

TAXONOMY OF UNITED STATES *LEUCOCHRYSA*
(NEUROPTERA: CHRYSOPIDAE)*

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This paper is one of a projected series dealing with the taxonomy and identification of United States Chrysopidae. Both of our species of *Leucochrysa* prove to range well into the tropics, where the genus is diverse and abundant.

Bickley and MacLeod 1956 discuss at length the history and possible validity of *Allochrysa*. Banks 1903 separated *Allochrysa* from *Leucochrysa* on the basis of its having a quadrangular rather than a triangular intramedian cell, despite the fact that *L. varia*, the type species of the genus, also has a quadrangular cell. This oversight was rectified by Navás 1917, who correctly synonymized *Allochrysa* with *Leucochrysa*, and erected the genus *Nodita* for the species with a triangular intramedian cell, previously placed in *Leucochrysa* by Banks. Banks followed Navás' usage for tropical species, but inexplicably continued referring all the U. S. species to *Allochrysa*. Bickley and MacLeod took a non-committal stand, justifying retention of *Allochrysa* by suggesting that characters might someday be found which show that these genera are distinct. My examination of many neotropical species has not turned up any such characters. Banks himself referred the Antillean population of *L. insularis* to *Leucochrysa*, and the United States population of the very same species to *Allochrysa*. There appears to be no basis whatever for the continued recognition of *Allochrysa*. It may be superfluous to point out that since *L. insularis* is the type species of both *Protochrysopa* Kolbe 1888 (by monotypy) and *Allochrysa* Banks 1903 (*L. virginica*, by original designation), these genera are synonymous.

In the tropics, the genus *Nodita* merges with *Leucochrysa*. Thus far, the only characters useful for its separation are the venational ones discussed by Banks 1945, which have proved variable and unreliable in many cases, as Banks himself was aware. An example

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is *Leucochrysa risi* Navás, in which many specimens have an intramedian cell resembling that of *Nodita*; this species could be assigned to either genus equally well. The case of *L. negata* is comparable (see below). Species of *Nodita* and *Leucochrysa* from the United States, however, can be separated with fair reliability by the form of the intramedian cell.

Occasional aberrant specimens of other genera with a quadrangular intramedian cell may mistakenly be referred to *Leucochrysa* if other characters are not considered. This is exemplified by *Allochrysa parvula* Banks 1903: 143, the unique type of which is *Chrysopa lineaticornis* Fitch: No data, (Runnymede, Fla., according to description) male, MCZ 11405, "*C. columbiana*, det. E. G. MacLeod" (new synonymy).

The genitalia of both sexes of *Leucochrysa* are fully illustrated here for the first time. In the male, the eighth sternite is more or less distinctly demarked from the ninth; sternites except ninth usually with microtholi. Tignum, gonapsis and gonocristae are absent. The mediuncus (=arcessus) usually bears a small curved median tooth or hook flanked by notches (Fig. 10, 11), no entoprocesses (gonocoxites). In the female, subgenitale small, or entire area posteriorly to seventh sternite broadly sclerotized (*insularis*, *arizonica*, *singularis*), ventral pit sometimes far anteriorly (*insularis*, *arizonica*) or on a separate sclerite (*internata*). Spermatheca pillbox-shaped as in *Chrysopa*, or more frequently elongate and bent (*internata*, *dolichocera*), spermathecal duct short (*insularis*, *arizonica*) to extremely elongate (*internata*, *angrandi*), bursal duct sometimes elaborated (*magnifica*), two bursal glands.

The female genitalia, although tedious to prepare for examination, are surprisingly diverse, offering excellent taxonomic characters. It is imperative that preparations of critical specimens retain the copulatory bursa with its glands, ducts, and connection to the spermatheca intact. Removal of the spermatheca destroys the associated structures, and should be avoided if at all possible.

Leucochrysa colombia Banks

Figures 1-4

Allochrysa colombia Banks 1910: 150. A specimen from "Sta. Margarita, W. Colombia, July, 2700 m" MCZ No. 11999 (not dissected) is designated lectotype. A "cotype" female from Canon del Monte Tolima, Colombia, 1700 m, in the BMNH is designated a paratype. *Leucochrysa colombia*, Banks, 1944: 32.

