



First report of rare pomfrets (Teleostei: Bramidae) from Brazilian waters, with a key to Western Atlantic species

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Abstract

This is the first in a series of reports describing new records caught with circle hooks, a method only now being employed in exploratory fishing in Brazilian deep waters. Several new records of deep-water fishes were obtained with this equipment. In this paper we record for the first time the occurrence of two genera and species of Bramidae in Brazilian waters: the tropical pomfret *Eumegistus brevorti* and the keeltail pomfret *Taractes rubescens*. We also report on previously unnoticed collection records from preserved specimens of *Pterycombus brama* in museum collections, and the first capture of an adult bigscale pomfret *Taractichthys longipinnis* in Brazil. These new records increase the number of bramid species known from Brazilian waters to ten. The addition of *P. brama* to the Brazilian Bramidae makes the Southwestern Atlantic the only known area of the world where two species of *Pterycombus* are found together. Meristic, biometric, and new biological data are presented for *Eumegistus brevorti*. Some species of bramids are rather rare and even if well described in the literature there are morphological characters and behavioral aspects yet to be added. Herein we present detailed descriptions of some bramid species to add to their published descriptions. A key to the Western Atlantic Bramidae is provided.

Key words: Pomfrets, *Eumegistus*, *Taractes*, *Taractichthys*, *Pterycombus*, deep-sea fishes, fisheries.

Introduction

The worldwide marine and usually oceanic Bramidae contains 20 species in seven genera (Mead, 1972; Mundy, 2005; Thompson, 2008). Seven species of Bramidae are reported to date from Brazilian waters: *Brama brama* (Bonaterre, 1788), *B. caribbea* Mead, 1972, *B. dussumieri* Cuvier, 1831, *Pteraclis aesticola* (Jordan & Snyder, 1901), *Pteraclis carolinus* Valenciennes, 1833, *Pterycombus petersii* (Hilgendorf, 1878), and *Taractichthys longipinnis* (Lowe, 1843) (Figueiredo *et al.*, 2002; Menezes & Figueiredo, 2003). In Atlantic waters two other genera and four additional species are known, *Eumegistus brevorti* (Poey, 1861), *Pterycombus brama* Fries, 1837, *Taractes asper* Lowe, 1843, and *T. rubescens* (Jordan & Evermann, 1887) (Mead, 1972; Mundy, 2005; Thompson, 2008). Considering the tropical, oceanic, pelagic and wide ranging habits of most of the Atlantic Bramidae, it would not come as a surprise if additional species were recorded along the Brazilian coast.

The TAMAR (Tartarugas Marinhas, marine turtles in Portuguese) Project is designed to protect sea turtle populations in Brazil, and its work has been internationally recognized as a model for conservation programs. A research program has been carried out by the TAMAR, aiming to evaluate this circle hook's efficiency in pelagic longline fisheries. Since circle hooks reduce the incidental capture of sea turtles (Piovano, 2009) the

primary goal of this research is to encourage the use of circle hooks, in order to replace the prevailing “J” hook in artisanal and industrial fisheries, thus reducing bycatch. Another goal is to perform a scientific survey of the living organisms in the deep waters of the areas close to the TAMAR stations of Bahia, Sergipe, São Paulo and Fernando Noronha in Brazil, and this has resulted in the discovery of several new records of fish species for the Southern Atlantic and Brazilian waters (e.g. *Aulopus*, *Verilius*). This paper is the first in a series reporting these new records.

In this paper we report on the occurrence of the tropical pomfret, *Eumegistus brevorti* in the deep-waters of Brazil, not only far from the coast at Fernando de Noronha Archipelago, but also close to the shore, 10 miles off Praia do Forte, Mata de São João, Bahia, in the outer shelf and slope areas, at depths between 400 and 900 m. Meristic, biometric and new biological data are presented for the species, elsewhere considered rare but found in unusually high numbers at the site off Bahia. We also report on the occurrence of the keeltail pomfret, *Taractes rubescens* as well as the very first adult specimen of the bigscale pomfret, *Taractichthys longipinnis*, from Brazilian waters, adding new data about their meristics and biology. Aspects of the precautions to be established to develop the fishery of the tropical pomfret are also discussed.

While studying preserved Bramidae specimens at the MZUSP collection to develop a key for the Western Atlantic Bramidae, we found several young individuals of *Pterycombus brama*, mistakenly labeled as *Pterycombus petersii*, the two known species of the genus to date. In the same collection we also found a few small specimens of *P. petersii*, and two other individuals of doubtful identification. With those identifications the Southwestern Atlantic comes as the only known area of the world where both species of this genus occur together, and the number of Brazilian Bramidae species increases to 10, representing one of the most diverse bramid assemblages in the world

Material and methods

Measurements of the specimens, as well as of gonads, eggs and stomach contents were taken with a digital caliper to hundredths of millimeters (mm); measurements over 150 mm and to 300 mm were taken with a manual caliper to the nearest tenth of mm; measurements over 300 mm were taken with a meter stick to the nearest mm. Mass was assessed with a hand-scale to tenths of kilograms; for stomach contents and gonads an analytical digital precision scale, with an error of 0.001 g was used. Digital pictures were taken of the examined specimens, gonads, eggs and stomach contents. All pictures but those noted in the legends are by TAMAR and/or the authors.

The report of *Eumegistus brevorti* is based on 30 specimens, including not only the ones hereafter listed but also others 21 randomly chosen from the catches. In order to have their stomach contents checked, several fishes were dissected *in situ*, even if the majority of them had voided the contents before being caught. All vomit and stomachs contents were weighed and analyzed to family, genus and species whenever possible; samples were preserved in formalin and later transferred to alcohol. The gonads of three females were collected; both gonads of each fish were measured and weighed; the total number of eggs was estimated by counting the number contained in each of 10 samples of 0.1 ml and then dividing the total volume of each gonad by the sample's mean (248 eggs).

The report of *Taractes rubescens* is based on the only specimen caught and known for Brazil. The reports of *Pterycombus* spp. are based on 12 specimens examined at the Museu de Zoologia da Universidade de São Paulo (MZUSP) and listed below. The report of *Taractichthys longipinnis* is based on the only adult specimen caught and known for Brazil.

The key to Southwestern Atlantic Bramidae species is supported not only by literature but also by specimens examined at the MZUSP fish collection and listed below. Institutional abbreviations follow Leviton *et al.* (1985), except UNESP-SV (Universidade Estadual de São Paulo, Campus de São Vicente), and TAMAR (PROJETO TAMAR).

Material examined

Eumegistus brevortii: MZUSP 95974 (2 ex: young adult, 420 mm SL, Brazil, Bahia, Mata de São João, off Praia do Forte, collector G. Marcovaldi, depth 700 m, 30 October 2007; adult, 424 mm SL, same place, collectors G. Marcovaldi & A. Carvalho-Filho, depth 450 m, 11 November 2007); ZUEC 6313 (1 ex: young adult, 443 mm SL), same data as for young MZUSP 95974; UNESP-SV 1A (1 ex: young adult, 443 mm SL), same data as for adult MZUSP 95974; UNESP-SV 2A (1 ex: adult, 454 mm SL), same data as for young adult MZUSP 95974; TAMAR 0027 (1 ex: adult, 523 mm SL), Brazil, Bahia, Mata de São João, off Praia do Forte, collector G. Marcovaldi, depth 600 m, October 2006. TAMAR 0035 (1 ex: young adult, 394 mm SL), Brazil, Bahia, Mata de São João, off Praia do Forte, collector G. Marcovaldi, depth 500 m, April 2008.

Taractes rubescens: TAMAR 0021 (1 ex: 487 mm SL), Brazil, Bahia, Mata de São João, Praia do Forte, collectors G. Marcovaldi and A. Carvalho-Filho, depth 600 m, April 2008.

Taractichthys longipinnis: MZUSP 78303 (1 ex: 29.3 mm SL), Brazil, 27°54'43"S and 47°04'37"W, Revizee Sul, Station 363, collector Equipe Revizee, 07 December 1997; TAMAR 0043 (1 ex: 472.4 mm SL), Brazil, Bahia, Mata de São João, Praia do Forte, collector G. Marcovaldi, depth 200 m, mesopelagic, 11 October 2008; UF 168739 (1 ex: 50.0 mm SL), Bahama Islands, Cay Sal Bank, Santaren Channel, NE of Anguilla Cays (24°16'42"N –79°32'30"W), depth 591–629 meters, 41' Otter Trawl Field Number: CI225 (R/V Columbus Iselin), collectors: Staiger and Hulet, reclassified as *Taractichthys longipinnis* by A. Carvalho-Filho in January, 2009.

Brama caribbea: MZUSP 78258 (4 ex: 92.2 – 113.6 mm SL), Brazil, 26°10'07"S and 46°02'13"W, N. Oc. Atlantico Sul, Revizee Sul, Station 345, collector Equipe Revizee, 19 November 1997. MZUSP 61592 (2 ex: 57.5 and 63.0 mm SL), Brazil, tuna stomach content, collector L.A. Zavala-Camin, 28 February 1977.

Brama dussumieri: MZUSP 61634 (2 ex: 94.3 and 92.5 mm SL), Brazil, tuna stomach content, L.A. Zavala-Camin, October 1977.

Brama brama: MZUSP 80495 (1 ex: 41.8 mm SL), Brazil, 27°53'52"S and 47°17'03"W, N. Oc. Atlantico Sul, Revizee Sul, Station 362, collector Equipe Revizee, 07 December 1997.

Pteraclis aesticola: MZUSP 61590 (2 ex: 33.4 and 59.7 mm SL), Brazil, tuna stomach content, collector L.A. Zavala-Camin.

Pteraclis carolinus: MZUSP 78302 (1 ex: 19.3 mm SL), Brazil, 25°56'07"S and 45°11'12"W, N.Oc. Atlantico Sul, Revizee Sul, Station 241, collector Equipe Revizee, 15 May 1997.

