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AN ANNOTATED LIST OF DEEP-SEA FISHES COLLECTED IN THE NORTHERN RED SEA, GULF OF AQABA

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ABSTRACT

During the years 1989–1993 an intensive collection of fishes from the aphotic zone (below 150 m) of the northern part of the Gulf of Aqaba was conducted.

This survey recorded 69 fish species, 8 elasmobranchs, and 61 teleosts, belonging to 45 families.

Fifteen species are endemic to the Red Sea: *Mustelus mosis, Narcine bentuviai, Rhinobatos punctifer, Ophichthus echeloides, Rhynchoconger sp., Physiculus marisrubri, Ostichthys hypsipterygion sufensis, Pterygotrigla sp., Uranoscopus marisrubri, Parascolopsis sp. 1* and *sp. 2, Atrobucca geniae, Chromis pelloura, Samariscus sp., Thamnaconus modestoides erythraeensis.*

Eleven species are new records for the Red Sea: *Gymnothorax johnsoni, Rhynchoconger sp., Synodus doaki, Pterygotrigla sp., Chelidoperca pleurospilus, Carangoides equula, Parascolopsis sp. 1 and sp. 2, Bodianus leucostictus, Paracaesio sordidus,* and *Samariscus sp.* Two species, *Cociella crocodila* and *Parascolopsis eriomma,* are first substantiated records for the Red Sea.

None of the species recorded in this list is considered conventional deep-sea fishes. The ichthyofauna of the aphotic zone of the Gulf of Aqaba is composed of species of shallower origin.

INTRODUCTION

The Gulf of Aqaba, an appendix of the Red Sea, is separated from it by the sill of Tiran, which is at a depth of about 220 m. It is a hypersaline gulf (40.3–41.6%) with high surface temperatures (20.5–27.3 °C) and presents an almost constant temperature throughout the column (Reiss and Hottinger, 1984).

Until the last decade, mesopelagic and benthic fishes from the Gulf of Aqaba were sporadically recorded, based mainly on the "occasional" catch by scientists or fishermen. The only scientific attempt to investigate this particular ichthyofauna was by Aron and Goodyear (1969), who collected fishes by midwater trawl. They reported *Maurolicus muelleri, Vinciguerria lucetia, Astronesthes martensii, Stomias affinis, Lestrolepsis*

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luetkeni, Benthosema pterota, Diaphus coeruleus, Bregmaceros arabicus, Synagrops philippinensis, Taractichthys steindachneri, Champsodon sp., and *Trichiurus lepturus.*

Post and Svoboda (1980) reported six deep-sea fishes: *Maurolicus muelleri, Stomias affinis, Astronesthes martensi, Benthosema pterotum, Diaphus coeruleus*, and *Lestidiops jayakari* from material washed up on the Jordanian shore, probably following deep-sea explosions.

Johnson and Feltes (1984) described the photichthyid *Vinciguerria mahabiss* from the Red Sea as a new endemic species.

Additional benthic and mesopelagic fishes were reported from the Gulf of Aqaba in different studies: *Iago omanensis* by Baranes and Ben-Tuvia, 1979; *Muraenesox cinereus* by Golani and Ben-Tuvia, 1982; *Saurida tumbil, Pristigenys niphonia, Argyrops spinifer, Polysteganus caeruleopunctatus, Parupeneus cyclostomus, Upeneus subvittatus, Trachurus indicus*, and *Thyrsitoides marleyi* by Ben-Tuvia, 1982; *Acropoma japonicus*, Brüss and Ben-Tuvia, 1983; *Nemipterus japonicus* by Diamant and Porter, 1983; *Branchiostegus sawakinensis* by Porter and Diamant, 1984, and by Ajiad, 1987; *Ostichthys hypsipterygion sufensis* by Golani, 1984; Ajiad, 1987; *Lycodontis elegans* by Ajiad and El-Absy, 1986; *Atrobucca geniae* by Ben-Tuvia and Trewavas, 1987; *Narcine bentuviai* by Baranes and Randall, 1989).

Cohen (1973) showed that there are only 8 species of mesopelagic fishes in the Red Sea compared to the 300 deep-water fishes of the Indian Ocean. Dor (1984) presented a checklist of the fishes of the Red Sea including about 1,000 species.

Klausewitz (1989) summarized the ichthyological research in the Red Sea and showed that there are no primary deep-sea fishes, but shallow- or deep-water immigrants from the Indian Ocean which became bathyal inhabitants.

Since 1989 an effort has been made to investigate the ichthyofauna of the Gulf of Aqaba and especially the benthic fishes from the aphotic zone (below150 m). We present here a preliminary annotated list of fishes from this study and some earlier collection.

MATERIAL AND METHODS

The collections were made from 600–2000 m off the Interuniversity Institute of Elat (IUI, the H. Steinitz Marine Laboratory) at the northern tip of the Gulf of Aqaba. Along this transect, depths of 150–900 m were recorded.

Most of the material was obtained by using monofilament trammel net, usually baited and set overnight. Traps of various shapes and sizes, and longlines with hooks of Kirby type no. 4 and 5 were also used as fishing gear. The fishing gear was set with a small (7-m) boat provided with a mechanical winch. The exact depth at the working site was determined by the reading of the echo-sounder.

The specimens collected were brought to shore in less than an hour and sorted there. Fresh material was photographed before preservation. The specimens were identified, where possible, to the species level. Weights and measurements (Standard Length unless otherwise mentioned) were recorded. Stomach contents were preserved for further ecological studies.

Samples of the material collected were deposited in the Hebrew University Fish Collection (HUJ). Large sharks were not preserved, their data only recorded.

During the month of August 1992, the *Jago* submersible of H. Fricke and J. Schauer from the Max Planck Institute was made available to IUI scientists, and the senior author had the opportunity to conduct a deep-dive at 400 m. Color pictures and video films were taken, providing additional ecological information on the deep-sea ichthyofauna.

ANNOTATED LIST

CARCHARHINIDAE

Carcharhinus altimus (Springer, 1950)

Material: 1575 mm, male, 1.XII. 1989, 250 m; 1580 mm, female, 11.III.1991, 350 m.

This species seems to be mainly an inhabitant of deep waters, although it can also be found at short distances from the shore.

Carcharhinus plumbeus (Nardo,1827)

Material: 1805 mm, 16.XI.1989, 350 m.

This species is the most common shark in the Gulf of Aqaba; it may be found throughout the water column.

SPHYRNIDAE

Sphyrna mokarran (Rüppell, 1837)

Material: 2260 mm, 20.XI.1989, 300 m.

This shark is found in both shallow and deep waters.

TRIAKIDAE

Iago omanensis (Norman, 1929)

[Plate I, Fig. 1]

Material: HUJ 16462 (10 spec.), 310-485 mm, 18.VIII.1992, 350 m.

The dwarf smooth hound is one of the smaller members of the family Triakidae. *Iago omanensis* was first reported from the Gulf of Eilat by Baranes and Ben-Tuvia (1979) as a rare shark. However since then it appears as the most common shark in the aphotic zone and comprises the main part of the biomass of the deep waters of the Gulf of Aqaba. Additional specimens were collected at a depth of 800 m and, in the Red Sea proper, it was found in even deeper water (Klausewitz and Thiel,1982; Baranes and El Samra, pers. observ.).

Mustelus mosis (Hemprich & Ehrenberg, 1875)

[Plate XIX, Fig. 58]

Material: 10 specimens 258–770 mm, 150–250 m.

The taxonomic status of the genus *Mustelus* still needs clarification. *Mustelus mosis* seems to be endemic in the Red Sea (Heemstra, pers. comm.), where it is common both in the photic and the aphotic zone.

TORPEDINIDAE

Narcine bentuviai Baranes & Randall, 1989

[Plate I, Fig. 2]

Material: HUJ 13612 (Holotype), 150 mm, 2.XI.1986, 160 m; HUJ 13614, 82 mm, same as Holotype; HUJ 13615, 77 mm, 27.V.1987.

This endemic species is rare in the Gulf of Aqaba at all depths sampled.

Torpedo sinuspersici Olfers, 1831

[Plate 1, Fig. 3]

Material: HUJ 14134, 335 mm, 14. XII. 1989, 300 m.

RHINOBATIDAE

Rhinobatos punctifer Compagno & Randall, 1987

[Plate I, Fig. 4]

Material: HUJ 16182, 310 mm, 14.XII.1989, 300 m; HUJ 16424, 295 mm, 29.VII.1990, 150 m.

This endemic species is common at depths of 150–300 m.

MURAENIDAE

Gymnothorax johnsoni (Smith, 1962)

[Plate II, Fig. 5]

Material: HUJ 14127, Total Length (TL) 731 mm, 5.I.1990, 200m; HUJ 14147, TL 880 mm, 15.IX.1989, 150m; HUJ 14150, TL 795 mm, 15.XII.1989, 200 m.

McCosker et al. (1993) identified the specimen HUJ 14150 and reported it as the first record from the Red Sea. The species was described from the eastern shore of South Africa (Castle and McCosker, 1986).

OPHICHTHIDAE

Ophichthus echeloides (D'Ancona, 1928)

[Plate II, Fig. 6]

Material: HUJ 14133, TL 510 mm, 14.XII.1989, 300 m.

McCosker et al. (1993) described the first adult specimen. The *Leptocephalus* was described by D'Ancona (1928).

CONGRIDAE

Rhynchoconger n.sp.

[Plate II, Fig. 7]

Material: HUJ 14454, TL 564 mm, 23.V.1990, 350 m.

Additional eels (9 specimens), 21.VII.1992, 360 m, were given to Ben-Tuvia, who is describing this new species (see Isr. J. Zool., this issue).

MURAENESOCIDAE

Muraenesox cinereus (Forsskål, 1775)

[Plate III, Fig. 8]

Material: HUJ 13738 , TL. 1535 mm, 31.III.1989, 300 m; HUJ 14991, TL. 925 mm, 12.III.1991, 500 m; HUJ 17044, TL 1224 mm, 14.III.1993, 800 m.

According to Castle (1984) the only pike conger occurring in the Red Sea is *M. cinereus;* this author also mentioned *M. bagio* (Hamilton-Buchanan, 1822) in the Madagascar area. Castle (1984) stated that the two species differ by their size (*M.cinereus* being shorter than 80 cm in TL), the proportion between the interorbital and the head length (*M. cinereus* has a shorter and broader snout than *M. bagio*), the number of lateral line pores (less than 47 in *M. cinereus*), the number of dorsal rays to front of anus (more than 66 in *M. cinereus*), and the number of vertebrae (more than 145 in *M. cinereus*). The measurements given by Golani and Ben-Tuvia (1982) do not fit any of the species diagnoses of Castle (1984). Klausewitz and Thiel (1982) reported *M. cinereus* from the Red Sea proper, and their counts and measurements fit the description of Golani and Ben-Tuvia (1982) for the specimen from the Gulf of Aqaba.

The measurements and the counts of the additional specimens we collected fit those of Golani and Ben-Tuvia (1982) but show variation in the body proportions. Although we agree that there is still a certain confusion in the specific status of the pike congers, we attribute the Gulf of Aqaba specimens to *M. cinereus*.

A single specimen was recorded in the Mediterranean Sea as a Lessepsian migrant (Golani and Ben-Tuvia, 1982).

SYNODONTIDAE

Saurida tumbil (Bloch, 1795)

[Plate III, Fig. 9]

Material: HUJ 11880, 2 spec., 283–382 mm, 1.IX.1986, 500 m; HUJ 11947, 383 mm, 1986, 350 m; HUJ 14018, 285 mm, 14.XII.1989, 300 m.

Common species between 200 and 500 m. The present report considerably extends its bathymetrical distribution.

Synodus doaki Cressey, 1981

[Plate III, Fig. 10]

Material: HUJ 15157, 114 mm, 28.V.1991, 250 m.

The color pattern of the body and head and the red stripes on the fins fit the description of Cressey (1981), who also stated that this species inhabits deeper waters (60–140 m) than most of its congenerics. The present record is the first one for the Red Sea, and presents a considerable extension of the previously recorded depth habitat.

MORIDAE

Physiculus marisrubri Brüss, 1986

[Plate IV, Fig. 11]

Material: HUJ 17013, 107 mm, 28.II.93, 400 m.

Although the specimen collected presented a continuous second dorsal-caudal-anal fin, we assume that this is a case of regeneration of the caudal fin as described in some of the specimens of Brüss (1986). Another specimen of *Physiculus sp.* was photographed from the *Jago* submersible but not collected. Although there are some differences between the meristics of our specimen and the diagnosis of Brüss (1986) we accept *P. marisrubri* for the Gulf of Aqaba until we examine additional specimens.

MALACANTHIDAE

Branchiostegus sawakinensis Amirthalingam, 1969
[Plate IV, Fig. 12]
Material: HUJ 16987, 218 mm, 23.III.93, 150 m.
One specimen was photographed from the *Jago* submersible.

OPHIDIIDAE

Brotula multibarbata Temminck and Schlegel, 1846
[Plate IV, Fig. 13]
Material: HUJ 14456, TL 363 mm, 11.V.1990, 150 m.

BATRACHOIDIDAE

Thalassothia cirrhosa (Klunzinger, 1871)
[Plate IV, Fig. 14]
Material: HUJ 13711, TL 238 mm, 20.III.1989, 200 m.

