

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 *steinheili* 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 Caribbean 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.

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 declivous. 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: $1\frac{3}{4}$ 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. (*Euopthalma*) *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 declivous. 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 nuptial 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 Galapagos 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 synonymizing 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 *borinquenensis* 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.