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DEEP-SEA BOTTOM FISHES CAUGHT ON THE 14TH CRUISE OF THE R/V AKADEMIK KURCHATOV

by

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Captures of deep-sea fish in waters of the American Mediterranean Sea and adjacent Bahama-Bermuda region of the Atlantic Ocean prior to our work were performed by a series of expeditions: Coast and Geodetic Survey of the USA ("Blake," 1877-1880), New York Zoological Society ("Zaca" and "Arcturus," 1929-1931), Bingham Oceanographic Laboratory of Yale University, USA ("Pawnee," 1927), the Danish Carlsberg Foundation ("Dana," 1920-1922 and 1928-1930), Bureau of Commercial Fisheries, USA ("Oregon," "Oregon II" and others between 1950 and 1960), and the University of Miami ("Pillsbury," 1969). However, only the latter of these expeditions working in the region of the Puerto Rico Trench, outside the limits of the American Mediterranean Sea, carried out investigations in depths exceeding 4000 m.

Owing to this, the lower abyssal, from 4000 to 6000 m, and to a greater extent the hadal (ultraabyssal), deeper than 6000 m, the ichthyofauna of the American Mediterranean Sea proper has been left to the present time practically uninvestigated. Knowledge of the deep-sea fish fauna of this region has thus been based mainly on a detailed study of the bathyal and, to a lesser degree, the bathyabyssal zone, in depths of 500-700 to 3000 m. Investigations of the R/V Akademik Kurchatov conducted in the basins and trenches of the Caribbean Sea to a depth of 7050 m provides the first preliminary knowledge of the ichthyofauna of the greatest depths of this region.

Bottom fishes were caught using a four meter beam trawl (BT), Sigsbee trawl (TC) 2.5 m in width, and six meter Galathea trawl (TG). The beam trawl was fished in depths of 300 to 2640 m, the Sigsbee and

Galathea trawls in depths of 2610 to 7030 m. Fifty-seven trawls were conducted.

A list of fishes caught and characteristics of the captures are given in Table 1.

Our collection is represented by 31 species in 11 families of deep-sea fishes proper and 4 species in 4 families of semi-deep-sea, bathyal bottom fishes. The greatest number of species captured were brotulids (Brotulidae - 10 species)[1] and longtails (Macrouridae - 6 species), and after these follow the slickheads (Alepocephalidae - 4 species). Species of these three families characterize oceanic deep-sea bottom fishes, making up almost 2/3 the total number of species taken of deep-sea benthic fishes. The families Ipnopidae, Synaphobranchidae and Halosauridae are represented in our collection by two species each; families Bathypteroidae, Notacanthidae, Moridae, Macrouroididae, Aphyonidae, Ophidiidae, Carapidae, Draconettidae and Chaunacidae by one species each.

The successful collections of fish are distributed in 5 depth groups. 1) 300-750 m (mesobenthal zone and mesobathybenthal subzone, one collection). 2) 1050-1120 m (bathyal, 3 collections). 3) 2200-3500 m (transitional bathyabyssal subzone, 4 collections). 4) 4090-5030 m (abyssal, 4 collections). 5) 5800-6800 m (hadal or ultraabyssal, 5 collections). The composition of the catches of these

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[1] Identified by J. Nielsen

zones are described in terms of their quantitative, taxonomical and bathymetric relationships in Table 2.

Beam trawl captures in the mesial zone (1, station 1234, San Andres Bank) produced specimens of 7 species of fish, distributed in 6 families: Ophidiidae, Carapidae, Draconettidae, Chaunacidae, Moridae and Brotulidae (Table 2). Almost all species of Ophidiidae and Carapidae are limited in their distribution to the shelf (continental shelf, "epial") and only a few descend to the lower slope. All species of families Draconettidae and Chaunacidae inhabit the slope: Draconettidae has been cited in depths of 183-549 m (Briggs and Berry, 1959), Chaunacidae in 219-783 m (Jordan and Evermann, 1898). These families belong to a suborder including, besides semi-deep water forms, also families inhabiting the shelf in the epibenthal or oceanic epipelagic: Callionymidae and Antennariidae (Rass and Lindberg, 1971). The family Brotulidae is distributed from the littoral to the greatest ocean depths, comprising a composite group, including both small coastal subgroups of genera and by far more numerous deep-sea oceanic subgroups (Norman, 1966). The Moridae, a characteristic group of the depths of the oceanic slope (Rass, 1967), is distributed in the mesobenthal [200-500 (700) m] and bathybenthal [(500) 700-2000 (3000) m]. Thus, our samples in this zone contain a semi-deep water fauna composed of semi-deep water species of inshore families, semi-deep water families of largely shallow-water orders characteristically inhabiting the oceanic slope and semi-deep water representatives of the largely deep-sea family Brotulidae.

