

**TAXONOMIC REVISION OF THE GENUS *Metamonius* EATON
(NESAMELETIDAE: EPHEMEROPTERA), WITH NOTES ON ITS BIOLOGY
AND DISTRIBUTION**

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ABSTRACT: The information available on the Chilean representatives of the superfamily Siphonuroidea (sensu Kluge et al., 1995) is outdated, inaccurate and incomplete. A taxonomic revision of the siphonuroid genus *Metamonius* is presented here. New material is compared with descriptions in literature of the three species of *Metamonius* in order to determine the variability of the more relevant characters; discrepancies with the authors of the species are discussed; synonymy of *M. anceps* and *M. fuengiensis* is proposed; removal of the species *M. hollermayeri* from the genus is also proposed; description of the previously unknown male subimago of *M. anceps* is included, as well as notes on the biology and distribution of the genus; association of larvae and winged stages is now confirmed by rearing. This paper represents Part I of a series revising the Siphonuroidea of Chile.

Key words: *Metamonius*, Ephemeroptera, neotropical, taxonomy, distribution.

INTRODUCTION.

At the alpha taxonomy level a large portion of the aquatic insects fauna of Chile has received very little attention beyond their very first descriptions.

Amongst the Ephemeroptera several groups have hardly dealt with in the last 50 years, so that most of the information on them is available only from the works of early authors such as Pictet (1843), Blanchard (1851), Eaton (1871, 1881, 1883-1885), Weyenbergh (1883), Ulmer (1904, 1920, 1938), Navás (1912, 1915, 1918, 1922a y b, 1923, 1925, 1928, 1930a y b, 1933a y b, 1934, 1935), Needham & Murphy (1924), Lestage (1930, 1931, 1935a, b) and Demoulin (1952, 1955a, b, c, d, e). Most of these pioneer works are no longer of use since species were often described from one developmental stage only, so that different stages were frequently described as different species. Also, some of the old descriptions are so incomplete or inaccurate that they may fit more than one species.

Recently, the Chilean Atalophlebiinae (Leptophlebiidae) have been clarified in the main by Peters & Edmunds (1972), Pescador & Peters (1980a y b, 1982, 1985, 1987, 1991),

Miserendino (1996), Pescador (1997), and Pescador & Gonser (2001), who have studied their taxonomy in detail as part of a worldwide interest in this speciose Gondwanean group. Similarly, some of the Chilean Baetidae have recently been studied by investigators such as Gillies (1990), Lugo-Ortiz & McCafferty (1996, 1999a, b) and McCafferty (2000).

However, there is no recent taxonomic work available on the rest of the Chilean Ephemeroptera, so that descriptions of the species of the Caenidae family and superfamily Siphonuroidea (sensu Kluge et al. (1995) are still incomplete. Therefore, their specific diversity has not been established and, in most cases, not all the developmental stages have been described.

In addition to the purely scientific importance of this highly endemic fauna, the updating and completion of this information has become necessary so that this knowledge can be applied to environmental evaluation and monitoring of the Chilean watercourses.

This work is the first of a series of taxonomic revisions of the Chilean Siphonuroidea, which includes the Ameletopsidae, Nesameletidae and Oniscigastridae families. Each genus will be dealt with individually and information on their distribution and biology will also be included.

This first paper is a revision of the genus *Metamonius*.

Bibliographical antecedents.

The Ephemeroptera family Nesameletidae is part of the Gondwanean fauna of amphinotic distribution. In the Australian zone the family is represented by the Australian genus *Ameletoides* (one species), and the New Zealander *Nesameletus* (two species). In the Neotropical zone Nesameletidae is represented by the genus *Metamonius*, with three species.

The genus *Metamonius* was erected by Eaton in 1885 in order to relocate in it the species *Siphylurus? anceps*, previously described by himself in 1883, which he then designated as *M. anceps*. All this was done for two winged specimens, a male imago and a female subimago from Chile, with no further locality specified. Eventually, Demoulin (1955a), with new material collected at Pichinahuel, Prov. de Arauco, Chile, described the female imago of the species and, in a later work (1955c), described the nymph of *Metamonius anceps* from specimens collected at Los Maitenes, Santiago, Chile; río Gol Gol and Portezuelo de Puyehue, Prov. de Osorno, Chile. In this paper, Demoulin (1955c) also redescribed the female subimago from one of the specimens of the río Gol Gol. *Metamonius anceps* remains to this day the type-species of the genus.

Independently, a peculiar nymph from Tierra del Fuego, Argentina, had been

described by Ulmer in 1904, who designated it only as a “nymphé des *Baëtis*-Typus”. Due to its similarity with the New Zealand species *Ameletus ornatus*, Lestage (1935a) tentatively proposed to move this larvae into the genus *Ameletus*, even though, by designating it only as *fuegiensis sp. nov.*, he kept the genus as doubtful. Eventually Lestage himself (1935b), based on characters from its mouthparts, relocated the nymph in the genus *Ameletoides*, as *A. fuegiensis*. Finally, Demoulin (1955c) placed it, with reservations, in the genus *Metamonius* as *M. fuegiensis*, thus consigning the second species of the genus.

