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THE NEW WORLD SPECIES OF THE GENUS SOLENOPSIS (HYMENOP. FORMICIDAE).

BY WILLIAM S. CREIGHTON.

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Part 1.

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Carlo Emery once characterized the genus Solenopsis as the *crux myrmecologorum*. That the term is apt no one who has experienced the difficulties of the group will deny, least of all the author who, at the end of three years of study, still finds the "cross" a heavy burden. At the inception of the work there was little thought that it would assume its present proportions. Its growth has necessitated constant restriction but, even after lopping off all the Old World species, the bulk of the remainder is extremely unwieldy. It therefore seemed advisable, since the monograph can be divided into two parts, to publish these separately. The present paper presents an analysis of the species in the subgenera *Solenopsis*, *Euophthalma*, *Diagyne* and *Oedaleocerus*. The subgenus *Diplorhoptrum* will be dealt with in a subsequent publication.

The author is glad to avail himself of the opportunity to acknowledge here the help which he has received. It is impossible to thank Dr. W. M. Wheeler in adequate measure for his support. His generosity in allowing me access to his collection, his counsel and most of all the inspiration which has been derived from association with him have made the present work possible. I also wish to express my sincere thanks to Dr. F. Santschi of Kairouan, Tunis, who generously sent me many specimens of South American forms, without which this work would have been seriously handicapped. My thanks are also due Dr. W. M. Mann and Dr. M. R. Smith for the gift of specimens. I wish also to express my gratitude to my friends Dr. C. T. Van Aller and Mr. H. P. Löding for material sent me and further for their coöperation while I was engaged in field work near Mobile, Ala.

The genus Solenopsis is at present represented by approximately one hundred species, two-thirds of which occur in the New World. In the remaining third, six species are known from the Ethiopian region, eleven from the lands adjacent to the Mediterranean, eight are Asiatic, five Polynesian, while a single species occurs in Australia

[1]Contributions from the Entomological Laboratory of Harvard University, No. 326.

and another in Tasmania. The Asiatic species, particularly those from China, show a strong relationship to European forms and it is probable that they represent variants of species whose range extends entirely across Europe and Asia.

The distribution of the species in the New World gives a great preponderance of South American forms. Of the sixty-odd species approximately twenty per cent are peculiar to North America, twenty per cent are indeterminate occurring either in the Antilles or Central America or ranging over both continents, and sixty per cent are indigenous to South America. It may be argued that the numerical superiority of the South American forms proves that continent to be the center of distribution of the genus. This view is, however, open to question. When we consider the amount of each continent which is included in the tropics the difference in the number of forms becomes more explicable. In addition the two species, *geminata* and *globularia*, whose range includes the Antilles, North and South America are unquestionably of Antillean origin. Furthermore the existence of a number of "couples" of closely related species one member of which occurs in North America while the other is native to South America points to an Antillean origin for the group.

The genus Solenopsis has always been extraordinarily intractable in the matter of subdivision. The older workers were satisfied with a very loose split into two groups, one of which was designated the "*geminata* group" while the other was usually referred to simply as the "small species." The first subgenus to be set up was *Synsolenopsis*. This was erected by Forel in 1918 on the basis of a single, aberrant female. This insect, to which he gave the specific name, *bruchi*, differed principally in the presence of spines on the epinotum and was thought by Forel to be a parasitic form. In 1923 Santschi described the worker of an ant which he called *Synsolenopsis photophila*. This insect also had spines on the epinotum and this character was the basis for its inclusion in the subgenus *Synsolenopsis*. In the same paper Santschi changed the name of *bruchi* to *bruchiella*, since the former name was preoccupied. In the last analysis the confirmation of Santschi's supposition depends upon the discovery of the female of *photophila*, but the presence of epinotal spines in both forms certainly appears to indicate relationship. Forel's description of *bruchiella* is rather meager, but in the case of *photophila* Santschi has not only given a very complete account of the worker but has figured it as well. A study of these has convinced me that the differences shown by this

insect are more than sufficient for generic status. In addition to the presence of epinotal spines the pronotum and mesonotum are finely striate and the eyes are very large and reniform. There is no species in the genus Solenopsis which shows either of the first two characters and only one, *S. macrops*, in which the eyes are at all comparable to those of *photophila*. The eyes of *macrops*, however, although large and elongate, are suboval and borne far forward with the anterior border very close to the insertion of the mandibles and well toward the ventral surface of the head. In *photophila* the eyes are further removed from the base of the mandibles and more dorsal in position. I therefore propose to regard Synsolenopsis as a separate genus.

In 1923 Santschi erected the subgenus *Diagyne* for *S. succinea*. had long been known that the very small females of this insect possess ten-jointed antennae in distinction to those of all the other species in the genus in which the antennae are of eleven joints. In addition the clypeus of both the female and worker of *succinea* is unique in that it possesses neither carinae nor teeth and is quite different in general configuration from that of any other member of the genus. This condition is approached by several species, perhaps most closely by *S. xyloni* subsp. *amblychila*, but in such cases the carinae are always present although the carinal teeth may have disappeared. The subgenus *Diagyne* is therefore quite distinct although it undoubtedly belongs in the genus Solenopsis to which, as Santschi has pointed out, it bears much the same relation as does the subgenus *Decacrema* to Crematogaster.

Neither of the divisions proposed above helped to reduce the species in the genus Solenopsis to groups of a more convenient size. The first definite step in this direction was made by Santschi in 1924. I give below a translation of the note which appeared in his publication of that date:

"The strongly dimorphic Solenopsis and generally those of large size belong to the subgenus *Solenopsis* s. str. while the small monomorphic species ought to be united in the subgenus *Diplorhoptrum*, Mayr."

While I heartily commend the spirit of Santschi's proposal I cannot agree to the proposition itself since it is morphologically unsound. In the first place it is impossible to draw any hard and fast line on the basis of polymorphism alone since the members of the genus, taken collectively, present a very complete series of stages from well-developed polymorphism to monomorphism. Secondly, there are

certain constant structural features which are in many cases entirely independent of size, that permit the establishment of clearly delimited subgenera within the group. These differences may be most readily presented in the form of a key after which the subgenera will be more fully characterized.

1. Female with ten-jointed antennae; the clypeus in both female and worker without teeth or carinae.....subgen. *Diagyne*
   Female with eleven-jointed antennae; the clypeus in both female and worker aways with carinae and usually with teeth.....2
2. The second and usually the third funicular joint of the worker at least one and one-half times as long as broad.....subgen. *Solenopsis*
   Second and third funicular joints of the worker at most very slightly longer than broad, usually much broader than long.....3
3. Eyes of the worker large, usually composed of twenty or more facets, or if fewer are present (never less than twelve) the postpetiole is greatly dilated.....subgen. *Euophthalma*
   Eyes of the worker small, sometimes absent, composed at most of fifteen facets, usually not more than ten.....4
4. Antennal scapes of the female greatly thickened and sharply bent; the postpetiole about two and one half times as wide as the node of the petiole.....subgen. *Oedaleocerus*
   Antennal scapes of the female not unduly thickened and gradually curved; the postpetiole not more than one and one-half times as wide as the node of the petiole.....subgen. *Diplorhoptrum*

Subgenus Diagyne Santschi.

The characteristics of this subgenus have been given on the preceding page. It is represented by a single species, *S. succinea* Emery.

Subgenus Solenopsis (Fabr.).

Strongly polymorphic species of large size. Eyes large, of thirty or more facets. The second and third funicular joints of the major worker always twice as long as broad, usually less elongate in the minor but in this caste the second joint never less than one and one-half times as long as broad and the third joint at least one and one-quarter times as long as broad. Female at least 6.0 mm. in length, usually more. Its thorax bulky only slightly narrower than the head. Type of the subgenus: *Atta geminata* Fabr.

The subgenus is made up of the following species: *bondari, gayi, geminata, tridens, saevissima* and *xyloni.*

SUBGENUS EUOPHTHALMA, SUBGEN. NOV.

Feebly polymorphic or monomorphic species not exceeding 2.7 mm. in length. The head of the worker usually quadrate. Eyes ordinarily of twenty or more facets. Second and third funicular joints very slightly longer than broad or as broad as long. Thorax usually unimpressed at the mesoepinotal suture, the suture sometimes deeply incised. Type of the subgenus: *Myrmica globularia* Fred. Smith.

It is unfortunate that it is necessary to designate *globularia* as the type of the subgenus since in some respects it is far from typical. Its extraordinary postpetiole is quite unique and moreover two of its variants are exceptional in that the eyes of the smaller workers have only twelve facets. In other regards, however, it is fairly representative. So little is known of the females of this group that no generalization concerning this caste can be made. The following species are included in the subgenus *Euophthalma: andina, globularia, huachucana, macrops, metanotalis, occulata, nigella, picquarti, schilleri* and *silvestrii.*

SUBGENUS OEDALEOCERUS, SUBGEN. NOV.

The antennal scape of the female greatly thickened, its greatest diameter at the basal third, abruptly bent at that point. Postpetiole very wide, approximately two and one-half times as wide as the node of the petiole. Worker with the same characteristics as that of the following subgenus. Type of the subgenus: *Solenopsis angulata* Emery.

The antennal modifications of the female in *S. angulata* are of such an extraordinary nature that it stands quite alone in the genus and should have subgeneric rank. It is unfortunate that these characters do not occur in the worker since their absence in that caste necessitates the examination of the female for certain subgeneric recognition.

SUBGENUS DIPLORHOPTRUM (MAYR).

Species of variable size, monomorphic to highly polymorphic. Eyes small, never more than fifteen facets present and usually less, rarely without eyes. Second and third funicular joints as broad as long or broader than long. Impression of the dorsum of the thorax at the mesoepinotal suture variable. Size and character of the female variable. Type of the subgenus: *Formica fugax* Latr.

Despite the heterogeneous nature of the species composing this

subgenus the group is exceedingly compact. Although the extremes differ greatly in size there is such a complete series of transitional forms that further subgeneric division appears to be impossible. The species may, however, be separated into a number of groups in which the characteristics are fairly consistent. The means of separation cannot be given here but will be presented in a future publication. The groups and the species which compose them are as follows:

Westwoodi Group.

gallardoi, germaini, iheringi, krockowi, orestes, patagonica, pilosula, salina, tetracantha, wasmanni, westwoodi.

Laeviceps Group.

albidula, brevipes, goeldi, laeviceps, leptanilloides, manni, (sp. nov.), *pergandei, pygmaea.*

Molesta Group.

castor, conjurata, corticalis, hammari, helena, molesta, pollux, subtilis texana, truncorum.

Azteca Group.

azteca, brevicornis.

Basalis-tenuis Group.

altinodis, basalis, decipiens, franki, clytemnestra, hayemi, hermione, latastei, picea, picta, schmalzi, spei, stricta, subadpressa, tenuis.

The above list contains several forms hitherto considered subspecies or varieties. There are also a number of previously described species missing, which have either been synonymized or dropped because of inadequate description. The reasons for these changes will be fully discussed in the section dealing with the subgenus *Diplorhoptrum.*

SUBGENUS SOLENOPSIS (FABRICIUS).

The characteristics of the members of this subgenus have been given on the preceding page. Since there has been a considerable amount of alteration within the group it seems advisable to begin the account of the subgenus with the arrangement of forms followed in this work:

S. (S.) *bondari* Santschi

S. (S.) *gayi* (Spinola)
var. *fazi* Santschi
subsp. *bruesi,* subsp. nov.

S. (S.) *geminata* (Fabr.)
= *geminata* var. *nigra* Forel
subsp. *eduardi* (Forel).
= *eduardi* var. *perversa* Santschi
subsp. *galapageia* Wheeler
subsp. *medusa* Mann.
= *eduardi* var. *bahiaensis* Santschi
subsp. *rufa* (Jerdon)
= *geminata* var. *diabola* Wheeler

S. (S.) *tridens* Forel
var. *substituta* Santschi

S. (S.) *saevissima* (Fred. Smith)
= *moelleri* var. *gracilior* Forel
var. *moelleri* (Forel)
= var. *incrassata* Forel
= var. *morosa* Santschi
= var. *pylades* Forel (Santschi emend.)
var. *perfida* Santschi
var. *richteri* Forel
= var. *tricuspis* Forel
var. *quinquecuspis* Forel
subsp. *interrupta* Santschi
= var. *macdonaghi* Santschi
subsp. *electra* Forel
var. *wagneri* Santschi

S. (S.) *xyloni* (MacCook)
var. *maniosa* (Wheeler)
subsp. *aurea* (Wheeler)
subsp. *amblychila* (Wheeler)

The variety *lehmann-nitschei* Santschi, has been dropped as impossible of certain determination.

Key to the species in the subgenus Solenopsis

1. Mandibles of the majors and larger medias abruptly curved, the teeth aborted or absent ..... *geminata*
Mandibles in all the worker castes gradually curved with three or four well-developed teeth 2
2. The antennal scape of the minor worker surpassing the occipital border 3

The antennal scape of the minor worker failing to reach the occipital border by a distance about equal to its greatest thickness.....5

3. Pronotum with strongly-marked humeral angles; two blunt, keel-like projections present at the junction of the basal and declivious faces of the epinotum.....*tridens*

Pronotum without well-marked humeral angles; no projections at the junction of the basal and declivious faces of the epinotum.....4

4. Postpetiole in all the worker castes globose when seen from above..*bondari*

Postpetiole in the majors and medias transverse when seen from above.....*saevissima*

5. Major workers with cordate heads and 3-toothed mandibles (southern U. S. and Mex.).....*xyloni*

Major workers with quadrate heads and 4-toothed mandibles (Chile and Peru).....*gayi*

S. (Solenopsis) bondari Santschi.

S. bondari, Santschi, Bull. Soc. Ent. Belg. Vol. 65, p. 236 (1925) ♀.

Worker: Length 3.0–3.5 mm. (Plate IV, figs. 7, 8, 9.)

Head, exclusive of the mandibles, as broad as long, the sides moderately convex, rather strongly narrowed at the mandibles, the occipital angles much rounded, the occiput with a narrow and feeble median impression. Clypeus strongly projecting, the clypeal teeth very divergent, each terminating in a very short tooth which is scarcely more than a blunt angle, lateral denticles reduced to feeble sinuousities on the clypeal margin, a very short and exceedingly blunt median tooth is present between the carinal teeth. Mandibles rather slender the external border feebly convex, the masticatory border armed with four large teeth. The antennal scape in repose surpasses the occipital border by an amount equal to its greatest thickness. First funicular joint somewhat longer than the following two together, joints 2–7 all longer than broad; club stout, the terminal joint approximately twice as long as the penultimate. Eyes oval, composed of thirty facets, separated from the insertion of the mandible by a distance twice as great as their maximum diameter.

Pronotum seen from above with the humeral angles much rounded. Seen in profile the promesonotum is feebly and evenly convex, the mesoepinotal suture is broad and very deep. Epinotum slightly lower than the adjacent portion of the mesonotum, its basal face virtually straight, not sharply separated from the very short declivious face. Node of the petiole in profile low, thick and obtuse, scarcely higher than thick and slightly inclined backward, the peduncle as long

or a little longer than the base of the node, its ventral tooth reduced to a tiny denticle or absent. Postpetiole in profile slightly thicker than high, obtusely rounded above, with a prominent, angular ventral projection. Seen from above the node of the petiole is four-fifths as wide as the globose postpetiole. Anterior edge of the first gastric segment truncate.

Color clear golden yellow, the abdominal segments bordered with yellowish brown. The integument has a peculiar, translucent appearance which causes the punctures to appear in sharp contrast, although they are not very large and only moderately numerous. Hairs long, erect and moderately abundant. Mandibles feebly striate, meso- and metapleurae and the declivious face of the epinotum with very fine striae, the rest smooth and shining.

Redescribed from two cotypes sent me through the kindness of Dr. Santschi. The sexual forms are unknown.

Localities: Brazil, Bahia. (Type loc.) (Bondar.)
British Guiana, Kartabo. (W. M. Wheeler.)

Bondari is very closely related to *saevissima* but may be easily distinguished by its much smaller eyes and globose postpetiole. It is also much less polymorphic. I was at first inclined to doubt that the fifteen specimens upon which this species was founded showed the entire size range of the species. However, field notes given me by Dr. Wheeler indicate that this is the case. A colony consisting of about one hundred workers was found by him in a rotten log in heavy forest in British Guiana. Although the insects varied slightly in size the difference is negligible when compared with that shown by the workers of *saevissima*. The situation of the nest was also at variance with the usual nesting sites of *saevissima*, since *saevissima* ordinarily nests in open, sunny places. The Kartabo material is slightly darker in coloration than the two cotypes which I examined and the clypeal teeth appear to be a little longer. It may represent a separate variety but, until there is more material available for comparison, I prefer to include it with the typical form.

S. GAYI (SPINOLA).

Introduction.

S. gayi is the only representative of the subgenus Solenopsis which occurs in the southern portions of the Andean coastal plain. The older records, without exception, come from an area in central Chile roughly six hundred miles in length, of which Valpariso may be

taken as the center. More recent investigations, however, have extended the range of *gayi* to Peru and future explorations in that country and northern Chile will undoubtedly add much to our knowledge of the species.

The taxonomic history of *gayi* demands only a brief explanation. The species was originally described as *Myrmica gayi* by Spinola in 1851. Seventeen years later Mayr transferred it to the genus Pogonomyrmex. Why he did so is rather difficult to see since he himself set up the genus Pogonomyrmex and could hardly have failed to note the differences of thoracic structure and sculpture mentioned in the original description of *gayi*. In 1886 he regarded the insect as identical with *S. geminata* but nine years later Emery showed that it must at least be considered of subspecific rank. Finally in 1909 Forel gave *gayi* its present position as a separate species in the genus Solenopsis. Santschi in 1923 described the variety *fazi* and a new subspecies, *bruesi* is described in the present paper.

Key to the forms of S. gayi.

1. Head of the major worker widest just behind the eyes which are composed of approximately 45 facets.....2
   Head of the major worker widest between the eyes and the insertion of the mandibles, notably narrowed behind, the eyes composed of 60–65 facets.....subsp. *bruesi*, *subsp. nov.*
2. Color sordid yellow to golden yellow.....*gayi*
   Color piceous brown.....var. *fazi*

S. gayi (Spinola).

S. gayi (Spinola),in Gay, Hist. fis. Chile, Zool., Vol. 6, p. 242 (1851). ☿ ♀ ♂. (Myrmica.)

S. gayi, Forel, Deutsche Ent. Zeitschr, p. 269 (1909).

Pogonomyrmex gayi, Mayr, Annuar. Soc. Nat. Modena, Vol. 3, p. 170 (1868).

S. geminata, Mayr. Verh. Zool-bot. Ges. Wein, Vol. 36, p. 365, 460 (1886).

S. geminata subsp. *gayi*, Emery, Act. Soc. Sci. Chili, Vol. 5, p. 11 (1895). ☿ ♀.

Worker major: Length 4.3 mm. (Plate IV, fig. 6.)

Head exclusive of the mandibles very slightly broader than long (approximately one-tenth), sides moderately convex, widest just behind the eyes, occipital angles much rounded, the occiput broadly and feebly concave. Clypeus scarcely projecting, the anterior edge virtually straight except at the median lobe which is rather sharply

marked off from the rest of the clypeus although it projects very little beyond it. Clypeal carinae divergent, very thick and rather irregular above and terminating in two long but powerful teeth; lateral denticles reduced to mere lobes at the base of the carinal teeth. At the point where the extreme lateral portion of the clypeus meets and fuses with the anterior border of the gena there is a small more or less semicircular notch. Mandibles rather short and stout, the outer border rather strongly curved but not bent as in *geminata,* masticatory border with three large, very coarse teeth and a much smaller and more acute innermost tooth. Eyes oval, of forty-five facets. The antennal scape in repose fails to reach the occipital border by a distance just equal to the length of the first funicular joint. This joint very slightly shorter than the following two together. Joints two and three twice as long as broad; the remaining small joints all somewhat shorter. Club slender, five-sixths as long as the remainder of the funiculus, the terminal joint one and three-quarter times as long as the penultimate.

Promesonotum seen from above pyriform, the humeral angles very much rounded. The almost obliterated promesonotal suture forms a chevron-shaped impression on the dorsum of the thorax. The sides are strongly constricted at the mesoepinotal suture. Seen in profile the pronotum appears rather angular. There is a short declivious anterior face and a much longer very feebly convex posterior face. The mesonotum is straight throughout except at the posterior end where it passes, by means of a very short and steep declivity, to the prominent mesoepinotal suture. Basal face of the epinotum only slightly lower than the adjacent portion of the mesonotum, not sharply separated from the much shorter declivious face. Node of the petiole in profile only slightly higher than the length of its base, the anterior face straight and descending at an angle of about seventy degrees, the summit rather narrowed, the posterior face moderately and evenly convex from crest to base, peduncle stout, as long as the base of the node, without ventral lamella or tooth. Postpetiole in profile three-fourths as high as the node of the petiole but of about equal thickness, as thick at the summit as at the base, the summit evenly convex, the anterior and posterior faces short and virtually perpendicular, the ventral face of the node rather long and sinuate. Seen from above the postpetiole is very slightly wider than the node of the petiole (approximately one-fifteenth), both are transverse, the petiole roughly trapezoidal, the postpetiole suboval in outline. Base of the first gastric segment truncate and feebly concave.

Color sordid yellow to rich golden yellow, the mandibles, anterior border of the head, a patch on the vertex, antennae and legs lighter yellow. Mandibular teeth piceous brown. Posterior borders of the gastric segments tinged with brown. Hairs moderately abundant, erect, golden, very unequal in length on the head, thorax and petiolar nodes, of more nearly uniform length on the abdomen. Punctures small but moderately numerous. Mandibles covered with very coarse, irregular, rounded striae. Striations on the genae just behind the insertion of the mandible much reduced, not reaching the anterior border of the eye. Metapleurae very feebly striate. Posterior articulations of the petiole and postpetiole striato-rugulose. The rest smooth and shining.

Worker minor: Length 2.3 mm.

Head exclusive of the mandibles one-ninth longer than broad, the sides virtually straight, the occiput flat. The antennal scape in repose fails to reach the occipital border by a distance equal to its greatest thickness. First funicular joint as long as the following two together, second joint one and one-half times as long as broad, third joint only slightly longer than broad, the remaining small joints all approximately as broad as long. Eyes of forty facets. Promesonotal suture absent. Seen from above the node of the petiole is transversely oval and the postpetiole subcircular in outline. In other regards as in the major worker.

I have seen no females of the typical *gayi*. For a description of this caste the reader is referred to the variety *fazi*.

The male of *gayi* appears to be known only from Spinola's original description a translation of which is given below:

"Male: Length 4.2 mm.

"Antennae filliform, without appearing to have a scape. First joint short, not reaching the level of the eyes. Head small, one-third narrower than the thorax, very convex and almost round. Eyes strongly projecting, coarsely granulate and occupying more than a third of the side of the head. Ocelli as in the female. Mesothorax proportionally larger and more convex. Epinotum shorter and more steeply inclined towards the back. Abdomen, wings and legs as in the female. General color of the body bright black. Joints of the antennae grey. Wings hyaline, the veins testaceous."

Localities: Chile, Coquimbo. (Type loc.) (No collector.)
Santa Rosa. (Type loc.) (No collector.)
Valpariso. (Kinberg.)

Santiago. (Silvestri.)
Talca. (Silvestri.)
Vina del Mar. (Silvestri.)
Temuco. (Silvestri.)
Peru, Lima. (C. T. Brues.)

The color of a series of specimens collected by Brues at Lima, Peru is a rich golden yellow while in the material taken by Silvestri at Talca, Chile the color is a somewhat paler yellow and less brilliant in appearance. While it is possible that the Peruvian specimens may represent a distinct variety in view of the highly variable coloration of some of the related species I consider it advisable to make no separation until more material from northern Chile is available for examination.

Solenopsis (Solenopsis) gayi var. **fazi** Santschi.

S. gayi var. *fazi*, Santschi, Rev. Suisse Zool., Vol. 30, p. 261 (1923).

This variety differs principally from the typical *gayi* in its much darker coloration. The two cotypes which I have examined are of a piceous brown with the front of the head, a median spot on the vertex, the base of the first gastric segment, the tarsi and the funicular joints yellowish brown. In the original description of *fazi* Santschi stresses the absence of the frontal furrow as an additional means of distinguishing this form. However, since the frontal furrow in the typical *gayi* is at best obsolete and often entirely absent, the distinction is without much value. The decidedly darker color of *fazi* appears to me sufficient in itself to give it varietal status.

Female: Length, 6 mm. (Plate IV, fig. 3.)

Head exclusive of the mandibles slightly broader than long, the sides strongly convex, narrowed more in the anterior than in the posterior half, the occiput flat and rather narrow because of the excessive rounding of the occipital angles. Clypeus as in the major worker (see *gayi*) but with the carinae and the carinal teeth greatly thickened. The notch in the genae behind the insertion of the mandible is less deep than in the major worker but still prominent. Mandibles as in the major worker. The antennal scapes in repose reach, or very slightly surpass, the occipital border. First funicular joint slightly longer than the following two together. Second joint one and one-half times as long as broad, the remaining joints gradually decreasing in length and increasing in width, the seventh joint slightly broader than long. Club slender, approximately five-sixths as long

as the remainder of the funiculus, the terminal joint one and one-half times as long as the penultimate. Eyes of moderate size, oval, their anterior border separated from the insertion of the mandible by a distance slightly less than half their greatest diameter, their posterior border approximately at the middle of the side of the head.

Thorax elliptical, twice as long as broad, at its widest point very slightly narrower than the head. In profile the scutum slightly overhangs the pronotum. Epinotum obtusely angular, the basal face longer than the declivious. Node of the petiole seen in profile narrowly triangular, almost twice as high as it is thick at the base, the summit rather acute, peduncle short, thick and tapering. Postpetiole as in the major worker. Seen from above both nodes are strongly transverse, the postpetiole is one and one-fourth times as wide as the node of the petiole, the latter very narrowly elliptical, postpetiole twice as thick and sub-oval in outline. Base of the first gastric segment truncate.

Color reddish brown, the anterior fourth of the head, front and vertex yellow. The scutum bears two narrow yellow bands which converge posteriorly to form a broad median band. Scutellum entirely yellow. Base of the first gastric segment yellow, the remainder of the abdomen piceous. Punctures larger and more prominent than in the major worker. Hairs moderately abundant, of irregular length, erect, golden. Upper portions of the epinotum and petiolar nodes covered with extremely fine and rather irregular striae which give those parts a somewhat duller appearance. Striae on the genae extending back to the anterior border of the eye, the base of the petiolar nodes striato-rugulose. The rest smooth and shining.

Localities: Chile, Santiago. (Type loc.) (Faz.)
Valpariso. (Hoffman.)

Solenopsis (Solenopsis) gayi subsp. **bruesi,** subsp. nov.

The major worker of this subspecies differs from that of the typical *gayi* as follows:

The head is widest between the eyes and the insertion of the mandibles, the sides are more convex, the head notably narrowed posteriorly. The occiput is unimpressed or at most very feebly impressed. The eyes are composed of 60–65 facets. The antennal scape in repose fails to reach the occipital border by a distance slightly less than the length of the first funicular joint. This joint as long as the following two together. The club approximately two-thirds as long as the

remainder of the funiculus. Node of the petiole with an evenly rounded, obtuse summit, the posterior face straight and perpendicular, the anterior face with a very slight forward slope. Postpetiole considerably thicker than the node of the petiole, both it and the petiole lower than in the typical *gayi* and the sculpturing at their bases is much more feeble. Seen from above the nodes are narrower and less angular than in the type. Color sordid yellow, the abdominal segments tinged with piceous brown. (Plate IV, figs. 4, 5.)

I have not seen any of the very small workers of this subspecies but those measuring 3.2 mm. show much the same characters as the major worker. The sexual phases are also unknown to me and it is largely for this reason that I have retained *bruesi* as a subspecies of *gayi*. Although the differences shown by the worker of the new subspecies might be considered sufficient to entitle it to specific status, in the last analysis the question turns upon the character of the sexual forms and until these are discovered it is better to class it with *gayi* to which it is closely related.

Described from a number of specimens taken by Prof. C. T. Brues in Chosica Canyon (2000 ft.) Peru.

SOLENOPSIS GEMINATA (FABR.).

Introduction.

Since its recognition in 1804 *S. geminata,* the type of the genus, has been described a surprising number of times. There are no less than eleven names for this species which have been abandoned on the synonymic junk-heap. It is inevitable that such a widely distributed and abundant ant should repeatedly appear in the literature under new names and it is remarkable that, despite this plethora of descriptions, the taxonomy of *geminata* has largely escaped confusion. At various times related species have been regarded as variants of *geminata* but, during the past sixty years there has been little doubt as to what constitutes the typical form. Truth compels one to add that this unusual situation is more a result of the characteristic cephalic structure of the major worker than an outcome of taxonomic acumen.

There is no necessity for anything more than a brief outline of the history of the species. Originally described as *Atta geminata* by Fabricius in 1804, it was given the present generic name nearly half a century later when Westwood set up *Solenopsis mandibularis* as a new species. The insect subsequently fell into the hands of Frederick

Smith and Buckley who between them managed to assign it to four different genera and eight separate species before it was rescued by Mayr in 1867. Since that time there has been practically no confusion in regard to the true *geminata* but subsequent interpretations of subspecies and varieties must often be taken with a grain of salt.

The distribution of *geminata* is Antillean, that is to say it occurs in the greatest abundance throughout the islands of the West Indies with fringes in those portions of the Americas which border the Gulf of Mexico and the Carribean Sea. In addition the insect is found in the northern part of the narrow, western coastal plain of South America and there is a subspecies known from the Galapagos. Wherever it occurs it is one of the dominant insects and consequently much material has come into collections and a number of variants have been described. We shall disregard for the moment the single aberrant subspecies known from the Galapagos Islands and confine our attention to the forms which occur in the West Indies and continental America.

The first variant of *geminata* to be described was the subspecies *rufa*. As nearly as can be determined the "*Atta rufa*," described by Jerdon in 1851 from specimens taken in India, was identical with the subspecies of *geminata* which at present bears that name. Forel, in 1902, first placed the subspecies on a recognizable basis when he pointed out the presence of the mesosternal spine which characterizes it. For many years this variant was known only from the Old World tropics and it was assumed that *rufa* was indigenous to the East Indies and southern Asia. Its occurrence there was thought to constitute the sole exception to the strictly New World distribution of the so called "*geminata* group." During the past twenty-five years, however, specimens of *rufa* from Mexico and the portions of the United States which border the Gulf of Mexico have been accumulating in collections, and the place of origin of this form has become highly questionable.

