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THE NORTH AMERICAN FORMS OF *LASIUS UMBRATUS* NYLANDER.¹

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Like many other ants that are peculiar to the north temperate zone, *Lasius umbratus* is very widely distributed and presents a number of local subspecies and varieties. In the Old World it ranges from England to Japan, through northern and central Eurasia; in North America from Nova Scotia and the Atlantic States to the Rocky Mountains and will probably be found on the Pacific Coast, at least in the mountains of California or at lower elevations in Washington and Oregon. According to Forel and Emery the species is represented in Europe by four subspecies, namely, the typical *umbratus* Nyl., *mixtus* Nyl., *affinis* Schenk and *bicornis* Förster. To these Ruzsky has added a fifth, *exacutus*, from Oriental Russia. To judge from a female specimen in my collection, the Japanese form is indistinguishable from the typical *umbratus*. Transitional forms which Forel has called *mixto-umbratus* occur in Switzerland, and others which Ruzsky has called *umbrato-affinis* have been taken in eastern Russia. Mayr cited three forms from the United States: *mixtus*, *affinis* and *bicornis*, but Emery has shown that the first of these differs slightly from the European *mixtus* and had been previously described by Walsh as *Formica aphidicola*, and that the last is a distinct subspecies which he has called *minutus*. He was unable to find *affinis* among his American material and I have been equally unsuccessful. This form, therefore, is probably not represented on our continent. More recently

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Viereck has described from New Mexico a new subspecies as *subumbratus*, and another subspecies, *vestitus*, from Idaho, is added in the present paper. This form may prove to be the hitherto unknown female of Emery's *L. speculiventris*, which, I believe, is merely a subspecies of *umbratus*.

All the various forms that constitute the species *umbratus* may be readily distinguished in the worker and female phases from the other species of *Lasius*, by the following peculiarities: the maxillary palpi are 6-jointed and this character places the species in the genus *Lasius sensu stricto* and removes it from the exclusively North American subgenus *Acanthomyops*, which includes species with 3-jointed maxillary palpi and a strong odor like that of lemon verbena or oil of citronella. The joints of the maxillary palpi in *umbratus* are not long and subequal as in *L. niger* and its various forms, but grow successively shorter towards the tip. It differs from our two other *Lasii* with yellow workers and diminishing maxillary joints (*L. flavus nearcticus* Wheeler and *L. brevicornis* Emery) in having the antennal scapes extending a considerable distance beyond the posterior corners of the head, the larger size of the eyes in the worker, and in being more or less tinged with brown in this phase. Moreover, the female *umbratus* has the head as broad as the thorax, whereas in *nearcticus* and *brevicornis* it is distinctly narrower. It is by no means easy to separate the various subspecies or races of *umbratus* on morphological characters, such as the size of the eyes of the worker, shape of the petiole of the worker and female, dentition of the mandibles of the male, etc., since these characters are rather inconstant. More satisfactory distinctions are furnished by peculiarities of stature, pubescence, pilosity and color.

Notwithstanding its wide distribution *L. umbratus* is by no means as common as other species of the genus. In North America however, it is much more frequently met with than in Eurasia; but even in our country it is sporadic, being abundant in certain localities and totally lacking in others. It prefers rather damp, shady spots like those occupied by *L. nearcticus* and the species of *Acanthomyops*. Like the species of this sub-genus it forms populous colonies under stones, in rotten stumps or logs or constructs large masonry dome nests. These dome nests I have seen only in meadows or in clearings in the woods where the soil is covered

with grass and is more or less exposed to the sun. The subspecies *subumbratus* is an exclusively boreal form, occurring only in British America and at elevations above 7,500 ft. in the Rocky Mountains. The same is probably true of *vestitus*. The subspecies *minutus* and *speculiventris* and the variety *aphidicola* occur in the transition zone and of these only *aphidicola* is at all common. Like our other yellow *Lasii*, *umbratus* is subterranean in its habits and devotes itself to the care of root-aphids and -coccids, all or nearly all of its food consisting of the sweet excreta of these insects.

The sexual phases are rarely found in the nests of *umbratus*, apparently because they are not retained by the parental colonies for days or weeks during the latter part of the summer or early fall but escape for their marriage flight very soon after reaching maturity. Recent studies in Europe indicate that the just-fertilized *umbratus* queen is unable to establish her colony independently after the manner of *L. niger* and *flavus*, but becomes a temporary parasite on a colony of *niger* or of one of its subspecies or varieties after the manner of certain species of *Formica* of the *rufa* and *exsecta* groups. Our American *umbratus* forms apparently behave in the same manner. De Lannoy and Wasmann, moreover, have collected some evidence to show that *umbratus* is in turn the temporary host of the palearctic *L. fuliginosus*. The rare or sporadic occurrence of *umbratus* on both continents certainly points to parasitic habits on the part of the queen and her incipient colony.