FISTULARIIDAE

Fistularia petimba Lacepede, 1803
[Plate V, Fig. 15]
Material: HUJ 15150, 480 mm, 27.V.1991, 250 m.

TRACHICHTHYIDAE

Hoplostethus mediterraneus Cuvier, 1829
[Plate V, Fig. 16]
Material: HUJ 17014, 125 mm, 22.III.93, 650–700 m.

HOLOCENTRIDAE

Ostichthys hypsipterygion sufensis Golani, 1984
[Plate V, Fig. 17]

Material: HUJ 16425 (2 spec.), 133–151 mm, 10.IX.1989, 250 m.

Ostichthys acanthorhinus Randall, Shimizu and Yamakawa, 1982
[Plate V, Fig. 18]
Material: HUJ 17030, 137 mm, 30.III.1993, 600 m.
This species was first recorded from the central Red Sea by Klausewitz (1986).

MONOCENTRIDAE

Monocentris japonicus (Houttuyn, 1782)
[Plate VI, Fig. 19]
Material: HUJ 13755 (2 spec.), 128–132 mm, 1.V.1988, 200 m; HUJ 17103, 130 mm, VII.1993, 400 m.

TRIGLIDAE

Lepidotrigla bispinosa Steindachner, 1898
[Plate VI, Fig. 20]
Material: HUJ 14132, 87 mm, 14.XII.1989, 300 m.
This species was previously reported at depths shallower than 150 m.

Lepidotrigla spiloptera Günther, 1880
[Plate VI, Fig. 21]
Material: HUJ 15149, 95 mm, 27.V.1991, 250 m.

Pterygotrigla sp.
[Plate VI, Fig. 22]
Material: HUJ 13957(3 spec.),125–144 mm, 30.XI.1989, 350 m; HUJ 14002 (8 spec.), 111–154 mm, 20.XI.1989, 300 m.
This species is the most common triglid from the deep water of the Gulf. It is closely related to *P. hemisticta* (Temminck and Schlegel, 1842) but differs slightly from the Japanese fishes from the type locality in its coloration pattern (no spots on pectorals in Red Sea) and squamation on chest (naked in Red Sea, some in Australia, and dense in Japan). The taxonomic status of the Red Sea species is presently being studied by Golani and Baranes.

PLATYCEPHALIDAE

Cociella crocodila (Tilesius, 1812)
[Plate VII, Fig. 23]
Material: HUJ 14019 (2 spec.), 303–320 mm, 14.XII.1989, 300 m.
Fowler (1945) stated that *C. crocodila* is a Red Sea fish but did not record any specimen. Randall (1983) photographed a Red Sea specimen he named *C. crocodila*, but he confirmed (Randall, pers. comm.) that the fish is most likely *Papilloculiceps longiceps.*
Therefore our record is the first substantiated one of *C. crocodila* in the Red Sea.

DACTYLOPTERIDAE

Dactyloptena peterseni (Nystrom, 1887)
[Plate VII, Fig. 24]
Material: HUJ 15154 (2 spec.), 117–206 mm, 28.V.1991, 250 m.

SCORPAENIDAE

Scorpaenopsis oxycephala Bleeker, 1849
[Plate VII, Fig. 25]
Material: HUJ 14003, 15.V.1989, 250 m.
Eschmeyer (1986) stated that this species is a habitant of shallow waters, down to 35 m only.

CHAMPSODONTIDAE

Champsodon omanensis Regan, 1908
[Plate VII, Fig. 26]
Material: HUJ 16463, 130 mm, 22.VII.1992, 400 m.

URANOSCOPIDAE

Uranoscopus marisrubri Brüss, 1987
[Plate XIX, Fig. 59]
Material: HUJ 13712, 153 mm, 20.II.1989, 200 m.

SERRANIDAE

Epinephelus areolatus (Forsskål, 1775)
Material: HUJ 16986, 222 mm, 15.II.92, 180 m.
Additional non-preserved specimen, 270 mm, was collected on 27.X.1989, at 200 m.

Epinephelus epistictus (Temminck and Schlegel, 1842)
[Plate VIII, Figs. 28 and 29]
Material: HUJ 14125, 259 mm, 4.I.1990, 350 m; HUJ 17004, 510 mm, 4.III.1993, 650 m; HUJ 17012, 530 mm, 16.III.1993, 780 m.
Two additional specimens (TL 620 mm and TL 640 mm) were collected at 700 m but not preserved. Our specimens fit the description and the picture of *Epinephelus sp.* in Heemstra and Randall (1986: Plate 42, 166.62). This species was later synonymized with *E. epistictus* by Randall and Heemstra (1991). Although the morphometrics and the meristics of our specimens are at the extreme of the ranges of the ones given in the diagnosis of *E. epistictus*, we follow the latest revision and accept *E. epistictus* until further examination.

Epinephelus fasciatus (Forsskål, 1775)
[Plate IX, Fig. 30]
Material: HUJ 14128, 227 mm, 19.I.1990, 150 m.

Epinephelus radiatus (Day, 1867)
[Plate IX, Fig. 31]
Material: HUJ 14124, 437 mm, 4.I.1990, 350 m.

Chelidoperca pleurospilus (Günther, 1880)
[Plate IX, Fig. 32]
Material: HUJ 16465, 81 mm, 27.V.1991, 250 m.
A rare fish, this is the first record of the genus in the Red Sea.

PRIACANTHIDAE

Priacanthus sagittarius Staernes, 1988
[Plate X, Fig. 33]
Material: HUJ 15153, 245 mm, 28.V.1991, 250 m.

Pristigenys niphonia (Cuvier, 1829)
[Plate X, Fig. 34]
Material: HUJ 11426, 218 mm, 1983, 300 m.

APOGONIDAE

Apogon pseudotaeniatus Gon, 1986
[Plate X, Fig. 35]
Material: HUJ 13760, 78 mm, 12.VI.1989, 150 m.
This species is related to *A. taeniatus* (Ehrhenberg,1828) from which it differs only from the position of the posterior transversal bar.

ACROPOMIDAE

Acropoma japonicus Günther, 1859
[Plate XI, Fig. 36]
Material: HUJ 14131, 136 mm, 14. XII.1989, 300 m; HUJ 14146, 151 mm, 13.X.1989, 300 m.
It is a common species between 150 and 450 m.

CARANGIDAE

Carangoides equula (Temminck and Schlegel, 1844)
[Plate XI, Fig. 37]
Material: HUJ 14568, 170 mm, 20.VIII.1990, 250 m; HUJ 14569, 160 mm,

20.VII.1990, 250 m; HUJ 15849 (2 spec.), 125–130 mm, 21.V.1990, 300 m; HUJ 15997, 110 mm, 11.X.1989, 350 m; HUJ 15998, 215 mm, 15.VI.1990, 250 m.

This report is the first record of this species in the Red Sea.

Decapterus russelli (Rüppell, 1830)

[Plate XIX, Fig. 60]

Material: HUJ 15996, 246 mm, 14.XII.1989, 300 m.

Naucrates ductor (Linnaeus, 1758)

[Plate XI, Fig. 38]

Material: HUJ 14570, 204 mm, 20.VII.1990, 200 m.

Trachurus indicus Nekrasov, 1966

[Plate XI, Fig. 39]

Material: HUJ 15995, 170 mm, 3.VIII.1990, 400 m.

SPARIDAE

Argyrops spinifer (Forsskål, 1775)

[Plate XII, Fig. 40]

Material: HUJ 13761 (2 spec.), 160–202 mm, 12.VI.1989, 150 m.

This species is common at depths of 150–250 m; larger specimens (300–450 mm) were found at 400 m. The present report considerably extends the bathymetric distribution of the species.

Polysteganus coeruleopunctatus Klunzinger, 1870

[Plate XII, Fig. 41]

Material: HUJ 13794, 160 mm, 15.XI.1986, 250 m; HUJ 13901 (3 spec.), 123–130 mm, 13.X.1989, 300 m;HUJ 17040 (2 spec.), 200–240 mm, 28.IV.1993, 450 m.

This is the most common teleost in our samples between 250–500 m. The present report extends considerably the bathymetrical distribution of the species.

NEMIPTERIDAE

Parascolopsis eriomma (Jordan and Richardson, 1909)

[Plate XIII, Fig. 42]

Material: HUJ 15158 (4 spec.), 210–222 mm, 1.V.1989, 300 m.

This species was previously mentioned by Bayoumi (1972) from the Gulf of Suez but no specimen was preserved; therefore our specimens are the first substantiated record of the species from the Red Sea.

Parascolopsis sp. 1

[Plate XIII, Fig. 43]

Material: HUJ 13958 (2 spec.), 94–95 mm, 30.XI.1989, 350 m; HUJ 16428, 114 mm, 11.XII.1985, 250 m.

Our specimens are closely related to *P. townsendi* but differ from it by the size and shape of the gill rakers. The genus is presently under revision by Russell and Golani who are describing this species (see Isr. J. Zool., this issue).

Parascolopsis sp. 2

Material: HUJ 17086, 18.XII.1992, 450 m; HUJ 17087, 18.XII.1992, 450 m; HUJ 17088, 3.VIII.1990, 400 m; NTMS (not yet catalogued), 7.XI.1992, 400 m.

This species is also closely related to *P. towsendi* but differs from it by the squamation on the cheeks.

Nemipterus japonicus (Bloch, 1791)

Material: HUJ 10865, 257 mm, 13.V.1982, 200 m.

This species seems to be rare in the Gulf of Aqaba and was not collected since the first record of Diamant and Porter (1983). According to Russell (pers. comm.) the identification of the specimen is doubtful, but since we were unable to find and examine this specimen we cannot confirm the presence of this species in the Gulf of Aqaba.

Nemipterus randalli Russell, 1986

[Plate XIII, Fig. 44]

One specimen (TL 120 mm, 18.VIII.1992, 500 m) was collected but not preserved. Russell (pers. comm.) identified the specimen according to a color photo of the fresh specimen.

SCIAENIDAE

Atrobucca geniae Ben-Tuvia and Trewavas, 1987

[Plate XIV, Fig. 45]

Material: HUJ 16426 (2 spec.), 107–186 mm, 14.XII.1989, 300 m; HUJ 16427 (4 spec.), 186–233 mm, 11.X.1989, 350 m.

Very common species below 250 m.

PINGUIPEDIDAE

Parapercis somaliensis Schultz, 1968

[Plate XIV, Fig. 46]

Material: HUJ 16464 (3 spec.), 140–155 mm, 19.VI.1992, 350 m.

CALLIONYMIDAE

Callionymus bentuviai Fricke, 1981

[Plate XIV, Fig. 47]

Material: HUJ 16989, 63 mm, 11.II.93, 410–480 m.

MULLIDAE

Parupeneus heptacanthus (Lacepede, 1802)
[Plate XV, Fig. 48]
Material: HUJ 12241, 250 mm, 15.VI.1986, 350 m.

Parupeneus rubescens (Lacepede, 1801)
[Plate XV, Fig. 49]
Material: HUJ 13714, 222 mm, 20.III.1989, 200 m; HUJ 14148, 175 mm, 15.XI.1989, 150 m.

Upeneus moluccensis (Bleeker, 1855)
Material: HUJ 11348, 140 mm, 1.IV.1981, 300 m; HUJ 13600 (16 spec.), 6.XII.1986, 150 m.
Rare in the Gulf of Aqaba, this species is known in the Mediterranean Sea (Lessepsian migrant) where it is now one of the most common commercial trawl-fish (Golani, in press).

Upeneus subvittatus (Temminck and Schlegel, 1843)
[Plate XV, Fig. 50]
Material: HUJ 11670 (5 spec.), 140–195 mm, 15.XI.1985, 200 m; HUJ 12242, 189 mm, 15.VI.1986, 300 m.
Very common between 200 and 400 m.

PENTACEROTIDAE

Histiopterus typus Temminck and Schlegel, 1844
[Plate XX, Fig. 61]
Material: HUJ 13194, 160 mm, 13.V.1988, 350 m.
The meristics of our specimen from the Gulf of Aqaba are higher than those of the Red Sea specimen of Klausewitz (1980) but are in the ranges given by Hardy (1983) who synonymized *H. spinifer* and *H. typus*.

POMACENTRIDAE

Chromis pelloura Randall and Allen, 1982
[Plate XVI, Fig. 51]
Material: HUJ 14571 (3 spec.), 100–109 mm, 20.VII.1990, 200 m.

LABRIDAE

Bodianus leucostictus (Bennett, 1831)
[Plate XVI, Fig. 52]
Material: HUJ 13667, 242 mm, 15.I.1989, 200 m.
Although our specimen resembles *Bodianus trilineatus* (Fowler, 1934) as described by Gomon and Randall (1983), we follow Randall (1986) who synonymized *Lepidaplois*

trilineatus Fowler (1934), *Lepidaplois luteopunctatus* Smith (1957), and *Lepidaplois bourboni* Fourmanoir and Gueze (1961) with *Bodianus leucostictus* (Bennett, 1831). Randall (1986) also pointed out that the distinction between *B. trilineatus* and *B. leucostictus* is provisional. This is the first record of the species in the Red Sea.

