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# Ocellus-bearing *Neobythites* species (Teleostei: Ophidiidae) from the West Atlantic with description of a new species

JØRGEN G. NIELSEN[1], FRANZ UIBLEIN[2] & MICHAEL M. MINCARONE[3]

[1]*Natural History Museum of Denmark, Universitetsparken 15, DK-2100 Copenhagen, Denmark. E-mail: jgnielsen@snm.ku.dk*
[2]*Institute of Marine Research, P.O. Box 1870 Nordnes, N-5817 Bergen, Norway. E-mail: franz.uiblein@imr.no*
[3]*Núcleo em Ecologia e Desenvolvimento Sócio-Ambiental, Universidade Federal do Rio de Janeiro, CP 119331, 27910-970 Macaé, RJ, Brazil. E-mail: mincarone@nupem.ufrj.br*

## Abstract

Three species of the ophidiid genus *Neobythites* containing ocelli in the dorsal fin are known from the West Atlantic: *Neobythites gilli* Goode and Bean 1885, *N. ocellatus* Günther 1887 and *N. monocellatus* Nielsen 1999. In the year 2000, 18 specimens of *Neobythites* were caught on the upper continental slope off eastern Brazil. This is the first documented record of a *Neobythites* specimen off Brazil since the holotype of *N. ocellatus* was caught in 1873. Seventeen of the specimens are referable to *N. ocellatus* and one to *N. monocellatus*. Until now the distribution of *N. ocellatus* was considered to be from off Atlantic Florida, the Caribbean Sea and then a gap of 4500 km to the type locality off Brazil. However, the holotype and the 17 specimens differ from the more northerly recorded specimens in pattern and number of spots and ocelli on the dorsal fin. The 18 Brazilian specimens have two distinct ocelli, one near the origin of the dorsal fin and one above the midpoint of the fish, and further back occasionally a small, black spot, while the northern specimens occasionally have a small, black spot near the origin of the fin, a distinct ocellus above the midpoint and up to three ocelli further posteriorly. Consequently a new species, *N. multiocellatus*, is described based on 59 specimens from the Caribbean Sea to off Atlantic Florida. The record of the *N. monocellatus* specimen extends its distribution about 3000 km southwards. A comparison of the four ocellus-bearing species from the West Atlantic is made.

**Key words**: *Neobythites*, Ophidiidae, Ophidiiformes, West Atlantic, new species

## Introduction

*Neobythites* Goode and Bean 1885 is the most species-rich of all ophidiiform genera with 50 species found in all warm waters except for the East Atlantic (Nielsen 2002). Eight species are reported from the West Atlantic of which the following three have 1–4 ocelli on the dorsal fin: *Neobythites gilli* Goode and Bean 1885, *N. monocellatus* Nielsen 1999 and *N. ocellatus* Günther 1887 (Fig. 1).

During the preparation of an annotated list of ophidiiform fishes from Brazilian waters (Mincarone *et al.* 2008) we noticed that most of the 18 specimens of *Neobythites* caught in 2000 off eastern Brazil by the RV THALASSA, did not fit any of the descriptions of the West Atlantic *Neobythites* spp. published by Nielsen (1999). Until 1999 almost all authors had considered *N. ocellatus* a junior synonym of *N. gilli* (the type species of *Neobythites*). However, Nielsen (1999) showed that the two species could be separated by the number of ocelli in the dorsal fin and the number of fin rays in the dorsal and anal fins. Furthermore, *N. gilli* was restricted to the Gulf of Mexico while *N. ocellatus* was found from off the Atlantic coast of Florida to Brazil, but not in the Gulf of Mexico. His conclusion was based on an examination of 178 specimens of *N. gilli* from the Gulf of Mexico and 308 specimens of *N. ocellatus* found from Florida to Venezuela. There was one additional specimen, namely the holotype of *N. ocellatus* that was caught by the "Challenger" expedition in 1873 off northeastern Brazil at 9°05'S, ca. 4500 km from the closest locality of *N. ocellatus* in the

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Caribbean Sea. The gap in the area of distribution was explained by small collection activity on the continental slope off northeastern Brazil. The holotype corresponds in almost all meristic and morphometric characters to the 308 specimens caught further north with the main exception being the lower number of ocelli in the dorsal fin (2 distinct ocelli *vs* 3–4) and the more anterior position of the first ocellus.

The 18 *Neobythites* specimens from Brazilian waters can be split into two groups according to the number of ocelli in the dorsal fin: 1. Dorsal fin with two distinct ocelli (17 specimens); 2. Dorsal fin with one ocellus (1 specimen).

Mincarone *et al*. (2008: 53) recognized three taxa, *N. ocellatus* (12 specimens), *N. monocellatus* (1 specimen) and *Neobythites* sp. (5 specimens), which was a result of not differing between ocelli and dark spots. Actually, the five specimens listed as *Neobythites* sp. have two distinct ocelli only, like the 12 *N. ocellatus* specimens.

The fact that the newly caught 17 specimens have two distinct ocelli placed in the same position as those of the holotype of *N. ocellatus*, strongly indicates that the few ocelli on the dorsal fin of the holotype is not a result of bleaching as suggested by Nielsen (1999: 349). The capture of the 17 specimens, 127 years later, not far from the type locality make us believe that the distribution of *N. ocellatus* is restricted to the continental slope of eastern Brazil. This indicates that the 308 specimens with a more northerly distribution do not belong to *N. ocellatus* but form an undescribed species.

The specimen from group 2 belongs to *N. monocellatus* Nielsen 1999, which is known from the Caribbean Sea southwards to off French Guiana and now found off Brazil, an extension along the coast of northeastern South America of ca. 3000 km.

Nielsen (1999) did not distinguish between ocelli and dark spots on the dorsal and anal fins. However, according to Uiblein and Nielsen (2005: 365) the difference between an ocellus and a dark spot is that the former is a dark spot surrounded by a white ring. Consequently, *N. braziliensis* Nielsen 1999 is not included in the present paper as all the markings on the dorsal and anal fins are spots. This also implies that the number of ocelli given for *N. gilli* and for the West Indian specimens of *N. ocellatus* in Nielsen (1999) is higher than in the present paper.

In the following, the three known ocellus-bearing species will be discussed and the new species described.

## Material and methods

The material examined belongs to the following institutions: MOVI—Museu Oceanográfico Univali (Itajaí, Brazil); UF—Florida Museum of Natural History (Gainesville, USA); USNM—National Museum of Natural History (Washington, USA); and ZMUC—Zoological Museum, University of Copenhagen (Copenhagen, Denmark). The position of the ocelli is measured from the tip of the snout to the anterior edge of the black ocellus-spot. The dorsal ocelli are termed “anterior” (near origin of fin), “central” (above mid-body), and further back “1$^{st}$ posterior”, “2$^{nd}$ posterior” and “3$^{rd}$ posterior”.

## *Neobythites* Goode and Bean 1885

*Neobythites* Goode and Bean 1885: 601 (type species *Neobythites gilli* Goode and Bean 1885, by monotypy).