Pterycombus petersii: MZUSP 61586 (2 ex: 37.83 and 64.47 mm SL), Brazil, tuna stomach content, collector L.A. Zavala-Camin, October 1979 (with SL labeled as 39.97 and 67.42). MZUSP 78301 (1 ex: 29.1 mm SL), Brazil, 34°11'38"S and 51°17'13"W, 1,246 m, N.Oc. Atlantico Sul, Revizee Sul, Station 204, collector Equipe Revizee, 23 April 1997. MZUSP 80633 (1 ex: 30.3 mm SL), Brazil, 34°45'28"S and 48°46'10"W, 985 m, N.Oc. Atlantico Sul, Revizee Sul, Station 219, collector Equipe Revizee, 04 May 1997.

Pterycombus brama (all labeled as *Pterycombus petersii*): MZUSP 61622 (1 ex: 108.0 mm SL), Brazil, 30°10'S and 47°42'S, 570 m, ORV Prof. Besnard, collector L.A. Zavala-Camin, April 1972. MZUSP 61623 (2 ex: 60.13 and 84.2 mm SL), Brazil, tuna stomach content, collector L.A. Zavala-Camin, January 1973. MZUSP 61572 (1 ex: 78.7 mm SL), Brazil, tuna stomach content, collector L.A. Zavala-Camin, January 1976. MZUSP 61633 (1 ex: 110.59 mm SL), Brazil, tuna stomach content, collector L.A. Zavala-Camin, January 1980. MZUSP 61593 (1 ex: 68.31 mm SL), Brazil, tuna stomach content, collector L.A. Zavala-Camin, June 1976.

Pterycombus sp. (labeled as *Pterycombus petersii*): MZUSP 61573 (2 ex: 30.92 and 62.94 mm SL), Brazil, tuna stomach content, collector L.A. Zavala-Camin, March 1976.

The following fishing sets were deployed:

Drift Vertical Long-Line (DVLL): Deployed to the bottom, surface supported with a buoy, fishing the lower 100–150 meters of the water column with 20 to 25 Mustad© circle hooks, size 12/0 to 14/0, baited with

sardines (*Sardinella* spp.), in a single line, with no branchlines. Therefore, it is aimed at demersal and bathypelagic fishes. The DVLL is left drifting, usually at evening for 3 to 4 hours, slowly carried by currents and covering roughly a mile or so. When reeled back into the boat it comes with a sample of fishes living at the aimed depth. Often a baited hook is attached to the sinkers. Noise and light devices are also attached among the hooks series.

Electric Reel Set (ERS): This set deploys a chosen fish-line from the boat and with 10 to 15 circle hooks linked to its lower 80–120 meters, also baited with sardines and with noise and light devices as above. It fishes for 5 to 15 minutes and then is reeled back with the help of electric power.

Results and discussion

Circle hooks (FIG 1) are used not only because they are safer than the “J” hooks for sea-life and fishermen, but also for their efficiency in hooking fishes; furthermore, as a side benefit, they leave intact the fishes’ inner organs. Their shape make a huge difference, since up to 98% of the fishes are hooked in the maxillary bones, allowing an easy and clean unhook, hands and fingers remaining safely where they are supposed to be. And last but by no means least, as an extra and precious benefit, sea-life such as dolphins, birds and sea turtles are rarely hooked (Atlantic States Marine Fisheries Commission, 2003).



FIGURE 1. The circular hook 12/0 used in the present study.

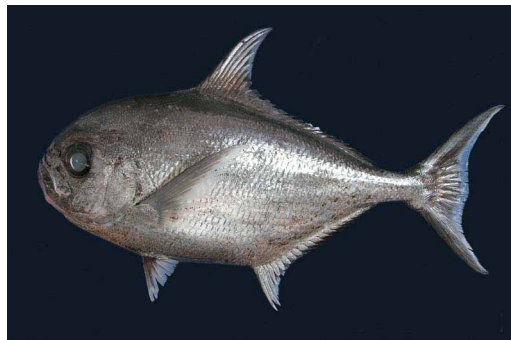


FIGURE 2. *Eumegistus brevorti*, freshly preserved male, 523 mm SL and 2.8 k, caught at 600 m depth 10 miles off Praia do Forte, Bahia, Northeast Brazil.

On October 26, 2006 a strange fish specimen was caught and unknown to the turtle experts, a photograph was taken and the fish preserved. The second author, oceanographer Guy Marcovaldi, sent the picture to friends and ichthyologists, looking for identification. When the first author received it, the fish family was identified as Bramidae, as well as the probable genus and species, *Eumegistus brevorti*. To confirm this analysis, the picture was sent to Dr. Bruce A. Thompson, a renowned world specialist of the Bramidae at that time with the Louisiana State University (EUA), who confirmed the identification.

The fish (FIG 2) was caught about 10 miles off Praia do Forte, 600 m depth, with electric reel, and sardines as bait. It measured 523 mm SL and weighed 2.8 kg. At that time two other specimens of the same species, not examined by us, were collected in deep offshore waters: one at the same site, and another in the waters of Fernando de Noronha Archipelago. With the improvement of fishing techniques, the “rare” fish became a daily catch (FIG 3). In two years about 220 specimens were caught and at the barbecue stand they revealed to have a delightful taste. Several specimens were preserved and sent to research institutions.

Eumegistus brevorti (FIG 2)

Tropical Pomfret, Olho-de-Ovo.

The genus *Eumegistus* is composed of two species, *E. illustris* Jordan & Jordan, 1922, from the Pacific, and *E. brevorti* from the Atlantic, known from West Africa (larvae), Cuba, Bahamas, Virgin Islands, Puerto Rico, Colombia, and offshore in the Gulf of Mexico and the Caribbean. We found few reports on *E. brevorti*, all preserved in institutions around the world. Additionally, we found other preserved specimens in museum internet sites, all listed in Table 3 together with those of the literature and of this study. This meso/bathypelagic species occurs between 384 and 1317 m and may reach 481 mm SL; adults are known usually from offshore islands (Thompson & Russel, 1996; Hernández-Hamón *et al.*, 1999; Bunkley-Williams & Williams, 2004; Moteki & Mundy, 2005; Richards, 2006).

We examined 30 fishes (Table 1.A–B), ranging from 394 to 550 mm SL and weighing from 1.65 to 4.80 kg. Two females are the largest and heaviest specimens ever reported for the species. From this sample, 20 were males (425–523 mm SL), six were females (447–550 mm SL, Table 4, in part) and four were young adults of indeterminate sex, still having keels in the caudal peduncle’s horizontal rows of scales (394, 420, 443 and 443 mm SL, weighing 1.29, 1.65, 1.72, and 1.73 kg). Females were heavier (4.22–4.80 kg) than males (2.30 and 3.91 kg). The TAMAR vessel’s captain, also a very experienced fisherman, reported that only about 10% of the hooked *Eumegistus* were females bearing maturing eggs, which was confirmed by us in the field.

Diagnostic characters: Based on examined specimens and literature data (Table 1.A–B).

Body compressed, rather high, the greatest depth 41–52% of standard length; dorsal profile of head arched and rounded; lower edges of mandibles not touching along entire length, a good part of the isthmus visible between them; pre-caudal groove absent; dorsal-fin rays 29–33; anal-fin rays 20–24; pectoral fin extends beyond lobe of anal fin, with 17–21 rays; horizontal series of scales 47–57; gill rakers slat-like, 3–4 + 6–7, not counting rudiments; scales on sides of body cycloid with a median soft keel, those in the posterior part and on caudal peduncle with a strong antrorse spine in young adults (see discussion below); naked area above and behind the eyes; scales on caudal fin base abruptly smaller than those on caudal peduncle. Color varies from almost black or dark brown with bronze to gold or silver sheen, to silvery white; dorsum always darker, belly somewhat lighter; most of lateral body scales outlined with thin dark lines (pale individuals) or silvery-white lines (dark individuals); dorsal fin usually dark with its anterior portion silvery-white to silvery-dusky; anal fin silvery-white to silvery-dusky, outlined with a dark band except in the anterior lobe; anterior lobe of dorsal and anal fins tips sometimes whitish in young adults; pectoral and pelvic fins dark interiorly and with a pale posterior large border; caudal fin dark with conspicuous posterior white median margin, split in two by black central rays in young adults (FIG 4-A). The differences between adults and young adults in the caudal fins’ white and black marks, as well as the whitish lobes of dorsal and anal fins (which are more conspicuous in young adults), are also displayed by the Pacific *Eumegistus illustris* Jordan & Jordan, 1922 (FIG 4-B and 4-C), leading us to assume that this pattern is a character, among others, of the genus.

