

***Coryphorus aquilus*, a New Genus and Species of Tricorythidae
from the Amazon Basin (Ephemeroptera)**

by

William L. PETERS

ABSTRACT

Coryphorus aquilus, a new genus and species of the Tricorythidae, is described from nymphs collected in Brazil and Columbia and provisionally placed in the heretofore African subfamily Machadorythinae. The type locality is described. Relationships of *Coryphorus* to other genera of the Tricorythidae are discussed and illustrations of anatomical structures of *Machadorythus* are given for comparison.

Recently, nymphs of a new genus of the Tricorythidae were sent to me by Dr. J. B. Wallace, University of Georgia, Dr. S. S. Roback, Academy of Natural Sciences of Philadelphia, and Dr. G. F. Edmunds, Jr., University of Utah. This new genus from the Amazon Basin appears to belong to the subfamily Machadorythinae which was previously monotypic. The subfamily is based on the genus *Machadorythus* known only from nymphs collected in Africa.

Terminology and procedures used in the description follow those of Peters, Peters and Edmunds (1978).

Genus *Coryphorus* gen. n. (Fig. 1-9, 18-23, 29-34)

♂ and ♀ Imagines. Unknown.

Mature ♂ Nymph. Eyes large, elevated above vertex of head and widely separated (Fig. 1, 18). Pedicel of antennae thick and at least 2.5 times length of scape (Fig. 18). Vertex of head with paired, submedian, long, slender tubercles (Fig. 18). Mouthparts (Fig. 2-9, 18): labrum rectangular-shaped (Fig. 2); dorsal hair as in Fig. 2, submedian areas of hair ventrally. Clypeus as in Fig. 18, anterior margin straight. Left and right mandibles as in Fig. 3-4. Lingua of hypopharynx square-shaped, lateral margins slightly convex, anterodorsal surface deeply cleft as in Fig. 7, anteroventral and lateroventral margins with dense areas of hair (Fig. 7);