**Diagnosis.** Body short with tapering caudal part covered with small, cycloid scales; lateral line more or less distinct; snout most often blunt, rarely pointed, equal in length to horizontal diameter of eye window; opercular spine strong and pointed; hind margin of preopercle with 0 to 2 (rarely 3) spines; median basibranchial tooth patches 2; pseudobranchial filaments 1–8; anterior gill arch with 6–34 long rakers; pectoral fin rays 22–34; pelvic fin with 2 rays; precaudal vertebrae 11–14; large variation in color patterns with some species without ocelli and dark blotches, some with one to more ocelli on dorsal fin and some with horizontal and vertical, dark bands on body and fins.

**Key to the species of ocellus-bearing West Atlantic *Neobythites***

1a. Dorsal fin with one ocellus (central)..... *monocellatus*
1b. Dorsal fin with 2–4 ocelli ..... 2
2a. Number of rays in dorsal fin 88–97 and anal fin 73–81, vertebrae 52–56 ..... *gilli*
2b. Number of rays in dorsal fin 96–101 and anal fin 80–85, vertebrae 55–59 ..... 3
3a. Dorsal fin with two distinct ocelli, the anterior near origin of fin ..... *ocellatus*
3b. Dorsal fin with 3–4 ocelli, the anterior above midpoint of fish..... *multiocellatus* n. sp.

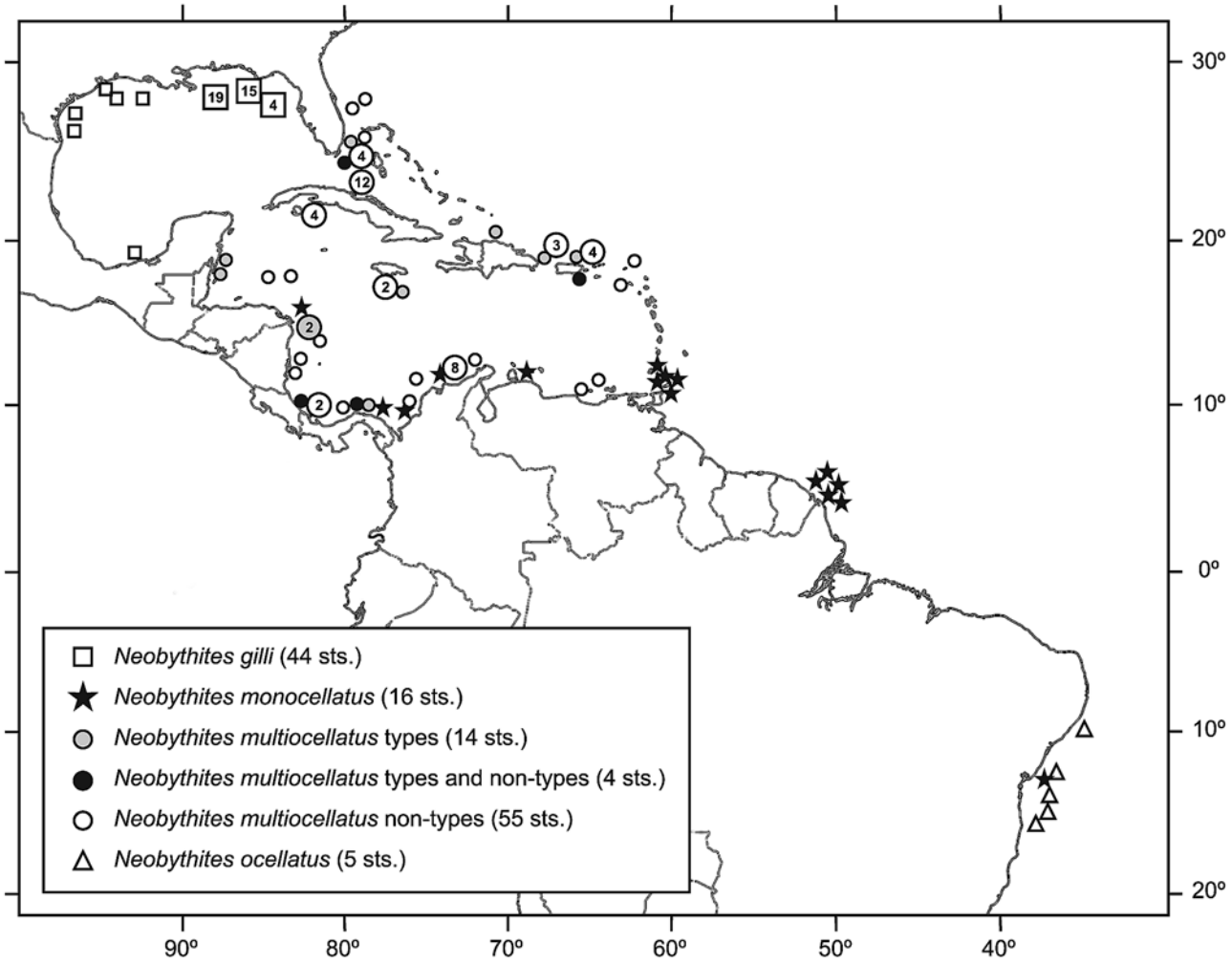


**FIGURE 1.** Records of ocellus-bearing *Neobythites* species in the West Atlantic. The numbers indicate the number of neighbouring stations.

### *Neobythites gilli* Goode and Bean 1885
(Figs. 1–3)

*Neobythites gilli* Goode and Bean 1885: 601 (type locality 28°36'N, 85°33'W).
*Neobythites gilli*: Miranda Ribeiro 1915: 632 (holotype of *N. ocellatus*); Koike and Guedes 1981: 50 (material lost; identification doubtful); Nielsen 1999: 337 (all specimens of this species caught from outside the Gulf of Mexico seem to be incorrectly identified).

**Material examined.** 178 specimens, SL 26–144* mm. Holotype and 177 non-types: for catalog numbers and localities see Nielsen (1999: 337). Additional material: none.

*Erroneously given as 59–229 in Nielsen (1999, tab. 2).

**Diagnosis.** *Neobythites gilli* differs from all other Atlantic *Neobythites* species by the following combination of characters: two distinct ocelli in the dorsal fin with a centrally placed ocellus (snout to dark part of ocellus 41–49 % SL) and a 1st posterior ocellus (snout to dark part of ocellus 59–67 % SL); very rarely a small, black spot anteriorly in the fin and one posterior to the second ocellus, 0–1 weak spine on hind margin of preopercle, total vertebrae 52–56, dorsal 88–97, and anal 73–81 fin rays.

**Similarity.** It appears from Table 3 that *N. gilli* like *N. ocellatus* have two ocelli in the dorsal fin. In *N. gilli* they are placed as the central ocellus (snout to ocellus-spot 41–49 % SL) and 1st posterior ocellus (snout to ocellus-spot 59–67 % SL) while in *N. ocellatus* they are placed as the anterior ocellus (snout to ocellus-spot 28–31 % SL) and central ocellus (snout to ocellus-spot 45–50 % SL). *Neobythites gilli* generally have fewer ocelli than *N. multiocellatus* and furthermore fewer vertebrae and rays in dorsal and anal fins than *N. multiocellatus*, *N. monocellatus*, and *N. ocellatus*. It also differs from *N. monocellatus* by having two ocelli (*vs* one).