Leucochrysa claveria Navás 1927. Banks 1944: 135 (synonymy). Although the type could not be located in the Navás collection in 1974, the description is sufficiently complete to indicate Banks' action is probably correct.

Leucochrysa californica Navás 1928: 235, new synonymy. Holotype: "California", Riksmuseum, Stockholm, female. *Allochrysa californica*, Banks 1938: 122. *Allochrysa virginica* (incorrectly), Bickley and MacLeod, 1956: 184.

The identity of *L. californica* has long been a puzzle, as Navás' description does not fit any known species from the United States. The specimen proved to be heavily plastered with moth scales, accounting for his incomplete description of the head markings. The printed label "California" dates from the late nineteenth century (Per Inge Persson, pers. comm.), and perhaps replaced an original handwritten label, now lost, such as "Col" or perhaps even "Cali". As this species is otherwise known only from Colombia, we may presume that the type originated there also.

Description. Head (Fig. 4) pale, labrum, clypeus and frons suffused with wine red; red genal stripe present; on vertex a dark blackish red V-mark bordering the antennal fossae, jointed posteriorly by a pair of slender transverse red marks; membrane of fossae pink or red suffused. Scapes dorsally suffused with blackish red, bearing medial black stripe; pedicel black ringed, short anterior blackish red, flagellar stripe. Pronotum pale yellow green, anterior corners pink suffused, occasionally with two small brown spots. Abdominal tergites 6 and 7 heavily black-marked. In the forewing, the inner gradate series extends far distally, intersecting all but one to three "intermediates" (branches of Rs extending from Rs to pseudomedia, and appearing almost as crossveins). Costal area broad, tallest cell 4.3 times as tall as wide, marginal fork opposite outer psm crossvein, 5 times as long as wide. Dark spot surrounding the outer psm crossvein, and 6 or 7 crossveins near the center of the outer gradate series are dark, narrowly brown bordered. Forewing 23.5 mm long. In female, subgenitale (Fig. 1) narrow, bearing a small pit on the inner anterior surface. Copulatory bursa (Fig. 2) small, bursal duct delicate, moderately long, two bursal gland ducts; spermatheca pillbox-shaped, duct short (Fig. 3).

This species is easily recognized by the inner gradate series extending far basally, broad wings with long costal and marginal cells, and head markings.

Leucochrysa arizonica (Banks)

Figures 5-9, 17-18

Allochrysa arizonica Banks 1906: 98. Holotype: Palmerlee, Ariz., July, male, M.C.Z. No. 11403 (not dissected). Banks 1938: 122; Bickley and MacLeod 1956: 184.

