

**THE NYMPH OF *SECOCHELA ILLIESI* (EPHEMEROPTERA:
LEPTOPHLEBIIDAE: ATALOPHLEBIINAE)
FROM SOUTH AMERICA**

Manuel L. Pescador¹ and Tom Gonsler²

¹ Entomology, Center for Water Quality
Florida A&M University
Tallahassee, FL 32307-4100, USA

² EAWAG, Limnological Center
Kastanienbaum, Switzerland

ABSTRACT

The nymph of *Secochela illiesi*, the only species presently known in the genus, is described. The characters that distinguish the nymph of *Secochela* from other genera of Leptophlebiidae are discussed. The nymph shares the derived characters that define the *Meridialaris* lineage, which includes genera from South America, Australia, and New Zealand.

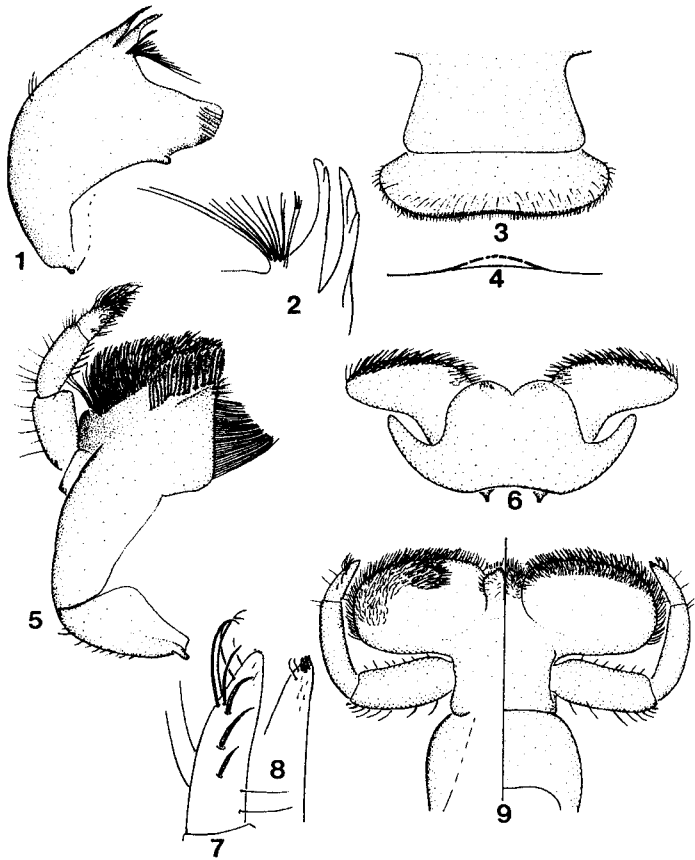
INTRODUCTION

Pescador and Peters (1982) established the genus *Secochela* for the species *Secochela illiesi* based on male and female imagos, male subimago, and egg. The nymph of this monotypic genus is herein described for the first time. The specimens were collected by one of us (TG), while conducting research on the ecology and biology of mayflies in Chile (Gonsler, 1990). Nymphs were associated with adults by rearing.

This paper represents an on-going taxonomic documentation of the leptophlebiid fauna of southern South America (Peters and Edmunds, 1972; Pescador and Peters, 1980a, b, 1982, 1985, 1987, 1990, 1991; Pescador, 1997; Dominguez and Pescador, 1983; Dominguez and Flowers, 1989). The techniques of Pescador and Peters (1980a) were followed to prepare structures for taxonomic description of the nymph.

