

Two New Genera of Cool-adapted Leptophlebiidae (Ephemeroptera) from Southern South America¹

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ABSTRACT

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Two new monotypic genera of Leptophlebiidae, *Dactylophlebia* and *Magallanella*, are established. Two new species, *Dactylophlebia carnulenta* from the central Andean region of Chile and Argentina and *Magallanella flinti* from southern Chile, are described from nymphs and illustrated. Notes on their biology and ecology are included.

Most of the cool-adapted leptophlebiid genera of South America have not yet been revised. Peters and Edmunds (1972) delineated 6 genera occurring in the cool mountain streams of southern South America, 3 of which they established as new: *Atalonella* Needham and Murphy, 1924, *Hap-siphlebia* Peters and Edmunds, 1972, *Massartella* Lestage, 1930, *Massartellopsis* Demoulin, 1955, *Meridialaris* Peters and Edmunds, 1972, and *Penaphlebia* Peters and Edmunds, 1972. All these genera are known from nymphs and adults and all are endemic to the cool regions of South America except *Atalonella*, which also occurs in Australia and Tasmania.

This is the 1st of a series revising the cool-adapted genera of Leptophlebiidae in southern South America. This geographical area of continental South America has been biogeographically defined by Illies (1969) and Hubbard and Peters (1977).

Morphological structures for photomicroscopy were briefly treated (ca. 1 min) in an ultrasonic cleaner and mounted in Canada balsam.

Nymphal gut contents were analyzed as described by Pescador and Peters (1974). Five nymphs of each species collected from different localities were dissected and analyzed. Descriptive terminology is that of Peters and Edmunds (1970) and Peters et al. (1978).

Dactylophlebia, new genus
(Fig. 1, 3-8, 15, 19-22, 28, 30)

Genus A Pescador and Peters (1980)

Male Imago — Unknown.

Female Imago — Unknown.

Mature Nymph (In alcohol) — Head prognathous. Antenna 1 1/2 times as long as head, with apical groupings of fine hairs at annulations. Mouthparts (Fig. 3-8, 15): length of labrum 2/3-3/4 width; labrum with lateral margins abruptly

curved (Fig. 4), dorsal hair as in Fig. 4; anteromedian emargination sharply cleft, V-shaped with weakly developed blunt median denticles (Fig. 5). Clypeus narrower than labrum, lateral margins divergent (Fig. 4). Outer margin of mandibles slightly angular with median hair tuft and hair along basal 1/2 (Fig. 6), outer right incisor with weakly developed spines (Fig. 7). Galea-lacinia of maxillae with narrow apex (Fig. 3), with up to 15 sub-apical pectinate setae; segments 1 and 2 of palpi equal in length, segment 3 a little shorter than segment 2, inner margin of segment 2 glabrous (Fig. 3). Lingua of hypopharynx with well developed lateral processes, paired submedian longitudinal rows of hair on internal dorsal surface, anterior margin shallowly cleft (Fig. 8); superlingua as in Fig. 8 with hair along anterior margin, lateral margins blunt. Segment 2 of labial palpi subequal length of segment 1, segment 3 slightly shorter than segment 2, apical 1/2 of inner margin of segment 3 with short thick setae and dorsal surface with long thick setae (Fig. 15); glossae straight with apical knob; submentum with long lateral spines (Fig. 15). Lateral margins of pronotum glabrous except for a few short peg-like anterolateral setae (Fig. 1). Legs (Fig. 19-21, 28): maximal width of tibiae twice that of tarsi, tibiae of fore legs in cross section compressed, tarsi oval; tarsi of metathoracic legs with 4-6 spines along outer margin (Fig. 21); apical 2/3 of femora deeply indented with pronounced ventral flange so tibia can draw into femur (Fig. 19), femora with a few dorsal hairs and prominent lanceolate setae (Fig. 28). setal insertions depressed; denticles on claws in double rows, progressively larger apically (Fig. 20). Gills (Fig. 1, 22): gills on segments 1-7 alike, dorsal and ventral portion of lamellae plate-like, apically terminated with finger-like processes (Fig. 1, 22), main trunk of tracheae along median line with branches on both sides (Fig. 22). Posterolateral projections on abdominal segments 6-9; abdominal terga with fine dorsal hair,