The following tables will facilitate the identification of workers and females of our North American forms of *umbratus*:

WORKERS.

1. Antennal scapes and tibiae with very few or no erect hairs; gaster with appressed pubescence. 2
 Antennal scapes and tibiae with abundant erect hairs; gaster without pubescence. subsp. **speculiventris** Emery.
2. Gaster with sparse pubescence and short erect hairs, shining; average length of body over 4 mm. 3
 Gaster very densely pubescent, with long erect hairs, subopaque; average length of body less than 4 mm. subsp. **minutus** Emery.
3. Pale yellow; eyes small. subsp. **subumbratus** Viereck.
 Brownish yellow; eyes larger. . . subsp. **mixtus** Nyl. var. *aphidicola* Walsh.

FEMALES.

1. Length not exceeding 4.5 mm subsp. **minutus** Emery.
 Length not less than 6 mm 2
2. Scapes and legs covered with dense, erect hairs; length
 6 mm subsp. **vestitus** subsp. nov.
 Scapes and legs naked or with only a few scattered erect hairs;
 average length more than 6 mm 3
3. Body dark brown above; erect hairs on the gaster very short or
 absent subsp. *mixtus* Nyl. var. **aphidicola** Walsh.
 Body light brown or reddish; hairs on gaster very long, reclinate
 ate subsp. **subumbratus** Viereck.

1. *Lasius umbratus subumbratus* Viereck.

Trans. Ent. Soc. Phila. XXIX, 1902, p. 72. ♀.

Worker. Length 4–5.5 mm.

Very similar to the typical *umbratus*. Body shining and rather smooth, especially the clypeus and gaster. Pubescence and pilosity abundant, the former more so on the head and thorax than on the gaster. Erect hairs on the femora few and scattered, absent on the tibiae and scapes. Eyes small. Petiole high and much compressed anteroposteriorly, its sides and upper border rounded, the latter entire or with a very feeble notch. Pale yellow throughout, except the mandibles, which are reddish brown, with black teeth, and the articulations of the antennal funiculi which are fuscous or blackish.

Female. Length 7–8.5 mm.

Differing from the true *umbratus* as follows: Color paler, being a light brown or reddish, with the lower surface and the legs more yellowish. Pubescence much longer and more abundant. Hairs on the head, thorax and abdomen very long, slender and reclinate; absent on the legs and scapes. In some specimens the hairs on the head are short and sparse. Border of the petiole bearing a fringe of long hairs, its upper border much less deeply notched than in the true *umbratus*. Wings gray, with basal halves distinctly infuscated as in the other forms of the species.

Male. Length 3.5–4.5 mm.

Differing from the true *umbratus* only in its somewhat paler color and in lacking erect hairs on the legs and scapes. Eyes hairy as in that form and with the mandibles furnished with two larger apical and several minute basal teeth.

This subspecies was originally and rather inadequately described by Viereck from two females taken at Beulah, N. M. (about 8,000 ft.), one August 17 by Dr. H. Skinner, and one July 27 by Prof. T. D. A. Cockerell. These are in the type collection of the Phila. Acad. Nat. Sci. In my own collection the form is represented from the following localities:

New Mexico: Beulah (Cockerell; topotype), one dealated female.

Colorado: Two females, one dealated, taken by P. J. Schmitt; one dealated female taken by myself in Cheyenne Cañon (about 8,000 ft.), near Colorado Springs; numerous workers from Williams Cañon, near Manitou (about 7,500 ft.), also captured by myself.

Utah: Numerous workers from Little Willow Cañon (C. V. Chamberlin).

Nova Scotia: Many workers, males and winged females taken from five colonies by Mr. John Russell at Digby, and six dealated females taken at Bedford, near Halifax by Mr. William Reiff.

Dr. P. P. Calvert and Mr. E. T. Cresson, Jr., kindly compared one of the female specimens from Nova Scotia with Viereck's type and state that the former differs from the latter only in being somewhat more yellowish and less reddish. I am unable to detect any differences even in coloration between my Rocky Mountain specimens and those from Nova Scotia.

It is interesting to note, as bearing on the probable temporary parasitism of *umbratus*, that the six dealated queens taken by Mr. Reiff at Bedford, N. S., were found living in three colonies of the large yellowish form of *Lasius niger* var. *neoniger* Emery so characteristic of boreal America.

2. *Lasius umbratus mixtus* Nyl. var. *aphidicola* Walsh.

Formica aphidicola Walsh, Proc. Ent. Soc. Phila. 1862, p. 310, worker ♂.