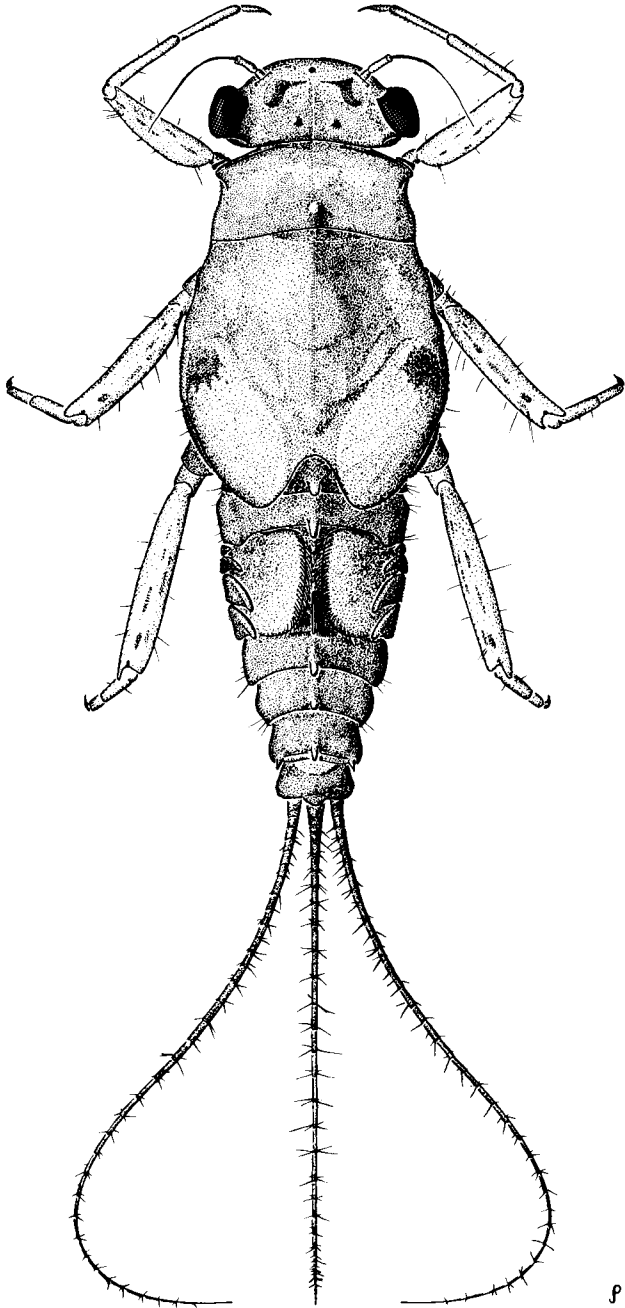


Fig. 1: Mature ♂ nymph of *Coryphorus aquilus*.

superlingua of hypopharynx as in Fig. 7, with a row of hair along anterior margin. Maxillae slender (Fig. 5), palpi absent. Submentum of labium greatly expanded laterally as in Fig. 8; glossae and paraglossae entirely fused; segment 1 of labial palpi large, broad and fleshy, length of segment 1 equal to length of glossae-paraglossae; segments 2 and 3 of labial palpi minute, length of segment 3 about half length of segment 2 (Fig. 9). Long setae sparsely spaced over entire body. Pronotum with a posteromedian, long, blunt tubercle (Fig. 1, 18); anterolateral margins of pronotum with a triangular-shaped lateral projection (Fig. 1). Fore wing pads almost entirely fused into mesonotum except for apical fourth; hind wing pads absent. Legs slender, progressively longer posteriorly (Fig. 1, 29-31). Claws long, slender; a single row of small, wide, blunt denticles on basal half of claws (Fig. 33). Abdominal terga 1-2 with a posteromedian, long slender tubercle; tergum 3 with a posteromedian small, wide-based, apically acute tubercle; terga 4-5 without tubercles; tergum 6 with a median, large keel-shaped projection; terga 7-9 with a posteromedian, long, slender tubercle, those on terga 7-8 thicker and blunter (Fig. 1, 19-20). Abdominal tergum 2 posterolaterally expanded for insertion of gills 2; terga 3-6 with lateral tergal flanges, flanges progressively larger posteriorly and curved dorsally over gills to form a gill chamber (Fig. 1, 19); tergum 9 with small, apically acute, subposterolateral projections (Fig. 1, 19). Gills (Fig. 21-23): gills on segments 2-5. Dorsal portion of gill 2 rectangular-shaped, except outer lateral margin lobed (Fig. 21); margin fringed with long setae, except setae shorter along anterior and outer lateral margins (Fig. 21); dorsal portion operculate, ventral portion with 2 finger-like fringed lobes (Fig. 22). Dorsal portion of gills 3-5 generally rectangular-shaped, posterior margin heavily fringed (Fig. 23); ventral portion with 2 finger-like fringed lobes (Fig. 23); gills progressively smaller posteriorly. Terminal filaments equal in length; sparse whorl of long setae near articulations (Fig. 1).

Etymology. An arbitrary combination of letters. Masculine.

Type species. *Coryphorus aquilus* sp. n.

***Coryphorus aquilus* sp. n. (Figs. 1-9, 18-23, 29-34)**

♂ and ♀ Imagines. Unknown.

Mature ♂ Nymph (in alcohol). Length of body 5.5-5.8 mm. Head dark brown, vertex darker and granulated. Antennae pale. Eyes black. Thorax dark brown, granulated, dorsum blackish; base of fore wing pads black, remainder dark brown, granulated (Fig. 1). Legs pale, except coxae blackish; femora with longitudinal narrow darker streaks (Fig. 29), except on ventral surface of prothoracic femora. Abdomen dark brown, granulated; terga blackish, except pale under gills. Dorsal portion of gill 2 dark brown, granulated, remainder of gills pale. Terminal filaments dark brown, apical half paler.