The subspecies *diabola* was next described by Wheeler in 1908 from material taken in Texas. It was separated from the typical *geminata* through its smaller cephalic punctures and lighter color. This led Forel to set up what he characterized as the "other extreme," the dark variety *nigra*, based upon specimens from Zent, Costa Rica. In addition to its piceous color the variety was said to show a more pronounced punctuation than the typical form. Finally Mann, in 1916, described the subspecies *medusa* from northeastern Brazil.

The largest workers of this variant have the genae strikingly dilated just behind the insertion of the mandible. The color of the type specimens is even darker than the specification given for *nigra* and the punctuation is unusually strong.

In the course of the present investigation it became necessary to assign several hundred specimens to their proper place among the forms just mentioned. Since the material was unusually abundant and distributed over the entire known range of the insect it seemed an excellent opportunity to attempt the correlation of structural variation with geographical distribution. It was at once apparent that the insular specimens can be classified largely by locality, since there appears to be but one form, the typical *geminata*, throughout the islands of the West Indies. Not so the continental specimens which vary *ad infinitum*. As long as previously described forms were kept in mind there seemed to be little meaning to distributional facts and less to most of the criteria upon which the variants were established. Color characteristics, unless accompanied by some definite structural difference, were found to be wholly without value as a means of separation. Not only was it possible to find light and dark specimens in practically every locality but frequently these differences were shown by individuals coming from the same nest. Variation in punctuation was equally unsatisfactory for the same reason. Under such conditions it is impossible to maintain the validity of varieties based wholly upon differences in color and punctuation, consequently both *nigra* and *diabola* become of no significance. There is no need to refer again to *nigra*, since it must be considered a synonym of the typical *geminata*. *Diabola*, however has a slightly different relationship which is discussed in a subsequent paragraph. After the breakdown of these two varieties the entire preëxisting scheme was thrown out and a series of specimens whose localities ranged from Florida to eastern Brazil was assembled. A study of this series led to very interesting results. By disregarding variations in punctuation and color it was possible to divide the material into two groups, each showing a structural difference which could be correlated with geographical distribution. The range of the first group extends northward from Peru through Ecuador and western Colombia into Central America and thence through Mexico to the southern United States. That of the second group begins in northeastern Colombia and passes through Venezuela, the Guianas and into eastern Brazil apparently terminating about the latitude of Bahia. Colombia, as the meeting

place of the two forms, becomes, therefore, of peculiar significance. A study of the topography of that country shows that it is crossed, roughly from north to south, by three ranges of mountains whose altitude is often in excess of thirteen thousand feet. This natural barrier divides Colombia into two separate faunal regions and there is every reason to suppose that there would be differences in the forms on the opposite sides of the mountains.

Except for their greater variation in color and sculpture the members of the first group agree closely in structure with the insular *geminata*. In the major worker the sides of the head are approximately parallel to the point where the occipital angles begin. There is a shallow and rather narrow impression of the sides just in front of the eyes but the genae are no wider in front of this impression than is the rest of the head. On the other hand we find that in the second group the major workers have the sides of the head gradually narrowed from the eyes to the occipital angles, the impression in front of the eyes is reduced or absent and the genae are expanded which gives that portion of the head a greater width than elsewhere. The condition just described may be recognized as that which characterizes the subspecies *medusa*. In *medusa*, however, we have a very extreme form which shows these characters in the highest degree. The specimens from Colombia, while they are distinct from the typical *geminata* are, nevertheless, intermediate between that form and *medusa*. The two groups, therefore cannot be considered as representatives of separate species.

Each of the groups can be further subdivided but the subdivisions are apparently without geographical significance. In the material coming from the north of Panama a separation can be made on the presence or absence of the mesosternal spine. Specimens which possess this character are invariably light in color, the exception noted above to the usual high degree of color variation. I was surprised to find the mesosternal spine present in the cotypes of the subspecies *diabola* for its supposed absence constitutes the means of separation of *diabola* and *rufa*. I believe that Wheeler may have been misled by the unstable character of this structure which shows a startling amount of variation even within a series from the same nest. There may be from one to four needle-like spines, or a rather obtuse triangular point or points, or at times a broadly truncate projection. Such fluctuations would, if at all constant, provide excellent means for separation. Unfortunately they are entirely without value unless

taken collectively. An attempt to find other characters by means of which *diabola* and *rufa* might be separated only led me to believe more firmly in their identity.

The subdivision of the second group has been already suggested, since the Colombian material can scarcely be included with the typical *medusa*. However, an entirely unexpected outcome resulted from the study of the Colombian specimens. I have been fortunate in having at my disposal a large number of specimens collected by Dr. George Salt and Mr. P. J. Darlington in the state of Magdalena, Colombia. Many of these were taken at Rio Frio. In going over the material from that locality an attempt was made to recognize the species *eduardi*. As may be recalled Forel described this species from a single minor taken at Rio Frio. The only outstanding characteristic peculiar to the species lies in the structure of the epinotum, which was described as follows:

"The whole epinotum hollowed from one end to the other by a broad, central, longitudinal groove and bordered on its two faces as in *tridens* but rounded and not subdentate or tuberculate between the two as in that species."

Aside from the fact that it is always extremely inadvisable to base a new species upon the minor worker of a polymorphic form, Forel should have realized that the characteristics given above are regularly shown by the smaller medias of the typical *geminata* and that it is not impossible to find minors which approximate this condition. In the case of the material from Rio Frio, of which I have examined several complete series of workers, the minors all show the epinotal structure characteristic of *eduardi*. Furthermore the sides of the epinotum and mesonotum have the dense, rugose-reticulate sculpture mentioned by Forel in his description of that form. I therefore have no hesitancy in identifying the insect described by Forel as *eduardi* with the Colombian form of *geminata*. However, as has already been noted, the major workers of this form are transitional as regards the dilation of the genae and the minor workers are virtually unique in the shape and sculpture of the epinotum, since similar conditions occur but rarely in the minors of the typical *geminata* or the subspecies *medusa*. We may, therefore, retain *eduardi* as a subspecies of *geminata*. The two variants of this form described by Santschi must, on the other hand, be synonomized. One, the variety *bahiaensis*, of which I have seen cotypes, is obviously a synonym of the subspecies *medusa*. The other, the

variety *perversa,* since it differs from *eduardi* only through its darker coloration will have to be considered identical with that form. As has already been explained the coloration of the continental *geminata* is too variable to permit the establishment of varieties upon this character alone.

A summary of the facts presented above may be stated as follows: The typical *geminata* occurs uniformly throughout the islands of the West Indies, in the extreme southern portions of the United States from Florida to Texas, in Mexico, in Central America and in the Pacific coastal plain through Colombia, Ecuador and Peru. From Florida to Panama the range of the typical form is overlapped by that of the subspecies *rufa.* The typical *geminata* is replaced in the Atlantic coastal region of Colombia, in Venezuela, the Guianas and north eastern Brazil by the subspecies *eduardi.* This form grades into the subspecies *medusa* which occurs in the more easterly portions of Brazil.

An interesting outcome of this explanation lies in the strong evidence which it presents for the Neotropical origin of the subspecies *rufa.* While it is by no means impossible that an introduced ant might achieve an even distribution over an area as great as that occupied by *rufa,* the number of records from localities well inland and often at a considerable altitude make such an explanation seem improbable.

The following key embodies in condensed form the morphological differences just discussed and in addition includes diagnostics for the separation of the subspecies *galapageia.*

1. Major worker 4.5 mm., female 6.6 mm. in length....subsp. *galapageia*
   Major worker 6.0 mm., female 7.5–8.0 mm. in length.....2
2. Epinotum of the smallest workers with a median longitudinal groove, bordered at the edges; sides of the epinotum and mesonotum densely rugose-reticulate.....subsp. *eduardi*
   Epinotum of the smallest workers without a median longitudinal groove, the edges not bordered; sides of the epinotum and mesonotum feebly rugose and somewhat shining.....3
3. Head of the largest worker with approximately parallel sides, the genae not dilated behind the insertion of the mandible.....4
   Head of the largest worker tapering from the eyes to the occipital angles, the genae dilated just behind the insertion of the mandibles. subsp. *medusa*
4. Thorax bearing a mesosternal spine or projection.....subsp. *rufa*
   Mesosternum of the thorax without spine or projection.....*geminata*

In view of the large number of descriptions of *geminata* already in

the literature another account may seem entirely superfluous. However aside from the fact that its absence would occasion a rather conspicuous hiatus in a monograph of the genus, there are additional considerations which make its inclusion advisable. Chief among these is the fact that *geminata* is undergoing a rapid dissemination to new localities through the agency of modern commerce. There is always the temptation to give such immigrants varietal status and already two forms of questionable validity have been described from tropical Africa. This practice is in any case to be deplored, particularly when the species in question is as variable as *geminata*. It is hoped that the inclusion of a full description of the typical form may lead investigators to a more conservative view in the establishment of new varieties on the basis of "tramp" specimens.

Solenopsis (Solenopsis) geminata (Fabr.)

S. geminata (Fabricius), Syst. Piez., p. 423 (1804). ♀ (*Atta*).

Formica geminata, Roger, Berl. Ent. Zeitschr., Vol. 6, p. 289 (1862). ☿ ♀ ♂

S. geminata, Forel, Mitt. Munchen, Ent. Ver., Vol. 5, p. 10 (1881). ☿ ♂
Wheeler, Bull. Amer. Mus. Nat. Hist., Vol. 24, p. 424 (1908). ☿
Forel, Deutsche Ent. Zeitschr., p. 268 (1909).

S. geminata var. *nigra*, Forel, Bull. Soc. Vaud. Sci. Nat., Vol. 44, p. 45, (1908) ☿
Forel, Deutsche Ent. Zeitschr., p. 268 (1909).
Forel, Bull. Soc. Vaud. Sci. Nat., Vol. 49, p. 23 (1913). ☿

S. mandibularis, Westwood, Ann. Mag. Nat .Hist., Vol. 6, p.87 (1841). ☿

S. saevissima, Mayr, Verh. Zool.-bot. Ges. Wien., Vol. 12, p.751 (1862). ☿

Myrmica virulens, Fred. Smith, Cat. Hym. Brit. Mus., Vol. 6, p. 132 (1858).

Atta clypeata, Fred. Smith, *Ibid.*, Vol. 6, p. 169 (1858). ♀ ♂.

Diplorhoptrum drewseni, Mayr, Europ. Formicid., p. 71 (1861). ☿

S. drewseni, Ern. Andre, Rev. Mag. Zool. (3), Vol. 2, p. 200 (1874). ☿

Myrmica glaber, Fred. Smith, Trans. Ent. Soc. Lond. (3), Vol. 1, p. 34 (1862). ☿

Myrmica polita, Fred. Smith, *Ibid.*, Vol. 1, p. 34 (1862). ☿

Myrmica (Monomorium) saxicola, Buckley, Proc. Ent. Soc. Phil., Vol. 6, p. 341 (1866). ☿

Atta lincecumi, Buckley, *Ibid.*, Vol. 6, p. 344 (1866). ☿ ♀

Atta brazoënsis, Buckley, *Ibid.*, Vol. 6, p. 345, (1866). ☿

Atta coloradensis (part), Buckley, *Ibid.*, Vol. 6, p. 346, (1866). ☿

Worker major: Length 6 mm. (Plate I, fig. 1, 11.)

Head, exclusive of the mandibles, very slightly broader than long, the sides parallel from the insertion of the mandibles to the point where the occipital angles begin except for a slight impression just in front of the eyes. (Occiput divided into two lobes by a profound median impression.) At the bottom of this impression lies a prominent groove which extends across the frontal area to a point just behind the frontal lobes. Clypeus not projecting, its anterior edge slightly concave with a shallow, concave, impression between the carinal teeth. Carinal teeth very stout and moderately divergent. Lateral denticles much smaller and set close to the side of the carinal teeth. (Mandibles very thick and abruptly bent so that the apical half lies at right angles to the basal.) In some specimens the apex of the mandible is pointed and the inner margin bears two poorly defined teeth. Usually, however, the mandibles are toothless and in many cases the inner ends are rounded off to such an extent that the mandibles fail to meet when closed. The antennal scapes in repose reach two-thirds of the distance to the occiput; first funicular joint as long as the following two together, second funicular joint twice as long as broad, the remaining joints all longer than broad but gradually decreasing in length and increasing in thickness; club slender, about three-fourths as long as the remainder of the funiculus, the terminal joint very slightly less than twice as long as the penultimate. Eyes rather flat, composed of one hundred or more facets, their outline irregularly oval, their border delimited by a shallow groove. They are separated from the insertion of the mandibles by a distance twice as great as their maximum diameter.

Thorax with a well-defined pro-mesonotal suture. In profile the pronotum slopes sharply forward from the suture in a straight line, the mesonotum is much longer and feebly convex throughout except at the posterior end where it passes by means of a short, rather steep declivity to the deep, slot-like mesoepinotal suture. The epinotum in profile is very angular with basal face somewhat longer than the declivious.

Node of the petiole in profile high and thin, the summit narrow, the posterior face virtually perpendicular, the anterior face sharply sloping forward and meeting the peduncle at a marked angle, the peduncle as long or slightly longer than the base of the node, rather thick with a ventral lamella but no ventral tooth. Post petiole in profile approximately four-fifths as high as the node of the petiole;

as long as high with the summit evenly convex and the anterior and posterior faces perpendicular. Seen from above both petiole and postpetiole are strongly transverse. The postpetiole is slightly wider and irregularly oval in outline. The base of the abdomen is truncate and bears a concave impression at its point of junction with the postpetiole.

Punctures coarse and numerous, those on the head, particularly on the occiput and mandibles, often elongate. Hairs golden, stout and erect; short on the frontal area, occiput and antennal scapes, longer on the mandibles, thorax, petiolar nodes and abdomen, very long on the anterior edge of the clypeus. Mandibles and summits of the petiolar nodes with a few coarse, scattered striae. Area between the eye and the insertion of the mandibles, pleurae and the entire epinotum with numerous fine irregular striae. Base of the petiolar nodes rugulose. Other parts of the insect strongly shining.

The color is highly variable. The only constant feature is the piceous coloration of the mandibles and the anterior border of the head. In other regards the insect shows a range of color which extends from brownish yellow specimens in which the gastric segments are bordered with light brown bands to individuals having a sooty, brownish coloration with the abdomen and occiput piceous.

Worker minor: Length 2.4 mm. (Plate I, figs. 6, 10, 12.)

Head, exclusive of the mandibles, slightly longer than broad, the sides feebly convex and gradually narrowing from the eyes to the occiput, the latter flat. Clypeus moderately projecting, the carinal teeth relatively longer and thinner than the major worker, the lateral denticles relatively larger and less closely approximated to the carinal teeth. Mandibles gradually curved, their masticatory border with four large teeth. The antennal scape in repose surpasses the occipital border by less than its own thickness. First funicular joint as long as the following two together, second joint slightly less than twice as long as broad, the remaining joints gradually increasing in thickness but not decreasing in length; club relatively stouter than in the major worker, the terminal joint a trifle more than twice as long as the penultimate. Eyes oval, of about thirty facets, separated from the insertion of the mandible by a distance one and one-half times as great as their maximum diameter.

Promesonotal suture absent. Promesonotum in profile evenly convex throughout, descending to the mesoepinotal suture through a

short and abrupt declivity. Mesoepinotal impression relatively feebler than in the major worker but still strong. Basal and declivious faces of the epinotum not sharply separated, the profile appearing as a somewhat irregular curve.

Node of the petiole in profile relatively lower, thicker and blunter than the major worker, the posterior face slightly inclined forward, the angle at which the anterior face meets the peduncle less clearly defined, the peduncle relatively longer and thinner and without ventral lamella or tooth. Postpetiole in profile approximately three-fourths as high as the node of the petiole, its anterior face slightly inclined backwards, the summit strongly convex, the posterior face strongly inclined forward. Seen from above the nodes are much less transverse than in the major worker. The postpetiole is scarcely wider than the node of the petiole and oval in outline. The first gastric segment is truncate at the base but lacks the concave impression at the base of the postpetiole.

Punctures fine and rather sparse, the long, erect, yellow hairs which they bear of equal length on head, thorax and abdomen, those on the appendages shorter and somewhat more appressed. Mandibles longitudinally striate, pleurae and base of the epinotum striato-rugulose, base of the petiolar nodes rugulose, for the rest smooth and shining. The color varies from a clear yellowish brown with the abdomen and often the petiolar nodes piceous brown to a uniform piceous brown. The appendages and mandibles are in all cases of a lighter color than the rest of the insect.

Female: Length 7.5–8 mm. (Plate I, fig. 5.)

Head, exclusive of the mandibles, one-sixth broader than long, quadrate, a little wider behind the eyes than in front of them, the sides very feebly convex from the eyes to the occipital angles, straight or nearly straight in front of the eyes and meeting the anterior border of the head at a sharp angle. Occipital angles well-marked, the occiput flat with a narrow and shallow median impression, occipital furrow clearly defined, frontal furrow short, clearly marked only for about half the distance from the median ocellus to the base of the frontal lobes, thereafter becoming shallow and indistinct. Ocelli large and prominent. Clypeus feebly projecting, carinal teeth very stout and rather blunt, the edge of the clypeus between them with a shallow concave impression; lateral denticles small, often poorly defined and in some cases represented only by a sinuousity in the

edge of the clypeus. Mandibles strongly bent but less so than in the major worker, the masticatory border with three large teeth and usually the rudiment of a fourth. Eyes large, strongly convex, irregularly oval in outline, their posterior border reaching a point half way between the occiput and the anterior border of the head. The antennal scape in repose just reaches the lateral ocellus. Funicular joints and club as in the major worker.

Thorax robust, elliptical, its maximum width three-fifths of its length, only slightly narrower than the head (the eyes excluded). Seen in profile the mesonotum shows a straight posterior half and a convex anterior portion which overhangs the pronotum. Scutellum as high as the mesonotum, slightly convex with a short, perpendicular posterior face. Angle of the epinotum well-defined but very obtuse, the basal and declivious faces of about equal length. Mesosternum large and subglobose beneath.

Petiolar nodes very similar to those of the major worker except that the peduncle is thicker, the node of the petiole slightly lower and the postpetiole bears on either side an obtuse, somewhat conical, ventral projection with a small opening at its summit (this condition is sometimes found in the major worker but in that caste the conical projection is usually absent and the opening occurs as a small tubercle on the side of the node). Seen from above the nodes are very strongly transverse and of approximately equal width. Abdomen as in the major worker. Wings hyaline with yellow veins.

Punctures smaller and less numerous than in the major worker. Somewhat larger on the head than on the thorax and abdomen. Body hairs long, golden and erect, somewhat longer on the head than elsewhere, longest on the anterior edge of the clypeus. Mandibles with a few coarse, indistinct striae, epinotum almost completely covered with fine wavy striae, petiolar nodes, except their summits which are shining, striato-rugulose. For the rest smooth and shining. The color varies from a clear yellowish brown with the front of the head, the mesosternum and the appendages paler and the mandibles and the posterior half of the abdomen castaneous, to a deep castaneous brown with only the extreme anterior portion of the head yellowish brown.

Male: Length 5.8 mm. (Plate I, fig. 4.)

Head trapezoidal, its maximum width (including the eyes) approximately one-fourth greater than its length. Eyes very large, strongly

convex and oval in outline, occupying more than one-half the side of the head, their anterior border reaching the insertion of the mandible. Ocelli very large and prominent, the lateral ocelli which mark the boundary of the occiput with a shallow concave impression between them. Anterior edge of the clypeus approximately straight; seen from the side the clypeus shows a blunt, beak-like central lobe. Mandibles small, linear, bidentate. Antennal scape about one and one-half times as long as broad, roughly cylindrical; first funicular joint subglobose, broader than the scape or the following joint; second funicular joint more than twice as long as broad, third joint one and one-half times as long as broad, the remaining joints all more than twice as long as broad and progressively decreasing in width.

Thorax bulky, elliptical, its greatest width two-thirds of its length, only slightly less than twice as wide as the head (eyes included). Seen from the side the anterior part of the mesonotum is greatly swollen and overhangs the pronotum which is so much displaced that the head of the insect appears to be attached to the ventral surface of the thorax. Epinotum rather rounded, the basal face strongly convex transversely and slightly convex longitudinally, declivious face flat and virtually perpendicular. Node of the petiole in profile low but with an acute summit, the anterior face not sharply separated from the thick peduncle, the posterior face perpendicular. Seen from behind the summit of the node shows a broad, shallow median impression. Postpetiole in profile as high as the node of the petiole, about one and one-half times as high as long with a long, backward-sloping anterior face, a rounded summit and a very declivious posterior face. The conical lateral projections are even stronger than in the female. Seen from above both nodes are very transverse, the postpetiole is approximately three times as broad as long and one-sixth wider than the node of the petiole. First gastric segment truncate at the base but not impressed. Wings hyaline, the veins clear yellow.

Punctures fine and fairly numerous, the hairs which they bear long, thin, golden, erect or suberect and of uniform length over the body, those on the legs shorter and stiffer; antennae without long hairs but clothed with a dense short pubescence. Base of the epinotum, area between the eye and the insertion of the antenna and the area between the ocelli striato-granulate. Base of the petiolar nodes granulate. For the rest smooth and shining. Color yellowish brown to piceous brown, the antennae and legs pale yellow.

To present a list of the localities in which *geminata* has been taken

would require several pages. Its distribution may be summarized as uniform throughout the West Indies and on the Continent from Florida to Costa Rica. In the eastern Gulf States its range extends inland only about a hundred to a hundred and fifty miles and this also appears to be true for the greater part of Texas. From Mexico southward, however, the distribution is from coast to coast.

The habits of this species have been so often described that only the briefest comment is necessary here. In general *geminata* prefers to nest in open fields or sunny glades, avoiding the shade of deep woods. The nests are usually irregular, sandy craters of loose construction but sometimes rotten stumps are utilized as nesting sites. The ferocity of this ant is proverbial, for the activity of the workers when disturbed never fails to attract attention, however callous the observer. For a good description of the habits of *geminata* the reader is referred to Forel's account published in 1881 (see synonymy) or to the observations of H. H. Smith quoted by Forel in his *Formicides de l'Antille St. Vincent* (Trans. Ent. Soc. Lond. p. 396, 1893).

Solenopsis (Solenopsis) geminata subsp. **galapageia** Wheeler.

S. geminata var. *galapageia*, Wheeler, Proc. Cal. Acad. of Sci., Vol. II, p. 272 (1919). ♀ ♀

Aside from its smaller size there is little to distinguish the worker of *galapageia* from that of the typical *geminata*. Such a distinction in the case of a polymorphic ant is quite valueless unless it is accompanied by a similar difference in the female. Not only is the female of *galapageia* decidedly smaller (6–6.5 mm.) but it also shows certain structural variations which lead me to believe that this form should have subspecific rank. The frontal furrow is much more prominent and is clearly marked to the base of the frontal lobes. In the typical *geminata* this furrow is poorly defined, in some specimens virtually absent, in the anterior half of the head. The summit of the petiole in *galapageia*, when seen from behind, shows a very distinct, obtuse, median notch. I have been able to find a transition to this condition in two *geminata* females from Jamaica but in both of these the notch is poorly indicated. In all other females which I examined, both of the typical form and also of the subspecies *medusa* and *rufa*, the summit of the petiolar node is entire and slightly convex. The color of the female of *galapageia* is a clear castaneous brown with the front of the head, the antennae, tibiae and tarsi yellow. The mandibles are castaneous with piceous teeth and the femora are castaneous with

their bases and apices tipped with yellow. Male unknown. The subspecies is known only from type material. Type locality: Charles Island, Galapagos Is. (F..X. Williams.)

Solenopsis (Solenopsis) geminata subsp. **rufa** (Jerdon.)

(Plate I, figs. 7, 8.)

S. geminata subsp. *rufa* (Jerdon) Madras, Jour. Litt. Sci., Vol. 17, p. 106 (1851). ☿ (Atta.)

S. geminata, Mayr, Tijdschr, v. Ent. Vol. 10, p. 109 (1867). ☿ ♀ ♂

S. geminata, Emery, Bull. Soc. Ent. Ital., Vol. 23, p. 166 (1892).

S. geminata st. *rufa*, Forel, Jour. Bombay Nat. Hist. Soc., Vol. 14, p. 689 (1902). ☿

S. geminata var. *rufa*, Wheeler, Bull. Amer. Mus. Nat. Hist., Vol. 23, p. 272 (1907). ☿

S. geminata var. *rufa*, Forel, Deutsche Ent. Zeitschr., p. 268 (1909).

S. geminata var. *rufa*, Bingham, Fauna Brit. India, Hym, Vol. 2, p. 158 (1903). ☿ ♀ ♂

S. geminata var. *diabola*, Wheeler, Bull. Amer. Nat. Hist. Vol. 24, p. 424 (1908). ☿

S. geminata var. *diabola*, Forel, Deutsche Ent. Zeitschr. p. 268 (1909).

S. cephalotes, F. Smith, Jour. Proc. Linn. Soc. Lond. Zool., Vol. 3,p. 149, (1858). ☿

Crematogaster laboriosus, F. Smith, *ibid.*, Vol. 4, suppl., p. 109, (1860). ☿

As has been pointed out in the introduction the worker of the subspecies *rufa* is characterized by the presence of a mesosternal spine or projection. In addition they can generally be distinguished by their lighter color which is a clear, reddish yellow with the abdominal segments cleanly and narrowly bordered with brown. The mandibles are usually darker, particularly in the major workers, where they are often piceous red. In some specimens the occiput and pronotum are tinged with brown.

Aside from its lighter coloration, which is like that of the worker, I can see no difference between the female of *rufa* and that of the typical *geminata*. The males are indistinguishable.

In view of the close similarity of the sexual forms it would seem that *rufa* is scarcely more than a variety of *geminata*. However, in order to eliminate the possibility of confusion and to reduce taxonomic juggling to a minimum it seems preferable to let matters stand as they are. My reasons for synonymizing *diabola* with *rufa* have been fully discussed in the introduction and need not be repeated here. The following list comprises the New World locality records of *rufa*.

United States: Florida, Miami. (W. M. Wheeler.)
Biscayne Bay. (No collector.)
Alabama, Mobile. (H. P. Löding.)
Georgia, Spring Creek. (Bradley.)
Okeefinokee Swamp. (Bradley.)
Mississippi, Tupelo. (M. R. Smith.)
Louisiana, Lake Charles. (La. Exp. Sta.)
Cameron, (La. Exp. Sta.)
Texas, Huntsville. (W. M. Wheeler.)
Austin. (W. M. Wheeler.)
Dallas. (W. D. Hunter.)
Granite Mts. (W. H. Long.)
Montopolis. (W. M. Wheeler).
Langtry. (W. M. Wheeler.)
Paris. (Rucker.)
New Mexico, Almagordo. (von Krockow.)
Mexico: Vera Cruz, San Francisco. (Petrunkewitch.)
Jalapa. (No collector.)
Cordoba. (Mann & Skewes.)
Morelos, Cuernavaca. (No collector.)
Jalisco, Guadalara. (Mc. Clendon.)
Yucatan, Merida. (W. M. Mann.)
British Honduras: Manatee, (J. D. Johnson.)
Guatemala: Quirigua. (W. M. Wheeler.)
Puertos Barrios. (W. M. Wheeler.)
Zacapa. (W. M. Wheeler.)

Solenopsis (Solenopsis) geminata subsp. **eduardi** (Forel.)

(Pl. I, figs. 2, 9.)

S. eduardi, Forel, Mem. Soc. Ent. Belg., Vol. 20, p. 12 (1912).
Santschi, Ann. Soc. Ent. Belg., Vol. 64, p. 13, (1924).
S. eduardi var. *perversa*, Santschi, Ann. Soc. Ent. Belg., Vol. 64, p. 13 (1924).

The subspecies *eduardi* may readily be distinguished from all the other forms of *geminata* by the longitudinally grooved and bordered epinotum of the minor worker. The sculpture of the sides of the epinotum and mesonotum is unusually strong, rugose and densely reticulate. The transverse rugae are well marked on both basal and declivious faces. The bordering is rather thick and, when seen from above, appears to diverge posteriorly. In the majors the epinotum

is deeply grooved and densely sculptured but as this is also true to a lesser degree in the majors of the typical *geminata* the difference is not particularly striking in this caste. The shape of the head in the largest workers of *eduardi* is intermediate between that of the typical *geminata* and the subspecies *medusa*. The sides are only slightly narrowed toward the occiput and the genae, while considerably more expanded than in the typical *geminata*, are less so than in the subspecies *medusa*. The color of *eduardi* is extraordinarily variable. A number of the specimens collected by Dr. Salt have a coloration as light as that of *rufa*, while another series from a locality only a few miles distant are deep piceous brown. It is because of this fluctuation in color that I cannot see the justification for Santschi's variety *perversa*, which was established principally because of the black color of the head of the worker. I have not seen the female of *eduardi* but the insect described by Santschi seems very similar to that of the subspecies *medusa*. The antennal scapes are shorter than in the female of the typical *geminata*. The thorax is said to be higher than that of *geminata* with the mesonotum overhanging the pronotum, a character not shown by the other forms. The male of *eduardi* is unknown.

There is no need to repeat here my reasons for reducing *eduardi* to a subspecies of *geminata*. A full explanation may be found on page 57 of the introduction to *geminata*.

Localities: Colombia, Magdalena, Rio Frio. (Type loc.) (A. Forel, George Salt, P. J. Darlington.)
Venezuela, Frines. (No collector.)
Brazil, Pernambuco, Tapera. (R. P. Wasermann.)

Solenopsis (Solenopsis) geminata subsp. **medusa** Mann.

(Plate I, fig. 3.)

S. geminata subsp. *medusa*, Mann, Bull. Mus. Comp. Zool. Harvard, Vol. 60, p. 447, pl. 4, fig. 31 (1916). ♀

S. eduardi var. *bahiaensis*, Santschi, Bull. Soc. Ent. Belg., Vol. 65, p. 236 (1925). ♀

In the major worker of the subspecies *medusa* the narrowing of the posterior portion of the head and the expansion of the genae reach extreme conditions. The head is one and one-third times as wide at the genae as at the occiput. This permits an easy separation from the typical *geminata* and there is usually little difficulty in distinguishing the majors of *medusa* from those of the subspecies *eduardi* al-

though in this case the difference is less pronounced. However since the minor worker of *medusa* does not have the grooved and sculptured epinotum characteristic of *eduardi* the two forms may be separated more readily by this character.

The female of *medusa* is very similar in structure to that of the typical *geminata*. It does not have the expanded genae or narrowed occiput of the major worker. There are, however, two characters which permit accurate identification. The antennal scape of the female of *medusa* is shorter than that of *geminata*, failing to reach the lateral ocellus by a distance equal to its greatest thickness. The transverse rugae on the basal face of the epinotum are very strong. In the typical *geminata* they are feeble and often entirely obliterated in the anterior half of the basal face. The male of *medusa* is unknown.