Lasius aphidicola Mayr, Verh. zool.-bot. Ges. Wien, XXXVI, 1886, p. 429;

Dalla Torre, Catalog. Hymen. VII, 1893 p. 182.

Lasius umbratus subsp. *mixtus* var. *aphidicola* Emery, Zool. Jahrb. Abth. f.

Syst. VII, 1893, p. 640, 641, worker ♀ ♂; Wheeler, Bull. Amer. Mus. Nat.

Hist. XXI, 1905, p. 397; Occas. Papers Bost. Soc. Nat. Hist. VII, 7, 1906, p. 13.

Lasius speculiventris Wheeler, Bull. Amer. Mus. Nat. Hist. XXI, 1905, p. 397.

Worker. Length 3.5–4.5 mm.

Brownish yellow, with the appendages, lower portion of the body and anterior portion of the head paler. Surface, especially the dorsum of the gaster shining, owing to the short and dilute, though distinct pubescence. Hairs erect, coarse and rather abundant, short on the gaster, absent on the scapes and legs. Petiole seen from behind with rounded or subangular sides and the notch in the upper border variable, but usually feeble.

Female. Length 6-7 mm.

Dark brown; mandibles, appendages, pleuræ, epinotum and petiole usually reddish or yellowish. Basal half of wings strongly infuscated. Pilosity and pubescence similar to those of the worker but the pubescence on the gaster denser so that this region is much less shining than in the worker. Erect hairs on the gaster often absent, when developed scattered and very short except on the terminal segments. Eyes very hairy. Petiole from behind with rounded sides and upper border, the latter feebly emarginate.

Male. Length 4-4.5 mm.

Mandibles with two apical and no basal teeth. Body black; appendages piceous; wings colored like those of the female. Surface, especially that of the gaster, smooth and shining. Pilosity moderately developed, erect; absent on the scapes and legs; pubescence more dilute and inconspicuous than in the worker. Eyes hairy.

I have followed Emery in regarding this subspecies as the one which Walsh described as *Formica aphidicola*, though his description is very inadequate. As it is our most common form of *umbra-tus*, it is, in all probability, the one which he saw. The types came from Rock Island, Ill. I have examined numerous specimens from the following localities:

Illinois: Rockford (Wheeler); Algonquin (W. A. Nason).

Wisconsin: Milwaukee (C. E. Brown).

Michigan: Ann Arbor (J. Dawson).

Maine: Elms (W. Deane).

New Hampshire: Mt. Washington (Mrs. A. T. Slosson).

Massachusetts: Boston (Wheeler); Essex County (G. B. King); Medford (Mus. Comp. Zool.).

Connecticut: Colebrook (Wheeler); Westport (W. E. Britton).

New York: Bronxville (Wheeler); Bergen Beach (G. v. Krockow); Staten Island (W. T. Davis).

New Jersey: Ithaca (J. C. Bradley); Fort Lee, Great Notch and Ramapo Mts. (Wheeler); Tom's River (W. T. Davis); Woodbury (H. Viereck).

Pennsylvania: St. Vincent (P. J. Schmitt), Philadelphia; Tinicum Islands; Enola.

North Carolina: Black Mts. (Wm. Beutenmuller); Raleigh (F. Sherman).

Colorado: Florissant and Colorado Springs (Wheeler); Eldora, 8,600 ft. (Mrs. W. P. Cockerell).

Emery cites *aphidicola* also from Caldwell, N. J., District of Columbia and Virginia. According to this authority, *aphidicola* is so close to the European *mixtus* as to be scarcely distinguishable. The color of the worker of the American form is usually darker, and the body and wing color of the female is decidedly deeper. Worker forms are sometimes found with a few, scattered erect hairs on the antennal scapes and tibiae and therefore represent transitions to the typical *umbratus*.

3. *Lasius umbratus minutus* Emery.

Lasius umbratus var. *bicornis* Mayr, Verh. zool.-bot. Ges. Wien, XXXVI, 1886, p. 430.

Lasius umbratus subsp. *minutus* Emery, Zool. Jahrb. Abth. f. Syst. VII, 1893, p. 641, worker ♀ ♂; Wheeler, Bull. Amer. Mus. Nat. Hist. XXI, 1905, p. 397; Occas. Papers Bost. Soc. Nat. Hist. VII, 7, 1906, p. 13.

Worker. Length 3–3.5 mm.

Brown, with the cheeks, clypeus, mandibles, appendages and lower surface of the body more yellowish. Body so densely pubescent that its shining surface is obscured and appears glossy or subopaque. Hairs on the head, thorax and gaster abundant, erect and coarse, on the gaster longer and more conspicuous than in the two preceding subspecies. Scapes and legs naked; lower surfaces of the femora with a few scattered, erect hairs. Petiole high and narrow, with straight sides and a distinct notch in the apical border.

