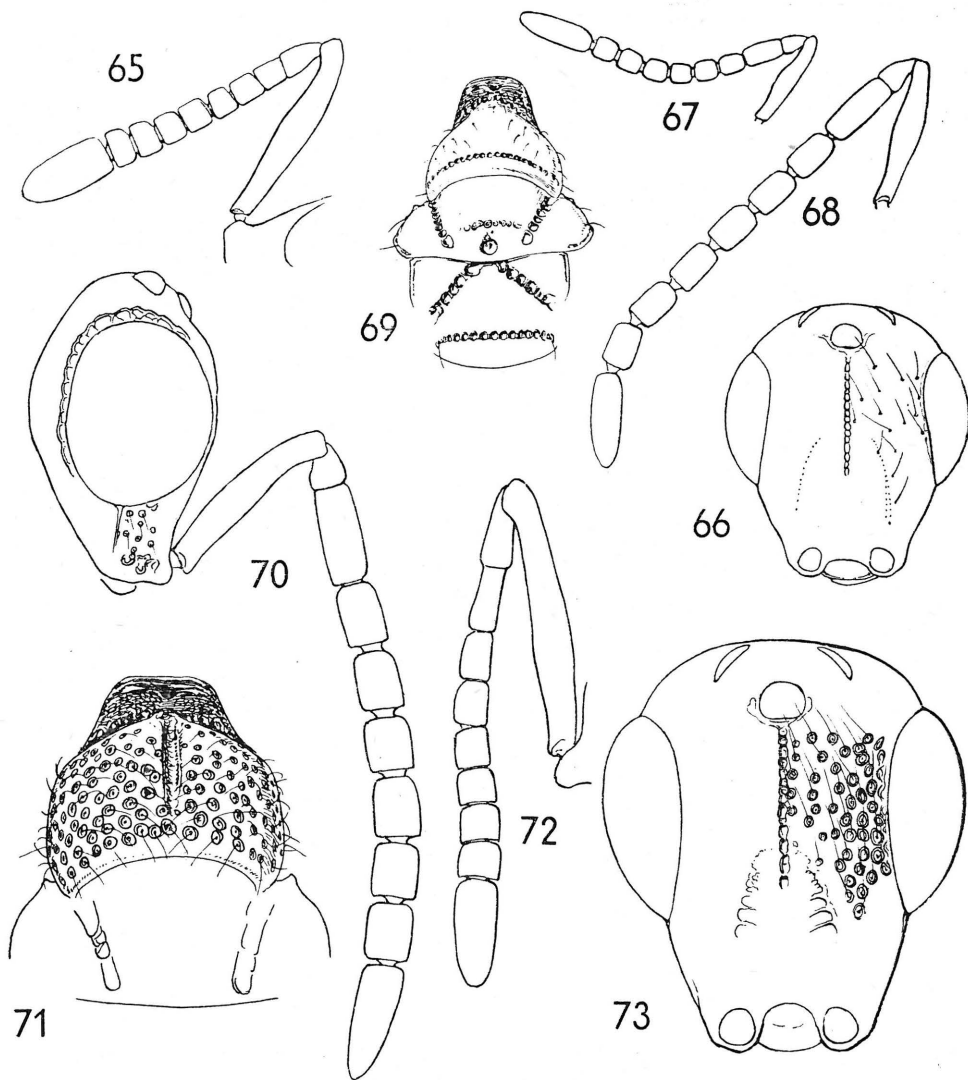
***Spalangia simplex* Perkins**

Spalangia simplex Perkins, 1910, Fauna Hawaïensis, **2**: 657; ♀♂.

For some time I have regarded specimens of this species as being different from any other described before, but finally I have come to the conclusion (in particular when I received further material of this species from Malaya) that it is most probably the same as *simplex* Perk.

The African specimens (for male antenna see Fig. 68) fit exactly the original description, except the body colour which is nearly black, with metallic tinge hardly pronounced, and larger size of the body (*simplex*:

"1.5—2 mm."; the largest African specimen with body stretched about 2.5 mm.), which may be unimportant. The Malayan series (Figs. 65, 66, 68 and 69) comprises specimens not larger than described from the Hawaiian material by Perkins, but the antenna in the male (Fig. 67) has shorter



Figs. 65—69. *Spalangia simplex* Perk.: Fig. 65. Antenna of female (from Rwanda). Fig. 66. Head of the same female. Fig. 67. Antenna of male (from Malaya). Fig. 68. Antenna of another male (from the environ of Lake Kivu). Fig. 69. Part of thorax of male. Figs. 70—73. *Spalangia sulcifera*, sp. n.: Fig. 70. Male head with antenna in side view. Fig. 71. Pronotum in male. Fig. 72. Female antenna. (All figures except Fig. 73 drawn at same scale) Fig. 73. Head of female.

funicle segments: the first of them only twice as long as broad, the second to seventh only very slightly oblong. Because of these discrepancies and in particular because I could not see any specimens compared with the type, I attribute the mentioned specimens only with a query to *simplex*, though all the deviations may well be covered by the intra-specific variation.

If, in addition, the presumed synonymy of also the Australian *S. gro-tiusi* Grt. and *S. parasitica* Grt. with *simplex* Perk. proves to be correct, the species would be known in East Africa, Malaya, Australia and Hawaii [see more p. 496].

Material examined. — Africa, Congo: Haut-Uele, Paulis, III. 1947 (P. L. G. Benoit). — Rwanda, Kisenyi, 12. VIII. 1953 (A. E. Bertrand); N. Lake Kivu: Rwankwi, XII. 1951 and 15. II. 1952 (J. V. Leroy). — Uganda: Mujenje, IX. 1913 (Kitzberger). — Malaya: Pahang, Fraser's Hill, 4,000 ft., 19. V., 26. V., 31. V. and 22. VI. 1932 (H. M. Pendlebury).

Spalangia sulcifera, sp. n.

As already mentioned this species is most probably nearest to *S. sey-rigi* described by Risbec in 1952 from Madagascar, and differs from the latter mainly by much shorter antennae.

Female. — Head (Fig. 73) in facial view slightly oblong (35:32), densely punctured along eyes, more sparsely on disc of frons where the interspaces are as wide as punctures; scrobes moderately deep, laterally transversely ribbed, otherwise nearly smooth; a short median groove behind median ocellus on vertex; in side view head twice as long as thick; eye oval (18:13), orbita in particular posteriorly furrow-like, crenate, malar space (between eye and mandible base) almost twice as short as eye (10:18), gena length to top of the distinctly obliquely protruding antennal socket nearly equal to eye width (12:13); sulcus distinct. Antenna (Fig. 72): scapus dull, delicately, somewhat longitudinally ruguloso-granulate, slender, as long as five following segments combined; pedicellus slightly longer than first funicle segment (7:6), three times as long as broad; basal funicle segments decreasing in length and very slightly increasing in width, the first 2.5 times, the second 1.2 times and the third funicle segment as long, as broad, the following feebly transverse; clava 2.5 times as long as broad.

Pronotal collum posteriorly rather dull, delicately transversely rugulose-granulate; collar (Fig. 71) rather long (18:25), almost parallel-sided, rounded and immargined anteriorly, without distinct cross-line posteriorly, everywhere rather densely umbilicately punctured with interspaces in average narrower than half the width of punctures, in median line with a very deep groove in anterior $\frac{2}{3}$. Mesoprescutum on uncovered part crowdedly punctured without distinct smooth line, anterior to punctures densely and delicately transversely alutaceous. Scutellum transverse (22:15), with distinct median groove fading out posteriorly, sparsely punctured sublaterally; frenal cross-line slightly sinuate, separating posterior quarter as a belt hardly narrower than metanotum. Propodeum: median double alveolate row moderately expanded anteriorly, median carina here slightly elevated; lateral plicae low, indistinct, bordered on inner side by alveolae generally in one row; nucha short; sublateral areae outside the narrow spiracular furrow smooth, the furrow widened behind into irregular fovea; postero-lateral corner short, subrectangular; lateral fimbriae not dense. Mesopleura with coarse subalar rugae, anterior oblique impression coarsely rugose, episternal scrobe wide, round, shallow; precoxal pit round and rather deep, precoxal edge distinct, bordered by a more or less rugose impression connected with anterior oblique impression; mesopleura otherwise smooth, its postero-dorsal corner obtusangular. Forewing bare at base, several hairs below end of submarginal vein; prestigma as long as postmarginal or stigmal vein, the latter archedly bent; wing blade very densely and rather shortly hairy.

Abdominal petiole about 2.5 times as long as broad, bare on sides, dorsal carinae weak and rather irregular, in median line a narrow groove. Gaster polished, second tergite deeply broadly emarginate behind, in the middle almost three times shorter than the third tergite. Ovipositor sheaths pointed, subexserted.

Body black, not distinctly metallic; tarsi pale testaceous except last segment which is dark. Length of squatted body 3 mm., of stretched body 3.8 mm. (holotype).

Male. — Very similar to female in all characters except the following ones. Head slightly shorter than broad (31:33), with genae more strongly converging to mouth and 2.2 times shorter than eye length; eyes short-oval (18:15); head in side view (Fig. 70) thicker (18:31). Scapus finely longitudinally striate, shorter than three following segments together (19:21); pedicellus globular; first funicle segment 2.1 times as long as broad, the second 1.3 times, the third to seventh 1.2 to 1.1 times as long as broad, in one small male that I attribute also to this species the funicle segments 3 to 7 are quadrate; clava as long as two preceding segments, three times longer than broad. Abdominal petiole three times as long as broad. Third gastral tergite 2.5 times longer than the second which is almost so distinctly emarginate as in female. Length (body stretched!) 2.3—3.5 mm.

