

## SHORT COMMUNICATION

## On the taxonomic status of three eels (Teleostei: Anguilliformes) described from Leptocephali by Tommasi (1960)

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**ABSTRACT.** The taxonomic status of three species of eels described from leptocephali larvae in 1960, is revised and elucidated: *Leptocephalus anaelisae* Tommasi, 1960, a member of Moringuidae, is confirmed as a junior synonym of *Neoconger mucronatus* Girard, 1858; *Leptocephalus juliae* Tommasi, 1960, a Muraenidae, is confirmed as a junior synonym of *Uropterygius macularius* (Lesueur, 1825); and *Leptocephalus humbermariorum* Tommasi, 1960, a Congridae, is now placed as *species inquirenda* in *Rhynchoconger* Jordan & Hubbs, 1925. Each of the three species was described based on a unique holotype, but none of the three holotypes were found in any scientific collection investigated by us. Indeed, the three holotypes are considered to be permanently lost.

**KEY WORDS.** *Leptocephalus*, *Rhynchoconger*, *Uropterygius macularius*, *Neoconger mucronatus*.

*Leptocephalus* was erected by GRONOVIVS (1763), in a publication that was later rejected for nomenclatural purposes (direction 87). Subsequently SCOPOLI (1777) re-erected it, but the name was suppressed under the plenary power for the purposes of the Principle of Priority but not for those of the Principle of Homonymy (direction 87). Indeed, *Leptocephalus* is not valid (MELVILLE & SMITH 1987, ICZN 1999). However, until the mid-1960's, the larval form of anguilliforms were frequently described as new species and placed in *Leptocephalus* (e.g., FACCIOLA 1883, EIGENMANN & KENNEDY 1902, FOWLER 1938, 1944, CASTLE 1964a, b). This practice resulted in a parallel system of nomenclature for the anguilliforms, one for the larvae and the other for the adults. A total of 217 specific names were produced based on descriptions of larvae, 207 of which are still available (ICZN 1999, ESCHMEYER 2015). The identity of several species remains questionable, in view of difficulties involved in matching juveniles with adults, and also because most types were not designated properly, or have been lost.

This is the case for three nominal species described by TOMMASI (1960). Each species was described based on a single specimen collected on board of the NE Almirante Saldanha: *Leptocephalus juliae* was obtained near to the platform break, northeast off Recife, Pernambuco State, western South Atlantic; *Leptocephalus anaelisae* and *Leptocephalus humbermariorum* were

obtained from between 270 and 300 nautical miles off São Luiz, Maranhão State, outside the Brazilian Economic Exclusive Zone in the western North Atlantic (Fig. 1).

For each species, TOMMASI (1960) provided the type locality, a short diagnosis, and a rough illustration of the types, nevertheless, a catalog number for the specimens analyzed was missing. According to L.R. Tommasi (pers. comm. to MRS M), the specimens were sent to the ichthyological collection of the Museu de Zoologia (MZUSP) in the 1960's. Such information was not confirmed by the curator in charge at the time, J.L. Figueiredo (pers. comm. to MRS M). Even though the types are whereabouts unknown, the nominal species are available in accordance with the ICZN (1999).

Searches for the type specimens were conducted by us at the Museu de Zoologia da Universidade de São Paulo (MZUSP), and the Biological Collection "Prof. Edmundo F. Nonato" of the Instituto Oceanográfico da Universidade de São Paulo (ColBIO). The descriptions and illustrations provided by TOMMASI (1960) were compared with the literature cited in the text, in order to elucidate the taxonomic status of the three species.

The MZUSP ichthyological collection houses over 600 lots of anguilliforms, but only ten of them are leptocephali. The locality and date of collection of those lots, however, do not fit the data provided by TOMMASI (1960). The ColBIO was created

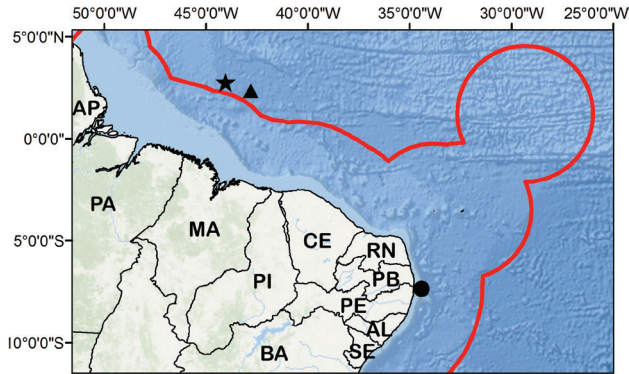


Figure 1. Northern portion of Brazil with indications for the type localities of *Leptocephalus anaelsiae* (star), *Leptocephalus juliae* (dot), and *Leptocephalus humbermariorum* (triangle). Red line represents the boundaries of the Brazilian Economic Exclusive Zone. Abbreviations stand for the Brazilian States: (AL) Alagoas, (AP) Amapá, (BA) Bahia, (CE) Ceará, (MA) Maranhão, (PA) Pará, (PB) Paraíba, (PE) Pernambuco, (PI) Piauí, (RN) Rio Grande do Norte, (SE) Sergipe.