**TABLE 1.** Meristic and morphometric characters of *N. monocellatus* and *N. gilli.*

| | *N. monocellatus* MOVI 39139 | *N. monocellatus* HT + 69 PTs | | | *N. gilli* HT + 177 non-types | | |
|---|---|---|---|---|---|---|---|
| | | range | mean | *n* | range | mean | *n* |
| Standard length (SL) | 97 | 37–154 | | 70 | 26–144 | | 178 |
| *Meristic characters* | | | | | | | |
| Dorsal fin rays | 98 | 93–99 | 96.5 | 66 | 88–97 | 92.5 | 125 |
| Caudal fin rays | 8 | 8 | 8 | 62 | 8 | 8 | 75 |
| Anal fin rays | 82 | 78–83 | 80.4 | 67 | 73–81 | 76.8 | 133 |
| Pectoral fin rays | 25 | 24–27 | 25.7 | 50 | 23–25 | 24.2 | 48 |
| Pseudobranchial filaments | 5 | 4–6 | 4.6 | 61 | 3–6 | 4.2 | 49 |
| Precaudal vertebrae | 12 | 12–13 | 12.0 | 69 | 11–13 | 12.0 | 152 |
| Total vertebrae | 57 | 54–58 | 56.4 | 69 | 52–56 | 54.2 | 139 |
| Origin of dorsal fin above vertebra n° | 5 | 5–6 | 5.1 | 69 | 4–6 | 5.0 | 85 |
| Origin of anal fin below dorsal fin ray n° | 19 | 17–21 | 19.1 | 69 | 17–21 | 19.0 | 83 |
| Origin of anal fin below vertebra n° | 14 | 14–15 | 14.5 | 69 | 14–15 | 14.3 | 83 |
| Long gill rakers on anterior arch | 15 | 13–15 | 14.1 | 66 | 12–15 | 13.8 | 52 |
| *Morphometric characters in % SL* | | | | | | | |
| Head length | 22.5 | 21.0–24.0 | 22.2 | 69 | 20.5–25.5 | 22.7 | 83 |
| Depth at anal fin origin | 17.0 | 14.0–19.5 | 17.1 | 66 | 15.0–19.0 | 17.0 | 92 |
| Upper jaw length | 11.0 | 10.5–13.0 | 11.6 | 60 | 10.5–14.5 | 11.6 | 41 |
| Horizontal eye window | 5.5 | 4.9–7.0 | 5.6 | 60 | 4.7–6.9 | 5.6 | 49 |
| Preanal length | 40.5 | 35.5–44.0 | 39.9 | 66 | 38.5–45.5 | 41.9 | 43 |
| Predorsal length | 25.5 | 20.0–27.0 | 24.8 | 64 | 22.0–27.5 | 25.4 | 54 |
| From base of pelvic to anal fin | 23.5 | 19.5–27.0 | 23.4 | 63 | 19.5–26.5 | 23.9 | 32 |
| Pelvic fin length | 18.5 | 17.5–23.5 | 20.3 | 64 | 15.0–22.5 | 19.5 | 55 |

**Description.** Table 1 shows the principal meristic and morphometric characters of the 178 specimens, including the holotype, taken from Nielsen (1999: 345). Since no additional specimens are examined reference is made to the description from 1999. For comparison reasons the sagittal otolith is shown in Figure 3. Only the "Ocelli" section of the original description is repeated here due to the present separation between spots and ocelli.

Dorsal fin ocelli and spots: Figure 2 shows the two ocelli of which the central ocellus is larger than the 1st posterior ocellus. Table 3 gives the position of the two ocelli. A black spot at the origin of the dorsal fin (snout to spot 27–31 % SL) is seen in eight specimens and also a spot posterior to the 1st posterior ocellus (snout to spot 75–80 % SL) is found in eight specimens.

**Distribution.** Known only from the Gulf of Mexico, at depths from 59 to 229 m. The distribution of the 178 specimens (from 44 stations) examined by Nielsen (1999: 337) is shown on Figure 1.

**Remarks.** Koike and Guedes (1981) recorded a 140 mm *Neobythites gilli* caught in June 1967 in a reef area off Piedade, Pernambuco, at 10 m depth. Unfortunately, the specimen cannot be traced. The color description did not mention the presence of ocelli in the dorsal fin. The shallow depth and lack of ocelli make it very unlikely that the specimen was correctly identified.