Material. Holotype ♂ nymph, BRAZIL, Amazonas State, small Terra Firme stream, nr. União, 25.II.1977, J. B. Wallace; paratypes: 1 nymph, Amazonas State, waterfall, Cachoeira do Traira Creek, nr. Rio Cuieiras, N. of Manaus, 16.XII.1960, E.-J. Fittkau; 1 nymph, Amazonas State, Rio

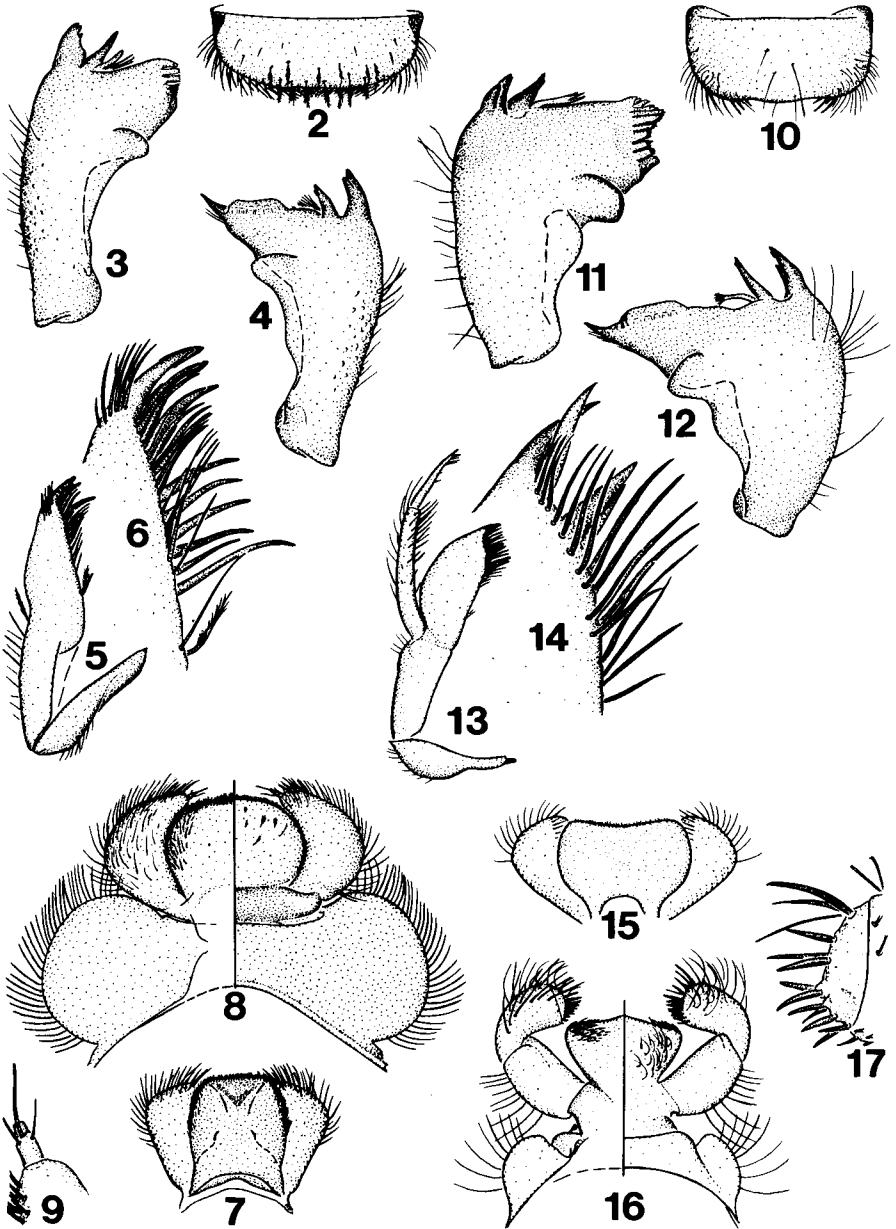


Fig. 2-9: *Coryphorus aquilus*. Fig. 10-17: *Machadorythus* sp. Mouthparts of nymph: 2, 10: labrum; 3-4, 11-12: left and right mandibles; 5-6, 13-14: maxilla with detail of apex; 7, 15: hypopharynx; 8-9, 16-17: labium (dorsum on right, venter on left) with detail of apex of palpi.

