

CENTRAL AMERICAN *TORTOPUS*
(EPHEMEROPTERA: POLYMITARCYIDAE):
A UNIQUE NEW SPECIES AND
NEW COUNTRY RECORDS^{1,2}

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ABSTRACT: *Tortopus bellus*, new species, from Costa Rica is described on the basis of the male adult. The species is distinguished by its basally fused penes, undeveloped parastyli, and general abdominal coloration. *Tortopus unguiculatus*, previously known in Central America from Costa Rica and Nicaragua, is newly reported from Guatemala and Honduras.

The Pan-American mayfly genus *Tortopus* Needham and Murphy (Polymitarcyidae) is known from 11 described species. Seven are from South America (Hubbard and Peters 1981, Domínguez 1985, Hubbard *et al.* 1992), three from North America (McCafferty 1975, 1994; Edmunds *et al.* 1976), and one from South and Central America (Maés 1988, McCafferty and Lugo-Ortiz 1992). Only the North American *T. incertus* (Traver) is known from larvae and male and female adults (McCafferty 1975, 1994; Edmunds *et al.* 1976). Of the other described species, three are known from male adults, four from female adults, and two from male and female adults (Traver 1950, Edmunds *et al.* 1976, Hubbard *et al.* 1992). Ulmer (1932, 1942) and Traver (1950) provided taxonomic treatments of the adults of the genus. Scott *et al.* (1959) described the larval stage and its habitat. McCafferty (1975) provided a provisional species key to the larvae in North America based on geographic distribution. Until more associations of sexes and of larvae and adults are performed the taxonomy of the genus will remain problematic.

Tortopus is a sister lineage of the Pan-American genus *Campsurus* Eaton (McCafferty 1991), and they are very similar in both the larval and adult stages. Larvae of *Tortopus* can be distinguished by the presence of a single subapical tubercle on the medial margin of the mandibular tusks, and the adults by the presence of genital parastyli (males) and parastyli receptors (females) and shriveled and stringlike mid- and hindlegs [see Edmunds *et al.* (1976): Figs. 33, 206, 207, and 349; McCafferty and Bloodgood (1979): Figs. 1-9]. Larvae of *Campsurus* possess prominent basal and subbasal tubercles on the medial margin of the mandibular tusks, and adults lack genital parastyli

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and parastyli receptors and have highly atrophied, short, flattened mid- and hindlegs [see Edmunds *et al.* (1976): Figs. 350 and 351].

McCafferty *et al.* (1992) hypothesized that *Tortopus* has a Neotropical center of origin based on its close relationship with *Campsurus*. They indicated that the restriction of *Tortopus* to the east in North America was atypical of other Pan-American genera in North America. *Tortopus* evidently penetrated the Nearctic via the maritime corridor of the Gulf of Mexico rather than via the mountainous corridors used by western genera. The genus appears to be warm-water sublimited, but it is also humid restricted (McCafferty 1975, McCafferty *et al.* 1992).

Only *T. unguiculatus* (Ulmer) has been reported from Central America (Maés 1988). We herein describe a new species from Costa Rica and provide new distributional records for *T. unguiculatus*. The materials studied are housed in the Purdue Entomological Research Collection, West Lafayette, Indiana.