in 2012 to host plankton and nekton samples obtained by the staff members of the Instituto Oceanográfico of the University of São Paulo, where L.R. Tommasi was a professor for over 20 years. It houses a major collection of fish larvae, with 1,482 lots of anguilliforms obtained since 1968. The specimens used by TOMMASI (1960) were collected in 1958; therefore, they are older than any specimen stored at the ColBIO. Only nine lots hosted at the ColBIO were collected by the Navio Escola Almirante Saldanha: eight in 1973, between Cabo de São Tomé and Cabo Frio (22°19'-24°22'S), Rio de Janeiro State; and one in 1987, from off Ubatuba (23°45'S), São Paulo State. Based on that, we conclude that the holotypes of *L. anaelsiae*, *L. humbermariorum*, and *L. juliae* are permanently lost.

*Leptocephalus anaelsiae* (Figs. 2, 3) was considered as a junior synonym of *Neoconger mucronatus* (Fig. 4) by SMITH & CASTLE (1972) and SMITH (1989b), but no further explanation was given to establish the synonymy. *Leptocephalus anaelsiae* can be recognized as a Moringuidae by having the gut with a prominent loop just before the anus. Within Moringuidae, it fits on *Neoconger mucronatus* by having one melanophore on the midlateral line near to the tail, one melanophore on the dorsal surface of the intestinal loop, and 93 total myomeres (range 93-109). It is noteworthy that the specimen described by TOMMASI (1960) lacks the pectoral fin, which is present in *N. mucronatus*, and has fewer preanal myomeres (51 vs. 59-60). The reduction or absence of the pectoral fin is a characteristic of the family Muraenidae; however, members of this family have a simple gut, i.e., a narrow tube without any loops (SMITH 1989b, d, FAHAY 2007).

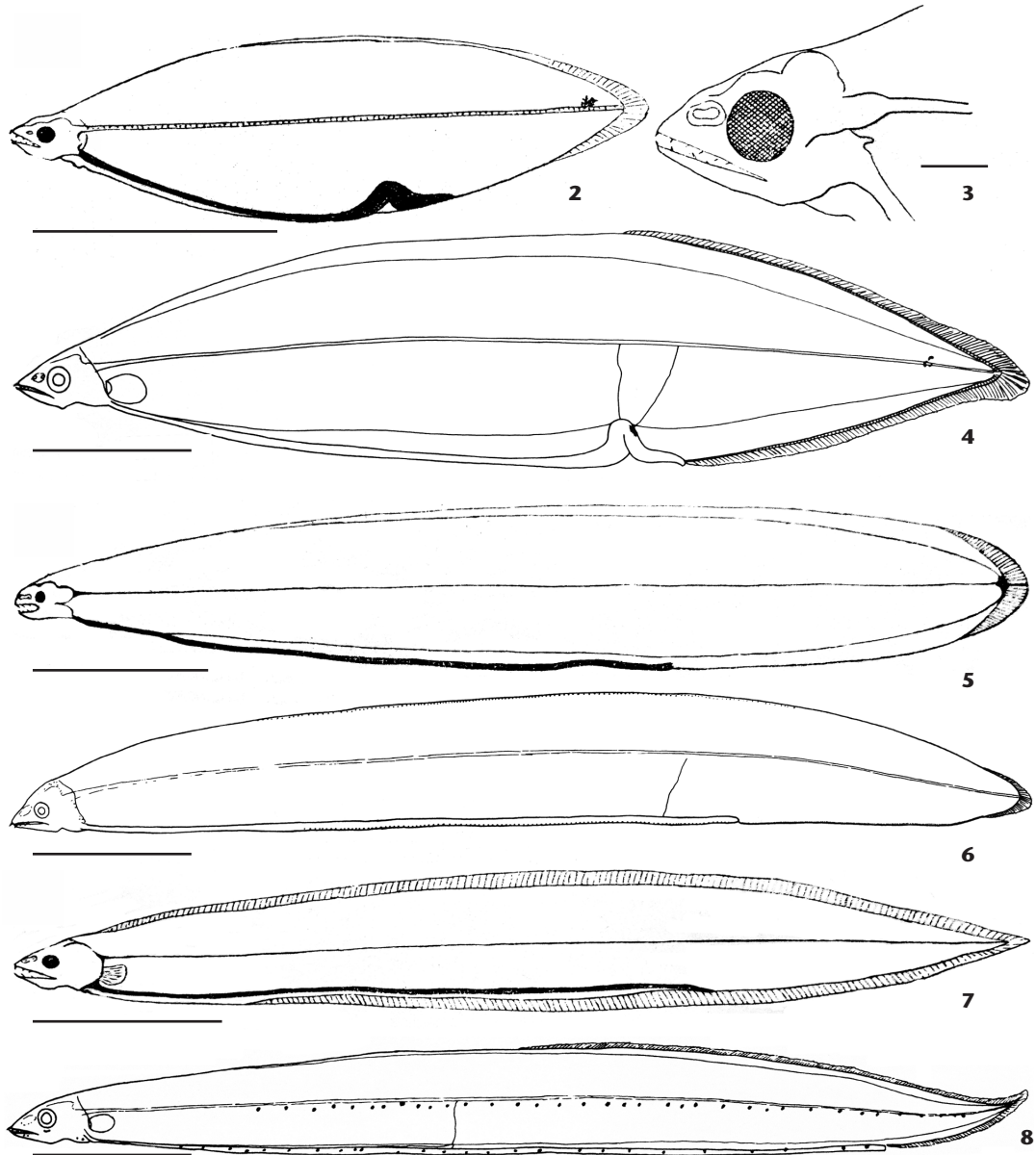
*Neoconger mucronatus* has a wide distribution in the western Atlantic, from the Gulf of Mexico (ca. 35°N) and the Caribbean to Northeastern Brazil (10° S). Larval specimens were also reported from the Sargasso Sea and the Azores (SMITH 1989b, d).