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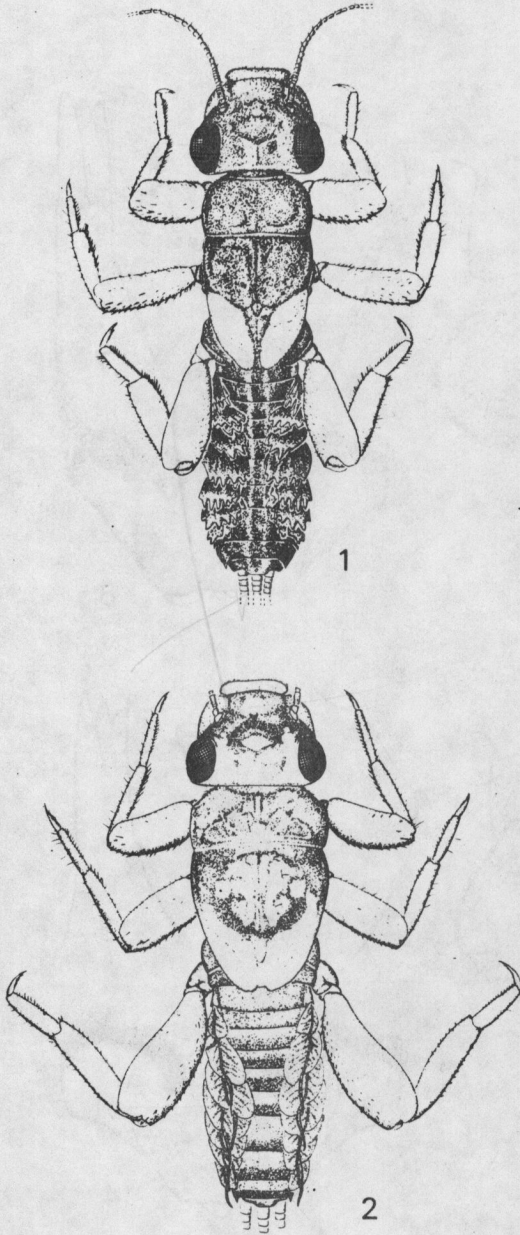


Fig. 1-2—Nymphs of : 1. *Dactyloplebia carnulenta* 2. *Magallanella flinti*.

lateral margins glabrous, posterior margins with short spines (Fig. 30). Terminal filament longer than cerci; segments of caudal filaments with apical hair singly or in groups of variable number, apical spines closely set together.

Etymology.—*dactylos*, Gr., meaning finger; *phlebos*, Gr., meaning veins. Gender, feminine.

Type-species.—*Dactyloplebia carnulenta*, new species.

Discussion.—*Dactyloplebia* can be distinguished from all other genera of Leptophlebiidae by the following combination of nymphal characters: (1) clypeus is narrower than labrum and lateral margins are divergent (Fig. 4); (2) labrum is $2/3$ – $3/4$ as long as wide and lateral margins are abruptly curved (Fig. 4); (3) outer margin of mandibles is slightly angular and bears a median hair tuft and hair along basal $1/2$ (Fig. 6); (4) claws have a double row of denticles and these are progressively larger apically (Fig. 20); (5) posterolateral projections occur on abdominal segments 6–9; and (6) abdominal gills 1–7 are alike, plate-like, and dorsal and ventral portions of lamellae terminate in finger like processes (Fig. 22).

Dactyloplebia carnulenta, new species
(Fig. 1, 3–8, 15, 19–22, 28, 30)

Male Imago.—Unknown.

Female Imago.—Unknown.

Mature Nymph (in alcohol).—Body length, ♂ 5.0–6.0 mm, ♀ 5.0–7.0 mm. Dorsum of head blackish-brown, venter pale brown, a prominent pale yellow spot lateral to lateral ocelli and anterior to median ocellus. Scape and pedicel of antennae orange brown, flagellum paler. Ocelli grayish-yellow. Upper portion of ♂ eyes orange yellow, lower portion black; ♀ eyes black. Mouthparts: maxillary palpi dark brown, apical corner of segment 2 with tuft of long hair (Fig. 3); segments 1 and 2 of labial palpi dark yellow, segment 3 brown, outer margin of segment 2 of palpi with 15–20 long spinous setae, inner margin 6–8; lateral margins of submentum each with 9–14 long spines (Fig. 15). Thorax: blackish-brown. Legs: dark brown, femora of prothoracic legs with a broad dorsal pale yellow spot near base; tarsi with 14–16 thick spines. Abdomen: dark brown. Gills: grayish-black, broad with developed tracheal branch with several traceoles, gill lamellae terminate in 4–6 finger-like processes (Fig. 22). Caudal filaments dark brown.

