

**TERATODIA BERGROTH, NEW SYNONYM
OF *DIPHLEPS* BERGROTH WITH DESCRIPTIONS
OF TWO NEW SPECIES
(HETEROPTERA: MIRIDAE: ISOMETOPINAE)**

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ABSTRACT

The monobasic genus *Teratodia* Bergroth is synonymized under the monobasic genus *Diphleps* Bergroth. *Teratodia emoritura* Bergroth is shown to be the male of *Diphleps unica* Bergroth. The new species *Diphleps maldonadoi* from Puerto Rico and *D. similaris* from Jamaica are described, figures are provided for the known species, and a key to the genus is given.

With the discovery of an isometopid in Pennsylvania hitherto known only from Texas and Washington, D.C. and my recent work on a catalog and checklist for the isometopids of North America, I have become aware of an unsettled problem concerning the Nearctic genera *Diphleps* Bergroth and *Teratodia* Bergroth. In addition, general interest led me to examine material housed in several collections and resulted in the discovery of the two new *Diphleps*.

In this paper *Teratodia* Bergroth is synonymized, two new species of *Diphleps* are described and figured along with the male and female of *D. unica*. Male genital parameres of the 3 known species are illustrated and a key to the genus is given. The following abbreviations are for institutions cited in this paper:

- AMNH American Museum of Natural History, New York, N.Y.
- CU Cornell University, Ithaca, N.Y.
- PDA Pennsylvania Department of Agriculture, Bureau of Plant Industry, Harrisburg, Pa.
- PSU Pennsylvania State University, University Park, Pa.
- NMNH National Museum of Natural History, Washington, D.C.

There has been considerable controversy on the validity of the genus *Teratodia*. Bergroth (1924) erected the monotypic genera *Diphleps* (based on a single female collected in Ohio) and *Teratodia* (based on a single male collected in Virginia). Since then, only females of *Diphleps* have been taken (in Illinois and Maryland) and only males of *Teratodia* have been taken (in Missouri).

McAtee and Malloch (1924), after noting their familiarity with the genus *Diphleps*, claimed that Bergroth described *Teratodia* from a male of *Diphleps*. Bergroth (1925) denied this synonymy and stated that: "In *Diphleps* the anterior pronotal angles are projecting in the form of a large interiorly sinuate, exteriorly rounded lobe touching a large part of the eye, in *Teratodia* these angles are only slightly produced, not nearly touching the eye. There is no sexual difference of this kind in any other Isometopid or Mirid." Blatchley (1926) followed Bergroth, but McAtee and Malloch (1932), with no further explanation, again listed *Teratodia* as

a synonym of *Diphleps*. All succeeding authors have ignored McAtee and Malloch's (1932) paper and have continued to treat *Teratodia* as a distinct genus. Froeschner (1949) recognized *Teratodia* and noted that more field observations were needed before the problem could be settled.

I have become quite familiar with *Diphleps unica* in Pennsylvania where females are commonly encountered on the bark of honeylocust (Wheeler and Henry 1976) and oak. My first exposure to the male of *D. unica* was a single specimen collected on elm in North Carolina. Initially, my first impression was that this specimen was *D. unica* and presumably a female, but upon closer examination it proved to be a male. All general aspects of this specimen, including coloration and shape of the body, were those of a female *D. unica*. The only significant differences were the larger eyes, a narrower vertex, more thickened 2nd antennal segments and less produced humeral angles. With the exclusion of the pronotum, these characters are typical variations found in males of many mirid species, especially the Isometopinae. Additional searching provided over 40 males and several females from Florida (PSU) found collected on the same dates at black light traps. There was little question about the association of sexes and, in fact, careful examination under a binocular stereoscope was required to separate males from females.

I later became curious about the identity of *Teratodia emoritura* since the literature revealed an obvious problem and this species did key out closely with *Diphleps* (Blatchley 1926, Froeschner 1949) and my specimens of male *D. unica* keyed to *T. emoritura*. By comparing males of *D. unica* to Bergroth's description of *T. emoritura* it was apparent that the 2 were conspecific or very close.