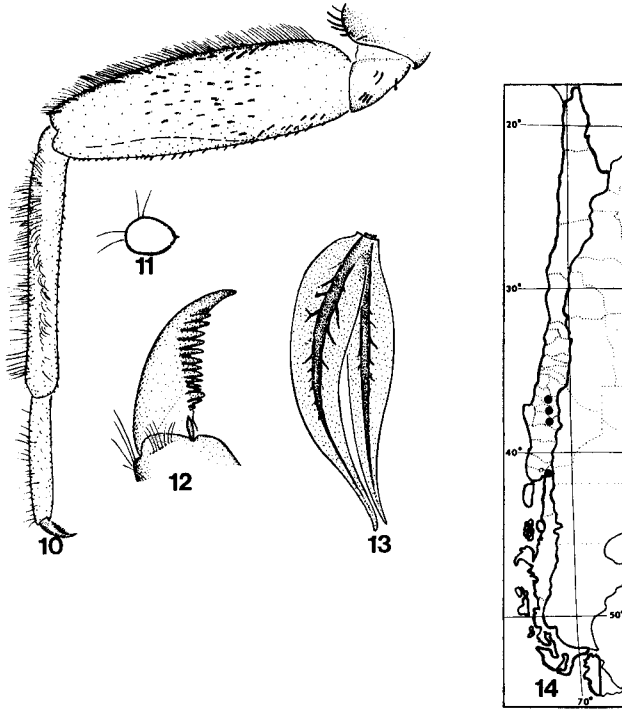
***Secochela* Pescador and Peters**

Genus E Pescador and Peters, 1980b
Secochela Pescador and Peters, 1982:1



Figs. 1-9. *Secochela illiesi*, mature nymph: 1, left mandible; 2, right mandibular incisor; 3, clypeus and labrum; 4, enlarged anteromedian emargination of labrum; 5, right maxilla, ventral; 6, hypopharynx; 7 and 8, segment 3 of labial palpi, dorsal view and ventral view; 9, labium, dorsal (left), ventral (right).

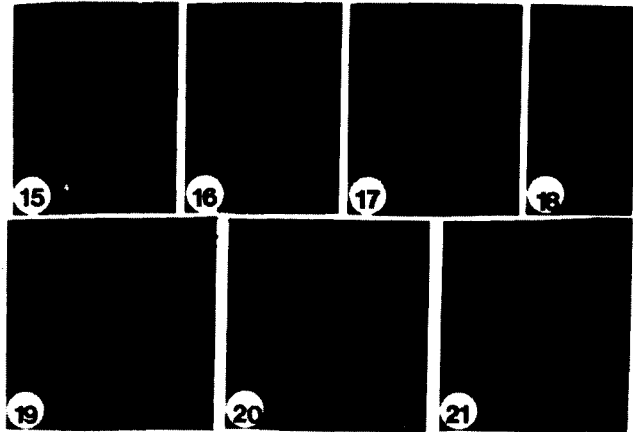
Mature Nymph: Head prognathous. Antennae $1 \frac{1}{3}$ times as long as head, flagellum with clusters of fine subapical hairs usually in-groups of 3's and 4's (Fig. 15). Mouthparts (Figs. 1-9): Clypeus distinctly narrower than labrum, lateral margins apically divergent (Fig. 3). Length of labrum approximately $\frac{1}{3}$ times maximum width, angularly curved laterally (Fig. 3); anteromedian emargination broad, U-shaped with undefined indentations (Fig. 4). Outer margin of mandibles smoothly curved, glabrous except for a thin submedian hair tuft (Fig. 1); outer incisors with minute apical serrations (Fig. 2); prostheca well-developed (Fig. 4). Galea-laciniae of maxillae apically broad with 15-17 pectinate setae (Fig. 5); segments 1-2 of maxillary palpi subequal in length, segment 3 slightly shorter than either segment 1 or 2, with long thick hair (Fig. 5); inner margin of segments 2 and 3 with spinous setae. Hypopharyngeal lingua with well-developed lateral processes (Fig. 6), anterior margin moderately cleft; superlinguae with thick hair along anterior margin, lateral margin smoothly curved (Fig. 6). Segments 1 and 2 of labial palpi subequal in length, segment 3 approximately $\frac{1}{2}$ length of either segment 1 or 2; segment 3 with a row of well-developed dorsal setae (Fig. 7) and with few apical denticles (Fig. 8); glossae straight and flat, paraglossae ventral to glossae (Fig. 9); lateral margins of submentum glabrous (Fig. 9). Pronotum with a row of short anterolateral spines. Legs (Figs. 10-12). Maximal width of tibiae approximately $1 \frac{1}{2}$ x