Geographical Distribution (Fig. 32).—Holotype ♂ mature nymph CHILE: Osorno Prov, Río Pescadero, near Antillanca, Puyehue, 12–XII-1972, 2500 m, M. L. Pescador & L. E. Pena. Paratypes, CHILE: 7 nymphs, same data as holotype; Cautin Prov., 2 nymphs, Río Llancahue, Villarica, 11–II-1958, J. Illies; Malleco Prov., 2 nymphs, Estero Huemul trib. of Lago Gualletue ca. Marinemuco, 11–XII-1963, G. F. Edmunds, Jr. ARGENTINA: Neuquen Prov., 20 nymphs, Río, Aseret nr. Lago Currhue, 23–I-1974, O. S. Flint, Jr.; 10 nymphs, Arroyo Culebra, 20 km S of San Martín de los Andes, 2–II-1974, O. S. Flint, Jr.

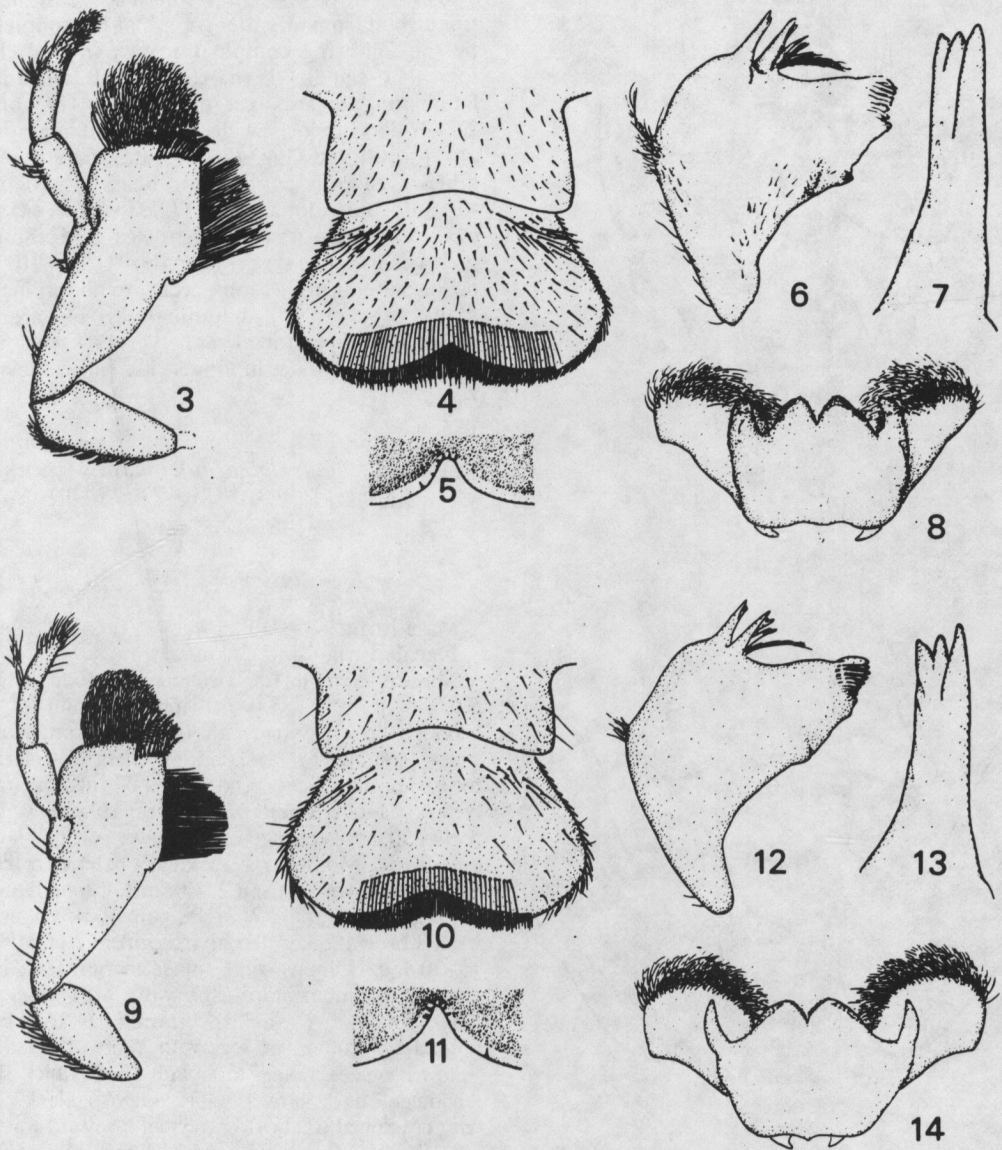


Fig. 3-14.—Mouthparts of mature nymph: 3-8, *Dactylophlebia carnulentar*, 9-14 *Magallanella, Flintii* 3, 9. Ventral view of right maxilla; 4, 10 clypeus and labrum, 5 11 enlargement (2x) of venter of anteromedian emargination of labrum; 6, 12 left mandible; 7, 13 detail of outer incisor of right mandible; 8, 14 hypo-pharynx.

All types are preserved in alcohol. Holotype and 7 nymphal paratypes are deposited in the collections of Florida A & M Univ. Ten nymphal paratypes are deposited in the collections of the Univ. of Utah. Twenty-four nymphal paratypes are deposited in the collections of the National Museum of Natural History (U.S.).

Etymology.—*carnulentus*, L., adj., meaning fleshy.

Biology.—*Dactylophlebia carnulentar* has a narrow geographical and ecological range. The nymphs appear to be strictly stream-dwellers at altitudes above 1000 m. Of all localities visited, we collected nymphs only from one, a small, fairly swift, rocky stream at an altitude of 2557 m. Ten nymphs were collected from a cluster of small rocks covered with a dense growth of algae. Dr. O. Flint, Jr., of the National Museum of Natural History kindly gave us his notes on the general description of the