In 1935 Navás published a very poor description of a winged male and female from Trumao, Río Bueno, Prov. Valdivia, Chile, as *Metamonius hollermayeri*. This would be the third species of *Metamonius*. Unfortunately, the types have been lost.

These three species; *M. anceps*, *M. fuegiensis*, and *M. hollermayeri*, constitute the diversity of the genus *Metamonius*.

The descriptions we have of the species of *Metamonius* are based on few specimens, themselves coming from only a few localities. Therefore, the variability of their characters is little known.

Not all the stages of all three species have been described, only *M. anceps* is better known although the male subimago still remains to be described. Of *M. fuegiensis* we only know the nymph. As for *M. hollermayeri*, the very scanty description of its winged stages does not even specify whether these are imagos or subimagos.

Therefore, to this day we have no clear-cut diagnostic characters for each of the three species, in all stages of development.

METHODS.

Insect material was collected from rivers and streams in various localities from the Región Metropolitana to Magallanes and Tierra del Fuego in the XII Region, on the Chilean side of the Andes, and from Bariloche to Ushuaia on the Argentine side. This was done in springtime and summer of 2000, 2001, 2002, and 2003. Specimens from the Colección de Macrozoobentos del Instituto de Zoología de la Universidad Austral de Chile, collected prior to this study, were also included. In this work we shall only mention those localities where *Metamonius* was actually found.

Nymphs were collected using a dipnet with a mesh of 500µm. The emerging stages were captured by means of a semi submerged driftnet, anchored to the stream bed from early afternoon till the following morning. Flying insects were captured with an aerial net with extender handles, by the watercourses. These are non-discriminating methods; therefore

representatives of the whole benthic community accompanying *Metamonius* were also captured and preserved in a 70% ethanol solution as complementary material for this study.

Some of the nymphs collected were kept alive for rearing in their native watercourses, inside semi-submerged cages. Occasionally, nymphs from far away localities were transported in insulated containers to a stream near our laboratory, in order to better supervise the rearing.

Specimens in all stages of development were preserved in a 70% ethanol solution and stored in glass vials. This material is deposited in the macrozoobenthos collection kept by Maritza Mercado at the Instituto de Zoología of the Universidad Austral de Chile in Valdivia.

Diaphanous microscopy preparations were made of mouthparts, legs and rear abdomen of specimens from different localities. The nymph parts were heated below boiling point in 5% KOH on a controlled-temperature hot-plate, and kept in this solution for some minutes -according to their sizes - until optimum transparency was achieved. After washing in distilled water, the diaphanized pieces were immersed for no less than two minutes in absolute ethanol, and mounted in Euparal.

Diaphanous preparations following this procedure, were also made of wings, legs, and genitalia of male and female adults.

Material examined:

- 3 male nymphs, 3 female nymphs, 1 male subimago and exuviae (reared), 3 female subimagos and exuviae (reared), 1 male imago and exuviae (reared), 1 female imago and exuviae (reared); Río Quempo, altitude aprox 1500 m, El Alfalfal, Región Metropolitana, Chile. N° col. N-0987, N-1773, N-1774, A-1011, A-1316, A-1317, A-1318, A-1319, A-1320.
- 4 male nymphs, 4 female nymphs; Río Icalma, altitude 1180 m, tributary to Laguna Chica de Icalma, IX Region, Chile. N° coll. N-1356a, N1356b.
- 3 male nymphs, 7 female nymphs; Estero Dolluco, 39°23' 73°05', Cordillera de Queule altitude 600 m., IX Region, Chile. N° coll. N-1779, N-1779.
- 28 male nymphs, 37 female nymphs, 4 female subimago and exuviae (reared), 3 male imago and exuviae (reared), 1 female imago and exuviae; unnamed stream, 40°40'56''S; 72°01'13''W, Ruta Internacional Puyehue, Osorno, X Region, Chile. N° coll. N-1770, N-1771, N-1772, N-1775, N-1776, N-1777, N-1780, N-1781, N-1782, N-1783, N-784, A-1321, A-1323, A-1324, 1325, A-1326.

- 1 female nymph, 1 male nymph; Río Frío, aprox. 10 km south of Villa Santa Lucía, Chiloé Continental, X Region, Chile. N° coll. N-0710
- 1 male nymph, unnamed stream at Puente Camahueto, (42°49.55' S; 72°43,44'W) 13 km. South of Caleta Gonzalo, altitude 185 m, X Region, Chile. N° coll. WDS-A-1512.
- 1 male nymph; Río Laura, altitud aprox. 500 m., Aysén, XI region, Chile. N° coll. BAD-9419.
- 1 nymph; Estero Acantilado, altitud aprox. 150 m., tributary to Río Queulat, XI Region, Chile. N° coll. N-0796.
- 7 male nymphs, 15 female nymphs; Río Tierra Mayor, aprox. 11 km north of Ushuaia, Tierra del Fuego, altitude aprox. 300 m, Argentina. N° coll. N-1500.
- Microscopy preparations of a male imago identified as *Metamonius sp.* from the locality of Ushuaia, Tierra del Fuego, Argentina, deposited in the collection of the Museo Miguel Lillo de Tucumán, was also reviewed, through the kindness of Dr. Eduardo Domínguez.