Variation in this species as suggested by the mentioned small male specimen may be considerable. Apart from the funicle segments also punctures on head and particularly on pronotal collar vary greatly: in the small male they are relatively much larger and accordingly sparser than in the holotype female and on the mesoprescutum a median impunctate line is indicated, while posteriorly mostly two deeper large foveae are discernible (this sculpture varies similarly in many species). On scutellum the median groove may fade out.

Hosts unknown.

Distribution: Madagascar.

Holotype (female): Madagascar, Ankaratra, IV. 1944 (A. Seyrig). Deposited in the Mus. R. Afr. Centr., Tervuren, Belgium.

Further material (3 males, allotype and paratypes): Madagascar, Ankaratra, II. 1941 (A. Seyrig) — allotype; Ambositra, II. 1944 (A. Seyrig); Madagascar, without further data (Sikora lgt.).

III. *Spalangia* in Australia and the Pacific Islands

At the present level of knowledge it is not easy to estimate even approximatively the actual number of species of *Spalangia* in Australia and the Pacific Islands. There have been many species described from this part of the world and surely at least some of them will prove to be synonymous with species known already from elsewhere. Today it is also impossible, mainly because of the number of species inadequately described by Girault, to render even a tentative key to species.

Most species of *Spalangia* from Australia were described by A. A. Girault: *S. grotiusi*, *australiensis* and *virginica* in 1913, *parasitica* in 1915, *punctulaticeps* in 1929, *shakespearei* in 1931, *abenabooi* in 1932, *mors*, *muscophaga*, *kingstonensis*, *epos* and *marxi* in 1933. His descriptions are, however, so short and inadequate that it is impossible to get an idea of the species in question. In addition the type material was not available to me. Girault himself synonymised in 1934 his *S. abenabooi* and *mors*. The two seem to belong to the group with distinct subcaudal cross-line on pro-

notum, and are probably synonymous with *nigroaenea* or with *endius*. Also *grotiusi*, *parasitica*, *shakespearei*, *marxi*, *muscophaga* and *kingstonensis* of Girault (and *sundaica* Grah. and *orientalis* Grah.) belong most probably all to the same group. As belonging here, we can also add *S. cameroni* Perk. known from many Pacific Islands, *endius* Walk. (= *philippinensis* Fullaw., = *orientalis* Grah.) and *simplex* Perkins.

The species without pronotal cross-line are represented in Australia by *S. australiensis* Grt., *virginica* Grt. and *epos* Grt. (the last two probably near to *fuscipes* Nees), and in Hawaii by *S. lanaiensis* Ashm. The Australian *S. punctulaticeps* Grt. belongs probably to this group, also. Another species is *S. nigra* known in Hawaii.

All the species known from this part of the world are mentioned alphabetically below.

***Spalangia abenabooi* Girault**

Spalangia muscidarum; Johnston and Tiegs, 1921, Proc. R. Soc. Queensl., **33**: 103, 104—105 (nec Richardson, 1913, sec. Girault).

Spalangia abenabooi Girault, 1932, Hymenoptera, Thysanoptera Nova Australiensis. II, p. (1).

Spalangia mors Girault, 1933, Some Beauties Inhabitant not of the Boudoirs of Commerce but of Nature's Bosom — New Insects, p. (1).

As already mentioned this species belongs to the *nigroaenea*-group, i. e. to species with isolated cross-line on pronotum before caudal margin, and may be synonymous either with the cosmopolitan *S. nigroaenea* Curt. or *endius* Walk. (= *orientalis* Grah.). Girault proposed *abenabooi* originally for "*muscidarum*" in Johnston and Tiegs, 1921 (nec Richardson, 1913) and synonymised *S. mors* with *abenabooi* in 1934 in a privately published paper entitled "Miridae et Hymenoptera Nova Australiensis", p. (3). All data concern Australia; host is unknown.

***Spalangia australiensis* Girault**

Spalangia australiensis Girault, 1913, Mem. Queensl. Mus., **2**: 333; ♀.

Described from Queensland, host unknown. This species is probably near *fuscipes* Nees, but tarsi are "white"; cross-line on scutellum faint.

***Spalangia cameroni* Perkins**

For synonymy, description, host records and distribution of this species see pp. 454—457 above. *S. cameroni* was repeatedly introduced into various Pacific Islands to control the house fly (see e. g. Simmonds, 1929). Not yet known in Australia.

***Spalangia endius* Walker**

For synonymy and other data on this species see above pp. 458—461. *S. endius* was described originally from the Galapagos Islands but is known to me also from Australia (here described as *orientalis* Grah.), Philippines (described as *philippinensis* Fullaway), Hawaii, New Caledonia, Fiji and Samoa.

***Spalangia epos* Girault**

Spalangia epos Girault, 1933, Some Beauties Inhabitant not of Commercial Boudoirs but of Nature's Bosom, notably New Insects, p. {4}.

In the original description this species is compared with *S. australiensis* Grt. and both probably belong to the vicinity of the European *S. fuscipes* Nees. Known only from the short description, from Australia. Host unknown.

***Spalangia grotiusi* Girault**

I have not seen the type of this species which, according to the description, may be synonymous with *S. simplex* Perkins. See therefore more under this name here below, p. 496.

***Spalangia kingstonensis* Girault**

Spalangia Kingstonensis Girault, 1933, Some Beauties Inhabitant not of the Boudoirs of Commerce but of Nature's Bosom — New Insects, p. {1}.

The description reads: "*S. Kingstonensis*. From *abenabooi*: Ciliation wing ending base marginal vein (save minute cilia centrally); funicle 1—3 longer than wide, 1 longest. No venational discontinuity. Kingston, forest." Nothing can be added without a reexamination of the type. *S. abenabooi* and then perhaps also *kingstonensis* belong to the species with distinct pronotal cross-line. Host unknown.

***Spalangia lanaiensis* Ashmead**

Spalangia lanaiensis Ashmead, 1901, Fauna Hawaiiensis, 1: 325—326; ♀♂.

This species belongs to the *fuscipes*-group, i. e. to species with an incomplete cross-line on the scutellum. Also the sculpture of the propodeum is very weak. The double alveolate row of the latter is forked and divided anteriorly by a smooth flat median strip (at least in the type female in the British Museum). The antenna of female is described as 12-segmented, but it is quite normal for the genus, only the clava is more distinctly composed from two fused segments. The first funicle segment is about 1.4 times as long as broad, the following ones transverse; clava about as long as 3.5 preceding segments combined. Head in frontal view longer than wide as 20:17. Tarsi pale as in the North American *S. haematobiae* Ashm., to which *lanaiensis* is most closely allied. It even may prove to be the same species when a richer material is at hand and the variation may be judged properly. *S. lanaiensis* was described from Hawaii and not mentioned since description.

***Spalangia marxi* Girault**

Spalangia marxi Girault, 1933, Some Beauties Inhabitant not of Commercial Boudoirs but of Nature's Bosom, notably New Insects, p. {3}.

The short original description reads: "*Spalangia marxi*. From *orientalis*: Ciliation extending proximad of the venational discontinuity; punctures pronotum, head sparser; funicle 1 quadrate, scarcely exceeding 2,

latter equal others. Forest, Stanthorpe, Apr. 26, 1924." Judging from the comparison with (*orientalis* =) *endius* the species *marxi* should be allied to that species and have the pronotal cross-line. The quoted discrepancies are, however, of little if of any taxonomic value.

***Spalangia mors* Grlt. see *S. abenabooi* Grlt.**

***Spalangia muscophaga* Girault**

Spalangia muscophaga Girault, 1933, Some Beauties Inhabitant not of the Boudoirs of Commerce but of Nature's Bosom — New Insects, p. (1).

The original description reads: "*S. muscophaga*. As *Kingstonensis* but funicles after 1 quadrate; no indentation at venation on basal margin ciliation; stigmal longer, regularly curved; sculpture of scutum divided by an acute carina; ciliation in male extends to just proximad of thickening of submarginal vein. *Musca gibsoni*, Nelson, J. F. Illingworth." None of the mentioned characters seem to be of sufficient taxonomic value to warrant a reliable recognition of the species, which is probably very near to *endius* (= *orientalis*).

***Spalangia nigra* Latreille**

This species is known (apart from Europe and North America) also from Hawaii (as *hirta*). See above pp. 443—448.

***Spalangia nigroaenea* Curtis**

In Australia and the Pacific Islands this species was known mostly under its synonyms like *muscidarum* Rich. or *sundaica* Grah. It is widely distributed here; see under *nigra* above, pp. 448—453.

***Spalangia obscura* Bouček**

For this species described from Malaya and the Philippines see above pp. 488—489.

***Spalangia orientalis* Graham**

A subjective synonym to *endius* Walk.; see under this, p. 458.

***Spalangia parasitica* Girault**

Spalangia parasitica Girault, 1915, Mem. Queensl. Mus., 3: 346; ♀.

Girault compares this species with *grotiusi* to which *S. parasitica* should be very similar. If the differences are not greater than expressed in the inadequate description it is probable that the two species are identical. As mentioned elsewhere I hope to have recognized in *grotiusi* the same species as *simplex* Perkins, which I know also from the Malayan Peninsula and East Africa.

***Spalangia philippinensis* Fullaway**

A subjective synonym to *endius* Walk.; see under this, p. 458.