To try to settle this problem, I borrowed both of Bergroth's types from the Cornell University Collection. Unfortunately, the specimen of *T. emoritura* is badly damaged (head and pronotum separated from abdomen; 4 legs and antennae, except 1st segment, missing). Even so, both "species" disclosed the same sexual dimorphism I found between males and females of *D. unica*.

Furthermore, in his description of *Teratodia*, Bergroth pointed out several similarities between the two genera. He noted: "Elytra much as in *Diphleps* but claval commissure only as long as scutellum . . . rostrum slender, apparently about as long as in *Diphleps*" and "Wings as in *Diphleps*. Abdomen apparently as in *Diphleps*. Legs, (visible only in part) apparently constructed much as in *Diphleps*." I agree that the hemelytra are very similar and I see no difference in the length of the claval commissure as Bergroth indicated—the commissure parallels both the scutellum and the mesoscutum in both specimens. The rostrum, wings, abdomen and legs are as Bergroth observed.

Additionally, in a rebuttal to McAtee and Malloch, Bergroth (1925) stated that the description of the head and figure of *Diphleps* were correct, yet on the preceding page he noted that his type-specimen while still fresh was crushed back from the front. This alone would account for his specimen having the head shape exaggerated and pushed closely to the pronotum (Bergroth 1924:6, Fig. 1). This error would make the male and female dimorphism appear even greater than is actually true. He also argued that *Teratodia* did not have a black band on the 2nd antennal segment. His specimen was rather pale and in poor condition so his observation may have

been correct, but in males of *Diphleps* this band is also sometimes absent or obscured. However, more often the band is present in *Diphleps*, though frequently paler, but much broader than in the females.

Bergroth's argument that "there is no sexual difference of this kind in any other Isometopid or Mirid" is rather weak. There are many examples of such sexual dimorphism in the Heteroptera and dramatically so in the Isometopinae. Jordon's (1941) figures of *Isometopus intrusus* H. S. clearly show pronotal dimorphism. Hesse (1947) figured the dimorphic pronotum of the genus *Letaba* and compared male-female dimorphism by noting that "the anterior margin in males shallowly emarginate and antero-lateral angles abtusely rounded, the anterior margin in females distinctly more deeply emarginate to receive the head, the antero-lateral part on each side of head projecting much more than in males". He also pointed out that "so different are the two sexes in shape and structure that an entomologist, not knowing all particulars and confronted with only a few specimens of each sex, would not hesitate in assigning them to separate genera." Similarly, the Nearctic *Corticoris signatus* (Heid.) shows pronotal variation, as well as a completely different wing pattern. This is unlike *Diphleps* and *Teratodia* that have remarkably similar hemelytral patterns.

That the shape of the pronotum provides strong generic affinities should be viewed with caution, especially with the isometopines, as pointed out by Hesse (1947). To further strengthen this conclusion, I was fortunate to obtain 4 more specimens of *Diphleps* (3 males and 1 female) from Jamaica and Puerto Rico. By comparing males from these new localities to males from the United States, I found two new forms. The male and female from Jamaica (*D. similaris*, Fig. 8, 9) exhibit characters parallel to those found in *Diphleps* males and females (Fig. 1, 2). The two males from Puerto Rico (*D. maldonadoi*) possess head characters found in both *D. unica* (Fig. 2) and *D. similaris* (Fig. 9) males and also have a pronotal shape (Fig. 5) that is intermediate between males and females of the other two species. The humeral angles arch forward much more than those of *D. unica* and *D. similaris* males.

In view of Bergroth's weak arguments (based on 2 poor specimens) for separating *Teratodia* and *Diphleps*, and my familiarity with the genus *Diphleps*, plus the discovery of a new male Diphlebini that possesses the narrow vertex, enlarged eyes and thickened 2nd antennal segments found in *Teratodia* and also the "unique" pronotal shape that allegedly is found only in *Diphleps*, I have little reservation in calling *Teratodia emoritura* the male of *Diphleps unica*. The genus *Diphleps* holds page priority over *Teratodia*; therefore, *Teratodia* must become a junior synonym of *Diphleps*.