Mead (1972) reported the presence of an antrorse spine on posterior body and caudal peduncle scales on the specimen he examined with 259 mm SL, the lectotype of the junior synonym *E. saussuri* (Lunel, 1865). Hernández-Hamón *et al.* (1999), reported 5 rows of keeled scales on caudal peduncle for an individual 246 mm SL. Moteki & Mundy (2005) reported that a juvenile (23.0 mm) had head and body covered by scales with a few spines. Thompson & Russell (1996) did not report any keel or spines on body scales on three adult specimens (425, 475 and 481 mm SL). The four young adults examined by us presented the following distinguishing features in the caudal peduncle:

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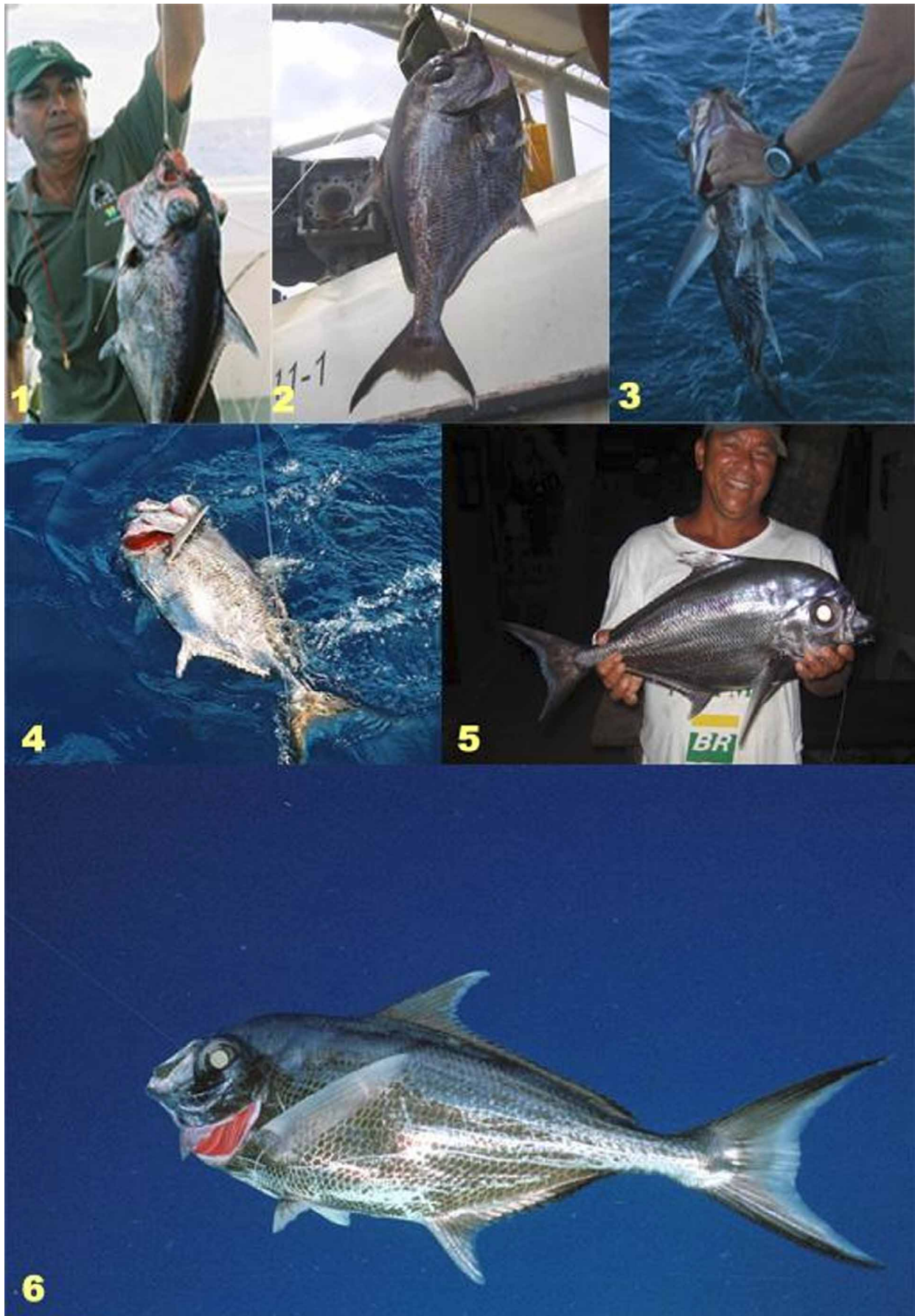


FIGURE 3 The Tropical Pomfret becomes a daily catch off Bahia, Northeast Brazil.

TABLE 1A. *Eumegistus brevorti*. Meristic data, larvae not included.

| Counts | Mead (1972) | Thompson & Russell (1996) | Moteki & Mundy (2005) | Moteki (2005) | Hernández- Hamón <i>et al.</i> (1999) | Present Study |
|--------------------|-------------|---------------------------|-----------------------|---------------|---------------------------------------|---------------|
| (N) specimens | 1 | 3 | 2 | 2 | 1 | 30 |
| Dorsal fin rays | 33 | 31–33 | 31–33 | 31–33 | ---- | 29–32 |
| Anal fin rays | 22 | 22–23 | 23–24 | 23–24 | 22–23(?) | 20–23 |
| Pectoral fin rays | 20 | 20 | 20 | 20 | 20 | 17–21 |
| Scales, horizontal | ca. 50 | 55–57 | ----- | 50** | 54–57(?) | 47–56 |
| Upper gill rakers | 3 | 3 | ----- | ----- | ---- | 3–4 |
| Lower gill rakers | 6 | 7 | | | | 6–7 |

(?): The authors examined one specimen, so the gap in counts is not plausible.

TABLE 1B. *Eumegistus brevorti*. Selected proportional measurements in thousands of SL. Juvenile and larvae not included.

| | Mead 1972* | Thompson & Russell 1996** | Present Study |
|--------------------------|------------|---------------------------|---------------|
| Head Length | 288 | 280–316 | 241–286 |
| Snout Length | 76 | 59–62 | 47–67 |
| Eye diameter, horizontal | 88 | 94–109 | 60–88 |
| Eye diameter, vertical | 91 | 98–117 | 71–104 |
| Postorbital length | 147 | 127–137 | 116–148 |
| Body depth | 517 | 480–515 | 408–484 |
| Predorsal length | 441 | 429–449 | 391–446 |
| Preanal length | 618 | 620–653 | 578–617 |
| Pectoral fin length | 273 | 336–392 | 252–350 |
| Dorsal fin base | 502 | 502–523 | 500–563 |
| Anal fin base | 353 | 316–339 | 315–367 |

* Type of *E. saussuri* (Lunel) 259 mm, considered by us a young adult.

** Three adult females.

TABLE 2. *Eumegistus brevorti*. Egg and ovary characteristics of three females. Measurements in mm and weights in g.

| | September 2007 | November 2007 | April 2008 |
|-------------------------|----------------|---------------|------------|
| SL | 447 | 514 | 550 |
| Egg diameter | 0.63 | 0.66 | 0.63 |
| Left ovary length | 78.4 | 85.1 | 73.7 |
| Left ovary max. width | 43.1 | 36.2 | 39.1 |
| Left ovary max. height | 37.5 | 27.8 | 28.9 |
| Left ovary weight | 75.8 | 57.4 | 50.7 |
| Number of eggs | 178,500 | 208,200 | 84,400 |
| Right ovary length | 64.8 | 88.2 | 80.6 |
| Right ovary max. width | 17.2 | 51.8 | 39.6 |
| Right ovary max. height | 13.6 | 32.9 | 33.1 |
| Right ovary weight | 10.0 | 93.3 | 51.8 |
| Number of eggs | 55,800 | 138,900 | 111,900 |
| Total weight of ovaries | 85.8 | 150.7 | 102.5 |
| Total number of eggs | 234,300 | 347,100 | 196,300 |

TABLE 3. *Eumegistus brevorti*. Preserved specimens in several museum collections. Data in parenthesis are number of individuals.

| Specimen | Size (mm) | Local | Depth (m) | Literature | Remarks |
|---------------------|-----------|----------------|-----------|--------------------------------------|---------|
| ZMUC-P 46714 (1) | 7.7 | West Africa | 100 | Moteki & Mundy, 2005 | |
| ZMUC-P 46715 (7) | 4.0 – 8.7 | West Africa | 100 | Moteki & Mundy, 2005 | 1 |
| MCZ 55043 (1) | 23.0 | Caribbean | 110 – 133 | Moteki & Mundy, 2005 | 2 |
| INVEMAR 2282 (1) | 246 | Colombia | 190 | Hernández-Hamon <i>et al.</i> , 1999 | |
| MHNG 940.85 (1) | 260 | Cuba | No data | Hernández-Hamon <i>et al.</i> , 1999 | 3 |
| MHNG 565.70 (1) | 295 | Cuba | No data | Hernández-Hamon <i>et al.</i> , 1999 | 4 |
| USNM 266281 (1) | 457 | Gulf of Mexico | 439 | Hernández-Hamon <i>et al.</i> , 1999 | |
| UF 47476 (1) | 425 | Virgin Islands | 274 – 366 | Thompson & Russell, 1996 | |
| UF 47477 (1) | 481 | Virgin Islands | 366 | Thompson & Russell, 1996 | |
| UF 99703 (1) | 475 | Bahamas | 390 – 420 | Thompson & Russell, 1996 | |
| USNM 372736 (2) | 270; 340 | Puerto Rico | 384 | Bunkley-Williams & Williams, 2004 | |
| CAS-SU 148107 (1) | No data | Gulf of Mexico | 1317 | Bunkley-Williams & Williams, 2004 | 5 |
| IGFA 17375-4390 (1) | 610 (FL) | Bahamas | No data | Bunkley-Williams & Williams, 2004 | |
| USNM 391436 (1) | 480 | Bahamas | 579 | Present study | |
| USNM 386567 (1) | 388 | Bahamas | No data | Present study | |
| MZUSP 95974 (2) | 420; 424 | Bahia, Brazil | 700; 450 | Present study | |
| ZUEC 6313 (1) | 424 | Bahia, Brazil | 700 | Present study | |
| UNESP-SV 1A (1) | 443 | Bahia, Brazil | 450 | Present study | |
| UNESP-SV 2A (1) | 454 | Bahia, Brazil | 700 | Present study | |
| TAMAR 0027 (1) | 523 | Bahia, Brazil | 600 | Present study | |
| TAMAR 0035 (1) | 394 | Bahia, Brazil | 500 | Present study | |

(1): According to Moteki & Mundy (2005), the smaller specimen is so damaged that is impossible to determine the species, identified as *E. brevorti* by Mead (1972).

(2): Misidentified by Mead (1972) as *Taractichthys longipinnis*; this misidentification persists in the collection records of the MCZ to date.

(3): Lectotype of *B. saussurii*.

(4): Dried end mounted syntype of *B. saussurii*.

(5): Stanford University Collection in California Academy of Sciences; assumed as *E. brevorti*.

TAMAR 0035, 394 mm SL; MZUSP 95974, 420 mm SL: 6–12 scales with antrorse spine on each of the four central rows of scales, more sharp and strong at the middle of the row;

UNESP-SV 1A, 443 mm SL: 4–7 scales with antrorse spine on each of the four central rows of scales, more sharp and strong at the middle of the row;

ZUEC 6313, 443 mm SL: 3–5 scales with a moderate keel on each of the four central rows of scales, higher at the middle of the row.