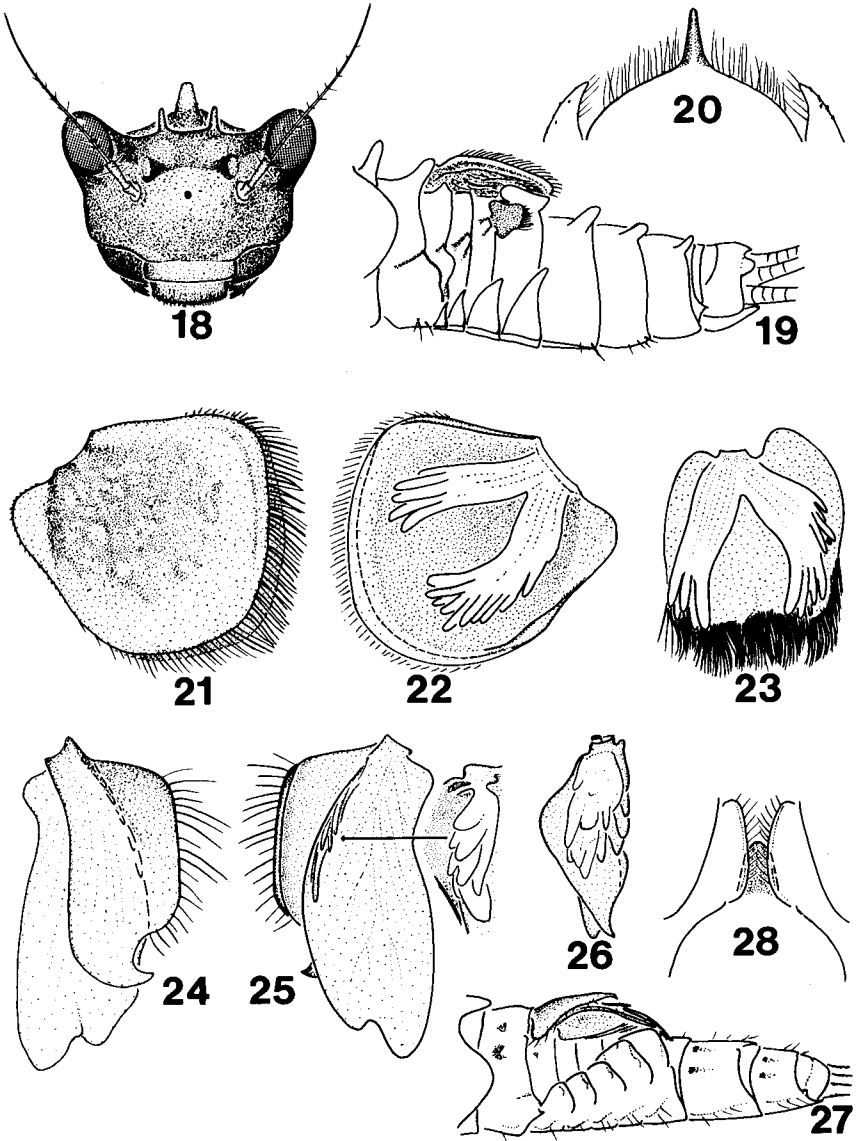


Fig. 18-23: *Coryphorus aquilus*. Fig. 24-28: *Machadorythus* sp. Nymph: 18: frontal view of head; 19, 27: outline of abdomen showing gill position; 20, 28: outline structure of closure of gill chamber on tergum 6 (20) or tergum 7 (28); 21-22, 24-25: dorsal and ventral views of gill 2; 23, 26: ventral view of gill 3.