The color of *medusa* is less variable than in some of the other forms of *geminata*. As yet I have seen no completely light colored individuals although some of the specimens in the type series have a reddish brown area on the front of the head, the pronotum and the base of the gaster. The majority of the specimens I have examined are uniform piceous black in color. As has already been noted Santschi's *eduardi* var. *bahiaensis* must be synonomized with *medusa*. A comparison of the cotypes of this variety with those of *medusa* failed to show any differences by which the two could be separated.

Localities: Brazil, Ceara, Maranguape Mts. (Type loc.) (W. M. Mann.)
Bahia. (Bondar.)

SOLENOPSIS SAEVISSIMA (FRED. SMITH).

Introduction.

In approaching the subject of *S. saevissima* one has the unpleasant feeling that he is entering a battle-field strewn with unexploded missiles and that there is a strong probability that one of these taxonomic duds may, through tampering, bring the investigator to grief. It therefore behoves him to proceed with as much care and circumspection as he is able to command. Perhaps it is this feeling of restraint which has prevented work on the species, certainly it has been desperately needed. Santschi's revision published in 1916 is the sole effort in this direction and, while it marks a great advance, there still remains much to be done. It would be difficult to find a more vicious complex among the Formicidae than that of the forms of *saevissima*. Its seemingly endless variability is enough of a prob-

lem in itself and when to this one adds misconstrued relationships, contradictions and disputes concerning questions of priority, the situation becomes so hopelessly involved that one despairs of any adequate solution. Under the circumstances it may seem paradoxical to hold that relief may result from the inclusion of forms hitherto considered representatives of another species, but such is unquestionably the case. There are no reasons why Forel should have given *moelleri* specific rank and its inclusion with *saevissima* clears up much of the confusion.

After studying a large amount of material comprising cotypes or homeotypes of practically all the described forms, I am of the opinion that the following arrangement best expresses the relationship of the various forms of *saevissima:*

saevissima (Fred. Smith)
= *pylades* Forel
= var. *gracilior* Forel
var. *moelleri* (Forel)
= var. *incrassata* Forel
= var. *morosa* Santschi
= var. *pylades* Forel (Santschi *emend*)
var. *perfida* Santschi
var. *quinquecuspis* Forel
var. *richteri* Forel
= var. *tricuspis* Forel
subsp. *interrupta* Santschi
= var. *macdonaghi* Santschi
subsp. *electra* Forel
var. *wagneri* Santschi

The variety *lehmann-nitschei,* Santschi does not appear in this list. I shall subsequently give reasons why this form should be dropped. The explanation for the arrangement just proposed is intimately connected with the taxonomic history of the species and can be most easily explained by a discussion of the circumstances under which the various forms were originally recognized. *Saevissima* was first described by Frederick Smith in 1855 and placed by him in the genus Myrmica. Seven years later Mayr corrected the mistake as to the genus but made an equally unfortunate error by identifying the form with *S. geminata* subsp. *rufa.* It is doubtless due to this that during the next forty years the literature contains no references to *saevis-*

sima. It is inconceivable that specimens of this widely distributed insect should have failed to reach European taxonomists over so long a period and we must, therefore, suppose that these were grouped with *rufa.* In 1904 Forel described a subspecies of *geminata* which he called *pylades,* from a female taken in Mexico. He was doubtful as to the exact status of this form and, since he had no workers, preferred to group it with *geminata* to which it showed obvious relationship. Five years later he was able to identify a complete series of material from Sao Paulo, Brazil with *pylades* and separated it as a distinct species since the largest soldier caste characteristic of *geminata* was absent. In 1915 Wheeler called attention to the long neglected *saevissima* and pointed out that Smith's description of this form exactly corresponded to *pylades.* Wheeler therefore placed *pylades* in the synonomy of *saevissima* and reduced it again to a subspecies of *geminata.* Forel bitterly opposed this view, defending both the validity of the name *pylades* and the specificity of the form thus described. He was finally forced to concede the priority of the name *saevissima* when Wheeler sent specimens to Donisthorpe for comparison with Smith's types. Forel's opinion of the specific rank of this form was, however, correct and since 1916 *saevissima* has been recognized as a separate species. Santschi in his key to the forms of *saevissima* ('16) retains *pylades* as a distinct variety but this appears to me more a sop to Cerberus than a taxonomic reality. It will be subsequently shown that the variety *pylades* must be regarded as a synonym of *saevissima* var. *moelleri.*

Before leaving the subject of the typical form it seems advisable to discuss a fact which may, if neglected, cause trouble in the future. As has already been noted Forel's original description of *pylades* was based upon a female taken in Mexico. His subsequent recognition of the worker of the species was supposed to have eliminated any doubts concerning the relationships of the female first described. Unfortunately for Forel's supposition the range of *saevissima* extends very little to the north of the Guianas. On the other hand we know that two forms (*maniosa* and *aurea*) of the North American species *xyloni* occur in Mexico. The female of this insect is very similar to that of *saevissima* and there can be little doubt that it is to some form of *xyloni* that Forel's original description of *pylades* applies. However, in view of the previous difficulties connected with the name *pylades,* it would be extremely inadvisable to replace either *maniosa* or *aurea* with the older name. I feel certain that the most ardent adherent

to the law of priority would willingly yield the point in this case for the sake of the more important consideration of clarity.

We may now take up Forel's treatment of *moelleri*. This leads to a very complicated discussion involving five described forms, four of which appear to be identical. *S. moelleri* was described in 1904 from material taken at Blumenau, Brazil. In the same paper Forel established the variety *gracilior* from specimens secured at Ceara, Brazil. Since *gracilior* has only an indirect bearing on what is to follow the discussion of this form has been deferred to a subsequent paragraph. As may be noted the date of the description of *moelleri* precedes by five years Forel's recognition of the worker of *saevissima*. There is nothing in the account of the worker of *moelleri* to distinguish it from *saevissima*, but the characters given for the sexual phases are, to say the least, most peculiar. In the first place the length of the female is said to be 4.0 mm. Since *moelleri* is admittedly of close relationship to *saevissima* one would scarcely expect to find such a striking exception in the size of the female. The females of the species in the subgenus *Solenopsis* are all 6.0 mm. or more in length. However, even if we assume that *moelleri* may constitute an exception to this rule there still remain other discrepancies. In the females of the subgenus *Solenopsis* the thorax is invariably wide, almost equalling the head in width. Forel's description of the female of *moelleri* stresses the very narrow thorax, which is said to be much narrower than the head. Finally the clypeal teeth of the female of *moelleri* are described as feebler than those of the worker, a condition which does not occur in any member of the genus known to me. The male slso shows comparable irregularities of size and structure. The above considerations lead me to believe that the female and male described as the sexual forms of *moelleri* really belong to a widely different species related to *picta* or *corticalis* in the subgenus *Diplorhoptrum*. We must, therefore, consider only the worker of *moelleri* in determining its relationships.

For seven years after its description Forel made no mention of *moelleri* but in a publication of 1911 he again referred to it. I give here a translation of his statement:

"The worker of *S. pylades* (= *saevissima*) is very closely related to *moelleri* Forel, it is, however, more thickset (funicular joints somewhat thicker than long, longer than thick in *moelleri*) with thicker nodes."

This is a most extraordinary observation since there is not a single

form of *saevissima* in which the funicular joints are thicker than long. Moreover, while Forel never adequately described the typical *saevissima* he did give a very complete account of the variety *richteri* in which he distinctly specifies that the funicular joints are all much longer than thick. The distinction between *moelleri* and *saevissima* would therefore seem to be largely a matter of preconceived ideas which break down upon close examination.

It is now necessary to give a brief discussion of the history of the variety *incrassata*. This insect was first noted as a form of *geminata* by Forel in 1908. The original description is quite worthless since it deals entirely with a comparison of the shape of the petiole to that of *geminata* and makes distinctions which are shown by every form belonging to *saevissima*. The following year Forel, having seen the worker of *saevissima*, rectified his error and made *incrassata* a variety of that species. This he did in a synoptic table giving no characters by which the two might be separated. Thus we have the unusual situation of the erection of a variety which, for all practical purposes was never described. As might be expected this has led to regrettable results.

It is my opinion that Forel's *moelleri* is identical with the insect which he described four years later as *incrassata*. Unfortunately I have not seen a cotype of *moelleri* but I am led to this conclusion by the following facts:

I have examined a cotype of *incrassata* and find that it exactly agrees with the description of the worker of *moelleri;* there is in the collection of Dr. W. M. Wheeler a large series of specimens collected by Witte at Blumenau (the type locality of *moelleri*) which differ in no way from the cotype of *incrassata;* finally except for the typical *saevissima* this insect appears to be the only form belonging to this species which has been taken up to the present in southern Minas Geraes, Sao Paulo and Parana.

There are two remaining synonyms in this complex, Santschi's variety *morosa* and the variety *pylades*, a form nominally under the authorship of Forel but actually set up by Santschi in 1916. *Morosa* was characterized as follows:

"Entirely brown; the legs, antennae and the anterior third of the head more or less reddish. Clypeus bidentate. Blumenau, Brazil, type locality."

Santschi in his original description of *morosa* included some specimens from Missiones, Argentina but he later corrected this, assigning

the Argentinian material to the variety *richteri*. The color of the variety *pylades* was given by Santschi ('16) as deep yellow with the bordering of the gastric segments not sharply delimited. He subsequently ('23) notes that the form may be distinguished from *incrassata* by its feeble clypeal teeth. In this last observation he was entirely incorrect and we must therefore depend solely upon color as a means of separating *pylades*. Unfortunately the color of *pylades* is less distinctive than Santschi indicates. In the homeotype which he sent me the posterior two-thirds of the head and the entire thorax are dirty brownish yellow, the abdomen slightly darker, the anterior third of the head and the appendages light yellow. As may be seen the difference between this condition and that of *morosa* is slight. I have already mentioned Witte's material from Blumenau and given reasons for considering it identical with *moelleri*. In one series of workers from a single nest (No. 128) the variation in color is sufficient to include both *morosa* and *pylades*. It is consequently impossible to maintain the validity of either of these varieties since both represent insignificant fluctuations of a single variable form.

The discussion just given may be summed up as follows:

In the southeastern part of Brazil from southern Minas Geraes to Santa Catharina there is a form of *saevissima* whose color varies from dirty brownish yellow to sordid brown with the abdomen somewhat darker and the anterior third of the head and the appendages somewhat lighter than the rest of the body. This form was first described as *moelleri* and this name therefore takes precedence over the synonyms *incrassata*, *morosa* and *pylades*.

We may now consider the variety *gracilior*. I have been fortunate in having for examination a single cotype of this insect. As the name implies *gracilior* was distinguished by its slender structure. In addition the first node of the petiole was said to be thinner and with a longer peduncle than that of *moelleri*. I have compared the cotype mentioned above with *moelleri* and find that it differs in the characters specified. Unfortunately for *gracilior* exactly the same differences are shown by the typical *saevissima*. A comparison of *gracilior* and *saevissima* convinces me of their identity. I cannot attach much significance to Forel's statement that in *gracilior* the dorsum of the epinotum bears a rather distinct concavity. The epinotum of the cotype is rather badly crushed in at one side but hardly enough to obliterate a concavity had one been present. It seems to me that Forel must have intended the declivious rather than

the basal face in his description since the latter is usually more or less concave.

Another described form which must be synonomized is Forel's variety *tricuspis*. This was originally supposed to differ from *richteri* in the presence of a well-developed median denticle on the anterior edge of the clypeus. The clypeus in *richteri* usually shows a low and very broad projection between the carinal teeth but this is frequently produced into a median tooth. The variation is often within a series from the same nest, hence the character is of no significance for varietal determination. The same criticism applies to the clypeal teeth of *quinquecuspis* but this form appears to be distinct since the major worker lacks the reddish yellow band at the base of the first gastric segment, which is very constant in *richteri*.

There remain for discussion the forms *interrupta, mac-donaghi, wagneri* and *electra*. The first three of these were originally described as varieties of *saevissima* while the last was given subspecific status. As indicated in the table at the beginning of the introduction I consider *interrupta* and *mac-donaghi* identical and of subspecific rank while *wagneri* must apparently be regarded as a variety of the subspecies *electra*. My reasons for synonomizing *interrupta* and *mac-donaghi* may be very briefly stated. The only difference between the two forms is the degree of infuscation of the abdomen of the minor worker. In *mac-donaghi* the gaster of the smallest worker is completely infuscate while in *interrupta* it is virtually clear yellow with only a trace of infuscation at the edges of the segments. It is obviously impossible to maintain the validity of a variety based upon a character so prone to fluctuation. Furthermore I have examined specimens of *interrupta* and *mac-donaghi* sent me by Dr. Santschi and am unable to find any differences in the two which will permit separation. The major workers of both show an expanded condition in the posterior portion of the head the significance of which will be subsequently discussed. Both forms were described in the same paper and as a result we must utilize pagination as the only means of determining priority. Curiously enough they are both described on the same page but, since *interrupta* precedes, *mac-donaghi* must go into the synonomy.

The case of *electra* and *wagneri* is less clear. Although *wagneri* was set up as a variety of *saevissima* all the characteristics in the original description were derived from a comparison to *electra*. *Wagneri* was said to differ from *electra* in its greater size and more uniform

and somewhat lighter color. Unfortunately I have not seen any specimens of this form, nor is it possible to deduce its relationships from its distribution since the type locality is in a region covered by the ranges of both *richteri* and *electra*. In size and coloration it appears to be transitional between *interrupta* and *electra* and until we are better acquainted with the form it may be provisionally assigned as a variety of the latter subspecies.

A comparison of the typical *saevissima, moelleri, richteri, interrupta* and *electra* shows a marked difference in the size of the major worker. In *interrupta* these reach a length of 6.8 mm. in *richteri* 6.0 mm., in the typical *saevissima* 5.3 mm. and in *moelleri* and *electra* 4.7 mm. If this size variation were the only difference the case would be relatively simple. Actually, however, it seems at first sight that the size of the workers is of little importance since there are structural similarities apparently independent of size. In the typical *saevissima* and *moelleri* the head of the largest worker is widest just behind the eyes and, since the amount of narrowing anterior and posterior to that point is approximately equal, the head is sub-oval in outline. In *interrupta, richteri* and *electra,* on the other hand, the head is widest a short distance behind the eyes and hence of a somewhat cordate shape. This is most pronounced in *interrupta,* but in *electra* and *richteri* the head, while less cordate than in *interrupta* is more so than in *saevissima.* The explanation of these differences may, I believe, be derived from a comparison of the size of the worker and female. This is most easily presented in tabular form:

	Length of major	Length of female	Actual dif.	Per-centage dif.	Shape of head in major
interrupta	6.8 mm.	8.0 mm.	1.2 mm.	15%	strongly cordate
richteri	6.0 mm.	7.7 mm.	1.9 mm.	25%	mod. cordate
saevissima	5.3 mm.	8.2 mm.	2.9 mm.	37%	oval
moelleri	4.7 mm.	7.7 mm.	3.0 mm.	39%	oval
electra	4.7 mm.	6.4 mm.	1.7 mm.	27%	mod. cordate

As may be seen from the above the relative difference in size is least in the case of *interrupta,* most in the case of *saevissima* and *moelleri* and transitional in *richteri* and *electra.* This would seem to indicate that the expansion of the posterior part of the head is a function of the degree in which the size of the worker approaches that of the female and quite independent of the actual size of the worker. Such a fact can be best explained by assuming that two

distinct developmental tendencies are operating in the case of *saevissima*. One leads to the elimination of the largest caste of workers but does not effect the size of the female. The other reduces the size of both female and worker but does not eliminate the largest caste relatively speaking. If this is true we must regard *interrupta* as most nearly approximating the ancestral condition since the size of the female is undiminished and the largest caste of workers is still present. *Saevissima* represents a form produced by the operation of the first factor, the largest workers are no longer present but the size of the female is unaffected. *Electra* and to a lesser extent *richteri*, show the effect of the second factor, the size of the female is decreasing but relatively large workers are still produced. In *moelleri* both factors have been at work causing a reduction in the size of the female and the dropping out of the largest caste of workers.

Regardless of what value may be attached to the above considerations it is obvious that in the forms of *saevissima* we have an unusually clear case of incipient production of new species. The absence of some of the transitional forms would make it difficult to include the extremes in the same species. Indeed it is quite thinkable that subsequent investigations may so narrow the lines by which a species is delimited that all the forms of *saevissima* will be given specific status. At present, however, it is more consistent to regard them as members of a single highly variable species.

Before approaching the subject of geographical distribution it is necessary to discuss the status of the variety *lehmann-nitschei*. This variety has had a singularly unfortunate history and the treatment about to be proposed will be a fitting termination to the career of this taxonomic step-child. *Lehmann-nitschei* was first described by Santschi in 1916 as a variety of *tridens*. In 1923 he rectified his mistake and made the form a variety of *electra*. While Santschi was undoubtedly correct in removing *lehmann-nitschei* from *tridens*, the advisability of assigning it to *electra* is open to question, since the type material of the form is composed only of minors and small medias. The extraordinary degree of structural similarity between the small workers of the forms of *saevissima* forces one to utilize color characters for their separation. Santschi evidently realized this when he transferred *lehmann-nitschei*, but the distinctions of color which he makes are far from satisfactory. I have examined specimens of *lehmann-nitschei* sent me by Dr. Santschi and can see no reason why they might not be considered minors of *interrupta*.

On the other hand they seem to fit in equally well with the description of the variety *wagneri*. Although the locality in which the types were secured favors the first interpretation the question is impossible of certain settlement because of the initial absence of major workers and must always remain so in the event that any synonomy is attempted. Since synonomy is out of the question and since the form does not appear to me sufficiently distinct to justify varietal status I can see no reason for its retention and suggest that it be dropped as impossible of exact determination.

In the foregoing discussion the considerations have been in large part morphological. In addition it is possible to show that the arrangement of the forms of *saevissima* proposed at the beginning of the introduction is closely correlated with geographical distribution. Heretofore the distribution of the variants of *saevissima* has appeared far too hap-hazard to permit satisfactory explanation and, considering the tangled taxonomy of the species, this is hardly surprising. In view of the ever increasing importance of distributional facts in determining the value of varietal characters it is very gratifying to find an agreement between morphological features and geographical ranges.

The distribution of the typical *saevissima* is considerably more extensive than that of any one of its variants. As has been already noted the earlier records of this ant from Central America and Mexico must be regarded as belonging to *geminata* subspecies *rufa* or one of the forms of *xyloni*. It is not until we reach the Guianas that we find *saevissima* in abundance, although it must certainly occur in Venezuela and probably gets into the more eastern portions of Colombia. In the Guianas the typical form is widespread in the drier and more open portions of the country. The same is true of its occurrence in the Amazon Basin. Bates, in his classic account of this insect remarks,

"It is found only on sandy soils in open places and seems to thrive most in the neighborhood of houses and weedy villages—, it does not occur at all in the shades of the forest."

With the exception of the variety *perfida* Sants., which is a rare and local variant known only from Piricicabo, the typical *saevissima* is the only form which occurs throughout the tremendous area in Brazil extending from the boundary of the Guianas to the southern part of the state of Minas Geraes. Here it meets the variety *moelleri* and the two then extend together through the small states of Espirito

Santo and Rio de Janeiro into Sao Paulo. The range of the typical *saevissima* apparently terminates here but that of *moelleri* extends into Parana, Santa Catharina and Rio Grande do Sul. It is known from Missiones, Argentina, but I believe I am correct in stating that it does not extend across northern Argentina as formerly supposed (*vide* page 86). The variety *richteri* is first met with in Uruguay but most of the range of this insect lies in Argentina where it extends on the northwest almost to Bolivia, on the west to the Andes and southward as far as the northern boundary of the state of Rio Negro. Three other forms overlap portions of this range. The variety *quinquecuspis* occurs throughout the eastern portion of the state of Buenos Aires as far south as Bahia Blanca. The subspecies *interrupta* whose range extends into the state of Rio Negro on the south, reaches Mendoza on the west and the state of Entre Rios on the northeast. The subspecies *electra* and its variety *wagneri* are more northern in distribution, extending from Uruguay northwestward into Bolivia.

The following key presents characters for the separation of the various forms of *saevissima:*

1. Dorsum of the thorax in the majors and larger medias rectilinear or sub-rectilinear in profile, the epinotum long and low with the short declivious face completely covered with transverse striae, color reddish brown to sordid brown.....2
   Dorsum of the thorax in the majors and larger medias arcuate or broken in profile, the epinotum only slightly longer than high, the declivious face striate only at the lower portion or if completely striate the color is a deep piceous brown.....3
2. Gaster of the majors and large medias with a basal band of sordid yellow.....subsp. *electra*
   Gaster in all castes uniform piceous brown.....var. *wagneri*
3. Head of the majors strongly cordate, color bright yellow..subsp. *interrupta*
   Head of the majors oval, or if moderately cordate the color is piceous brown.....4
4. Head and thorax pale yellow to golden yellow, the abdominal segments more or less tinged with brown.....*saevissima* s .str.
   Head and thorax sordid brownish yellow to deep piceous brown, the abdominal segments more or less piceous.....5
5. Head and thorax sordid brownish yellow to dirty brown the gastric segments edged with piceous brown.....var. *moelleri*
   Head and thorax deep piceous brown, the gaster wholly piceous or piceous except for a roseate band at the base of the first segment...6
6. Base of the first gastric segment in the larger workers with a broad transverse band of reddish yellow.....var. *richteri*
   Gaster in all castes uniform piceous brown.....var. *quinquecuspis*

The variety *perfida* is not included in the key. I have not seen the form and the characters given in the description are so similar to those of the variety *moelleri* that its inclusion would certainly lead to difficulties. The reader is referred to the translation of Santschi's description on page 86.

Solenopsis (Solenopsis) saevissima (F. Smith).

S. saevissima, F. Smith, Trans. Ent. Soc. Lond. (2), Vol. 3, p. 166, pl. 13, fig. 18, 1855. (*Myrmica.*) ☿

S. saevissima, Santschi, Physis Buenos Aires, Vol. 2, p. 378–380 (1916). ☿

S. pylades, Forel, Bull. Soc. Vaud. Sci. Nat. Vol. 51, p. 723 (1917); Deutsche Ent. Zeit., p. 279 (1911). ☿ ♀

S. geminata var. *pylades*, Forel, Ann. Soc. Ent. Belg., Vol. 48, p. 172 (1904). ♀. Forel, Deutsche Ent. Zeitschr. p. 268 (1909).

S. geminata subsp. *saevissima*, Wheeler, Bull. Amer. Mus. Nat. Hist., Vol. 34, p. 395 (1915). Wheeler, Psyche, Vol. 23, p. 142 (1916). Wheeler, Proc. Cal. Acad. Sci., Vol. 2, p. 272, (1919).

S. moelleri var. *gracilior*, Forel, Ann. Soc. Ent. Belg. ,Vol. 48, p. 174 (1904). ☿

Worker major: Length, 5.3 mm. (Plate II, figs. 1, 2.)

Head, exclusive of the mandibles, as broad as long, the sides moderately convex, the occipital angles strongly rounded, the occiput with a shallow and rather narrow median concave impression, a feeble groove extends from the front to the occiput. Clypeus feebly projecting, the carinae prominent, strongly divergent, angular above and terminating in rather short but very stout teeth; lateral denticles smaller and closely appressed to the carinal teeth, a low, feebly convex median lobe lies on the anterior margin of the clypeus between the carinal teeth. Mandibles with the external border moderately and evenly convex, the masticatory border very oblique and armed with four teeth of which the innermost is considerably smaller but quite distinct. The antennal scapes in repose fail to reach the occipital border by a distance slightly exceeding their greatest thickness. First funicular joint four times as long as broad, as long as the following three together. Second funicular joint twice as long as broad, the remaining small joints gradually decreasing in length and increasing in thickness, the seventh joint approximately one and one-half times as long as thick. Club slender, the terminal joint twice as long as the penultimate. Eyes oval, of about ninety facets,

separated from the insertion of the mandibles by a distance approximately one and one-half times their maximum diameter.

Thorax seen from above with the humeral angles much rounded, the pronotal suture obsolete but its position indicated by a shallow groove, the constriction of the sides at the mesoepinotal suture only moderately strong. Seen in profile the promesonotum is moderately convex throughout except at the extreme posterior end where it descends to the mesoepinotal suture by means of a short, almost perpendicular declivity. Mesoepinotal suture deep and narrow Epinotum in profile notably lower than the adjacent portion of the mesonotum, the basal face flat or very feebly convex and at least one-third longer than the declivious face. Node of the petiole in profile obtusely triangular, about one-fourth higher than the length of its base, the anterior face virtually straight, the posterior face slightly convex, the summit bluntly rounded; peduncle thick, scarcely longer than the base of the node and without a ventral tooth. Postpetiole in profile very slightly higher than thick, the summit broadly and feebly convex, the ventral face with an obtusely rounded anterior projection. Seen from above the node of the petiole is sub-triangular in outline and slightly narrower than the transversely oval postpetiole. Anterior border of the first gastric segment narrowly truncate.

Color pale yellow to reddish yellow, the abdominal segments margined with brown. In some specimens this brownish coloration may cover most of the segment but it is usually confined to a rather distinct band at the posterior edge of the segment. Mandibles completely covered with coarse, irregular striae. The area between the anterior margin of the eye and the insertion of the mandible feebly striate. Meso- and metapleurae and the lower portion of the declivious face of the epinotum covered with very fine striae, base of the postpetiole finely reticulate. Punctures small and moderately numerous. The rest of the insect smooth and shining. Hairs long, erect, golden on the body; those on the appendages somewhat shorter but stout and erect except on the antennal club where they are very short, fine and subappressed.

Worker minor: Length 2.8 mm. (Plate II, figs. 9, 11.)

Head exclusive of the mandibles one-eighth longer than broad, the sides strongly narrowed from the eyes to the occiput, the latter flat. Clypeus moderately projecting, the carinal teeth small and acute, median and lateral denticles reduced to sinuousities in the anterior

edge of the clypeus. The antennal scape surpasses the occipital border by slightly less than its greatest thickness. First funicular joint slightly shorter than the following two together. Second joint about one and one-half times as long as broad, third joint slightly longer than broad, the remaining small joints approximately as broad as long, club as in the major worker. Eyes of forty to forty-five facets, separated from the insertion of the mandible by a distance only slightly exceeding their maximum diameter.

Dorsum of the thorax without a trace of the promesonotal suture, the pronotum feebly convex in profile, the mesoepinotal suture with a moderately strong impression, the epinotum angular, about as high as long with its basal face lower than the mesonotum. Node of the petiole in profile approximately as high as it is thick at the base. Postpetiole in profile slightly thicker than high. Seen from above the postpetiole is subglobular and about one-fourth wider than the node of the petiole. Area between the eye and the insertion of the mandible and the declivious face of the epinotum smooth. Otherwise as in the major worker.

The conditions in the medias vary between the extremes described.

Female: Length 8.2 mm. (Plate II, fig. 3.)

Head exclusive of the mandibles as broad as long, markedly quadrate, the occiput with a narrow, concave, median impression. Clypeal carinae very strong, less divergent than in the worker and more rounded above, their terminal teeth very short and stout but quite sharp. Lateral and median denticles reduced to almost imperceptible flattened lobes. The antennal scapes in repose slightly surpass the lateral ocelli. Funicular joints as in the major worker. Eyes large, strongly convex, oval, a line drawn through the middle of the side of the head would pass through their posterior third. Other cephalic characters as in the major worker.

Thorax slightly narrower than the head, oval, slightly less than twice as long as broad. Basal face of the epinotum meeting the declivious face at a very wide angle, the two virtually forming a continuous slightly arcuate slope. Node of the petiole in profile high and very acute, both anterior and posterior faces straight, the summit narrow and sharp, peduncle short and thick and without a ventral tooth. Postpetiole in profile much higher than long, the summit obtusely rounded, the ventral face very short. Seen from above both nodes are strongly transverse, the postpetiole about one-

sixth wider than the node of the petiole. Wings hyaline the veins pale yellow.

In sculpture, pilosity and color the female is essentially the same as the major worker.

I have not seen the male of the typical *saevissima*. For a description of this caste the reader is referred to the variety *moelleri* the male of which appears to be identical with that of *saevissima* except for its somewhat smaller size. The male of *saevissima* measures 6.2 mm. in length.

It is exceedingly difficult to compile a list of localities for *saevissima* since many of the older records were assigned to *geminata*. The following list represents those for which there is little or no possibility of error.

Localities: British Guiana, Georgetown. (Crampton, H.O. Lang.)
Kartabo. (W.M. Wheeler, Wm. Beebe.)
Brazil, Para, Obidos. (No collector.)
Itacoatiara. (W. M. Mann.)
Manaos. (W. M. Mann.)
Tapajos River. (Type loc.)
Ceara, Ceara. (Diaz da Rocha.)
Minas Geraes, Diamante. (T. J. Borgmeier.)
Matto Grosso, Cuyaba. (No collector.)
Sao Paulo, Santos. (Ris.)
Bahnhof. (Luderwald & von Ihering.)
Riaz da Sierra. (Luderwald & von Ihering.)
Ypiranga. (Luderwald & von Ihering.)

Solenopsis (Solenopsis) saevissima var. **moelleri** (Forel).

S. saevissima var. *moelleri* (Forel) Ann. Soc. Ent. Belg., Vol. 48, p. 173 (1904). ♀ (*S. moelleri.*)

S. geminata var. *incrassata* Forel, Verh. Zool-bot. Ges. Wien, Vol. 58, p. 362 (1908). ♀

S. pylades var. *incrassata*, Forel, Deutsche Ent. Zeitschr., p. 269 (1909).

S. geminata subsp. *saevissima* var. *incrassata*, Wheeler, Bull. Amer. Mus. Nat. Hist., Vol. 34, p. 397 (1915).

S. saevissima var. *incrassata*, Santschi, Physis. Buenos-Aires, Vol. 2, p. 380 (1916). ♀

S. saevissima var. *morosa*, Santschi, Ibid., Vol. 2, p. 381, (1916). ♀. Rev. Suisse Zool., Vol. 30, p. 265 (1923).

S. saevissima var. *pylades*, Santschi, Physis Buenos-Aires, Vol. 2, p. 380 (1916) ♀ Rev. Suisse Zool. Vol. 30, p. 267 (1923) ♀ (*nec pylades*, Forel, 1904 etc.)

Aside from its darker color and smaller size the workers of the variety *moelleri* differ from those of the typical *saevissima* in a number of characters. In the minors and smaller medias the thorax is distinctly stouter, the ratio of the length (neck of the pronotum included) to the width is 4.5: 2, (4.5 : 1.8 in *saevissima*). The constriction at the mesoepinotal suture is more pronounced, the node of the petiole in profile is thicker and, seen from above, both nodes are notably broader in *moelleri* than the typical *saevissima*. These differences are not shown by the larger medias and majors which are virtually identical with *saevissima* workers of corresponding size except for their darker color.