Thus, it is very probable that the development and the reduction of the spines on scales follows the age of the fish, developing as a few on each scale in juveniles, transforming into one strong, antrorse, sharp spine in young adults, becoming a low keel on older fish, and finally disappearing almost completely, being just a smooth low keel, on large adults. To confirm this hypothesis we would need specimens in the 50–180 mm SL range, unknown to date. The Pacific species seems to present the same pattern (FIG 4-B).

Concerning the dorsal, anal and pectoral fins, as well as the horizontal series of scales and the proportional measurements, our data widen several parameters of previous studies (Table 1-A and 1-B).

Bunkley-Williams & Williams (2004) suggested that more than one species of *Eumegistus* may exist in the Caribbean and Atlantic due to the differences among several morphometric measurements reported by

previous studies (Mead, 1972; Thompson & Russell, 1996; Hernández-Hamon *et al.*, 1999). We disagree with this suggestion, since: 1) Bramidae, as a rule, presents different proportions with growth, and 2) there were not enough specimens at that time (2004), to support such assertion. Our data show a wider range of morphometric proportions than previously reported and we assume that this wide-ranging species might differ somewhat when separate populations are analyzed. The meristic and morphometric data of the examined specimens, compared to previous descriptions are in Table 1-A and 1-B.

Distribution: Tropical Atlantic Ocean, from West Africa to Bahamas and the Caribbean area, Gulf of Mexico, Colombia and Venezuela, and Fernando de Noronha Archipelago and Bahia in Brazil. The present study extends the occurrence of the tropical pomfret southwards about 3,500 kilometers, since it was known only from the tropical North Atlantic.

Proposed Brazilian name: “Olho-de-Ovo” (= egg-eye). This name was adopted by the Fishing Team due to the fact that many of the collected specimens arrived at surface with bulged eyes due to sudden decompression.

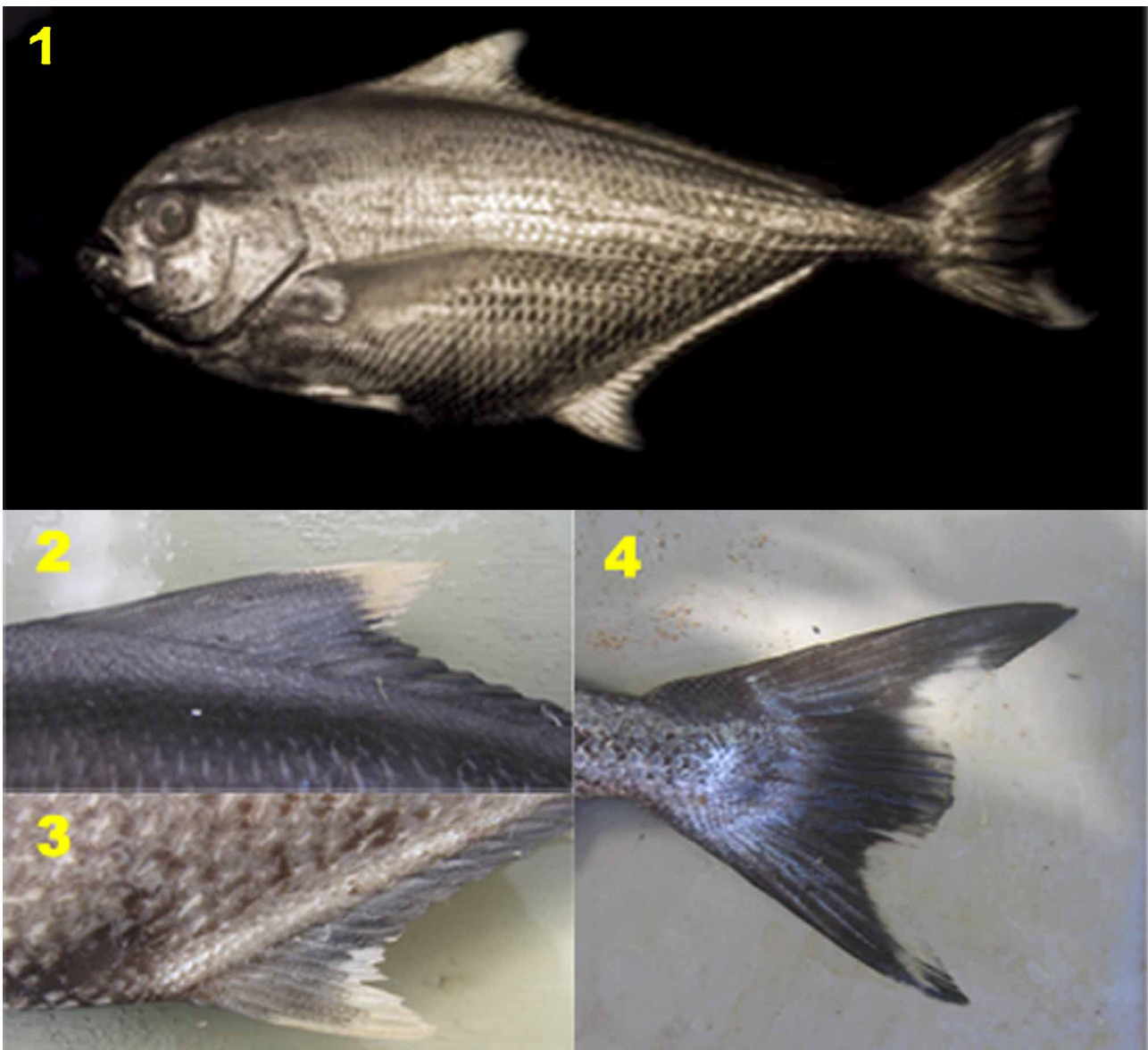


FIGURE 4-A. The smallest *Eumegistus brevorti* specimen, TAMAR 0035 (394 mm SL), showing white-tipped dorsal and anal fins lobes and caudal fin with black central rays, caught at the Praia do Forte, off Bahia, Northeast Brazil.



FIGURE 4-B. Young adult, about 23 cm SL, of *Eumegistus illustris* from the Pacific Ocean, showing the same white-tipped dorsal and anal fin lobes and caudal fin with black central rays as the Atlantic species, and the rows of keeled scales on caudal peduncle. Photograph by NMFS Pacific Islands Region Observer Program, Honolulu, Hawaii, USA.



FIGURE 4-C. Young and adult caudal-fin color patterns of *Eumegistus illustris* from the Pacific Ocean. Photograph by NMFS Pacific Islands Region Observer Program, Honolulu, Hawaii, USA.

Habitat, Depth, Temperature and Presumed Schooling Pattern: All specimens were caught from October 2006 to June 2008, at 300–900 m depth, and between 30 and ~100 meters from the ocean floor. This data, alone, is enough to partially confirm the supposition made by Mead (1972) and Thompson & Russell (1996), about its benthopelagic and probable demersal habits. Temperature probably has an important role in the habitat preferences of the tropical pomfret, as all individuals were collected between 8 and 10°C measured on occasions. In several fishing trips 3–10 individuals were caught in the same site and depth, very probably at the same time, which indicates grouping or schooling behavior.

Diet: We examined stomach contents or vomit of 30 specimens. Of these, 40% (N=12) were empty and had not vomited; 46.7% (14) preyed only on fishes and cephalopods, and 13.3% (4) presented a diet of fishes, crustaceans (Oplophoridae, Scyllaridae and Squillidae), and cephalopods (5–7). The data confirm the benthopelagic habitat proposed by Mead (1972) and Thompson & Russell (1996), since some of the prey are considered bottom-dwelling species, e.g., the oplopherid shrimp and the scyllarid *Parribacus antarcticus*

(Lund, 1793) (M. Tavares, pers., comm.), the squillid mantis shrimp, and the ogocephalid batfish *Halieutichthys aculeatus* (Mitchill, 1818); the small batfishes are the main support of this statement, since all five specimens (20.7–25.3 mm SL) were diagnosed as juveniles, with a naked ventral surface, elongated rays in the caudal fin, and similar meristics as the adults (Richards & Bradbury, 2006).

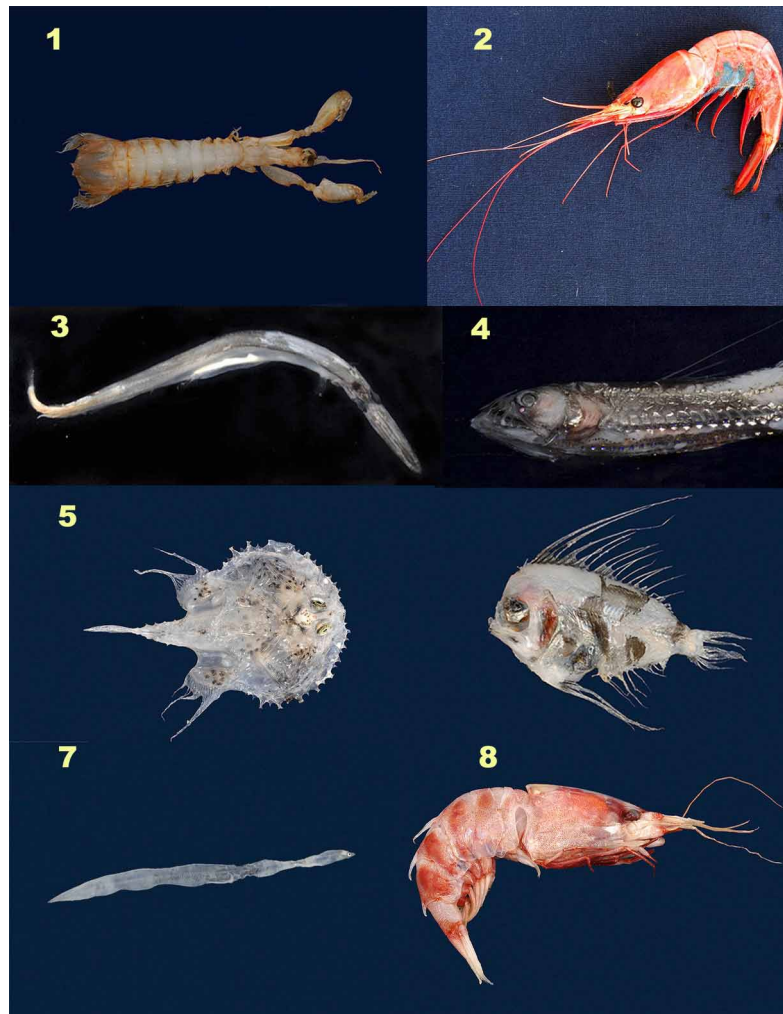


FIGURE 5. Stomach contents of *Eumegistus brevorti* caught off Bahia, Northeast Brazil:

1. Crustacea, Stomatopoda, Squillidae. 2. Crustacea, Decapoda, Pandalidae.
3. Paralepididae, *Lestidium atlanticum*. 4. Chaliodontidae, *Chauliodus sloani*.
5. Ogocephalidae, *Halieutichthys atlanticus*. 6. Caristiidae, *Caristius* sp.
7. Anguilliformes, unknown leptocephalus. 8. Crustacea, Decapoda, Oplophoridae.