RESULTS AND DISCUSSION.

Genus *Metamonius* Eaton

The genus *Metamonius* was erected by Eaton (1885) from winged specimens, and redefined by Demoulin (1955b), also from adult individuals of the type species *Metamonius anceps*, in that same paper Demoulin (op. cit.) presented complementary information to Eaton's (1885) original description.

The following diagnostic characters for the genus were gathered from literature by Dominguez et al. (1994). Adult stages: anastomosis between the transverse veins of the stigmatic area absent; costal projections of hindwings rounded (Fig. 1b); tetrasedgmented genital forceps (Fig. 1e). Nymph: hydrodynamic body; abdominal gills oval, with a chitinized line through the central portion, and small denticles along the outer margin.

These characteristics are consistent with our observations except that our material invariably shows moderate anastomosis in the stigmatic area (Fig. 1a). This anastomosis is more intense in the subimaginal stage of both sexes and somewhat more so in males. Eaton (1885) also illustrates –in his fig. 34b of plate XX – just such a process in the wing of a male imago.

Further characters of diagnostic value for the adult stages: last two segments of forceps together subequal in length to the second, reduced caudal filum, claws identical for all three legs (Ulmer, 1920). This last character was also indicated by Lestage (1931) in his keys to the genera of Ephemeroptera.

Further characters of diagnostic value for the nymph: Hypognathous head downwards oriented in 90° as-per the longitudinal body axis (Ulmer, 1904).

Metamonius anceps (Eaton, 1883)

Siphylurus? anceps Eaton, 1883; pag. 209, plate XX, fig. 34b.

While reviewing the specimens collected for this work we found that the existing descriptions by Eaton (1885), and Demoulin (1955a, b, c), are quite accurate and closely correspond to our new material. Therefore we shall make use of them and mention here only new observations and discrepancies with these authors.

Male imago.

Eaton (1885), when referring to the genitalia mentions only the forceps, accessory structures of the male reproductive system. In view of the taxonomic importance with diagnostic value of the whole reproductive apparatus, we present here a complete description of the external morphology of all its components.

Genitalia (Fig. 1e): Gonobase angular with distal portion broader, margin free with a wide and shallow “U” shaped cleft forceps tetrasedgmented; segment 1 subrectangular, width approximately 3/5 of its length; segment 2 length equivalent to 1/2 of complete forceps; segment 3 length 1/3 of segment 2; segment 4 subequal to segment 3. Penis lobes fused from their base almost up to the apex, in most cases the middle part is narrowed and a discrete waist can be observed. Each lobe presents, in its distal apex, two lateral projections, one internal the other external, the external being the more basal of the two. The distal extreme of each lobe is projected towards a rounded apex.

Eaton (1883) gave the following tarsal proportions for the first two segments of the male imago's hind leg: segment 1 in length 4/5 of segment 2. Subsequently, Demoulin (1955a) questions this proportion and asks Mr. D. E. Kimmins of the British Museum to revise Eaton's specimen. Kimmins rules that the first segment is longer than the second in a relation of 14/12. The revision of our material has shown this 14/12 relation to be accurate in most cases, though in some individuals both segments are of equal length. All the same, the variations we observed in the relative tarsal magnitudes do not alter the tarsal formulae which remains: foreleg: 1 = 2, 3, 5, 4; middle and hind legs: 1, 2, 5, 3, 4.

A description of the previously unknown male subimago is now presented.

Male subimago (in alcohol) — Body length, cerci excluded: 10,5 - 11,5 mm.

Head — Same as imago (Eaton, 1883), only the antennae are slightly thicker than the male imago.

Thorax — Same colouring as imago. Wing venation more strongly marked than imago, with more transverse veins visible, veins shaded with dark pigmentation, membrane translucent white. Stigmatic area of forewing with notorious vein anastomosis, hind wing may or may not present anastomosis in that zone. Tarsal formulae: foreleg: 2 = 3, 4, 5, 1; middle and hind legs: 2, 1 = 5, 3, 4.

Abdomen — Dorsal markings as in imago but colouration slightly more intense. Ventrally a dark brown longitudinal band goes along all segments. Segments 1 to 8 with thick posterolateral projections terminated in rounded apices, segment 10 with a deep “U” shaped posteromedian cleft; forceps nearly straight. Paracerci similar to imago, cerci shorter than imago, all conveying a markedly pubescent aspect.