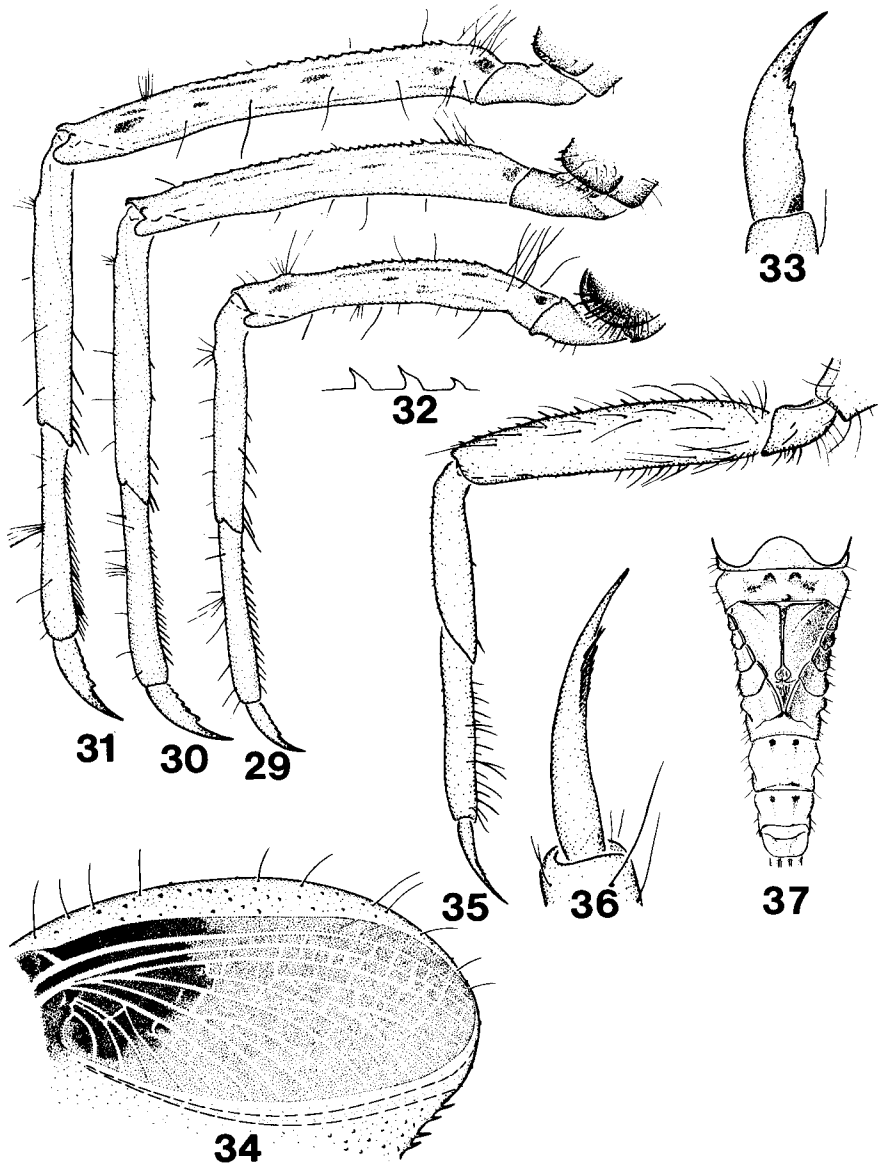


Fig. 29-34: *Coryphorus aquilus*, nymph: 29-31: fore, middle and hind leg; 32: detail of serration on femora; 33: fore claw; 34: mesothoracic wing pad with developing wing. Fig. 35-37: *Machadorythus* sp., nymph: 35: fore leg; 36: fore claw; 37: dorsal view of abdomen.