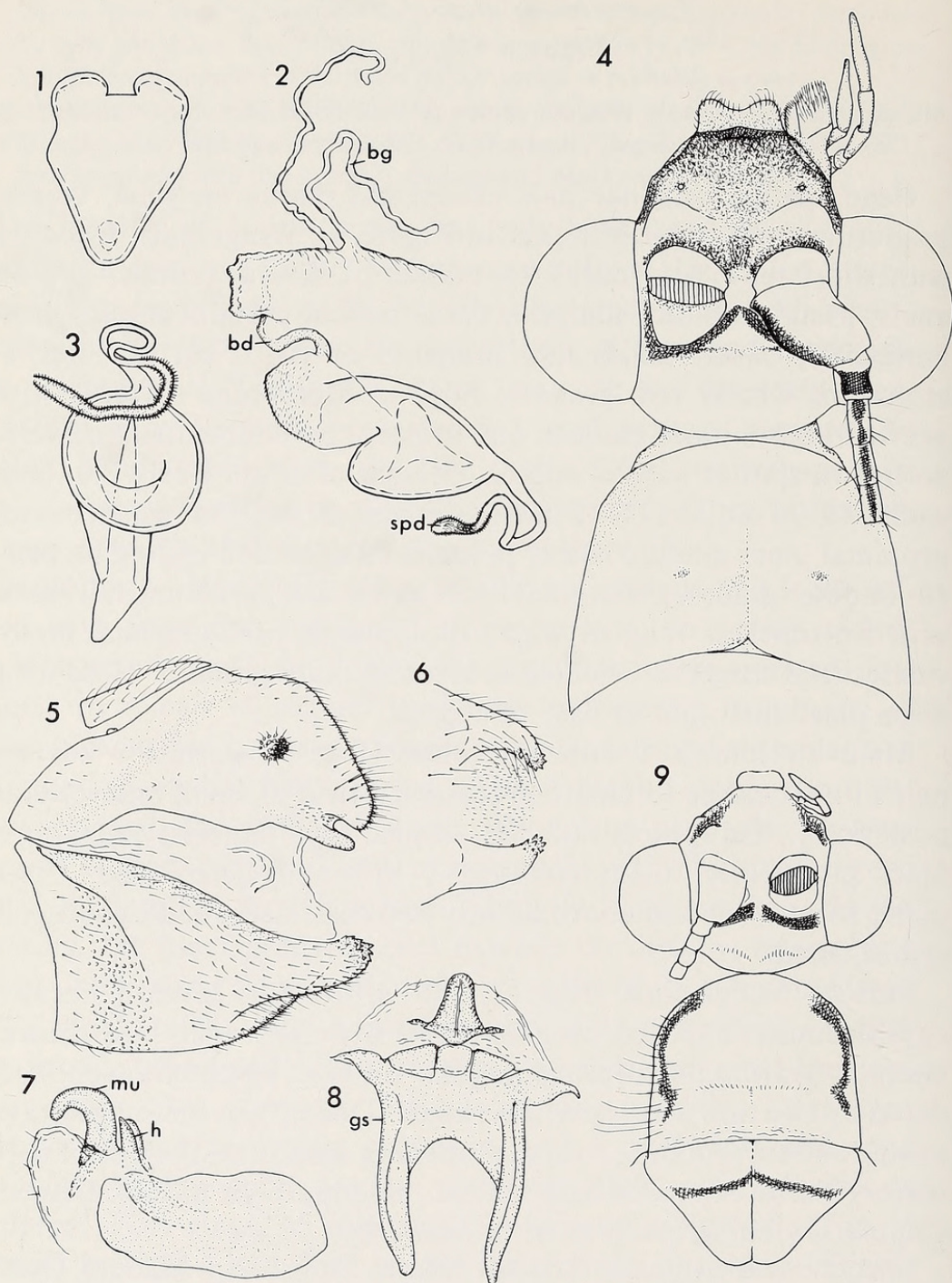
Head, palpi, antennae pale except red marks on gena, vertex, pronotum, mesoprescutum, as in Figure 9. Wings pale, forewing with short red-black marks on middle of several costals, and on anals, pseudocubitals, marginal forks behind pseudocubitus, pseudomedials, basal radials and branches of Rs. First two medial crossveins wholly red, gradates brown. Membrane suffused with brown at basal inner gradate, and at distal pseudomedial crossvein; no brown spot at base of stigma. Height of tallest c-cells 3.0 times width, 19-20 radials, 11-12 inner gradates, series follows psm basad, proximal inner gradate nearly perpendicular to and ending on psm; 10-11 outer gradates, marginal fork nearest last pseudomedial crossvein 5.6 times as long as wide; 10 apparent pseudomedial crossveins, distal crossvein oriented as an extra outer gradate. Hind wing veins pale, dark spot at base of stigma.

Male: sternites 2-8 with microtholi (Fig. 5); sternite 9 bears a pair of denticulate forcipate processes; a field of small microtrichia posteriorly. Ectoprocts notched, ventral lobe hairless; callus cerci black posteriorly. Gonarcus (Fig. 7-8) heavily sclerotized, 3 thin plates form low hood above bluntly hooklike mediuncus; gonosetae sparse, small.

Female: Subgenitale (Fig. 17, 18) as broad as seventh sternite, conspicuously exposed even in dried material, shiny red-brown, laterally bearing downturned angular process; apical pit deep, bordered by two thin nearly vertical ridges. Dorsally to the subgenitale, membrane surrounding oviducal opening and forming floor of copulatory bursa expanded and tanned. Spermatheca pillbox shaped. Copulatory bursa much as in *L. insularis*.

Specimens examined: Arizona: Santa Rita Mts., Madera Can., 12-13-VI-1968, female, Menke and Flint, USNM. Mexico: Michoacán, Jct Hwy 4 and Huetamo Rd., 15 mi. E. Morelia, 8-VII-1947, male, T. H. Hubbell (Univ. of Michigan); Jalisco, Ajijic, 16-18-VII-1966, Flint and Ortiz, 6 specimens (USNM and PAA).