Choerodon robustus (Günther, 1862)

[Plate XVI, Fig. 51]

Material: HUJ 14151, 255 mm, 22.V.1989, in trap at 200 m; HUJ 15156 , 255 mm, 28.V.1991, 250 m.

LUTJANIDAE

Paracaesio sordidus Abe and Shinohara, 1962

[Plate XX, Fig. 62]

Material: HUJ 16461, 360 mm, 15.II.1992, 180 m; HUJ 16462 (4 spec.), 370–420 mm, 18.III.92, 150 m.

This species lives in schools and it is not rare. Dor (1984) included *P. sordidus* in his CLOFRES, following Abe and Shinohara (1968) who synonymized this species with *P. xanthurus*. However Allen (1985), in his revision of Lutjanidae, showed that the synonymy was erroneous. Therefore our specimens are the first record from the Red Sea.

GEMPYLIIDAE

Thyrsitoides marleyi Fowler, 1929

[Plate XVII, Fig. 54]

Material: HUJ 14072, 998 mm, 14.XII.1989, 300 m.

Thyrsitoides marleyi was first recorded from the Red Sea by Ben-Tuvia (1982). In the same year Ajiad et al. (1982) described *T. jordanus* n. sp. based on a single specimen. Although we were unable to examine the type specimen of *T. jordanus,* the detailed photographs of the described specimen, the location, and depth of collection site indicate that this specimen is the same as ours. The morphometrics and the counts of *T. jordanus* and of our specimen match those given for *T. marleyi* (Fowler, 1929). The type specimen of Fowler has fleshy keels on the caudal base (Nakamura, 1980), like the Ajiad et al. (1982) specimen. Therefore we conclude that *T. jordanus* is a junior synonym of T. *marleyi.*

ARIOMMATIDAE

Ariomma brevimanus (Klunzinger, 1884)

[Plate XVII, Fig. 55]

Material: HUJ 13660, 587 mm, 20.III.1989, 200 m.

This species was described from the Red Sea by Klunzinger (1884). According to Dor (1984), it was not collected subsequently and its presence in the Red Sea was only quoted (Regan, 1902; Fowler, 1945; Haederich, 1967). Recently, Ajiad and Mahasneh (1986) reported three specimens from Aqaba.

PLEURONECTIDAE

Samariscus sp.

Material: HUJ 16980, 116 mm, 9.VII.92, 350–400 m.

This specimen was loaned to Hensley (Univ. Puerto Rico) for identification (see Isr. J. Zool., this issue).

BOTHIDAE

Bothus pantherinus (Rüppell, 1830)

[Plate XX, Fig. 63]

Material: HUJ 16179, 141 mm, 28.V.1989, 250 m.

MONACANTHIDAE

Thamnaconus modestoides erythraeensis Bauchot and Mauge, 1978

[Plate XVIII, Fig. 56]

Material: HUJ 14129, 161 mm, 19.I.1990, 150 m; HUJ 14149 (2 spec.), 148–162 mm, 12.XI.1989, 200 m; HUJ 17006, 151 mm, 23.III.92, 150 m; HUJ 17007, 180 mm, 23.III.92, 150 m

This Red Sea monacanthid was identified by Hutchins (Bauchot and Mauge, 1978) as *T. modestoides* (Barnard, 1927). Although the morphometrics of the Red Sea specimens fitted the ranges of specimens examined by Hutchins, Bauchot and Mauge (1978) erected a new subspecies, based on the geographical distance between the Red Sea and the Australian waters.

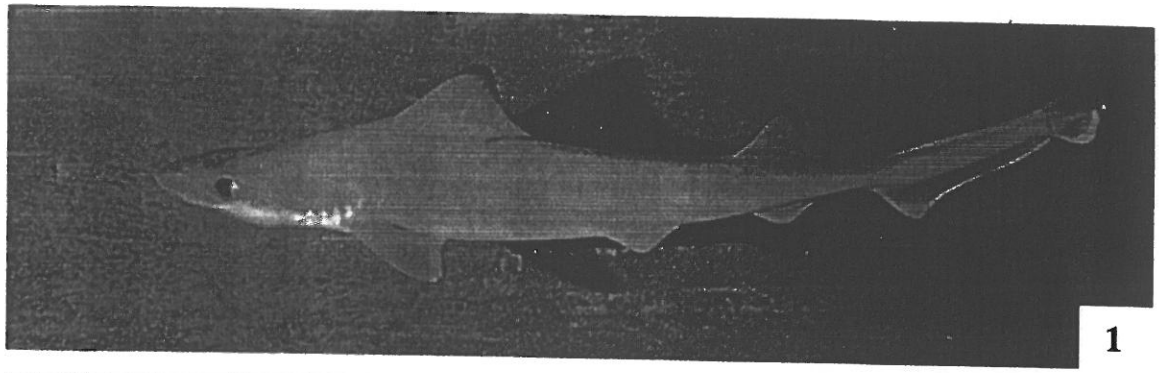
The two specimens (HUJ 17006 and 17007) present large differences in the body shape and although Bauchot and Mauge (1978) reported a communication of Hutchins stating that there are considerable variations between males and females and also among specimens of the same sex, we believe that further work on the Red Sea monacanthid may lead to the erection of a new species.

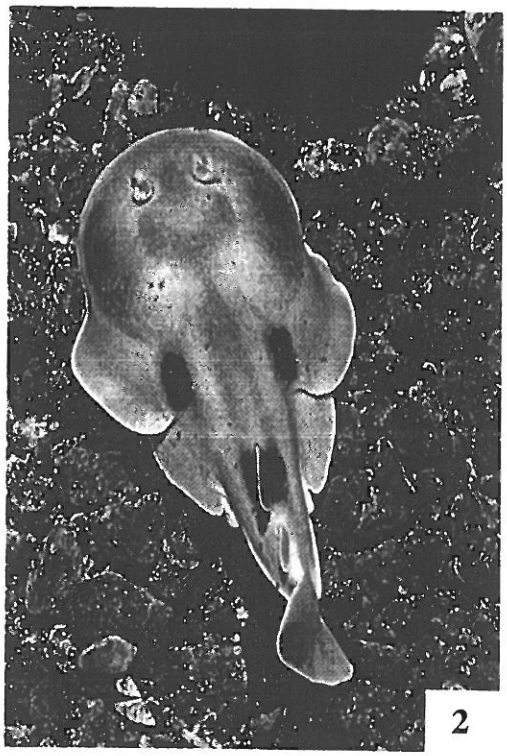
TETRAODONTIDAE

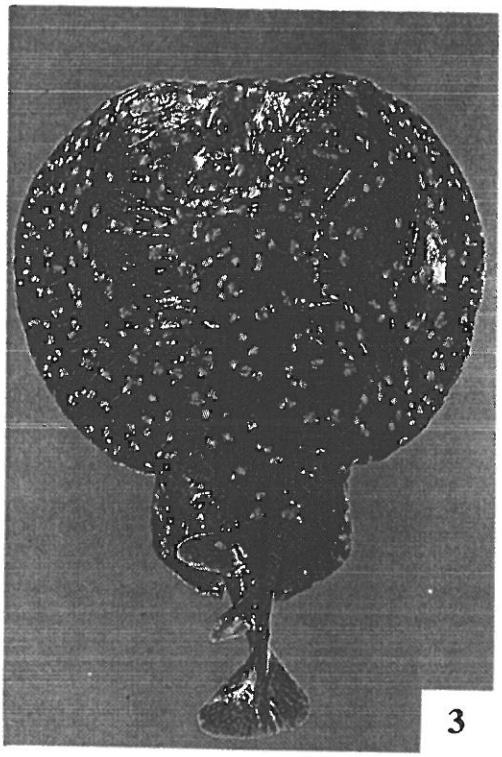
Lagocephalus scleratus (Forster, 1778)

[Plate XVIII, Fig. 57]

Material: HUJ 15077, 415 mm, 28.V.1991, 250 m.







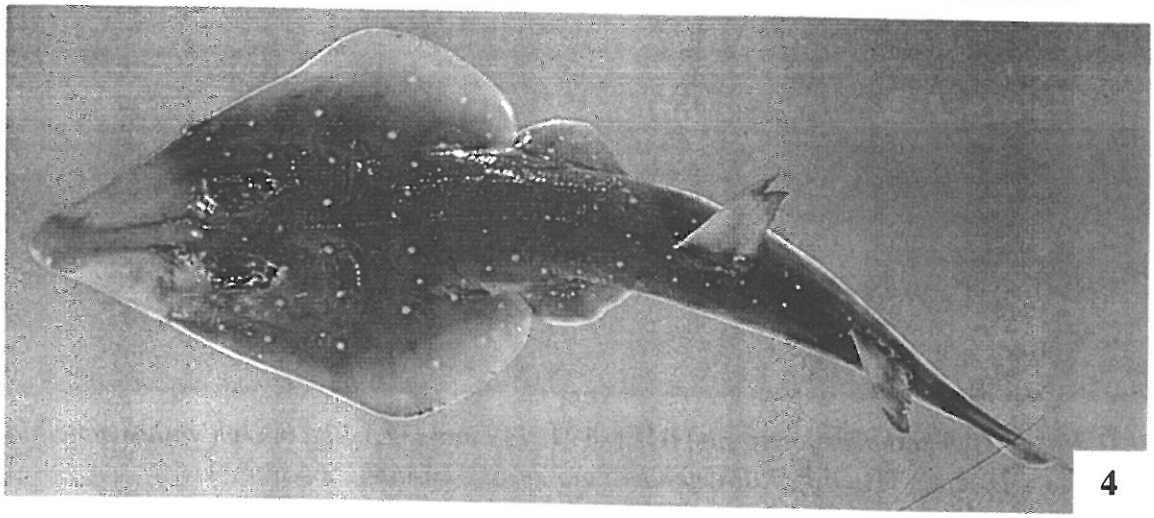
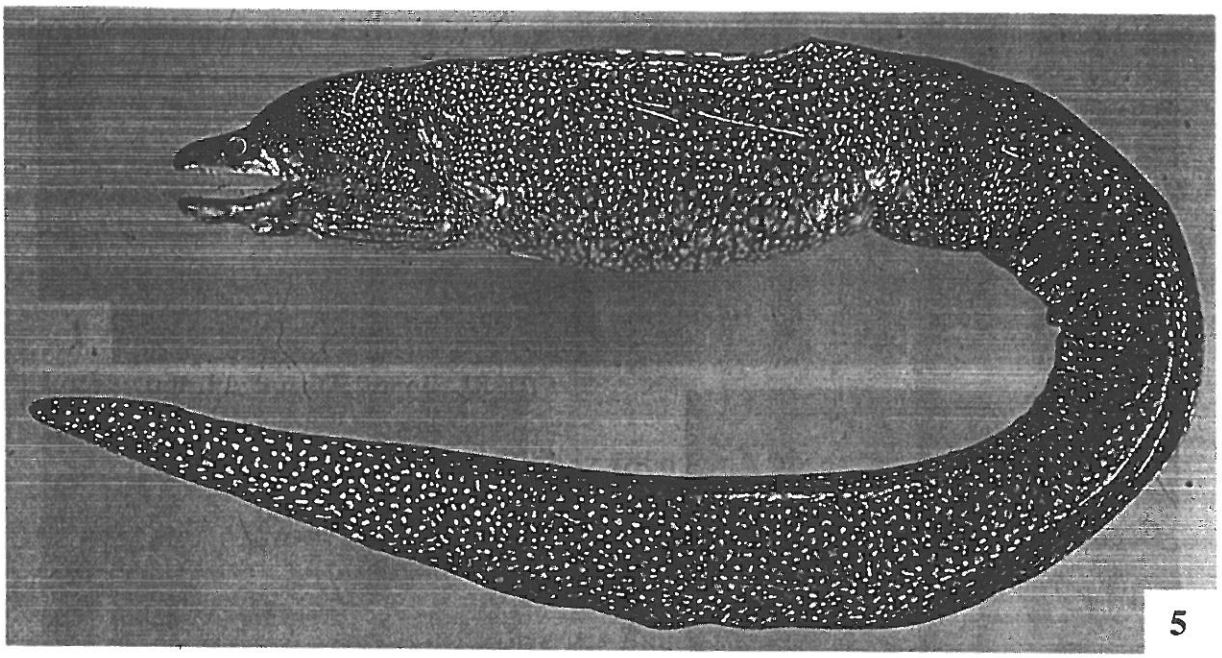
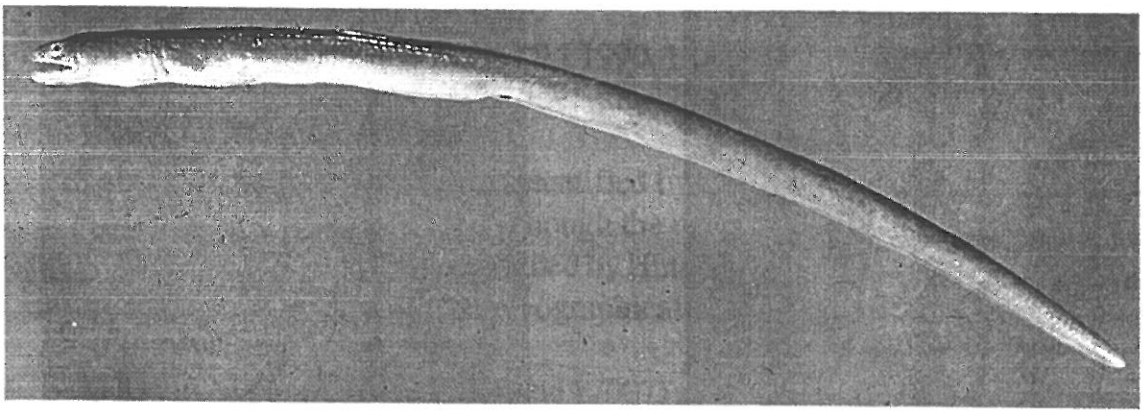


Plate I. Fig. 1. *Iago omanensis*, (Tank photograph) HUJ 16462. Fig. 2. *Narcine bentuviai*, HUJ 13612, 150 mm. Fig. 3. *Torpedo sinuspersici*, HUJ 14134, 335 mm. Fig. 4. *Rhinobatos punctifer*, HUJ 16182, 310 mm.