Figs. 10-14. *Secochela illiesi*, mature nymph: 10, fore leg; 11, cross section of tibia of fore leg; 12, fore claw; 13, gill IV; 14, geographical distribution of *S. illiesi*.

maximal width of tarsi, tibiae of prothoracic legs in cross section slightly oval (Fig. 11); femora with fine hair and prominent spoon-shaped-setae (Fig. 19); dorsum of tibiae with submarginal row of spatulate setae (Fig. 17), apex of setae with minute papillae (Fig. 18); tarsal claws with moderately large and unequal-sized basal denticles, remaining denticles progressively larger apically (Fig. 12). Gills (Fig. 13): gills on abdominal segments I-VII alike; dorsal and ventral lamellae slender, gradually tapered apically (Fig. 13); main trachea with weakly developed branches (Fig. 13). Posterolateral spines on abdominal segments II-IX, progressively longer posteriorly (Fig. 21); abdominal terga with few scattered filamentous dorsal setae, with fringe of lateral setae, and needle-like posterior spines (Figs. 20-21). Caudal filaments: terminal filament approximately 1/3 longer than cerci; surface of caudal filaments granulate, segments with sharp-pointed apical spines (Fig. 16).

Discussion: Pescador and Peters (1982) had previously discussed the adult and egg characters that distinguish *Secochela* from the other genera of Leptophlebiidae. The nymph of *Secochela* can be distinguished from all other genera of Leptophlebiidae by the following combination of characters: (1) clypeus is distinctly narrower than labrum and the lateral margins are apically divergent (Fig. 3); (2) length of labrum is approximately 1/3 times maximum width and angularly curved laterally (Fig. 3); (3) outer margin of mandibles is smoothly curved and glabrous except for a thin submedian hair tuft (Fig. 1); (4) lateral margins of submentum are glabrous (Fig. 9); (5) dorsum of tibiae has submarginal dorsal row of spatulate setae (Fig. 17), apex of setae with minute papillae (Fig. 18); (6) tarsal claws have unequal-sized basal denticles and the remaining denticles are progressively larger apically (Fig. 12); (7) posterolateral spines occur on abdominal segments II-IX; (9) abdominal gills I-VII are alike, both dorsal and ventral lamellae are slender and gradually tapered apically



Figs. 15-21. Scanning electron micrographs of *Secochela illiesi*, mature nymph: 15, antenna (1000X); 16, caudal filament (400X); 17, tibial setae and hair, dorsal (100X); 18, enlarged tibial setae (2000X); 19, femoral setae and hair, dorsal (1000X); 20 and 21, abdominal terga (600X, 150X).

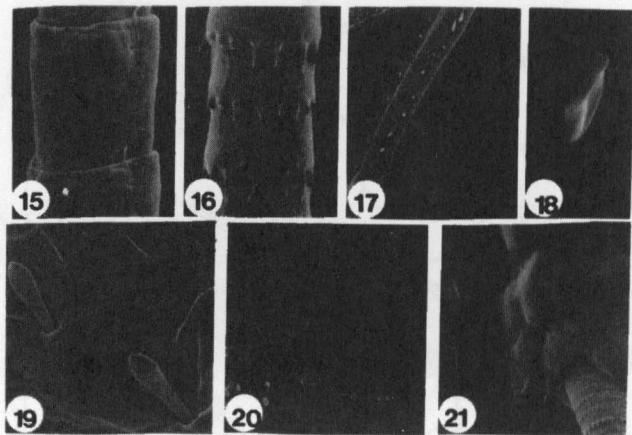
(Fig. 13); and (10) caudal filaments have granulate surface and sharp-pointed apical spines (Fig. 16).