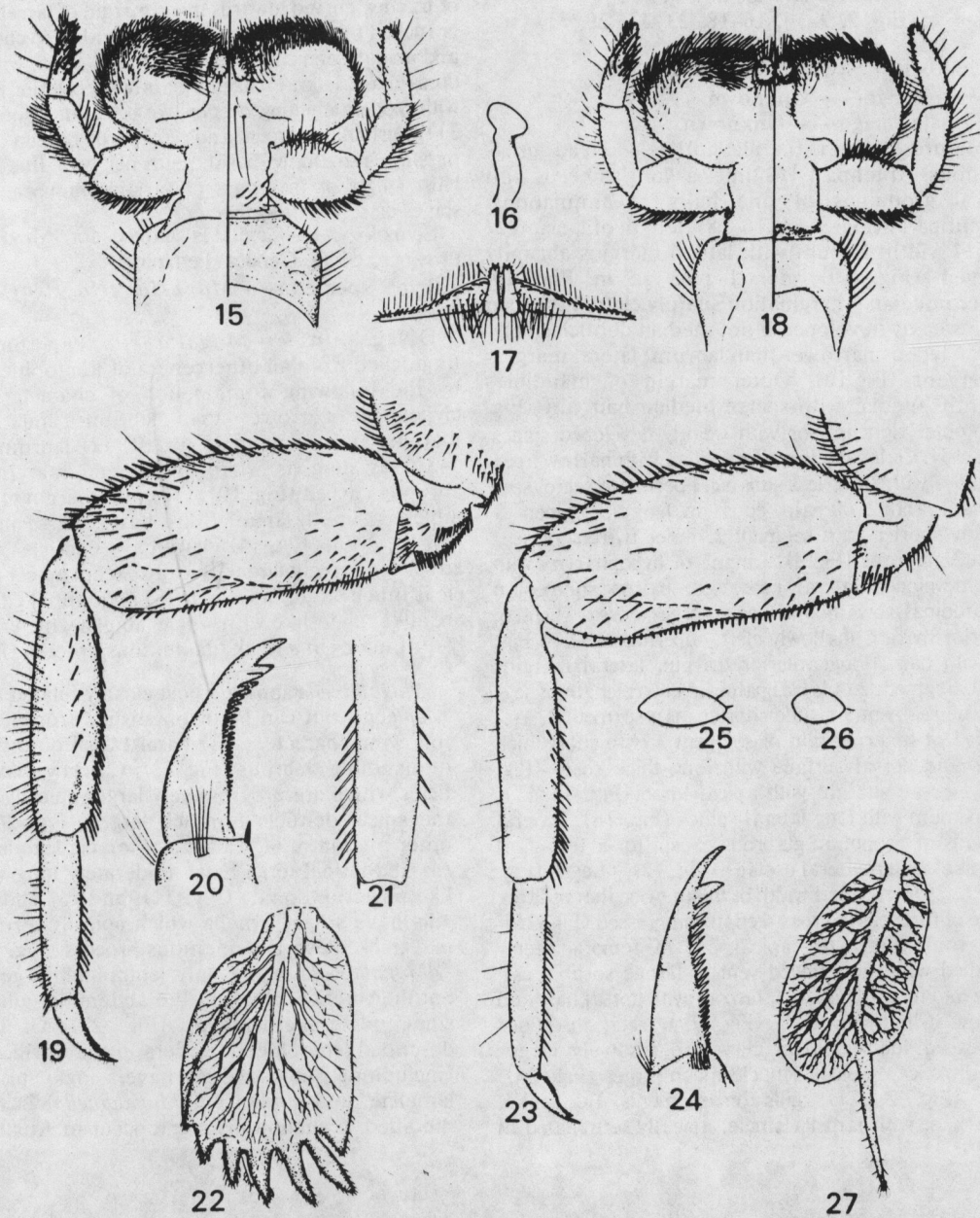


Fig. 15-27—Mouthparts (labium), legs and gills of mature nymph: 15,19-22. *Dactylophlebia carnulenta* 16-18, 23-27. *Magallanella flinti*, 15, 18, ventral (right side of figure) and dorsal (left) view of labium; 16, lateral outline of glossa of labium (venter on right); 17, anterior view of labium; 19, 23, fore leg; 20, 24, fore claw; 21, tarsus of hind leg; 25, 26, cross sections of tibia and tarsus of fore leg; 22, 27 gill 4.

stream where he collected a few nymphs in Neuquen Province Argentina. The stream (altitude 1150 m) had a rubble to sandy bottom, was clear and cold with riffles, a few pools, and some mossy rock.

Nymphs are primarily detritivores. Gut contents were detritus (51.69%), mineral particles (30.23%), diatoms (14.12%), and filamentous algae (3.96%).

Identified diatoms included *Cymbella* and *Melosira*.

Attempts to rear the adults from the nymphs were unsuccessful. The nymphs are very fragile and delicate, and the gills are easily detached by the splash of water against the wall of the rearing cages. We suspect, however, that adult emergence occurred in late December because all nymphs collected on Dec. 12 had black wing pads.

Magallanella, new genus
(Fig. 2, 9-14, 16-18, 23-27, 29, 31)

Genus B. Pescador and Peters (1980)

Male Imago. — Unknown.

Female Imago. — Unknown.

Mature Nymph (in alcohol). — Head prognathous. Antenna 1 1/2 times as long as head, with apical groupings of fine hairs at annulations. Mouthparts (Fig. 9-14, 16-18): length of labrum 2/3-3/4 width; labrum with lateral margins abruptly curved (Fig. 10), dorsal hair as in Fig. 10; anteromedian emargination sharply cleft, V-shaped with