The prey most often observed among fishes were *Chauliodus sloani* Bloch & Schneider, 1801 (adults, including a ripe female), *Diaphus garmani* Gilbert, 1906, *Scopelarchus* sp., *Lestidium atlanticum* Borodin, 1928, young *Halieutichthys aculeatus*, young Gempylidae (*Neopinnula americana* (Grey, 1953) and *Gempylus serpens* Cuvier, 1829) and Trichiuridae (*Lepidopus* sp.). The largest recorded prey was the steindachnerid fish *Steindachneria argentea* Goode & Bean, 1896, weighing 18.31 g and measuring 135.8 mm SL. The largest stomach content included fishes, crustaceans, cephalopods and worms, and weighed 38.28 g. In about 25% of the examined stomachs we found a few parasitic worms (Nematoda and Trematoda).

As side benefits, several new or rare records of fishes and cephalopods for Brazilian waters, and even for the Southwestern Atlantic Ocean, were found in the vomit and stomach contents, such as *Caristius* sp., *Steindachneria argentea*, *Asarcenchelys longimanus* McCosker, 1985, and the squid *Spirula spirula* (Linnaeus, 1758), which will be dealt with in another paper.

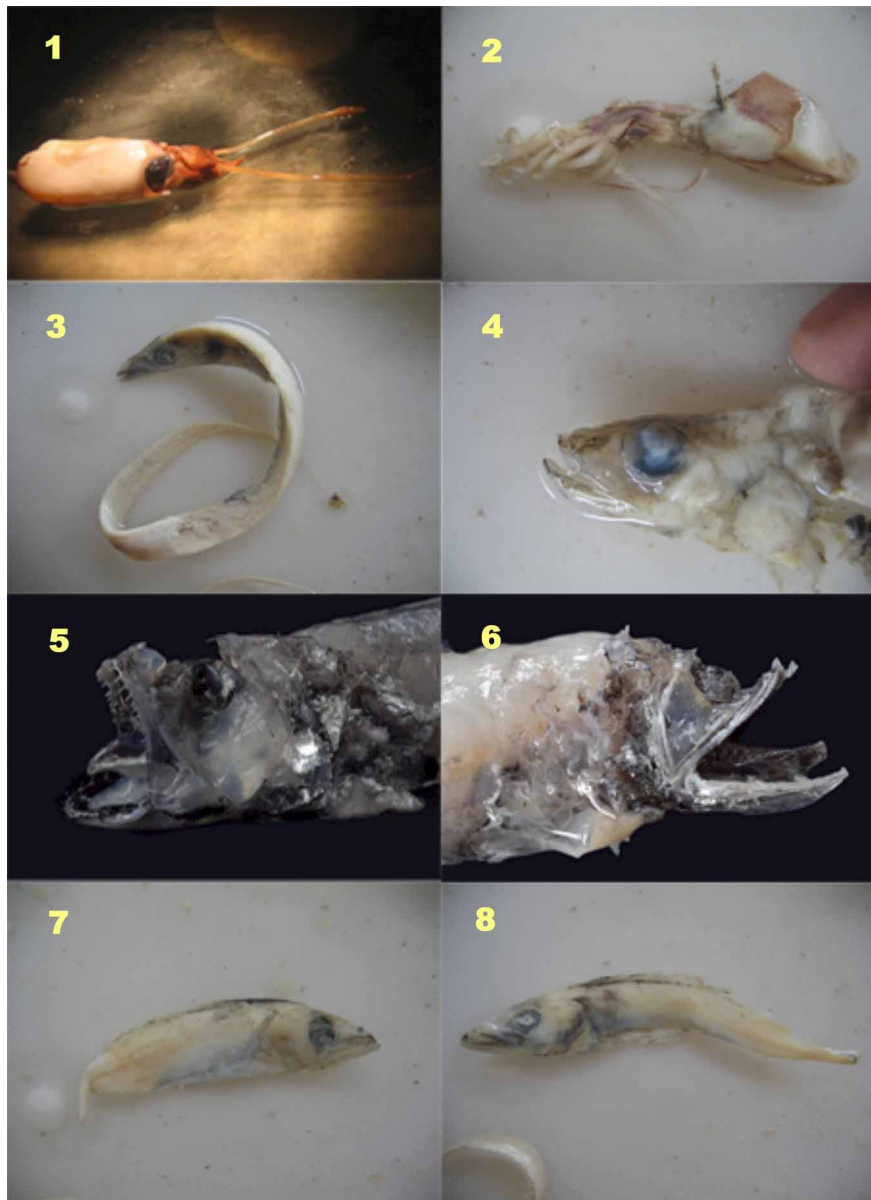


FIGURE 6. Stomach contents of *Eumegistus brevorti* caught off Bahia, Northeast Brazil:

1. Cephalopoda, Spirulidae, *Spirula spirula*.
2. Cephalopoda, Enoploteuthidae. 3. Trichiuridae, *Lepidopus altifrons*
4. Scopelarchidae, *Scopelarchoides* sp.
5. Steindachneridae, *Steidachneria argentea*. 6. Myctophidae, *Diaphus garmani*. 7. Gempylidae, *Neopinnula americana*.
8. Gempylidae, *Gempylus serpens*.

Spawning season: The ovaries of four large females were analyzed, all of them ripe. The eggs were transparent (an indication of maturity in Bramidae according to Omori *et al.*, 1997, and Yatsu & Nakamura, 1989), with a diameter of 0.63–0.66 mm, and numbering up to about 350,000. All females had one of the ovaries smaller than the other (FIG 8), and in the case of the specimen caught in September, the difference of size was most evident: the right ovary weighed only 10.06 g, and the left one 75.81 g. (See Table 2 for an overview of all data, except for the specimen caught in June 2008 that had its viscera accidentally discarded before a proper analysis).

All females were collected in September and November 2007, April and June 2008, covering a large period of the year: early to late winter, mid-spring and early autumn. The fact that the September female had

one of the ovaries much smaller than the other may imply in a peak of spawning pattern; however, this anomaly may be due to other causes. Thus, we provide evidence to support the hypothesis that *E. brevorti* spawns from early winter to late summer in the Northern Hemisphere, as suggested by Thompson & Russell (1996) from observations in the Caribbean of three large females, all mature with late stage vitellogenic and early hydrated oocytes, indicating a spawning season over much of the year (January–August), or from early winter to late summer in the Northern Hemisphere. Spawning season in Brazilian water may also range over at least 8 to 10 months of the year (this paper).



FIGURE 7. Stomach content of *Eumegistus brevorti*, caught off Bahia, Northeast Brazil: Crustacea, Decapoda, Scyllaridae, *Parribacus antarcticus*, 58.8 mm long

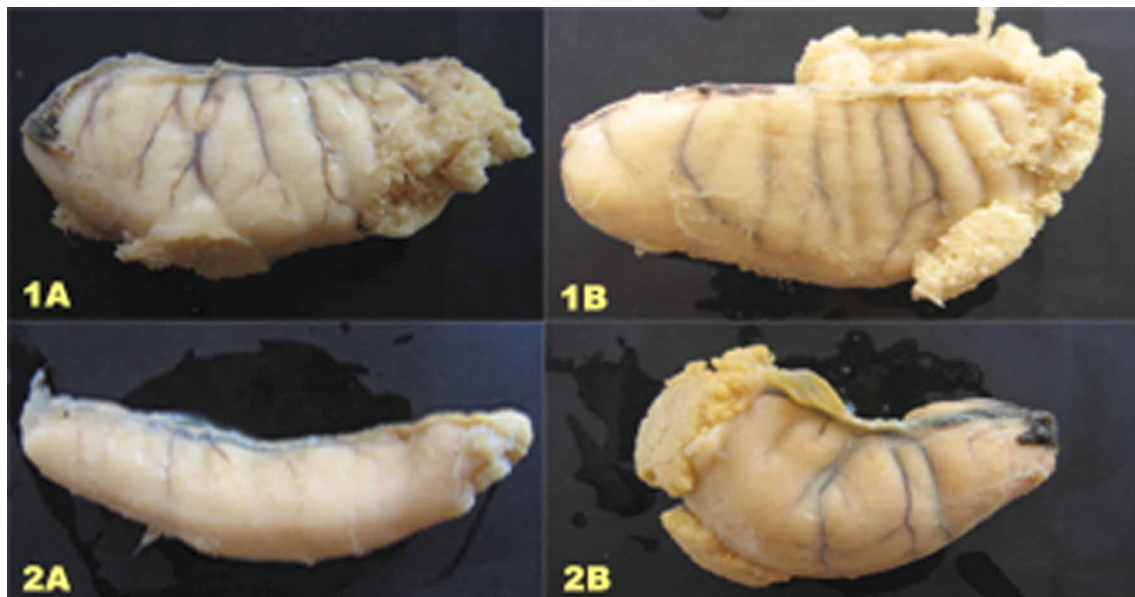


FIGURE 8. Ovaries of *Eumegistus brevorti* caught off Bahia, Northeast Brazil: 1: 11.16.2007: A 57.37 g; B: 93.25 g and 2: 09.07.2007: A: 10.06 g; B: 75.82 g .