Pescador and Peters (1980b, 1982) have indicated that *Secochela* belongs to the *Meridialaris* lineage that includes genera from Chile and southern Argentina [*Meridialaris* and *Massartellopsis* (Pescador and Peters, 1980, 1982, 1987)], Australia [*Austrophlebioides* (Campbell and Suter, 1988)] and New Zealand [*Atalophlebioides* and *Deleatidium* (Townsend and Peters, 1978, 1996)]. The adults of *Secochela* according to Pescador and Peters (1982) can be distinguished from the other genera of the lineage by the shape and armatures of the penis lobes, and the type of tarsal claws. The *Secochela* nymph shares the same derived characters that define the *Meridialaris* lineage which include the strongly divergent lateral margins of the clypeus (Fig. 3), the labrum distinctly broader than the clypeus (Fig. 3), the apically broad galea-lacinia of maxillae with 15 or more subapical pectinate setae (Fig. 5), and the glabrous lateral margins of the labial submentum (Fig. 9). The nymph, however, can be distinguished from the other genera of the *Meridialaris* lineage by the following characters: (1) outer margin of mandibles is smoothly curved and glabrous except for a thin submedian hair tuft (Fig. 1), (2) femora have prominent spoon-shaped setae (Fig. 19); (3) dorsum of tibiae has submarginal row of spatulate setae (Fig. 17), apex of setae with minute papillae (Fig. 18); and (4) tarsal claws have unequal-sized basal denticles and the remaining denticles are progressively larger apically (Fig. 12).

***Secochela illiesi* Pescador and Peters**

Secochela illiesi Pescador and Peters, 1982:8 (male, female, egg).

Mature Nymph (in alcohol): Body length 6.0-7.0 mm. Dorsum of head dull yellow, lightly washed with dark brown between ocelli extending to anterior base of compound eyes, forming a narrow irregular transverse band. Antennae yellow, scape faintly washed with black. Female eyes black; upper portion of male eyes orange-yellow, lower portion black. Median ocellus approximately 2x smaller than lateral ocelli. Mouthparts: labrum yellow, posterior margin thinly lined with orange-brown; dorsum of mandible yellow, faintly washed with dark brown along margins, venter pale. Maxillae yellow, stipes and basal half of outer margin of galea-lacinia faintly washed with dark brown; apical hair of galea-lacinia brownish; inner margin of segment 2 of maxillary palpi with series of 5-7 spinous setae (Fig. 5). Labium pale



Figs. 15-21. Scanning electron micrographs of *Secochela illiesi*, mature nymph: 15, antenna (1000X); 16, caudal filament (400X); 17, tibial setae and hair, dorsal (100X); 18, enlarged tibial setae (2000X); 19, femoral setae and hair, dorsal (1000X); 20 and 21, abdominal terga (600X, 150X).

yellow, marginal setae brownish-yellow. Thorax: nota yellow, median and margins of pronotum, mesoscutellum and anterolateral corners of mesonotum washed with dark brown. Pleura yellow, pleural sutures and areas around base of legs washed with dark brown. Legs yellow, subcoxae and coxae dorsally washed with dark brown; tarsal claws with 14-16 denticles (Fig. 12). Abdomen: terga yellow, faintly washed with dark brown, progressively darker towards lateral margins and posterior margins; posterolateral spines on abdominal segments VIII and IX slightly incurved apically (Fig. 20). Sterna yellow; brownish abdominal ganglia externally visible, particularly pronounced on fused ganglia on sterna VII-VIII. Gills with short tracheal branches (Fig. 13). Gills grayish-white, tracheae dark brown. Caudal filaments: yellow with 2-3 narrow, prominent orange-brown annulations near base.