The bathyal collections (2nd group) produced the greatest catch - 19 species in 8 families with average biomass per sample nearly 600 g (Table 2). In this zone the Macrouridae (6 species), Alepocephalidae and Brotulidae (with 3 species) predominate. Well represented are the eel-like deep-sea benthic fish--Synaphobranchidae, Halosauridae and Notacanthidae. These essentially typify the bathyal fauna, decreasing with lesser and with greater depth, and are familiar commercial resources at the present time. L. A. Zenkevich in recent years (1968) commented on the potential availability of fishery resources in the bathyal zone.

The catch in the transitional bathyabyssal depth zone (3rd group) is composed of 4 species in 3 families--Ipnopidae, Brotulidae and Aphyonidae.

Fishes of this zone are characterized by degenerate eyes; very reduced in Aphyonus (Aphyonidae) or completely reduced and transformed into a photoactive organ in Ipnops (Ipnopidae, 2 species). As shown by Nielsen (1966), all species which are highly adapted with regard to the structure of the eyes of the Ipnopidae dwell within the bathyal and abyssal depth ranges, from 870 to 5900 m, and here we obtained our species Ipnops murrayi and I. agasszi from depths of 1392-3475 m. The biomass of our catches from these zones was the least, equal to 20 g; that is 5 g per sample (Table 2).

Catches in the abyssal zone (4th group) produced 6 species of Brotulidae and one species of Alepocephalidae. Accordingly, this zone is largely occupied by oceanic brotulid fishes, possibly no less

characteristic for it than for the Macrouridae, Alepocephalidae and Anguillomorpha in the bathyal. Grey (1956) reported 53 species of Brotulidae, more than a third the total number of species of this family, for depths over 2000 m. The species composition of the Brotulidae is interesting. All species, with one unique exception--Leucicorus sp. n.*--are encountered only within this zone. Leucicorus sp. n. is typical of the greatest depth zone, as shown below. The depths for Acanthonus armatus were 4090-4150 m, greater than the known discoveries for this species obtained on the preceding expeditions in depths of 3155-3270 m off the coast of tropical America, 255 (sic)--2743 m off West Africa and southern India, and in 1920-1957 m off the Philippine Islands and New Guinea (Nielsen, 1965). The mean biomass of the catch of this zone was higher than the bathyabyssal--35 g, as opposed to 5 g.

The catches in the hadal zone (5th group), from depths of 5800-6800 m, were the first made in the Caribbean Sea (in the Cayman Trench). All 5 samples produced fish of one species of brotulid--Leucicorus sp. n. This evidently, is the characteristic, unique hadal fish species of the Caribbean region (Table 2). The occasion of the capture of one specimen of this species in lesser depths--4590 to 4600 m (Table 1)--evidently is uncharacteristic. Leucicorus sp. n. has a broad distribution on the floor of the Cayman Trench, but is not encountered with other species of fish which are

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* Translators note: Leucicorus atlanticus Nielsen, 1975

absent in hadal depths. Catch biomass varied between 7.2 and 66.5 g, composed on the average of 26 g. This was the first taking of data on the biomass of fish from the hadal zone; not one other fish species until now has been successfully collected from the hadal zone sufficiently for this quantification (Rass, 1958; Nielsen, 1964).

Thus, the number of benthic deep-sea fish species and the average biomass of our catches for the different depth zones is represented in the following view: 1) mesobenthal-mesobathyal - 7 species and 163 g 2) bathybenthal - 19 species and 599 g 3) bathyabyssobenthal - 4 species and 5 g 4) abyssobenthal - 7 species and 35 g 5) hadobenthal - 1 species and 26 g (Table 2). What deserves mention is the large number of species and high catch biomass in the bathybenthal (bathyal), a sudden reduction in species number and biomass in the bathyabyssobenthal (bathyabyssal), a somewhat elevated number of species and biomass and changes in the taxonomic base in the abyssobenthal (abyssal), and the monopolization of one species in the hadal, with a biomass here exceeding that obtained in the lesser depths of the transitional bathyabyssal zone.