Amazonas nr. St. Rita Mission, 24.VIII.1961, E.-J. Fittkau; 3 nymphs, Para State, Rio Maro, nr. mouth, 18.XI.1952, H. Sioli; 1 nymph, COLOMBIA, Dept. del Meta, Caño El Viento, 32 km ENE Puerto Lopez (CL-25), 9.III.1971, J. Richardson. All types are in alcohol. Holotype is deposited in the collections of the Instituto Nacional de Pesquisas da Amazonia (INPA), Manaus. Two paratypes are deposited in the collections of Florida A & M University, 2 paratypes in the collections of the University of Utah, and 1 paratype each in the collections of the Academy of Natural Sciences of Philadelphia and the Zoologische Staatssammlung, Munich.

The holotype and the paratype from Colombia are nearly mature. Other paratypes are younger and the tubercles on the head, pronotum, and abdominal terga 1-3 and 6-9 are more elongated and acute than those on mature nymphs. In addition, a prominent posteromedian tubercle occurs on the mesonotum; in mature nymphs, this tubercle is reduced to a rounded hump between the wing pads (Fig. 1). Younger nymphs are pale in color with irregular, scattered markings over the body (marks heaviest on abdominal terga 2, 6 and 7).

Etymology. *aquilus*, Latin, meaning dark-colored.

Biology. Roback and Nieser (1974) gave a description of the Colombian locality (CL-25) and Figs. 14 and 15 of their paper are photographs of the locality. J. B. Wallace has provided me with the following description of the Brazilian type locality. It is within several kilometers of the junction of the Rio Caturiapixuna with the Rio Solimões and about 400 meters from the south bank of the Rio Solimões on elevated Terra Firme (the rising water level of the river during the wet season does not inundate the stream). The stream is heavily shaded by surrounding rain forest and the water is clear but very pale tea-colored from humic substances. The bottom substrate is sand intermixed with much leaf detritus. Submerged logs, limbs, etc., form the stable substrate and *C. aquilus* was found on this woody substrate. The stream is about 2 meters in width and the maximum current speed recorded by Dr. Wallace was 30 cm/sec. Water temperature at the time of collection was 28°C, and the stream was reported to flow year-round. The long setae on the body of nymphs are matted with detritus.

DISCUSSION

Coryphorus can be distinguished from *Machadorythus* in the nymph by the following important morphological characters: (1) vertex of head has paired, submedian, long, slender tubercles (Fig. 18); (2) abdominal gills occur on segments 2-5, are rectangular dorsally and bifurcate ventrally and are partially enclosed by lateral flanges of terga 3-6 which curve dorsally to form a gill chamber (Fig. 1, 19-23); (3) maxillary palpi are absent (Fig. 5); (4) segments 2 and 3 of the labial palpi are minute (Fig. 8-9); and (5) basal half of claws possess a single row of 6 small, wide, blunt denticles (Fig. 33).

Interestingly, *Coryphorus* appears to belong to the Tricorythinae-Machadorythinae grouping based on the shared, derived character state of fusion of the glossae and paraglossae (Fig. 8). This grouping was previously known only from the Ethiopian and Oriental Regions. *Coryphorus* belongs to the Machadorythinae based on shared derived character states: (1) eyes are large and elevated above vertex of head (Fig. 1, 18), (2) pedicel of antennae is thick and at least 2.5 times length of scape (Fig. 18), and (3) pronotum has a single, posteromedian

tubercle (Fig. 1, 18). Although *Coryphorus* shares many other characters with *Machadorythus*, all of which appear derived, its placement in the Machadorythinae will remain provisional until adults of *Coryphorus* and *Machadorythus* are known. Nymphs of *Coryphorus* also share many characters with genera of the Ephemerythinae and Leptohyphinae. These relationships are based on cladistic analyses, but full relationships of the various subfamilies will be discussed when fully studied.