weakly developed blunt median denticles (Fig. 11). Clypeus narrower than labrum, lateral margins divergent (Fig. 10). Outer margin of mandibles slightly angular with sparse median hair tuft (Fig. 12), outer right incisor with weakly developed spines (Fig. 13). Galea-lacinia of maxillae with narrow apex (Fig. 9), with 15 or less subapical pectinate setae; segments 1 and 2 of palpi equal in length, segment 3 slightly shorter than segment 2, inner margin of segment 2 glabrous (Fig. 9). Lingua of hypopharynx with well developed lateral processes, paired submedian longitudinal rows of hair on internal dorsal surface, anterior margin shallowly cleft; superlingua as in Fig. 14 with hair along anterior margin, lateral margins blunt. Segment 2 of labial palpi subequal length of segment 1, segment 3 a little shorter than segment 2, apical 1/2 of inner margin of segment 3 with short thick setae and dorsal surface with long thick setae (Fig. 18); glossae straight with apical knob (Fig. 16-17); submentum with long lateral spines (Fig. 18). Lateral margins of pronotum glabrous except for a few short pap-like anterolateral setae (Fig. 2). Legs (Fig. 23-26, 29): maximal width of tibiae twice that of tarsi, tibiae of fore legs in cross section compressed (Fig. 25), tarsi oval (Fig. 26); apical 2/3 of femora deeply indented with pronounced ventral flange so tibia can draw into femur (Fig. 23), femora with dorsal hair and narrow cylindrical setae (Fig. 29), setal insertions depressed; denticles on claw progressively larger apically except apical denticle much larger (Fig. 24). Gills (Fig. 2, 27): gills on segments 1-7 alike, plate-like, with lamella single, apically terminated in