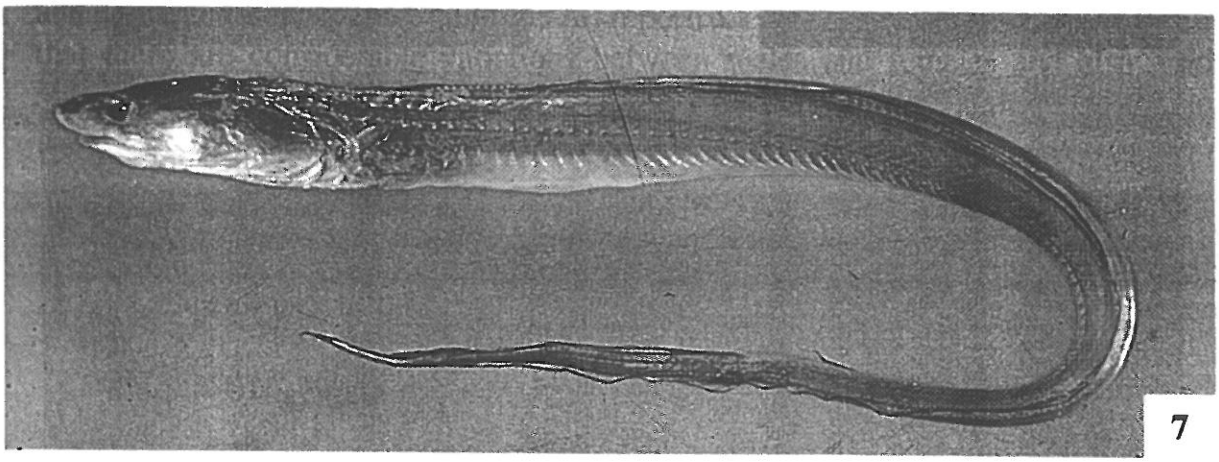
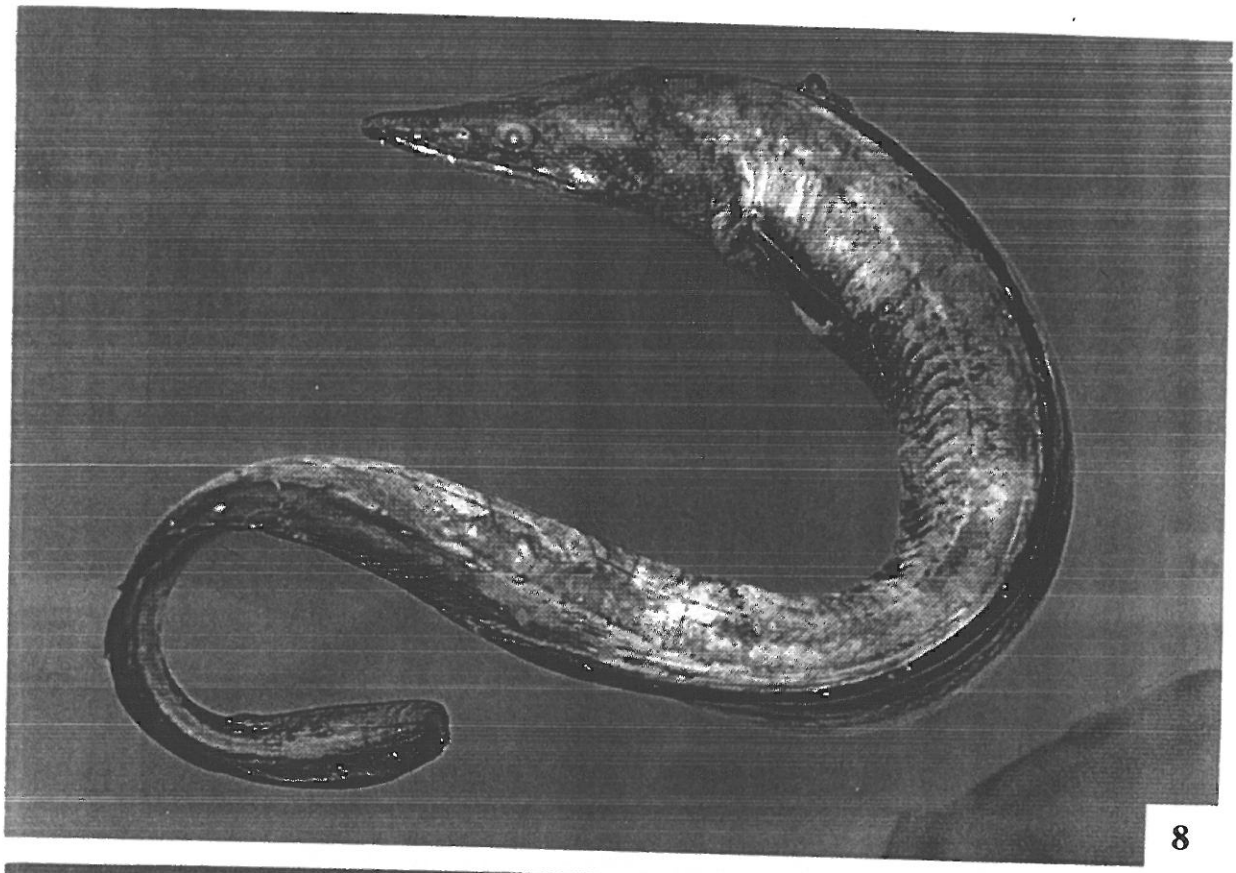
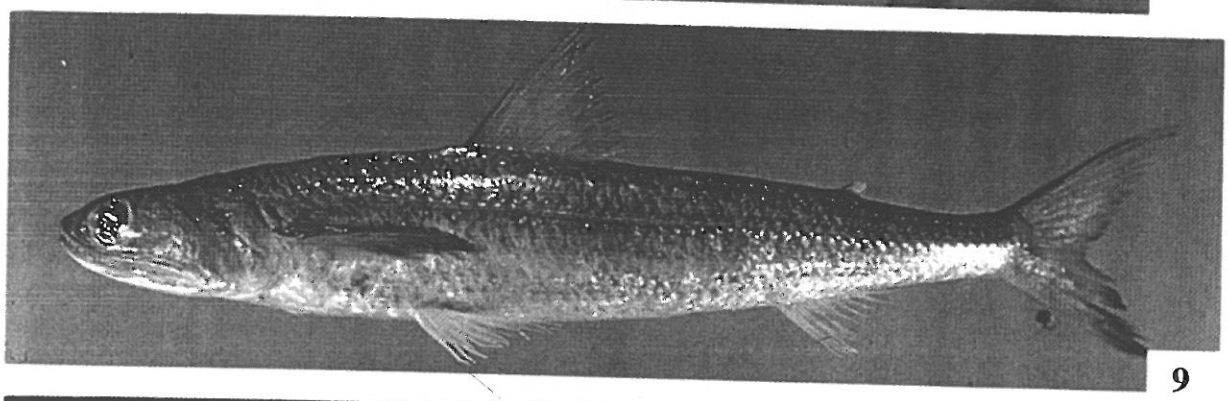


Plate II. Fig. 5. *Gymnothorax johnsoni*, HUJ 14127, 731 mm (TL). Fig. 6. *Ophichthus echeloides*, HUJ 14133, 510 mm (TL). Fig. 7. *Rhynchoconger sp.* HUJ 14454, 564 mm (TL).





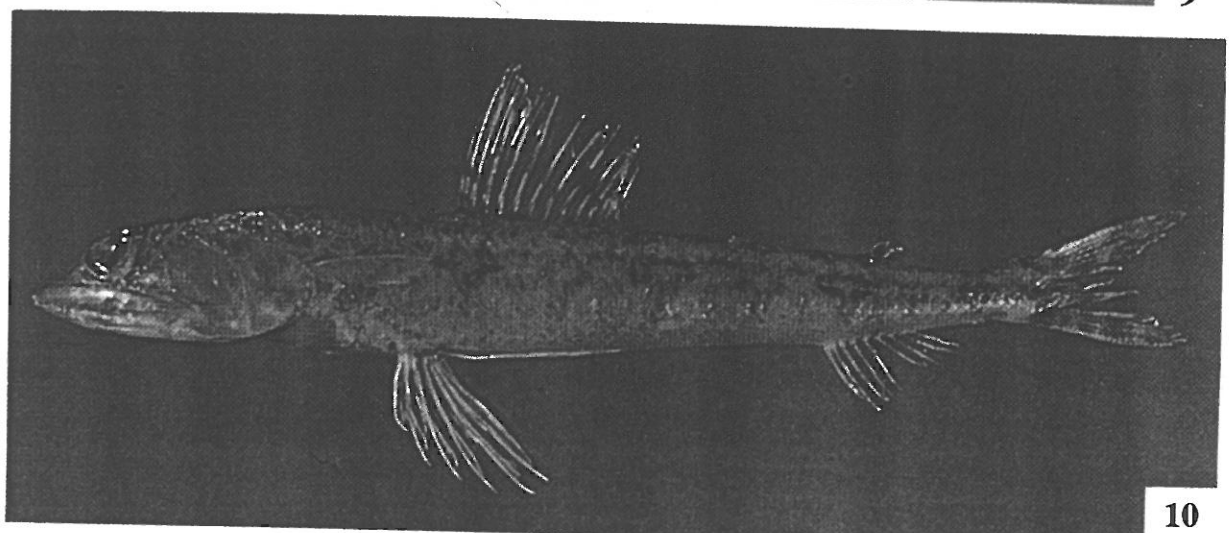
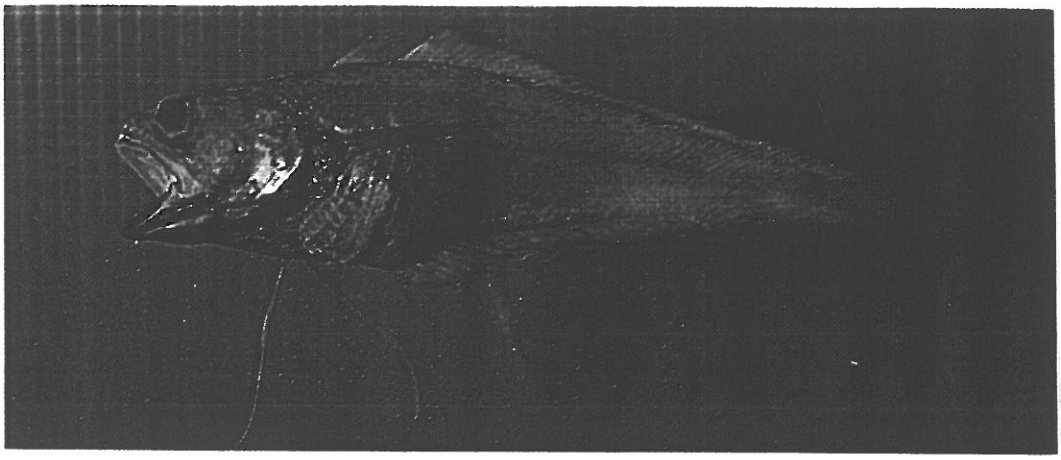


Plate III. Fig. 8. *Muraenesox cinereus*, HUJ 17044, 1224 mm (TL). Fig. 9. *Saurida tumbil*, HUJ 14018, 285 mm. Fig. 10. *Synodus doaki*, HUJ 15157, 114 mm.