Female imago.

Amongst the characteristics indicated by Demoulin (1955b), most of which are consistent with our material, it is mentioned that in the foreleg the tibia is longer than the femur, and the tarsus subequal to the tibia. The individuals, collected and reared at our disposal, all presented the tibia subequal to the femur, just as in the male imago, and the tarsus subequal to the tibia in their forelegs

Female subimago.

The descriptions by Eaton (1883) and Demoulin (1955c) are in accordance with our observations. We have found only one slight imprecision in Demoulin’s (1955c) description of the forelegs segments: in the foreleg tibia is subequal to femur but not in a 3/4 proportion as Demoulin (1955c) indicates. This seems to be an extremely variable character and in one individual we even found the tibia to be subequal to femur in the right foreleg, but exactly the opposite in the left foreleg: the femur was subequal to the tibia.

Nymph (Fig. 2).

Demoulin (1955c) presents a complete description of the nymph including a plate with illustrations (Fig. 1a-h, pag. 3, 1955c). The figure designated as “h” (Demoulin, 1955c) corresponding to the left maxilla shows the third palpus segment to be absolutely clean. All the specimens reviewed by us presented the apex covered by setae (Fig. 1f).

Even though Demoulin (1955c) mentions the presence of a serrated section on the basal half of the internal rim of the claws, we may add that it is composed of a double row of denticles (Fig. 1g).

Further characters of diagnostic value for the nymphs: distal margin of the gills is nearly straight (Fig. 1c), except in the first one in which it is curved. Denticles in gills II-VII

are disposed in two sections along the gill margins, as shown by Demoulin (1955c, Fig.1c, for gill IV). The first section covers approximately one third of the distal margin and continues along the straight portion, up to approximately 1/4 of its length. The other section is constituted by smaller and fewer denticles, and goes along the opposite corner of the distal portion of the gill. Serrated portions or minute denticles arranged in irregular groups occur between the larger denticles of both sections, setae also stem amongst the denticles which surpass even the larger ones (Fig. 1d). Gill I presents no denticles but only setae along its distal margin.

The maximum length amongst the nymphs collected for this study was 19.8 mm; in a female individual from river Quempo. In this locality and in Dolluco the largest nymphs were found. The specimens from both localities present a darker general pigmentation, which may even obliterate their characteristic maculae.

Metamonius fuegiensis (Lestage, 1935)

Nymph des Baëtis-Typus Ulmer, 1904; pag. 6-7, Figs. 1, 7-11.

Ameletus? fuegiensis Lestage, 1935a; pag.110

Ameletoides fuegiensis Lestage, 1935b; pag. 348-349.

Ulmer's (1904) description of his *Nymph des Baëtis-Typus* is completely coincident with Demoulin's (1955c) nymph of *M. anceps*, and the latter author remarked on this point. This is why, after the various tentative denominations by Lestage (1935a, b), Demoulin (1955c) included this nymph in the genus *Metamonius*, with reservations.

Further on in the aforementioned work, Demoulin (1955c) mentions three characters in the nymph which he believes might be of specific value. Two of those characters are not mentioned in Ulmer's (1904) description: the serrated section on the inner margin of the claws, and a soft appendage shaped "as gloved fingers" observable in the outer side of the cardino-stipital articulation of the maxillae. The third character is mentioned by Ulmer (1904) and, even though it is consistent with his own description of *M. anceps*, Demoulin (1955c) mentions it as a possible differentiating character: it concerns the proportions of the maxillary palp segments, in which articles I and II are subequal in length, and article III is less than half the length of article II. Besides all this, Domínguez et al. (1994) proposed that the two nymphs might be distinguished by differences in the colouration of the abdominal maculae.

We have reviewed the claw configuration of the new specimens collected in Ushuaia, type locality of *M. fuegiensis*, and all were found to have the double row of denticles

aforementioned as characteristic of *M. anceps*. Also, they all possess the soft appendage to the cardino-stipital articulation, and the segments of their maxillary palps were found to conform to the proportions found in *M. anceps*. The colouration of the maculae was similar to *M. anceps*, although the general pigmentation is darker.

Having reviewed a male imago from this same locality in Ushuaia, we have concluded that all its characteristics are consistent with *M. anceps*. Particularly the genitalia shows no difference whatsoever between the two species.

***Metamonius hollermayeri* Navás, 1935**

In spite of the very poor description Navás (1935) made of this species, whose type locality is Trumao, Prov. de Valdivia, Chile, we have good reasons to believe that it is possible to clarify its correct taxonomic position.

Three visits were made to the locality of Trumao in 2001 and 2003, in order to find new material of *M. hollermayeri*. Samples were taken in various rivers and streams of the area, to no avail. No *Metamonius* was found. What we did find though, is the species *Siphonella ventilans*, abundant in the rio Bueno (Trumao area), and whose characteristics happen to be completely congruent with the scant description available of *M. hollermayeri*.