Geographical Distribution (Fig. 14): *Secochela illiesi* has only been collected in Chile. Pescador and Peters (1982) reported the species from *Llanquihue Prov.*, *Bío Bío Prov.*, *Linares Prov.*, *Malleco Prov.*, and *Nuble Prov.* The specimens for this study included 4 nymphs that were collected from *Los Lagos Prov.*, Río Quinchila. 9.III.85, T. Gonser. The specimens are deposited in the collections of Florida A&M University (2 nymphs) and Universidad Nacional de Tucumán, Argentina (2 nymphs).

ACKNOWLEDGMENTS

We would like to thank Janice G. Peters for the illustrations and to Kim Riddle for her assistance with the electron microscope. Janice G. and William L. Peters, Florida A&M University read and offered valuable comments on the manuscript. This research was supported by a research grant (FLAX 91004) from CSREES-USDA to Florida A&M University.

REFERENCES

- Campbell, I. C. and P. J. Suter. 1988. Three new genera, a new subgenus and a new species of Leptophlebiidae (Ephemeroptera) from Australia. *J. Aust. ent. Soc.* 27: 259-273.
- Domínguez, E. and M. L. Pescador. 1983. A new species of *Penaphlebia* (Ephemeroptera: Leptophlebiidae) from Argentina. *Ent. News* 94:21-24.
- Domínguez, E. and R. W. Flowers. 1989. A revision of *Hermanella* and related genera (Ephemeroptera: Leptophlebiidae: Atalophlebiinae) from subtropical South America. *Ann. ent. Soc. Amer.* 82: 555-573.
- Pescador, M. L. 1997. *Gonserellus*: A new genus of Leptophlebiidae (Ephemeroptera) from southern South America. *Aquat. Insects* 19: 237-242.
- Pescador, M. L. and W. L. Peters. 1980a. Two new genera of cool-adapted Leptophlebiidae (Ephemeroptera) from southern South America. *Ann. ent. Soc. Amer.* 73: 332-338
- Pescador, M. L. and W. L. Peters. 1980b. Phylogenetic relationships and zoogeography of cool-adapted Leptophlebiidae (Ephemeroptera) from southern South America, pp. 43-56. In: J. F. Flannagan and K. E. Marshall (eds.). *Advances in Ephemeroptera Biology*. New York, Plenum.
- Pescador, M. L. and W. L. Peters. 1982. Four new genera of Leptophlebiidae (Ephemeroptera: Atalophlebiinae) from southern South America. *Aquat. Insects* 4: 1-19.
- Pescador, M. L. and W. L. Peters. 1985. Biosystematics of the genus *Nousia* from southern South America (Ephemeroptera: Leptophlebiidae: Atalophlebiinae). *J. Kans. ent. Soc.* 58: 91-123.
- Pescador, M. L. and W. L. Peters. 1987. Revision of the genera *Meridialaris* and *Massartellopsis* (Ephemeroptera: Leptophlebiidae: Atalophlebiinae) from southern South America. *Trans. Amer. ent. Soc.* 112: 147-189.
- Pescador, M. L. and W. L. Peters. 1990. Biosystematics of the genus *Massartella* Lestage (Ephemeroptera: Leptophlebiidae: Atalophlebiinae) from South America. *Aquat. Insects* 12: 145-160.
- Pescador, M. L. and W. L. Peters. 1991. Biosystematics of the genus *Penaphlebia* (Ephemeroptera: Leptophlebiidae: Atalophlebiinae) from South America. *Trans. Amer. ent. Soc.*, 117: 1-38.
- Peters, W. L. and G. F. Edmunds (Jr.). 1972. A revision of the generic classification of certain Leptophlebiidae from southern South America (Ephemeroptera). *Ann. ent. Soc. Amer.* 65: 1398-1414.

- Towns, D. R. and W. L. Peters. 1978. A revision of genus *Atalophlebioides* (Ephemeroptera: Leptophlebiidae). N. Z. J. Zool. 5: 607-614.
- Towns, D. R. and W. L. Peters. 1996. Fauna of New Zealand: Leptophlebiidae (Insecta: Ephemeroptera). Manaaki Whenua Press, Lincoln Canterbury, New Zealand. No. 36, 143 pp.