Fishery Resource & Conservation: The high number of specimens of the tropical pomfret collected in Brazilian waters is not atypical as one might believe at a first glance. Bunkley-Williams & Williams (2004) reported that it was also found off Puerto Rico, but did not specify how many. Fishing with the TAMAR fishing sets (appropriate to research sampling of deep fish fauna) indicates that this species is rather abundant in the region. The only other species so often hooked is the oil-fish, *Ruvettus pretiosus* Cocco, 1833, a

common species around the world (Parin, 2003). The Bramidae are targeted by fisheries in several parts of the world and regarded as excellent foodfish. Thus, the presence of a probably large population of the tropical pomfret in Bahia may lead to commercial fishery, but its stock and biology need to be better known (otherwise we will deal with another species at the risk of overfishing). An excellent analysis of deep-water fisheries is in Morato *et al.* (2006); in the abstract the authors state: “Global landings of demersal marine fishes are demonstrated to have shifted to deeper water species over the last 50 years. Our analysis suggest deep-water fish stocks may be at serious risk of depletion, as their life histories render them highly vulnerable to overfishing with little resilience to over-exploitation. Deep-sea fisheries are exploiting the last refuges for commercial fish species and should not be seen as a replacement for declining resources in shallower waters. Instead, deep-water habitats are new candidates for conservation.” With this alert in mind, the major effort now shall be done to collect the data about the tropical pomfret in the Brazilian waters before “go fishing”.

When the above mentioned finding was coming to conclusion, another bramid species, new to Brazilian waters, was collected at the same site off Bahia: a male of the keeltail pomfret, *Taractes rubescens*, hooked in about 600 meters deep and now preserved in the PROJETO TAMAR collection. It differs from its only congener, *Taractes asper*, mainly by the presence of a strong keel in the caudal peduncle (absent in *T. asper*), as well as by body and fins proportions (Mead, 1972; Haedrich, 1986; Smith, 1986; Thompson & Russell, 1996).

Taractes rubescens

Keeltail Pomfret, Lira.

(FIG. 9)

Diagnostic characters: Based on examined specimen (in brackets) and literature data (Mead, 1972; Thompson & Russell, 1996; Thompson, 2003, 2008; McEachran & Feckhelm, 2005; Haedrich, 1986; Santos *et al.*, 1997).

Body compressed, rather fusiform compared to that of most Bramidae, the greatest depth 36–45% (37%) of standard length; dorsal profile of head almost straight, the forehead slightly concave; snout pointed; pre-caudal grooves well developed; strong, rather high and well developed lateral keel on the caudal peduncle, a character that distinguish this species from all other known species of the family; dorsal fin rays 30–32 (31); anal fin rays 19–23 (19); pectoral fin extends to anterior anal fin rays, with 19–22 (19) rays; horizontal series of scales 41–48 (48), to origin of peduncle’s keel; gill rakers, 1–3 + 7–8 (2 + 7), not counting rudiments; gill filaments more than three times length of rakers; scales on sides of body cycloid and smooth, spines present only in young; posterior profile of upper lobe of the caudal fin falcate, the lower somewhat protruding medially. Color varies from almost black to dark brown with bronze to silver sheen, belly somewhat lighter; all fins with the same dark color of the body and a silvery sheen; caudal fin dark with a posterior white margin less discernible on upper lobe. The specimen examined had the outer border of the caudal fin’s lower lobe shaped like an “S”; this same “S” shape also present in the other species of the genus, *T. asper* (FIG 22), thus leading us to conclude that this is a character of the genus not yet described. Also noteworthy, the main character of *T. rubescens*, the lateral keel on the caudal peduncle, is not reported by Thompson and Russell (1996) after examining 43 specimens.

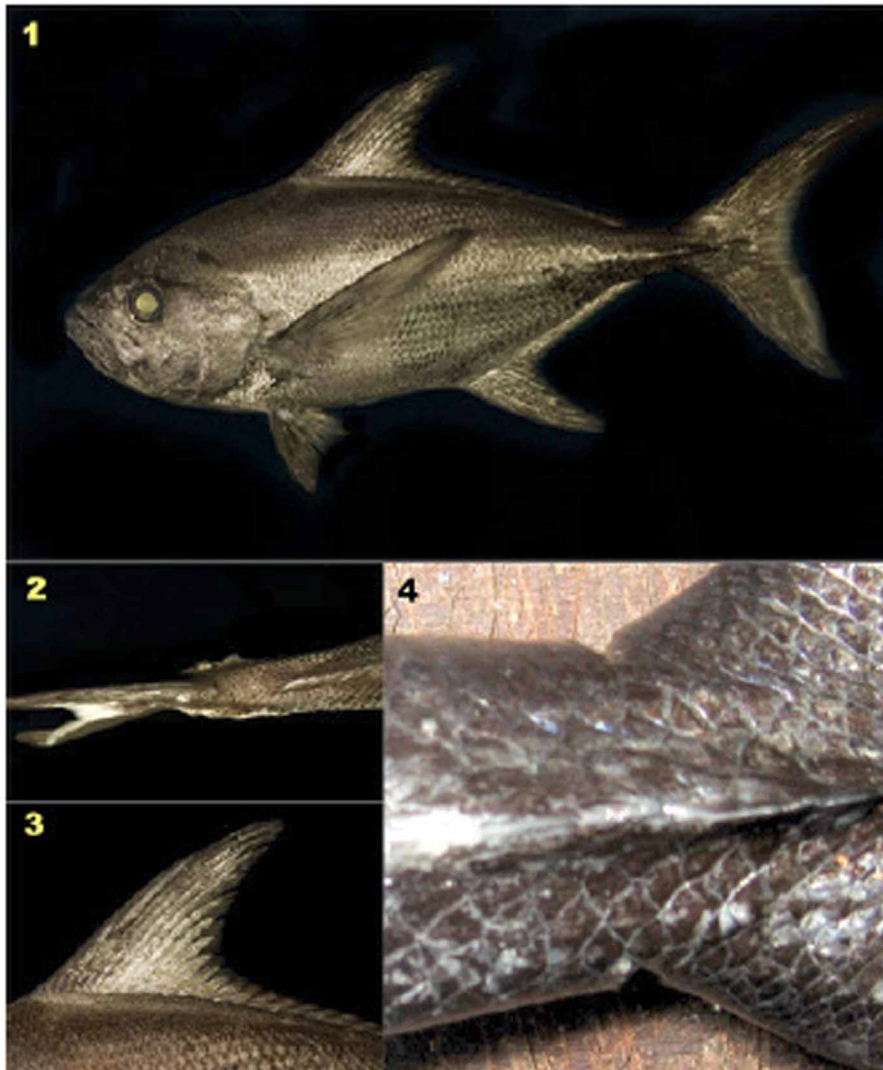


FIGURE 9. 1. *Taractes rubescens*, male, 487 mm SL, caught at 600 m depth off Praia do Forte, caught off Bahia, Northeast Brazil: 2 and 4. Caudal peduncle's keel. 3. Dorsal fin.



FIGURE 10. Stomach content of *Taractes rubescens*: Crustacea, Decapoda, Aristeidae caught off Bahia, Northeast Brazil.

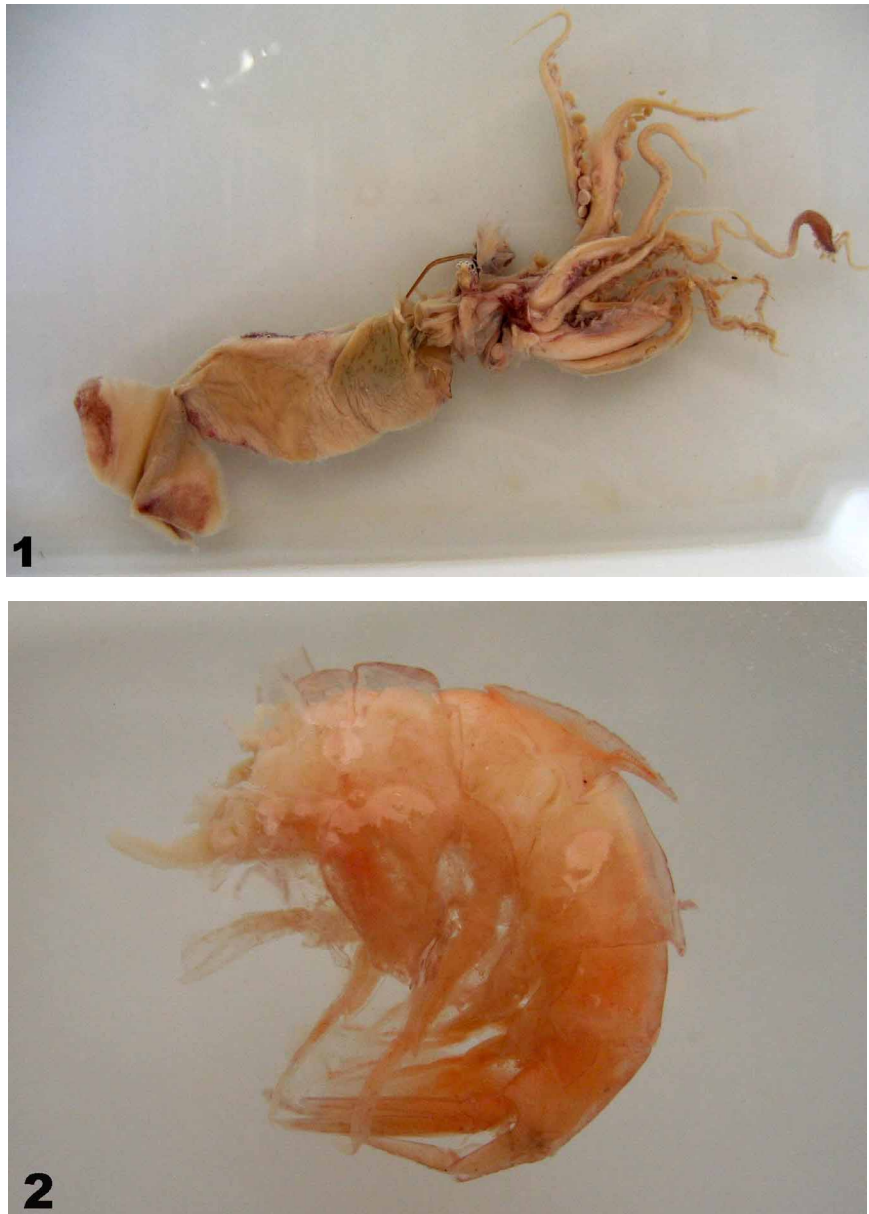


FIGURE 11. Stomach contents of *Taractichthys longipinnis* caught off Bahia, Northeast Brazil:
1. Cephalopoda, Ommastrephidae;
2. Crustacea, Decapoda, Oplopheridae.