Tortopus bellus Lugo-Ortiz and McCafferty, NEW SPECIES

Figs. 1-2

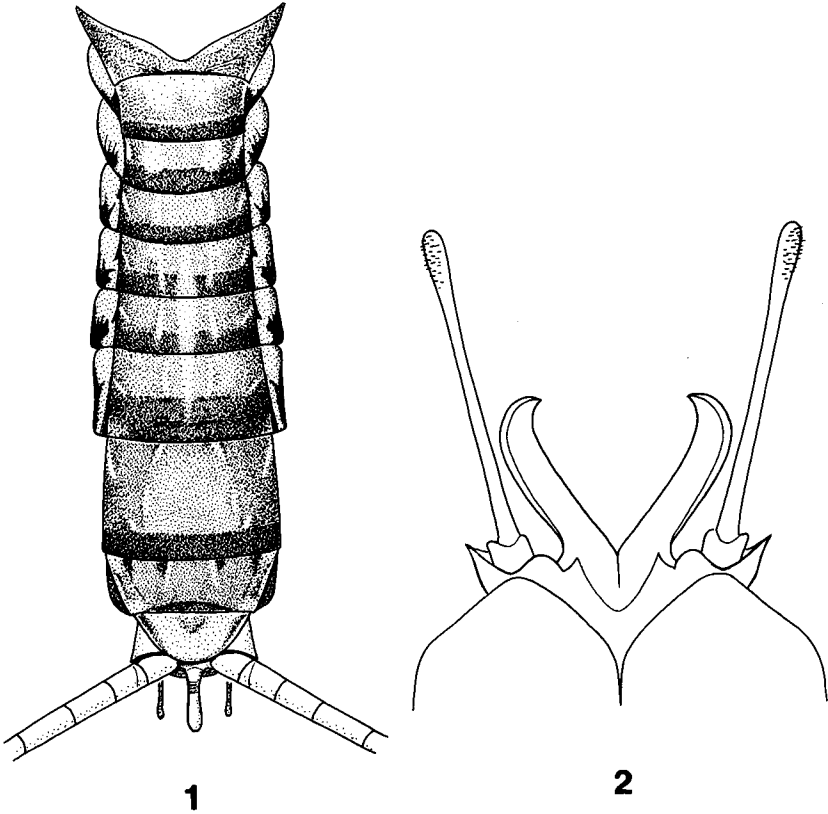
Male adult. Body length: 8.3 mm; wing: 10.5 mm; caudal filaments: 28.0 mm. Head: Dorsal surface heavily suffused with purplish gray dots anteriorly, light brown to pale posteriorly, light brown ventrally. Ocellar bases black. Scapes stippled with purplish gray dots, inner sides pale; pedicels entirely suffused with purplish gray dots; flagella pale. Thorax: Pronotum purplish gray anteriorly and posteriorly; heavily suffused with purplish gray dots medially, becoming pale brown laterally; thin pale dorsal median line present. Prosternum pale brown and suffused with purplish gray dots. Mesonotum light brown, posteriorly suffused with purplish gray dots. Mesosternum heavily suffused with purplish gray dots submedially. Metanotum pale brown, heavily suffused with purplish gray dots medially. Region between costal and subcostal veins in forewings lightly suffused with purplish gray from base to middle of wing. Legs suffused with purplish gray dots; foretibiae almost black. Abdomen (Fig. 1): Tergum 1 purplish gray and very narrow; terga 2-7 anteriorly pale, becoming heavily suffused with purplish gray dots posteriorly and laterally, and with oblique pale sublateral dashes; terga 8-9 purplish gray, tergum 8 almost twice length of any tergum between terga 2-7; tergum 10 lightly suffused with purplish gray dots. Prominent pleural folds on segments 2-7, suffused with purplish gray dots and marginally pale. Sternal coloration as in terga, except lighter and marginally pale on sterna 2-7. Genitalia (Fig. 2) with bladelike penes, narrowly sclerotized along lateral margin, and basally fused; styli purplish gray, clublike, with very small spines along interior margin, spination becoming more dense distally and forming terminal pad [see McCafferty and Bloodgood (1989): Figs. 3-4]; parastyli undeveloped. Caudal filaments pale; terminal filament appearing 4-segmented, clublike, suffused with purplish gray dots; cerci very long, with tuft of fine setae distally.

Female adult. Unknown.

Larva. Unknown

Material examined. Holotype: Male adult, COSTA RICA, Heredia Prov., light trap, rain forest, VIII-24-1987, D. Brigham.

Etymology. The specific epithet is a Latin word meaning beautiful.



Figs. 1-2. *Tortopus bellus*, NEW SPECIES, male adult: 1. Abdomen (dorsal). 2. Genitalia (ventral).

DISCUSSION

Tortopus bellus can be distinguished from other members of the genus by its unique abdominal coloration (Fig. 1), basally fused penes, and undeveloped parastyli (Fig. 2).

McCafferty and Bloodgood (1989) indicated that the parastyli probably function as holding structures during copulation. However, the undeveloped nature of these appendages in *T. bellus* suggests that they could not function in holding the female during copulation, and it is possible that they are vestigial in this species. If this is indeed the case, we expect the female of *T. bellus* to have a reduced or no parastyli receptors on abdominal segment 8 [see McCafferty and Bloodgood (1989): Figs. 6-9], a condition which has not been documented in any of the species known from females only.