***Spalangia punctulaticeps* Girault**

Spalangia punctulaticeps Girault, 1929, Trans. R. Soc. South Austral., **53**: 319; ♀.

This species was described from one female taken in the Kangaroo Island off Adelaide. It might be allied, judging from the description, to the European *S. erythromera* Först. The sculpture of head, apart from the scattered umbilicate punctures, is described as "rugulose-punctate", that of pronotum and mesoscutum "densely scaly", with a "weak cross-row of fovea . . . distad of the middle" on the latter. Host unknown as in most Girault species.

***Spalangia shakespearei* Girault**

Spalangia shakespearei Girault, 1933, Some Beauties Inhabitant not of Commercial Boudoirs but of Nature's Bosom, notably New Insects, p. (5).

Described as follows: "*Spalangia shakespearei*. From *parasitica*: Cross-row fovea of scutum absent, a quadrate, finely sculptured mesal area on same, a triangular area each side of it. Smaller. Kingston, forest." As all the Girault species not recognized and not mentioned since description.

***Spalangia simplex* Perkins**

Spalangia simplex Perkins, 1910, Fauna Hawaiiensis, **2**: 657; ♀♂.

?*Spalangia grotiusi* Girault, 1913, Mem. Queensl. Mus. **2**: 332—333; ♀. — —; 1915, *ibidem*, **3**: 346.

?*Spalangia parasitica* Girault, 1915, Mem. Queensl. Mus. **3**: 346, ♀.

I could not examine the types of any of the three species which are most probably conspecific. They all are described to have not only the transverse subcaudal crenate line on pronotum (as have the species of the *nigroaenea*-group), but also another, similar cross-line on mesoscutum and a deep fovea in the middle of the disc behind the line (Fig. 69). I attribute to this species, although with some hesitation, a series coming from Malaya (coll. British Museum) and several East-African specimens. They fit rather well the original description of *S. simplex* Perk. (see p. 489). The descriptions of *grotiusi* and of *parasitica* are too short and do not mention most of the basic characters. In a subsequent note, in 1915 (p. 346), however, Girault described additionally the mentioned important feature on the mesoscutum of *grotiusi*, which seems quite sufficient for a reliable recognition of the species. Two females standing as *grotiusi* in the British Museum collection do not fit, however, the mentioned characters of the mesoscutum. They belong to a distinct species (unknown to me by name) closely related to *S. endius* Walk.

S. parasitica is said to be very similar to *grotiusi*, and if the differences are not greater than expressed in its inadequate description, it is very probable that the two are identical, and both again conspecific with *simplex* and the specimens I have seen.

Spalangia sunaica Graham

I consider this species to be most probably synonymous with the cosmopolitan *S. nigroaenea* Curt.; see under the latter, pp. 448—453.

Spalangia virginica Girault

Spalangia virginica Girault, 1913, Mem. Queensl. Mus., 2: 333, ♂.

The short original description mentions the lacking cross-line on the scutellum, which suggests an appurtenance to the species group allied to the European *S. fuscipes* Nees. *S. virginica* was described from Queensland. Host unknown.

IV. Spalangia in Central and South America

From this region comparatively few species were described: *S. chontalensis* Cam. and *S. impuncta* How. from Central America, and *S. brasiliensis* Ashm., *bakeri* Kieff., *tarsalis* Brèthes and *platensis* (Brèthes) from the South American continent, *S. endius* Walk. was described from the Galapagos. Now also *S. drosophilae* Ashm. is known to occur in Central America and the material available to me contains still several other species: *S. cameroni* Perk., *gemina* Bčk., *nigroaenea* Curt. and a species very similar to the European *S. fuscipes* Nees (probably *haematobiae* Ashm.).

Tentative key to Neotropical species of Spalangia

- 1 Pronotum with distinct subcaudal cross-line of close punctures 2
- Pronotum smooth, alutaceous, punctate or rugose, but always without any cross-line near hind margin 7
- 2 Pronotal collar distinctly margined anteriorly 3
- Pronotal collar rounded anteriorly 5
- 3 Collar edge very high, irregular, wavy, more raised sublaterally and submedially (Fig. 77); umbilicate punctures very coarse, often rugose; abdominal petiole unusually long, with longitudinal carinae less numerous and grooves only feebly shiny, delicately punctulate on bottom **chontalensis** Cam.
- Collar edge weaker, regularly raised; umbilicate punctures not very coarse, punctures forming the pronotal cross-line quite fine; petiole shorter, its longitudinal carinae more irregular and numerous, with grooves fairly shiny 4
- 4 Head of female distinctly oblong, in male about as long as wide **nigroaenea** Curt. (and ?*bakeri* Kieff.)
- Head in female probaly also rather long, in male slightly longer than broad (21:19); abdomen finely punctulate **platensis** (Brèthes)
- 5 Collar semiglobose, regularly arched and set with large piliferous punctures, interspaces polished (Fig. 30); distal funicle segments in female transverse, in male subquadrate **endius** Walk.
- Collar less arched, sublaterally and anteriorly crowdedly rugoso-punctate and without interspaces (Fig. 26); disc smooth and often with a weak longitudinal groove 6
- 6 Body rather shiny, pronotum with hairs situated mainly in rugose punctures; female head distinctly elongate and distal funicle segments oblong; in male these segments elongate **cameroni** Perk.

- Body rather dull, pronotal hairs on tubercles of sculpture; female head hardly longer than wide, distal funicle segments transverse (Fig. 56); in male these segments subquadrate **gemina**, sp. n.
- 7 Body less than 2 mm. in length; scutellum without distinct cross-line; pronotum sparsely punctured and often more or less alutaceous 8
- Body longer; scutellum with distinct crenate cross-line; pronotum umbilicately punctate 9
- 8 Body strongly depressed, in female head in profile three times as long as thick (Fig. 54), scapus very short, second funicle segment almost ring-like; male flagellum covered with erect hairs as long as segment width, first funicle segment four times longer than pedicellus; Central America **drosophilae** Ashm.
- Body not extraordinarily flattened, head much thicker, scapus normal, second funicle segment in female mostly subquadrate, first funicle segment in male much shorter and pubescence of flagellum short **impuncta** How. (and *?fuscipes* Nees)
- 9 Length 2.5 mm.; Argentina **tarsalis** Brèthes
- Length 3.1 mm.; head in female oblong, gena long and closely, opaquely punctured; Brazil (Santerem) **brasiliensis** Ashm.

***Spalangia bakeri* Kieff.**

Spalangia bakeri Kieffer, 1910, Ann. Soc. ent. Fr., 78: 347—348; “♀”.

This species is not known to me but for the description which clearly shows by the form of the antennae that the type was a male. *S. bakeri* has the pronotum “lisse, brillant, ponctué sur les côtés et le long du bord antérieur”, which seems to point to a species very similar to *nigroaenea* Curt., but with a longer abdominal petiole (“3—4 fois aussi long que gros”), then probably *chontalensis* Cam. Described from Brazil, without more detailed data.

***Spalangia brasiliensis* Ashm.**

Spalangia brasiliensis Ashmead, 1904, Mem. Carnegie Mus., 1: 502; ♀.

Probably near to *nigra* Latr. (= *rugosicollis* Ashm.) but the description is rather inadequate and does not render a sufficiently clear idea of the species. It may be also seen in the key above, into which it is difficult to place the species with certainty.

***Spalangia cameroni* Perk.**

For synonymy, description, host records and distribution see above pp. 454—457. I have seen specimens which were collected in Brazil (Pernambuco, Nova Teutonia and Sao Paulo) and in the British West Indies (St. Vincent, Grenada and Balthazar).

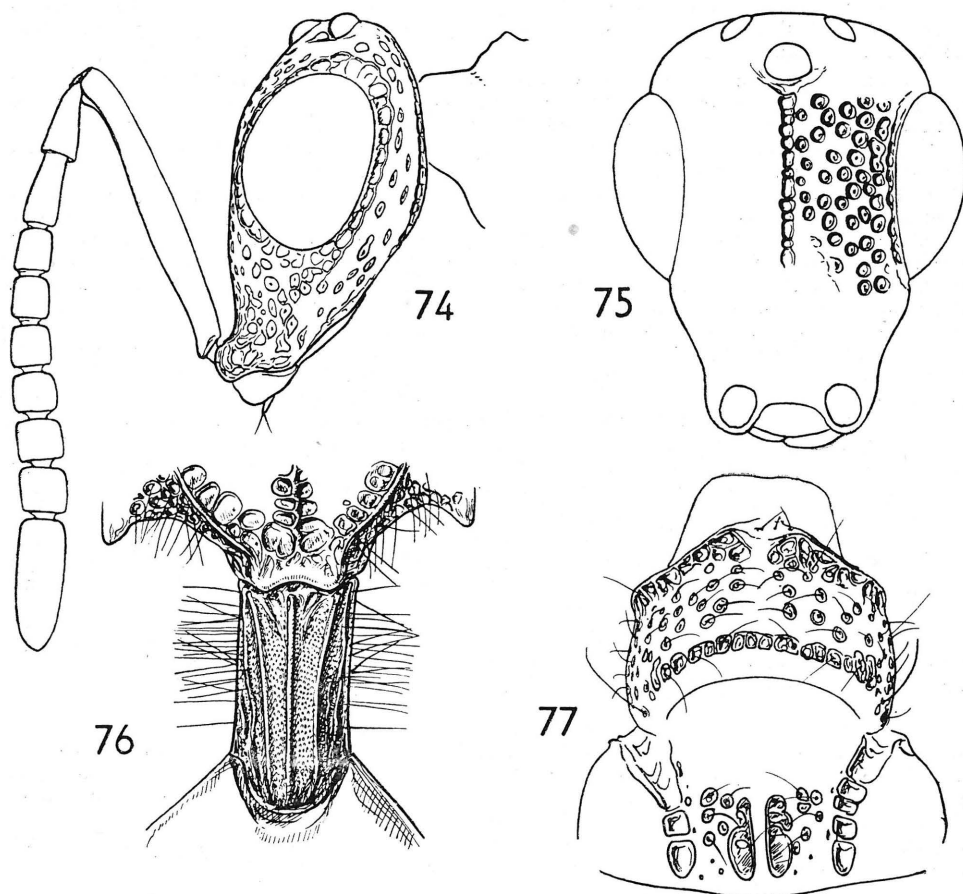
***Spalangia chontalensis* Cam.**

Spalangia chontalensis Cameron, 1884, Biol. Centr.-Amer., Ins. Hym., 1: 110, pl. 5, fig. 14; ♀.