While the color of the variety *moelleri* is variable in regard to shade, the pattern is quite constant. Over most of the body the color varies from a dirty, brownish yellow to a sordid, blackish brown. The anterior third of the head, mandibles and appendages are of a lighter shade, their color varying from a light yellow to yellowish brown. In the more darkly colored individuals the difference is not striking and is usually less pronounced in the medias and not shown by the minors whose coloration is uniform. In all castes the edges of the gastric segments are infuscated.

Female: Length 7.7 mm.

Identical with the female of *saevissima* except for its smaller size and darker color. General color of the insect rich castaneous brown, the anterior third of the head, mandibles and antennae brownish yellow. The thorax, which is slightly more piceous than the head, has two dull, orange bands extending longitudinally across the scutum. The three anterior gastric segments bear a small basal spot of yellow at either side.

Male: Length 6.0 mm.

Head including the eyes approximately one and one-third times as broad as long, broadest through the middle of the eyes, much narrowed behind with the posterior border evenly convex. The very large eyes occupy more than half of the side of the head, the anterior border extending almost to the insertion of the mandible. Clypeus with an elevated subtriangular median lobe, the lateral portions flat and sharply marked off from the median lobe. Mandibles linear, with a single long terminal tooth and one or two small denticles on the inner margin. First joint of the antenna approximately one

and one-half times as long as broad, rather expanded basally and narrowed apically. Second joint short, much broader than long, broader than the following joint. Third joint more than twice as long as broad. Fourth joint one and one-half times as long as broad, the remaining joints gradually increasing in length and decreasing in thickness, the terminal joint about six times as long as broad. Ocelli prominent, the area between the lateral ocelli very feebly or not at all impressed.

Thorax bulky, elliptical, approximately three-fifths as broad as long, and one and two-fifths times as broad as the head. Thorax in profile with a narrow pronotum, the scutum very bulky but only slightly overhanging the pronotum, scutellum feebly convex and somewhat higher than the scutum. Basal face of the epinotum consisting of two distinct portions, a large, transversely convex, slightly sloping upper portion and a smaller, triangular, strongly sloping posterior portion; declivious face short and perpendicular.

Node of the petiole in profile low, the anterior face forming a continuous low slope with the rather thick peduncle, the posterior face short and declivious. Postpetiole in profile very low and thick, the dorsum evenly convex. Seen from above both nodes are strongly transverse, the postpetiole slightly wider and shaped like a much-compressed spindle. Wings hyaline with yellow veins.

Head rugulose, the epinotum, peduncle and base of the petiolar nodes finely striate, the rest smooth and shining with moderately large and rather sparse punctures. Hairs of medium length, yellow, erect. Abundant on the head, the sides of the scutum, the posterior half of the scutellum, epinotum, petiolar nodes and ventral surface of the gaster. Sparse on the pronotum, epimera, mesothoracic sternite and the dorsum of the gaster. Completely absent from a narrow, median, longitudinal area on the scutum. The color varies from a piceous brown to a very deep piceous black. The abdomen is always a trifle lighter than the head and thorax. The thorax sometimes bears two longitudinal brownish yellow stripes. Legs and antennae brownish yellow to dirty brown.

Localities: Brazil, Minas Geraes, Pirapora (Gerbe). (Thayer Exp.)
Rio de Janeiro, Petropolis. (T. J. Borgmeier.)
Santa Catharina, Blumenau (type loc.) (Moeller, Reichensperger, Witte.)
Sao Paulo, Sao Paulo (von Ihering.)
Tipuca River. (No collector.)

Rio Grande do Sul, Taquara (von Ihering.)
San Lourenco (von Ihering.)
Camaquam (von Ihering.)
Argentina, Missiones (von Stieger.)

This insect has been reported by Bruch from Mendoza, Jujuy and Tucuman, Argentina, but I believe that these records belong to the subspecies *electra*. If *moelleri* occurred so far to the west and southwest we should certainly expect to have records from the intervening territory, particularly as this would include the much-worked region between Buenos Aires and Sante Fe. There is nothing to indicate that this form extends to the south of Rio Grande do Sul.

The unusually complex synonymy of the variety *moelleri* has already been taken up in the introduction. For a full discussion of the matter the reader is referred to page 72.

Solenopsis (Solenopsis) saevissima var. **perfida** Santschi.

S. saevissima var. *perfida*, Santschi, Rev. Suisse Zool. Vol. 30, p. 266, (1923). ♀

I have seen no specimens referable to this variety. A translation of the original description is given below:

"Worker: dull yellowish or reddish with the appendages and the border of the gastric segments reddish yellow, the middle of the femora and the tibiae brownish. Two small teeth on the clypeus. Head of the minor workers not sensibly narrowed behind. Sixth and seventh funicular joints no longer than thick. Otherwise as in the type."

Type locality: Brazil, Minas Geraes, Piracicabo (E. Luja).

Solenopsis (Solenopsis) saevissima var. **quinquecuspis** Forel.

S. saevissima var. *quinquecuspis*, Forel, Bull. Soc. Vaud. Sci. Nat. Vol. 49, p. 224 (1913). ♀ (*pylades* var.)

S. geminata subsp. *saevissima* var. *quinquecuspis*, Wheeler, Bull. Amer. Mus. Nat. Hist., Vol. 34, p. 379 (1915).

S. saevissima var. *quinquecuspis*, Santschi, Physis, Buenos Aires, Vol. 2, p. 381 (1916). ♀

As the name implies this variety was originally founded upon a supposed variation in the number of clypeal teeth. The variety *richteri*, to which *quinquecuspis* is closely related was assumed to have only two teeth on the anterior edge of the clypeus. Actually *richteri* is highly variable in this respect and consequently the number of clypeal teeth is of no significance for varietal status. In the case of *quinquecuspis*, however, there is another difference which permits

separation. Although there is some ambiguity in the original description, I believe I am correct in assuming that this insect lacks the yellow band at the base of the first gastric segment which characterizes *richteri*. Should this prove not to be the case I can see no way in which *quinquescuspis* could be separated from *richteri*.

Localities: Argentina, Buenos Aires, Bahia Blanca (Type loc.)
(Zelenka and Olavaria.)
Puerto Militar (Zelenka and Olavaria.)
Buenos Aires (Weise).
Monte Hermoso. (Carette.)

Solenopsis (Solenopsis) saevissima var. **richteri** Forel.

S. saevissima var. *richteri*, Forel, Deutsche Ent. Zeitschr., p. 267 (1909). ☿ ♀ (*pylades* var.)

S. geminata subsp. *saevissima* var. *richteri*, Wheeler, Bull. Amer. Mus. Nat. Hist., Vol. 34, p. 297 (1915).

S. saevissima var. *richteri*, Santschi, Physis Buenos Aires, Vol. 2, p. 381 (1916). ☿

S. pylades var. *tricuspis*, Forel, Mem. Soc. Ent. Belg., Vol. 20, p. 4 (1912). ☿

S. geminata subspecies *saevissima* var. *tricuspis*, Wheeler, Bull. Amer. Mus. Nat. Hist., Vol. 34, p. 397 (1915).

S. saevissima var. *tricuspis*, Santschi, Physis Buenos Aires, Vol. 2, p. 381 (1916). ☿

The majors and medias of this variety are easy to distinguish because of their very characteristic coloration. The entire insect is a deep, piceous brown with the exception of the first gastric segment which bears at its base a broad band of reddish yellow. The smallest workers lack this band and are sometimes difficult to distinguish from those of *moelleri* although they are usually much darker. The thorax of the smaller medias and minors is stout as in the variety *moelleri*. The size of *richteri* ranges from 2.8 mm. to 6.0 mm. and in the largest workers the head is more cordate than in *moelleri* or the typical *saevissima*. The number of teeth on the clypeus is variable. There may be two, three or five but the carinal teeth are always much longer and thinner than in *moelleri* or the typical *saevissima*.

With the exception of its smaller size, longer carinal teeth, slightly thicker petiole and different color the female of *richteri* exactly resembles that of the typical *saevissima*. Its color is a dirty yellowish

brown with the clypeus, the frontal area of the head and two longitudinal stripes on the scutum sordid yellow. In certain specimens other thoracic sclerites bear markings of yellow but these appear to be rather variable. The gaster is uniformly brown, except the base of the first segment which is reddish yellow. The presence of this yellow band on the first gastric segment is the most outstanding difference between the female of *richteri* and that of *moelleri*, although the longer carinal teeth of *richteri* furnish another separatory character. Length 7.7 mm.

I can detect no differences between the male of *richteri* and that of *moelleri* other than the somewhat greater size of the former.

Localities: Uruguay, Montevideo (Richter, Ducloux, von Steiger.)
Neuva Helvecia. (von Steiger.)
Herrero. (Ducloux.)
Argentina, Missiones. (Bruch.)
Salta, Jujuy. (Scheul.)
Mendoza. (Carette.)
Buenos Aires, Buenos Aires. (Type loc.) (Richter, von Steiger.)
La Plata. (Bruch.)
Tigre. (von Steiger.)
Delta Parana. (von Steiger.)
Sierra Ventana. (Bruch.)

As has already been noted in the introduction, it is necessary that *tricuspis* be regarded as a synonym of *richteri*, since the number of clypeal teeth in *richteri* is too variable to permit the recognition of a variety based upon this character alone.

That the variety *richteri* has been introduced into the United States is a fact which may in the future attract the attention of economic entomologists. Three or four years ago I was surprised to find specimens of this insect in material collected in Mobile, Alabama. Mr. H. P. Löding, who has made an intensive study of the insects of that region is of the opinion that its first appearance may be dated about eleven or twelve years ago. It apparently preceded the Argentine ant, for upon the arrival of that pest, it was driven out of the infested area with the native ants. My own observations in Mobile are too meager to be of much value but they indicate that *richteri* is spreading slowly to the north of the city. The area occupied at present is small, not extending more than six or seven miles from Mobile, but there is no reason why the insect should not spread

widely since its range in South America lies almost entirely in the south temperate zone. In certain sections of Mobile *richteri* has become a nuisance by disfiguring lawns with its unsightly crater nests. These vary somewhat according to the surroundings but when in the open are usually in the form of flattened domes, of smooth texture on the outside but of very loose construction within. One particularly large nest which I found at the edge of a pine wood was neatly thatched with bits of pine needles. This ant frequently makes long tunnels close to the surface of the soil. Portions of the roof subsequently fall in, leaving irregular trench-like areas through which the insects pass.

Solenopsis (Solenopsis) saevissima subsp. **interrupta** Santschi.

S. saevissima var. *interrupta*, Santschi, Physis Buenos Aires, Vol. 2, p. 397 (1916).

S. saevissima var. *macdonaghi*, Santschi, Physis Buenos Aires, Vol. 2, p. 397, 380 (1916).

S. geminata subsp. *pylades* Bruch, Rev. Mus. La Plata, Vol. 23, p. 313 (1916).

The color of the subspecies *interrupta* is very similar to that of the typical *saevissima* and it seems fairly certain that many of the older records from Argentina attributed to the latter form really belong to *interrupta*. The presence of a caste of very large workers with distinctly cordate heads is the most distinguishing characteristic of *interrupta*. Some of these large individuals reach a length of 6.4 mm. and these show the cordate condition of the head to a very marked degree. However, it is quite noticeable in specimens 5 mm. in length and serves to separate these from *saevissima* workers of corresponding size.

In the largest workers the head is widest at the posterior third, the occiput is divided by a strong V-shaped median impression into two feebly convex lobes. Frontal groove very prominent, extending from the base of the antennal lobes to the occiput. In it lies a single ocellus. Clypeal teeth long and very stout, lateral denticles well developed, median denticle present and variable in size. The innermost mandibular tooth reduced to a mere angle between the masticatory and inner borders. The antennal scapes in repose reach the posterior fifth of the head. The eyes are bounded by a shallow groove or trench which extends forward as a fan-shaped area of striae to the insertion of the mandibles. Thorax rather bulky. Promesonotal suture strongly marked. The mesonotum in profile feebly

convex, slightly higher than the pronotum, its posterior portion very little higher than the adjacent portion of the epinotum, the latter with a long and very feebly convex basal face. This gives the entire thorax a broadly arcuate outline which is broken only by the narrowly impressed mesoepinotal suture. Seen from above the sides of the thorax are only slightly constricted at the mesoepinotal suture. Petiolar nodes much as in the typical *saevissima*, but somewhat higher and thinner in profile. The postpetiole bears a prominent anterio-ventral tooth. Seen from above both nodes are strongly transverse, the petiole slightly more than three-quarters as wide as the postpetiole. Gaster truncate at the base. Color rich, reddish yellow, the abdominal segments bordered with brown, the bordering interrupted at the median line. The width of the bordering varies to some extent but in the majors and large medias never covers the entire segment.

The small medias and minors of *interrupta* are exceedingly similar to those of the typical *saevissima*. There is, of course, no difference in the shape of the head and the color is virtually identical.

Female: Length 7.0–8.0 mm.

I have not seen the female of *interrupta*. Santschi describes it as similar to the major worker except for the presence of three brown bands on the thorax. This character appears to be quite distinct since it is not shown by the typical *saevissima*, and in *richteri*, in which the thorax is also banded, the conditions are reversed there being two yellow bands on an otherwise brown thorax. For this reason it seems fairly certain that the insect described by Bruch in his publication of 1916 (*vide supra*) as *S. geminata* subsp. *pylades* is really *interrupta*. Although the size of the female which he describes is smaller than that mentioned by Santschi the relationship of the two is quite obvious. A translation of Bruch's description of the sexual forms is given below:

"Female: Length about 6.0 mm. Color castaneous yellow as in the worker. Dorsum of the thorax with three longitudinal brown bands, a median anterior band and two lateral bands situated more to the rear. The rest of the dorsum is darker, the same as the nodes. The abdomen is nearly black with the anterior part as in the worker, castaneous yellow, the segments bordered with the same color but deeper. The wings are subhyaline, their veins very pale yellow. Pilosity the same as in the worker. The head is square, not enlarged

behind. The eyes are very large and very convex. The clypeal teeth are very short and very obtuse. The head is smooth and glistening with the punctuation feeble and sparse.

Male: completely black, very shining and brilliant, the funiculi and tarsi are a brownish yellow, the tibiae and the articulations of the joints sordid brown. The epinotum is somewhat opaque, finely reticulate and partially striate, the sides of the nodes are also reticulate. The head is very small, subglobular. The thorax is much broader than in the female and more convex. The first node is much wider at the apex than at the base, terminating in a horizontal edge and not rounded as in the worker and female. The second node is subglobular, the anterio-lateral part angular."

Localities: Argentina, Cordoba, Cordoba. (von Steiger.)
Santa Fe, Santa Fe. (von Steiger.)
Mendoza, Mendoza. (Jensen-Haarup.)
Chibuto. (Durione.)
Entre Rios, Estacion Sosa. (MacDonagh.)
Villaguay. (Bruch.)
Buenos Aires, Moreno. (Nordenskjold.)
Monte Hermoso. (Carette.)
Bajo Hondo (type loc.) (Carette.)
Rio Negro, Colonia Frias. (Lehmann-Nitsche.)

I have synonymized *macdonaghi* with *interrupta* for the following reasons:

The color of the two forms is identical except for a difference in the amount of infuscation of the abdomen. This difference is most clearly shown by the minor workers. The gaster of the minor of *interrupta* is said to be clear yellow with the bordering of the segments virtually obliterated. In the minor of *macdonaghi* the gaster is uniform piceous brown. While I have not seen a large series of workers of *interrupta,* I have repeatedly observed, in the typical *saevissima,* fluctuations in gastric infuscation among workers from the same nest. These are frequently of a sufficient magnitude to include both conditions described above. Such variations must be considered individual differences and cannot be used as a basis for varietal status. In the second place the majors and large medias of *macdonaghi* show an interruption of the bordering of the gastric segments. This is less conspicuous than in *interrupta,* where the

fuscous band is narrower, but is quite distinct nevertheless. It is hardly necessary to add that the large workers of both have cordate heads. It is my opinion, therefore that *interrupta* and *macdonaghi* represent insignificant variations of a single form.

Solenopsis (Solenopsis) saevissima subsp. **electra** Forel

S. saevissima subsp. *electra*, Forel, Bull. Soc. Vaud. Sci. Nat., Vol. 50, p. 274, (1914). ♀ (*pylades* subsp.)

S. geminata subsp. *electra*, Wheeler, Bull. Amer. Mus. Nat. Hist., Vol. 34, p. 397 (1915).

S. saevissima subsp. *electra*, Santschi, Physis Buenos Aires, Vol. 2, p. 381, (1916). ♀

Worker major: Length 4.7 mm. (Plate II, figs. 6, 7.)

Head strongly cordate. Mesonotum not convex, together with the basal face of the epinotum forming an almost rectilinear dorsum to the thorax. Epinotum with a long basal face and a very short declivious face, the latter entirely covered with transverse striae. Petiolar nodes relatively narrow, the postpetiole scarcely wider than the node of the petiole. In other regards the structure is the same as that of the typical *saevissima*.

The minors of *electra* are difficult to distinguish from those of the variety *moelleri*. The eyes are slightly larger, being composed of fifty to fifty-five facets. The epinotum is longer and lower with the short declivious face transversely striate throughout. The minors of the variety *richteri* also have the declivious face of the epinotum transversely striate but these can usually be distinguished from those of *electra* by their darker and more uniform color. Length of the minor worker 2.8 mm.

The color of the subspecies *electra* varies from a clear reddish brown with the abdomen piceous brown to dirty piceous brown with the abdomen deep piceous. In the larger specimens the base of the first gastric segment bears a band of dirty yellow.

The female of the subspecies *electra* has not been described. I have seen a single specimen taken by T. J. Borgmeier at Tintina, Argentina, which seems without doubt to belong to this form. Unfortunately the largest worker of the series taken with the female measures only 3.7 mm. and consequently I am deprived of the most outstanding characteristic for determination, the cordate head of the major worker. Nevertheless the workers so exactly correspond to those of similar size in a series sent me by Dr. Santschi that I have little hesitancy

in regarding the two as belonging to the same subspecies. The female is described below.

Female: Length 6.4 mm. (Plate II, fig. 8.)

Head exclusive of the mandibles as broad as long, quadrate, the sides narrower in front of the eyes than behind them, occiput with a narrow, concave, median impression. Clypeus feebly projecting except in the middle where the two carinae project well forward. Carinae moderately divergent in their anterior two-thirds, parallel in their posterior third. The anterior edge of the clypeus between the carinae feebly concave. Carinal teeth unusually stout and rather blunt, lateral denticles absent, a small median denticle occurs between the carinal teeth. Mandibles with four teeth, the innermost much smaller than the others. Eyes large, oval, strongly convex, their anterior fifth flattened so that the eye is not uniformly convex. The antennal scape in repose slightly surpasses the lateral ocellus. First funicular joint a little longer than the following two together. Second joint approximately twice as broad as long, third joint one and one-half times as long as broad, the remaining small joints all somewhat longer than broad. Club slender, two-thirds as long as the remainder of the funiculus, the terminal joint one and three-fourths times as long as the penultimate.

Thorax oval, very slightly less than twice as long as broad, five-sixths as wide as the head. The two faces of the epinotum rather confluent, the basal face with a broad and shallow median longitudinal impression. Petiole and postpetiole as in the female of *saevissima* except that the node of the petiole is thinner. Seen from above the petiole is five-sixths as wide as the postpetiole.

Cephalic punctures rather prominent and moderately numerous. The mandibles coarsely and irregularly striate. The area between the anterior border of the eye and the insertion of the mandible and the entire epinotum, with the exception of the anterior part of the basal face, finely and evenly striate. Peduncle and base of the petiolar nodes finely rugulose. Hairs long, erect, golden. Color rich golden yellow, the gaster reddish brown with a broad band of yellow at the base of the first segment, the remaining segments each with a pair of lateral yellow spots.

Localities: Argentina, Jujuy. (Type loc.) (Scheub.)
Tucuman. (Shipton.)
Salta, Rosario del Frontera. (Weiser.)
Cordoba, Cordoba. (Scott.)
Santiago del Estero. (Merkle?)

Solenopsis (Solenopsis) saevissima subsp. **electra** var. **wagneri,** Santschi

S. saevissima var. *wagneri*, Santschi, Physis Buenos Aires, Vol. 2, p. 328, (1916). ♀. Rev. Suisse Zool. Vol. 30, p. 266, (1923) ♀.

I have seen no workers which could be certainly referred to this form. It is apparently very similar to *electra* from which it differs principally in its larger size and the lack of the yellowish band at the base of the first gastric segment.

Localities: Bolivia, Carandaiti. (Lizer and Deletang.)
Argentina, Santiago del Estero, Icano. (Type loc.) (Wagner.)
Uruguay, Trinidad. (Joergensen.)

S. (SOLENOPSIS) TRIDENS FOREL.

Only two forms of this rare insect are known. They may be separated as follows:

1. Basal face of the epinotum entirely smooth; color brownish black, antennae and legs brown, mandibles brownish red.....*tridens*
Basal face of epinotum at least in part covered with feeble transverse striae; color reddish yellow, the gaster and petiolar nodes black, appendages and occiput tinged with brown.....var. *substituta*

S. (Solenopsis) tridens Forel.

S. tridens, Forel, Deutsche Ent. Zeitschr., p. 298 (1911.) ♀

I have seen no specimens referable to the typical *tridens*. A translation of Forel's description is given below.

"Worker: Length 2.8–3 .2 mm.

"Mandibles 4-toothed, smooth with coarse scattered punctures and several striae. The two carinae or keels of the clypeus are sharp, divergent, rather strong towards the front and ending in two teeth. Between these but further under lies a longer, more pointed, very prominent median tooth (much stronger than in *wassmani* Em.). Moreover at each side of the teeth there is a blunt scarcely tooth-shaped angle. The whole body slender. Head about one-fifth longer than broad, broader in front, significantly narrowed behind with the sides behind the eyes moderately convex and with convex although still furrowed posterior border. Frontal furrow absent. Frontal area significant. Eyes convex, relatively large, very slightly in front of the middle of the

head, numbering about 60–70 facets. The antennal scape surpasses the posterior border of the head by about its own thickness. Funicular joints all longer than thick, seventh and eighth only slightly so. Promesonotal suture absent. Thorax strongly constricted. Basal face of the epinotum a good one and a half times longer than broad, almost rectangular, somewhat beveled (feebly convex transversely, more strongly convex longitudinally), terminated by two very blunt rounded protuberances. Declivious face much shorter, very steep without being perpendicular. First node much broader than long, seen from the side bluntly conical, feebly convex before and behind, thickened at the base, peduncle very thin (as long as the base of the nodes). Second node as broad as long but narrowed in front and behind, scarcely broader than the first, the summit sloping at the back but rounded throughout, as high as the first. Legs slender.

"Mesopleurae finely wrinkled, otherwise completely smooth and strongly shining. Head and abdomen with distinct though scattered small punctures. Pubescence not distinct. Hairs sparse, fine, golden and pointed, somewhat shorter, more numerous and more inclined on the tibiae and antennal scapes.

"Brownish black; epinotum, antennae and legs brown, mandibles brownish red."

Sexual forms unknown.

Type locality: Brazil (East Bahia) Villa Nova. (Garbe.)

Although Forel does not mention the presence of well developed humeral angles in the type we may assume that the insect shows this character since the angles are unusually prominent in the variety *substituta* Sants., a form which appears to differ mainly in its lighter color. These angles together with the blunt protuberances at the posterior edge of the basal face of the epinotum form the principal means of distinguishing this species from *saevissima*. The presence of the median clypeal tooth which Forel utilized as a means of recognition is of no value since the same structure occurs in some of the forms of *saevissima*.

S. (Solenopsis) tridens var. **substituta** Santschi.

(Plate IV, figs. 1, 2.)

S. tridens, var. *substituta*, Santschi, Bull. Soc. Ent. Belg., Vol. 65, p. 236, (1925). ♀, ♀.

This form differs from the typical *tridens* in its lighter coloration. The head and thorax are reddish yellow, the occiput, antennae, distal

half of the femora and the remaining joints of the legs tinged with brown, the gaster and in some specimens the upper parts of the petiolar nodes piceous. The basal face of the epinotum is sculptured with indistinct transverse striae.

A single cotype which I was able to examine through the kindness of Dr. Santschi shows a very marked development of the humeral angles of the pronotum. Seen from above the anterior edge of the pronotum is very feebly convex and meets the sides at a sharp angle. The resulting outline of the pronotum is completely different from that of *saevissima* in which the anterior edge is strongly and evenly convex and the humeral angles so rounded that they can hardly be said to exist. The epinotum of *tridens* is unique. Seen from above the lateral bordering is sinuate and diverges at the junction of the basal and declivious faces to form two broad, low, obtusely angular carinae.

Santschi has given a brief account of the female of the variety *substituta* a translation of which is included here:

"Female: Length 6.5 mm.

"Except for the gaster which is black the color varies from a clear reddish yellow to a much darker reddish yellow with the upper side of the nodes, the thorax and the vertex brownish. Wings hyaline, veins yellowish. The head is scarcely longer than broad. The scapes slightly surpass the posterior border of the head."

Male unknown.

Type locality: Brazil (Sao Paulo) Pitangora. (Luderwaldt.)

S. XYLONI (MACCOOK).

Introduction.

After a careful study of a large amount of material from the southern and southwestern United States I am convinced that the forms *xyloni, maniosa, aurea* and *amblychila* are closely related variants of a single species. The specificity of *aurea* has already been established but since *xyloni* was described thirty years earlier this name must be given priority. The forms may be arranged as follows:

S. xyloni MacCook.
  var. *maniosa* Wheeler.
  subsp. *aurea* Wheeler.
  subsp. *amblychila* Wheeler.

The members of the group thus set up differ from *geminata* through the absence of the largest worker caste and through the more rounded

head and evenly curved, three-toothed mandibles of the large workers. The absence of the fourth mandibular tooth also serves to separate these forms from *saevissima* but a much more striking difference is offered by the uniformly shorter antennal scapes of *xyloni*. These, even in the minor worker where they are longest, never reach the occipital border. In this character *xyloni* shows an approach to *gayi* of Chile but in the latter species the head of the large worker is more quadrate.

The first mention of *xyloni* seems to be attributable to Buckley. In 1866 he described a *Myrmica* (*Atta*) *sabeana* which may have been the insect we now designate as *xyloni*. Buckley's descriptions have been the cause of endless vituperation by myrmecologists and there is no need to increase the stock of expletives expended on this misguided worker. His description has long been abandoned as utterly worthless and MacCook's account of *xyloni*, published in 1879, is considered the original recognition of this form. To an impartial observer such procedure might seem a jump from the frying pan into the fire. MacCook's description is even less complete than that of Buckley but his figures prove that he was describing a *Solenopsis* and his specifications of size and color enable us to recognize the form with reasonable accuracy. Before describing *xyloni* MacCook sent specimens to Forel for examination. These were pronounced identical with *geminata* but MacCook refused to accept this interpretation since he had noted the absence of the largest soldier caste in his specimens and rightly considered them representatives of a separate species. It is interesting to note that thirty years later Forel valiantly defended the specificity of his *pylades* for this very reason. In the years following MacCook's description *xyloni* completely dropped from sight. Emery must have known this insect since there are two specimens in the collection of Dr. Wheeler which bear the note "*S. geminata*, color var., Emery det." Nevertheless there are no references to it in the literature until 1915 at which time it was made a subspecies of *geminata* by Wheeler. In the meantime (1906) he had described *aurea* as a variety of *geminata*. Three years later Forel raised *aurea* to specific rank. In his publication of 1915 Wheeler assigned a new subspecies, *maniosa*, to *geminata* and another, *amblychila*, to *aurea*. This arrangement has been followed up to the present. By uniting *xyloni*, *maniosa*, *aurea* and *amblychila* within a single species a much more consistent arrangement is secured since the group thus produced is of very uniform character and at the same

time *geminata* is relieved of forms whose relation to it is obviously distant.

S. xyloni occurs throughout the southern United States from Florida to California. Specimens from the eastern half of this range belong without exception to the typical *xyloni*, a form which is found from Florida to Arizona. Its range to the north is much more extensive than was formerly supposed. It is abundant in northern Alabama and undoubtedly gets into that portion of Tennessee which lies to the west of the Appalachian highland. In central Texas the range of the typical *xyloni* is overlapped by that of the subspecies *aurea*, the two forms occurring together through western Texas, New Mexico and Arizona. The variety *maniosa* is the only form of this species found in California. *Maniosa* occurs as far east as New Mexico but is less abundant in New Mexico and Arizona than in California. The subspecies *amblychila* is found only in the mountains of southern Arizona.

Key to the subspecies and varieties of S. xyloni

1. Eyes of the major worker consisting of 70–80 facets (50 in the minor), separated from the insertion of the mandibles by a distance one and one-half times as great as their maximum diameter.....2
   Eyes of the major worker consisting of not more than 50 facets (20 in the minor), separated from the insertion of the mandibles by a distance twice as great as their maximum diameter.....3
2. Major worker brownish red to blackish red, the minor much darker ..... *xyloni*
   Color in all castes light reddish yellow, the posterior edges of the abdominal segments marked with black.....var. *maniosa*
3. Clypeal teeth of the major worker present.....subsp. *aurea*
   Clypeal teeth of the major worker absent.....subsp. *amblychila*

S. (Solenopsis) xyloni (MacCook.)

S. xyloni, MacCook, in Comstock, Rep. Cotton Worm, p. 188, (1879). ☿, ♀.
S. geminata subsp. *xyloni*, Wheeler, Bull. Amer. Mus. Nat. Hist., Vol. 34, p. 395 (1915). ☿.
?*Myrmica (Atta) sabeana*, Buckley, Proc. Ent. Soc. Phila., Vol. 6, p. 343 (1866). ☿.

Worker major: Length 5.8 mm. (Plate III, figs. 1, 4.)

Head, exclusive of the mandibles, slightly broader than long, broadest at the posterior third, the sides moderately convex, narrowed from the posterior third towards the mandibles, the occipital angles

much rounded, occiput with a pronounced but rather narrow impression; frontal furrow present. Clypeus feebly projecting, forming a virtually straight line except where the carinal teeth project forward, the latter short and stout, lateral denticles reduced to feeble lobes or simply forming a sinuate portion of the edge of the clypeus, clypeal carinae clearly marked from the teeth to the frontal lobes but extending only a short distance between the latter before fusing with the clypeus. Mandibles evenly curved, armed with three large teeth. A small denticle on the inner margin represents the vestige of the fourth tooth. Eyes suboval, more or less pointed at the anterior end, composed of 70–80 facets, separated from the insertion of the mandibles by a distance one and one-half times as great as their maximum diameter, the outermost ring of facets usually unpigmented. The antennal scapes in repose slightly surpass the posterior fifth of the head, first funicular joint as long as the following two together, second and third funicular joints approximately twice as long as broad, the remaining small joints decreasing in length and increasing in width; club slender, about five times as long as broad, the terminal joint only slightly more than one and a half times as long as the penultimate.