**TABLE 2.** Meristic and morphometric characters of *N. ocellatus* and *N. multiocellatus*.

| | *N. ocellatus* | | | | *N. multiocellatus* | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | HT | HT + 17 PTs | | | HT | HT + 58 PTs | | | 21 non-types | | | |
| | | range | mean | *n* | | range | mean | *n* | range | mean | *n* | |
| Standard length (SL) | 86 | 66–147 | | 18 | 124 | 68–148 | | 59 | 50–148 | | 21 | |
| *Meristic characters* | | | | | | | | | | | | |
| Dorsal fin rays | 98 | 95–100 | 98.1 | 17 | 97 | 96–101 | 98.0 | 57 | 94–101 | 97.8 | 19 | |
| Caudal fin rays | 8 | 7–8 | 7.9 | 8 | 8 | 8 | 8.0 | 48 | 8 | 8.0 | 17 | |
| Anal fin rays | 82 | 81–85 | 82.8 | 17 | 83 | 80–90 | 82.7 | 57 | 79–86 | 82.3 | 17 | |
| Pectoral fin rays | 24 | 24–27 | 25.5 | 17 | 24 | 23–27 | 25.1 | 50 | 24–27 | 25.4 | 16 | |
| Pelvic fin rays | 2 | 2 | 2.0 | 18 | 2 | 2 | 2.0 | 59 | 2 | 2.0 | 21 | |
| Pseudobranchial filaments | 3 | 3–4 | 3.7 | 18 | 4 | 3–5 | 4.0 | 55 | 3–5 | 3.5 | 17 | |
| Precaudal vertebrae | 12 | 12 | 12.0 | 18 | 12 | 12–13 | 12.0 | 59 | 12 | 12.0 | 21 | |
| Total vertebrae | 57 | 56–58 | 57.1 | 17 | 57 | 54–59 | 57.0 | 58 | 56–58 | 57.1 | 20 | |
| Origin of dorsal fin above vertebra n° | 5 | 5–6 | 5.1 | 18 | 5 | 5–6 | 5.2 | 59 | 5–6 | 5.3 | 21 | |
| Origin of anal fin below dorsal fin ray n° | 20 | 19–21 | 20.2 | 18 | 18 | 18–22 | 19.3 | 59 | 18–21 | 19.3 | 21 | |
| Origin of anal fin below vertebra n° | 14 | 14–15 | 14.5 | 18 | 14 | 14–15 | 14.2 | 59 | 13–15 | 14.2 | 21 | |
| Long gill rakers on anterior arch | 14 | 14–16 | 14.5 | 18 | 16 | 13–16 | 14.8 | 57 | 13–16 | 15.0 | 18 | |
| Total gill rakers | 20 | 20–23 | 21.6 | 17 | 23 | 20–24 | 22.4 | 57 | 20–25 | 23.1 | 18 | |
| *Morphometric characters in % SL* | | | | | | | | | | | | |
| Head length | 22.5 | 21.5–23.5 | 22.4 | 17 | 22.5 | 20.5–24.0 | 22.7 | 57 | 20.5–24.0 | 22.7 | 18 | |
| Depth at anal fin origin | 18.0 | 16.0–18.5 | 17.2 | 17 | 16.0 | 14.5–18.5 | 16.8 | 57 | 15.0–19.0 | 17.1 | 21 | |
| Upper jaw length | 11.5 | 11.0–12.5 | 11.6 | 17 | 12.5 | 10.5–12.5 | 11.7 | 57 | 10.5–12.5 | 11.7 | 18 | |
| Horizontal eye window | 6.0 | 5.3–6.1 | 5.6 | 17 | 5.1 | 4.5–6.2 | 5.2 | 58 | 4.5–6.2 | 5.2 | 19 | |
| Postorbital length | 13.5 | 12.0–14.0 | 12.9 | 16 | 13.6 | 11.0–14.5 | 13.2 | 57 | 11.5–14.0 | 12.9 | 18 | |
| Preanal length | 42.0 | 38.5–44.0 | 41.1 | 17 | 40.4 | 38.0–45.5 | 41.0 | 57 | 39.0–43.0 | 40.9 | 18 | |
| Predorsal length | 24.5 | 24.0–26.5 | 25.1 | 17 | 26.0 | 23.0–27.0 | 25.0 | 57 | 23.5–26.0 | 25.0 | 18 | |
| From base of pelvic to anal fin | 25.5 | 22.0–25.5 | 24.1 | 17 | 23.5 | 21.0–28.5 | 23.6 | 57 | 22.0–27.0 | 24.0 | 18 | |
| Pelvic fin length | 17.0 | 16.0–21.5 | 18.9 | 16 | 19.5 | 15.5–23.0 | 19.6 | 51 | 13.0–17.5 | 15.0 | 16 | |

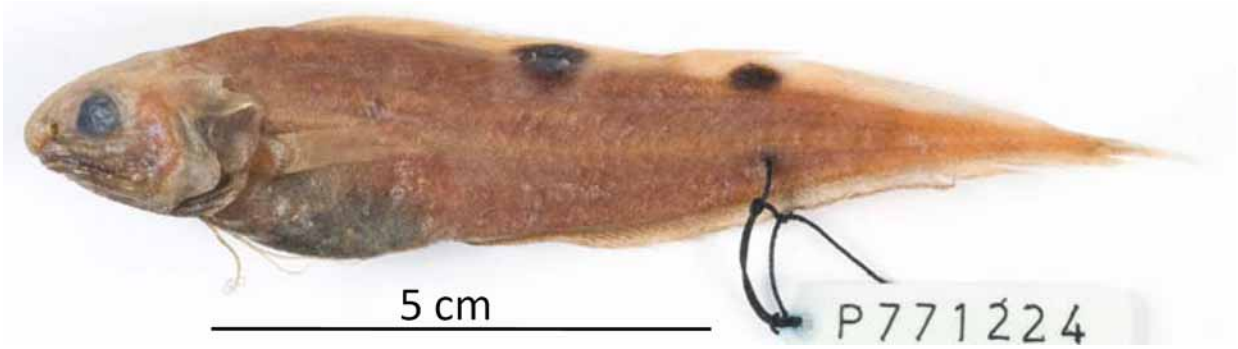


**FIGURE 2.** *Neobythites gilli*, 104 mm SL, ZMUC P771224.

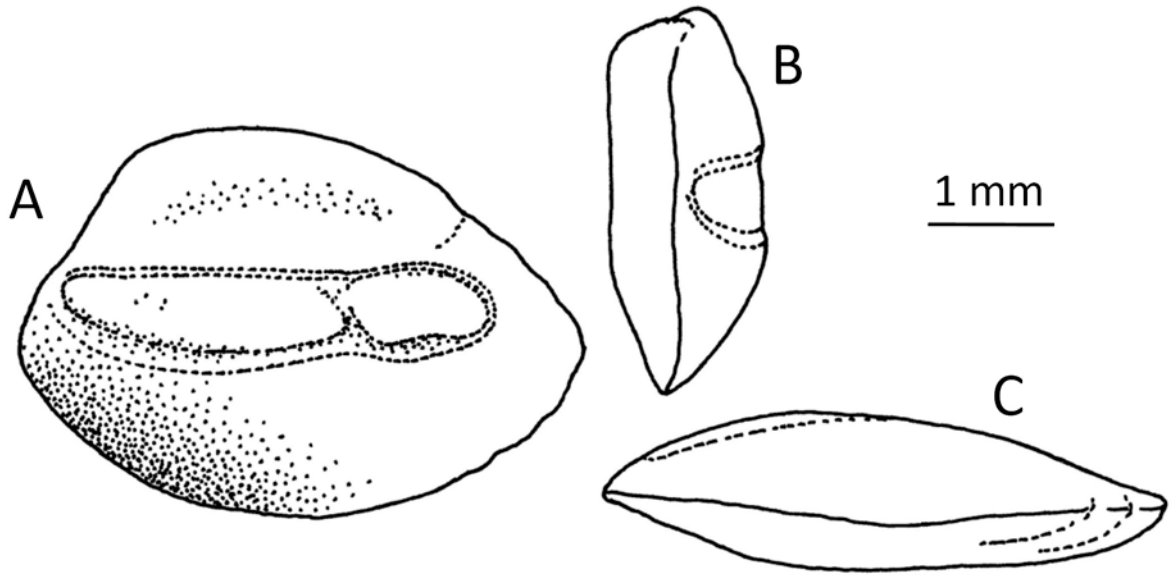


**FIGURE 3.** *Neobythites gilli*, holotype, 80 mm SL, USNM 37340. Right sagitta: A—Median view, B—Anterior view, C—Dorsal view.

***Neobythites monocellatus* Nielsen 1999**
(Figs. 1, 4–5)

*Neobythites monocellatus* Nielsen 1999: 351, fig. 8 (type locality off Venezuela, 9°53'N, 59°53'W).
*Neobythites monocellatus*: Mincarone *et al*. 2008: 53, fig. 3N.

**Material examined.** 71 specimens, SL 36–154 mm. Holotype and 69 paratypes: for catalog numbers and localities see Nielsen (1999: 351). Additional material: MOVI 39139, unripe, 97 mm SL, 13°22.057'S, 38°40.204'W–13°19.472'S, 38°38.035'W, RV THALASSA, st. E500, bottom trawl, 360–433 m, 8 Jun. 2000.