The wing drawn by Navás (1935, Fig. 20) reveals the following characteristics: stigmatic area strongly anastomosed, much more so than in any *Metamonius* specimen we have reviewed; veins R and M forked, two veins originate at the base of R, the first branches at one third of its trajectory originating R1, R2 and R3, the second one branches off around its middle course originating R4 and R; M is forked at one third of its trajectory originating M1 and M2. This venation pattern is not to be found in the *Metamonius* material reviewed by us, nor in the literature of the genus. This pattern is characteristic of one neotropical Siphonuroid genus only, and that is *Siphonella*. Also, the shape and proportions of the wing drawn by Navás (1935) is coincident with wing of *Siphonella* by Ulmer (1938, Fig. 11). Furthermore, the type of environment favoured by *Metamonius* is not to be found in the Trumao area.

Biology.

Even though the presence of *Metamonius* is recorded in literature in at least one medium sized river such as the Gol Gol (Demoulin, 1955c) and, even though two larvae were collected by the authors in the Río Frío (prov. Palena, Chile), the great majority of captures have taken place in small mountain streams with cold, clear, well aerated waters, typically in the headwater reaches of streams well removed from, and little perturbed by

human activity. We should mention here that the Argentine lake localities found in literature are area references only, all *Metamonius* nymphs having actually been found in streams entering the lakes (Eduardo Dominguez, personal communication).

Metamonius nymphs are quick swimmers found mostly under large stones and boulders in rapid waters or in the slack marginal waters of swift streams, but always associated with rocks or other objects large enough to shelter under. Exceptionally, at Icalma, nymphs were found in abundance amongst the dense *Myriophyllum* growing from the fine gravel bottom.

The adults emerge in spring, from early November to January. Reared subimagos took 48 to 96 hours in reaching the imaginal stage. We have never observed the nuptial flight of the species, nor large swarms of individuals.

The accompanying insect fauna collected along with our *Metamonius* material, as well as what is registered in literature (Miserendino et al., 2000) reflects a community structure typical of headwater reaches, dominated by representatives of the orders Plecoptera, Ephemeroptera and torrential Diptera, accompanied by species of Megaloptera and Trichoptera. Beyond that, our records show these communities to be extremely variable at the specific level, as the local species are incorporated in each zone.

Exceptionally, *Metamonius* has been found in the the Sub-Antartic forests of Western Tierra del Fuego, in the semiarid scrubland region of Central Chile, and even in completely exposed sites above the tree line such as the Arroyo Esquel, Argentina (Miserendino y Pizzolón, 2000), but most *Metamonius* localities lie inside well forested areas, typically within the Andean *Nothofagus* dominated assemblages known as the Nord-Patagonic rainforests. Since *Metamonius* exists outside these forests we believe that the coincidental distribution of the two is due to similar environmental requirements, found mostly along the Andean and Pre-Andean slopes of South-Central Chile and Argentina.

Geographical distribution (Fig. 3).

The distributional area of *Metamonius* covers a wide latitudinal span along the Andean ranges from the province of Santiago, Chile (33° 32' S), to Tierra del Fuego (54° 47' S) in the Southernmost tip of the Continent, and also in the Chilean Coastal Ranges south of the Cordillera de Nahuelbuta (37°46'S). Bellow parallel 38°S. *Metamonius* is recorded in various Argentine localities from Lago Huechulafquen (39° 43'S) to Esquel 42°54'S, and then again in Ushuaia 54°47'S, its southernmost location. This distributional area is by no means homogeneous, as a main, more densely populated area is clearly apparent along the

Andean foothills between 37°S and 45°S, and quite impressive gaps occur from there to its most extreme latitudinal localities, both north and south. Some 1400 km from the Río Queulat (44°30'S), to Ushuaia (54°47'S), and aprox. 650 km. from Icalma (38°50'S) to Quempo (33°32'S). Furthermore, the Andean and Chilean coastal ranges are separate mountain systems, the intermediate depression between them constituting a barrier as the habitat there is unsuited to *Metamonius*. Therefore, the distribution of *Metamonius* comprises a main distributional area outside of which, in three distinct locations, *Metamonius* is found in a distributionally disjunct condition: Quempo to the North, Ushuaia to the South, and the Coastal ranges to the West.

The main *Metamonius* distributional area is roughly coincident with the present distribution of the Nord-Patagonic assemblages of *Nothofagus*-with-Conifers, and It is now a well documented fact that during the Quaternary and Holocene periods, migrations of the Chilean rainforests occurred, both altitudinal and latitudinally (Villagrán, 2001), and that along with them went all the hygrophillous biota of Chile. This we believe to be the only plausible explanation for the presence of *Metamonius* in its outpost localities: it was “carried” there, along with the shifting Nord-Patagonic forests.