Diphleps Bergroth, 1924

Diphleps Bergroth, 1924:4. Type-species *Diphleps unica*, Bergroth, monobasic. *Teratodia* Bergroth, 1924:7. Type-species *Teratodia emoritura* Bergroth, monobasic. New Synonymy.

Diphleps unica Bergroth, 1924
(Fig. 1-4)

Diphleps unica Bergroth, 1924:7.

Teratodia emoritura Bergroth, 1924:8. New Synonymy.

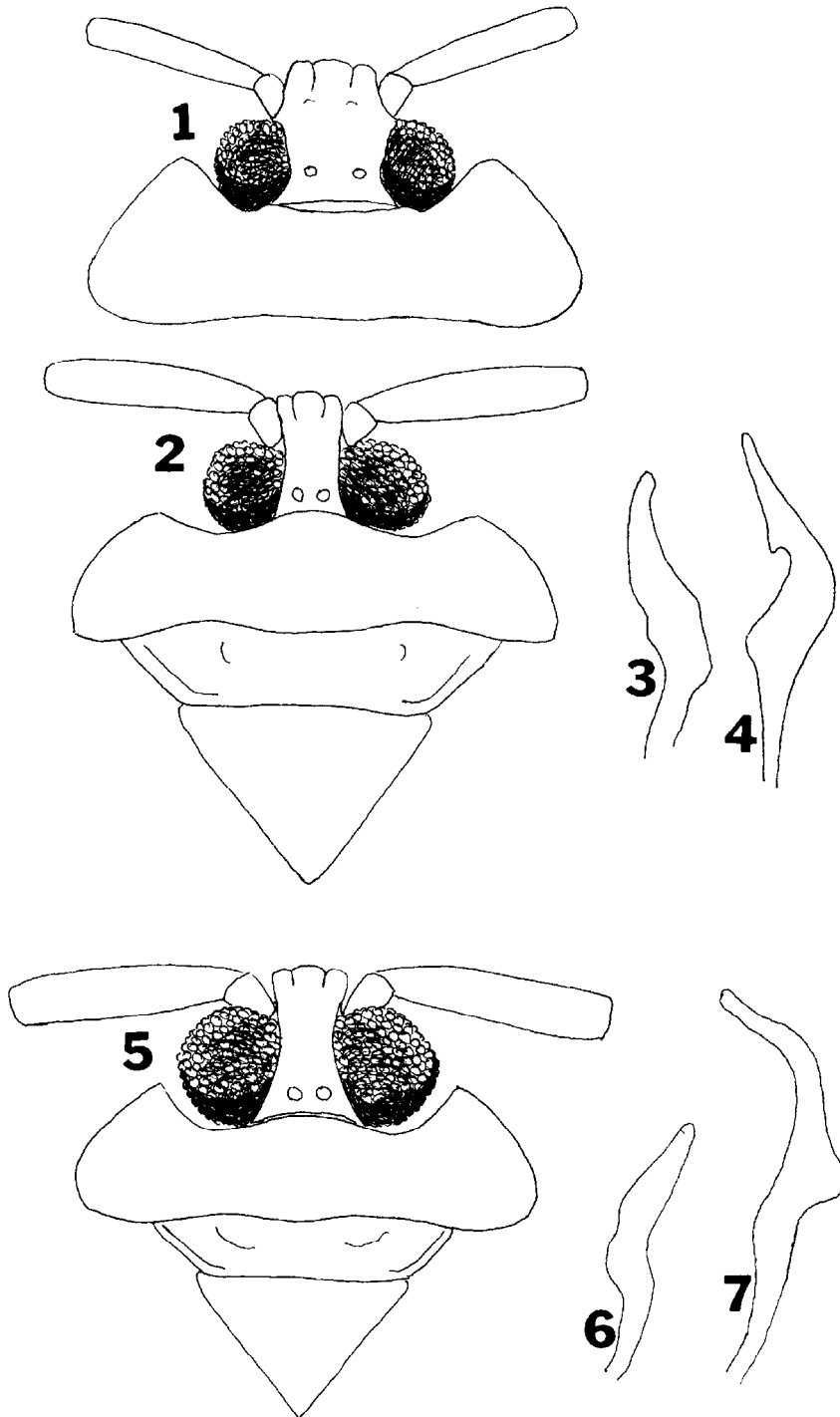


Fig. 1-7. *Diphleps* spp. Fig. 1-4. *D. unica*: 1) head and pronotum, female; 2) head, pronotum, mesoscutum and scutellum, male; 3) lateral view, right paramere; 4) lateral view, left paramere. Fig. 5-7. *D. maldonadoi*: 5) head, pronotum, mesoscutum and scutellum, male; 6) lateral view, right paramere; 7) lateral view, left paramere.

Male: Length 2.36 mm, generally suboval and flattened, brown to gray-brown, variously speckled with fuscous; sparsely clothed with flattened nearly scale-like, white setae. **Head** (Fig. 2): length 0.22 mm, width 0.46 mm; vertex (across ocelli) 0.16 mm, grayish to light brown, invaded by fuscous; tylus width across apex 0.14 mm, brownish, lined with red or dark brown, eyes granulate, larger than in females; ocelli red, 0.12 mm apart. **Rostrum:** length 0.76 mm, brown, reaching middle of metacoxae. **Antennae:** I, length 0.08 mm, fuscous, barrel-shaped, tapered at base, barely reaching apex of tylus; II, length 0.48 mm, width 0.08 mm, dark brown to fuscous, fuscous at extreme base, pale just beyond base and apex (band or broad dark area, if light in color, may blend in with pale base and apex, thus appearing absent); III, length 0.08 mm, black; IV, length 0.10 mm, black. **Pronotum** (Fig. 2): length 0.24 mm, width 1.00 mm, about 4× as wide as long, anterior margin moderately sinuate on either side of median, humeral angles weakly arched around eyes (much less than in females (Fig. 1) or males of *maldonadoi* (Fig. 5)), basal margin weakly sinuate, nearly straight; calli distinct, weakly indented medially; variously speckled with fuscous, some speckles coalescing to form larger markings, humeral margins, median line and a basal spot on either side of median line fuscous; mesoscutum largely fuscous, lateral areas pale, scutellum grayish-brown, paler median line forming shallow ridge, apex fuscous. **Hemelytra:** brown to grayish-brown, embolium wide, broadest at apex, radial vein reaching half way through corium, claval commissure parallel to mesoscutum and scutellum (as it is in all *Diphleps*), several fuscous spots on embolium, a pale spot at middle and apex of corium along emboliar margin; cuneus wide at base and tapering narrowly near apex of membrane, a fuscous spot at middle on inner margin. **Membrane:** pale translucent, brown speckled. **Venter:** brown, abdomen dark brown, pleura and basalar plate pale. **Legs:** brown, coxae pale, femora brown, paler at base and apices, hind femora saltatorial. **Genitalia:** Fig. 3, 4.

Female: Length 2.60 mm, width 1.52 mm, suboval, broader than male. **Head** (Fig. 1): length 0.36 mm, width 0.52 mm; vertex (across ocelli) 0.24 mm, tylus width across apex 0.18 mm, ocelli 0.14 mm apart. **Rostrum:** length 0.84 mm, reaching near hind margin of metacoxae. **Antennae:** I, length 0.08 mm, II, length 0.48 mm, width 0.06 mm, fuscous band narrower than in male but more pronounced; III, length 0.08 mm; IV, 0.10 mm. **Pronotum:** (Fig. 1) length 0.24 mm, width 1.16 mm, anterior margin strongly arched, humeral angles reaching anteriorly as far as middle of eyes; basal margin straight, basal angles rounded. Hemelytral pattern, coloration and claval commissure (paralleling mesoscutum and scutellum) as in males.