This species is closely allied to the cosmopolitan *S. nigroaenea* Curt., with which it has in common the distinctly margined collar. *S. chontalensis*

Cam. (the type of which I could examine recently in the British Museum) has, however, in general a much coarser sculpture of head and thorax, the collar edge wavily raised, the abdominal petiole distinctly longer than in *nigroaenea*, its carinae are more plain but the bottom of the grooves is not so shiny owing to a delicate dense puncturation, then the second gastral tergite is rather deeply emarginate posteriorly, etc. Neither the type nor any of the other specimens I have seen has the peculiar character of a longitudinal furrow on the scutellum, mentioned in the original description. Probably it should have referred to the mesoprescutum.

S. bakeri Kieffer, 1910, may be a synonym to *chontalensis*, but the type could not be traced out and the original description is not adequate.



Figs. 74—77. *Spalangia chontalensis* Cam., female: Fig. 74. Head with antenna in side view. Fig. 75. Head in facial view. Fig. 76. Abdominal petiole with a part of propodeum. Fig. 77. Pronotum showing the irregularly raised anterior margin, and mesoscutum.

Female. — Head (Fig. 75) in facial view oblong (28:24.5; 39:33), with eyes large and prominent and genae more or less sinuate in outline, converging; frons densely umbilicately punctured with interspaces smooth and narrow, mostly less than one-third the puncture diameter, except on disc of frons where they are sometimes rather broad; space between ocelli and eye impunctate save for several punctures at eye margin; scrobes shallow, sublaterally shallowly alveolate, smooth in the middle; head in profile (Fig. 74) twice as long as thick, gena densely but rather irregularly punctate, as long as eye width; sulcus indistinct; hind orbita almost furrow-like, crenate; occipital carina high below but fading out before reaching level of lower eye extremity; antennal socket more or less protruding obliquely forward. Antenna (Fig. 74) long, slightly subclavate; scapus tuberculate-granulate, slightly shiny, very slender, as long as five following segments combined; pedicellus 2.2 to 2.6 times as long as broad, in the largest specimen only hardly longer than the first funicle segment; this also about 2.6:1 (but only 2:1 in the smallest specimen), following funicle segments subequal in length but slightly increasing in width: the second about one and a half as long as broad and the last three hardly longer than broad in the female of 4.2 mm., in the smallest female second funicle segment only 1.2 times and the seventh 0.9 times as long as broad; clava about as long as 2.5 preceding segments together, fully 2.5 times as long as broad.

Pronotal collum rather crowdedly umbilicately punctured except mesad, here almost smooth, only with several scattered punctures and sometimes with traces of transverse rugae. Collar (Fig. 77) anteriorly margined by high crest, interrupted in the middle and lowered sublaterally, thus forming two lateral and two submedian blunted lobes; its disc umbilicately punctate anterior to the deep and irregularly crenate cross-line at hind margin; punctures dense laterally and anteriorly, leaving smooth a broad median strip. Mesoscutum with two longitudinal submedian, more or less crenate impressions, separated by a smooth elevated line, and with some punctures outside them. Scutellum with umbilicate punctures sublaterally, frenal cross-line coarsely crenate, frenum taking up distal quarter or fifth only. Metanotum as short as frenum. Propodeum with double median alveolate row expanded anteriorly in very wide basal alveolae, median carina weak; lateral plicae blunted but distinct, archedly converging toward the short nucha, bordered on inner side by one row of alveolae; spiracular furrow widened posteriorly; postero-lateral corner rather sharp, protruding; lateral fimbriae not dense. Mesopleura smooth, with anterior oblique impression and episternal impression broad and deep, precoxal pit round and precoxal suture carinaceous. Forewing with scattered long hairs on cubital fold and on basal cell distally; prestigma narrow, as long as postmarginal vein and not separated by pale break from the long marginal vein; stigmal vein strongly bent, longer than the postmarginal.

Abdominal petiole fully twice as long as broad, subparallel-sided, with numerous erect hairs laterally; the median and submedian carinae high, the sublateral ones less regular and weak; bottom of grooves minutely punctured. Gastral tergites polished, hind margin of second tergite deeply archedly emarginate, the tergite in the middle about 2.5 times shorter than the third. Ovipositor sheaths hardly exerted.

Body black, with a very faint metallic tinge on head and thorax; tips of fore and hind tibiae, and all tarsi except the brown claw segment, testaceous. Wings usually slightly yellowish. Length (of stretched body) 2.5–4.2 mm.

Male. — Head only as long as broad, with eyes still more protruding than in female. Antenna very long, slender, filiform; scapus plainly shorter than three following segments combined (19:22); pedicellus only slightly longer than broad; first funicle segment about three times as long as broad, the second to seventh subequal, each nearly to fully twice as long as broad; clava equals in length to 1.6 preceding segment; the semierect hairs of flagellum about three times shorter than funicle width. Abdominal petiole 3 to 3.5 times as long as wide. Length of body 2.5–3.8 mm.

Variation rather wide as may be seen already from the given range of the body size, and most of its points are mentioned in the redescription above.

Host not known.

Distribution: Central and South America (Mexico, Nicaragua, British West Indies, Brazil).

Material examined. — Mexico: Vera Cruz, Atoyac, V. (H. H. Smith, Godman-Salvin Coll.). — Nicaragua: Chontales (the Type, British Museum Coll.). — British West Indies: St. Vincent, Leeward side (H. H. Smith). — Brazil: Sta. Catharina: Blumenau; Nova Teutonia, 2. VI., 29. VI., 17. XII. 1937 and 20. IV. 1938 (F. Plaumann).

***Spalangia drosophilae* Ashmead**

See above, pp. 479—481. This species was ascertained by Simmonds, 1952 [p. 533] in Trinidad, B. W. I., and is widely distributed in North America.

***Spalangia endius* Walker**

I have seen specimens of this cosmopolitan species collected in the British West Indies (St. Vincent) and in Argentina. The species was described originally from the Galapagos Islands, where its type was collected by Ch. Darwin. For more data see above pp. 458—461.

***Spalangia gemina* Bouček**

This species is described as new above (pp. 484—485) from Mauritius, India, Siam, Malaya, Fiji and Venezuela.

***Spalangia impuncta* Howard**

Spalangia impuncta Howard, 1896, Journ. Linn. Soc. Lond. Zool. **26**: 140—141; ♀.

According to the original description and the damaged type in the British Museum collection this species should be most closely allied to *S. haematobiae* Ashm. (*fuscipes*-group) and is most probably a synonym to it. The South American specimens mentioned with a query under *fuscipes* above may be also conspecific with *haematobiae*. *S. impuncta* was described from the Island of Grenada in the Antilles and has not been mentioned since in the literature.

***Spalangia nigroaenea* Curtis**

For synonymy, description, host records and distribution data concerning this species see above pp. 448—453. *S. nigroaenea* is a cosmopolitan species specimens of which I have seen also from Central America (Mexico and Haiti) and from South America (Argentina: Tucumán). Probably *S. bakeri* Kieffer, described from Brazil, is a synonym to *nigroaenea*, while *S. endius* Walk., synonymized together with *nigroaenea* with *nigra* Latr. by Walker, 1846, proved to be a different species.

***Spalangia platensis* (Brèthes), comb. n.**

Prospalangia platensis Brèthes, 1915, An. Soc. cient. Argent. **79**: 315—317; ♀ ♂.

The description of this species accompanied with figures of the female and of the male head and antenna shows clearly that it is a *Spalangia*, probably allied to *endius* Walker. From the latter, *platensis* seems to differ by a longer abdominal petiole in female, and a longer head and very long funicle segments in male. The data of head seemed rather confusing, however. It is well known that in facial view the head is always shorter in males than in females of any species in the genus *Spalangia*. In Brèthes' description and figures it is invertedly so. On my request Prof. L. De Santis of La Plata, Argentina, additionally kindly examined the types of *Prospalangia platensis* and found the above statement to be reversed. According to his letter of 21st August, 1962, *platensis* is correctly placed in my key above, where it comes nearest to *nigroaenea* Curt. (all the same I have a suspicion that the two species may be identical).

***Spalangia tarsalis* Brèthes**

Spalangia tarsalis Brèthes, 1913, An. Mus. Nac. Buenos Aires **24**: 96; ♀.