**Diagnosis.** *Neobythites monocellatus* differs from all other Atlantic *Neobythites* species by having only one ocellus on the dorsal fin, placed anteriorly to the midpoint of the fish (snout to ocellus-spot 41.0–51.0 % SL) and by the following combination of characters: preopercle lacking a distinct spine on the posterior edge (rather developed as a flat, broad process), dorsal fin rays 93–99, anal fin rays 78–83, and total vertebrae 54–58.

**Similarity.** Judging from the number of ocelli on the dorsal fin (Table 3) *N. monocellatus* is closest to *N. gilli* and *N. ocellatus* which both have two distinct ocelli. In meristic characters *N. monocellatus* is closest to *N. multiocellatus* and *N. ocellatus.*

**Description.** Table 1 shows a comparison between the Brazilian specimen and the type material (70 specimens). In spite of the large geographical separation between the type material and the new Brazilian specimen the latter falls within the variation of all characters. For comparison reasons the sagittal otolith is shown on Figure 5. See Nielsen (1999: 351) for a detailed description.

**Distribution.** *Neobythites monocellatus* is found from Honduras and along the north coast of South America to French Guiana and now also off Bahia, Brazil (13°S), an extension of ca. 3000 km (Fig. 1). Caught on the continental shelf and upper slope, at depths from 117 to 439 m.

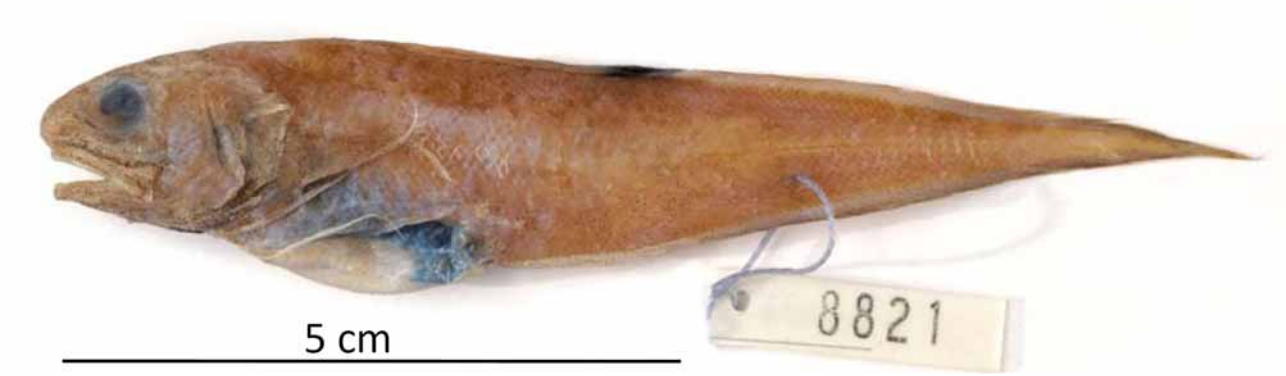


**FIGURE 4.** *Neobythites monocellatus*, 97 mm SL, MOVI 39139.

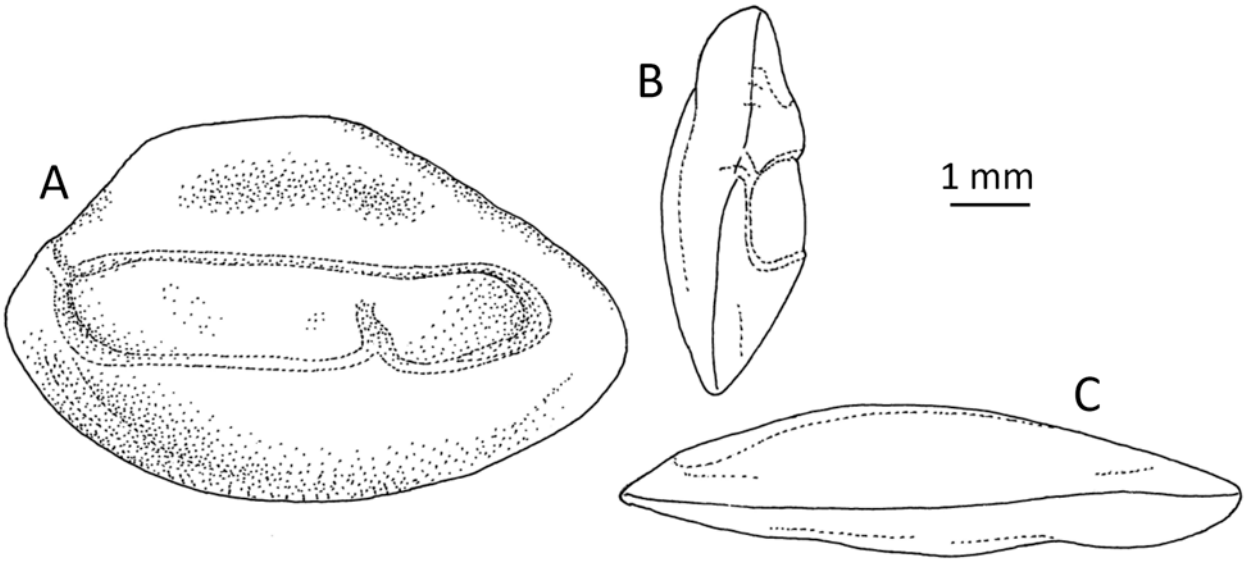


**FIGURE 5.** *Neobythites monocellatus*, 141 mm SL, USNM 309244. Right sagitta: A—Median view, B— Anterior view, C—Dorsal view.

### *Neobythites ocellatus* Günther 1887

(Figs. 1, 6–7)

*Neobythites ocellatus* Günther 1887: 103, pl. XXI, fig. B (type locality off Pernambuco, 9°05'S, 34°50'W).

*Neobythites gilli* (in part): Goode and Bean 1896: 103 (*N. ocellatus* was treated as a junior synonym of *N. gilli*, an incorrect view which was followed by most subsequent ichthyologists); Miranda Ribeiro 1915: 632.

*Neobythites ocellatus*: Nielsen 1999: 346 (except for the holotype of *N. ocellatus* all specimens belong to a new species described in the present paper); Mincarone *et al*. 2008: 54, fig. 3O.

*Neobythites* sp.: Mincarone *et al*. 2008: 54, fig. 3P.