Additionally, *Neoconger* sp., possibly *N. mucronatus*, was reported based on three leptocephali collected near to the Davis Bank, Bahia State (CASTRO & BONECKER 2005, BONECKER & CASTRO 2006)

*Leptocephalus juliae* (Fig. 5) was considered to be a junior synonym *Uropterygius macularius* (Fig. 6) (SMITH & CASTLE 1972, SMITH 1989d, 2012), but also in this case the authors did not justify their decision. *Leptocephalus juliae* can be recognized as a Muraenidae by having the gut simple and narrow, without any loop or thickenings, eyes not telescopic, no pigment on the body, pectoral fins reduced or absent, and by the head short and snout blunt. Within this family, it can be assigned to either *Anarchias* or *Uropterygius* by the dorsal fin distinctly restricted to the extreme posterior end of the body, and the anal-fin origin well separated from the anus. *Anarchias* and *Uropterygius* can be distinguished by the lack of melanophores and 105-114 myomeres in *Anarchias*, and the presence of melanophores at the bottom of the gut and 118-123 myomeres in *Uropterygius* (SMITH 1989d, FAHAY 2007). As *Uropterygius*, *L. juliae* has "numerous dorsal and ventral melanophores, less grouped on the dorsal border than ventral, several of which on the posterior part of the head" (TOMMASI 1960: 91, our translation). Moreover, TOMMASI (1960: 91) described the holotype of *L. juliae* with 125 myomeres, which does not fit the range of myomeres described for the leptocephali of *U. macularius*, but fits the vertebral range (117-126) known for the adults of this species (BÖLHKE et al. 1989: 126-127). In general, the number of myomeres in the leptocephali agrees with the number vertebrae in the adults, therefore, we agree with the previous conclusions, and consider *L. juliae* as a junior synonym of *U. macularius*.

*Uropterygius macularius* is known from the western Atlantic, in the Gulf of Mexico, Florida, Bahamas, and along the Brazilian coast, from Pará to Bahia, and the Atol das Rocas (BÖLHKE et al. 1989, MENEZES et al. 2003, CASTRO & BONECKER 2005, BONECKER & CASTRO 2006).