Thorax seen from above with a well-developed promesonotal suture, the pronotum transversely rectangular, mesonotum longer than broad, suboval and truncate behind at the mesoepinotal suture, epinotum approximately as broad as long, subquadrate with the sides somewhat convex and not distinctly marked, the declivious face with a shallow impression which extends to the posterior third of the basal face. Seen in profile the pronotum appears somewhat angular with an abruptly sloping, straight anterior portion and a slightly convex less sloping posterior part, the promesonotal suture broad and shallow, the mesonotum evenly convex except at the extreme posterior portion where it descends abruptly to the deep mesoepinotal suture. Epinotum lower than the mesonotum, sharply angular, the basal face much longer than the declivious. Node of the petiole in profile thick and obtuse, the anterior face sharply sloping in a straight line from the summit of the node to the peduncle, the posterior face convex at the summit of the node but descending perpendicularly throughout most of its length, peduncle almost as long as the base of the node, thick and with a ventral lamella which ends anteriorly in an obtuse tooth. Postpetiole in profile dome-shaped, higher than thick and only slightly lower than the node of the petiole, the ventral

face forms a sharp angle at its anterior edge and bears two conspicuous rugae near its posterior border. Seen from above the postpetiole is slightly narrower than the transversely oval postpetiole. Anterior edge of the abdomen narrowly truncate.

The color varies from a brownish red with the posterior portion of the abdomen castaneous brown to a deep blackish red with only the frontal area of the head and the mesonotum yellowish. In the latter case the posterior part of the abdomen is piceous. The mandibles and the area between their insertion and the anterior border of the eye coarsely striate. Basal face of the epinotum, meso- and metapleurae and frontal lobes with very fine striae. Lower portions of the petiolar nodes finely striato-rugulose. Cephalic punctures small but rather numerous, those of the abdomen minute but more abundant. Hairs long, stout, erect and golden.

Worker minor: Length 1.6 mm. (Plate III, figs. 7, 8.)

Head exclusive of the mandibles, as long as broad, sides virtually parallel except in the posterior third where they are somewhat narrowed. Occipital angles much less rounded than in the worker major, occiput flat. Clypeus more projecting than in the major, the carinal teeth relatively longer, the edge of the clypeus between them with a concave impression, lateral denticles poorly defined, carinae continued well back between the frontal lobes. Mandibles with four teeth, the innermost small but distinct and borne in a line with the other three. Eyes rounder than in the major worker, not pointed anteriorly, composed of 40–50 facets and separated from the insertion of the mandibles by a distance only slightly exceeding their maximum diameter. The antennal scapes in repose fail to reach the occipital border by a distance less than the length of the first funicular joint; second and third funicular joints notably longer than broad, the remaining small joints slightly or not at all longer than broad; club slender, the terminal joint twice as long as the penultimate.

Thorax without promesonotal suture, in some specimens there is a slight ridge in the position where the suture should occur. Promesonotum in profile feebly convex, mesoepinotal suture wide and deep, epinotum only slightly lower than the adjacent portion of the mesonotum, less angular than in the major worker, declivious face not impressed, approximately as long as the basal face. Node of the petiole in profile thicker and lower than in the worker major, the summit very obtuse, both anterior and posterior faces somewhat

convex; peduncle without the ventral lamella, the tooth small and acute. Postpetiole in profile very similar in shape and size to the node of the petiole but slightly lower and inclined forward. Seen from above the node of the petiole is about three-fourths as wide as the postpetiole, the latter is much less transverse than in the major worker. Anterior edge of the abdomen truncate.

Color blackish red to piceous, the mandibles, clypeus and anterior portion of the head yellow. Mandibles coarsely striate, a few feeble striae between their insertion and the anterior margin of the eye; meso- and metapleurae finely striate. Punctures fine and rather sparse, the hairs which they bear long, erect, and golden.

The medias show characters transitional between those of the two castes described above.

Female: Length 6.6 mm. (Plate III, fig. 6.)

Head exclusive of the mandibles one-sixth longer than broad, subquadrate, the sides virtually straight, the posterior angles very slightly rounded, occiput flat or very feebly impressed. Clypeus and mandibles as in the major worker. The antennal scapes in repose reach the lateral ocelli; funicular joints and club as in the major worker. Eyes large, oval, their posterior border only slightly surpassing the middle of the side of the head. Thorax slightly narrower than the head, ellipsoidal, one and two-third times as long as broad. Epinotum without a sharp separation between the basal and declivious faces. Node of the petiole in profile somewhat thinner than that of the major worker; postpetiole more angular and a trifle lower. Seen from above the postpetiole is very strongly transverse, almost twice as broad as long. Wings hyaline, iridescent, the veins and stigma pale yellow.

Color piceous red, mandibles, anterior two-thirds of the head, antennae and legs yellow; abdomen brownish black, sometimes with two yellow spots at the base of each segment except the first. Sculpture and pilosity as in the major worker.

Male: Length 5 mm. (Plate III, fig. 5.)

Head trapezoidal, eyes large, oval about two-thirds as long as the side of the head, their anterior border almost reaching the insertion of the mandibles. Clypeus not projecting; mandibles bidentate, the inner tooth small. Second antennal joint much shorter and far broader than either the preceding or succeeding joints, approximately doughnut shaped, third joint as long as the following two together.

Thorax one and one-third times as broad as the head. Seen in profile the scutum is greatly swollen and overhangs the pronotum. Node of the petiole in profile very low with an acute summit. Postpetiole in profile much depressed; seen from above transverse and slightly wider than the node of the petiole. Wings as in the female. Color reddish black, appendages yellow, the pronotum with three broad yellow bands. Hairs numerous and fine, those on the petiolar nodes somewhat longer and coarser.

Localities: Alabama, Mobile. (H. P. Loding, W. S. Creighton.)
Montgomery, Huntsville. (W. S. Creighton.)
Louisiana, Shreveport. (No collector.)
Texas, Austin, Ft. Davis. (W. M. Wheeler.)
Arizona, Phoenix, Huachuca Mts., Oracle, Texas Pass. (W. M. Wheeler.)

The specimens from Alabama and Louisiana are somewhat lighter in color than those from Texas but not as light as the variety *maniosa*. The difference is too slight even for varietal distinction.

Xyloni nests under stones, at the base of tufts of grass or in sandy "draws" near the edge of streams. The crater is very irregular. and consists of a mass of loose, friable soil or sand without definitely formed passages.

S. (Solenopsis) xyloni var. **maniosa** (Wheeler.)

S. xyloni var. *maniosa*, Wheeler, Bull. Amer. Mus. Nat. Hist., Vol. 34, p. 396 (1915). (*geminata* subsp.)

Except for their lighter color the workers of this form are identical with those of *xyloni*. As long as *maniosa* was placed with *geminata* it could be regarded as a subspecies but since there are no significant structural differences between it and *xyloni* I am forced to consider *maniosa* as a variety of that species.

The major workers of *maniosa* are of a clear reddish yellow with the abdomen more or less marked with piceous brown. In most specimens the brown coloration is confined to a band at the posterior edge of each gastric segment but more rarely the entire abdomen is dark. The minor workers usually show the complete infuscation of the abdomen but the head and thorax are reddish yellow as in the major worker. They are, therefore, easily distinguished from the uniformly dark minors of *xyloni*. The color of the female is a light reddish brown with the abdomen black. The males of *maniosa* cannot be distinguished from those of *xyloni*.

Localities: New Mexico; Almagordo. (G. von Krockow.)
Arizona; Tucson, Yuma, Tempe, Yucca, Gila Bend Mts., Benson. (W. M. Wheeler), Thatcher (Chamberlin.)
California; Pasadena, San Gabriel Mts., San Ysidro, Del Mar, Needles, (W. M. Wheeler), Friant, Fresno, Los Angeles, (Chamberlin), Berkeley Hills, Los Gatos Canyon, (J. P. Bradley), La Jolla, (J. F. McClendon), Visalia, (Culbertson), Whitter, (H. L. Quayle).

S. (Solenopsis) xyloni subsp. **aurea** (Wheeler.)

(Plate III, fig. 2.)

S. xyloni subsp. *aurea*, Wheeler, Bull. Amer. Mus. Nat. Hist., Vol. 21, p. 336 (1906). ☿, ♀, ♂. (*geminata* var.) Ibid., Vol. 24, p. 425, (1908). ♀, ♂.
S. aurea, Forel, Deutsche Ent. Zeitschr., p. 269 (1909).

The workers of all sizes of this subspecies may be distinguished from those of corresponding castes in *xyloni* by their smaller eyes and the more rectilinear dorsum of the thorax. The eyes of the major worker of *aurea* consist of about 50 facets which are separated from the insertion of the mandibles by a distance twice as great as their maximum diameter. Those of the minors have twenty facets and are separated from the insertion of the mandibles by a distance slightly less than twice their greatest diameter. The epinotum of the major worker is not depressed and in profile forms an almost straight line with the posterior portion of the epinotum. This is completely rectilinear in the minor worker. The clypeal teeth of the larger workers are slightly smaller than in *xyloni* but this character is difficult to employ unless one is familiar with both forms. There also appears to be a difference in size. I have never seen workers of *aurea* whose length exceeded 4.6 mm. but such a character cannot be depended upon, particularly when, as in this case, the females are of equal size.

The color of all sizes of workers in the subspecies *aurea* is a beautiful clear yellow with the mandibles and the posterior margins of the gastric segments tinged with brown.

The female of *aurea* very closely resembles that of *xyloni*. The head is slightly wider in proportion to its length and the postpetiole more transverse but both these differences are subject to confusing

variations. By far the most satisfactory criterion lies in the paler coloration of the female of *aurea*. The insect is a rich golden yellow with the posterior edges of the gastric segments narrowly bordered with castaneous brown. The color of the male is blackish brown with the yellow bands on the pronotum absent or much obscured. I can detect no other differences between this insect and the male of *xyloni*.

Localities: Texas; Austin. (Type loc.), W. M. Wheeler. Fort Davis. (W. M. Wheeler.)
New Mexico; desert near Magdalena. (W. S. Creighton.)
Arizona; Yuma, Grand Canyon, Phoenix, Casa Grande, Post Canyon Pinaleno Mts., Coyote Mts. (W. M. Wheeler.)

Aurea nests under stones and dried dung and does not construct craters. It appears to be nocturnal or crepuscular in habits. The workers are rarely found outside the nest during the day and avoid direct sunlight as much as possible. Several workers which I found early one morning near the bottom of Bright Angel Trail in the Grand Canyon were dragging about a much crushed beetle. When I first observed them they were still protected from the direct rays of the sun. An hour later when I returned the place was in brilliant sunlight. The beetle had been abandoned and what few ants I could find had taken refuge under nearby stones. Although the workers in the nests which I found in the desert country near Magdalena, N. M. were close to the cake of dried dung which covered the upper passages of the nest, they almost immediately disappeared into the lower passages when exposed to the light.

S. (Solenopsis) xyloni subsp. **amblychila** (Wheeler.)

(Plate III, fig. 3.)

S. xyloni subsp. *amblychila*, Wheeler, Bull. Amer. Mus. Nat. Hist., Vol. 34, p. 394 (1915). ♀. (*aurea* subsp.)

The major worker of *amblychila* may be distinguished from that of any other form in the species through the absence of clypeal teeth. The anterior edge of the clypeus forms a perfectly straight line, the carinae terminating behind the margin. The punctures, particularly those on the head are notably sparse and small. In other characters *amblychila* closely resembles *aurea*. The mesonotum of *amblychila* is, however, more convex and the small funicular joints a trifle more elongate.

The clypeal teeth are present in the medias and minors of *amblychila*

and I can find no satisfactory character by which these may be separated from those of *aurea*.

The female of *amblychila* shows the unarmed clypeus and reduced punctures of the major worker. In other regards it is identical with that of *aurea*. The males of the two forms cannot be distinguished.

Localities: Arizona; Huachuca Mts. (Type loc.) (W. M. Wheeler.)
Mexico, Guadalajara. (McClendon.)

Subgenus Euophthalma, Subgen. nov.

The characteristics of this subgenus have already been discussed in the introduction. It is composed of species of small or moderate size in which polymorphism is, at best, feebly developed. The eyes are large and are ordinarily composed of 20–60 facets. The second and third funicular joints are usually as broad as long or broader than long. In the case of *globularia*, which constitutes an exception to both statements, the second and third funicular joints are slightly longer than broad and the eyes of the smallest workers in some of the subspecies are made up of only twelve facets. Despite these irregularities *globularia* obviously belongs to the subgenus *Euophthalma* and its peculiar postpetiole is so distinct that confusion in regard to this species is extremely unlikely.

The synonymy of the group is as follows:

S. (*Euophthalma*) *andina* Santschi
S. (*Euophthalma*) *globularia* Fred. Smith
= var. *curta* Forel
subsp. *lucayensis* Wheeler
subsp. *littoralis* subsp. nov.
subsp. *pacifica* Wheeler
var. *descheoensis* Mann
var. *rubida* Wheeler
subsp. *steinheili* Forel
= var. *borinquenensis* Wheeler
= var. *cubaensis* Wheeler
S. (*Euophthalma*) *huachucana* Wheeler
S. (*Euophthalma*) *macrops* Santschi
S. (*Euophthalma metanotalis* Emery
var. *argus* Santschi
subsp. *emiliae* Santschi
subsp. *pelontona* Forel
subsp. *shiptoni* Forel
var. *steigeri* Santschi

S. (*Euophthalma*) *nigella* Emery
subsp. *gensterblumi* Forel
= subsp. *praevalens* Santschi
S. (*Euophthalma*) *occulata* Santschi
S. (*Euophthalma*) *picquarti* Forel
S. (*Euophthalma*) *schilleri* Santschi
S. (*Euophthalma silvestrii* Emery

My reasons for placing *gensterblumi* and *occulata* in the subgenus *Euophthalma* are discussed at the end of the description of those forms. A key to the various species is presented below:

1. Postpetiole greatly dilated, seen from above subcircular, more than one-half as wide as the greatest width of the abdomen....*globularia*
   Postpetiole not dilated, seen from above transverse in the major workers, transversely oval to subglobose in the minors, never more than one-third as wide as the greatest width of the abdomen....2
2. Epinotum entirely rugose or reticulo-punctate.....7
   Epinotum smooth except for a few rugae on the metaplurae and the declivious face.....3
3. Eyes very large and elongate with fifteen facets in their greatest length, their anterior border extending almost to the insertion of the mandibles.....*macrops*
   Eyes with eight or less facets in their greatest length, their anterior border separated from the insertion of the mandible by a distance equal to or exceeding their length.....4
4. Major worker with the antennal scape in repose reaching the posterior third of the head, minor worker with the scape in repose reaching the posterior fourth of the head; occiput of major with a strongly impressed median furrow.....*nigella*
   Major worker with the antennal scape in repose slightly surpassing the posterior fourth of the head, minor with the scape in repose reaching the posterior sixth of the head; occiput flat or scarcely impressed.....5
5. Eyes of forty-five facets.....*andina*
   Eyes of twenty to thirty facets.....6
6. Greatest length of thorax (neck excluded) approximately two and one-half times its greatest width, sides feebly constricted at mesoepinotal suture, color piceous brown.....*occulata*
   Greatest length of thorax (neck excluded) less than twice its greatest width, sides strongly constricted at the mesoepinotal suture, color yellow.....*huachucana*
7. Head distinctly broader than long, color pale yellow, the posterior part of the abdomen castaneous brown.....*silvestrii*
   Head as long as broad or longer than broad, color reddish brown to dark brown, the abdomen wholly or in large part piceous..*metanotalis*

S. picquarti Forel has been omitted since the characters given in the original description are not suitable for use in the key.

S. (Euophthalma) andina Santschi.

S. andina, Santschi, Rev. Suisse Zool., Vol. 30, p. 262, fig. 3 (1923). ♀

Worker: Length 2.8–3.0 mm. (Plate VII, figs. 1, 2.)

Head, exclusive of the mandibles, very slightly longer than broad (about one-seventh), the sides virtually straight, very feebly narrowed in front of the eyes, the posterior angles moderately rounded, the occiput approximately straight. Clypeus moderately projecting, the prominent and divergent clypeal carinae terminating in short, stout teeth. The lateral denticles are not distinct but there is an angular impression between the carinal teeth and the adjacent edge of the clypeus. Mandibles smooth, armed with four teeth, the outer three large, the innermost reduced to an angle which limits the internal border of the mandible. Eyes of about forty-five facets, separated from the insertion of the mandible by a distance slightly exceeding their greatest diameter. The antennal scapes in repose reach the posterior fourth of the head. First funicular joint slightly shorter than the following three together, joints 2–7 approximately as long as broad, club slender, the last joint two and one-quarter times as long as the penultimate.

Thorax with sharply defined humeral angles. Promesonotum in profile moderately convex, the mesoepinotal suture with a broad but rather shallow impression. Epinotum angular, the basal face very feebly convex and much longer than the declivious. Node of the petiole in profile triangular, the summit rounded but narrow, the anterior face at least one-third longer than the posterior, the peduncle with a very large ventral tooth. Postpetiole in profile rather angular and strongly inclined forward, about three-fourths as high as the node of the petiole. Seen from above the node of the petiole is approximately two-thirds as wide as the postpetiole. The latter is strongly transverse and trapezoidal in shape.

Color, thorax and abdomen castaneous brown, the head a somewhat more piceous brown, mandibles (except the teeth, which are brown), clypeus, anterior tarsal joints and articulations of the legs bright yellow. The meso- and metapleurae and the declivious face of the epinotum are finely striate. There are also a few irregular striae on the area between the eye and the insertion of the mandible. Punctures uniformly fine and sparse. Cephalic hairs very fine and

subappressed, those on the thorax and abdomen stouter and erect. The appendages bear numerous rather stout, suberect hairs.

Male and female unknown.

Type locality: Cueva d'Iturbe (3700 m. alt.) Jujuy, Argentina. (Weiser.)

In the original description of *andina* Dr. Santschi states that the color is black. This is not the case in the cotype which he sent me for examination. The differences which I have noted above may, however, be due to the drying of the specimen.

S. (EUOPHTHALMA) GLOBULARIA (FRED. SMITH.)

Introduction.

In *globularia*, as in so many of the older species, the exact nature of the type has always been a matter for considerable speculation with the result that much confusion has arisen in the establishment of subspecies and varieties. In 1859 Frederick Smith described a *Myrmica globularia* from Brazil. The description is virtually worthless since it fails to mention any structural characters which would permit even generic recognition. It is not surprising, therefore, that when, in 1881, Forel described *Solenopsis steinheili* from St. Thomas, W. I., he did not recognize its relation to the already described *globularia*. Three years later, however, Forel placed *steinleili* in the synonymy of *globularia* when Mayr, to whom he had sent specimens, compared the two and pronounced them identical. Unfortunately Mayr appears to have overlooked differences which we now regard as varietal or subspecific characters. Although Smith failed to note major structural features he did give a fairly satisfactory account of the color of his Brazilian form. I quote here from his description:

"Pale rufo-testaceous, very smooth and shining with a rufo-fuscous band on the first segment of the abdomen."

The color of *steinheili*, on the other hand, is described by Forel as follows:

"Reddish brown-yellow to light brown with somewhat darker head and darker brown middle of the abdomen. Mandibles, anterior end of the head, antennae and legs dirty yellow."

From our present knowledge of the distribution of the species we know that the majority of the specimens which come from the islands of the West Indies have the darker coloration specified for *steinheili*. Conversely those from Brazil are notably pale and agree very well with Smith's description. However, such pale specimens are usually

referred to Forel's variety *curta* which was described in 1912 from material taken in Colombia. The color of *curta* is said to be a reddish yellow with a very distinct brown band on the abdomen. It seems rather obvious that *curta* is identical with the original form described by Smith and that the confusion has arisen through Mayr's failure to note color differences between *steinheili* and the typical *globularia*. Such an interpretation necessitates the resuscitation of *steinheili* and this, in turn, eliminates the varieties *borinquenensis* and *cubaensis*, both described by Wheeler, which become synonyms of that form. It may be advantageous to repeat here the synonymy given at the beginning of the subgenus.

S. (*E.*) *globularia* (Fred. Smith)
= var. *curta* Forel
subsp. *lucayensis* Wheeler
subsp. *littoralis* subsp. nov.
subsp. *pacifica* Wheeler
var. *descheoensis* Mann
var. *rubida* Wheeler
subsp. *steinheili* Forel
= var. *borinquenensis* Wheeler
= var. *cubaensis* Wheeler

A full discussion of the reasons for synonymizing the varieties *borinquenensis* and *cubaensis* with *steinheili* is presented at the end of the description of that form.

The distribution of *globularia* is very similar to that of *geminata*. The subspecies *steinheili* appears to be the most abundant member of the complex, occurring in a number of the islands of the West Indies. There are, however, two other known insular variants, *lucayensis* from the Bahamas and *descheoensis* from Descheo Island, P. R. In the portions of South America which border the Carribean we find the typical *globularia*, while along the Gulf seaboard of the United States the subspecies *littoralis* occurs. Two forms, the subspecies *pacifica* and its variety *rubida* are known from the Galapagos Islands. There appears to be but one record of this species from Central America and none from Mexico.[1] This hiatus in collec-

[1] Since writing the above I have, through the kindness of Dr. W. M. Wheeler, examined specimens of *globularia* collected by Dr. Elizabeth Skwarra at Tamarinda (Vera Cruz) Mexico. There appears to be no difference between these specimens and those which are described in this paper as the subspecies *littoralis*, subsp. nov. The discovery of the Mexican specimens greatly extends the range of the subspecies *littoralis* and there is every reason to expect future records of this form from the coast of Texas.

tions is much to be regretted since we have no connecting links between the northern and southern forms except the insular variants whose significance is doubtful because of changes brought about by isolation.

I have had the good fortune to examine the types of the majority of the forms of *globularia* and have seen examples of all except the variety *rubida*. From a study of this material the following key to the subspecies and varieties has been prepared:

1. Head of the minor worker one-eighth longer than broad, that of the major worker as long as broad; eyes of 25–30 facets.....*globularia*
   Head of the minor worker one-sixth longer than broad, that of the major one-eighth longer than broad; eyes of 12–22 facets.....2
2. Epinotum subopaque, completely covered with fine, wavy striae subsp. *littoralis*
   Epinotum wholly or in part shining, at least the anterior portion of the basal face without striae.....3
3. Node of the petiole one-half as wide as the postpetiole; color very pale yellow .....subsp. *lucayensis*
   Node of the petiole approximately two-thirds as wide as the postpetiole; color reddish yellow to piceous brown.....4
4. Eyes of 12–18 facets; length 1.8–2.0 mm.....subsp. *steinheili*
   Eyes of 18–22 facets; length 2.0–2.2 mm.....5
5. Color deep piceous brown.....var. *descheoensis*
   Color clear golden yellow to red, the abdomen brown or black.....6
6. Color golden yellow, the first gastric segment banded with brown subsp. *pacifica*
   Color red, the abdomen in large part black (ex Wheeler).....var. *rubida*

S. (Euophthalma) globularia (Fred. Smith).

S. globularia (Fred. Smith), Cat. Hym. Brit. Mus., Vol. 6, p. 131 (1858). (*Myrmica.*)

S. globularia subsp. *lucayensis* var. *curta*, Forel, Mem. Soc. Ent. Belg., Vol. 20, p. 4 (1912).

Worker minor: Length 1.7 mm.

Head, exclusive of the mandibles, one-eighth longer than broad, the sides moderately convex, widest just behind the eyes, the occiput very feebly impressed. Clypeus feebly projecting, the two carinae very prominent and terminated by two strong, stout teeth, lateral denticles poorly developed, virtually absent in some specimens; a small median denticle is present on the anterior edge of the clypeus. Mandibles with four large teeth. The antennal scape in repose fails

to reach the occipital border by a distance slightly exceeding the length of the first funicular joint; joints 2–7 all slightly longer than broad; club slender, the terminal joint about two and one-half times as long as the penultimate. Eyes of about twenty-five facets, separated from the insertion of the mandible by a distance slightly less than their greatest diameter.

Promesonotum in profile flattened, forming a straight line with the epinotum, the mesoepinotal impression confined entirely to the suture which is narrow and slot-like. Epinotum in profile angular, the basal face much longer than the declivious. Node of the petiole in profile thick with a very bluntly rounded summit, the anterior face considerably longer than the posterior; the peduncle about two-thirds as long as the base of the node, rather slender and without a ventral tooth. Postpetiole in profile about two-thirds as high as the petiole, its anterior face strongly inclined forward and about equal in length to the unusually long ventral face, the latter bearing a prominent, tooth-like projection near the middle of its anterior edge; dorsum of the postpetiole evenly convex. Seen from above the node of the petiole is a trifle more than half as wide as the postpetiole, the latter is greatly dilated, subcircular with a truncate posterior border. The anterior edge of the first gastric segment is truncate, the truncation being about equal in width to the postpetiole.

Color reddish yellow; the mandibular teeth, the anterior edge of the clypeus and a broad band on the first gastric segment reddish brown, the occiput is also sometimes tinged with brown. The mesopleurae and the entire epinotum are covered with fine striae which give these portions a submatte appearance in contrast to the rest of the insect which is very smooth and shining with small and sparse punctures. Hairs sparse, rather short, stout and erect.

Worker major: Length 2.0 mm. (Plate VI, figs. 1, 2.)

Head as broad as long, the sides less convex than in the minor worker. Eyes of about thirty facets. Median clypeal tooth almost as long as the carinal teeth. The area between the eye and the insertion of the mandible bears a few irregular striae. In other regards as in the minor worker.

The female of the typical *globularia* appears to be known only from Smith's totally inadequate treatment. It may be of interest to include it here, since it speaks volumes for the difficulties encountered in attempting to utilize his descriptions:

"Female: Length: 1¾ line (Approximately 4.2 mm.)

Rather darker red than the worker; the thorax oblong-ovate, the wings hyaline and beautifully iridescent; the node of the petiole of the same relative proportions as in the worker; abdomen oblong-ovate, rufo-fuscous with the base and apical margins of the segments rufo-testaceous."

Male: Length: 3.0 mm.

Head, including the eyes, slightly broader than long, the sides moderately convex from the eyes to the occiput, the latter flat. Ocelli large and prominent. Clypeus not projecting when seen from above, angular with a well-defined central portion when seen from the side. Mandibles narrow, bidentate. Eyes large, strongly convex, nearly circular when seen from the side, their anterior edge virtually reaches the insertion of the mandible. Antennal scape short, cylindrical, twice as long as the globose second joint, the following joints all two or more times as long as broad. Thorax wider than the head, approximately twice as long as broad. Node of the petiole in profile angular, depressed, not sharply separated from the peduncle. Postpetiole in profile also depressed, the dorsum feebly convex, slightly lower than the node of the petiole, the lower face with a prominent ventral tooth. Seen from above the node of the petiole and the postpetiole are both strongly transverse.

Color brownish black, the legs, antennae and mandibles dirty yellow. Smooth and shining with numerous, long, erect, yellow hairs. Wings hyaline, iridescent and clothed with numerous, short hairs.

The descriptions of the workers and male given above are based upon specimens collected by Dr. W. M. Mann at Natal, Brazil. Owing to the great confusion in the earlier taxonomy of this species it is difficult to compile a satisfactory list of localities. I have given only the records which appeared to be unquestionably those of the typical *globularia*.

Localities: "Brazil" (Type locality.) (F. Smith.)
Brazil, Ceara. (Diaz da Rocha.)
Natal. (W. M. Mann.)
Colombia, Barranquilla. (A. Forel.)

The specimens taken by Biolley at Puntarenas, Costa Rica probably belong here also.

S. (Euophthalma) globularia subsp. **lucayensis** Wheeler.

S. globularia subsp. *lucayensis*, Wheeler, Bull. Amer. Mus. Nat. Hist., Vol. 24, p. 131, pl. 11, fig. 8 (1908). ♀.

S. globularia, Wheeler, Bull. Amer. Mus. Nat. Hist., Vol. 21, p. 89 (1905).

The workers of this subspecies are unique in the feeble sculpture of the epinotum and their exceedingly pale coloration. The basal face of the epinotum is virtually free from striae, while those on the sides are very weak and confined to the pleurae. The color is a pale, almost milky yellow with a faint brownish band on the abdomen. *Lucayensis* may further be distinguished from *steinheili* and *pacifica* to which it is most closely related, through the narrow petiolar node which is only one-half as wide as the postpetiole.

The sexual forms are unknown.

Type locality: Andros Island, Bahamas. (W. M. Wheeler.)

S. (Euophthalma) globularia subsp. **littoralis** subsp. nov.

The worker of this form may be distinguished from that of the typical *globularia* by its greater size, its more elongate head, its smaller eyes and the much broader petiolar node. The shape of the head in *littoralis* is approximately that of the subspecies *pacifica* and *steinheili* (about one-sixth longer than broad in the minors and slightly longer than broad in the majors) but it differs from them in the more pronounced sculpture of the epinotum. This, in *littoralis* is completely covered with rugae and subopaque as in the typical *globularia*. The node of the petiole in *littoralis* is unusually broad, in both the large and small workers it is fully two-thirds as wide as the postpetiole. The eyes of *littoralis* consist of 18–22 facets depending upon the size of the worker. The color is yellowish brown, the head and abdomen blackish brown, the appendages dingy yellow. Length: 2.0–2.2 mm. (Plate VI, fig. 3.)

Female: Length 3.8 mm.

Head, exclusive of the mandibles, as broad as long, broadest just behind the eyes, the sides straight and slightly narrowed from the eyes to the insertion of the mandibles, evenly convex from the eyes to the occiput, the latter flat. Clypeus moderately projecting with very coarse, short carinal teeth. The antennal scape in repose reaches the lateral ocellus. Funicular joints 2–7 all slightly longer than broad; club slender, the terminal joint two and one-half times as long as the penultimate. Eyes large, strongly convex, their posterior border situated at a point half way between the insertion of the mandible and the occiput.

Thorax seen from above narrowly elliptical, twice as long as broad. Epinotum angular, the basal face considerably longer than the declivious. Node of the petiole in profile relatively thinner than in

the worker, its anterior face less sharply separated from the peduncle. Postpetiole in profile about four-fifths as high as the node of the petiole, the ventral tooth very large. Seen from above the petiole is slightly more than two-thirds as wide as the postpetiole, the latter is almost twice as broad as long and suboval in shape. Anterior edge of the first gastric segment truncate.