Besides benthic deep-sea fish, bottom trawls raised a few bathypelagic fish and in shallower depths some shelf fish. Especially large catches were produced trawling with the beam trawl, in which the total catch weights made up nearly 8 kg/hr for trawls in 300-750 m, from 0.256 to 1.186 kg in depths of 1050-1120 m and a total of nearly 20 g in depths of 2200-2640 m (Table 3).

Besides considering the above benthic deep-sea fish taken by bottom trawls, several specimens of usually benthic species were taken in midwater by non-bottom trawls (Table 4).

Of the material tabled, it is evident that in midwater, in depths of 500-1000 m, species of the Alepocephalidae possessing luminous organs were caught which were absent in bottom trawls: Binghamichthys microphos*, Xenodermichthys socialis and Photostylus pycnopterus. It is probable that these species have a bathypelagic way of life. Moreover, juvenile specimens of the benthic Grenurus sp. and I. agassizi were captured a considerable distance off the bottom (Table 4). Waters of the Mexican Basin, where these species were caught, have an intensive flow.

Examination of the above collections of deep-sea bottom fishes suggests some interesting zoogeographical relationships, but the analysis is tenuous, having developmental deficiencies in the systematics of certain families, particularly the Brotulidae and Alepocephalidae, therefore it is preliminary.

Several representatives of our collections are circumtropical cosmopolitan species. These are Ilyophis brunneus, Synaphobranchus kaupi (Synaphobranchidae), Gadomus longifilis (Macrouridae), Acanthous armatus (Brotulidae), and possibly also Chaunax pictus (Chaunacidae)

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* Talismania antillarum (Goode & Bean)

(Castle, 1964; Parr, 1946; Nielsen, 1965). A series of species represent American Mediterranean endemics, partially appearing in adjacent waters of the Bahama-Bermuda and Guinea regions. These are the majority of the Macrouridae (Bathygadus vaillanti, Nezumia hildebrandi, Grenurus grenadae, Cariburus mexicanus), and also Draconetta acanthopoma. Of great interest are amphi-American deep-sea genera and species, as noted by comparison of the American Mediterranean ichthyofauna with that of Panamanian-Peruvian waters of the Pacific Ocean (Garman, 1899; Bussing, 1965; Parin et al., 1973). Such are Binghamichthys microphos (taken by non-bottom trawl in a depth of 1000 m), Ipnops agassizi (depths of 2970-3000 m), in part Bathypterois quadrifilis,[1] Aphyonus rassi, depths of 2610-2750 m, Leucicorus sp. n., closest to L. lusciosus Garman, in depths of 5800-6800 m and in (a unique finding) 4590-4600 m.

Especially striking is the proximity of the unique Caribbean hadal species of Leucicorus to the Panamanian species L. lusciosus Garman; this genus was monotypic prior to our sampling. In contrast to the Cayman Trench, the hadal depths of the Puerto Rico Trench are populated by another genus and species--Bassogigas profundissimus (Roule), occurring in other basins of the central Atlantic Ocean in depths from 5600 to 8370 m (Nielsen, 1964; Staiger, 1972).* Thus, the

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[1] Most similar to the Panamanian B. pectinatus (Mead, 1966:144)

* Translators note: Misidentification. Actually Abyssobrotula galatheae Nielsen, 1977.

characteristic hadal fish species of the Caribbean Sea and adjacent waters of the Atlantic Ocean are different: the majority of depths of the Caribbean Sea are inhabited by species of Pacific origin and are lacking in Atlantic species. The remarkable correspondence of this and the above stated facts from geological data is evidence that the floor of the Caribbean Sea is sliding to the east from part of the Pacific plate, and is geologically distinguished from the adjoining Antilles arc structures of the floor of the Atlantic Ocean (Khain, 1972). A possible assumption is that the deep-sea amphi-American genera of marine fish of Central America are the remainder of an ancient population surviving through time since the origin of the uplift of the isthmus and then isolated thereafter in the Caribbean Sea from the Gulf of Panama in the Pacific Ocean (Rass, 1971). Besides deep-sea species, circumtropical species also survived, a remainder of the fauna of the Tethys Sea, and, before the actual completion of isthmus formation--the shallow water amphi-American shelf genera and species (Ekman, 1953; Berry, 1970). With the joining of formations in the Miocene-Pliocene of the American Mediterranean Sea to the water systems of the Atlantic Ocean, the shelf-shallow water fauna and the deep water fauna of the upper layers by the Atlantic Ocean fauna. But this process, evidently, did not touch upon the majority of deep-sea forms, which were sufficiently well-adapted to extreme conditions of existence in order to maintain their niches, in addition to which there is the practical isolation of relatively shallow water rises to the penetration of their Atlantic competitors. Perhaps in this way, the relationships of the deep-water forms of the