In modern times the Nord-Patagonic forests stop abruptly before the ice fields in the Patagonian Andes (48°S), and become discontinuous and/or relictual in character north of the Biobío basin (37°S). Isolated patches of such forests also exist in the summits of the coastal ranges between 37°S and 43°S. Its present dsistribution was established some 3500 B.P. (Villagrán, 2001), as it was only in the late Holocene that it moved up to its present positions in the Andean foothills.

The two northenmost *Metamonius* localities are nearby mountain creeks in the Maipo basin: Los Maitenes (70°17'W-33°32'S. 1200-1400 m, Demoulin, 1955b), and Río Quempo, 1500 m. Although no paleobotanical work has been done in the Andean piedmont of Central Chile, palynological data from Laguna de Tagua-Tagua 34°30'S, in the Longitudinal Valley, indicate that the area was dominated by *Nothofagus* and conifers between 43000 and 10000 ¹⁴C years B.P. (Villagrán, 2001). Therefore, we know that assemblages similar to Nord-Patagonic forests reached the approximate latitude of the Maipo basin during the Quaternary. Should new *Metamonius* populations be found in Central Chile, none is to be expected North of 30°S, as this is the northenmost limit the temperate rainforests of Chile ever reached in glacial times (Villagrán, 1990).

The two wide-apart localities in the coastal ranges, Pichinahuel (73°02'W-37°47'S.,

height 1400, 1600 m, Demoulin 1955b) in the Cordillera de Nahuelbuta, and Dolluco (73° 05'W-39°23'S) in the Cordillera de Queule, stand within patches of Andean Nord-Patagonian forests isolated in the mountaintops of the Coastal Ranges of South-Central Chile. Though these forests were pushed westwards through the longitudinal valley as the Andes glaciers expanded in the Quaternary (Villagrán, 1991), their present position is due to a posterior altitudinal migration as the climate warmed up during the Holocene. The beginning of the Nord-Patagonian taxa colonization in Nahuelbuta is dated 5430 ¹⁴C years B.P. (Villagrán, 2001).

Ushuaia in Tierra del Fuego was under ice throughout the Pleistocene and *Metamonius* may have been preserved, along with the impoverished Fuegian *Nothofagus* forest, in isolated refugials to the east of the island (Rabassa, 2003). If this is correct, *Metamonius* would have accompanied the slow recovery of these forests during the Holocene, eventually to reach Ushuaia some 3000 B.P., as modern conditions were established in the island (Rabassa, 2003), in which case this would be a very ancient population, possibly isolated from all other *Metamonius* since Pliocene times.

On the other hand, already in Late-Glacial times, a rapid southward expansion of the North-Patagonian forests was on its way south from its quaternary refugials north of 44°S. (Villagrán, 2001). If *Metamonius* reached Tierra del Fuego in this manner further findings of *Metamonius* could be expected along this route, in the Canals Zone of Southern Chile.

Conclusions.

We conclude that the species described as *Metamonius anceps* and *M. fuegiensis* present identical characters and therefore the synonymy is proposed, the name of *Metamonius anceps* prevailing by right of priority.

The combination of characters defining the species is: nymphal body pisciform, well adapted to swimming; 7 pairs of abdominal gills, each with a longitudinal reinforcement along the middle; well developed hypognathous head angled in 90° as-per the body axis; characteristic pattern of body maculae as in Fig. 2; abdominal pattern maculae in the adults same as in nymphs; stigmatic area of the forewings with transverse veins and some anastomosis Fig. 1a; tetrasedgmented forceps in male genitalia, forceps and penes as in Fig. 1e.

The species *M. hollermayeri* Navás presents characters that will allow its relocation in the genus *Siphonella* (Mercado and Elliott, work in preparation).

Though in many groups and species endemic to the Chilean Coastal Ranges have

been identified, we were most careful in examining our material from these localities so that we can confidently ascertain that no differences whatsoever exists between Coastal and Andean *Metamonius*. Neither did we find differences among its latitudinal exponents that would substantiate different species in this genus. The genus *Metamonius* has then been found to be monospecific.

In spite of its ample distributional area *Metamonius* must be considered a rare insect, seldom found in collections, which occupies very restricted spaces in the headwaters of those systems in which it is actually present. The disjunct distribution of *Metamonius* appears to be related to migrations of the temperate rainforests of Southern-SouthAmerica during the Quaternary and Holocene periods.