thick fleshy filamentous process (Fig. 27), main trunk of trachea curved towards inner margin of lamella with branches on both sides. Posterolateral projections on abdominal segments 6-9; abdominal terga with fine dorsal hair, lateral margins glabrous, posterior margin with moderately long needle-like posterior spines (Fig. 31). Terminal filament and cerci partly broken off and missing, remaining basal segments with fine apical hair, singly or in groups of variable number, apical spines closely set together.

Etymology. — Genus is named for Magallanes Province, Chile. Gender. Feminine.

Type-species. — *Magallanella flinti*, new species.

Discussion. — *Magallanella* can be distinguished from all other genera of Leptophlebiidae by the following combination of characters: (1) clypeus is narrower than labrum, and lateral margins are divergent (Fig. 10); (2) labrum is 2/3-3/4 as long as wide, and lateral margins are abruptly curved (Fig. 10); (3) outer margin of mandibles is slightly angular and has a sparse median hair tuft (Fig. 12); (4) claws have denticles which are progressively larger apically except apical denticle is much larger (Fig. 24); (5) abdominal gills 1-7 are alike, plate-like with single lamella which apically terminates in a thick filamentous process (Fig. 2, 27).

Magallanella appears most closely related to *Dactylophlebia* but can be distinguished from it by the following characters: (1) basal 1/2 of outer margin of mandible glabrous (Fig. 12); (2) claws have denticles which are progressively larger apically except the apical denticle is much larger (Fig. 24); (3) outer margin of tarsi of metathoracic leg glabrous; (4) abdominal terga have moderately long needle-like posterior spines (Fig. 31); and (5) abdominal gills have single lamella which apically terminates in a thick, fleshy, filamentous process (Fig. 2, 27).

Magallanella is the only leptophlebiid genus in South America in which the abdominal gills have single plate-like lamellae (Fig. 27). Of the 73 described leptophlebiid genera in the world, only 5 (including *Magallanella*) have single plate-like lamellae, and all (except *Magallanella*) have gills modified to suction discs and occur in Australasia.



Fig. 28-31. — Photomicrographs of: 28-29, setae on dorsum of nymphal femora; 30-31, posterior margins of nymphal abdominal terga; 28, 30, *Dactylophlebia carnulenta*; 29, 31, *Magallanella flinti*.

The 4 genera include *Deleatidium* Eaton, 1899, from Australia and New Zealand, *Kirrara* Harker, 1954, from Australia, *Lepeorus* Peters et al., 1978, and *Lepegenia* Peters et al., 1978, from New Caledonia. Interestingly, *Magallanella* does not appear to be closely related to any of these genera, which is another indication that abdominal gills with single Plate-like lamellae probably evolved independently among the different genera (Peters et al. 1978).

Magallanella flinti, new species.
(Fig. 2, 7-14, 16-18, 23-27, 29, 31)

Male Imago.—Unknown.

Female Imago.—Unknown.

Mature Nymph (in alcohol).—Body length, ♂ 4.0-5.0 mm. ♀ 4.5-5.5 mm. Dorsum of head dark brown, black between ocelli, venter pale yellow, a broad triangular pale yellow spot on median posterior margin of clypeus. Scape and pedicel of antennae reddish-brown, flagellum pale yellow. Ocelli black. Upper portion of ♂ eyes orange red, lower portion black; ♀ eyes black. Mouthparts: maxillae pale orange yellow to brown; labial palpi yellow except segment 3 light brown, outer margin of segment 2 of palpi with 15-20 long thick hairs, lateral margins of submentum each with 9-15 spines (Fig. 18). Thorax: nota dark brown with network of narrow black. Sterna brown, thoracic ganglia black, externally visible. Legs yellow, subcoxae faintly washed with brown; tarsi each with 16-20 spines; each claw with 25-30 denticles, apical denticle broader than maximum width of claw (Fig. 24). Abdomen: terga black brown. Sterna yellow washed with dark brown, ganglia black brown and external-

ly prominent. Gills: membrane and tracheae black. Caudal filaments: partly broken off and missing, remaining basal segments yellow.