**TABLE 3.** Position of ocelli on the dorsal fin of West Atlantic *Neobythites* species shown as percentage of standard length. Average values in parenthesis; number of specimens examined in square brackets.

| | *N. gilli* Gulf of Mexico 173 spms. | *N. ocellatus* off Brazil HT + 17 spms. | *N. monocellatus* off N and NE South America 71 spms. | *N. multiocellatus* Caribbean Sea to Atl. Florida HT + 58 PTs |
|---|---|---|---|---|
| Snout to anterior ocellus-spot | | 28–31 (28.8) [18] | | |
| Snout to central ocellus-spot | 41–49 (44.7) [161] | 45–50 (47.1) [18] | 41–51 (46.6) [71] | 43–49 (45.9) [59] |
| Snout to1st posterior ocellus-spot | 59–67 (63.0) [124] | | | 61–67 (63.8) [59] |
| Snout to 2nd posterior ocellus-spot | | | | 73–79 (77.8) [59] |
| Snout to 3rd posterior ocellus-spot or spot | | | | 79–87 (84.5) [9]* |

*often so bleached that it is difficult to decide whether it is a spot or an ocellus-spot.

**Material examined.** 18 specimens, SL 66–147 mm. Holotype: BMNH 1887.12.7.43, ♀, 86 mm SL, off Pernambuco, 9°05'S, 34°50'W, RV CHALLENGER st. 122, bottom trawl, 641 m, 10 Sep. 1873. Non-types: MOVI 39138, 39140-39142 and 39185, 5♀(66–120 mm), 13°22.057'S, 38°40.204'W–13°19.472'S, 38°38.035'W, RV THALASSA st. E500, bottom trawl, 360–433 m, 8 Jun. 2000. MOVI 38801, 1♂(117 mm), 14°28.971'S, 38°54.004'W–14°25.696'S, 38°53.870'W, RV THALASSA st. E504, bottom trawl, 278 m, 10 Jun. 2000. MOVI 39146, 39148-39153, 7♀(114–147 mm) and ZMUC P771669, 1♀(121 mm), 15°42.675'S, 38°37.298'W–15°44.231'S, 38°39.196'W, RV THALASSA st. E511, bottom trawl, 233–294 m, 12 Jun. 2000. MOVI 38798-38799, 1♂ and 1♀(108–113 mm) and ZMUC P771668, 1♀(127 mm), 13°08.894'S, 38°28.687'W–13°07.255'S, 38°26.235'W, RV THALASSA st. E516, bottom trawl, 317–416 m, 19 Jun. 2000.

**Diagnosis.** *Neobythites ocellatus* differs from all other Atlantic *Neobythites* species by the position of the two ocelli on the dorsal fin, an anterior ocellus (snout to ocellus-spot 28–30 % SL covering 5–7 rays) and a central ocellus (snout to ocellus-spot 45–50 % SL covering 8–11 rays), in eight specimens followed by a faint, brown spot (snout to spot 64–69 % SL covering 3–6 rays) and by the following combination of characters: preopercular spine absent or thin and flat, dorsal fin rays 96–100, anal fin rays 81–85, and vertebrae 56–58.

**Similarity.** *Neobythites ocellatus* is most similar to *N. multiocellatus*. See the remarks in "Similarity" under *N. multiocellatus* and in Table 3.

**TABLE 4.** Number of rays covered by spots and ocellus-spots in the dorsal fin of *N. ocellatus* and *N. multiocellatus*. Average values in parenthesis; number of specimens examined in square brackets.

| | *N. ocellatus* HT + 17 spms. | *N. multiocellatus* HT + 58 PTs |
|---|---|---|
| Anterior ocellus | 5–7 (6.0) [18] | |
| Anterior spot | | 1–4 (2.5) [28] |
| Central ocellus | 8–11 (8.8) [18] | 5–9 (7.2) [59] |
| 1st posterior spot | 3–6 (4.3) [8]* | |
| 1st posterior ocellus | | 4–8 (6.1) [59] |
| 2nd posterior ocellus | | 3–7 (4.4) [59] |
| 3rd posterior ocellus/spot | | 3–6 (3.7) [9]* |

*often so bleached that it is difficult to decide whether it is a spot or an ocellus-spot.

**Description.** The principal meristic and morphometric characters are given in Tables 2–4. Elongate fish with an indistinct lateral line. Head and body covered by small, overlapping, cycloid scales. Origin of dorsal

fin above pectoral fin base, anal fin origin well in front of midpoint of fish and pelvic fin not reaching anus. Snout blunt equal in length to horizontal eye window. Maxilla ends well posterior to eye. Teeth small and granular somewhat larger in palatines and vomer. Two median basibranchial tooth patches, the anterior narrow and long and the posterior small and round. Anterior nostril ending in a tube and the larger posterior nostril with a low rim. Posterior margin of preopercle with a broad, flat spine and opercular spine strong and straight. Anterior gill arch with 1–3 small knobs and 4–5 long rakers on upper branch, one long raker in the angle, and lower branch with 8–10 long rakers (total long rakers 14–16) and 3–7 small knobs. Pseudobranchial filaments 3–4.