Color reddish brown, the head and thorax fuscous. The entire epinotum, the area between the eye and the insertion of the mandible and the base of the mandible striato-rugose. Hairs long, erect, golden.

The male of the subspecies ***littoralis*** differs very slightly from that of the typical *globularia*. In ***littoralis*** the eyes are slightly less convex and a trifle more elongate but in other regards the two appear to be identical.

Described from a number of workers and a single female taken by T. S. VanAller in Baldwin County (near Mobile) Alabama. The nest was in a rotten log on the shore of the bay. I was at first hesitant to accept this insect as a native form, since most of our southern ports have become asylums for a fauna of exotic species. Further investigation, however, has produced evidence that ***littoralis*** is endemic to the Gulf coast. Through the coöperation of Dr. M. R. Smith two localities in Mississippi were added and recently, when I spent two months in Mobile, further data were secured. The distribution of ***littoralis*** in the vicinity of Mobile is the reverse of that of the introduced species. It is rare in the neighborhood of the docks but occurs in increasing numbers as one goes towards the Gulf. On Dauphin Island, thirty miles south of Mobile, I found it in great abundance. Practically every rotten log on the beach harbored one or more nests. It appears to be a strictly littoral form and nests only in logs which are badly rotted and partially buried in the sand. Winged males and females were taken from a nest on June 30, but their scarcity and the absence of callow sexual forms leads me to believe that the nuptual flight had occurred prior to that time.

Localities: Alabama, Baldwin County (type locality). (T. S. Van Aller.)
Barrett's Beach. (W. S. Creighton.)
Dauphin Island. (W. S. Creighton.)
Mississippi, Ocean Springs. (J. P. Kislanko.)
Perkinston. (J. P. Kislanko.)
Pascagoula. (W. S. Creighton).

S. (Euophthalma) globularia subsp. pacifica Wheeler.

S. globularia subsp. *pacifica*, Wheeler, Proc. Cal. Acad. Sci., Vol. 2, p. 273 (1919). ☿, ♂. Wheeler, Zoologica, N. Y. Zool. Soc., Vol. 5, No. 10, p. 108, fig. 22 (1924). ♀.

The workers of this subspecies very closely resemble those of *steinheili* but they are of slightly greater size (2.0–2.2 mm.) and the eyes, which consist of 18–22 facets, are larger. The color is a deep, golden yellow with the first gastric segment bearing a broad brown band which extends almost to the base of the gaster. (Plate VI, fig. 5.)

The female of *pacifica* differs from that of *littoralis* in the following particulars:

The color is a clear golden yellow with the borders of the gastric segments tinged with brown, the eyes are larger and more elongate, a median denticle is present on the anterior edge of the clypeus, the sculpture of the epinotum is feebler, the postpetiole is smaller.

I have not seen the male of *pacifica*. Wheeler describes it as follows:

"Eyes more convex and perhaps a little longer, head narrower behind, mandibles smaller, epinotum more sloping, more rounded and less angular than in the typical *globularia*. The color is also different, the body being dark brown, the antennae and legs pale yellow, whereas in the typical form the body is black and the appendages brown."

Localities: Galapagos Islands, Albemarle Is. (Type loc.) (Albatross Exped.) Indefatigable Is., Tower Is., Daphne Is. (F. X. Williams.)

The nests of *pacifica* are usually constructed under small logs on sandy beaches. The specimens from Daphne Island, however, were found under stones at the bottom of the crater. It is to be regretted that our ignorance of the sexual forms of *steinheili* prevents a comparison of these with those of *pacifica*, since this might offer suggestive evidence concerning the supposed West Indian origin of certain species in the Galagagos fauna.

S. (Euophthalma) globularia subsp. pacifica var. rubida Wheeler.

S. globularia subsp. *pacifica* var. *rubida*, Wheeler, Proc. Cal. Acad. Sci., Vol. 2, p. 273 (1919). ☿.

The single type from which this variety was described is now in the Museum of the California Academy of Sciences. I have not seen it. The original description is as follows:

"Worker: Length 1.8 mm.

"Differing from the other forms of the species in color, the body being red with the mandibles, antennae and legs yellow and the first gastric segment, except at its anterior and posterior borders, black. The postpetiole is globular but a little broader than long."

Type locality: Hood Island, Galapagos. (F. X. Williams.)

S. (Euophthalma) globularia subsp. pacifica var. descheoensis Mann.

S. globularia var. *descheoensis*, Mann. Bull. Amer. Mus. Nat. Hist. Vol. 42, p. 428 (1920). ♀.

This form must be regarded as a variety of the subspecies *pacifica* rather than of the typical *globularia* to which it was first related. Structurally it is very similar to *pacifica*, the principal difference lying in its darker coloration. The entire insect is a deep piceous brown except the antennae and legs which are yellowish brown.

The sexual forms are unknown.

Type locality: Descheo Island, Porto Rico. (F. E. Lutz.)

S. (Euophthalma) globularia subsp. steinheili Forel.

S. steinheili, Forel, Mitt. Munchen Ent. Ver. Vol. 5, p. 11 (1881). ♀
S. globularia, Forel, Bull. Soc. Vaud. Sci. Nat. (2), Vol. 20, p. 376 (1884).
S. globularia var. *borinquenensis*, Wheeler, Bull. Amer. Mus. Nat. Hist., Vol. 24, p. 131, pl. 11, fig. 7 (1908). ♀.
S. globularia var. *cubaensis*, Wheeler, Bull. Mus. Comp. Zool. Harvard, Vol. 54, p. 485, (1913). ♀.

Aside from their darker coloration both the major and the minor workers of *steinheili* may be distinguished from the corresponding castes in the typical *globularia* by their smaller eyes, the more elongate head and the feebler sculpture of the epinotum. The head of the minor worker of *steinheili* is approximately one-sixth longer than broad, that of the major about one-eighth longer than broad. The eyes are composed of 12–16 facets and are separated from the insertion of the mandibles by a distance slightly exceeding their greatest diameter. The striations of the epinotum are feeble and are entirely absent on the upper portions of the sides and the anterior part of the basal face. The postpetiole of the major worker is transversely oval (subcircular in the typical *globularia*). The color varies from a clear, yellowish brown with the mandibles and appendages honey yellow to a dirty piceous brown, with the appendages sooty yellow. Length 1.8–2.0 mm.

The female is unknown. The male is identical with that of the typical *globularia.*

Localities: St. Thomas, W. I. (Type loc.) (A. Forel.)
St. Vincents, W. I. (H. H. Smith.)
Grenada, W. I. (H. H. Smith.)
Haiti, Port au Prince. (Keitel.)
Manneville. (W. M. Mann.)
Virgin Islands, Culebra Is. (W. M. Wheeler.)
Porto Rico, San Juan. (W. M. Wheeler.)
Cuba, Cogimar. (W. M. Wheeler.)
San Francisco de Morales. (W. M. Wheeler.)
Soledad (Cienfuegos). (W. S. Creighton.)

Following Mayr's comparison which led to the synonomizing of *steinheili* and *globularia,* one could employ either Smith's or Forel's description of the insect. Forel, naturally, compared such forms as subsequently came into his hands with *steinheili,* while Wheeler utilized the criteria given in Smith's original description. It thus happens that the diagnostics of color given for the variety *borienquenensis* by Wheeler are almost identically those pointed out by Forel as characteristic of *steinheili.* The only difference lies in the fact that Forel does not specifically mention the occurrence of a piceous band on the thorax of *steinheili.* This, however, becomes of no consequence when one studies the types of *borinquenensis.* These display a variation in color which extends from individuals with a clear, reddish brown head and thorax to specimens which have a piceous head and a piceous band on the thorax. Thus, while Wheeler was justified in considering *borinquenensis* distinct from the typical *globularia,* there is no reason to separate it from *steinheili.*

I have also ventured to synonymize the variety *cubaensis* with *steinheili,* although there are a number of objections which might be raised to such procedure. *Cubaensis* was originally given varietal status because of its unusually dark coloration and its smaller and more rounded postpetiole. As to the color one might repeat what has just been said for *borinquenensis,* there is a wide variation from brownish to piceous individuals with, I am bound to admit, a preponderance of the latter. The shape and particularly the size of the postpetiole are matters of more concern. Since a rounded postpetiole is characteristic of the minor worker throughout the species, little value can be attached to this criterion. Its size, on the other hand, is of considerable importance. After carefully measuring a

number of specimens of both forms I find that although the largest workers of *steinheili* have postpetioles larger than any found in *cubaensis* and the smallest workers of that form have postpetioles smaller than any found in *steinheili*, there is considerable overlapping in the middle of the scale. Thus while it might be possible to separate the extremes on size variations, a procedure entailing the use of differences of one-twentieth of a milimeter, this could not be used to distinguish the individuals at the middle of the range. Since the determination of such small differences is impractical for ordinary work it seems decidedly more advantageous to synonymize the two forms.

A possible explanation for the variation of color displayed by *steinheili* is offered by the character of the nesting sites. The specimens from Culebra Island and Porto Rico were taken from nests in white sand while the Cuban material was found under stones in damp loam. It is a recognized fact that dry, sandy nesting sites often tend to produce light colored forms in distinction to the darker condition usually associated with a damp and shady type of site. The statement just made might, of course, be used in proof that the two forms are distinct, but until it is proven that the nesting sites are habitually different such an argument lacks weight.

S. (Euophthalma) huachucana Wheeler.

S. huachucana, Wheeler, Bull. Amer. Mus. Nat. Hist., Vol. 34, p. 393 (1915.)
☿, ☿.

Worker minor: Length 1.8 mm. (Plate VII, fig. 5.)

Head, exclusive of the mandibles, one-sixth longer than broad, the sides straight throughout their anterior half, slightly tapering towards the occiput in the posterior half, the occiput with a broad and extremely feeble impression. Mandibles rather narrow, armed with four teeth, the outermost very thin, twice as long as the adjacent tooth, the innermost tooth small and acute but very distinct. Clypeus feebly projecting, the carinae prominent, well separated and only feebly divergent. Carinal teeth stout, tapering and moderately acute, the edge of the clypeus between them not impressed. Lateral denticles very poorly developed, separated from the carinal teeth by a small but distinct impression. The antennal scape in repose fails to reach the occipital border by a distance equal to the length of the first funicular joint. Second and third funicular joints slightly longer than broad, fourth and fifth joints as broad as long, sixth and

seventh joints broader than long. Club slender, slightly longer than the remainder of the funiculus, the terminal joint two and one-quarter times as long as the penultimate. Eyes composed of 20–30 facets, separated from the insertion of the mandible by a distance equal to their greatest diameter.

Thorax in profile with the mesonotum flat, the strong mesoepinotal suture narrowly but deeply impressed. Seen from above the humeral angles are moderately rounded and the sides are strongly constricted at the mesoepinotal suture. Basal face of the epinotum in profile slightly convex, much longer than the declivious face, the angle between the two considerably rounded. Basal face of the epinotum unbordered, the edges strongly rounded, those of the declivious face more angular but scarcely bordered. Node of the petiole in profile obtusely triangular, its anterior and posterior faces of equal length, its summit very obtuse, its base about twice as long as the peduncle which bears a very small ventral tooth. Postpetiole in profile scarcely thicker than the node of the petiole and about four-fifths as high, its summit much rounded, its anterior face perpendicular. Seen from above the node of the petiole is triangular and about three-fourths as wide as the globose postpetiole. The anterior edge of the first gastric segment is truncate and very slightly concave.

Color honey yellow, the posterior third of the head and the hinder edges of the gastric segments tinged with brown. Very smooth and shining with sparse, small punctures which bear long, erect, rather stout hairs.

Worker major: Length 2.3 mm. (Plate VII, figs. 6, 7.)

Head one-eighth longer than broad, the occipital border somewhat more impressed than in the minor. The antennal scape in repose only slightly surpasses the posterior fourth of the head. Eyes composed of 27–30 facets, separated from the insertion of the mandible by a distance considerably exceeding their greatest diameter. Promesonotum in profile evenly convex. The declivious face of the epinotum feebly bordered. Postpetiole seen from above transversely oval. In other regards as in the worker minor.

Female: Length 6.1 mm.

Head, exclusive of the mandibles, as broad as long, the sides slightly narrowed in front, the occiput feebly impressed in the middle, the occipital angles not much rounded. Clypeus very feebly projecting, its anterior edge almost straight, carinae more divergent

than in the worker, their terminal teeth short and very stout, lateral denticles obsolete. Mandibles tridentate. The antennal scape in repose reaches the lateral ocellus. All funicular joints distinctly longer than broad, the terminal joint of the club a little less than twice as long as the penultimate. Eyes large, convex, oval, their posterior border slightly surpassing the middle of the side of the head. Thorax about four-fifths as wide as the head, elongate-elliptical, epinotum in profile without a sharp angle between the basal and declivious faces, the basal face with a shallow, median longitudinal impression, the declivious face feebly bordered and transversely wrinkled. Node of the petiole in profile with a long, sloping, concave anterior face and a short, perpendicular posterior face, the summit much compressed. Postpetiole in profile notably thicker than the node of the petiole and about three-fourths as high.

Smooth and moderately shining. Punctures proportionately larger and more numerous than in the worker, the hairs which they bear much stouter. The genae behind the insertion of the mandibles and also the metapleurae striato-rugose; the peduncle and base of the petiole and the sides of the postpetiole finely rugulose. Head and thorax a rich reddish yellow, the basal portion of the first gastric segment a somewhat paler yellow, the gastric segments edged with reddish brown.

Male unknown.

Type locality: Miller Canyon, Huachuca Mts., Arizona. (W. M. Wheeler.)

Huachucana is closely related to the South American *andina* but differs in its more globose postpetiole, smaller eyes, less angular epinotum and yellow color. It is known only from the type material which was taken by Dr. W. M. Wheeler in 1910. Two nests were found under stones in Miller Canyon at an altitude of about fifty-five hundred feet.

S. (Euophthalma) macrops Santschi.

S. macrops, Santschi, Ann. Soc. Cien. Argent. Vol. 84, p. 280, (1914). ♀.

Worker: Length 1.4 mm. (Plate VI, fig. 4.)

Head, exclusive of the mandibles, one-sixth longer than broad, somewhat narrower in front than behind, the sides slightly convex, the occiput broadly and very feebly impressed. Clypeus moderately projecting, its anterior edge deeply impressed between the carinae

which are well marked and feebly divergent: Carinal teeth short, stout and obtuse, lateral denticles poorly defined and much rounded. The antennal scape in repose reaches the posterior fourth of the head. First funicular joint as long as the following three together, the small joints of the funiculus all strongly transverse, club short and thick, the terminal joint almost three times as long as the penultimate. Eyes very large, rather convex, about two and one-half times as long as wide, with twelve or thirteen facets in their greatest length (about fifty in all), their anterior border, which extends forward and downward, closely approximated to the most ventral point of the insertion of the mandible.

Thorax without humeral angles, the anterior edge of the pronotum evenly convex, the constriction of the sides at the mesoepinotal suture only moderately strong. Promesonotum in profile very feebly convex, dorsum of the thorax with a very feeble impression at the mesoepinotal suture, the latter very shallow. Basal face of the epinotum in profile feebly convex and passing to the somewhat shorter declivious face without a well marked angle. Basal face not bordered, the edges much rounded, those of the declivious face more angular. Node of the petiole in profile triangular, its base more than twice as long as the peduncle, the summit narrow but rather blunt, the peduncle with a small but distinct ventral tooth. Postpetiole in profile slightly higher than thick, its anterior face perpendicular, its posterior face forming a continuous convex slope with the rounded summit. Seen from above the node of the petiole is rather constricted, being only two-thirds as wide as the subglobose postpetiole. Anterior edge of the first gastric segment truncate and slightly concave.

Color black, the mandibles, antennae, legs and joints of the petiole more or less tinged with brown. Smooth and shining with very sparse and minute punctures. Hairs very fine, whitish and closely appressed except on the funicular joints and tarsi where they are suberect. Sexual forms unknown.

Type locality: Argentina, Tandil (Bruch).

Through the kindness of Dr. Santschi I have been able to examine one of the two types upon which this remarkable species was founded. The peculiar shape and position of the eyes sharply separate *macrops* from the other species in the subgenus *Euophthalma*. In regard to the significance of the unusually elongate eyes Dr. Santschi gives the following note:

"It (*macrops*) is distinguished particularly by the shape of the

eyes which are like those in *Oxyopomyrmex*. It shows, perhaps, a case of convergence for adaptation. The color also indicates an epigaeic life. I have been able to observe that the workers of *Oxyopomyrmex* stop at the opening of their nest before going out in such a manner that only the head projects, which permits the two eyes, by reason of their placement, to embrace a vast visual sector."

One additional note on *macrops* may be added. In the original description of this insect Santschi notes that the mandibles bear three teeth. The mandibles of the specimen which I examined were closed so that the teeth of the inner mandible were shielded. In the mandible which could be examined there were only three teeth, but at the point where the long outermost tooth should have occurred there was a truncated stump, strongly suggestive of the remains of a broken tooth. Since the mandibular teeth are frequently broken or worn down, it seems to me that Dr. Santschi's statement concerning the tri-dentate mandibles of *macrops* should be regarded with caution until more material can be examined.

S. (EUOPHTHALMA) METANOTALIS EMERY.

Introduction.

The strongly sculptured epinotum of *metanotalis* is a character sufficiently distinct to have saved it from the confusion which has fallen upon many of the less striking species in the genus. All the forms placed under *metanotalis* appear to have been correctly assigned, but when we compare these with others, not included under *metanotalis*, but showing the same characteristic of epinotal sculpture, difficultues at once arise. *Metanotalis* is unquestionably a highly variable insect. Such a condition is ordinarily accompanied by an abundance of material which permits extensive comparison. In the case of *metanotalis*, however, not only is the insect relatively rare but also the number of specimens collected is seldom large. Since its recognition by Emery in 1896, *metanotalis* has been taken less than a dozen times and on three occasions the specimens showed sufficient differences to justify varietal status. I have been fortunate in having for examination cotypes of the varieties *emiliae* and *argus* which Dr. Santschi generously sent me and there are, in the collection of Dr. W. M. Wheeler, two specimens of the typical *metanotalis* identified by Emery. A study of this material shows that it can be arranged in a series in which the size of the insect steadily decreases, the head becomes narrower, the occiput, at first concave, is later flat and then

feebly convex, the eyes diminish in size, the flat mesonotum grows convex, the epinotum loses its angularity and the node of the petiole increases in height and decreases in thickness. It thus happens that the smallest member of the series, Santschi's *emiliae*, shows characteristics similar to those of *shiptoni*, a species first described by Forel in 1914. Unfortunately I have seen no specimens of the typical *shiptoni* but I have examined a cotype of the variety *steigeri* which was established by Santschi in 1916. Moreover Forel's description of *shiptoni* deals with many of the characters enumerated above and from it one may see that *shiptoni* is transitional between *emiliae* and the variety *steigeri*. At the time when Forel described *shiptoni steigeri* was unknown and it is doubtful if he had seen *emiliae*, although in 1912 he described a similar variety which he called *pelotana*. Nevertheless *shiptoni*, if compared directly with the typical *metanotalis*, might justifiably be considered a separate species. Indeed, there is no reason, even when we consider the transitional forms, why such a view might not be defended, but in this event consistency would demand that the intermediate forms also have specific status. That this is far from desirable appears self-evident and I, therefore, propose to consider *shiptoni* a subspecies of *metanotalis*. The various forms may be arranged as follows:

S. (*E.*) *metanotalis* Emery
var. *argus* Santschi
subsp. *emiliae* Santschi
subsp. *pelotana* Forel
subsp. *shiptoni* Forel
var. *steigeri* Santschi

The subspecies *pelotana* I have not seen but it is evidently related to *emiliae* since Santschi mentions the existence of transitional forms between the two.

The distribution of *metanotalis* is largely restricted to the La Plata basin. If one takes as a center a point slightly to the north of Santa Fe, Argentina, and describes around it a circle whose radius is four hundred and fifty miles, all the known forms will be included in the area thus delimited. The subspecies *shiptoni* and its variety *steigeri* occur in the northwestern part of this area, while the subspecies *pelotana* marks its eastern boundary. The remaining forms come from the region around the mouth of the La Plata river.

It is difficult to separate the forms of *metanotalis* since they present

such a completely intergrading series of characters. The following key may facilitate the recognition of the various subspecies and varieties:

1. Dorsum of the thorax in profile rectilinear, mesonotum flat and forming a straight line with the basal face of the epinotum.....2
   Dorsum of the thorax in profile not rectilinear, mesonotum feebly convex, mesoepinotal suture feebly impressed.....3
2. Occiput flat.....*metanotalis*
   Occiput slightly impressed.....var. *argus*
3. Eyes with approximately forty facets.....subsp. *emiliae*
   Eyes with not more than twenty-five facets.....4
4. Carinal teeth long, head broader behind than in front, length 1.6–1.8 mm.....subsp. *shiptoni*
   Carinal teeth short, head as broad in front as behind, length 1.4 mm. var. *steigeri*

Forel's *pelotana* has been omitted since the brief description does not permit its certain inclusion. It would probably run down to *emiliae* from which it seems to differ in its longer head and lighter color.

S. (Euophthalma) metanotalis Emery.

S. metanotalis, Emery, Bull. Soc. Ent. Ital., Vol. 28, p. 86 (1896). ☿.

Worker: Length 2.5 mm. (Plate V, figs. 2, 3.)

Head as broad as long, the sides feebly convex, the occiput flat. Clypeus strongly projecting, the carinae prominent and terminating in rather long, stout, blunt teeth, the anterior edge of the clypeus between these strongly impressed, lateral denticles entirely absent. Outer border of the mandibles evenly curved, their masticatory margin armed with three large teeth, the outermost almost twice as long as the adjacent tooth, a very small denticle present at the junction of the masticatory and inner margins. The antennal scape in repose almost reaches the posterior sixth of the head, first funicular joint as long as the following three together, joints 2–5 as broad as long; joints six and seven slightly broader than long; club stout, the terminal joint slightly more than twice as long as the penultimate. Eyes very feebly convex, composed of about fifty-five facets, separated from the insertion of the mandible by a distance very little less than their greatest diameter.

Thorax with well marked humeral angles. Seen in profile the anterior portion of the pronotum forms a sharply descending, evenly

convex slope. Its posterior portion forms, with the mesonotum and the basal face of the epinotum, a flat plane in which the unimpressed mesoepinotal suture appears as a narrow slot. Basal face of the epinotum separated from the much shorter declivious face by a wide but sharply defined angle. Posterior half of the basal face feebly bordered, declivious face strongly bordered throughout. Node of the petiole triangular, about as high as the base is thick, the summit bluntly rounded, the peduncle almost as long as the base of the node and bearing a prominent ventral tooth, the portion of the petiole posterior to the peduncle and ventral to the node rather bulky and forming with the peduncle a sinuate ventral outline. Postpetiole in profile approximately two-thirds as high as the node of the petiole, somewhat thicker than high, the summit evenly rounded, the anterior face very short, the posterior face much longer and gradually sloping. Seen from above the node of the petiole is narrow, scarcely three-fourths as wide as the transversely oval postpetiole. Abdomen oval, the edge of the first gastric segment not truncate.

Smooth and moderately shining, the punctures sparse and very fine. Hairs of moderate length, sparse and erect. The entire epinotum and the mesopleurae striato-rugulose. The base of the mandible and the area between its insertion and the anterior margin of the eye irregularly striate. The lower portions of the sides of the petiole and postpetiole densely punctate. Sides of the pronotum with irregular and extremely feeble striae.

Head ferrugineous, thorax and clypeus, mandibles, appendages, petiolar joints and base of the gaster yellowish red, posterior portion of the gaster piceous.

Sexual forms unknown.

Localities: Argentina, La Plata (Type loc.) (Spegazzini.)
Buenos Aires. (Silvestri.)
Rio Negro, Colonia Frias. (Lehmann-Nitsche.)
Uruguay, Montevideo. (Ris.)

Redescribed from two specimens taken by Silvestri and compared with the types by Emery. *Metanotalis* is not likely to be confused with any other species in the subgenus except *silvestrii*, which also has a sculptured epinotum. The head of *silvestrii*, however, is distinctly broader than long, a character not shown by any of the forms of *metanotalis*.

S. (Euophthalma) metanotalis var. argus Santschi

S. metanotalis var. *argus*, Santschi, Rev. Suisse Zool. Vol. 30, p. 260 (1923). ♀, ♂.

The distinctly impressed occiput and slightly larger eyes of sixty or more facets distinguish this variety from the typical *metanotalis*. The clypeal teeth of *argus* are somewhat longer and the basal and declivious faces of the epinotum meet at a sharper angle. The abdomen is narrowly truncate at its anterior edge and uniformly piceous. Length 2.2–2.5 mm. (Plate V, fig. 1.)

The female of *argus* is unknown but Santschi has given a good description of the male, a translation of which is presented below:

"Male: Length 4.5 mm.

"Black, appendages mottled with brown, genital armature a greyish white. Wings hyaline with light brown veins. Gaster glistening and smooth, the rest dull, densely reticulo-striate or reticulo-punctate. Pilosity fine and oblique on the gaster, longer, thicker and more erect on the head, short and not very abundant on the appendages which are very densely pubescent. The head is more than a third broader than long, rounded behind; the eyes occupy all of the projecting portion of the sides. The clypeus has a semilunar impression near the anterior border in front of the median lobe. The frontal furrow reaches the median ocellus. Mandibles rugose, very narrow with parallel borders, armed with two teeth. The scape is one quarter longer than thick, the following joint rounded, as long and as thick as the scape. Joints 2–5 of the funiculus subequal in length, one-fourth to one-third longer than thick, the remaining joints progressively elongated. Thorax robust, basal face of the epinotum convex, a little longer than the declivious, which is concave in profile, forming with it a rounded angle. The two petiolar nodes have almost the same profile as in the worker."

Localities: Argentina, Entre Rios. (Type loc.) (Bruch.)

S. (Euophthalma) metanotalis subsp. emiliae Santschi.

S. metanotalis var. *emiliae*, Santschi, Rev. Suisse Zool. Vol. 20, p. 526 (1912). ♀.

The subspecies *emiliae* differs from the typical form in the following characteristics:

The eyes have only forty-two facets, the head is slightly narrower with the occipital angles more rounded, the mesonotum in profile is

feebly convex and does not form a straight line with the basal face of the epinotum, the mesoepinotal suture is feebly impressed, wider and not slot-like, the epinotum is more rounded, without a sharp angle between the two faces, the basal face is very slightly convex; the node of the petiole is higher and thinner, its height greater than the width of its base; the color is a more brilliant red; the anterior edge of the first gastric segment is narrowly truncate.

Length 2.0 mm. (Plate V, figs. 5, 6.)

Sexual forms unknown.

Localities: Uruguay, Colonia Helvetia. (Type loc.) (von Steiger.)
Argentina, Rio de la Plata, Isla Martin Gracia. (Bruch.)

S. (Euophthalma) metanotalis subsp. pelotana Forel.

S. metanotalis var. *pelotana*, Forel, Mem. Soc. Ent. Belg., Vol. 20, p. 5 (1912). ☿, ♀. Santschi, Rev. Suisse Zool. Vol. 30, p. 260 (1923). ☿.

Forel's description of *pelotana* deals only with the shape of the head and the color. The head is said to be markedly longer than broad with a slightly convex posterior border. The color is described as reddish yellow, the abdomen brown with the base reddish.

To judge from the shape of the head *pelotana* is transitional between *emiliae* and *shiptoni*. Forel has given us the description of the female of *pelotana* which is the only form in the species in which this caste is known. A translation of his description is presented below:

"Female: Length 6.0 mm.

"Mandibles tridentate. Clypeal carinae very strong. Thorax as broad as the head. Epinotum with two feeble tubercles (subbidentate) with the declivious face bordered and transversely wrinkled, less distinct on the basal face, the rest dull and reticulo-punctate as in the worker. Posterior half of the abdomen densely reticulate and subopaque or dull. Reddish yellow, two longitudinal brownish bands on the mesonotum and a transverse, more or less cloudy brownish band on each abdominal segment. Wings lacking. In other regards as in the worker."

Localities: Brazil, Pelotas. (Type loc.) (Gensterblum.)

S. (Euophthalma) metanotalis subsp. shiptoni Forel.

S. shiptoni, Forel, Bull. Soc. Vaud. Sc. Nat., Vol. 50, p. 267 (1914). ☿.

The subspecies *shiptoni* may be distinguished from any of the foregoing forms by its smaller eyes. In the original description these

are said to be composed of "at least fifteen large facets," but I am inclined to believe that the number given is too conservative. *Shiptoni* is smaller than *emiliae* which it seems to resemble closely. The head is one-seventh longer than broad and the occiput appears to be more convex than in *emiliae*. The node of the petiole is high and thin as in *emiliae*, the postpetiole somewhat thinner than in that subspecies. The head is brown, thorax petiolar joints and mandibles yellowish red, the appendages more yellowish, abdomen brownish black.

Length 1.6–1.8 mm.

Sexual forms unknown.

Type locality: Argentina, Tucuman. (Shipton.)

S. (Euophthalma) metanotalis subsp. **shiptoni** var. **steigeri** Santschi.

S. shiptoni var. *steigeri*, Santschi, Physis Buenos Aires, Vol. 2, p. 378, (1916).

In the original description of *steigeri* Santschi notes that it differs from *shiptoni* in the lack of infuscation of the occiput, the larger eyes and the somewhat broader anterior portion of the head which is as wide as the posterior portion (wider behind than in front in *shiptoni*). The number of facets composing the eye is said to be 18–22, but in the cotype sent me by Dr. Santschi the number is only sixteen. As I have already noted, Forel's statement in regard to the size of the eyes in *shiptoni* is rather loose and I doubt that Dr. Santschi is justified in drawing conclusions as to the relative number of facets in the two forms. In both *shiptoni* and *steigeri*, however, the facets are very coarse and much rounded so that they stand out sharply from each other. This gives the eye an appearance which Forel has very aptly compared to a black-berry.

Since I have not seen specimens of the subspecies *shiptoni* it is not possible to give a more complete comparison of that form and the variety *steigeri*. It seems advantageous, however, to contrast *steigeri* with the subspecies *emiliae*, but it must be borne in mind that the differences given below may or may not be shown by the typical *shiptoni*. In the variety *steigeri* the node of the petiole is higher and thinner than in *emiliae*, its height much greater than the width of its base. The postpetiole in profile, while thinner than in *emiliae* is still scarcely higher than thick. Seen from above the postpetiole is more strongly compressed from front to back than in *emiliae*, but no wider in comparison to the width of the node of the petiole than in

that form. The anterior edge of the first gastric segment is more broadly truncate than in *emiliae* and with a pronounced concave impression. Length: 1.5 mm. (Plate V, figs. 4, 7.)