The undeveloped nature of the parastyli of *T. bellus* may alternatively indicate a primordial condition of a primitive species of *Tortopus*. All other species of *Tortopus* known from males possess elongate parastyli [see Edmunds *et al.* (1976): Figs. 206 and 207], but the undeveloped nature of the parastyli in *T. bellus* is more reminiscent of the condition found in *Campsurus*.

Tortopus unguiculatus (Ulmer)

Material examined. GUATEMALA, Río Polochic, III-22-1906, male adults; Panzos, IV-1905, male and female adults. HONDURAS, Gracias a Dios Prov., Río Sigre, III-24-29-1952, R Greenfield, male adult.

DISCUSSION

Tortopus unguiculatus was previously reported from Costa Rica (Ulmer 1942) and Nicaragua (Maés 1988). The new records provided herein extend its known range northward. The species probably also occurs in Panama, since it has been reported from Colombia (Ulmer 1920).

Ulmer (1920) originally described this species from male adults. Later, Ulmer (1942) described the female adults. Its larvae, however, remain unknown. Ulmer (1942) indicated that until the male adults of *T. igaranus* Needham and Murphy are known, the species status of *T. unguiculatus* should be regarded as tentative.

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LITERATURE CITED

- Domínguez, E.** 1985. El género *Tortopus* Needham y Murphy (Ephemeroptera: Polymitarcyidae [sic]) en la Argentina. *Physis* 43: 69-72.
- Edmunds, G. F., Jr., S. L. Jensen, and L. Berner.** 1976. Mayflies of North and Central America. Univ. Minn. Press, Minneapolis.
- Hubbard, M. D. and W. L. Peters.** 1981. Ephemeroptera. Pp. 55-63. *In*: Aquatic biota of tropical South America, Part 1: Arthropoda, S. H. Hurlbert, G. Rodríguez, and N. D. Santos (eds.). San Diego Univ. Press, California.
- Hubbard, M. D., E. Domínguez, and M. L. Pescador.** 1992. Los Ephemeroptera de la República Argentina: un catálogo. *Rev. Soc. Entomol. Argent.* 50: 201-240.
- Maés, J. M.** 1988. Catálogo de los Ephemeroptera y Plecoptera de Nicaragua. *Rev. Nica. Entomol.* 2: 49-50.
- McCafferty, W. P.** 1975. The burrowing mayflies (Ephemeroptera: Ephemerioidea) of the United States. *Trans. Am. Entomol. Soc.* 101: 447-504.
- McCafferty, W. P.** 1991. Toward a phylogenetic classification of the Ephemeroptera (Insecta): a commentary on systematics. *Ann. Entomol. Soc. Am.* 84: 343-360.
- McCafferty, W. P.** 1994. Distributional and classificatory supplement to the burrowing mayflies (Ephemeroptera: Ephemerioidea) of the United States. *Entomol. News* 105: 1-13.
- McCafferty, W. P. and D. W. Bloodgood.** 1989. The female and male coupling apparatus in *Tortopus* mayflies. *Aquat. Insects* 11: 141-146.
- McCafferty, W. P. and C. R. Lugo-Ortiz.** 1992. Registros nuevos y notas sobre los Ephemeroptera de Nicaragua. *Rev. Nica. Entomol.* 19: 1-7.
- McCafferty, W. P., R. W. Flowers, and R. D. Waltz.** 1992. The biogeography of Mesoamerican mayflies. Pp. 173-193. *In*: Biogeography of Mesoamerica: proceedings of a symposium, S. P. Darwin and A. L. Welden (eds.). Tulane Univ. Stud. Zool. Bot., Suppl. Publ. 1.
- Scott, D. C., L. Berner, and A. Hirsch.** 1959. The nymph of the mayfly genus *Tortopus* (Ephemeroptera: Polymitarcyidae). *Ann. Entomol. Soc. Am.* 52: 205-213.
- Traver, J. R.** 1950. Notes on Neotropical mayflies. Part IV. Family Ephemeridae (continued). *Rev. Entomol. (Rio de Janeiro)* 21: 593-614.
- Ulmer, G.** 1920. Neue Ephemeropteren. *Archiv. Naturg.* 85: 1-80.
- Ulmer, G.** 1932. Bemerkungen ueber die seit 1920 neu aufgestellten Gattungen der Ephemeropteren. *Stett. Entomol. Zeit.* 93: 204-219.
- Ulmer, G.** 1942. Alte und neue Eintagsfliegen (Ephemeropteren) aus Süd- und Mittleamerika. *Stett. Entomol. Ziet.* 103: 98-128.