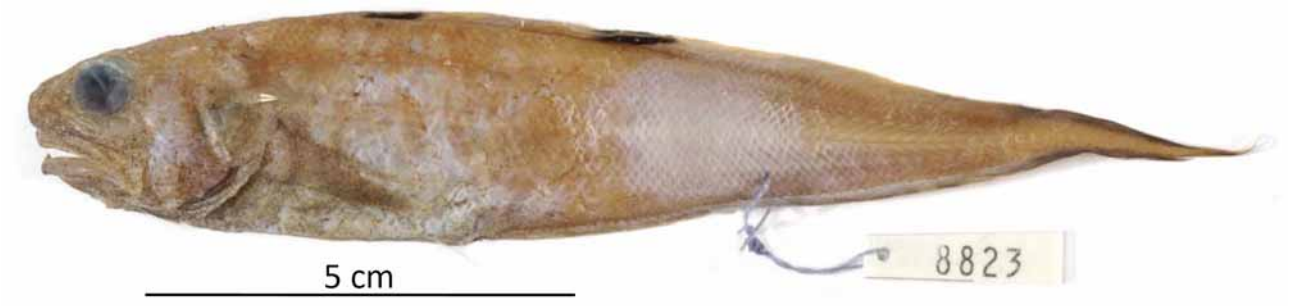


**FIGURE 6.** *Neobythites ocellatus*, 147 mm SL, MOVI 39146.

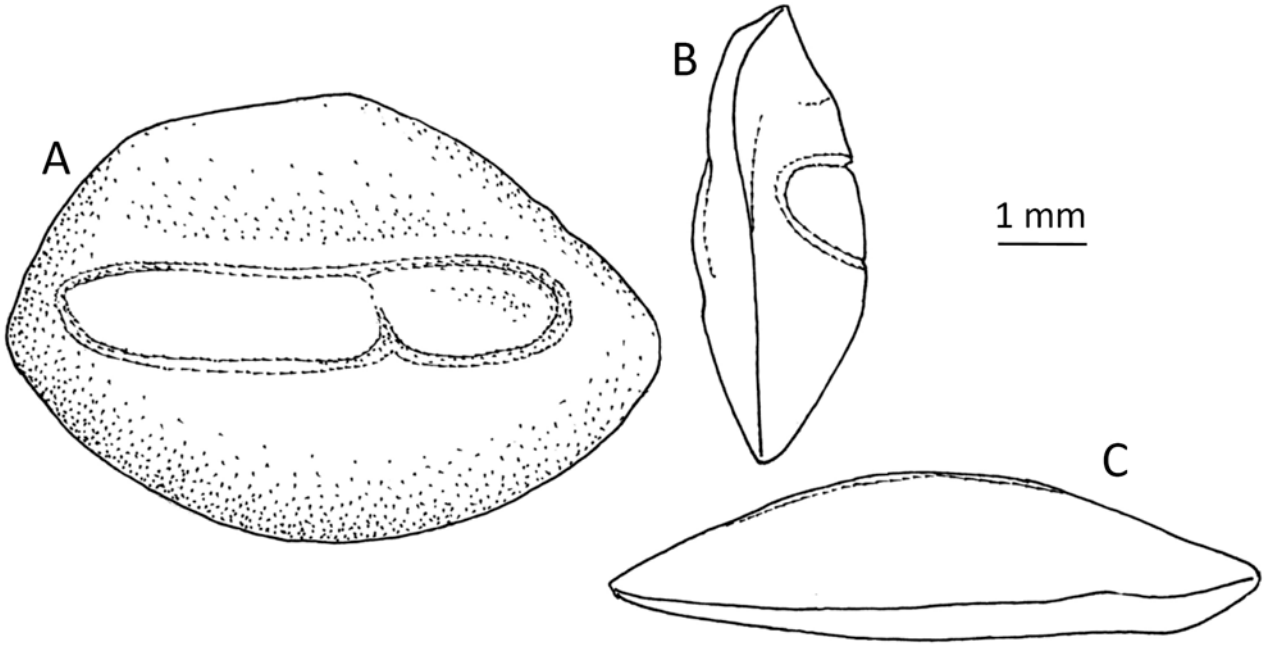


**FIGURE 7.** *Neobythites ocellatus*, 127 mm SL, MOVI 38800. Right sagitta: A—Median view, B—Anterior view, C—Dorsal view.

Sagittal otolith (Fig. 7): The oval sagitta is moderately compressed, 1.5 times as long as high. The anterior tip is rounded and the posterior more pointed. The divided sulcus is 0.8 the length of the sagitta. With the ostium twice the length of the cauda. Osteal channel not developed.

Axial skeleton (from radiographs): All neural and haemal spines with pointed tips. Anterior neural spine half the length of second spine. Vertebrae 3–8 with depressed neural spines. Base of neural spines 4–10 enlarged. Parapophyses on posterior six precaudal vertebrae. Pleural ribs on precaudal vertebrae 3–12 and epipleural ribs indistinct.

Coloration: The following is based on material preserved for eight years. Body and head generally light brownish with head and dorsal part of sides mottled darker brown. Oral and branchial cavities brown, eyes

and peritoneum blue and area around anus black. The dorsal fin has an anterior ocellus covering 5–7 rays and a central ocellus covering 8–11 rays. In eight specimens the central ocellus is followed by a small, brown spot covering 3–6 rays. A few specimens have 1–3 faint, small, dark spots on the anal fin.

**Distribution.** *Neobythites ocellatus* is known from five closely situated localities off northeastern Brazil, from Pernambuco to Bahia, at depths from 233–641 m (Fig. 1).

***Neobythites multiocellatus* n. sp.**
(Figs. 1, 8–9)

*Neobythites ocellatus* (in part): Nielsen 1999: 346 (all 308 specimens from the Caribbean Sea and further north).

**Holotype.** ZMUC P771207, ♀, 124 mm SL, off Caribbean Panama, 09°04'N, 81°25'W, R/V OREGON, st. 3597, bottom trawl, 282–301 m, 31 May 1962.

**Paratypes.** 58 specimens, SL 68–143 mm. UF 207003, 1(134 mm), off Puerto Rico, 17°47'N, 66°04'W, RV OREGON, st. ORE2639, bottom trawl, 412–439 m, 4 Oct. 1959. UF 207002, 1(100 mm), off Virgin Islands, 18°13'N, 64°14'30'' W, RV OREGON, st. ORE2649, bottom trawl, 229 m, 6 Oct. 1959. USNM 309245, 6(111–143 mm), off Puerto Rico, 18°26'N, 67°11'30"W, RV OREGON, st. 2658, bottom trawl, 320 m, 7 Oct. 1959. USNM 326145, 1(143 mm), 16°40'N, 82°51'36"W, RV EXPLORER, st. 1C, dredge, 366–770 m, 11 Mar. 1960. MOVI 43253, 1(74 mm), and ZMUC P77534, 1(110 mm), off Bahamas, 24°25'N, 79°13'W, RV SILVER BAY, st. 2470, bottom trawl, 235 m, 7 Dec. 1960. UF 211051, 9(79–117 mm), off Caribbean Panama, 9°02'N, 81°00'W, RV OREGON, st. 3595, bottom trawl, 183 m, 30 May 1962. USNM 340921, 5(103–126 mm), and ZMUC P771206, 1208-1209, 3(98–105 mm), same data as for holotype. USNM 340916, 1(139 mm), off Belize, 17°17'N, 87°59'W, RV OREGON, st. 3636, bottom trawl, 229 m, 10 Jun. 1962. UF 213150, 1(96 mm), off Atlantic Florida, 27°10'N, 79°55'W, RV GERDA, st. GRD174, bottom trawl, 318–351 m, 30 Jun. 1963. MOVI 43254, 1(110 mm), UF 233938, 1(124 mm), and ZMUC P771280-1282, 3(102–140 mm), off Dominican Republic, 19°48'30"N, 70°30'30"W, RV SILVER BAY, st. 5166, bottom trawl, 403–549 m, 15 Oct. 1963. UF 229534, 10(97–139 mm), off Belize, 17°28'30"N, 87°57'30"W, RV OREGON, st. ORE6404, bottom trawl, 275–329 m, 23 Jan. 1967. UF 230466, 5(68–112 mm), off Jamaica, 17°55'42"N, 78°00'W, RV PILLSBURY, st. 1232, bottom trawl, 384–485 m, 7 Jul. 1970. UF 229247, 8(92–118 mm), off Caribbean Nicaragua, 14°53'54"N, 81°23'12"W, RV PILLSBURY, st. 1356, bottom trawl, 542–686 m, 31 Jan. 1971.