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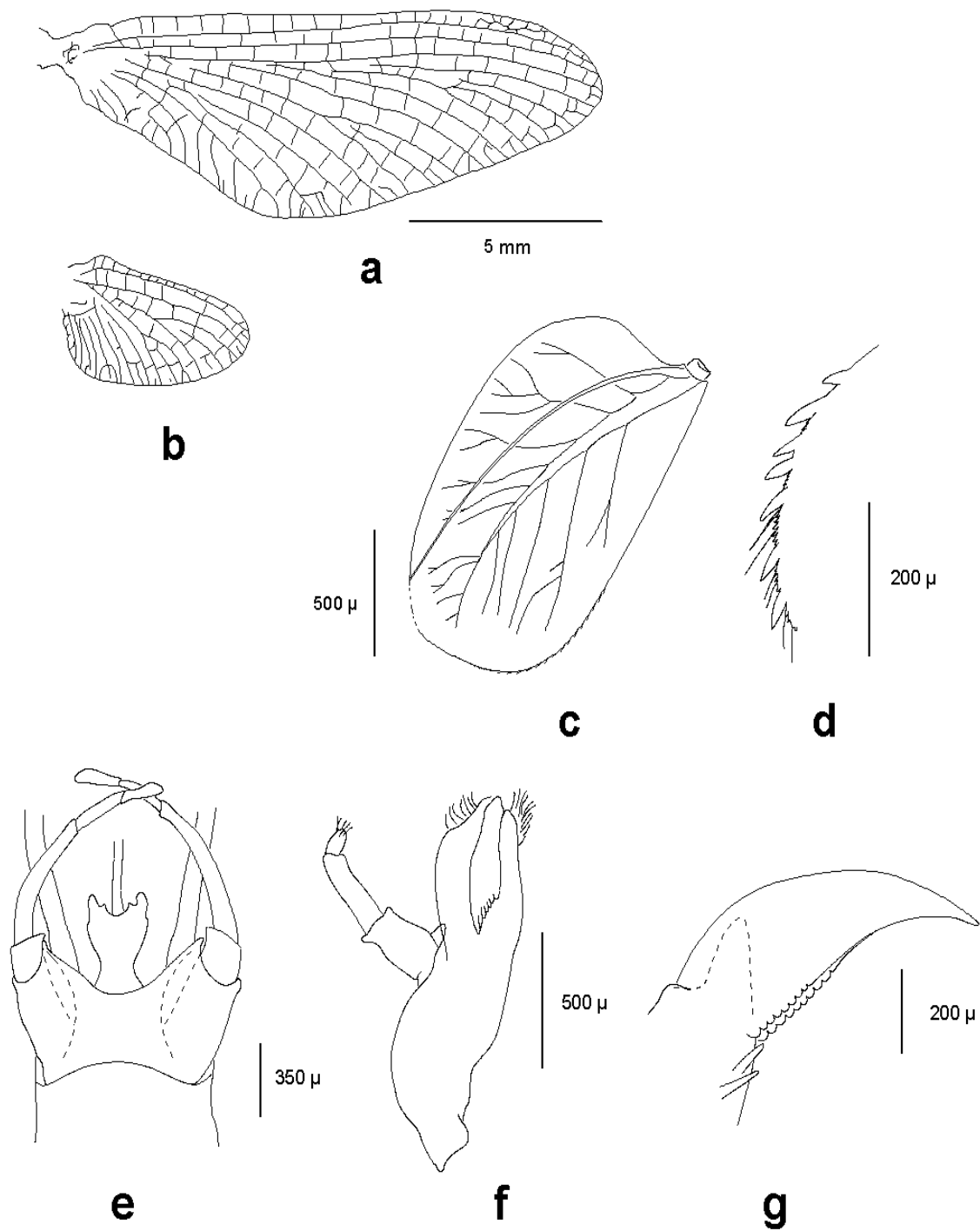


Figure 1. *Metamonius anceps*. **a**: Forewing, male imago; **b**: Hindwing, male imago; **c**: Gill IV, redrawn from Demoulin (1955b). **d**: Gill IV, portion of margin. **e**: Genitalia, male imago, ventral view. **f**: Nymph, left maxilla. **g**: Nymph, detail of claw in leg I.