SPECIMENS EXAMINED: 1 female, Cuyahoga Falls, Summit Co., Ohio, W. V. Warner collector (holotype, CU); 1 male, Paris, Fauquier Co., Virginia (on eastern slope of Blue Ridge Mts.), 27-VII-98, H. S. Barber collector (holotype of *T. emoritura*, CU); 1 male, Cabin John Br., Maryland, 29-VII-1914, H. S. Barber collector (det. as *Diphleps unica* Berg., W. L. McAtee and J. R. Malloch) (NMNH); 1 male Osceola Co., Florida, Florida Fruit Fly Survey, 29-I-1930, R. S. Thomas collector (NMNH); 1 male, Lake Placid, Florida, 14-XII-1958, S. W. Frost collector (PSU) (det. as *Diphleps unica* Bergr., Froeschner 61); 44 males, 2 females, Archbold Biological Station, Highlands County, Florida, 8-I-1961 to 2-III-1965,

S. W. Frost collector (PSU); 5 Females, Dauphin Co., Harrisburg, East Hbg. Cemetery, Pennsylvania, 11-VIII-1974 to 22-VIII-1975, on *Gleditsia triacanthos*, A. G. Wheeler, Jr. and K. McIntosh collectors (PDA); 1 male, Mecklenburg Co., Rt. 51, 1 mi. w. of Rt. 16 nr. Matthews, North Carolina 2-VII-1976, on *Ulmus alata*, A. G. Wheeler, Jr. collector (PDA).

REMARKS: The male and female of *D. unica* have been described by several authors as *Teratodia* and *Diphleps*, respectively. The main problem has been associating males and females, even though the general habitus of each is quite similar. Now that they are combined as one genus, there is little difficulty in separating *Diphleps* from other genera, using existing keys.

I have found discrete differences when specimens collected in Florida are compared to those found farther north. The southern forms have an overall browner color and reddish-tinged venter. Also I have noticed slight variation in the shape of the head in males when viewed laterally. The genitalia are nearly identical. However, the notch of the left paramere is not as distinct in some specimens as in others and must be carefully positioned to fully see this specific character.

Diphleps maldonadoi Henry, NEW SPECIES
(Fig. 5-7, 12)

Holotype Male (Fig. 12): Length 2.24 mm, width 1.32 mm, generally suboval and flattened; color brown to yellow-brown marked with fuscous; sparsely clothed with flattened, nearly scale-like, white setae. *Head* (Fig. 5): length 0.36 mm, width 0.54 mm; vertex 0.14 mm, fuscous; tylus yellow-brown, width across apex 0.16 mm; eyes strongly granulate, dorsal width 0.20 mm; ocelli red, 0.06 mm apart. *Rostrum*: length 0.76 mm, reaching posterior margin of mesocoxae. *Antennae*: I, length 0.10 mm, barrel-shaped, more tapered at base, fuscous, reaching tip of tylus; II, length 0.50 mm, width 0.01 mm, yellow-brown on basal half and apex, a fuscous band on apical third; clothed with brown, closely appressed setae; III, length, 0.80 mm, fuscous; IV, length 0.10 mm, fuscous. *Pronotum* (Fig. 5): length 0.24 mm, width 1.02 mm, more than 4× as wide as long, anterior margin sinuate, humeral angles strongly arched around eyes, lateral margins slightly rounded and curled up, basal margin nearly straight; calli round and distinct, a slight ridge formed by calli which narrows posteriorly along median line to base; mesoscutum exposed, width across anterior angles, 0.70 mm; scutellum, length 0.32 mm, width 0.44 mm, brown, with a slight median ridge, more pronounced towards apex. *Hemelytra*: brown, mottled with dark brown, embolium wide, pale on apical fourth; cuneus brown, darker along margin bordering membrane, apex narrowly tapered, ending near apex of membrane; posterior end of hemelytra bent down across cuneal fracture on mounted specimens. *Membrane*: opaque to translucent brown, veins slightly darker. *Venter*: light brown, pleura and basalar plate pale; abdomen dark brown, segment margins pale. *Legs*: brown, coxae and trochanters paler; femora saltatorial. *Genitalia*: Fig. 6, 7.

TYPE MATERIAL. HOLOTYPE MALE: Puerto Rico, Luquillo Forest, 2-I-1963, El Yunque Biol. Sta., Molindero Road, elev. 2,100 ft., at black light, Paul and Phyllis Spangler collectors (NMNH type no. 74021); PARATYPE: 1 male, Puerto Rico, Guajataca Forest, Isabela, 22-VII-1955, at light, Ramos and Maldonado collectors (NMNH).