amphi-American fauna can be geologically accurately dated and utilized as a standard for estimating evolutionary and taxonomic rates of radiation in the depths.

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Translator's appendix: List of taxonomic changes from Table 1.

Leptoderma springeri Mead & Böhlke = L. macrops Vaillant

Aldrovandia pallida Goode & Bean = A. affinis (Günther)

Macdonaldia sp. = Polyacanthonotus africanus (Gilchrist & von Bonde)

Nezumia hildebrandi Parr = N. aequalis (Günther)

Grenurus grenadae Parr = Sphagemacrurus grenadae (Parr)

Cariburus mexicanus Parr = Coryphaenoides mexicanus (Parr)

Squalogadus intermedius Grey = Squalogadus modificatus (Gilbert & Hubbs)

Mixonus pectoralis Goode & Bean = Bathyonus pectoralis (Goode & Bean)

Typhlonus sp. n. ? = Apagesoma delosommatus (Hureau, Staiger & Nielsen)

Table 1. List of deep-sea bottom fishes taken on the 14th cruise of the R/V Akademik Kurchatov.

Species	Grenada Basin sta.1207, 1208 2610-3000m	Aves Ridge sta.1209 1060-1068m	Venezuela Basin sta.1212 5030m	Passage near Curacao sta. 1212 1050-1120m	Beata Ridge sta.1224, 2200-2600m	Columbia Basin sta.1231, 1232,1233 3500-4160m	San Andres Bank sta.1234 380-750m	Nicaragua Rise sta.1238 1105-1100m	Cayman Trench sta.1242, 1243,1259 1266,1267 5800-6800m	Yucatan Basin sta.1272 4590-4600m
	TC	BT	TG	BT	BT	TC	BT	BT	TC	TC
ALEPOCEPHALIDAE										
Alepocephalus blanfordi Alcock (?)	—	2/263-270* / 114	—	—	—	—	—	—	—	—
Alepocephalus sp.	—	—	—	1/230 / 90	—	—	—	—	—	—
Leptoderma macrops Mead & Böhlke	—	2/85-107 / 4,5	—	1/175 / 9,75	—	—	—	—	—	—
Alepocephalidae g. sp.	—	—	—	—	—	1/93 / 8,0	—	—	—	—
BATHYPTEROIDAE										
Bathypterois quadrifilis Günther	—	—	—	1/123 / 11,8	—	—	—	—	—	—
IPNOPIDAE										
Ipnops agassizi Garman	1/84 / 1.55	—	—	—	—	2/50-88 / 4,0	—	—	—	—
I. murrayi	—	—	—	—	2/98-107 / 7,21	—	—	—	—	—
SYNAPHOBRANCHIDAE										
Ilyophis brunneus Gilbert	—	1/510 / 57,5	—	—	—	—	—	—	—	—
Synaphobranchus kaupi Johnson	—	—	—	1/290 / 21,8	—	—	—	—	—	—
HALOSAURIDAE										
Aldrovandia gracilis G & B.	—	—	—	1/490 / 41,3	—	—	—	—	—	—
A. pallida G. & B.	—	—	—	—	—	—	—	1/215+ / 27.0	—	—

* Key to fractions presented for each species: in the numerator is the number of specimens followed by range of lengths in mm; in the denominator is biomass in grams.