The original description hardly mentions any taxonomically valuable specific characters and thus it is difficult to gain an idea of the species. *S. tarsalis* was attributed by its own author later, in 1915 (p. 315), to the genus *Prospalangia* Brèthes. This is, however, only a synonym of *Spalangia* Latr., misunderstood from the Ashmead's key of 1904, according to which *Spalangia* should possess 12-segmented antennae in males.

S. tarsalis was described from Buenos Aires. Host unknown.

Species misplaced in *Spalangia*

***aenea* Provancher = *Trimorus aeneus* (Prov.)**

Spalangia aenea Provancher, 1887, Addit. Corr. Faune ent. Canada Hym., p. 200.

This species was transferred to *Trimorus*, Scelionidae, by Burks, 1958 (p. 92), on the authority of O. Peck, who had studied the type.

***flavipes* Fonscolombe = *Euplectrus bicolor* (Swed.)**

Spalangia? flavipes Fonscolombe, 1832, Ann. Sci. nat., Paris, **26**: 299.

This species was recognized as an "*Elachestus*" as early as 1834 by Nees (p. 428) and considered a variety of "*E. albiventris* Spin." which is a synonym of *Euplectrus bicolor* (Swed.). The synonymy was confirmed later on by Westwood who had received drawings of the species directly from Boyer de Fonscolombe (1840, vol. 2, p. 163). Also Fonscolombe himself transferred his species to *Euplectrus* in the same year (1840, p. 192).

gonatopoda Ljungh = *species dubia*

Spalangia gonatopoda Ljungh, 1823, Sven. Vetensk. Akad. Handl., 44: 268—269.

Owing to the absence of the type material in Sweden (it could be found neither in Lund nor in Stockholm) and the inadequateness of the original description, *S. gonatopoda* must be considered a *species dubia*. At any rate this species certainly does not belong to the genus *Spalangia*. In particular the words "Antenna . . . articulo basali longo secundoque brevi ferrugineis" (p. 268) and "Pedes Gonatopodum subsimiles, antici breves validi toti flavi, . . . postici . . . coxis femorum tibiarumque apicibus clavatis, nigris, de cetero flavi" (p. 269) do not fit any species of the genus and exclude it from *Spalangia*. I have an impression it could perhaps be a Bethyloid, but also then being forgotten since the description it should be put on the List of Rejected Names.

metallica Fullaw. = **Choetospila elegans** Westw.

Spalangia metallica Fullaway, 1913, Proc. Hawaii. ent. Soc., 2: 286.

S. metallica was synonymized with *Choetospila elegans* by Gahan, 1946, Proc. U. S. Natl. Mus., 96: 353, after a study of the type deposited in the U. S. National Museum in Washington.

pennisetae Risbec = **Platecrizotes sudanensis** Ferr.

Platecrizotes sudanensis Ferrière, 1934, Mitt. Schweiz. ent. Ges. 16: 91—92; ♀♂.

Spalangia pennisetae Risbec, 1951, Mém. Inst. Franç. Afr. Noire 13: 363; ♀. — **N. syn.**

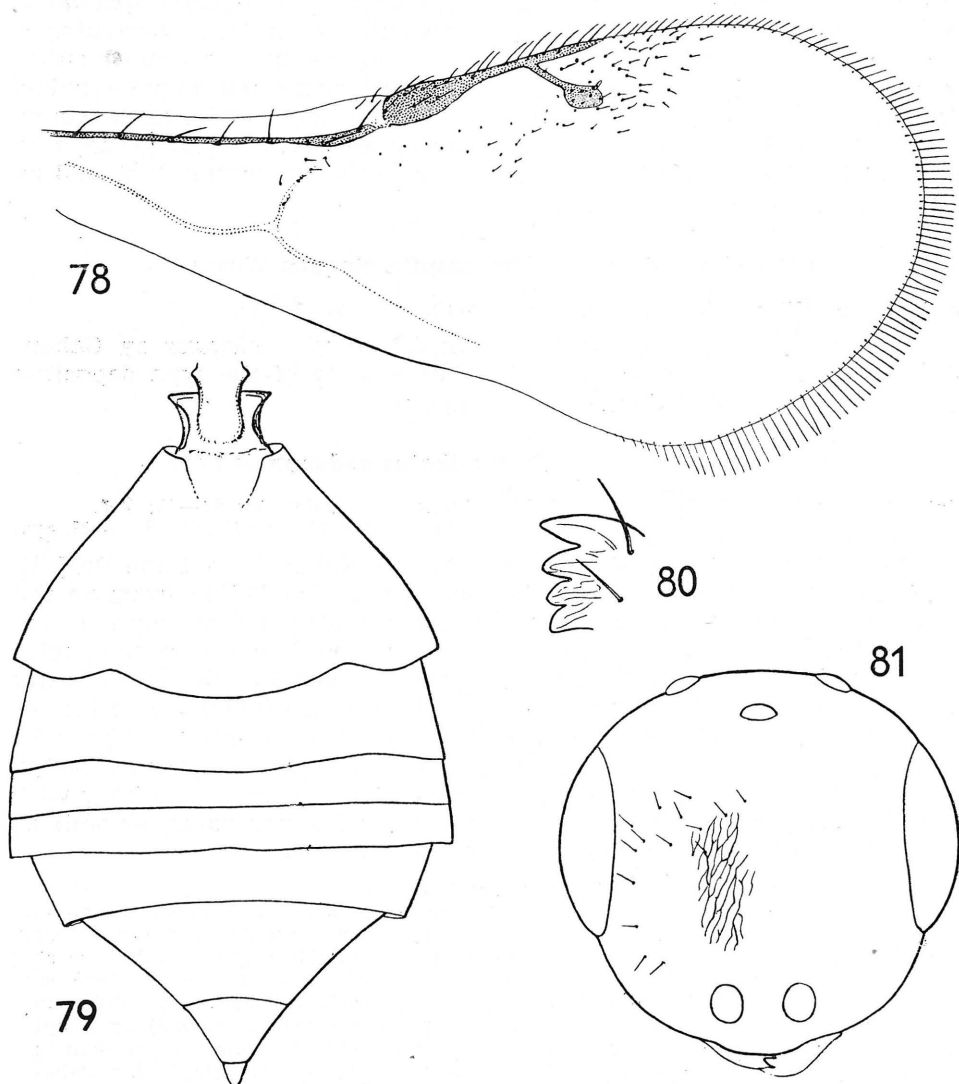
Through the courtesy of my friends Miss S. Kelner-Pillaut and Dr. J.-R. Steffan from the Paris National Museum I was enabled to examine the types of *S. pennisetae* which, as already the inadequate description suggested certainly could not belong to Spalangiinae. It is the same species as *Platecrizotes sudanensis* Ferr. the type of which I could see recently in the British Museum. *Platecrizotes* was described originally as a Pireniinae, but in my opinion it does not belong to that subfamily. It may be rather closely allied to *Pachycrepoides* Ashm., which it reminds by the configuration of the abdomen and the antennae. The depressed body with relatively large pronotum is considered to be of minor value, as well as the low insertion of the antennae.

Redescription of the genus *Platecrizotes* Ferr.

Antennae inserted far below eye margin (Fig. 81), about one diameter of antennal socket above mouth margin; 13-segmented, 11353, short (female); scape not nearly reaching ocellus, slender; pedicellus longer than first funicle segment; all three ring segments very short, strongly transverse; funicle segments transverse. Head subprognathous, subrotund (Fig. 81); face flat, scrobes rather shallow; eyes hairy; ocelli not connected by groove; vertex short, rounded off posteriorly as well as temples (these nearly wanting) and genae; malar space with distinct furrow, shorter than half the length of eye, not impressed at mouth corners; clypeus subtruncate; both mandibles 4-toothed (Fig. 80). Thorax depressed, about twice as long as broad, punctate-reticulate, sculpture nearly effaced on scutellum (only finely alutaceous).

Pronotum with collar nearly angularly (not sharply) set off and about as long as scapula, the sloping anterior part also punctulate, dorsal part narrowly smooth along hind border; propleurae strongly shifted forward, well visible from above; mesoscutum

with parapsidal furrows indistinct, transscutal suture straight, axillae subhorizontal; scutellum transverse, not divided by any furrow or sculpturally; metanotum narrow, ribbon-like, but abruptly expanded just before spiracle at either side, nearly smooth; propodeum large, horizontal, median carina vaguely indicated by an obtuse longitudinal elevation; plicae indicated anteriorly by smooth streaks; spiracle adhering to expanded metanotal margin, very small, elongate and opening sideways; callus punctate, sparsely hairy; neck somewhat indicated, with a narrow impression at either side, immargined



Figs. 78—81. *Platecrizotes sudanensis* Ferrière, female: Fig. 78. Forewing (hairs on disc omitted). Fig. 79. Abdomen. Fig. 80. Right mandible. Fig. 81. Head in facial view, with alutaceous sculpture partly indicated. (Fig. 80 drawn at twice larger scale than Figs. 78, 79 and 81.)

behind. Legs rather strong, especially femora and tibiae; basitarsus of front legs moderately widened; hind tibia with one spur; basitarsus of hind legs as long as two following segments combined. Forewing (Fig. 78): submarginal vein with a pronounced prestigma, then a pale break, marginal vein unusually swollen in basal half, slender in the apical, about twice as long as stigmal, which is distinctly knobbed and about as long as the pale postmarginal; marginal ciliation apically shorter than stigmal vein; basal fold with several hairs, the cubital nearly bare, speculum extended below marginal vein up to the stigmal. Hindwing with several hairs on distal half of costal cell. Pleurae of thorax turned ventrad, nearly smooth; prepectus punctate, very large, broadly connected medially; mesolcus fine; prosternum rather large with a deep longitudinal groove; propleura large, its ventral face larger than that of procoxa.