Habitat, Depth and Presumed Solitary Habit: The keeltail pomfret is an offshore pelagic species occurring from the surface to about 600 m depth, apparently solitary, more often captured at night (Thompson & Russell, 1996; Thompson, 2008; present paper). There are no records about its temperature preferences.

Diet: The examined specimen's stomach contained two rather large Aristeidae pelagic shrimps, one of them in FIG. 10.

Distribution: Central Pacific: Hawaii. Eastern Pacific: Costa Rica to Peru. Eastern Atlantic: off West Africa, Azores and Madeira Islands. Western Atlantic: Gulf of Mexico, Trinidad and Bahia in Brazil. The present paper extends the known occurrence of the keeltail pomfret southwards for about 3,500 kilometers.

Proposed Brazilian name: "Lira" (= lyre) after the tail shape, and used by Bahia's artisan fishermen that caught this fish.

Finally, shortly before the submission of this work a third uncommon bramid was captured at the very same site off Bahia: an adult male of the bigscale pomfret, *Taractichthys longipinnis*, hooked in about 200

meters, 1,300 meters from the bottom, also preserved in the PROJETO TAMAR collection. To our knowledge this is the first report of an adult of this species in Southwestern Atlantic waters. It differs from its only congener, *Taractichthys steindachneri* (Döderlein, 1883), from the Indian and Pacific Oceans, by the higher number of scales in horizontal series (more than 38, usually 42–45 against 38 or fewer in *T. steindachneri*), as well as by minor morphometric meristic features (Mead, 1972; Haedrich, 1986; Smith, 1986; Thompson & Russell, 1996).

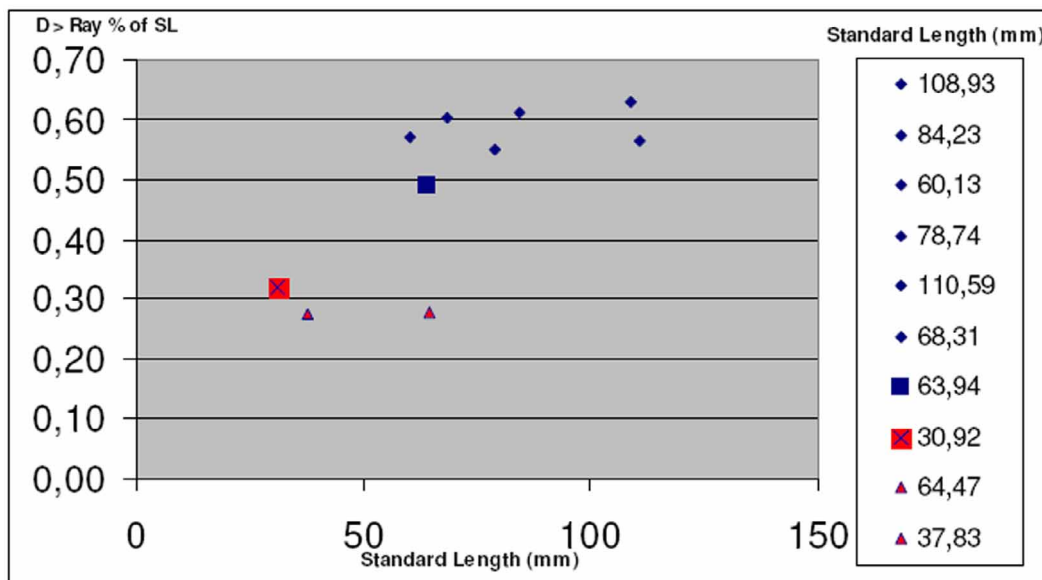


FIGURE 12. Graphic representation of percentage of the longest dorsal fin ray in standard length compared to size of each specimen. *Pterycombus brama* (blue dots), *Pterycombus petersii* (red triangles), and specimens not positively identified (blue and red squares). See also Table 4.



FIGURE 13. *Pteraclis aesticola* MZUSP 61590, 59.7 mm SL.



FIGURE 14. *Pteraclis carolinus* MZUSP 78302, 19.3 mm SL.



FIGURE 15. *Pterycombus petersii* MZUSP 61586, 65.2 mm SL.

Taractichthys longipinnis

Bigscale Pomfret, Lira-Galhudo.

(FIG. 18 A–D)

Diagnostic characters: Based on examined adult specimen (in brackets) and literature data (Mead, 1972; Haedrich, 1986; Tomás *et al.*, 1988; Smith, 1986; Thompson & Russell, 1996; Santos *et al.*, 1997; Figueiredo *et al.*, 2002; Thompson, 2003, 2008; McEachran & Fechhelm, 2005).

Body compressed, rather short and deep, the greatest depth 54–61% (56.3%) of standard length; dorsal profile of head strongly to moderate convex according to age; snout blunt; interorbital rounded; pre-caudal grooves well developed in adults; dorsal and anal fins stiff, covered with scales, and falcate; dorsal fin rays 33–38 (35); anal fin rays 27–30 (27); pectoral fin extends beyond anterior anal fin rays, with 20–22 (20) rays; horizontal series of scales 39–46 (41); gill rakers, 1–3 + 6–9 (1+8), not counting rudiments; scales on sides of body with a strong central spine, except in very large specimens as the one examined, aligned as in horizontal lines; scales of head and belly smooth; last scale on caudal peduncle larger than scales on caudal fin; caudal fin emarginated in young, forked to lunate in adults. Color varies from almost black to dark brown with

bronze to silver sheen, belly somewhat lighter; all fins with same dark color as body and a silvery sheen; paired ones with large whitish areas; dorsal and anal fins often with whitish borders or distal spots, and the caudal with a conspicuous white posterior border.

The pre-caudal groove seems not to be developed in the young, at least to 50.0 mm SL, as commented on by Rob Robins after examining the UF juvenile specimen. Robins had used Thompson's key (2003), on which *Taractichthys* and *Taractes* possess a well-developed transverse pre-caudal groove; observing that none was present on UF 168739, he concluded (erroneously as he said) that the fish was *Eumegistus* despite the high number of anal fin rays. Even after re-examining the specimen he had not see nothing as the illustrated groove (Fig 3 of Thompson's key, pg. 1470), leading him to the conclusion that perhaps the groove is absent in juveniles. Mead (1972) does not mention the presence or absence of it in juveniles.



FIGURE 16. *Pterycombus brama* MZUSP 61623, 84.2 mm SL.



FIGURE 17 *Taractichthys longipinnis* MZUSP 78303, 29.3 mm SL.

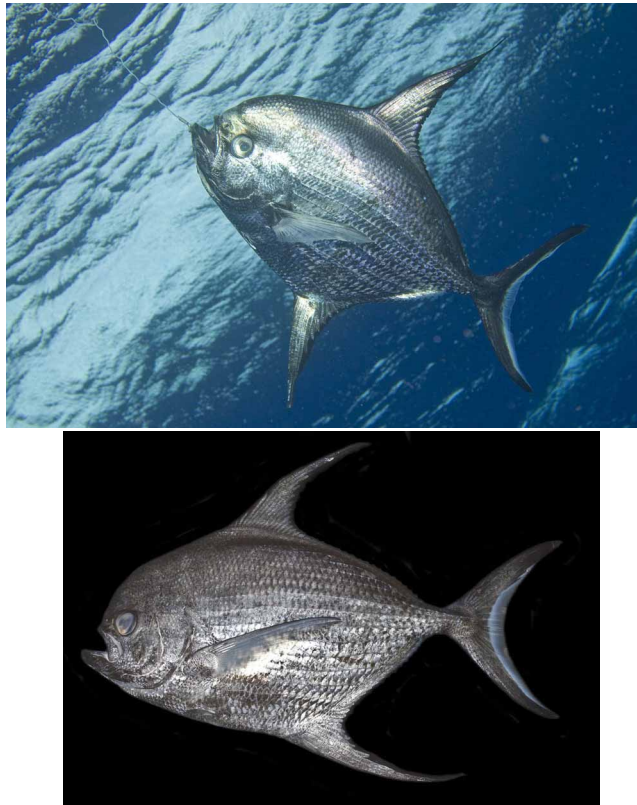


FIGURE 18 A & B *Taractichthys longipinnis*, adult male, 472.4 mm SL, caught off Praia do Forte, Bahia, Northeast Brazil.

Habitat, Depth, Temperature and Presumed Schooling Pattern: The bigscale pomfret is usually an offshore pelagic species occurring at least from 42 to about 200 m depth, and is apparently solitary, although also known to occasionally occur close to shore in small schools; there is evidence of its preference for waters of 10°C or colder (Mead, 1972; Thompson & Russell, 1996; this work). Stomach contents of the collected specimen indicate that this pomfret feeds at or near the bottom, as the tropical pomfret does, since we found in its stomach an identifiable portion of an oplophorid bottom-dwelling shrimp species (M.S. Tavares, personal comment).