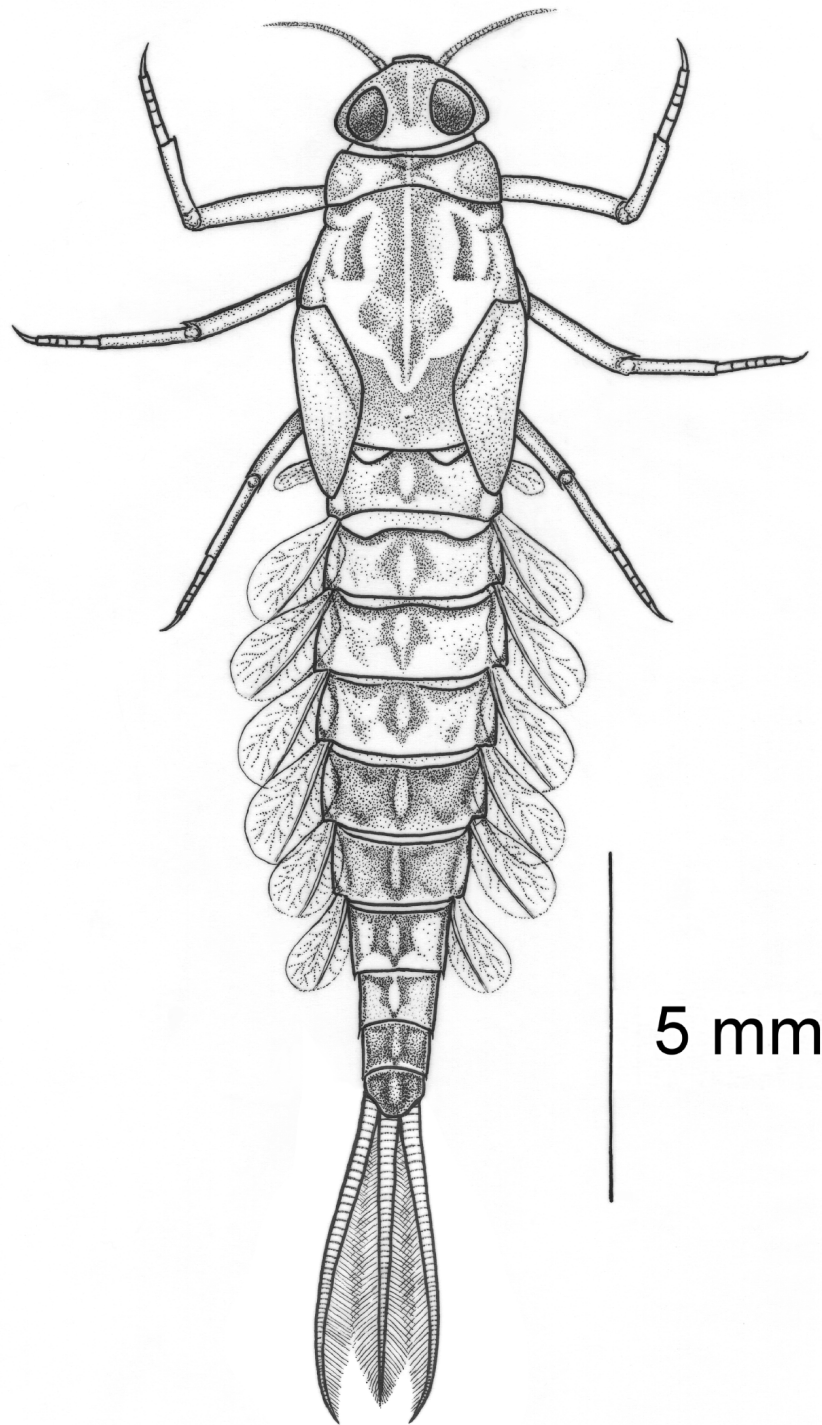


Figure 2. Nymph of *Metamonius anceps*.

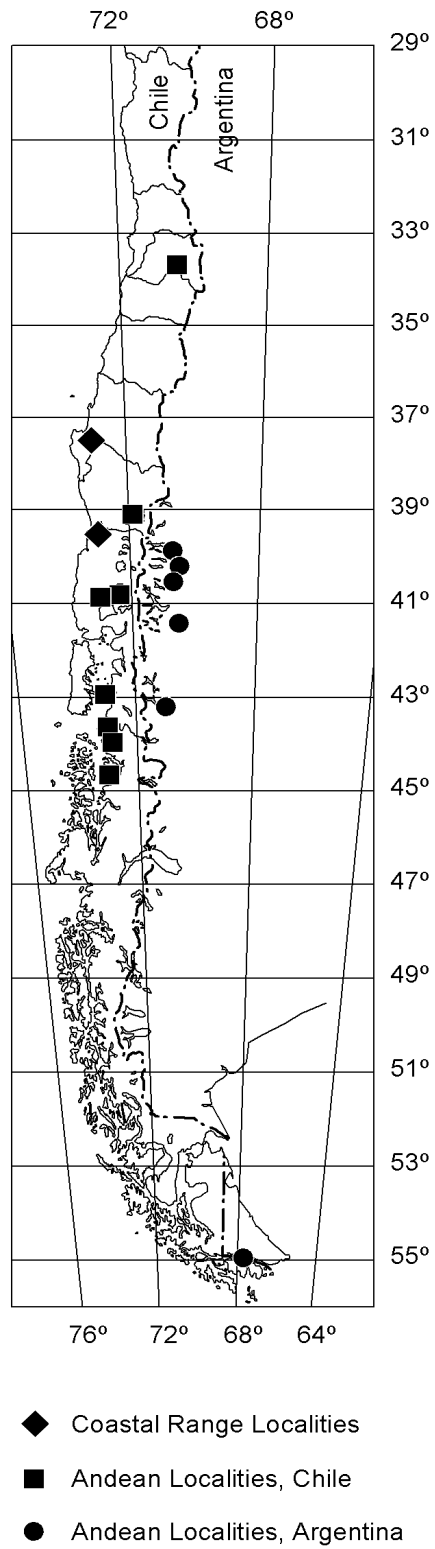


Figure 3. Geographical distribution of *Metamonius anceps*.