Type locality: Argentina, Chaco. (von Steiger.)

S. (EUOPHTHALMA) NIGELLA EMERY.

Introduction.

In his original treatment of *nigella* Emery combined the descriptions of the major and minor workers. This is to be regretted since it is difficult to know whether some of the characteristics apply to the major, the minor or to both. Moreover the species is strongly dimorphic with pronounced differences between the major and minors. The latter caste has never been fully described and this omission undoubtedly accounts for some of the subsequent confusion in the taxonomy of the species. In 1901 Forel described a subspecies of *S. picta* which he called *gensterblumi*. It is obvious that he did not, at the time, recognize the true nature of *picta* since *gensterblumi* has no relation to its whatsoever. I have examined the single cotype of *gensterblumi* in the collection of Dr. W. M. Wheeler and find that, except for the somewhat lighter color, it exactly corresponds to the cotypes of the small workers of Santschi's subspecies *praevalens*, a form of *nigella* described in 1923. Since the difference in color is, in my opinion, too slight to justify varietal status, I am forced to place *praevalens* in the synonymy of *gensterblumi* which becomes a subspecies of *nigella*. It is most unfortunate that Forel's name must take precedence over that of Santschi, since the former author was completely mistaken as to the affinities of *gensterblumi*, and the long association of the name with that of *picta* makes for possible confusion. Forel's failure to recognize the relationship of *gensterblumi* casts some doubt on the status of the insect which he described in 1912 as the female of *nigella*. I have included his description, since it is the only one available, but it should be used with considerable caution. *S. picquarti*, described by Forel in the Biologia Centrali-Americana, also seems to be very closely related to *nigella*. To judge from the description it can hardly be more than a subspecies of that form but, not having seen specimens, I prefer to retain *picquarti* as a separate species.

The typical *nigella* and the subspecies *gensterblumi* may be separated as follows:

Head of the major as broad as long, antennal scapes in the minor surpassing the posterior quarter of the head.....*nigella*
Head of the major one-sixth longer than broad, antennal scapes in the minor barely reaching the posterior quarter of the head.
subsp. *gensterblumi*

S. (Euophthalma) nigella Emery.

S. nigella Emery, Bull. Soc. Ent. Ital., Vol. 19, p. 355 (1887). ☿ Forel, Mem. Soc. Ent. Belg., Vol. 20, p. 5 (1912). ♀.

Worker major: Length 2.4 mm. (Plate VI, figs. 6, 7.)

Head very large, twice as broad as the thorax, subquadrate, the sides feebly convex, narrowed throughout their anterior half, occiput with a strongly impressed median groove, frontal furrow well developed. Clypeus moderately projecting, the carinae prominent, slightly divergent in their anterior half and each terminating in a moderately long, stout tooth, lateral denticles absent, the anterior edge of the clypeus between the carinal teeth strongly impressed. Mandibles short, their external border strongly curved, their masticatory border armed with three large teeth (the fourth tooth sometimes represented by a small denticle). Antennal scapes very short, their tips not reaching the posterior third of the head. First funicular joint only slightly shorter than the following three together, second funicular joint as broad as long, the remaining small joints strongly transverse; club stout, the terminal joint less than twice as long as the penultimate. Eyes large and flat, composed of about thirty facets, separated from the insertion of the mandible by a distance one-third greater than the maximum diameter of the eye.

Thorax with much-rounded humeral angles. The pronotum in profile with an abruptly descending anterior face, mesonotum flat, the mesoepinotal suture very broad, deeply incised but not impressed. Epinotum in profile angular, the basal face perfectly straight and very slightly longer than the declivious. Node of the petiole in profile triangular, the anterior face much longer than the posterior, the summit rather thin and somewhat flattened, the peduncle short and thick with a very large ventral tooth. Postpetiole in profile barely three-fourths as high as the node of the petiole, the anterior face perpendicular and sharply cut off from the dorsum which is evenly convex. Seen from above the node of the petiole is only two-thirds as wide as the postpetiole, the latter is one-fourth broader than long, subpentagonal, with the anterior angle rounded. Anterior edge of the abdomen narrowly truncate. Femora somewhat swollen.

Color black, the mandibles, joints of the funiculus, legs and tarsi reddish. Punctures distinct but small and sparse. Hairs excessively short, fine and appressed. A few long hairs on the anterior edge of the clypeus, the mandibles and the gula. The base of the mandibles and the metapleurae with a few irregular striations. The area between the eye and the insertion of the mandible striato-punctate, the declivious face of the epinotum transversely rugulose, the peduncle and the base of the petiolar nodes punctato-rugulose.

Redescribed from two major workers taken by Silvestri at Cernadas, (Cordoba) Argentina and compared by Emery with the types. I have not seen the minor worker of *nigella* nor is there an adequate description of it. The following characteristics are compiled from Emery's original description and Santschi's comparison with the minor of the subspecies *gensterblumi:*

Worker minor: Length 1.5 mm.

Head more elongate and narrower than in the major, the frontal furrow virtually absent, the area between the eye and the insertion of the mandible smooth. The antennal scape considerably surpasses the posterior quarter of the head. The declivious face of the epinotum is transversely wrinkled. The postpetiole is subglobose.

A translation of Forel's description of the female follows:

"Female: Length 4.5 mm.

"Head square, a little enlarged behind, the sides rather convex, occiput grooved, the middle of the head much broader than the thorax. Mandibles strongly bent in their anterior half. Clypeal teeth strong. Epinotum with two large and strong subdentate tubercles. Node of the petiole squamiform. Head with scattered punctures. Wings hyaline with pale veins. Black, legs and scapes brown; mandibles, anterior border of the head, funiculus, tarsi and articulations of the legs reddish."

Male unknown.

Localities: Brazil, Rio Grande do Sul. (Type loc.) (von Ihering.)
Argentina (Cordoba) Cernadas. (Silvestri.)
(Buenos Aires) Tandil. (Bruch.)
(Entre Rios) Villaguay. (Bruch.)
(Cordoba) Tanti Viejo. (Durione.)
Huasan. (Bruch.)
Sierra de la Ventana. (Bruch.)

Nigella is easily distinguished from any other species in the sub-

genus *Euophthalma* by the unusually large head of the major worker. The proportion of the head to the body and the strong bending of the mandibles is suggestive of the major of *geminata*. Beyond the fact that this species nests in sand, nothing appears to be known of its habits, but it is safe to assume from the structure of the head of the major that it is graminivorous.

S. (Euophthalma) nigella subsp. gensterblumi (Forel).

S. nigella subsp. *gensterblumi* (Forel), Mitt. Schweiz Ent. Ges., Vol. 10, p. 298 (1901) ♀. (*picta* subsp.)

S. nigella subsp. *praevalens*, Santschi, Rev. Suisse Zool.,Vol. 30, p. 257 (1923) ♀.

I have not seen the major worker of this subspecies but Santschi's description permits the recognition of a number of differences between it and the typical *nigella*. The more important of these are:

The head of *gensterblumi* is longer (one-sixth longer than broad) with a more feebly impressed occiput, the eyes are slightly larger, the mandibles have four teeth, the antennal scape reaches the posterior third of the head, the basal face of the epinotum is grooved (smooth in *nigella*) and meets the declivious face at a somewhat sharper angle. Length 2.2 mm.

Worker minor: Length 1.6 mm. (Plate VI, figs. 8, 9.)

Head, exclusive of the mandibles, as broad as long, the sides strongly convex, the occiput broadly and feebly impressed. Clypeus strongly projecting, the carinae prominent and each terminated by a moderately long, stout tooth, the anterior edge of the clypeus between the carinal teeth moderately impressed, lateral denticles represented only by much rounded and very feeble angles. External border of the mandible evenly curved, the masticatory margin with three large teeth and a fourth much smaller inner tooth at the junction of the masticatory and inner margins. The antennal scapes in repose barely reach the posterior quarter of the head, first funicular joint as long as the following three together, joints 2–7 all strongly transverse; club stout with the terminal joint swollen, three times as long as the penultimate. Eyes slightly convex, consisting of 18–22 facets, separated from the insertion of the mandible by a distance less than their greatest diameter.

Promesonotum in profile flattened, the mesoepinotal suture feeble and virtually unimpressed. Basal and declivious faces of the epino-

tum not sharply separated, together forming a feebly convex arc. Node of the petiole in profile triangular, the anterior face feebly concave and much longer than the straight posterior face, the summit narrow but rounded, the peduncle one-half as long as the base of the node and with a prominent ventral tooth. Postpetiole in profile about three-fourths as high as the node of the petiole. Seen from above the petiole is almost as wide as the postpetiole, the latter is approximately as broad as long with the anterior border strongly convex and the lateral and posterior borders straight.

Color piceous brown, the mandibles, clypeus, small funicular joints, base and apical third of the scape brownish red, legs brown, except the tarsi which are yellowish. Cephalic punctures small but distinct and fairly numerous, those on the thorax and abdomen minute and sparse. Metapleurae and the declivious face of the epinotum feebly striate. Otherwise smooth and shining. Hairs short, fine and appressed, a few long stout bristles are present on the clypeus, mandibles, gula and the edges of the posterior gastric segments.

Sexual forms unknown.

Localities: Brazil, Sao Paulo. (Type loc.) (von Ihering.)
Sao Paulo, Ypiranga. (Luderwaldt.)
Argentina, La Plata. (Bruch.)
(Buenos Aires) Sierra de la Ventana. (Bruch.)

For a discussion of the synonymy of *gentserblumi* the reader is referred to the introduction to *nigella*.

S. (Euophthalma) oculata Santschi.

S. oculata, Santschi, Com. Mus. Nac. Hist. Buenos Aires, Vol. 2, p. 161 (1925).
☿. (*angulata* subsp.)

Worker: Length 2.0–2.2 mm. (Plate VII, figs. 3, 4.)

Head as broad as long, broadest just in front of the eyes, posterior to the eyes the sides converge slightly toward the occiput, occipital angles not much rounded, occiput with a feeble and broadly concave impression. Clypeus strongly projecting, the carinae very divergent, rather thin and angular above, each terminated by a small, slender and somewhat acute tooth, lateral denticles well marked, much broader at the base than the carinal teeth but with the apex rather sharp. Mandibles quadri-dentate, the innermost tooth much smaller than the rest but distinct. The antennal scape in repose fails to reach the occipital border by a distance equal to its greatest thickness.

First funicular joint almost as long as the following three together, second joint slightly longer than broad, joints three, four and five as broad as long, joints six and seven slightly broader than long. Club very slender, one-sixth longer than the remainder of the funiculus, the terminal joint very slightly more than twice as long as the penultimate. Eyes composed of approximately thirty facets, separated from the insertion of the mandible by a distance equal to their greatest diameter.

Thorax seen from above rather narrow, the anterior edge of the pronotum considerably rounded, the sides only slightly constricted at the mesoepinotal suture. Promesonotum in profile evenly but moderately convex, mesoepinotal suture not impressed, shallow and slot-like. Basal face of the epinotum in profile flat, much longer than the declivious face from which it is separated by a well marked angle. Basal face of the epinotum not bordered, the edges much rounded, those of the declivious face angular but scarcely bordered. Node of the petiole in profile triangular, its height slightly greater than the length of its base, the summit obtusely rounded, posterior face perpendicular, anterior face somewhat longer than the posterior and sloping steeply to the peduncle, the latter approximately as long as the base of the node and bearing a prominent ventral tooth; a very short posterior peduncle occurs behind the node, the ventral surface of the petiole feebly sinuate. Postpetiole in profile about three-fourths as high as the node of the petiole, thicker than high with a short, perpendicular anterior face and an evenly convex summit which passes without sharp transition to the sloping posterior face. Seen from above the node of the petiole is rather narrow, subtriangular in outline and two-thirds as wide as the transversely oval postpetiole. Anterior edge of the first gastric segment truncate.

Head and abdomen piceous brown, thorax and petiolar joints a somewhat clearer and more yellowish brown, mandibles, base and apex of the scape, funicular joints and club and the articulations of the legs dirty yellow. Genae, between the insertion of the mandible and the anterior edge of the eye, with a few short and feeble striae, meso- and metapleurae and the sides and bottom of the mesoepinotal suture strongly striate, the rest of the insect smooth and shining with sparse and very small punctures. Hairs sparse, very slender, erect or suberect on the body, shorter stouter and subappressed on the appendages.

Type locality: Argentina, Catamarca. (Weiser.)

Oculata was originally considered by Dr. Santschi a subspecies of *angulata*. Since the female is unknown its relation to *angulata* was largely conjectural, and except for its somewhat similar petiole I can see no reason why *oculata* should have been assigned to that species. Its large eyes of thirty facets obviously place it in the subgenus *Euophthalma*. *Oculata* is closely related to *andina* and *huachucana*. It may be distinguished from *andina* by its longer antennal scapes and smaller eyes of only thirty facets. It differs from *huachucana* in its darker color and much more slender thorax in which the greatest width of the promesonotum is scarcely one and one-quarter times as wide as the epinotum. The constriction of the sides at the mesoepinotal suture is feeble. In *huachucana* the greatest width of the promesonotum is more than one and one-half times as wide as the epinotum and the sides are strongly constricted at the mesoepinotal suture. The node of the petiole, seen from above, is much narrower in *oculata* than in *huachucana*.

Although I have given *oculata* specific status I suspect that it may subsequently be necessary to make it a subspecies of *andina*. Indeed the differences between the two are of such a nature that I would not be greatly surprised if it should prove to be the minor worker of *andina*.

S. (Euophthalma) picquarti Forel.

S. picquarti, Forel, Biol. Centrali-Amer. Hymenop., Vol. 3, p. 80, (1900). ☿.

This species is known only from type material which I have not seen. A translation of Forel's description is given below:

"Worker: Length 1.6–1.7 mm.

"Head rather large, distinctly impressed behind, broader behind than in front, the sides feebly convex, rather flattened. Mandibles smooth, glistening. Eyes large, having seven or eight facets in a line in their greatest diameter, situated slightly in front of the anterior third of the head. Anterior border of the clypeus impressed in the middle, strongly projecting and armed with two short teeth, broad, directed outward and lightly curved outward. The clypeus is depressed, feebly convex, the two carinae are almost obsolete and the teeth scarcely form more than the lateral angles of the median lobe. At either side of the median lobe the clypeus is strongly impressed and has rather a prominent angle at the lateral border of this impression. Frontal furrow not very distinct but visible. The scapes

slightly surpass half the distance between the eye and the occipital border (almost reaching the posterior third of the head). The pronotum rounded near the anterior angles, dorsum of the pronotum rather depressed, rectilinear in profile, mesoepinotal suture deeply incised. Epinotum very short, in profile subdepressed above. Nodes of the petiole small and narrow, the second as broad as long. Femora rather strongly swollen. Joints 2–7 of the funiculus much broader than long. Last joint three times as long as the penultimate. Very smooth and very glistening with sparse piligerous punctures. Genae with dense, longitudinal, wrinkled striae. Some reticulations on the anterior part of the pronotum, on the metanotum and on the peduncle. Hairs regular, sparse everywhere, yellowish. Color dull brownish yellow, tarsi, antennae and mandibles more clear, antennal club and a band on the abdomen brownish."

Sexual forms unknown.

Type locality: Costa Rica. (Tonduz.)

This insect is very closely related to *nigella* if not actually a subspecies of it. I have seen no material which can be assigned to *picquarti* and, other than the original description, there are no references to it in the literature. It is probably rare or very local in distribution.

S. (Euophthalma) schilleri Santschi.

S. schilleri, Santschi, Rev. Suisse Zool., Vol. 30, p. 263, fig. 3, c (1923). ♀.

This species is known only from a single type in the collection of Dr. Santschi. A translation of his original description is given below:

"Worker: Length 2.8 mm.

"Black, mandibles, border of the clypeus, joints of the funiculus, neck, joints of the legs, the petiole and the last tarsi ferrugineous red. Smooth and glistening except the front of the head and the sides of the epinotum, which are striate and the dorsum of the epinotum and the foot of the peduncle, which are finely reticulate. Pilosity regular, very sparse, fine, whitish, short on the head, very rare on the thorax, longer and more oblique on the abdomen. The appendages have only a slightly erect pubescence.

Head almost square, scarcely longer than broad, the sides a little convex, the posterior border straight with the angles rounded. The eyes oval, rather convex, occupying the space between the first anterior quarter and the middle of the head. No frontal furrow. Frontal

area very narrow. The clypeal carinae progressively diverge up to the two lone teeth of the anterior border which are as long as one-fourth of the distance between them. Mandibles striate, the terminal border a little oblique, armed with three teeth besides a denticle on the internal border. The scape fails to reach the posterior border of the head by twice its own thickness. The first joint of the funiculus is as long as the following three together, joints 2–8 scarcely longer than thick, the terminal joint of the club slightly more than twice as long as the penultimate. Pronotum bordered in front and sub-shouldered. The profile of the thorax is almost straight from the middle of the pronotum to the epinotal angle, with a slight meso-epinotal incision. The epinotal faces sub-bordered, the basal face rectangular, about twice as long as broad, forming a rounded angle with the declivious face which is only half as long. The node of the petiole shows a triangular profile with a blunt summit, its anterior face more prolonged than the posterior and not higher than the length of its base. Peduncle with a subvertical tooth below. Postpetiole as high as the preceding node, much thicker in profile and a third broader. First segment of the gaster one-third longer than broad and truncate at the base."

Sexual forms unknown.

Type locality: Argentina (Neuquen) Challacito. (Schiller.)

Santschi relates this species to *andina* but, from his description, I consider it much more closely related to *metanotalis*. The straight dorsum of the thorax and the reticulate sculpture of the epinotum both indicate affinities with *metanotalis*. *Schilleri* would apparently run down in the key to *metanotalis* from which it seems to differ in its more rounded pronotum and darker color.

S. (Euophthalma) silvestrii Emery.

S. silvestrii, Emery, Bull. Soc. Ent. Ital. Vol. 37, p. 120 (1905). ♀ ♀.

Worker: Length 1.6–1.9 mm. (Plate V, figs. 8, 9.)

Head almost one-sixth broader than long, the sides feebly convex, somewhat narrowed toward the occiput, more feebly narrowed in front of the eyes. Occiput flat. Clypeus strongly projecting, its carinae each terminating in a long, rather thin tooth, the edge of the clypeus between these with a broad, cresentric impression, lateral denticles absent. Mandibles smooth, armed with four teeth, the innermost tooth very small and borne on the inner margin. The

antennal scape in repose fails to reach the occipital border by a distance slightly exceeding the length of the first funicular joint. This joint almost as long as the following three together, joints 2–7 only slightly broader than long, club rather thin, the terminal joint twice as long as the penultimate. Eyes consisting of about forty-five rather feebly pigmented and poorly defined facets, separated from the insertion of the mandible by a distance equal to their greatest diameter.

Promesonotum in profile feebly arcuate, the mesoepinotal suture narrowly but clearly impressed. Epinotum in profile evenly curved, the two faces not separated by an angle. Node of the petiole in profile triangular, its summit rounded, the anterior and posterior faces of almost equal length, the peduncle short and thick with a well developed ventral tooth. Postpetiole in profile notably lower, thicker, and more rounded above than the node of the petiole. Seen from above the node of the petiole is constricted, barely twice as wide as the peduncle and only two-thirds as wide as the transversely oval postpetiole. The anterior edge of the first gastric segment is narrowly truncate.

Color: thorax and node of the petiole pale yellow, the head, postpetiole and appendages slightly more reddish yellow, the abdomen castaneous brown, except for a yellow patch at the base of the first segment. Mesopleurae, metapleurae and the entire epinotum opaque, covered with fine coriaceous reticulations; the sides of the pronotum, the area between the eye and the insertion of the mandible and the base of the node of the petiole with a few irregular and rather feeble striae. Punctures fine and sparse. Hairs on the body unusually sparse, erect and very stout, those on the appendages more numerous, finer and shorter.

I have not seen the female of *silvestrii*. A translation of Emery's description of this caste follows:

"Female: Length 6.5 mm. with the gaster much distended.

"Pale ferrugineous, the posterior part of the gaster brown. Shining, the metapleurae, epinotum and sides of the postpetiole opaque, striatulate-punctate with the punctures stronger than in the worker. Hairs of the body acuminate. Head subquadrate with rounded sides; sculpture as in the worker but with the pilegerous punctures very much larger. Clypeus as in the worker but its teeth much larger and not spine-shaped. Node of the petiole more squamiform

than wedge shaped, postpetiole much broader than the petiole, more than twice as broad as long, somewhat hollowed out in front and for this reason semilunar with the angles rounded. The wings lacking."

Male unknown.

Type locality: Uruguay, La Sierra. (F. Silvestri.)

The description of the worker given above is based upon two cotypes in the collection of Dr. W. M. Wheeler. *Silvestrii* is known only from type material. It is closely related to *metanotalis* but differs in its broader head, less pronounced sculpture and paler color. No data on the habits of this species are available but its pale coloration and the feeble pigmentation of the eyes indicate a hypogaeic existence.

Subgenus Diagyne Santschi.

Diagyne, Santschi, Rev. Suisse Zool., Vol. 30, p. 267 (1923).

Female: scarcely larger than the largest workers (female 2.6–2.8 mm.) with ten jointed antennae. Clypeus without teeth or carinae. Mandibles rather narrow, armed with a large, stout, sharp outermost tooth which is somewhat bent inward. Middle tooth very small. Innermost tooth unusually large, composed of two teeth more or less fused together. Inner border of the mandible very short.

Worker: Clypeus with neither carinae nor teeth. Eyes consisting of four or five poorly defined facets. Second funicular joint as broad as long, joints 3–7 broader than long.

Type of the subgenus: *S. succinea* Emery.

The subgenus *Diagyne* is founded upon a single species, *S.* (*Diagyne*) *succinea* Emery. This insect as it is now known is represented only by the typical form and the subspecies *nicai* described by Forel in 1913. In the present work I have treated *S. inermiceps* of Wheeler and Mann as a synonym of *succinea*. This matter is fully discussed at the end of the description of *succinea*.

S. (Diagyne) succinea Emery.

S. succinea, Emery, Bull. Soc. Ent. Ital., Vol. 22, p. 52 (1890). ☿ ♀ ♂.

S. inermiceps, Wheeler and Mann, Bull. Amer. Mus. Nat. Hist. Vol. 33, p. 20, fig. 7, (1914). ☿.

Worker: Length 1.9–2.5 mm. (Plate VIII, figs. 2, 3.)

Head, exclusive of the mandibles, slightly less than one-sixth longer than broad, the sides convex, the head broadest a little behind

the middle, the occiput with a broad and shallow, concave impression. Clypeus very little projecting, its anterior edge sinuate, the median lobe broad and slightly concave, without carinae or teeth. Mandibles smooth, narrow and armed with four teeth, the innermost tooth much smaller than the rest. Eyes of three or four poorly defined facets, situated approximately at a point one-third of the way from the insertion of the mandible to the occipital border (in using this measurement it is well to note that the gena at the insertion of the mandible is deeply notched and the distance as given refers to a measurement from the bottom of this notch to the eye). The antennal scape in repose slightly surpasses the posterior fifth of the head. First funicular joint as long as the following three together, second joint approximately as broad as long, joints 3–7 broader than long. Club stout, the terminal joint three times as long as the penultimate.

Thorax with the humeral angles moderately rounded, the sides somewhat constricted at the mesoepinotal suture. Seen in profile the promesonotum is evenly and moderately convex except for the short and steep anterior face which descends to the neck. Mesoepinotal suture distinctly impressed. Epinotum in profile much higher than long, the two faces not clearly separated, together forming a steeply descending slope which is slightly convex in its upper half. The declivious face bears a broad and feeble median impression. Node of the petiole in profile low and very obtuse, scarcely higher than thick, the summit rather flattened, feebly convex and sloping slightly to the perpendicular posterior face. Anterior face longer than the posterior and steeply sloping forward, peduncle short and very thick with a long ventral lamella which ends anteriorly in an angular projection. Postpetiole in profile thicker and lower than the node of the petiole, the summit somewhat more evenly convex, virtually without a posterior face and with the anterior face extremely short. Seen from above both nodes are transversely oval in outline, the postpetiole being slightly wider and thicker than the node of the petiole. Edge of the first gastric segment truncate and with a strong concave impression at the base of the postpetiole.

Very smooth and shining with sparse, minute punctures which bear fine erect or suberect hairs. Punctures on the thorax, petiolar nodes and abdomen much sparser than on the head, the hairs which they bear coarser and longer. Color, head and thorax rich golden yellow, the mandibles, anterior edge of the clypeus and the articulation of the petiole and postpetiole yellowish brown, the appendages, petiolar nodes and the abdomen pale yellow.

Female: Length 2.6 mm. (Plate VIII, fig. 1.)

Head very slightly longer than broad, the sides behind the eyes narrowed toward the occiput, occipital angles well marked not much rounded, the occiput flat. Clypeus feebly projecting, the anterior edge without teeth, the median lobe with a broad, shallow sulcus extending backwards to the elongated frontal lobes, the carinae represented only by the rounded lateral areas which bound the sulcus. Mandibles rather long and narrow, tridentate, the terminal tooth bent inward, the middle tooth small and rounded, the innermost tooth very large, consisting of two more or less fused teeth. Eyes of medium size, strongly convex, with their posterior border approximately at the middle of the side of the head. Antennae ten-jointed. Antennal scape in repose slightly surpassing the occipital border, first funicular joint almost as long as the following three together, joints 2–7 all slightly longer than broad, club rather short and strongly swollen, the last joint twice as long as the penultimate.

Thorax only slightly narrower than the head. The basal and declivious faces of the epinotum not sharply separated, virtually forming a single very declivious slope. Node of the petiole in profile obtusely rounded with a very long anterior face not sharply separated from the peduncle, the posterior face short and slightly sloping forward. Postpetiole in profile large and thick, only slightly lower than the node of the petiole. Seen from above the petiole is rather narrow, the postpetiole is strongly transverse and one and one-half times as broad as the node of the petiole. Anterior edge of the first gastric segment truncate. Just posterior to the base of the postpetiole the segment bears a conspicuous, concave and narrowly triangular impression.

Punctures of moderate size and fairly numerous. Hairs long, stout and erect. Color tawny yellow, the triangular area between the ocelli deep brown. Wings hyaline, the veins and stigma clear yellow.

The male of *succinea* is known only from Emery's very brief description a translation of which is given below:

"Male: Length: 3.0 mm.

Extremely smooth with sparse, very feeble punctures, abdomen almost impunctate. Black, legs piceous, articulations and tarsi reddish, antennae an obscure yellow-brown. Head strongly narrowed behind, eyes very large, antennal scape very short. Mesonotum with a profound anterior, longitudinal, median sulcus, punctate toward the middle.

Localities: Costa Rica, Jimenez. (Type loc.) (No coll.)
Costa Rica, San Mateo. (P. Biolley.)
St. Vincents, W. I. (H. H. Smith.)
Cocos Keys, W. I. (A. Alfaro.)
Haiti, Petionville. (W. M. Mann.)
Haiti, Grande Riviere. (W. M. Mann.)

We may now discuss the reasons for synonymizing *inermiceps* with *succinea*. Although there are a number of species in the genus in which the carinal teeth are greatly reduced in size and one (the major worker of *S. xyloni* subsp. *amblychila*) in which they are lacking entirely, the complete absence of both teeth and carinae is met with in but two cases, that of *succinea* and of *inermiceps*. That the two are related by this unusual character appears too patent to require comment. Further relationship may be shown by a reference to Emery's description of the worker of *succinea*. In addition to describing the clypeal peculiarities Emery notes that the head is moderately elongate with the occipital border scarcely impressed. The first funicular joint is as long as the three following joints together. The color of the abdomen is lighter than that of the head and thorax. This last is a character of peculiar significance since the reverse is usually the case. The cotypes of *inermiceps* agree perfectly in all the points mentioned above, despite the fact that in the original description of *inermiceps* the first funicular joint is said to be nearly as long as the following four joints together. I also find that I cannot agree to the shape of the head of *inermiceps* as given in the original description, since it appears to me that the length has been greatly overestimated. This may be due, however, to the fact that I have excluded the mandibles in making measurements of the head. The size range of *inermiceps* is also slightly greater than specified in the description, extending from 1.9–2.3 mm. Since I can detect no differences which would permit the separation of the two forms I have been forced to synonymize them. In view of the fact that Emery's description is too brief to deal with differences which might be subspecific this procedure may be questioned. However, even though slight variations may exist, it is impossible at present to evaluate them. Finally, the presence of the typical *succinea* in other localities in the Antilles (*vide supra*) indicates that the Haitian specimens may also be typical.

Practically nothing is known of the habits of this interesting species. It nests in rotting logs in upland forests and the workers

have been taken on decaying fruit. As Dr. Santschi has observed the small size and aberrant mandibles of the female point strongly to habits of a temporary social parasite.

S. (Diagyne) succinea subsp. nicai Forel.

S. succinea subsp. *nicai*, Forel, Bull. Soc. Vaud. Sci. Nat. Vol. 49, p. 222, (1913). ☿. Santschi, Rev. Suisse Zool. Vol. 30, p. 267 (1923). ♀ ♂.

I have not seen any material referable to this subspecies. Forel describes the worker as follows:

"Worker: Length 2.0–2.7 mm.

"Differs from the typical *succinea* through its much flatter promesonotum, almost entirely flat except at its anterior and posterior extremities, and particularly through its longer petiolar joints, especially the peduncle of the first (much shorter in the type). The petiole has a distinct posterior face, although convex. The postpetiole is also much longer, yet a little broader than long and as long as it is high. The head and body in general are almost without punctures. The thoracic impression is a little wider. For the rest similar to the type."

The insect which Santschi has described as the female of *nicai* appears, from his description, to be very similar to that of the typical *succinea*. The principal differences seem to lie in its slightly greater size (2.8 mm.), the presence of tubercles in advance of the frontal lobes and the slightly larger eyes which occur nearer the middle of the sides of the head. Santschi also notes that the mandibles are quadridentate but as one of the cotypes of *succinea* which I examined showed the apex of the large innermost tooth divided, I am doubtful as to the significance of this difference. The color of the female of *nicai* appears to be much as in the typical *succinea* except that the infuscation of the vertex seems somewhat more extensive.

A translation of Santschi's description of the male of *nicai* is given below, since it will serve to amplify Emery's very brief notes on the male of *succinea* and may also be useful in contrasting the two:

"Male: Length 2.5 mm.