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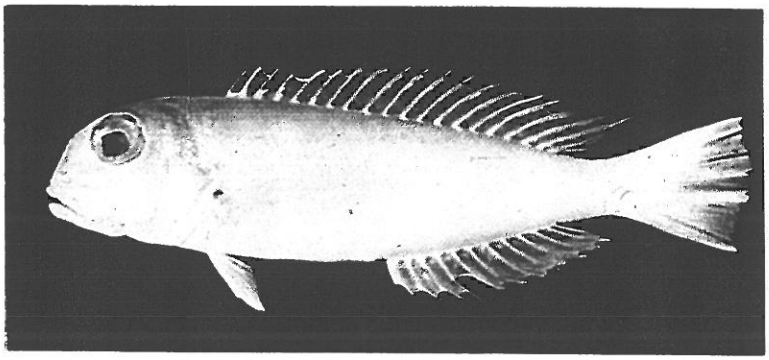

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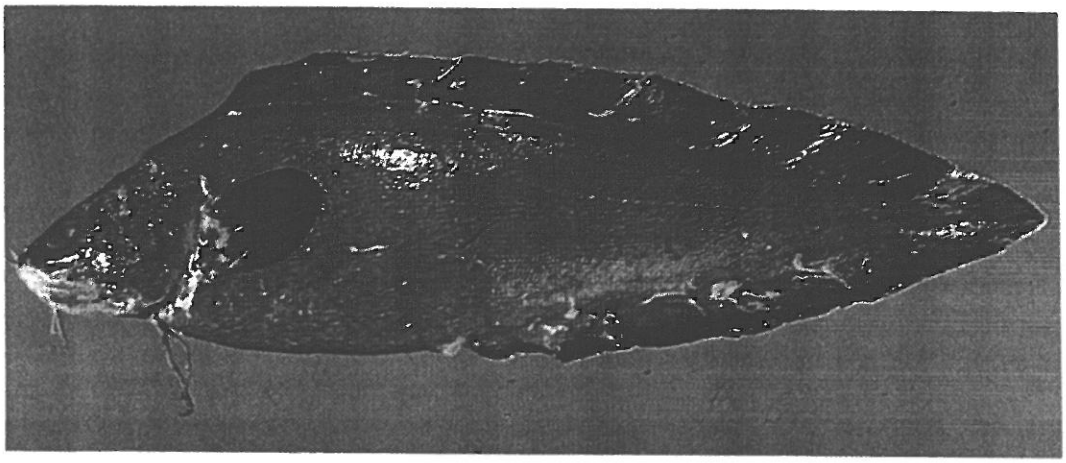

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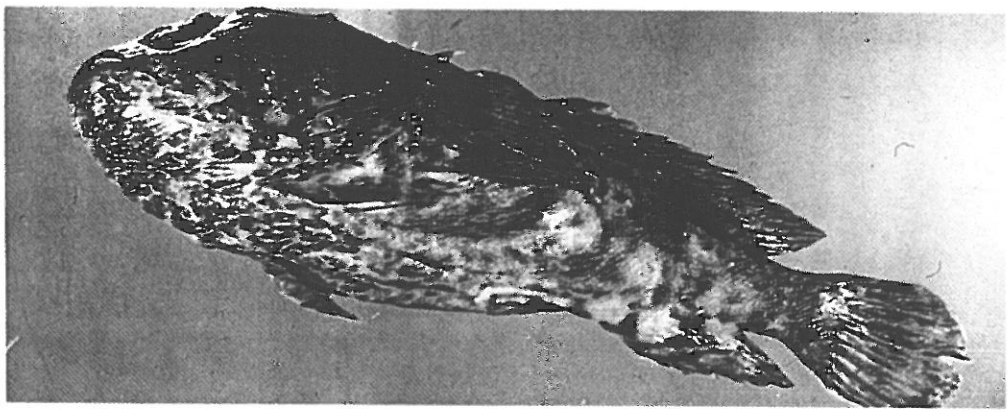

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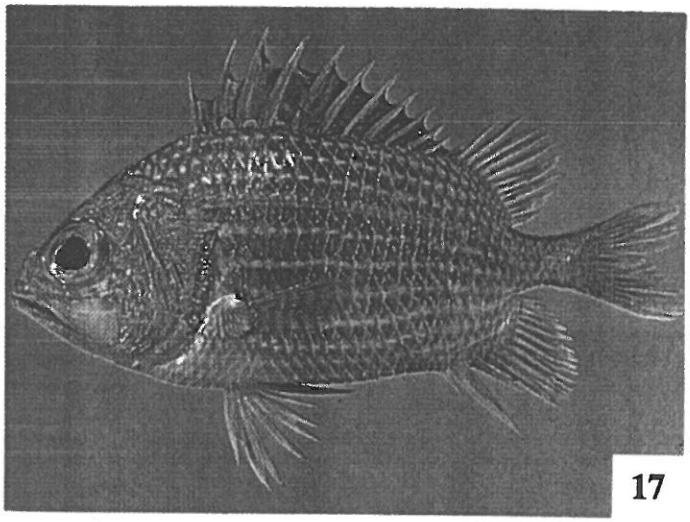
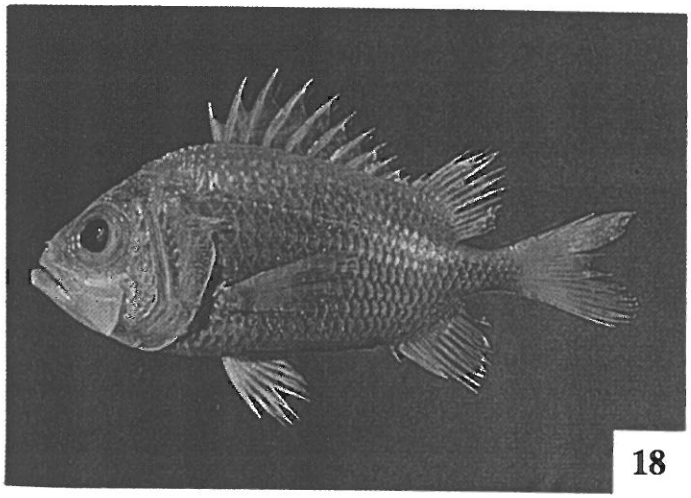
Plate IV. Fig. 11. *Physiculus marisrubri*, HUJ 17013, 107 mm. Fig. 12. *Branchiostegus sawakinensis*, HUJ 16987, 218 mm. Fig. 13. *Brotula multibarbata*, HUJ 14456, 363 mm (TL). Fig. 14. *Thalassothia cirrhosa*, HUJ 13711, 238 mm.





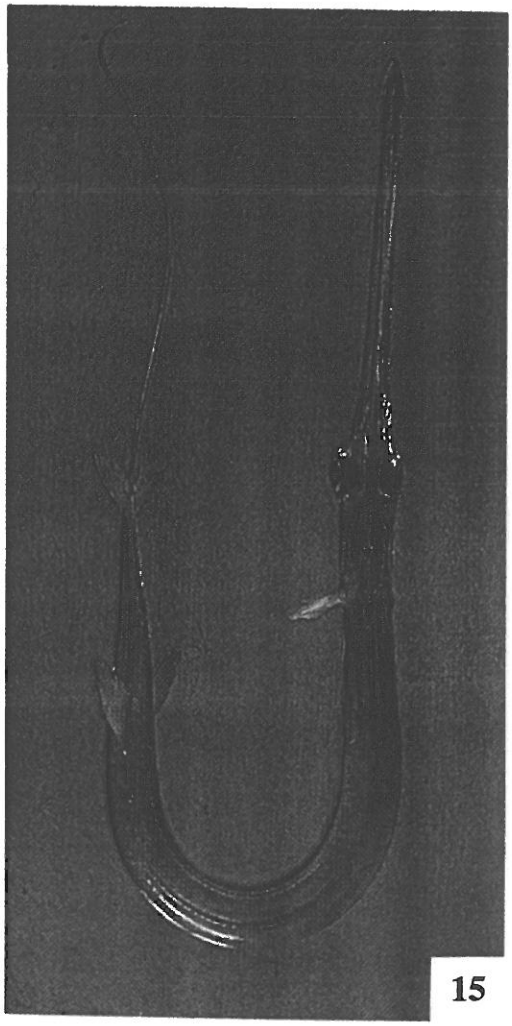
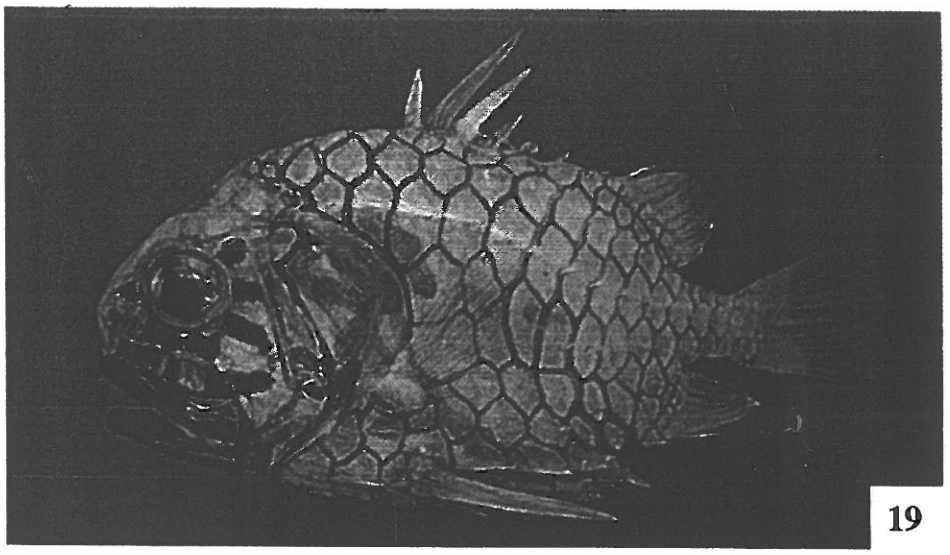
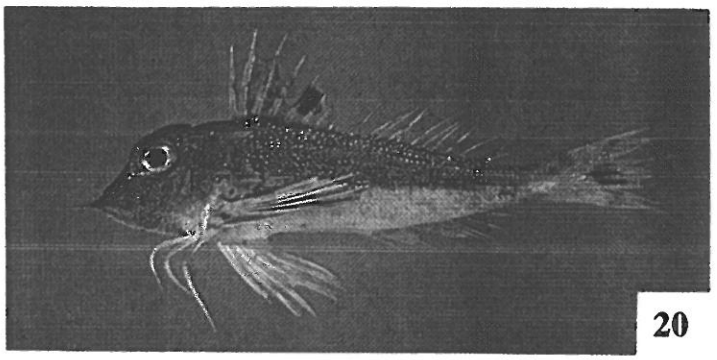
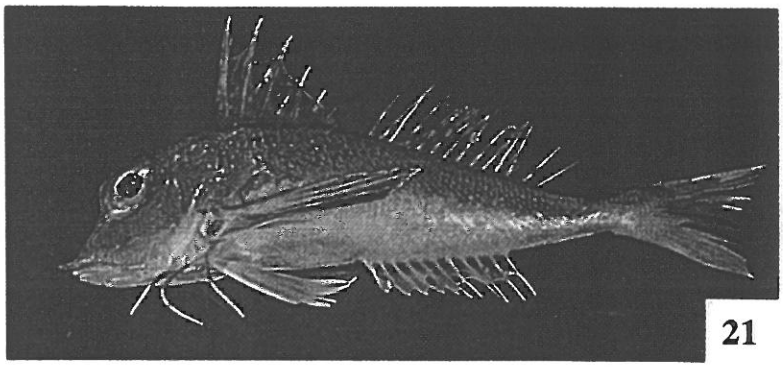


Plate V. Fig. 15. *Fistularia petimba*, HUJ 15150, 480 mm. Fig. 16. *Hoplostethus mediterraneus*, HUJ 17014, 125 mm. Fig. 17. *Ostichthys hypsipterygion sufensis*, HUJ 16425, 151 mm. Fig. 18. *Ostichthys acanthorhinus*, HUJ 17030, 137 mm.