Table 1. (continued)

Species	Grenada Basin sta.1207, 1208 2610-3000m	Aves Ridge sta.1209 1060-1068m	Venezuela Basin sta.1212 5030m	Passage near Curacao sta. 1212 1050-1120m	Beata Ridge sta.1224, 2200-2600m	Columbia Basin sta.1231, 1232,1233 3500-4160m	San Andres Bank sta.1234 380-750m	Nicaragua Rise sta.1238 1105-1100m	Cayman Trench sta.1242, 1243,1259 1266,1267 5800-6800m	Yucatan Basin sta.1272 4590-4600m
	TC	BT	TG	BT	BT	TC	BT	BT	TC	TC
NOTACANTHIDAE										
Macdonaldia sp.	--	--	--	--	--	--	--	1/209 9,8		
MORIDAE										
Physiculus kaupi Poey	--	--	--	--	--	--	4/42-170 59,3	--	--	--
MACROURIDAE										
Bathygadus vaillanti Roule & An el	--	--	--	1/300 130	--	--	--	--	--	--
B. favosus G. & B.	--	--	--	--	--	--	--	1/392 162	--	--
Gadomus longifilis (G. & B.)	--	--	--	--	--	--	--	1/220 14,4	--	--
Nezumia hildebrandi Parr	--	--	--	1/248 57,7	--	--	--	--	-	--
Grenurus grenadae Parr	--	1/134 5,65	--	2/90-157 4,55	--	--	--	--	--	--
Cariburus mexicanus Parr	--	2/465-515 810	--	--	--	--	--	--	--	--
MACROUROIDIDAE										
Squalogadus intermedius Grey	--	1/262 107	--	--	--	--	--	--	--	--
BROTULIDAE										
Acanthonus armatus (Günther)	--	--	--	--	--	1/245 98,1	--	--	--	--
Bassozetus taenia	--	--	1/145 9,3	--	--	--	--	--	--	--

Table 1. (continued)

Species	Grenada Basin sta.1207, 1208 2610-3000m	Aves Ridge sta.1209 1060-1068m	Venezuela Basin sta.1212 5030m	Passage near Curacao sta. 1212 1050-1120m	Beata Ridge sta.1224, 2200-2600m	Columbia Basin sta.1231, 1232,1233 3500-4160m	San Andres Bank sta.1234 380-750m	Nicaragua Rise sta.1238 1105-1100m	Cayman Trench sta.1242, 1243,1259 1266,1267 5800-6800m	Yucatan Basin sta.1272 4590-4600m
	TC	BT	TG	BT	BT	TC	BT	BT	TC	TC
Dicrolene intronigra G. & B.	—	—	—	2/70-183 / 31,8	—	—	—	1/215 / 42,5	—	—
Leucicorus sp. nova Nielsen	—	—	—	—	—	—	—	—	18/45 / 130,7	1/38 / 9,6
Mixonus pectoralis (G. & B.)	—	—	—	—	—	3/52-116 / 37,2	—	—	—	1/141 / 10,8
(Mixonus sp. juv., 1) Monomitopus agassizi (G. & B.)	—	2/147-161 / (41,5)	—	—	—	—	—	—	—	—
Oligopus claudei (Torre)	—	—	—	—	—	—	1/65 / 3,6	—	—	—
(Typhlonus sp. n.?)*	—	—	—	—	—	1/75 / 0,35	—	—	—	—
Porogadus sp. (poorly preserved)	—	—	—	—	—	1/141 / 6,5	—	—	—	—
Brotulidae oviparous, juv.	—	—	—	—	—	1/51 / 0,5	—	—	—	—
Broutulidae oviparous, juv.	—	1/63	—	1/77 / 1,6	—	—	—	—	—	—
Brotulidae oviparous postlarv.	—	—	—	—	—	—	1/52 / 1,2	—	—	—
APHYONIDAE										
Aphyonus rassi Nielsen	1/47 / 0,7	—	—	—	—	—	—	—	—	—
OPHIDIIDAE										
Lepophidium marmoratum G. & B.	—	—	—	—	—	—	2/14-0150 / (27,2)	—	—	—
CARAPIDAE										
Snyderidia bothrops Robins & Nielsen	—	—	—	—	—	—	1/260 / 62	—	—	—

* Specimen lost.

Table 1. (concluded)

Species	Grenada Basin sta.1207, 1208 2610-3000m	Aves Ridge sta.1209 1060-1068m	Venezuela Basin sta.1212 5030m	Passage near Curacao sta. 1212 1050-1120m	Beata Ridge sta.1224, 2200-2600m	Columbia Basin sta.1231, 1232,1233 3500-4160m	San Andres Bank sta.1234 380-750m	Nicaragua Rise sta.1238 1105-1100m	Cayman Trench sta.1242, 1243,1259 1266,1267 5800-6800m	Yucatan Basin sta.1272 4590-4600m
	TC	BT	TG	BT	BT	TC	BT	BT	TC	TC
DRACONETTIDAE										
Draconetta acanthopoma Regan	--	--	--	--	--	--	1/64 2,7	--	--	--
CHAUNACIDAE										
Chaunax pictus Lowe	--	--	--	--	--	--	3/27-33 7,0	--	--	--
TOTALS	2 2,25	12 1140,2	1 93	12 400,3	2 7,21	10 121,2	13 163,0	5 255,7	18 130,7	2 20,4

Table 2. Collections by depth zone.