This is a much more robust insect than *L. insularis*, easily recognized by the color markings of the head, and unusual external



Figures 1-4. *L. colombia* (holotype of *L. californica*). Fig. 1, subgenitale, ventral view. Fig. 2, copulatory bursa and spermatheca, left lateral view. Fig. 3, spermatheca, ventral view. Fig. 4, head and pronotum. Figures 5-9, *L. arizonica* (Michoacan, Mexico). Fig. 5, Male abdomen, lateral. Fig. 6, apex of ninth sternite, ventral. Fig. 7, gonarcus and mediuncus, lateral. Fig. 8, same, dorsal. Fig. 9, head and thoracic markings. Abbreviations used in Figs. 1-9: bd — bursal duct, bg — bursal gland, gs — gonarcus, h — hood, mu — mediuncus, spd — spermathecal duct.

genitalia in both sexes. Not previously reported from Mexico, it now appears to be a tropical species, Arizona representing the probable northern range boundary. *L. negata* (Navás) 1913: 316 is very similar, but the gonarcus hood is much more developed, extending almost to cover the mediuncus viewed dorsally; apical process of ninth sternite separated by a distinct v-cleft and with larger teeth, pronotum and head more lightly marked. I suspect that when more material is available, it will prove to be a geographic or developmental variant of *L. arizonica*. This species was described from "Guatemala: Amula, Guerrero, 6000 ft, Aug., H. H. Smith." The only Guerrero listed for Guatemala is at 15°29'N, 88°35'W, at an altitude of less than 2000 ft. It seems probable that *L. negata* is from Guerrero, Mexico, which is much closer to localities for *L. arizonica*.

The holotype of *L. singularis* Navás 1913: 316 was collected simultaneously with that of *L. negata*; both are identical but for the structure of the intramedian cell, the specimen with a quadrangular cell being named *Allochrysa* [now *Leucochrysa*] *negata*, and the other, with a triangular cell, *Leucochrysa* [now *Nodita*] *singularis* (New synonymy; *L. negata* has precedence). Navás' overlooking the identity of these two species, while describing them one after another, seems quite in character.

Leucochrysa insularis (Walker)

Figures 10-16

Chrysopa insularis Walker 1853: 269. Holotype: "Jamaica/*insularis*", male, British Museum (Natural History) (examined). *Protochrysopa insularis* Kolbe 1888: 74.

Chrysopa virginica Fitch 1856: 91. New synonymy. Holotype (not seen, probably lost): Cartersville, Va. Comparison of a male from Virginia with the holotype of *L. insularis* revealed no significant differences. *Nothochrysa virginica*, Banks 1895: 315. *Allochrysa virginica*, Banks 1903: 143, Bickley and MacLeod 1956: 184. *Nothochrysa phantasma* MacGillivray 1894: 170. Six cotypes are present in the MCZ, a male from "West Chop Mass., Aug. 8, 1893, MCZ Type 10479" is designated lectotype. Banks 1895: 315.

Leucochrysa cerverai Navás 1923: 325. New synonymy. Type not found. A long series from the type locality, Santiago de las Vegas, Habana, Cuba, F. Z. Cervera, Navás det., is in the MCZ and there is no doubt as to the identity of this species. The synonymy with *L. insularis* was suggested by Alayo 1968: 57. *Leucochrysa joannisi* Navás 1925: 13, "Santiago de las Vegas, Cuba, July 17, Aug. 20, 1924, F. Cervera". No type specimen designated, and no type found in the Navás collection, 1974. Alayo 1968: 57 (synonymy). There seems to have been no formal description published of this species; it is the color variant of

insularis with brown instead of pale lateral thoracic markings.

Allochrysa virginica ocala Banks 1938: 122. Type: "Lloyd Sink, Jefferson Co., Fla., G. Fairchild coll., Aug. 9, 1935", female, MCZ No. 23184 (examined).