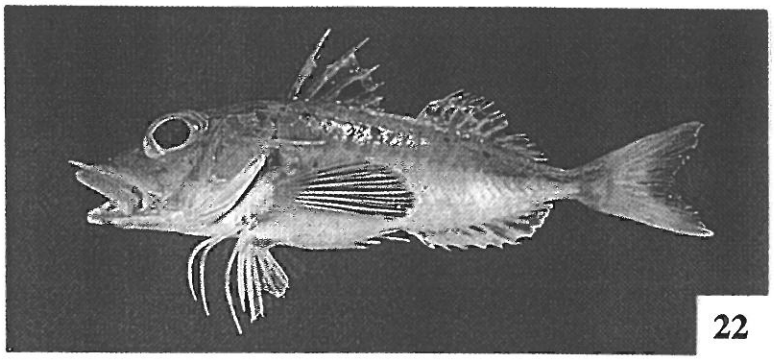
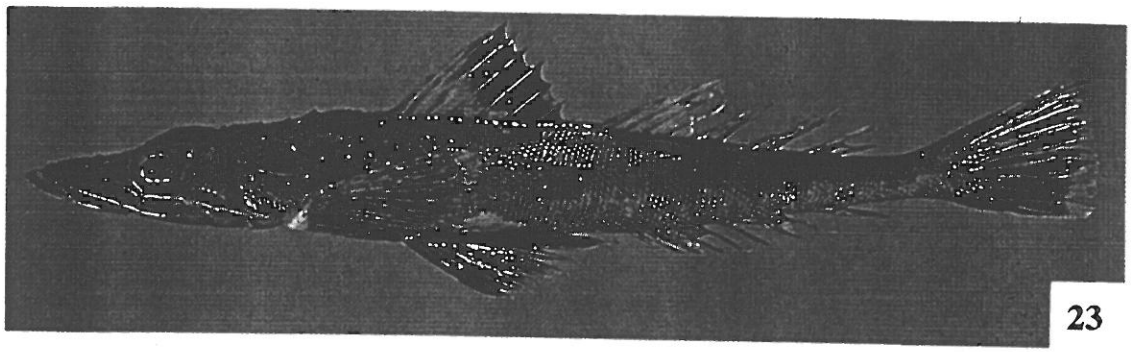
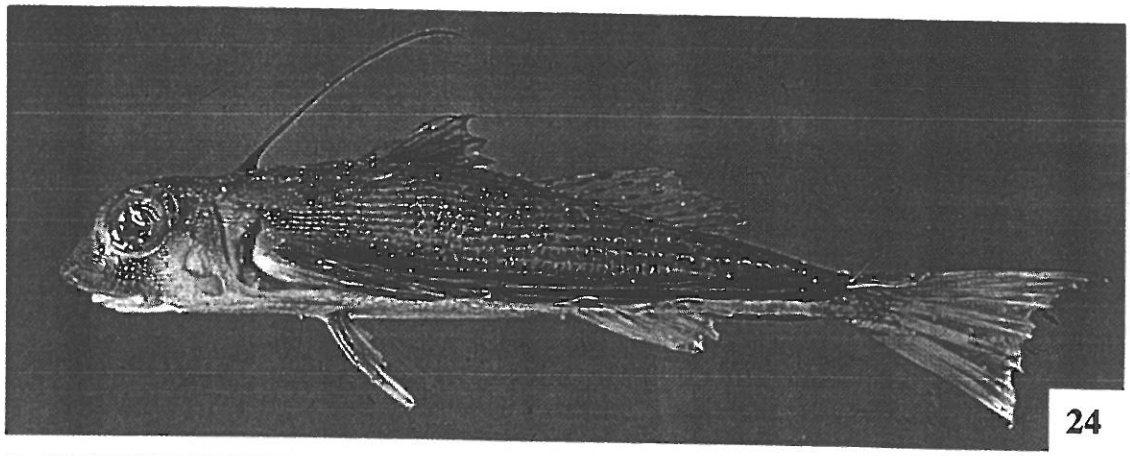
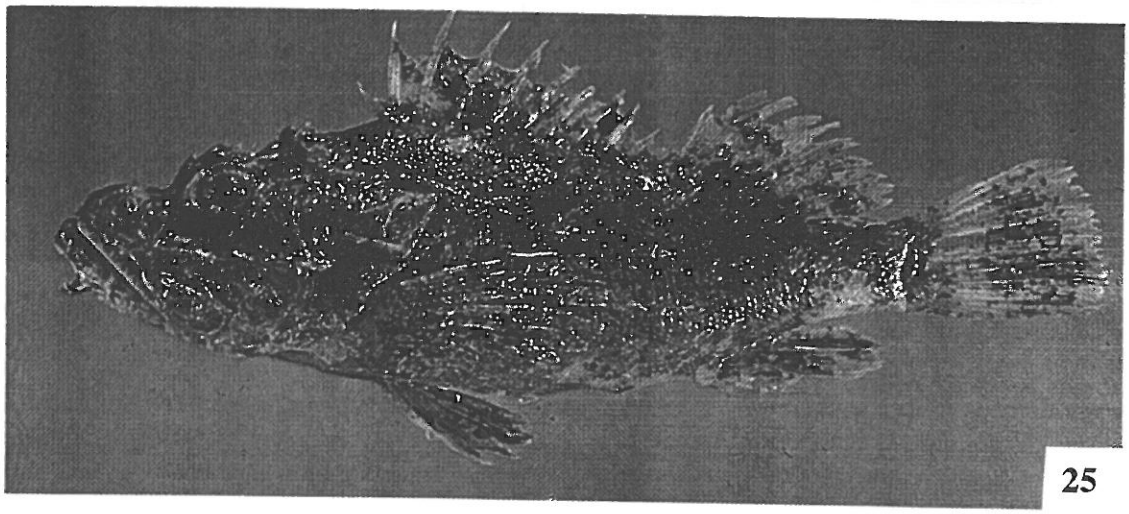


Plate VI. Fig. 19. *Monocentris japonicus*, HUJ 17103, 130 mm. Fig. 20. *Lepidotrigla bispinosa*, HUJ 14132, 87 mm. Fig. 21. *Lepidotrigla spiloptera*, HUJ 15149, 95 mm. Fig. 22. *Pterygotrigla sp.*, HUJ 13957, 141 mm.







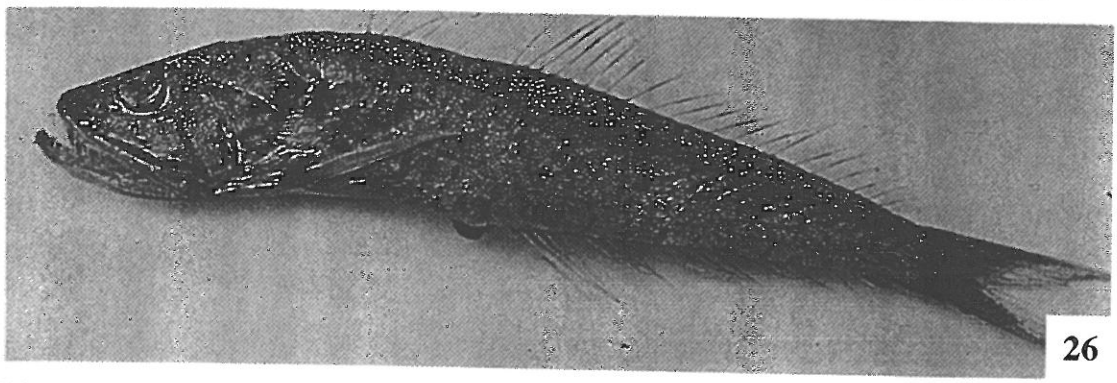
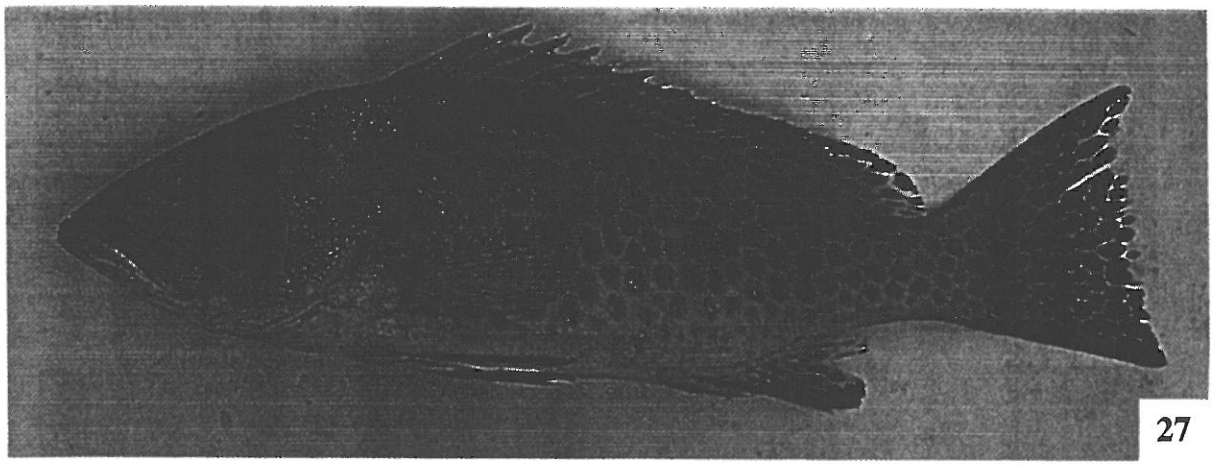
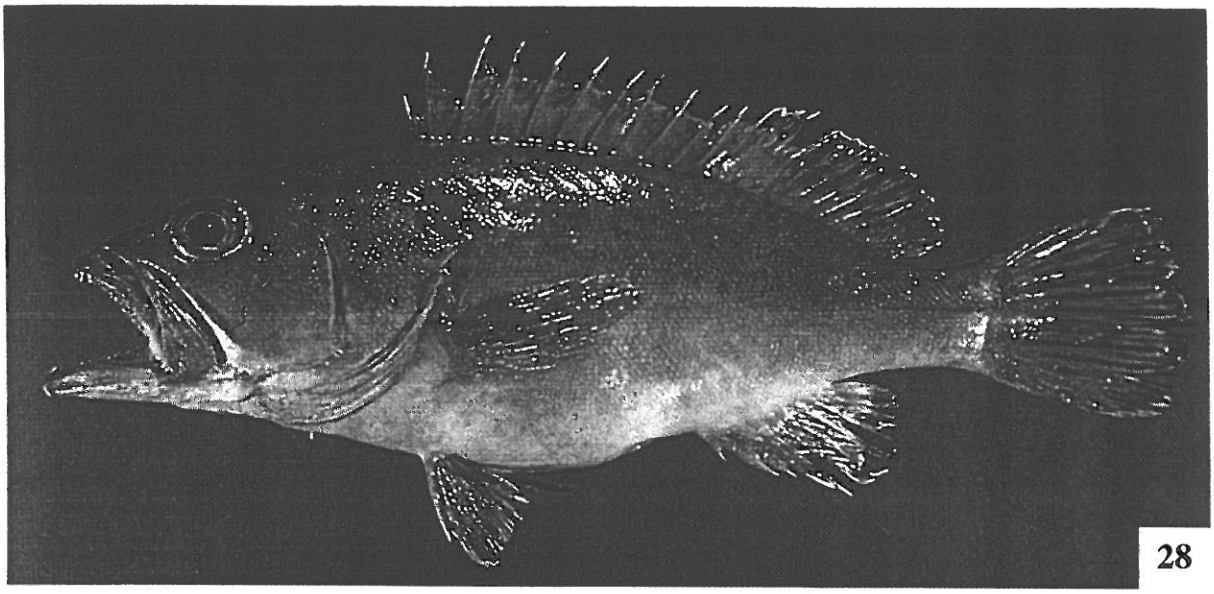


Plate VII. Fig. 23. *Cociella crocodila*, HUJ 14019, 303 mm. Fig. 24. *Dactyloptena peterseni*, HUJ 15154, 206 mm. Fig. 25. *Scorpaenopsis oxycephala*, HUJ 14003, 130 mm. Fig. 26. *Champsodon omanensis*, HUJ 16463, 130 mm.