The developing venation and color pattern of the fore wings of the holotype of *Coryphorus aquilus* (Fig. 34) are distinct from any known tricorythid. The only species with a similar color pattern and no hind wings described from the Neotropical Region is *Tricorythodes santarita* Traver from Uruguay. However, the nymph of *Coryphorus* is twice the size of the female imago of *T. santarita* and the venation of *Coryphorus* shows none of the distinctive characters in vein MP or in the cubito-anal region described for *T. santarita* by Traver (1959).

Previously, Machadorythinae were known only from Africa. Demoulin (1959) established *Machadorythus* for a new species from Angola, *M. palanquim*, based on nymphs alone; only a full nymph and developing wing pad illustrations were included with a short description. Edmunds, Allen and Peters (1963) established the subfamily Machadorythinae and included an illustration of the frontal view of the head and a lateral view of the abdomen from a nymphal specimen from Bandundu Prov., Zaire. The Zaire specimen was not identified to species. Matthew and Ryke (1969) discussed the habitat and abundance of *M. palanquim* in rivers of E. Transvaal, South Africa, and Demoulin (1970) recorded additional nymphs from Guinea and Shaba (Katanga) Prov., Zaire, which he thought were probably *M. palanquim*.

Recently, Dr. J. D. Agnew, University of Witwatersrand, sent a nymph of *Machadorythus* collected in Eastern Transvaal, Republic of South Africa. This nymph was used in the comparative study and phylogenetic relations given herein. Although this nymph awaits study by Dr. Agnew, illustrations are included in this paper (Fig. 10-17, 24-28, 35-37) for comparison with those of *Coryphorus*.

ACKNOWLEDGMENTS

I would like to thank Dr. J. B. Wallace, Dr. S. S. Roback, and Dr. G. F. Edmunds, Jr. for the loan of the *Coryphorus* specimens, and Dr. J. D. Agnew for the loan of a specimen of *Machadorythus*. Further, Dr. Wallace provided unpublished field notes on one Brazilian locality. Janice G. Peters prepared all illustrations. I thank Drs. Wallace, Agnew, and Edmunds for reading this manuscript. Dr. Wallace's field studies on the *Alpha Helix* in Brazil were supported by a grant from the National Science Foundation. This study was supported by a research program (FLAX 79009) of SEA/CR, USDA.

LITERATURE

- DEMOULIN, G. (1959): Une curieuse larve d'Ephéméroptère de l'Angola portugais. - Bull. Ann. Soc. R. Entomol. Belg. 95: 249-252.

- (1970): Ephemeroptera des faunes éthiopienne et malgache. - S. Afr. Anim. Life 14: 24-170.
- EDMUNDS, G. F., JR., R. K. ALLEN and W. L. PETERS (1963): An annotated key to the nymphs of the families and subfamilies of mayflies (Ephemeroptera). - Univ. Utah Biol. Ser. 13 (1): 1-49.
- MATTHEW, J. and P. A. J. RYKE (1969): New records of rare ephemeropterans in the Komati River system, Eastern Transvaal. - J. Entomol. Soc. S. Afr., 32: 431-434.
- PETERS, W. L., J. G. PETERS and G. F. EDMUNDS, JR. (1978): The Leptophlebiidae of New Caledonia (Ephemeroptera) Part I. - Introduction and systematics. - Cah. O.R.S.T.O.M., sér. Hydrobiol. 12 (2): 97-117.
- ROBACK, S. S. and N. NIESER (1974): Aquatic Hemiptera (Heteroptera) from the Illanos of Colombia. - Proc. Acad. Nat. Sci. Phil. 126: 29-49.
- TRAVER, J. R. (1959): The Subfamily Leptoxyphinae. Part II: Five new species of *Tricorythodes* (Ephemeroptera, Tricothyidae). - Proc. Entomol. Soc. Wash. 61: 121-131.

Address of the Author:
Professor W. L. PETERS
Department of Entomology
Florida A & M University
Tallahassee, Florida 32307, USA