Diet: In the stomach of the large adult male we found a large, almost undigested ommastrephid squid (22 cm and 95 g) and part of a benthic oplophorid shrimp (FIG. 11)

Distribution: Eastern Atlantic: Iceland and Norway southwards to South Africa; Azores and Madeira Islands. Western Atlantic: Nova Scotia, Canada and northern Gulf of Mexico to Puerto Rico, Bermuda, northern South America to southeastern Brazil.

Proposed Brazilian name: “Lira-Galhudo” after its resemblance to the “Lira” (*Taractes rubescens*) and the high dorsal and anal fins (“Galhudo”).

***Pterycombus* Fries, 1837**

Mead (1972) recognized two species within this genus: *Pterycombus brama* and *Pterycombus petersii*. To date *P. brama* is reported only from the Mediterranean and the North Atlantic (Canada to Gulf of Mexico and to northern South America; Iceland, British Isles and Norway to Gulf of Guinea); *P. petersii* is reported from the Indo-Pacific (South Africa to Japan and the central Pacific), the southeastern Atlantic (South Africa), and the southwestern Atlantic (southeastern Brazil) (Mead, 1972; Scott and Scott, 1988; Tomás *et al.* 1988; Figueiredo *et al.*, 2002; Thompson, 2008).



FIGURE 18 C & D *Taractichthys longipinnis*, UF 168739, young, 50.0 mm SL, from Bahamas.



FIGURE 19. *Brama caribbea* MZUSP 78258, 113.6 mm SL.



FIGURE 20. *Brama dussumieri* MZUSP 61634, 94.3 mm SL.



FIGURE 21. *Brama brama* MZUSP 80495 41.8 mm SL.

Several MZUSP specimens are damaged or not well preserved, but 12 were selected as in fair to good condition to be examined. The diameter of the eye was not considered by us as a useful parameter, as the variation in our specimens is much larger and does not agree at all with that of Mead (1972), probably because of the conditions of most of the old specimens; the same was found for the number of rays of the dorsal, pectoral and anal fins, the number of vertebrae and the actual size of the longest anal fin ray. On the other hand, the proportion of the longest dorsal fin ray in standard length showed a very conclusive difference (TABLE 4; FIG 11). Even so, two specimens could belong to either species (or even to a hybrid) as their measurements are intermediary between the two species (when the size is examined and compared with figure 48 of Mead (1972)). This latter figure is a graph displaying the “Relative height of (A) dorsal and (B) anal fin in young and adult *Pterycombus brama* and *Pterycombus petersii*”, and clearly shows a degree of overlap in

certain size classes (30 mm, for example). No adult of any *Pterycombus* species was ever documented to date in Brazilian waters. The presence of an undescribed species in the southern Atlantic, a possibility raised by Mead (1972), remains to be confirmed.

With the present paper, the number of Southwestern Atlantic Bramidae species increased from seven to ten, one of the largest in the world and, to date, the only with both species of *Pterycombus*.

TABLE 4. Selected measurements of old *Pterycombus* specimens in the MZUSP collection; numbers in brackets are number of specimen in each sample.

| Pterycombus | MZUSP | MZUSP | MZUSP | MZUSP | MZUSP |
|------------------------|--------------|--------------|-----------------|-----------------|-----------------|
| | 61622 | 61623 (1) | 61623 (2) | 61572 | 61633 |
| Measurements (mm) | | | | | |
| Standard length | 108,93 | 84,23 | 60,13 | 78,74 | 110,59 |
| Head | 26,57 | 23,8 | 18,95 | 21,47 | 28,22 |
| Eye, horizontal | 8,86 | 7,81 | 6,89 | 7,61 | 9,91 |
| Longest dorsal fin ray | 68,4 | 51,48 | 34,23 | 43,17 | 62,51 |
| Proportions (%) | | | | | |
| Eye on Head | 3,00 | 3,05 | 2,75 | 2,82 | 2,85 |
| Longest D ray/SL | 0,63 | 0,61 | 0,57 | 0,55 | 0,57 |
| ID | | | | | |
| Longest D Ray (1) | <i>brama</i> | <i>brama</i> | <i>brama</i> | <i>brama</i> | <i>brama</i> |
| Eye on head (2) | <i>brama</i> | <i>brama</i> | <i>petersii</i> | <i>petersii</i> | <i>petersii</i> |

continued.

| Pterycombus | MZUSP | MZUSP | MZUSP | MZUSP | MZUSP |
|------------------------|--------------|-----------|-----------|-----------------|-----------------|
| | 61593 | 61573 (1) | 61573 (2) | 61586 (1) | 61586 (2) |
| Measurements (mm) | | | | | |
| Standard length | 68,31 | 63,94 | 30,92 | 64,47 | 37,83 |
| Head | 18,14 | 18,55 | 11,21 | 18,13 | 12,43 |
| Eye, horizontal | 7,19 | 7,03 | 4,71 | 6,31 | 4,83 |
| Longest dorsal fin ray | 41,07 | 31,31 | 9,82 | 17,84 | 10,34 |
| Proportions (%) | | | | | |
| Eye on Head | 2,52 | 2,64 | 2,38 | 2,87 | 2,57 |
| Longest D ray/SL | 0,60 | 0,49 | 0,32 | 0,28 | 0,27 |
| ID | | | | | |
| Longest D Ray (1) | <i>brama</i> | ?? | ?? | <i>petersii</i> | <i>petersii</i> |
| Eye on head (2) | ?? | ?? | ?? | <i>petersii</i> | ?? |

(1): Comparing with Mead's graph (Fig. 48)

(2): Comparing with Mead's key (pg.93)



FIGURE 22. *Taractes asper*, about 45 cm SL, recently collected from Hawaii. Photograph by NMFS Pacific Islands Region Observer Program, Honolulu, Hawaii.

Key to Western Atlantic species of Bramidae:

Adapted from Mead (1972), Tomás *et al.* (1988), Smith (1991), Thompson (2003), and McEachran & Fechhelm (2005), and added with the new data of the present paper. The key does not include *Collybus drachme* Snyder, 1904, reported from Cuba by Claro and Parenti (2001), probably a misidentification with a *Brama* species; *C. drachme* is a synonym of the tropical Indo-Pacific *Brama orcini* Cuvier, 1831 (Mead, 1972; Mundy, 2005).

- 1a. Dorsal and anal fins broadly expanded, no scales along rays of these fins; median fins can be depressed into sheathed groove formed by modified scales (2).
- 1b. Dorsal and anal fins not broadly expanded, scales along at least part of the length of the rays; no modified sheath at base of median fins (5).
- 2a. Anterior dorsal and anal fin rays thickened; modified sheath at dorsal fin base extends forward onto snout. *Pteraclis* (3).
- 2b. Anterior dorsal and anal fin rays similar with no distinct thickening; modified sheath not extended forward beyond dorsal fin insertion *Pterycombus* (4).
- 3a. Branchiostegal rays 7; dorsal fin origin before eye *Pteraclis aesticola* (Jordan & Snyder, 1901), FIG 13.
- 3b. Branchiostegal rays 8; dorsal fin origin above posterior half of eye. *Pteraclis carolinus* Valenciennes, 1833, FIG 14.
- 4a. Small specimens (ca. 100 mm) with longest dorsal and anal rays shorter than half SL; lateral line absent in adults ...
..... *Pterycombus petersii* (Hilgendorf, 1878), FIG 15.
- 4b. Small specimens (ca. 100 mm) with longest dorsal and anal rays longer than half SL; lateral line present in adults ..
..... *Pterycombus brama* Fries, 1837, FIG 16.
- 5a. Transverse precaudal grooves well developed (6).
- 5b. Transverse precaudal grooves absent..... (8).
- 6a. Body rounded, depth 48 to 61% of SL; snout blunt; pelvic fins short, 7 to 9% of SL
..... *Taractichthys longipinnis* (Lowe, 1843), FIGS. 17 and 18 A–D.
- 6b. Body more elongate, depth 36 to 45% of SL; snout pointed; pelvic fins longer, 13 to 19% of SL *Taractes* (7).
- 7a. Caudal peduncle with prominent lateral keel *Taractes rubescens* (Jordan & Evermann, 1887), FIG 9.
- 7b. Caudal peduncle smooth, without lateral keel *Taractes asper* Lowe, 1843, FIG 22.

- 8a. Isthmus exposed, mandibles not touching along entire length; scales from a keel along ventral midline of belly; posterior border of caudal fin usually white..... *Eumegistus brevorti* (Poey, 1860), FIG 2.
- 8b. Isthmus usually not exposed, mandibles touching along entire length; scales do not form a keel along ventral midline of belly; posterior border of caudal fin black..... *Brama* (9).
- 9a. Pectoral fins relatively high on body; scales in horizontal series 50–54, from the uppermost point of gill opening to base of midcaudal rays; depth of body less than 13.5% of SL; pelvic fin less than 25% of SL.....
..... *Brama caribbea* Mead, 1972, FIG 19.
- 9b. Pectoral fins relatively high* on body; scales in horizontal series 57–65, from the uppermost point of gill opening to base of midcaudal rays; depth of body less than 13.5% of SL; pelvic fin greater than 25% of SL.....
..... *Brama dussumieri* Cuvier, 1831, FIG 20.
- 9c. Pectoral fins relatively low on body; scales in horizontal series 70–80, from the uppermost point of gill opening to base of midcaudal rays; depth of body greater than 13.5% of SL; pelvic fin less than 25% of SL.....
..... *Brama brama* Bonaterre, 1788, FIG 21.

* Despite Mead's statement (1972) that the pectoral fins of this species are "relatively low on body", we observed in preserved specimens that this fin is located relatively high on body when compared to *Brama brama* and only slightly lower than in *Brama caribbea*. Omori *et al.* (1997) present a picture of this species (figure 1) that supports the above observation.

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