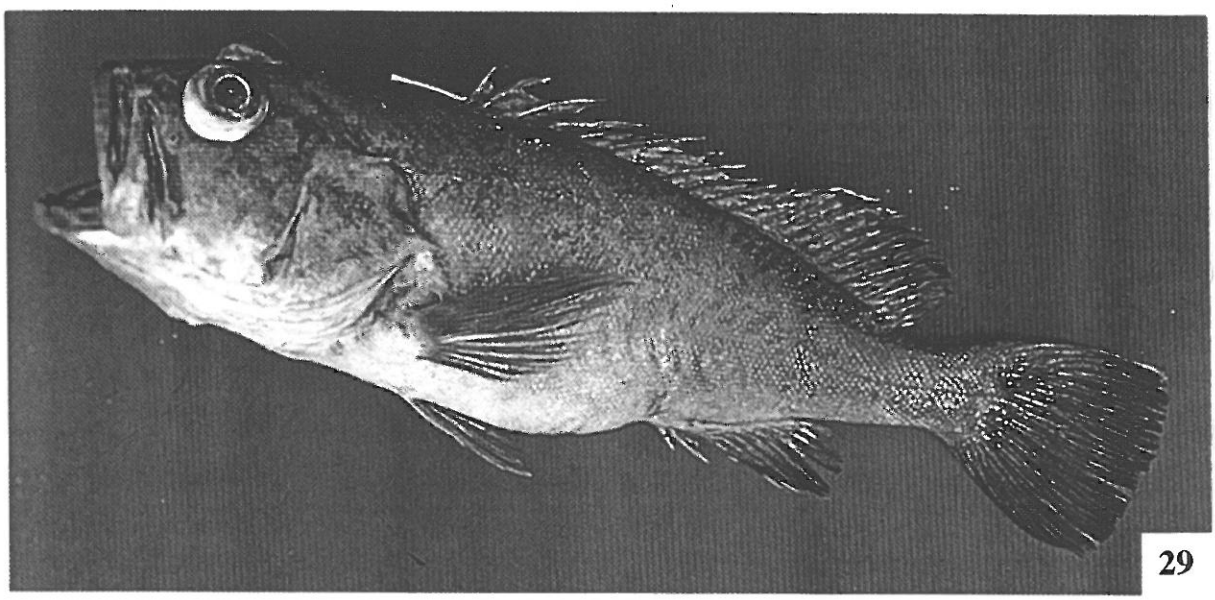
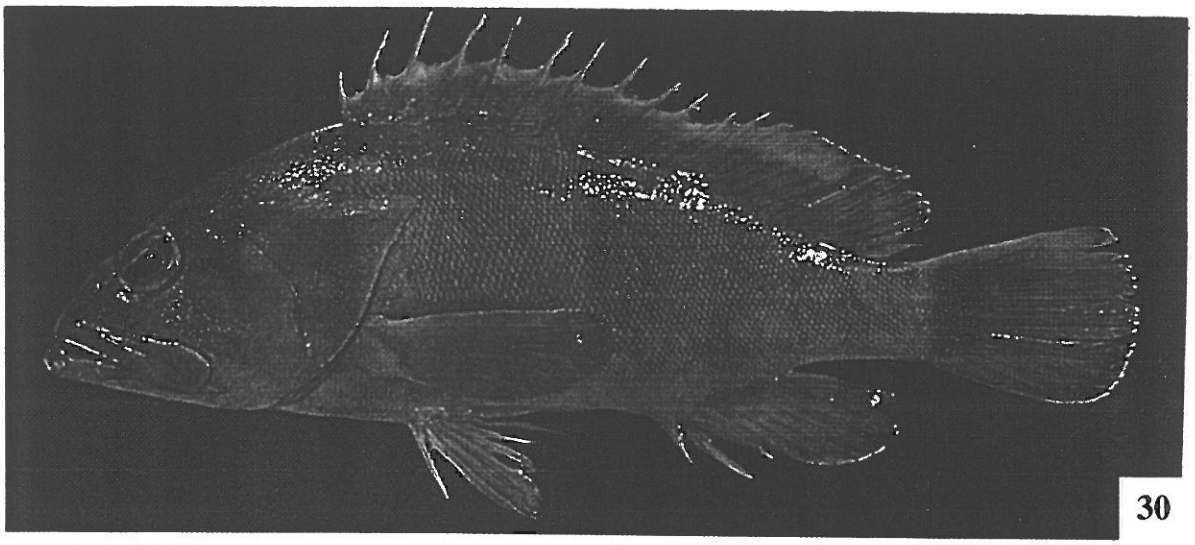
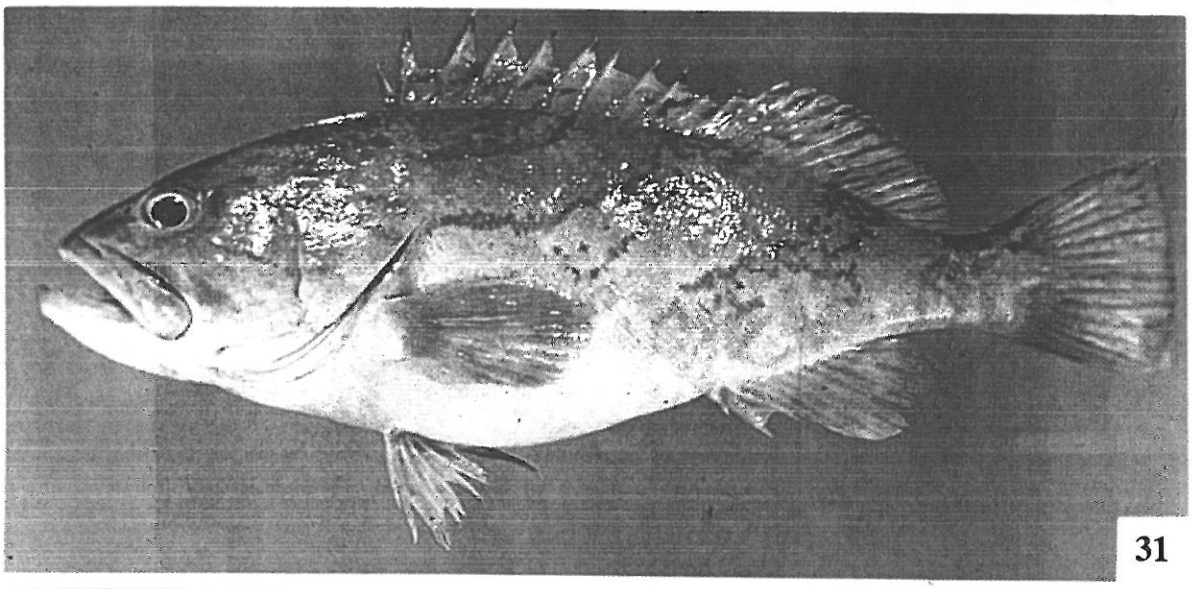


Plate VIII. Fig. 27. *Epinephelus areolatus*, 270 mm. Fig. 28. *Epinephelus epistictus*, HUJ 14125, 259 mm. Fig. 29. *Epinephelus epistictus,* 640 mm.





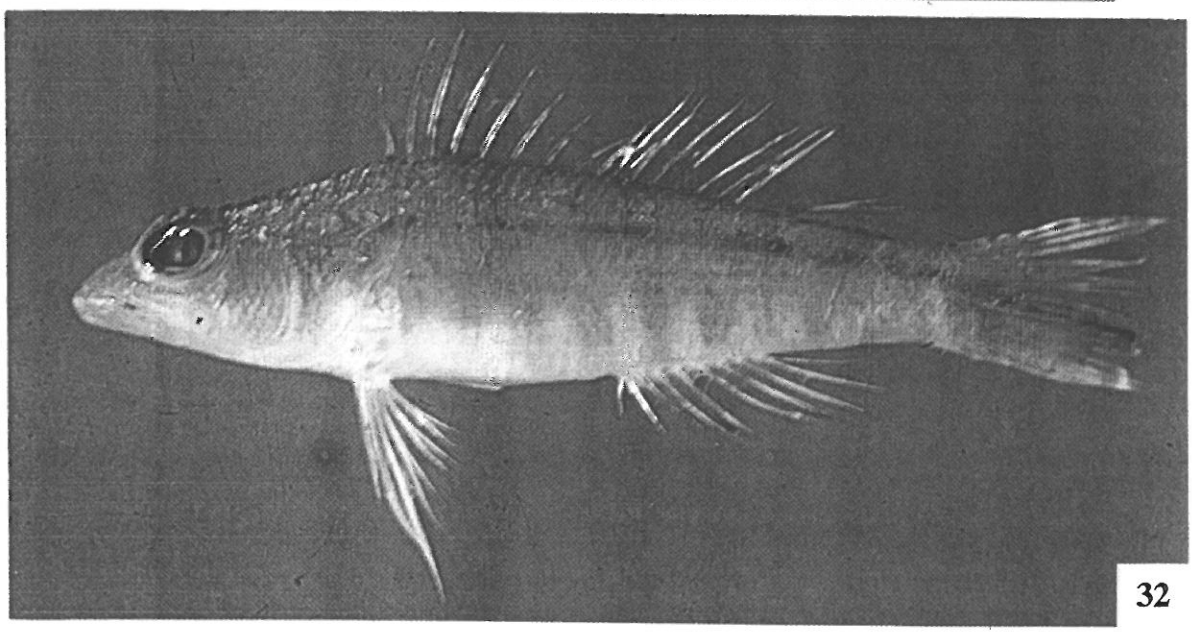
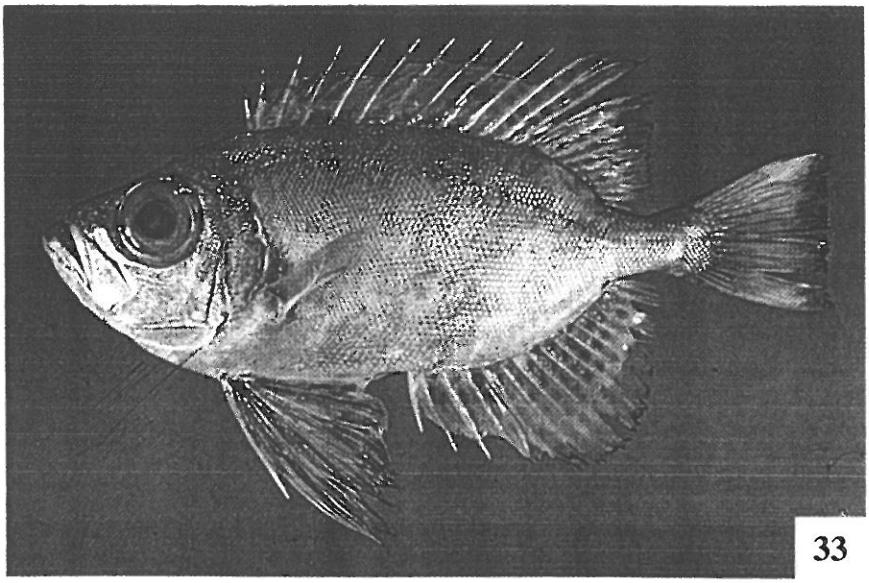
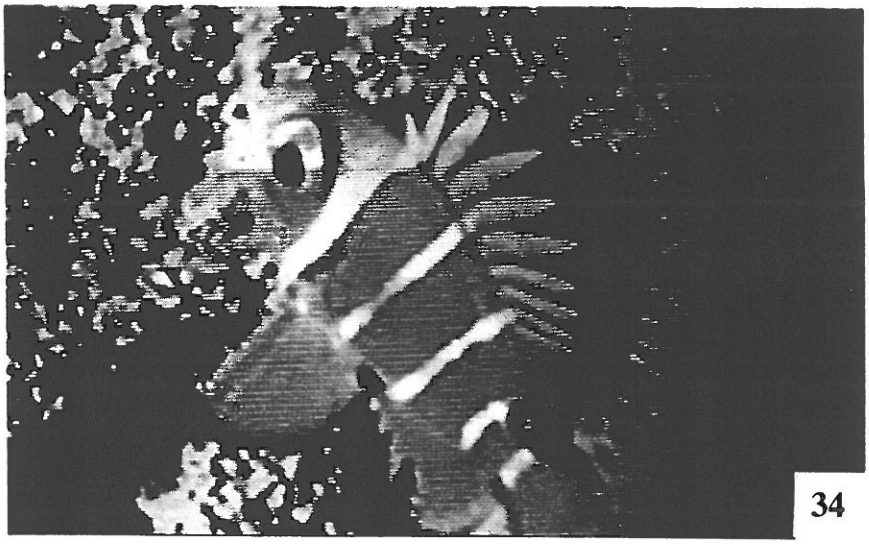


Plate IX. Fig. 30. *Epinephelus fasciatus*, HUJ 14128, 227 mm. Fig. 31. *Epinephelus radiatus*, HUJ 14124, 437 mm. Fig. 32. *Chelidoperca pleurospilus*, HUJ 16465, 81 mm.





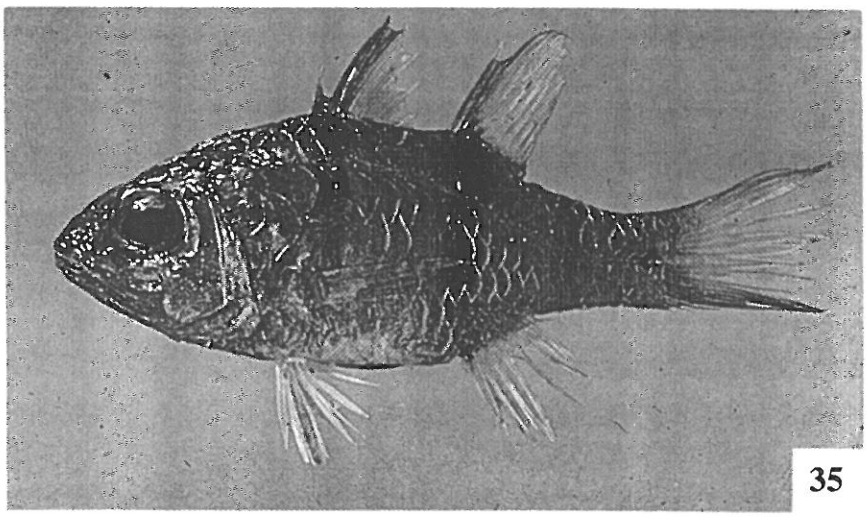
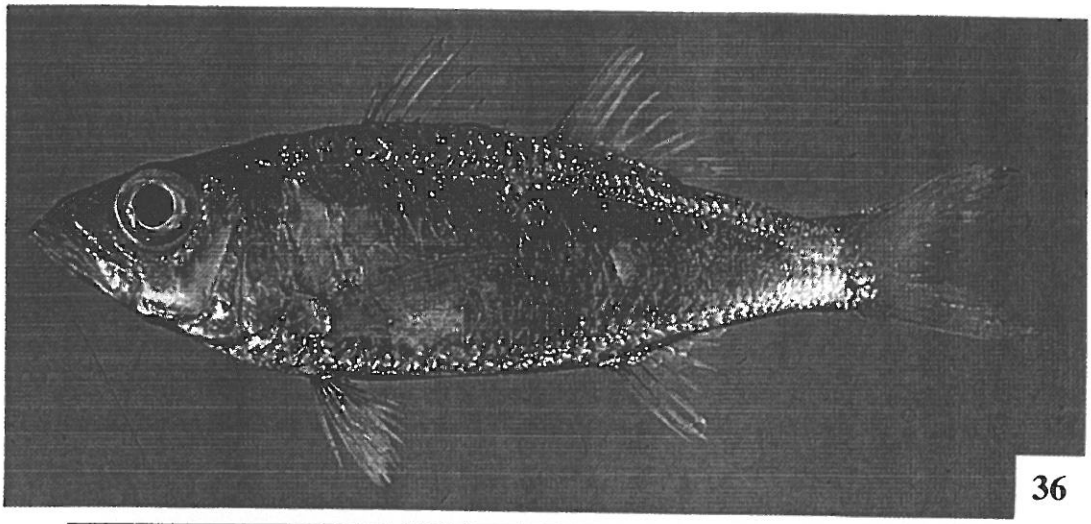
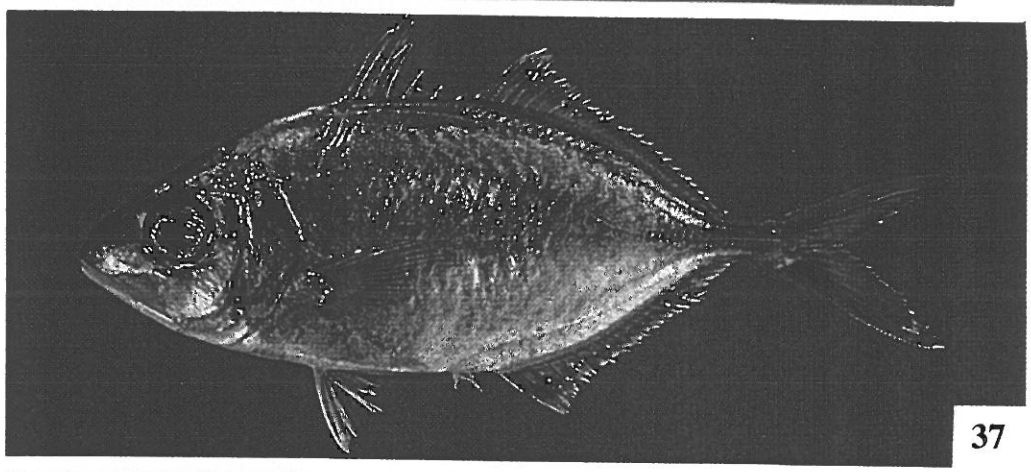
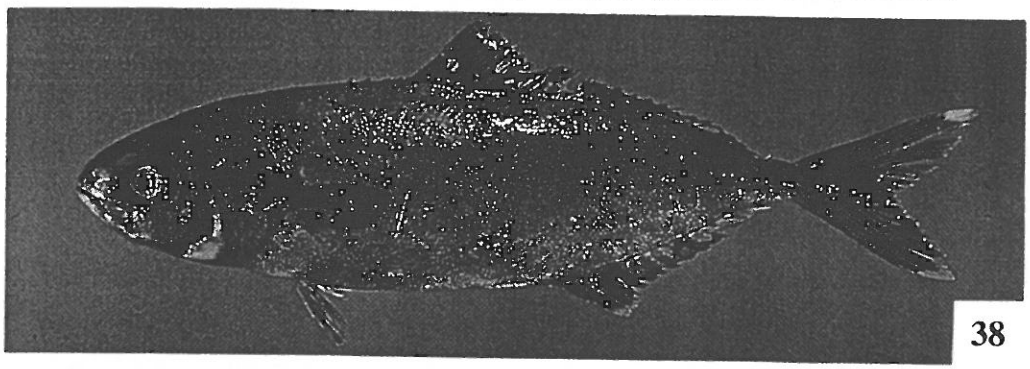