REMARKS: *Diphleps maldonadoi* resembles the other members of the genus but is separated by the strongly arched anterior margin of the pronotum, the tylus (tylus + lorum) slightly flared to apex, the comparatively narrower fuscous band on the male second antennal segment, the generally more brown color, the apical fourth of embolium pale, the uniformly colored membrane and the left genital paramere.

Maldonado's (1969) reference to *Diphleps unica* is actually *D. maldonadoi* and, although I have not examined his specimens, the genital claspers of my specimens compared to those figures provided by Maldonado leave little doubt about this association. I have named this isometopine after Dr. J. Maldonado Capriles, University of Puerto Rico, because of his efforts mentioned above and his past willingness to kindly lend and exchange specimens.

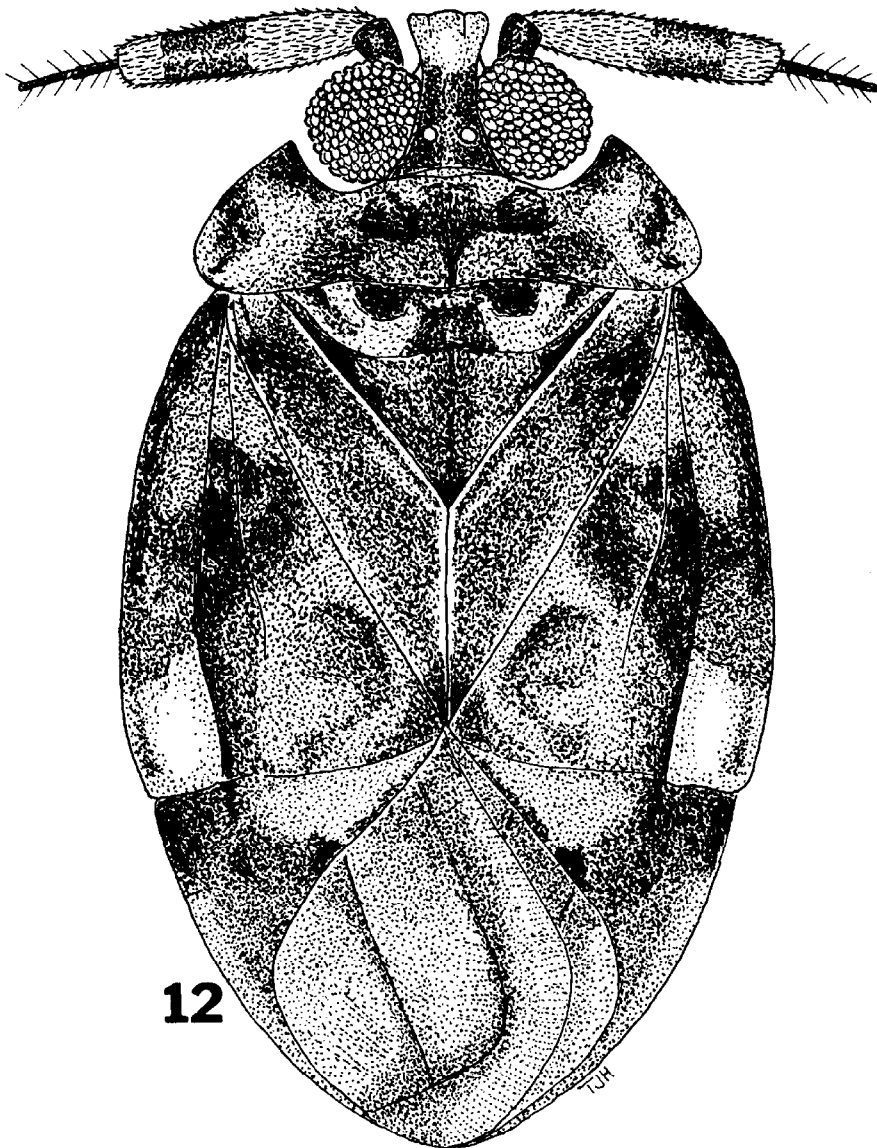


Fig. 12. *D. maldonadoi*: habitus, male.