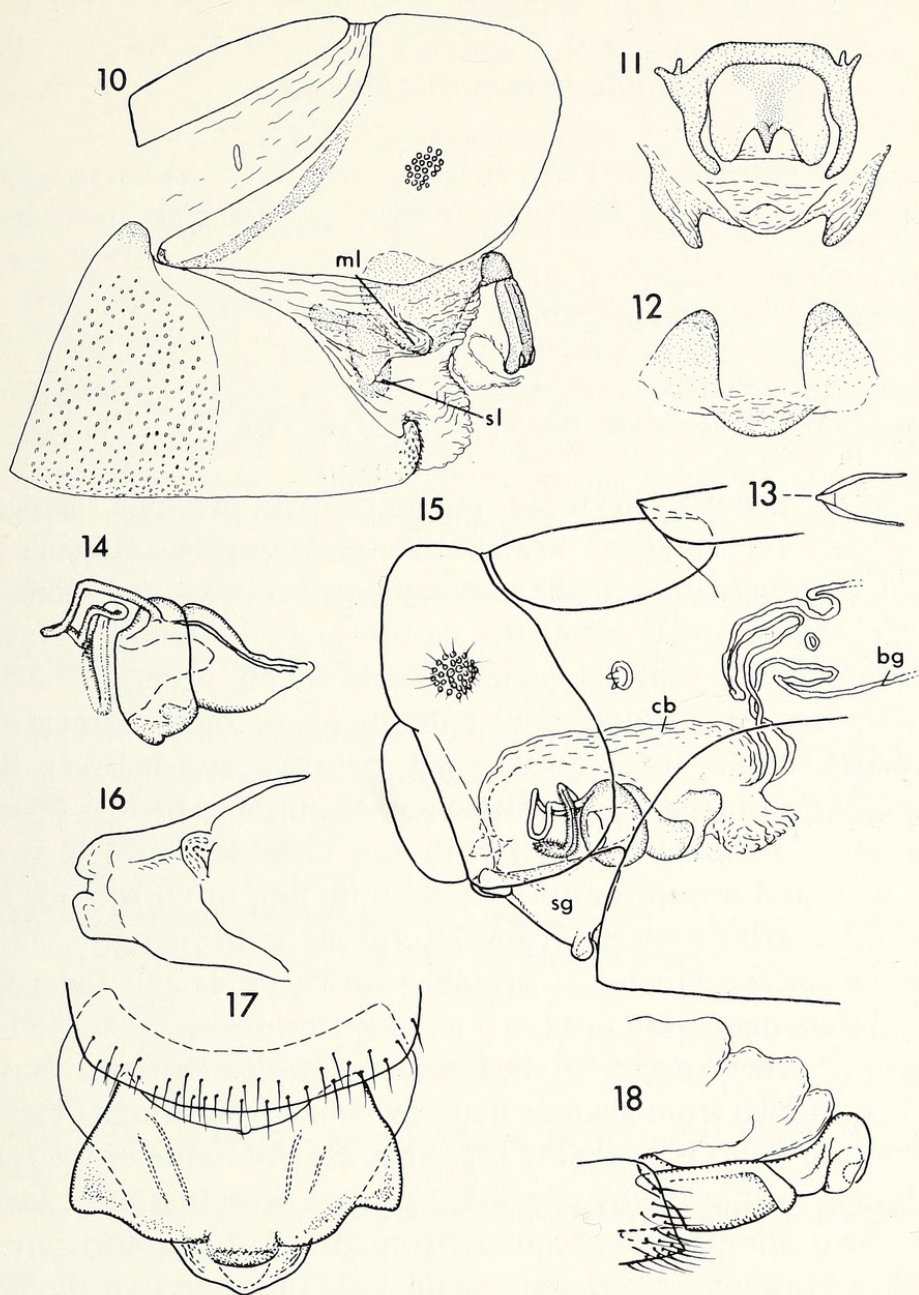
Maculation of this species shows geographic as well as individual variation. Specimens from Florida, Alabama, and the Antilles have a red or brown V mark on vertex bordering antennal fossae and genae are red marked (*L. insularis ocala*). In Georgia and Alabama the V mark, if present, is faint. North of Georgia, the vertex marks are absent and genae are brown marked or pale. The mesonotum bears two brown spots on the prescutal-scutal suture on lightly marked specimens; on heavily marked examples ("*L. joannisi*") nearly the entire pteronotum is brown or black. The holotype of *L. insularis* has most of the transverse veins in the forewing dark marked. In Florida specimens, the inner gradates are paler, costals pale; dark transverse veins include outer gradates (except apical 3 or 4), ends of proximal r's, 1-3 m, the cubitals, and ends of the anals. The gradates are often bordered by a dark streak. North of Florida, transverse veins are paler.