Body of abdominal petiole (for abdomen see Fig. 79) sharpangular, nearly twice as broad as long, punctate all over, with central part raised and protruding into the propodeal orifice; gaster of female flat, oval-pointed, broader and shorter than thorax; first tergite occupying about one-third, its hind margin broadly rounded mesad but emarginate sublaterally; second gastral tergite shorter than first but still nearly as long as two following combined; their margins straight; fourth tergite the broadest, fifth and sixth tergites again longer; ovipositor shortly protruding; hypopygium in three-quarters of abdominal length; pubescence sparse, short, dark.

One of the four females of *S. pennisetae* (inadvertedly labelled as *S. atherigona* by its author) was designated as lectotype. Originally all four specimens of this species were mounted on one slide. They were re-mounted by me and glued to white cards, the lectotype enclosed in a gelatine capsule.

polita Say = **Epistenia polita** (Say)

Spalangius (!) *politus* Say, 1828, Contrib. Maclur. Lyc. Philadelphia, 1: 79.

This species was recognized as an *Epistenia* and removed from *Spalangia* by Peck, 1951 (p. 567), in the Catalogue of the North American Hymenoptera.

rhizoperthae Risbec = **Choetospila elegans** Westw., n. syn.

Spalangia rhizoperthae Risbec, 1951, Mém. Inst. Franç. Afr. Noire, 13: 365.

According to Dr. Steffan, who examined the type in the Paris National Museum, this species is a synonym of *Choetospila elegans* Westw. as the original description already suggested. Through the courtesy of Dr. P. Basilewsky, Tervuren, I could examine a series of specimens identified by Dr. Risbec as *Platecrizotes* (sic!) *rhizoperthae*, which contained, apart from two other species, mostly *Ch. elegans*.

Host-parasite catalogue of *Spalangia*

DIPTERA

<i>Atherigona quadripunctata</i> Rossi, Muscidae	<i>S. cameroni</i> Perk. (Senegal)
<i>Calliphora augur</i> F., Calliphoridae	<i>S. nigroaenea</i> Curt. (Australia)
<i>Ceratitis anonae</i> Grhm., Trypetidae	<i>S. afra</i> Silv. (Nigeria)
<i>Ceratitis capitata</i> (Wied.), Trypetidae	<i>S. endius</i> Walk. (Hawaii)
<i>Ceratitis colae</i> Silv., Trypetidae	<i>S. afra</i> Silv. (Africa, labor.)
<i>Ceratitis (Pardalaspis) cyanescens</i> see	
<i>Pardalaspis</i>	

- Ceratitis giffardi* Silv., Trypetidae
Chrysomya albiceps Wied., Calliphoridae
Chrysomya dux Esch., Calliphoridae
Chrysomya megacephala F., Calliphoridae
Chrysomya rufifacies Macq., Calliphoridae
Chrysomya varipes Macq., Calliphoridae
Coprosarcophaga haemorrhoidalis Flln., Sarcophagidae
Dacus bivittatus cucumarius Sack, Trypetidae
Dacus cucurbitae Coq., Trypetidae
Dacus dorsalis Hend., Trypetidae
Dacus ferrugineus F., Trypetidae
Dacus (Chaetodacus) sp., Trypetidae
Drosophila melanogaster Meig., Drosophilidae
Fannia leucosticta Meig., Muscidae
Fannia scalaris F., Muscidae
Haematobia serrata see *Lyperosia irritans*
Hydrotaea australis Mall., Muscidae
Hydrotaea dentipes Flln., Muscidae
Hylemyia see *Phorbia*
?Lucilia sericata Meig., Calliphoridae
Lucilia sp., Calliphoridae
Lyperosia exigua Meig., Muscidae
Lyperosia irritans [L.], Muscidae
?Megaselia iroquoiana Mall., Phoridae
Meromyza americana Fitch, Chloropidae
Metagonistylum minense Tns., Tachinidae
Milichia ludens Wahl., Milichiidae
Musca domestica L., Muscidae
Musca domestica vicina Macq., Muscidae
Musca fergusonii Jhnst. Bancr., Muscidae
Musca gibsoni auct., Muscidae
Musca hilli Jhnst. Bancr., Muscidae
Musca humilis Wd., Muscidae
S. afra Silv. (Africa, labor.)
S. endius Walk. (Tanganyika)
S. nigroaenea Curt. (Australia)
S. endius Walk. (Tanganyika)
S. nigroaenea Curt. (Australia)
S. nigroaenea Curt. (Australia)
S. cameroni Perk. (Uzbekistan), *S. endius* Walk. (Uzbekistan)
S. afra Silv. (Zanzibar)
S. cameroni Perk. (Hawaii), *S. nigra* Latr. (Hawaii)
S. endius Walk. (Hawaii), *S. gemina* Bčk. (Malaya)
E. endius Walk. (India)
S. cameroni Perk. (Fiji)
S. drosophilae Ashm. (U. S. A.)
S. cameroni Perk., *S. endius* Walk., *S. nigripes* Curt. (all in Uzbekistan)
S. cameroni Perk., *S. endius* Walk., *S. nigripes* Curt. (all in Uzbekistan)
S. endius Walk. (Australia)
S. cameroni Perk. (Czechoslovakia)
S. nigroaenea Curt. (U. S. A.)
S. nigripes Curt. (Switzerland), *S. nigroaenea* Curt. (France, Australia)
S. cameroni Perk. (Fiji, Solomon Is.), *S. endius* Walk. (N. Australia), *S. nigroaenea* Curt. (Java, Australia, Solomon Is.)
S. cameroni Perk. (Hawaii, Fiji), *S. drosophilae* Ashm. (Texas), *S. endius* Walk. (Texas, Hawaii), *S. haematobiae* Ashm. (U. S. A.), *S. nigra* Latr. (U. S. A.), *S. nigroaenea* Curt. (Texas)
S. nigroaenea Curt. (U. S. A.)
S. drosophilae Ashm. (Canada)
S. gemina Bčk. (Venezuela)
S. crassicornis Bčk. (England)
S. cameroni Perk. (U. S. S. R. — N. Caucasus; Mauritius), *S. drosophilae* Ashm. (U. S. A., labor.), *S. endius* Walk. (Nyasa-land, Mauritius, Philippines, California, Texas), *S. nigra* Latr. (U. S. A., England), *S. nigripes* Curt. (France), *S. nigroaenea* Curt. (Czechoslovakia, France, South U. S. S. R., U. S. A., Australia, New Zealand, Mauritius), *S. platensis* (Breth.) (Argentina).
S. cameroni Perk. (Fiji), *S. endius* Walk. (Uzbekistan), *S. nigripes* Curt. (Uzbekistan), *S. nigroaenea* Curt. (Uzbekistan)
S. nigroaenea Curt. (Australia)
S. muscophaga Grt. (Queensland)
S. nigroaenea Curt. (Australia)
S. endius Walk. (S. Rhodesia), *S. nigroaenea* Curt. (S. Rhodesia)

Musca sorbens Wd., Muscidae

Musca sp., Muscidae

Musca terraereginae Jhnst. Bancr.,
Muscidae

Musca vetustissima Walk., Muscidae

Muscina stabulans Flln., Muscidae

Neopollenia stygia F., Calliphoridae

Ophyra anthrax Meig., Muscidae

Orthellia (= *Cryptolucilia*) sp. Muscidae

Oscinella carbonaria (Loew), Chloropidae

Oscinella frit (L.), Chloropidae

Oscinella minor (Adams), Chloropidae

Oscinella soror Macq., Chloropidae

Paracalliphora augur (L.), Calliphoridae

Paratheresia claripalpis (Wulp), Tachini-
dae, in *Diatraea saccharalis* (F.)

Pardalaspis cyanescens auct., Trypetidae

Pegomyia sp., Muscidae

Phaonia corbetti Mall., Muscidae

Phaonia querceti Bché., Muscidae

Phorbia antiqua (Meig.), Muscidae

Phorbia cinerea Flln., Muscidae

Phorbia platura (Meig.), Muscidae

Phyllomyza lasiae Collin, Milichiidae

Physiphora demandata F., Ulidiidae

Pycnosoma rufifacies see *Chrysomyia*

Ravinia striata F., Sarcophagidae

Rhagoletis completa Cress. (= *suavis* auct.),
Trypetidae

Sarcophaga dux Thoms., Sarcophagidae

Sarcophaga effrenata Walk., Sarcophagidae

Sarcophaga frontalis auct., Sarcophagidae

Sarcophaga impar Aldr., Sarcophagidae

Sarcophaga impatiens Walk., Sarcophagidae

Sarcophaga sp.

Sarcophaga sueta Wulp, Sarcophagidae

Stomoxys calcitrans (L.), Muscidae

Stomoxys sp.