Geographical Distribution (Fig. 32).—Holotype ♂ mature nymph, CHILE: Magallanes Prov., Isla Mornington, Puerto Alert, 20/27-IX-1969, O. S. Flint, Jr.: paratypes, 9 nymphs, same data as holotype; 25 nymphs, Magallanes Prov., Puerto Bueno, 51°S, 74°12'W, 2-X-1969, O. S. Flint, Jr.

All types are preserved in alcohol. Holotype and 15 nymphal paratypes are deposited in the collections of the National Museum of Natural History. Five nymphal paratypes are each deposited in the collections of Florida A&M Univ. and Univ. of Utah.

Etymology.—Species is named for Dr. O. S. Flint, Jr., who collected the specimens in Magallanes Prov., Chile.

Biology.—Little is known about the biology of *M. flinti*. The genus has only been collected from 2 areas in Magallanes Province, Chile by Dr. Oliver S. Flint, Jr. In Puerto Alert, collections were made in a stream about 5 m wide and 0.3 m deep with deep pools and water falls and from small tributary (30-90 cm wide × 5-10 cm deep) with a rubble and moss bottom, set in tundra and open forest. In Puerto Bueno, collections were made in a 30-90 cm

× 5-10 c, forest stream which had a mixture of gravel and rubble bottom with thick growth of moss.

The emergence of the adults is unknown. The nymphs collected in late September were nearly mature but did not have black wing pads.

The nymphs are primarily detritivores. Gut contents were detritus (82.93%), mineral particles (6.64%), diatoms (6.64%), and filamentous algae (3.79%).

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Fig. 32.—Geographical distribution of *Dactylophlebia carnulenta* (●) and *Magallanella flinti* (▲) in the southern Andes (Chile and Argentina).

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REFERENCES CITED

- Demoulin, G. 1955. Ephemeropteres nouveaux ou tares du Chile. Bull. Inst. R. Sci. Nat. Belg. 31(22) : 1-15.
- Eaton, A. E. 1899. An annotated list of the Ephermeridae of New Zealand. Trans. Entomol. Soc. London 1899 : 285-93.
- Harker, J. E. 1954. The Ephemeroptera of eastern Australia. Trans. R. Entomol. Soc. London. 105 : 241-68.
- Hubbard, M. D., and W. L. Peters. 1977. Ephemeroptera. P. 165-9. In Biota Acuatica de Sudamerica Austral, S. H. Hurlbert, (ed.) San Diego State Univ., San Diego.
- Illies, J. 1969. Biogeography and ecology of Neotropical freshwater insects, especially those from running waters. P. 685-708. In Biogeography and Ecology in South America, E. J. Fittkau et al., (eds.) Vol. 2, Dr. W. Junk, The Hague.
- Lestage, J. A. 1930. Note sur le genre *Massartella* nov. gen. da la famille Leptophlebiidae (Ephemeroptera) et la genotype *Massartella brieni* Lest. Mission Biol. Belg. Bresil 2 : 249-58.
- Needham, J. G., and H. E. Murphy. 1924. Neotropical mayflies. Bull. Lloyd. Libr. 24, Entomol. Ser. 4 : 1-79.
- Pescador, M. L., and W. L. Peters. 1974. The life history and ecology of *Baetisca rogersi* Berner (Ephemeroptera: Baetiscidae). Bull. Fla. State Mus. 17 : 151-208.
1980. Phylogenetic relationships and zoogeography of cool-adapted Leptophlebiidae (Ephemeroptera) in southern South America. In Proc. Third Internat. Conf. Ephemeroptera, J. Flannagan, (ed.) Plenum, New York.
- Peters, W. L., and G. F. Edmunds, Jr. 1970. A revision of the generic classification of the Eastern Hemisphere Leptophlebiidae (Ephemeroptera). Pac. Insects. 12 : 157-240.
1972. A revision of the generic classification fo certain Leptophlebiidae from southern South America (Ephemeroptera). Ann. Entomol. Soc. Am. 65 : 1398-414.
- Peters, W. L., J. G. Peters, and G. G. Edmunds, Jr. 1978. The Leptophlebiidae of New Caledonia (Ephemeroptera). Part 1. Introduction and Systematics. Cah. O.R.S.T.O.M., Ser. Hydrobiol. 12 : 97-117.