Male genitalia. Sterna except ninth with microtholi; apex of ninth sternum slightly notched with a small field of lanceolate gonocristae each side (Fig. 10). Mediuncus with median sclerotized band and hook, confluent with semimembranous lateral lobes, gonosacculus without setae (Fig. 11). Laterally to gonarcus a pair of delicate digitiform membranous sacs (Fig. 10), ventrally a pair of lightly sclerotized lobes connected by a membranous flap (shown withdrawn in Fig. 10). A membranous lobe between gonopore and ninth sternite.

Female genitalia. Subgenitale (Fig. 16) broadly sclerotized, expanded anteriorly as pit-bearing lobe adjacent to seventh sternite. Bursal gland ducts very long, unbranched, bursal duct inconspicuous.

The form of the mediuncus is typical for a *Leucochrysa*, but the ventral sclerotized lobes are highly distinctive.

Distribution. Coastal states from Massachusetts to Florida, Puerto Rico, Cuba and Jamaica, also West Virginia, Tennessee (Bickley and MacLeod 1956), Alabama, Mississippi, Arkansas, and Missouri. Range extensions: Ala.: Wilson Dam, F. Q. 9-VIII-1941, J. N. Belkin, LAM. Miss.: Clinton, Hinds Co., 20-V-1960, Bryant Mather, USNM. Ark.: Devil's Den St. Pk., Wash. Co. 12-VI-1966, R. W. Hodges, USNM. Mo.: Columbia, Malaise trap, 7



Figures 10-16. *L. insularis*. Fig. 10, male abdomen, lateral, sclerotized lobes withdrawn. Fig. 11, gonarcus, mediuncus and sclerotized lobes, dorsal view. Fig. 13, hypandrium internum. Fig. 14, spermatheca, dorsolateral. Fig. 15, female abdomen, showing broadly sclerotized subgenitale, and internal structures. Fig. 16, subgenitale, ventral view. Figures 17-18, *L. arizonica*. Fig. 17, apex of seventh sternite and subgenitale, ventral. Fig. 18, same, lateral. Abbreviations used in Figs. 10-16: bc — copulatory bursa, bg — bursal glands, ms — membranous sac, sg — subgenitale, sl — sclerotized lobes.

a.m.-7 p.m., 22-IX-1967, F. D. Parker, USNM; 5 mi. S. Joplin, 25-VI-1968, E. L. Todd, USNM.

Gumilla longicornis (Walker)

Osmylus longicornis Walker 1853: 235. Holotype: "Georgia," "Type, *Osmylus longicornis* Walker, det, D. E. Kimmins", "*Gumilla longicornis* Walk., Long. Navás det." BMNH.

Meleoma longicornis, Hagen 1861: 210.

Leucochrysa longicornis, Banks 1907: 26.

Gumilla ? *longicornis*, Navás 1912: 189, Krüger 1913: 221.

Allochrysa longicornis, Bickley and MacLeod 1956: 184. Not *A. longicornis* (Gray), Banks 1920: 339, as cited by Bickley and MacLeod 1956: 184.

This insect is not a chrysopid, but an osmylid in which the ocelli are lost, and the antennae are exceedingly elongate. Hagen's referral of *G. longicornis* to the chrysopid genus *Meleoma* seems to have been based solely upon the nature of the antennae. Navás' illustration of the wing characters is reasonably accurate. Additional features are: pronotum articulating above mesothoracic spiracle, claws simple, single aroliar pad, two nygmata between RS-MA and MP in forewing. In hindwing, basal piece of MA ("sinuate crossvein") absent, stem of MP runs close to R; MP2 fused briefly with and appearing to be a continuation of GuA; CuP unbranched, clearly separate from 1A for its entire length. Wing membrane microtrichiated, marginal vein entire except for a few marginal dots near wing apex.

The only other species of this genus, *Gumilla aspersus* Navás 1912: 189, known from a single male specimen from Brazil (Vienna Museum, not seen) is probably the same; Navás' figure of the forewing does not differ in any important respect from that of *G. longicornis*. Two additional specimens from Brazil, Langsdorf, are in the Berlin Museum. There thus seems little question that the type of *G. longicornis* is also from Brazil, not Georgia.

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