Catch Groupings by Depth	Depth Zone*	Station No.	Catch Composition (no. of species in parentheses) and its biomass**
1. 300-750 m, 1 BT capture	mesial(mesobenthal), partly mesobathyal (mesobathybenthal), 200-500 m	1234***	Moridae(1), Brotulidae(2), Ophidiidae(1), Carapidae(1), Draconettidae(1), Chaunacidae(1). Total biomass 163 g.
2. 1050-1170 m 3 BT captures	Bathyal(bathybenthal) 500(700)-2000(3000) m	1209,1222,1238	Alepocephalidae(3), Bathypteroidae(1), Synaphobranchidae(2), Halosauridae(2), Notacanthidae(1), Macrouridae(1), Brotulidae(3). Total biomass 1796 g. Mean biomass per sample 599 g.
3. 2200-3500 m, 4 captures: 1 BT and 3 TC	Bathyabyssal (bathyabyssobenthal) 2000-3000 m	1207,1208,1224, 1233	Ipnopidae(2), Brotulidae(1), Aphyonidae(1). Total biomass 20 g.
4. 4090-5030 m, 4 captures: 1 TG and 3 TC	Abyssal(abyssobenthal) 2000(3000)-6000 m	1212,1231,1232, 1272	Alepocephalidae(1), Brotulidae(6). Total biomass 140 g. Mean biomass per sample 35 g.
5. 5800-6800 m 5 TC captures	Hadal or ultrabyssal (hadobenthal) 6000-11000 m	1242A,1243, 1259,1266,1267	Brotulidae(1). Total biomass 131 g. Mean biomass per sample 26 g.

* According to Rass (1967)
** Biomass figures rounded to nearest gram
*** Trawl sample composed mainly of coastal bottom fish, total biomass of sample 7568 m.

Table 3. Fish collections by beam trawl in various depths.

	San Andres Bank 300-750 m sta. 1234	Aves Ridge 1068-1060 m sta. 1209	Passage near Curacao 1050-1120 m sta. 1222	Beata Ridge 2200-2640 m sta. 1224	Nicaragua Rise 1105-1100 m sta. 1238
	22.31-0.02	9.48-12.25	3.22-6.00	20.25-24.00	22.40-2.07
Captures of Deep-Sea Benthic Fishes					
No. of species	7	7	10	1	5
No. of specimens	13	12	12	2	5
Biomass/hr., g.	163	1140	400	7	256
Captures of Bathypelagic and Benthic Shelf Fishes					
No. of species	12/8*	2	6	6	—
No. of specimens	19/17	6	11	7	—
Biomass/hr., g.	246/7569	46	40	12	—

* Captures on San Andres Bank consisted of bathypelagic (in the numerator) and benthic shelf fish (denominator).

Table 4. Captures of bottom fishes (Alepocephalidae, Ipnopidae, Macrouridae, Brotulidae) in midwater by non-bottom trawls.

Species	Region	Sta. No.	Locality Depth, m	Capture Depth, m	No. of Specimens, Length, Fish wt.
ALEPOCEPHALIDAE					
Binghamichthys microphos (Parr)	Columbia Basin	1227	3440-3800	1000	1; 45 mm 0.7 g
Xenodermichthys socialis Vaillant	Cayman Trench	1258	5500	500	1; 53 mm 1.2 g
Photostylus pycnopterus Beebe	Mexican Basin	1277	3750-3760	1000	1; 97 mm
		1286	3760	1000	1; 89 mm
MACROURIDAE					
Grenurus sp. (juv.)	Mexican Basin	1287	3760	1500	1
IPNOPIDAE					
Ipnops agassizi Garman (juv.)	Mexican Basin	1280	3770-3773	1500	1; 43 mm
BROTULIDAE					
Brotulotaenia sp. n. Cohen	Grenada Basin	1206	3000-3006	1000	1