Diphleps similaris Henry, NEW SPECIES

(Fig. 8-11)

Holotype Male: Length 2.10 mm, width 1.20 mm, suboval and flattened, color light brown, speckled with brown and fuscous, intermixed with pale areas; sparsely clothed with white, nearly scale-like setae, especially on pronotum. *Head* (Fig. 9): length 0.36 mm, width 0.50 mm, brown; vertex 0.16 mm, bordered by dark brown, apical width of tylus 0.14 mm, area around ocelli tinged with orange-red; eyes granulate dorsal width 0.18 mm; ocelli 0.10 mm apart, orange-red. *Róstrum*: length 0.68 mm, reaching near posterior margin of metacoxae. *Antennae*: I, 0.10 mm, cylindrical, tapered at base, not reaching tip of tylus; II, 0.42 mm, width 0.10 mm, brown, pale at base and apex; III, 0.06 mm, brown; IV, 0.10 mm, brown. *Pronotum* (Fig. 9): length 0.22 mm, width 0.94 mm, pale marked with fuscous, anterior margin moderately sinuate, similar to *D. unica*, posterior margin straight across middle, rounded anteriorly at lateral angles; calli fuscous, with an indistinct fuscous vitta extending from each callus to pronotal base, median line fuscous, narrow and slightly raised; mesoscutum broadly ex-

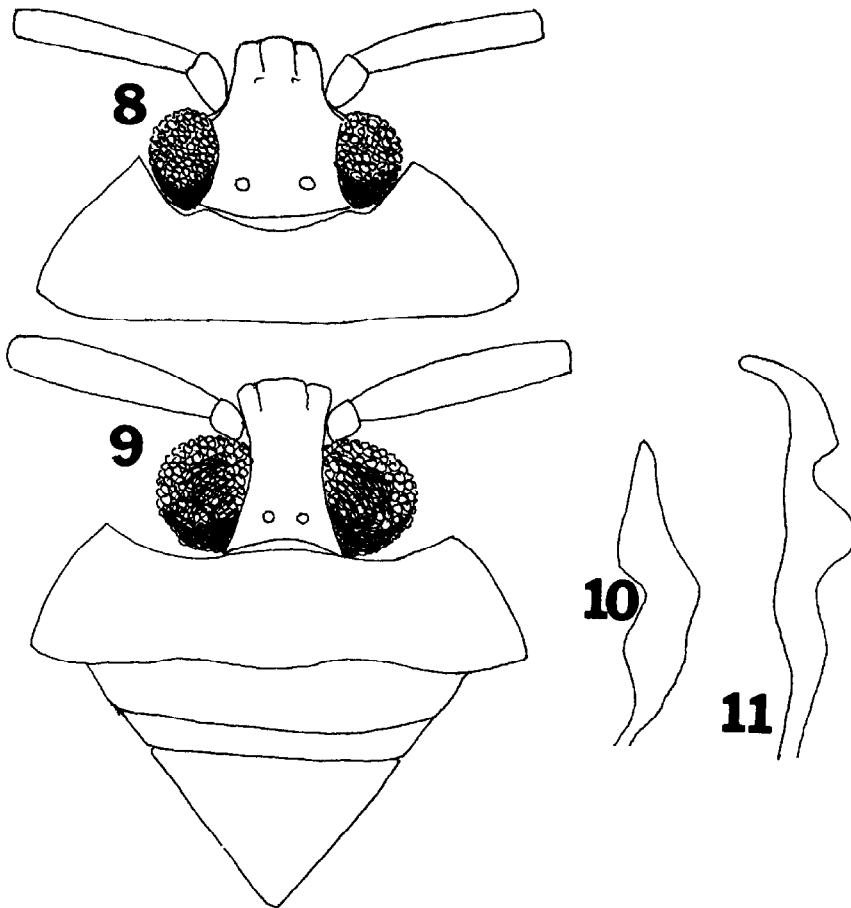


Fig. 8-11. *D. similaris*: 8) head and pronotum, female; 9) head, pronotum, mesoscutum and scutellum, male; 10) lateral view, right paramere; 11) lateral view, left paramere.