**Non-types.** 21 specimens, SL 50–148 mm. USNM 309245, 1(100 mm), off Puerto Rico, 18°26'N, 67°11'30"W, RV OREGON, st. 2658, bottom trawl, 320 m, 7 Oct. 1959. UF 15651, 1(99 mm), off Bahamas, 23°34'30"N, 79°07'W, RV SILVER BAY, st. SB2457, bottom trawl, 458 m, 5 Nov. 1960. UF 211636, 6(93–120 mm), off Bahamas, 23°52'N, 79°11'W, RV SILVER BAY, st. SB2468, bottom trawl, 366–384 m, 6 Nov. 1960. ZMUC P77535, 1(88 mm), off Bahamas, 24°25'N, 79°13'W, RV SILVER BAY, st. 2470, bottom trawl, 235 m, 7 Dec. 1960. UF 210884, 1(148 mm), off Cuba, 23°05'N, 78°49'W, RV SILVER BAY, st. SB3512, bottom trawl, 412–458 m, 7 Nov. 1961. UF 211051, 1(114 mm), off Caribbean Panama, 902'N, 8100'W, RV OREGON, st. ORE3595, bottom trawl, 183 m, 30 May 1962. USNM 340921, 2(113–115 mm), same data as for holotype. UF 217691, 1(58 mm), off Bimini, 25°23'N, 79°17'W, RV GERDA, st. GRD276, bottom trawl, 602 m, 31 Mar. 1963. UF 227376, 1(50 mm), off Atlantic Florida, 25°27'30"N, 79°20'W, RV GERDA, st. GDR274, bottom trawl, 571–637 m, 30 Mar. 1964. UF 230445, 1(122 mm), off Caribbean Venezuela, 10°42'30"N, 66°21'W, RV PILLSBURY, st. PIL738, bottom trawl, 137–192 m, 22 Jul. 1968. UF 229247, 5(100–121 mm), off Caribbean Nicaragua, 14°53'54"N, 81°23'12"W, RV PILLSBURY, st. PIL1356, bottom trawl, 542–686 m, 31 Jan. 1971. Non-types include specimens so bleached that only rests of the central and 1st posterior ocellus remain. The presence of rests of two ocelli leaves out *N. monocellatus* and the number of rays in dorsal and anal fins and the vertebral count excludes *N. gilli.*

**Material.** The material borrowed from UF and USNM was selected so that it covers a wide array of localities. All the 80 specimens here examined are represented among the 308 non-type specimens examined by Nielsen (1999: 346). However, due to the fact that no difference was made between ocelli and spots, none of the data from the 1999-paper are re-used. On the other hand we consider all of the 308 *ocellatus* specimens as referable to *N. multiocellatus.*

**Diagnosis.** *Neobythites multiocellatus* differs from the other eight West Atlantic *Neobythites* species by having 3 (rarely 4) ocelli on the dorsal fin, the anterior of which is placed somewhat behind a line through the origin of the anal fin, and by the following combination of characters: 0–1(weak) spine on hind margin of preopercle, total number of vertebrae 54–59, dorsal fin rays 94–101, anal fin rays 79–90.

**Similarity.** The meristic and morphometric characters of *N. multiocellatus*, *N. ocellatus* and *N. monocellatus* are much overlapping while they all differ from *N. gilli* by having fewer rays in the dorsal, anal and pectoral fin, and fewer vertebrae. Table 3 shows the difference between the three species in the ocellus-pattern on the dorsal fin.

**Description.** The principal meristic and morphometric characters are given in Tables 2–4. Holotype (differences from paratypes are in parentheses and appear from Table 2): Elongate fish with an indistinct lateral line. Head and body covered by small, overlapping, oval, cycloid scales. Dorsal fin origin above base of pectoral fin, anal fin origin well in front of midpoint of fish, pelvic fin reaches to or almost to anus. Snout blunt equal to length of eye window. Maxilla ends well behind eye. Teeth small and granular in jaws and somewhat larger in palatines and vomer. Anterior basibranchial tooth patch long and narrow and posterior small and round. Anterior nostril with a small tube and the larger posterior with a low rim. Hind margin of preopercle with a broad, weak spine (0–1 weak). Opercular spine strong and straight. Anterior gill arch with two (1–3) small knobs and four long rakers on upper branch, one long raker in the angle, and lower branch with 11 long rakers (total long rakers 13–16) and five (4–7) small knobs.


**FIGURE 8.** *Neobythites multiocellatus*, holotype, 124 mm SL, ZMUC P771207.

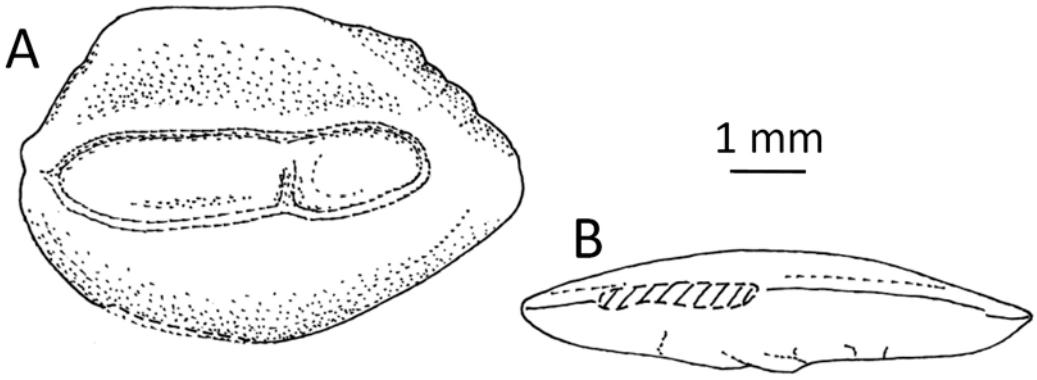


**FIGURE 9.** *Neobythites multiocellatus*, holotype, 124 mm SL, ZMUC P771207. Right sagitta: A—Median view, B—Dorsal view.

Sagittal otolith (Fig. 9): The oval sagitta is moderately compressed, 1.6 times longer than high. The anterior tip is rounded and the posterior more pointed. The divided sulcus is 0.7 the length of the sagitta, with the ostium about twice the length of the cauda. An ostial channel is indicated. The sagitta is very similar to that of *N. gilli*, *N. ocellatus* and *N. monocellatus.*

Axial skeleton (from radiographs): Tips of all neural and haemal spines thin and pointed. Anterior neural spine half the length of second spine.Vertebrae 3–8 with depressed neural spines slightly shorter than second spine. Base of neural spines 3–10 enlarged. Parapophyses developed on posterior six precaudal vertebrae. Pleural ribs present on posterior 3–12 precaudal vertebrae and on epipleural ribs 3–10.

Coloration: After 47 years of preservation the body and head are light brownish, eyes and peritoneum bluish, oral and branchial cavities dark brown and area around anus black. The dorsal fin is provided with a small black spot covering 2 (1–4) rays near its origin, a central ocellus, the ocellus-spot covering 7 (5–9) rays near the midpoint of the fish, a first posterior ocellus, the ocellus-spot covering 6 (4–8) rays, a second posterior ocellus, the ocellus-spot covering 6 (3–7) rays, a third posterior ocellus, ocellus-spot covering 6 (3–6) rays and most posterior a black spot covering 4 rays. Four of the 58 paratypes have 1–4 dark spots on the anal fin.

**Distribution.** *Neobythites multiocellatus* is recorded from most of the Caribbean Sea northwards to off the Atlantic coast of Florida. The depth range is 102–770 m. Figure 1 shows the 69 localities mentioned by Nielsen (1999).

**Etymology.** The specific name refers to the high number of ocelli (>2) on the dorsal fin.

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