Female. Length 4–4.5 mm.

Dark brown; mandibles, mouthparts and appendages, except the middle portions of the femora, pale brown; wings gray with infuscated bases. Pubescence and pilosity very similar to those of the worker, but longer. Petiole more feebly notched.

Male. Length 2.6–3.5 mm.

Black; with piceous legs and antennæ. Wings colored like those of the female. Mandibles with two apical and no basal teeth. Pubescence and pilosity like those of the worker, but the former more dilute, so that the surface of the body is more shining. Discoidal cell of the wing often incomplete or lacking.

The type specimens described by Emery came from New Jersey and Maine. I have examined specimens from the following states:

New Jersey: Cotypes (T. Pergande).

Maryland: Chestertown (E. G. Vanatta).

Illinois: Rockford (Wheeler).

Michigan: Ann Arbor (J. Dawson).

Connecticut: Colebrook (Wheeler).

Massachusetts: Forest Hills, Boston (M. Tanquary); Medford (Dall.).

Emery has called attention to the resemblance of this species, which is characterized by the small size of the females and the peculiar pubescence and pilosity of these and the workers, to the European *bicornis* and *affinis*. The description given above is drawn from numerous specimens of all three phases taken August 12, 1910, taken by Mr. M. Tanquary from a large masonry dome nest in low ground near Forest Hills, Mass. The dealated females bear a remarkable resemblance in size and coloration to the corresponding phase of our common *Tapinoma sessile*.

4. *Lasius umbratus vestitus* subsp. nov.

Female. Length about 6 mm.

Differing from *subumbratus* and *aphidicola* in its smaller size and in pilosity. Body dark brown above, with paler lower surface, mandibles, antennæ and legs. Surface finely shagreened and shining but appearing more opaque on account of the dense layer of fine grayish pubescence. Hairs sordid white, fine and uniformly abundant, erect, long on the body, shorter on the scapes and legs. The petiole, which is fringed with long hairs, has a peculiar shape, being in profile cuneate and inclined forward and rather thick at the base; seen from behind it is narrowed above, with a blunter and more rounded margin than in the other subspecies, and without emargination. Wings very long (8 mm.), faintly infuscated at the base.

Described from a single specimen taken by Prof. J. M. Aldrich at Moscow, Idaho.

This may be the female of *L. speculiventris*, of which Emery described only the male and worker.

5. *Lasius umbratus speculiventris* Emery.

L. speculiventris Emery, Zool. Jahrb. Abth. f. Syst. VII, 1893, worker ♂.

"*Worker*. Yellow; head subpubescent, densely hairy; scapes and tibiæ hirsute with erect hairs; head, thorax and legs pubescent, gaster without appressed pubescence, delicately, microscopically, transversely rugulose, very shining. Length 3.5-4 mm.

Male. Fuscous; legs, antennæ and genitalia pale; densely pilose; scapes with short hairs; tibiæ with scattered, scapes with short hairs; wings clouded with fuscous at the base. Length 3.5-4 mm., width of head 1.2 mm., length of scape 0.7 mm., anterior wing 4.5 mm.

Caldwell, N. J., from Mr. Pergande.

The worker is distinguished by the abundant, erect pilosity of the antennal scapes and tibiæ and by the complete absence of appressed pubescence on the gaster. The latter region, owing to the lack of the fine punctures connected with the pubescence, is remarkably shining. With the aid of a very strong lens its surface is seen to present, in addition to the hair-bearing punctures, only a very fine rugosity, in the form of long, transverse meshes. Whether this form is to be retained as an independent species or is to be regarded as a subspecies of *umbratus*, cannot be decided at present.

In the male the antennal scape is densely covered with short, oblique hairs as on the male of the European *umbratus*; it is relatively short and when placed transversely reaches beyond the eye about two fifths of the length (in *umbratus* the transversely placed scape extends easily half its length beyond the eye). The tibiæ bear only a few erect hairs. The general pilosity is more abundant and like that of the males of the true *umbratus* which I have before me." (Emery.)

I have translated the original description because I have not seen specimens of *speculiventris*. In my "Annotated List of the Ants of New Jersey" I stated that I had taken this form at Fort Lee and Great Notch, but examination of these specimens shows that they are merely very shining examples of *aphidicola*. As the characters mentioned in Emery's description are scarcely of specific value, I believe that I am justified in placing *speculiventris* among the *umbratus* forms. As already stated the subspecies described above as *vestitus* may be merely the hitherto unknown female of Emery's form.