posed, posterior margin raised above scutellum, an acute apical carina (Fig. 9) separates apical area from anterior portion; scutellum brown, darker across base, fuscous point at apex. *Hemelytra*: brown, speckled with fuscous, corium with a pale spot at base and apex; cuneus pale to light brown, darker at base, a fuscous spot at middle of inner margin. *Membrane*: pale, darker along veins, these dark areas somewhat broken to form small specks. *Venter*: dark brown, pleura and basalar plate pale. *Legs*: femora dark brown, pale at apices; tibiae pale to brown, tibial spines absent; tarsi and claws pale. *Genitalia*: Fig. 10, 11.

Allotype Female: Length 2.00 mm, width ca. 1.24 mm (wings spread). General coloration similar to male but slightly lighter. *Head* (Fig. 8): length 0.30 mm, width 0.44 mm, apical width of tylus 0.18 mm; vertex 0.22 mm; ocelli 0.12 mm; eye, dorsal width 0.12 mm. *Rostrum*: 0.66 mm, reaching just beyond metacoxae. *Antennae*: I, 0.08 mm, fuscous; II, 0.36 mm, light brown with a narrow brownish band at middle. The female is similar to the male in color and markings and differs by the broader vertex, proportionately smaller eyes, the slender 2nd antennal segments (with a narrower fuscous band) and the more strongly arched humeral angles.

TYPE MATERIAL. HOLOTYPE MALE: North Bimini Isl., Bahamas, B. W. I., 4-XII-1952, Am. M. Madler collector (AMNH); ALLOTYPE Female: Turks & Caicos Isl., Grand Turk Island, 19-II-1953 at light, Van Voast-A.M.N.H. Bahama Isls. Exped., E. B. Hayden collector (AMNH).

REMARKS: This species is most easily separated by the form of the left paramere and its small size. However, the following characters also help to distinguish *D. similis* from other species: dorsum speckled; calli fuscous with a fuscous vitta behind each callus; mesoscutum with an apical transverse carina; membrane pale with dark areas broken into specks; femora brown with apices pale.

KEY TO SPECIES OF *Diphleps* BERGROTH

1. Anterior angles of male pronotum strongly arched around eyes (Fig. 5); apical fourth of embolium pale; membrane uniformly brownish *maldonadoi* n. sp.
- 1' Anterior angles of male pronotum moderately arched around eyes (Fig. 2); embolium uniformly colored and speckled; membrane distinctly speckled..... 2
2. Rostrum reaching to posterior margin of metacoxae or beyond; length not more than 2.10 mm; humerus (male) nearly touching eyes (Fig. 8); inner angle of left paramere nearly straight (Fig. 11) *similis* n. sp.
- 2' Rostrum just reaching posterior margin of metacoxae; length 2.40 mm or longer; humerus (male) far removed from eyes (Fig. 1); inner angle of left paramere notched (Fig. 4)..... *unica* Bergroth

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BOOK REVIEW

ANIMAL COMMUNICATION, 2nd ed. Hubert and Mable Frings. 1977. University of Oklahoma Press, Norman. 207 p. \$4.95 (paperback). This book first appeared in 1964. The title page of the present edition reads, "Second Edition, Revised and Enlarged." Comparing the second edition with the first, I found no changes in the first 10 of the 11 chapters; only the final chapter and bibliography had been updated.

Even though the illustrative examples are not as current as they were in 1964, the book remains a useful, nontechnical introduction to animal communication. Its most significant deficiency is its failure to explain some of the subtler aspects of communication that are today the center of attention for many biologists. For example, the Fringses stress that signals exchanged by sexual partners prior to mating insure that the individuals are of the same species, but only obliquely refer to the fact that individuals of one sex (females in most species) can benefit by requiring considerably more of a mating partner than that it be of the proper species. Furthermore, individuals of the other sex can benefit by deceiving potential partners as to their satisfying such requirements or by intercepting potential partners who are approaching truthfully signalling individuals.

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