Syrirta pipiens L., Syrphidae

?*Thomasiella eryngii* (Perris), Cecidomyi-
dae

S. endius Walk. (Uzbekistan; Samoa),

S. nigroaenea Curt. (Uzbekistan)

S. cameroni Perk. (Hawaii, Fiji)

S. nigroaenea Curt. (Australia)

S. nigroaenea Curt. (Australia)

S. rugulosa Först. (Uzbekistan)

S. nigroaenea Curt. (Australia)

S. cameroni Perk., *S. stomoxysiae* Grt.
(both in Uzbekistan)

S. endius Walk. (Texas)

S. drosophilae Ashm. (Canada)

S. drosophilae Ashm. (Canada), *S. fuscipes*

Nees (Europ. U. S. S. R., Bulgaria,

?Germany)

S. drosophilae Ashm. (Canada)

S. drosophilae Ashm. (Canada)

S. nigroaenea Curt. (Australia)

S. drosophilae Ashm. (Trinidad), *S. nigro-
aenea* Curt. (Peru)

S. gemina Bčk. (Mauritius)

S. erythromera brachyceph Bčk. (Germany)

S. nigroaenea Curt. (Solomon Is.)

S. cameroni Perk. (Czechoslovakia), *S. ni-
groaenea* Curt. (Uzbekistan), ?*S. endius*
Walk. (Czechoslovakia)

S. nigra Latr. (Canada)

S. erythromera brachyceph Bčk. (Switzer-
land)

S. erythromera brachyceph Bčk. (Germany)

S. crassicornis Bčk. (England)

S. subpunctata Först. (Uzbekistan)

S. cameroni Perk., *S. endius* Walk., *S. ni-
groaenea* Curt. (all in Uzbekistan)

S. nigra Latr. (U. S. A.)

S. nigroaenea Curt. (Australia)

S. endius Walk. (Texas)

S. nigroaenea Curt. (Australia)

S. endius Walk. (Texas)

S. nigroaenea Curt. (Australia)

S. endius Walk. (Samoa), *S. nigroaenea*
Curt. (France, Australia)

S. endius Walk. (Texas)

S. cameroni Perk. (England, Czechoslova-
kia, Nyasaland, Fiji), *S. endius* Walk.
(Czechoslovakia, Texas), *S. nigra* Latr.
(Texas), *S. nigroaenea* Curt. (U. S. A.,
Czechoslovakia, Nyasaland), *S. platensis*
(Brèth.) (Argentina)

S. nigra Latr. (U. S. A.), *S. nigroaenea* Curt.
(Java)

S. subpunctata Först. (Caucasus)

S. fuscipes Nees (France)

HYMENOPTERA

<i>Alysia ridibunda</i> Say, Braconidae	<i>S. drosophilae</i> Ashm. (Texas)
<i>Eucoila rufocincta</i> (Kieff.), Eucillidae	<i>S. drosophilae</i> Ashm. (Texas)
<i>Hexacola</i> sp., Eucillidae	<i>S. drosophilae</i> Ashm. (Canada)
<i>Loxotropa</i> sp., Diapriidae	<i>S. drosophilae</i> Ashm. (Canada)

LEPIDOPTERA

<i>Adisura atkinsoni</i> Moore, Agrotidae	<i>S. gemina</i> Bčk. (India)
<i>Coleophora giraudi</i> Rag., Coleophoridae	? <i>S. nigra</i> Latr. (U. S. A.)
? <i>Cryptophlebia pallifimbriana</i> B., Olethreutidae	<i>S. gemina</i> Bčk. (Fiji)
<i>Pyralis farinalis</i> (L.), Pyralidae	<i>S. nigra</i> Latr. (U. S. A.)
<i>Recurvaria milleri</i> Busc., Gelechiidae	<i>S. drosophilae</i> Ashm. (U. S. A.: California)

REFERENCES

- Ashmead W. H., 1887: Studies on the North American Chalcididae, with descriptions of new species, chiefly from Florida. — *Trans. Amer. ent. Soc.* **14**: 183—203.
- Ashmead W. H., 1896: A synopsis of the Spalanginae of North America. — *Proc. ent. Soc. Wash.* **3**: 27—37.
- Ashmead W. H., 1901: Hymenoptera parasitica. — *Fauna Hawaiiensis* **1**: 277—364, pls. VIII—IX.
- Ashmead W. H., 1904: Classification of the Chalcid flies or the superfamily Chalcidoidea, with descriptions of new species in the Carnegie Museum, collected in South America by Herbert H. Smith. — *Mem. Carnegie Mus.* **1**: I—XI, 225—551, pls. XXXI—XXXIX.
- Bouché P. F., 1834: *Naturgeschichte der Insecten*. — Berlin; 216 pp., 10 pls.
- Brèthes J., 1913: Himenópteros de la América meridional. — *An. Mus. Nac. Buenos Aires* **24**: 35—160.
- Brèthes J., 1915: Sur *Prospalangia platensis* (n. gen., n. sp.) et sa biologie. — *An. Soc. cient. Argent.* **79**: 314—320.
- Cameron P., 1881: Notes on Hymenoptera, with descriptions of new species. — *Trans. ent. Soc. Lond.* **1881**: 555—577.
- Cameron P., 1884: Fam. Chalcididae, pp. 81—135. — *Biologia Centrali-Americana, Insecta, Hymenoptera*, vol. 1.
- Clausen C. P., King J. L., Cho Teranishi, 1927: The parasites of *Popilia japonica* in Japan and Chosen (Korea) and their introduction into the United States. — *U. S. Dept. Agr. Bull.* **1429**: 1—55, pl. I.
- Curtis J., 1839: *British Entomology*, being illustrations and descriptions of the genera of insects found in Great Britain and Ireland. Vol. XVI. — London.
- Dalman J. W., 1820: Försök till uppställning af insectenfamiljen Pteromalini, i synnerhet med afseende på de i Sverige funne arter. — *Sven. Vetensk. Akad. Handl.* **41**: 123—174, 340—385. (Seen a reprint with separate pagination, I—XI, 1—48, Addenda 49—96).
- Domenichini G., 1953: Studio sulla morfologia dell'addome degli Hymenoptera Chalcidoidea. — *Boll. Zool. agr. Bachicolt.* **19** (3): 1—116, pl. I.
- Donisthorpe H., 1927: The guests of British ants, their habits and life histories. — London; 244 pp.
- Donisthorpe H., 1938: Observations on a colony of *Acanthomyops* (*Dendrolasius*) *fuliginosus*, Latr., for 23 years. — *Ent. Rec.* **50**: 73—76.
- Dresner E., 1954: Observations on the biology and habits of pupal parasites of the oriental fruit fly. — *Proc. Hawaii. ent. Soc.* **15**: 299—310.
- Ferrière Ch., 1933: Note sur les parasites de *Lyperosia exigua* de Meij. — *Rev. suisse Zool.* **40**: 637—644.

- Fonscolombe B. de, 1832: Monographia Chalciditum Galloprovinciae circa Aquas Sextias degentium. — *Ann. Sci. Nat. Paris*, **26**: 186—192.
- Fonscolombe B. de, 1840: Addenda et errata ad monographiam Chalciditum, Galloprovinciae circa Aquas Sextias degentium. — *Ann. Sci. nat. Paris*, s. 2, **13**: 273—307.
- Förster A., 1850: Eine Centurie neuer Hymenopteren. Dritte Dekade. — *Verh. naturh. Ver. preuß. Rheinl. Westph.* **7**: 501—518.
- Förster A., 1851: Eine Centurie neuer Hymenopteren. Vierte und fünfte Dekade. — *Verh. naturh. Ver. preuß. Rheinl. Westph.* **8**: 1—42, pl. 1.
- Fullaway D. T., 1913: Report on a collection of Hymenoptera made in Guam, Marianne Islands. — *Proc. Hawaii. ent. Soc.* **2**: 282—290.
- Fullaway D. T., 1917: Description of a new species of Spalangia. — *Proc. Hawaii. ent. Soc.* **3**: 292—293.
- Fullaway D. T., 1917: Report on beneficial insects. — *Territ. Hawaii Board Agric. Forest. Div. Ent. Rept. j. bienn. Period end. Dec. 31, 1916*, pp. 105—109.
- Girault A. A., 1913: Australian Hymenoptera Chalcidoidea — VI. The family Pteromalidae with descriptions of new genera and species. — *Mem. Queensl. Mus.* **2**: 303—334.
- Girault A. A., 1915: Australian Hymenoptera Chalcidoidea — VI. Supplement. — *Mem. Queensl. Mus.* **3**: 313—346.
- Girault A. A., 1916: Descriptions of four new species of North American Pteromalidae. — *Soc. ent.* **31**: 56—58.
- Girault A. A., 1920: New Serphoid, Cynipoid and Chalcidoid Hymenoptera. — *Proc. U. S. Natl. Mus.* **58**: 177—216.
- Girault A. A., 1929: Notes on, and descriptions of, Chalcid wasps in the South Australian Museum. — *Trans. R. Soc. South Austral.* **53**: 309—346.
- Girault A. A., 1931: Hymenoptera, Thysanoptera Nova Australiensis. — Priv. Publ., Brisbane, 2 pp.
- Girault A. A., 1932: Hymenoptera, Thysanoptera Nova Australiensis. II. — Priv. Publ., Brisbane, 1 p.
- Girault A. A., 1933: Some Beauties Inhabitant not of Commercial Boudoirs but of a Nature's Bosom, notably New Insects. — Priv. Publ., Brisbane, 5 pp.
- Girault A. A., 1933: Some Beauties Inhabitant not of the Boudoirs of Commerce but of Nature's Bosom — New Insects. — Priv. Publ., Brisbane, 2 pp.
- Girault A. A., 1934: Miridae et Hymenoptera Nova Australiensis. — Priv. Publ., Brisbane, 3 pp.
- Graham L. F., 1932: Descriptions of two new species of the genus Spalangia Latreille (Pteromalidae) from Northern Australia and the Sunda Islands. — *Pamphl. Commonw. Austral. Counc. sci. ind. Res.*, **31**: 21—24 (Appendix to Handschin's paper).
- Graham-Smith G. S., 1919: Further observations on the habit and parasites of common flies. — *Parasitology* **11**: 347—384, pls. XVIII—XIX.
- Haliday A. H., 1833: An essay on the classification of the parasitic Hymenoptera of Britain, which correspond with the Ichneumonones minuti of Linnaeus. — *Ent. Mag.* **1**: 259—276, 333—350, 480—491 (part, continued).
- Handschin E., 1932: A preliminary report on investigations on the buffalo fly (*Lyperosia exigua* de Meij.) and its parasites in Java and Northern Australia. — *Pamphl. Commonw. Austral. Counc. sci. ind. Res.* **31**: 1—24 (Incl. Appendix by L. F. Graham).
- Handschin E., 1934: Studien an *Lyperosia exigua* Meijere und ihren Parasiten. II. Teil. Die natürlichen Feinde von *Lyperosia*. — *Rev. suisse Zool.* **41**: 1—71.
- Howard L. O., 1896: On the Chalcididae of the Island of Grenada, B. W. I. — *Journ. Linn. Soc. Lond. Zool.* **26**: 129—178.
- Howard L. O., 1911: The House Fly — Disease Carrier. — New York, Stokes & Comp.
- Johnston T. H., Bancroft M. J., 1920: Notes on the Chalcid parasites of Muscoid flies in Australia. — *Proc. R. Soc. Queensl.* **32**: 19—30.