"Blackish brown, the appendages dull yellow, a little brownish on the femora. Smooth and glistening. The head trapezoidal, a little longer than broad, the same with the eyes which occupy the anterior two-fifths of the sides. Clypeus feebly convex, without carinae. The scape as long as the second joint of the funiculus, the following

joints, shorter at first, are progressively elongated until they become much longer at the tip, the first joint of the funiculus globular and longer than thick. Thorax as broad as the head, the two epinotal faces more distinct than in the female, the declivious one-third shorter than the other. Peduncle as in the female but the nodes a little lower. Gaster not longer than the thorax."

Localities: Brazil, Sao Paulo. (Type loc.) (von Ihering.)
Argentina, near Rosario de Santa Fe. (Bruch?)

Subgenus Oedaleocerus, subgen. nov.

Worker: Small, monomorphic with rudimentary eyes of 5–10 facets, small joints of the antennae as broad as long or broader than long, dorsum of the thorax not impressed at the mesoepinotal suture (at least in the typical *angulata*), epinotum angular.

Female: Scape of the antenna greatly thickened and abruptly bent at the basal third, eyes large and strongly convex, postpetiole approximately two and one-half times as wide as the node of the petiole.

Type of the subgenus: *S. angulata* Emery.

Oedaleocerus contains only one species, *S.* (*O.*) *angulata.*

S. (Oedaleocerus) angulata Emery.

Introduction.

The case of *angulata* presents a number of difficulties not encountered elsewhere in the genus. It is unique in possessing a female whose characters are so aberrant that subgeneric rank is a necessity, yet its worker shows none of these peculiarities. On the contrary, practically every feature of that caste appears to place it in the subgenus *Diplorhoptrum.* It would even be possible to identify it with the *molesta* group within that subgenus, since the only outstanding difference shown by the worker of *angulata* is a somewhat shorter and more cordate head than is usual with those species. This distinction is at most a specific difference and totally unsuitable for subgeneric evaluation in comparison with a subgenus which contains such extremes as *S. leptanilloides* and *S. wasmanni.* This lack of similarity between the worker and female of *angulata* is sufficiently unusual to suggest that the female may actually be a workerless parasite. This interpretation would explain the differences between the two castes and at the same time permit the inclusion of the worker

in the subgenus *Diplorhoptrum*, where it obviously belongs. Unfortunately our present knowledge of the sexual forms of *angulata* is so meager that any such consideration must be largely speculative. Aside from the type series, workers and females of *angulata* have been taken together on only one occasion. The females in this instance differed very slightly, if at all, from those of the type series. This fact in itself may be taken as very strong evidence that the theory of parasitism is untenable. On the other hand, despite the fact that females showing the same aberrant characters have been taken at widely different times and places with workers of *angulata*, the idea that they are parasitic may still be defended. It is a well known fact that the sexual phases of the workerless parasites are produced in very large numbers. This results in conspicuous swarms at the time of mating and such a factor might have operated in the case of the female of *angulata* to call attention to a species which, because of its small size, would otherwise pass unnoticed. Furthermore, when Forel, in 1913, received workers and females of *angulata*, he was able to detect a number of structural differences in the worker upon which he gave it subspecific rank (the subspecies *nigelloides*). In the female no comparable differences were found. Indeed, the only difference between the female of the typical *angulata* and that of the subspecies *nigelloides* appears to be the completely black thorax and darker stigma of the latter. It is usually true that structural differences in the head of the worker, as was the case with the subspecies *nigelloides* are also shown, at least to some extent, in the female. Their absence in the female of that form constitutes an additional puzzle to the enigma of *angulata*. The close similarity of the females of the two forms, instead of overthrowing the idea of parasitism, may actually strengthen it.

There is an additional difficulty in connection with *angulata* which arises largely from the similarity of the worker to some of the species in the subgenus *Diplorhoptrum*. Because of this similarity *angulata* has become a dumping ground for all manner of forms whose relationship to it is very questionable. I refer in particular to the subspecies *huasanensis*, *mendozensis* and *carettei*, all described by Forel. Only the workers of these forms are known. If I am correct in assuming that Dr. Bruch has presented accurate figures in his interesting publication of 1916, none of these can be regarded as rightfully belonging to *angulata*. The first two show a strong impression of the dorsum of the thorax at the mesoepinotal suture, a character

which clearly separates them from *angulata*, in which the dorsum of the thorax is unimpressed, and relates them to the *basalis* group in the subgenus *Diplorhoptrum*. This is also true of the configuration of the petiolar joints, in which the proportions are more like those of the *basalis* group than like *angulata*. In the case of the subspecies *carettei* the relationship appears to me to lie in an entirely different direction. Although the eyes are composed of only ten or twelve facets, the shape of the thorax and petiolar joints as shown in Bruch's figure, strongly suggests a relationship to *nigella* in the subgenus *Euophthalma*. I have already shown that Santschi's subspecies *oculata* must be regarded as a separate species in that subgenus. The suggestions made above demand the examination of type material before satisfactory changes can be made. Since I have seen only cotypes of the typical *angulata*, the forms just discussed must be left provisionally in the subgenus *Oedaleocdrus*. They may be listed as follows:

S. (*O.*) *angulata* Emery
subsp. *carettei* Forel
subsp. *dolichops* Emery
subsp. *huasanensis* Forel
subsp. *mendozensis* Forel
subsp. *nigelloides* Forel

S. (Oedaleocerus) angulata Emery.

S. angulata, Emery in Ihering, Berlin Ent. Zeitschr., Vol. 39, p. 393, nota (1894) ♀. Emery, Bull. Soc. Ent. Ital., Vol. 28, p. 88 (1896). ♀.

Worker: Length 1.7–2.0 mm. (Plate VIII, figs. 4, 7.)

Head slightly longer than broad, the sides moderately convex, somewhat more narrowed in the anterior half than in the posterior half, the occiput broadly and feebly concave with the angles well rounded. Clypeus strongly projecting, the carinae prominent and divergent, each terminated by a large, stout and rather blunt tooth, lateral denticles reduced to sinuousities in the edge of the clypeus. Mandibles smooth, armed with four sharp teeth, the outermost tooth at least twice as long as the adjacent one, the innermost tooth reduced to a small denticle but still sharp. The antennal scape in repose reaches the posterior fifth of the head, first funicular joint as long as the following three together, second joint approximately as broad as long, joints 3–7 all broader than long; club moderately stout, the

last joint considerably wider than the penultimate and almost four times as long as the latter. Eyes of five or six poorly defined facets which are somewhat separated and borne on an oval, pigmented area, separated from the insertion of the mandible by a distance only a little less than twice their greatest diameter.

Humeral angles of the prothorax rather well marked, the promesonotum one and two-fifths times as wide as the epinotum, the mesoepinotal suture broad and prominent, the sides only moderately constricted at the suture except at the dorsum where the constriction is pronounced. Seen in profile the pronotum descends to the neck in a convex slope, mesonotum flat, mesoepinotal suture wide and deep but not impressed. Basal face of the epinotum virtually flat and feebly sloping to the rear, much longer than the steep declivious face which it meets at a well marked angle. Node of the petiole in profile bluntly triangular, its height somewhat greater than the length of its base, the summit feebly convex and sloping to the rear, not sharply separated from the almost perpendicular posterior face, anterior face longer than the posterior, steeply sloping forward and sharply separated from the peduncle which bears a prominent ventral tooth. Postpetiole approximately four-fifths as high as the node of the petiole, thicker and with the summit more obtusely rounded, posterior face feebly convex and sloping to the rear, not sharply separated from the rounded summit, anterior face somewhat shorter and perpendicular. Seen from above the node of the petiole is subtriangular in outline, slightly broader than long and only a little narrower than the transversely oval postpetiole. Anterior edge of the first gastric segment narrowly truncate. Very smooth and shining with sparse small punctures which bear rather thick, curved suberect hairs. A few feeble striae on the meso- and metapleurae. Color yellowish brown, the abdomen and occiput somewhat darker.

Female: Length 4.3 mm. (Plate VIII, figs. 5, 6.)

Head (eyes excluded) one-seventh broader than long, the sides much narrower in front of the eyes than behind them, slightly tapering from the eyes to the insertion of the mandibles, the sides behind the eyes strongly convex forming well marked occipital angles, occiput flat. Clypeus strongly projecting, the two carinae moderately divergent, each ending in a short, coarse, blunt tooth, the anterior edge of the clypeus between these teeth with a feeble concave impression, the median lobe of the clypeus concave throughout, lateral

denticles very obtuse and not particularly prominent. Mandibles quadridentate, the teeth with the same relative proportions as in the worker. Eyes strongly convex, suboval in outline, separated from the insertion of the mandible by a distance equal to one-half their greatest diameter. Ocelli large, the two lateral ones separated from each other by a distance one and one-half times as great as that which separates each from the median ocellus. The antennal scapes strongly swollen and sharply bent at their basal third where they are thickest, slightly tapering toward the apex and scarcely tapering toward the base. First funicular joint not quite as long as the following three together, second joint approximately as broad as long, joints three and four slightly broader than long, the remaining small joints much broader than long; club slender, the terminal joint two and one-half times as long as the penultimate.

Thorax elliptical, rather bulky, as wide as the head and a little less than twice as long as wide. Basal face of the epinotum steeply sloping and much longer than the declivious which is feebly convex. Both faces feebly bordered. Node of the petiole in profile triangular, its height greater than the length of its base, the summit rather narrow, the anterior face longer than the posterior, both steeply declivious. The base of the node bears a sinuate lateral expansion which extends forward to form the dorsum of the peduncle, the latter short and stout with a rather poorly developed ventral lamella which ends anteriorly in a tooth-like angle. Postpetiole in profile much depressed, the summit broadly and feebly convex, no definite posterior face, the anterior face straight and somewhat tilted forward (i. e. the dorsum in advance of the ventral portion). Seen from above both nodes are strongly transverse, the postpetiole elliptical, almost twice as broad as long and one and three-fourths times as wide as the node of the petiole. Truncation at the anterior edge of the first gastric segment very little, if any, wider than the postpetiole, with a deeply concave impression at the base of the latter.

Smooth and moderately shining with coarse and fairly numerous punctures on the head, thorax and first abdominal segment, punctures on the remaining abdominal segments much smaller. Mandibles and the genae between the insertion of the mandible and the eye with a few coarse, irregular striae. Metapleurae and most of the sides of the epinotum finely striate, basal face of the epinotum transversely striate, ventral portions of the petiole and postpetiole granulate. Blackish brown, the mandibles, funicular joints, except the club,

articulations of the legs, tibiae and tarsi reddish; occiput, scape, club and part of the thorax, petiolar joints and abdomen brown.

Redescribed from two cotypes in the collection of Dr. W. M. Wheeler. The color characteristics given in the description of the female are those of Emery. The specimen from which the present description was drawn is not fully colored.

Localities: Brazil, Rio Grande do Sul. (Type loc.) (von Ihering.)
Uruguay, Montevideo. (von Steiger.)
Argentina, Buenos Aires. (von Steiger.)

S. (Oedaleocerus) angulata subsp. carettei Forel.

S. angulata subsp. *carettei*, Forel, Bull. Soc. Vaud. Sci. Nat., Vol. 49, p. 223 (1913). ♀. Bruch, Rev. Mus. La Plata, Vol. 23, p. 319, Text fig. 12, b, e, pl. 9, fig. 11 (1916). ♀.

Forel's description follows:

"Worker: Length 1.7–1.9 mm.

"A little longer than Emery's type from which it may be distinguished by the large eyes composed of ten to twelve facets, further by the second node which is a great deal narrower. The head is also a little shorter."

Localities: Argentina, Mendoza. (Type loc.) (Carette.) (Bruch.)
Delta Parana. (Bruch.)
Arroyo Chana. (Bruch.)
Alto Pencoso. (Bruch.)

Dr. Bruch notes that the worker of this form reaches a length of 2.5 mm.

S. (Oedaleocerus) angulata subsp. dolichops Emery.

S. angulata subsp. *dolichops*, Emery, Bull. Soc. Ent. Ital., Vol. 37, p. 123 (1905). ♀.

Emery's description follows:

"Differs from the type of the species through the very elongate eyes, at least half again as long as broad in the worker."

Localities: Argentina, Puerto Camerones. (Type loc.) (Coll.?)
La Plata. (Spegazzini.)
Puerto Madryn. (Biraben.)
Buenos Aires. (von Steiger.)
Santa Fe. (von Steiger.)

S. (Oedaleocerus) angulata subsp. huasanensis Forel.

S. angulata subsp. *huasanensis*, Forel, Mem. Soc. Ent. Belg., Vol. 20, p. 8, (1912). ☿. Forel, Bull. Soc. Vaud. Sci. Nat., Vol. 50, p. 287 (1914). ☿. Bruch, Rev. Mus. La Plata, Vol. 23, p. 318, Text fig. 12, a, d, pl. 19, fig. 10 (1916). ☿.

Forel 1912:

"Worker: Length 1.7–1.8 mm.

"Clypeal teeth shorter than in the type of *angulata*. The eyes are much larger than in the type, elongated as in the variety *dolichops* Em., but of about eight or ten facets, often flat and partly atrophied. The scape is long, failing to reach the occipital border by about two times its own thickness. The postpetiole is broader, twice as broad as the node of the petiole. Otherwise identical with the type of the species. Of a brownish red with the head reddish brown and the abdomen brown. Appendages and mandibles yellowish.

Localities: Argentina, Huasan. (Type loc.) (Bruch.)
San Luiz. (Bruch.)

S. (Oedaleocerus) angulata subsp. mendozensis Forel.

S. angulata subsp. *mendozensis*, Forel, Bull. Soc. Vaud. Sci. Nat., Vol. 49, p. 223 (1913). ☿ (*carettei* var.) Forel, Ibid., Vol. 50, p. 277 (1914). ☿. Bruch, Rev. Mus. La Plata, Vol. 23, p. 320, text fig. 12, c, f, pl. 9, fig. 12 (1916). ☿.

Forel 1913:

"Worker: Length 1.9 mm.

"Distinguished from the variety *carettei* by its more slender shape, narrower, by its much clearer color, a dull reddish yellow with a brown occiput, and particularly by the very narrow head, one and one-third times as long as broad, with the sides scarcely convex. The eyes have only eight or nine facets but they are, nevertheless, much larger than in the type of angulata."

Forel 1914:

"I am obliged to make this form a special subspecies and not a simple variety of *carettei*, for the node of the petiole is much thicker and differently shaped than in the subspecies *carettei*. It is almost cubical, as thick above as below and almost flat above, whereas that in *carettei* is conical with a feebly obtuse summit."

Localities: Argentina, Rio Negro, Colonias Frias. (Type loc.) (Lehmann-Nitsche.)
Alto Pencoso. (Bruch.)

S. (Oedaleocerus) angulata subsp. **nigelloides** Forel.

S. angulata, subsp. *nigelloides*, Forel, Bull. Soc. Vaud. Sci. Nat., Vol. 49, p. 223 (1913). ☿, ♀, ♂.

Forel's description follows:

"Worker: Length 1.8–1.9 mm.

"Form of the thorax as in the type but the color almost black as in *nigella* Em. The teeth and the clypeal carinae are very strong and thicker than in the typical *angulata*, the carinae are strongly elevated. The head is slightly broader with the sides a little more convex than in the type of the species. The head is a little longer than broad but a little shorter than the typical *angulata*. The scapes are distinctly longer, they fail to reach the posterior border by only twice their thickness, whereas in the typical *angulata* they scarcely reach the posterior third of the head (see description of the worker of *angulata* W. S. C.). The mesoepinotal suture is, furthermore, slightly stronger than the typical *angulata*. In other regards the thorax is identical, also the petiolar nodes, the sculpture and the pilosity. The color is almost black with the mandibles, the base of the funiculus, the sides of the mesonotum, the epinotum and the petiolar nodes reddish. The antennal club and the tarsi are brown.

"Female: Length 4.3 mm.

"As in the type of the species with the same punctuation, spaced more closely than in the worker, especially on the head. Entirely black with the tarsi and the antennae brown and the mandibles and the base of the funiculus a yellowish red. The stigma is darker than in the type. The nodes are very large as in the type.

"Male: Length 3.2–3.5 mm.

"Thorax a little broader than the head, color as in the female but with the mandibles brown. Head rather dull and strongly reticulate. Second node twice as broad as long. Otherwise as in the type of the species."

Localities: Argentina, Buenos Aires. (Type loc.) (Rovereto.)
Monte Hermoso. (Carette.)

Forel has certainly underestimated the length of the antennal scape in the typical *angulata*. His last statement in the description of the male is also rather confusing, since the male of the typical *angulata* has never been described.

PLATE I

FIGURE 1. Head of the major of *S. geminata* Fabr.

FIGURE 2. Head of the major of *S. geminata* subsp. *eduardi* Forel.

FIGURE 3. Head of the major of *S. geminata* subsp. *medusa* Mann.

FIGURE 4. Head of the male of *S. geminata* Fabr.

FIGURE 5. Head of the female of *S. geminata* Fabr.

FIGURE 6. Head of the minor of *S. geminata* Fabr.

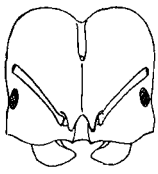
FIGURE 7, 8. Thorax of *S. geminata* subsp. *rufa* Jerdon showing variation in the form of the mesosternal spine.

FIGURE 9. Epinotum of minor of *S. geminata* subsp. *eduardi* Forel.

FIGURE 10. Epinotum of minor of *S. geminata* Fabr.

FIGURE 11. Thorax of the major of *S. geminata* Fabr.

FIGURE 12. Thorax of the minor of *S. geminata* Fabr.



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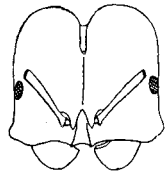

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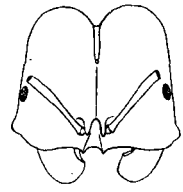

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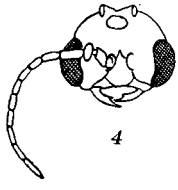

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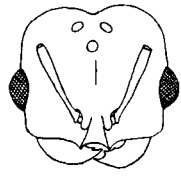

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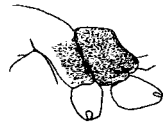

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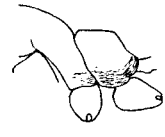

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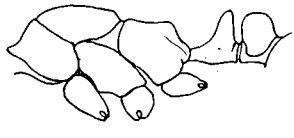

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PLATE II

FIGURE 1. Head of the major of *S. saevissima* F. Smith.
FIGURE 2. Thorax of the major of *S. saevissima* F. Smith.
FIGURE 3. Head of the female of *S. saevissima* F. Smith.
FIGURE 4. Thorax of the major of *S. saevissima* subsp. *interrupta* Santschi.
FIGURE 5. Head of the major of *S. saevissima* subsp. *interrupta* Santschi.
FIGURE 6. Head of the major of *S. saevissima* subsp. *electra* Forel.
FIGURE 7. Thorax of the major of *S. saevissima* subsp. *electra* Forel.
FIGURE 8. Head of the female of *S. saevissima* subsp. *electra* Forel.
FIGURE 9. Thorax of the minor of *S. saevissima* F. Smith.
FIGURE 10. Head of the male of *S. saeevissima* var. *moelleri* Forel.
FIGURE 11. Head of the minor of *S. saevissima* F. Smith.

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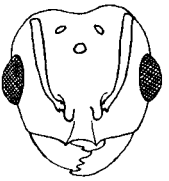

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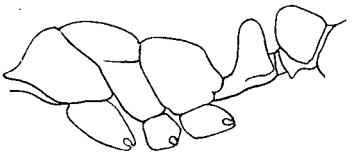

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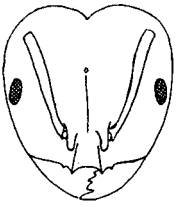

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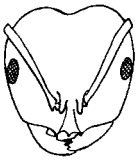

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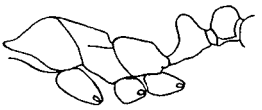

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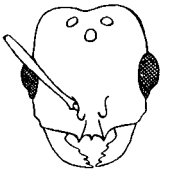

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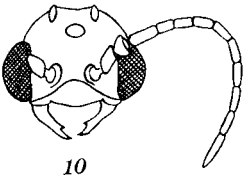

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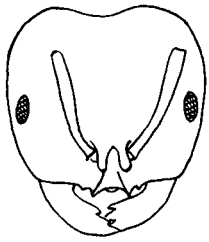
PLATE III

FIGURE 1. Head of the major of *S. xyloni* MacCook.
FIGURE 2. Head of the major of *S. xyloni* subsp. *aurea* Wheeler.
FIGURE 3. Head of the major of *S. xyloni* subsp. *amblychila* Wheeler.
FIGURE 4. Thorax of the major of *S. xyloni* MacCook.
FIGURE 5. Head of the male of *S. xyloni* MacCook.
FIGURE 6. Head of the female of *S. xyloni* MacCook.
FIGURE 7. Thorax of the minor of *S. xyloni* MacCook.
FIGURE 8. Head of the minor of *S. xyloni* MacCook.



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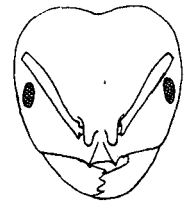

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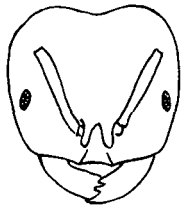

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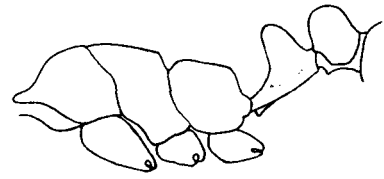

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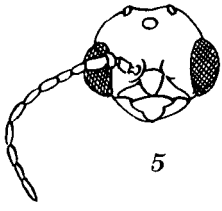

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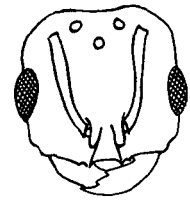

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PLATE IV

FIGURE 1. Head of the media of *S. tridens* var. *substituta* Santschi.
FIGURE 2. Thorax of the media of *S. tridens* var. *substituta* Santschi.
FIGURE 3. Head of the female of *S. gayi*, var. *fazi* Santschi.
FIGURE 4. Head of the major of *S. gayi* subsp. *bruesi* subsp. nov.
FIGURE 5. Thorax of the major of *S. gayi* subsp. *bruesi* subsp. nov.
FIGURE 6. Head of the major of *S. gayi* Spinola.
FIGURE 7. Thorax of the major of *S. bondari* Santschi.
FIGURE 8. Petiole and postpetiole of the worker of *bondari* seen from above.
FIGURE 9. Head of the major of *S. bondari* Santschi.

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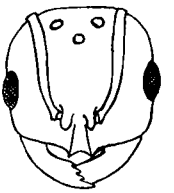

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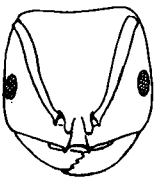

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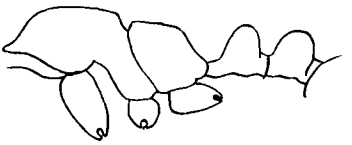

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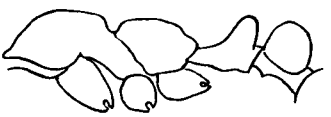

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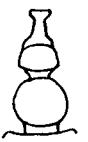

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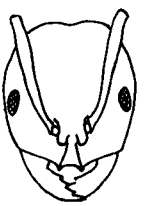

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PLATE V

FIGURE 1. Head of the worker of *S.* (*E.*) *metanotalis* var. *argus* Santschi.

FIGURE 2. Thorax of the worker of *S.* (*E.*) *metanotalis* Emery.

FIGURE 3. Head of the worker of *S.* (*E*). *metanotalis* Emery.

FIGURE 4. Thorax of the worker of *S.* (*E.*) *metanotalis* subsp. ***shiptoni*** var. *steigeri* Santschi.

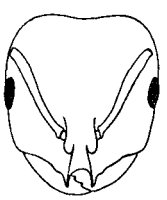
FIGURE 5. Head of the worker of *S.* (*E.*) *metanotalis* subsp. *emiliae* Santschi.

FIGURE 6. Thorax of the worker of *S.* (*E.*) *metanotalis* subsp. *emiliae* Santschi.

FIGURE 7. Head of the worker of *S.* (*E.*) *metanotalis* subsp. *shiptoni* var. *steigeri* Santschi.

FIGURE 8. Thorax of the worker of *S.* (*E.*) *silvestrii* Emery.

FIGURE 9. Head of the worker of *S.* (*E.*) *silvestrii* Emery.



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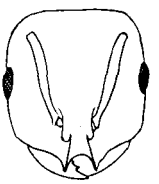

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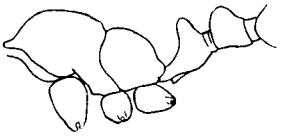

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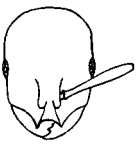

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PLATE VI

FIGURE 1. Head of the worker of *S.* (*E.*) *globularia* F. Smith.

FIGURE 2. Thorax of the worker of *S.* (*E.*) *globularia* F. Smith.

FIGURE 3. Head of the worker of *S.* (*E.*) *globularia* subsp. *littoralis* subsp. nov.

FIGURE 4. Worker of *S.* (*E.*) *macrops* Santschi.

FIGURE 5. Petiole and postpetiole of *S.* (*E.*) *globularia* subsp. *pacifica* Wheeler, seen from above.

FIGURE 6. Thorax of the major of *S.* (*E.*) *nigella* Emery.

FIGURE 7. Head of the major of *S.* (*E.*) *nigella* Emery.

FIGURE 8. Thorax of the minor of *S.* (*E.*) *nigella*, subsp. *gensterblumi* Forel.

FIGURE 9. Head of the minor of *S.* (*E.*) *nigella*, subsp. *gensterblumi* Forel.

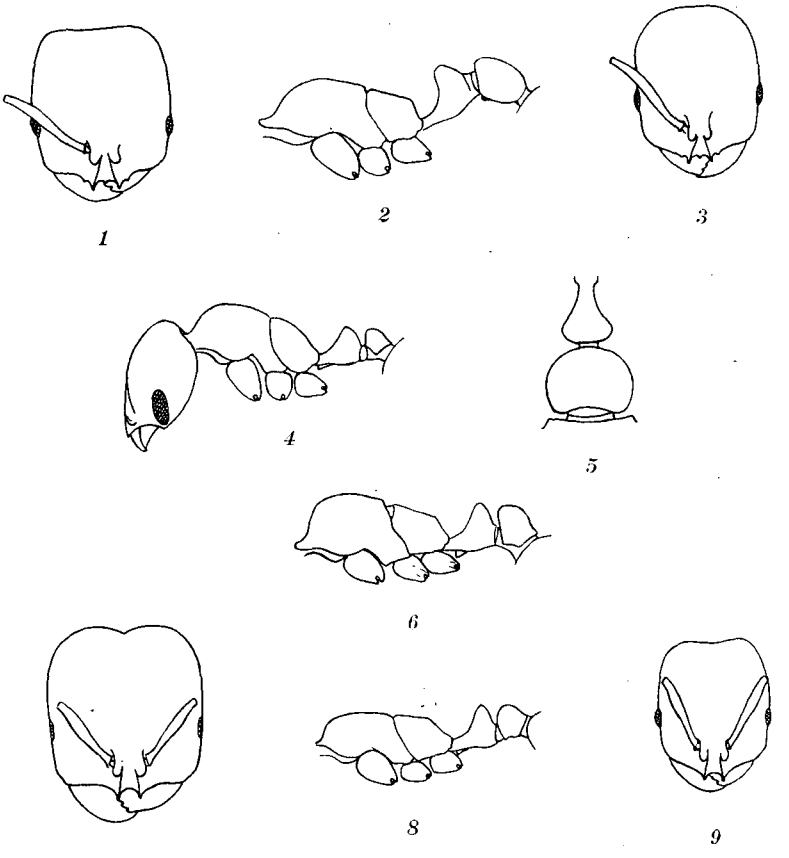
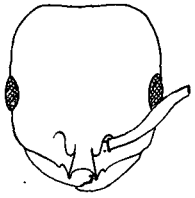


PLATE VII

FIGURE 1. Head of the worker of *S.* (*E.*) *andina* Santschi.
FIGURE 2. Thorax of the worker of *S.* (*E.*) *andina* Santschi.
FIGURE 3. Head of the worker of *S.* (*E.*) *oculata* Santschi.
FIGURE 4. Thorax of the worker of *S.* (*E.*) *oculata* Santschi.
FIGURE 5. Head of the minor of *S.* (*E.*) *huachucana* Wheeler.
FIGURE 6. Thorax of the major of *S.* (*E.*) *huachucana* Wheeler.
FIGURE 7. Head of the major of *S.* (*E.*) *huachucana* Wheeler.



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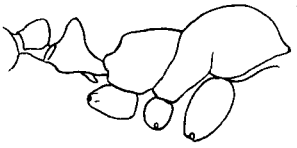

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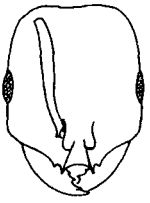

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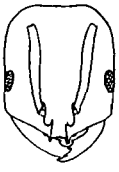

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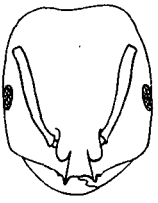

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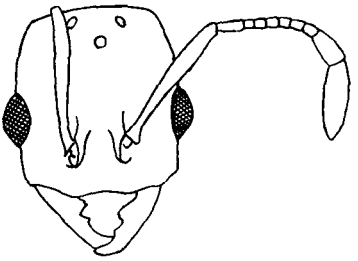
PLATE VIII

FIGURE 1. Head of the female of *S.* (*D.*) *succinea* Emery.
FIGURE 2. Head of the worker of *S.* (*D.*) *succinea* Emery.
FIGURE 3. Thorax of the worker of *S.* (*D.*) *succinea* Emery.
FIGURE 4. Head of the worker of *S.* (*O.*) *angulata* Emery.
FIGURE 5. Antennal scape of the female of *S.* (*O.*) *angulata* Emery.
FIGURE 6. Head of the female of *S.* (*D.*) *angulata* Emery.
FIGURE 7. Thorax of the worker of *S.* (*D.*) *angulata* Emery.



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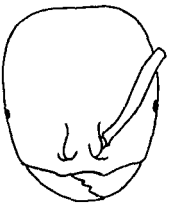

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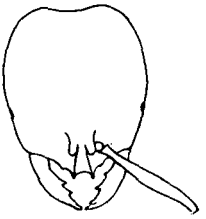

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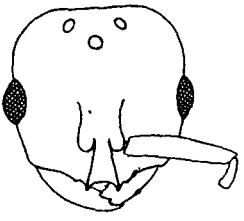

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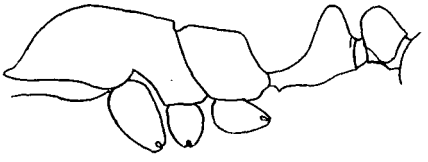

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