*Leptocephalus humbermariorum* (Fig. 7) was never confidently assigned to any anguilliform species. Moreover, the illustration provided by TOMMASI (1960) does not match the description in several aspects: the melanophores were not illustrated, the dorsal-fin origin is slightly behind the head, and the anal-fin origin is anterior to the anus, a characteristic which is not known for any fish. According to TOMMASI (1960), the head of *L. humbermariorum* resembles *Bathycongrus mystax* (de la Roche, 1809) [sic], meaning *Gnathophis mystax* (De La Roche, 1809). Nevertheless, the total number of myomeres (177) is too high to fit on any species of *Gnathophis* (range 126-141, SMITH 1989c). MENEZES & BENVENIGNO (1976) regarded to the two specimens of *Gnathophis* collected in the southern Brazilian coast as *G. mystax*, and SERÉT & ANDREATA (1992) erroneously assigned *Gnathophis* sp. aff. *mystax* to an adult of *Ariosoma* sp. (see MELO et al. 2009). MENEZES et al. (2003) reinforced the need for additional taxonomic review to elucidate the taxonomic status of those larvae. *Gnathophis mystax* was never reported from adults in the western South Atlantic, since it is, apparently, endemic to the Mediterranean Sea and Eastern North Atlantic (SMITH 1989c).



Figures 2-8. Schematic illustrations of: (2-3) *Leptocephalus anaelsae*, 26 mm TL (modified from TOMMASI 1960); (4) *Neoconger mucronatus*, 33 mm SL (modified from SMITH 1989b); (5) *Leptocephalus juliae*, 57.5 mm TL (modified from TOMMASI 1960); (6) *Uropterygius macularius*, 37 mm SL (modified from SMITH 1989d); (7) *Leptocephalus humbermariorum*, 54.5 mm TL (modified from TOMMASI 1960); (8) *Rhynchoconger gracilior*, 65 mm SL (modified from SMITH 1989c). Scale bars: 2, 3, 5, 7 = 1 cm; 4, 6 = 5 cm; 8 = 10 cm.

*Leptocephalus humbermariorum* can be recognized as a Congridae by having the gut simple and narrow, without any loop or thickenings, and longer than 50% of the body size; eyes not telescopic; pectoral fins well developed; and head and tail very pointed. Among the congrids, there are only four species in the western Atlantic with similar, general characteristics and myomere counts: *Bathycongrus vicinalis* (Garman, 1899), with

168-176 vertebrae/myomeres; *Bathyuroconger vicinus* (Vaillant, 1888), with 176-187 myomeres; *Rhynchoconger gracilior* (Ginsburg, 1951), with 176-182 myomeres; and *R. guppyi* (Norman, 1925), with 173-178 myomeres (FAHAY 2007). Even though the description provided by TOMMASI (1960) is not accurate enough to determine if the melanophores present in *L. humbermariorum* are subcutaneous (= *Rhynchoconger* spp.) or superficial (=

*Bathyrcongery* spp.), *L. humbermariorum* can be distinguished from *B. vicinus* by having a single row of 42 melanophores at the ventral edge (vs. three rows of lateral melanophores), and from *B. vicinalis* by having 132 preanal myomeres (vs. 148-156 preanal myomeres). Moreover, according to the description and illustration provided by TOMMASI (1960), *L. humbermariorum* lacks a dark crescent spot below eye, which is characteristic of *Bathyrcongery* (SMITH 1989a, c, BONECKER & CASTRO 2006, FAHAY 2007).

Based on the characters mentioned above, *L. humbermariorum* greatly resembles the leptocephali of *Rhynchoconger gracilior* (Fig. 8) and *R. guppyi*. Unfortunately, no diagnostic feature is known to separate the leptocephali of those two species. The adults can be only separated by the presence of a fourth supraorbital pore between the anterior and posterior naris in *R. gracilior* (vs. absent in *R. guppyi*) and the vomerine tooth patch broader than long in *R. gracilior* (vs. slightly longer than broad in *R. guppyi*). None of those characteristics are useful for larval differentiation. Moreover, none of those two species has been confidently recorded in the western South Atlantic, and they appear to have their ranges restricted to the western North Atlantic, with *R. gracilior* more widely distributed, from off the coast of Georgia to French Guiana, including the Gulf of Mexico and Caribbean, and *R. guppyi*, restricted to the Caribbean and the Bahamas (SMITH 1989c). A record of *R. guppyi* from Rio Grande do Sul, made by BERNARDES et al. et al. (2005), was considered to be a misidentification of the subtropical congrid *Bassanago albescens* (CAIRES & FIGUEIREDO 2011).

As the distinction between the leptocephali of *R. guppyi* and *R. gracilior* is apparently impossible, and none of the species was ever reported from the type locality of *L. humbermariorum* or nearby areas, we are not able to confidently assign an identity to it. Indeed, we conclude that *L. humbermariorum* must be considered as *species inquirenda* in the genus *Rhynchoconger*.

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