- Johnston T. H., Tiegs O. W., 1921: On the biology and economic significance of the Chalcid parasites of Australian sheep maggot-flies. — *Proc. R. Soc. Queensland* **33**: 99—128.
- Kieffer J. J., 1905: Über myrmekophile Hymenopteren. — *Berlin. ent. Ztschr.* **50**: 1—10.
- Kieffer J. J., 1910: Description de nouveaux microhyménoptères du Brésil. — *Ann. Soc. ent. Fr.* **78**: 287—348.
- Latreille P., 1805: Histoire naturelle, générale et particulière des Crustacées et des Insectes, XIII. — Paris, 432 pp.
- Latreille P., 1806, 1809: Genera Crustaceorum et Insectorum secundum ordinem naturalem in familias disposita, iconibus exemplisque plurimis explicata. I (1806), IV (1809). — Parisiis et Argentorat.
- Lindquist A. W., 1936: Parasites of horn-fly and other flies breeding in dung. — *Journ. econ. Ent.* **29**: 1154—1158.
- Ljungh S. I., 1824: Nya insecter, utur egen samling. — *Sven. Vetensk. Akad. Handl.* **1823**: 265—273.
- Masi L., 1917: Chalcididae of the Seychelles Islands. — *Novit. zool.* **24**: 121—230.
- Masi L., 1940: Descrizione di Calcididi raccolti in Somalia dal Prof. G. Russo con note sulle specie congeneri. — *Boll. Lab. Ent. agr. Portici* **3**: 247—324.
- Nees Ch. G. ab Esenbeck, 1834: Hymenopterorum Ichneumonibus affinium monographiae, genera europaea et species illustrantes, II. — Stuttgartiae et Tubingae; 448 pp.
- Nikolskaya M. N., 1937: Паразиты злаковых мушек и комариков из семейства Chalcididae (Hymenoptera). The Chalcidoid parasites (Hymenoptera) of some injurious flies of the grain crops. — *Rev. Ent. U. R. S. S.* **27**: 3—27.
- Parker H. L., 1924: Recherches sur les formes post-embryonnaires des Chalcidiens. — *Ann. Soc. ent. Fr.* **93**: 261—379, pls. 2—39.
- Parker H. L., Thompson W. R., 1928: Contribution à la biologie des Chalcidiens entomophages. — *Ann. Soc. ent. Fr.* **97**: 425—465.
- Peck O., 1951: Chalcidoidea; in Muesebeck et al., Hymenoptera of America north of Mexico — synoptic catalog. — *U. S. Dept. Agr. Agric. Monogr.* **2**: 410—594.
- Perron J. P., 1954: *Spalangia rugosicollis* Ashm. (Hymenoptera: Chalcidoidea), a new parasite of the onion maggot, *Hylemyia antiqua* (Mg.) (Diptera: Anthomyiidae). — *Canad. Ent.* **86**: 222.
- Pinkus H., 1913: The life history and habits of *Spalangia muscidarum* Richardson, a parasite of the stable fly. — *Psyche* **20**: 148—158.
- Provancher, 1887: Additions et corrections au volume II. de la Faune entomologique du Canada traitant des Hyménoptères. — Quebec.
- Richardson C. H., 1913a: An undescribed hymenopterous parasite of the housefly. — *Psyche* **20**: 38—39, pl. 1.
- Richardson C. H., 1913b: Studies on the habits and development of a hymenopterous parasite, *Spalangia muscidarum* Rich. — *Journ. Morph.* **24**: 513—557.
- Riggert E., 1935: Untersuchungen über die Parasiten der Fritfliege. — *Arb. physiol. angew. Ent.* **2**: 1—23.
- Risbec J., 1951: Les Chalcidoïdes d'A. O. F. — *Mém. Inst. Franç. Afr. Noire* **13**: 5—409.
- Risbec J., 1952: Contribution à l'étude des Chalcidoïdes de Madagascar. — *Mém. Inst. sci. Madagascar E*, **2**: 1—449.
- Severin H. H. P., Severin H. C., Hartung W. J., 1914: The ravages, life-history, weights of stages, natural enemies and methods of control of the melon fly (*Dacus cucurbitae*, Coq.). — *Ann. ent. Soc. Amer.* **7**: 178—207, 6 pls.
- Silvestri F., 1913: Viaggio in Africa per cercare parassiti di mosce dei frutti. — *Boll. Lab. Zool. gen. agr. Portici* **8**: 1—164.
- Silvestri F., 1914: Report of an expedition to Africa in search of the natural enemies of fruit flies (Trypanidae) with descriptions, observations and biological notes. — *Territ. Hawaii Board Agric. Forest. Div. Ent. Bull.* **3**: 1—176, pls. 1—24, 1 map.

- Simmonds F. J., 1944: The propagation of insect parasites on unnatural hosts. — *Bull. ent. Res.* **35**: 219—226.
- Simmonds F. J., 1946: A factor affecting diapause in hymenopterous parasites. — *Bull. ent. Res.* **37**: 95—97.
- Simmonds F. J., 1952: Parasites of the frit-fly, *Oscinella frit* (L.), in Eastern North America. — *Bull. ent. Res.* **43**: 503—542.
- Simmonds F. J., 1953a: Inter-relationship of the parasites of the frit-fly, *Oscinella frit* (L.), in Eastern North America. — *Bull. ent. Res.* **44**: 387—393.
- Simmonds F. J., 1953b: Observations on the biology and mass-breeding of *Spalangia drosophilae* Ashm. (Hymenoptera, Spalangidae), a parasite of the frit-fly, *Oscinella frit* (L.). — *Bull. ent. Res.* **44**: 773—778.
- Simmonds F. J., 1954: Host finding and selection by *Spalangia drosophilae* Ashm. — *Bull. ent. Res.* **45**: 527—537.
- Simmonds F. J., 1956: Superparasitism by *Spalangia drosophilae* Ashm. — *Bull. ent. Res.* **47**: 361—376.
- Simmonds H. W., 1929: Introduction of *Spalangia cameroni*, parasite of the housefly, into Fiji. — *Agric. Journ. Fiji* **2** (1): 35.
- Spinola M., 1808: Insectorum Liguriae species novae aut rariores, . . . , II (fasc. 2, 3, 4). — Genuae.
- Thompson W. R. and others, 1958: A catalogue of the parasites and predators of insect pests, Sect. 2, Part 5. Hosts of the Hymenoptera (Miscogasteridae to Trigonalidae), Lepidoptera and Strepsiptera. — Ottawa, Canada, pp. 561—698.
- Thomson C. G., 1875—1876: *Pteromalus* (Svederus). — *Hymenoptera Scandinaviae* **4**: 1—259.
- Walker F., 1839: *Monographia Chalciditum*. Vol. II. Species collected by C. Darwin, Esq. — London; pp. 1—100.
- Walker F., 1846: List of the specimens of Hymenopterous insects in the collection of the British Museum. Part I. — *Chalcidites*. — London; pp. 1—100.
- Walker F., 1848: List of the specimens of Hymenopterous insects in the collection of the British Museum. Part II. — *Chalcidites*. Additional species. — London; pp. 99—237.
- Westwood J. O., 1840: An introduction to the modern classification of insects, founded on the natural habits and corresponding organisation of the different families, II. — London, pp. 11+587.

Summary

The present paper brings, in separate chapters, 1) a revision of the Holarctic species of the genus *Spalangia* Latr., 2) a review of, with a tentative key to, the African and Oriental species, 3) a review of the species known in Australia and the Pacific Islands, and 4) a review accompanied by a tentative key, of the Neotropical species. In additional chapters the species misplaced in *Spalangia* are dealt with (with redescription of the genus: *Platecrizotes* Ferr.) and the known host-parasite relations are listed. Seven species and one subspecies are described as new to science and many names are dropped as new synonyms, mostly after previous studies of the types in question. All the species well known to the author are redescribed. The data at each species contain information on the type material, discussions of the synonymy, systematic position of the species, review of its host-relations, our knowledge of the developmental stages, life-history and behaviour, then geographical distribution and information on the material examined by the author.

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