Plate X. Fig. 33. *Priacanthus sagittarius*, HUJ 15153, 245 mm.
Fig. 34. *Pristigenys niphonia*, Underwater photography, cf 200 mm.
Fig. 35. *Apogon pseudotaeniatus*, HUJ 13760, 78 mm.







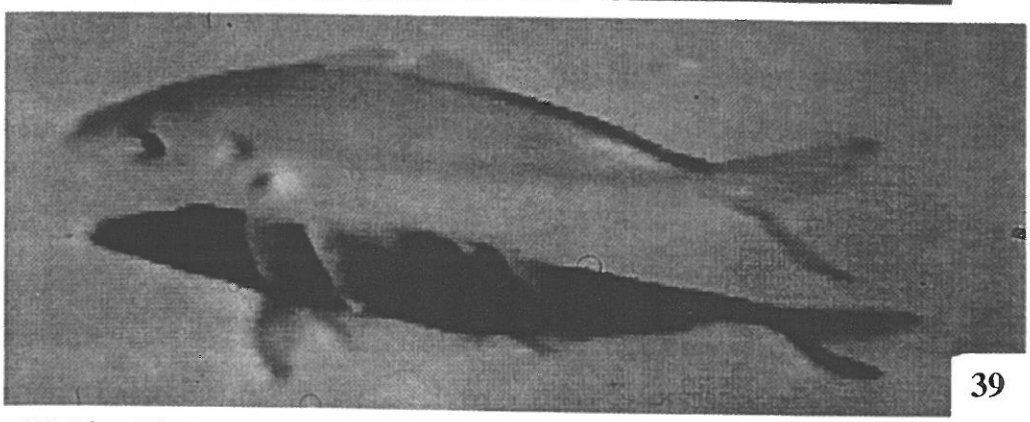
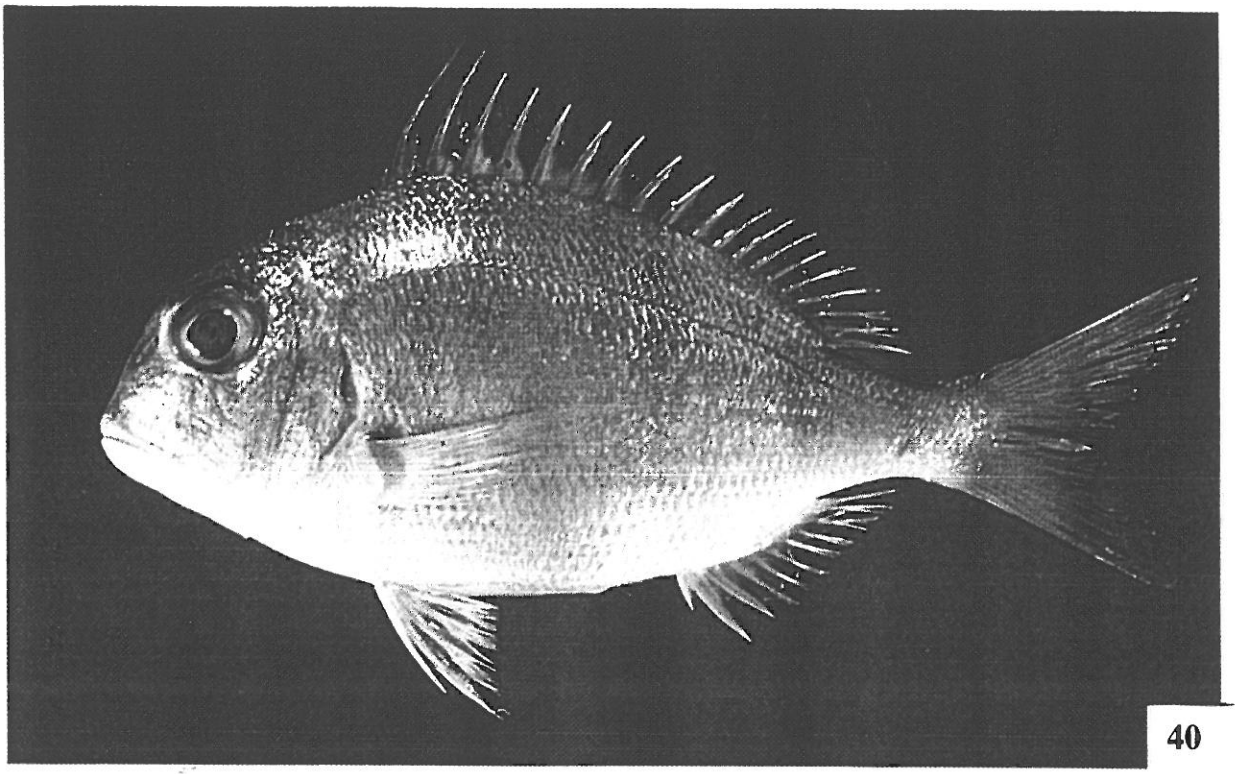


Plate XI. Fig. 36. *Acropoma japonicus*, HUJ 14131, 136 mm. Fig. 37. *Carangoides equula*, HUJ 14569, 160 mm. Fig. 38. *Naucrates ductor,* HUJ 14570, 204 mm. Fig. 39. *Trachurus indicus,* (Underwater photography) cf 150 mm.



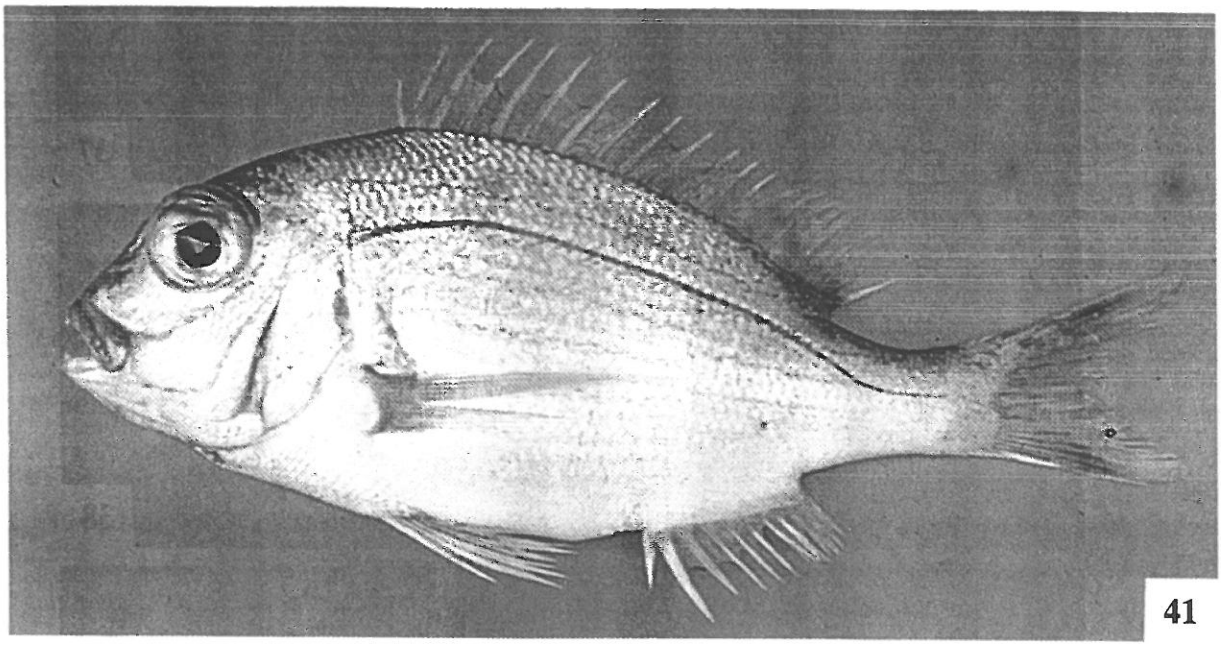
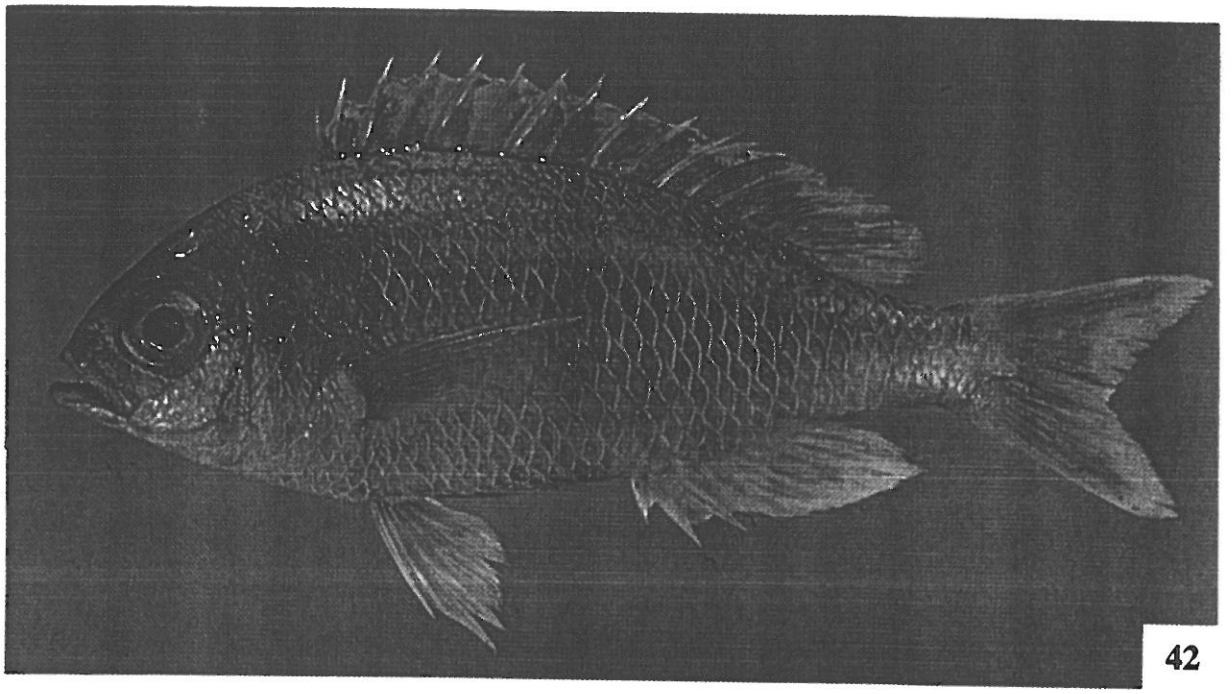
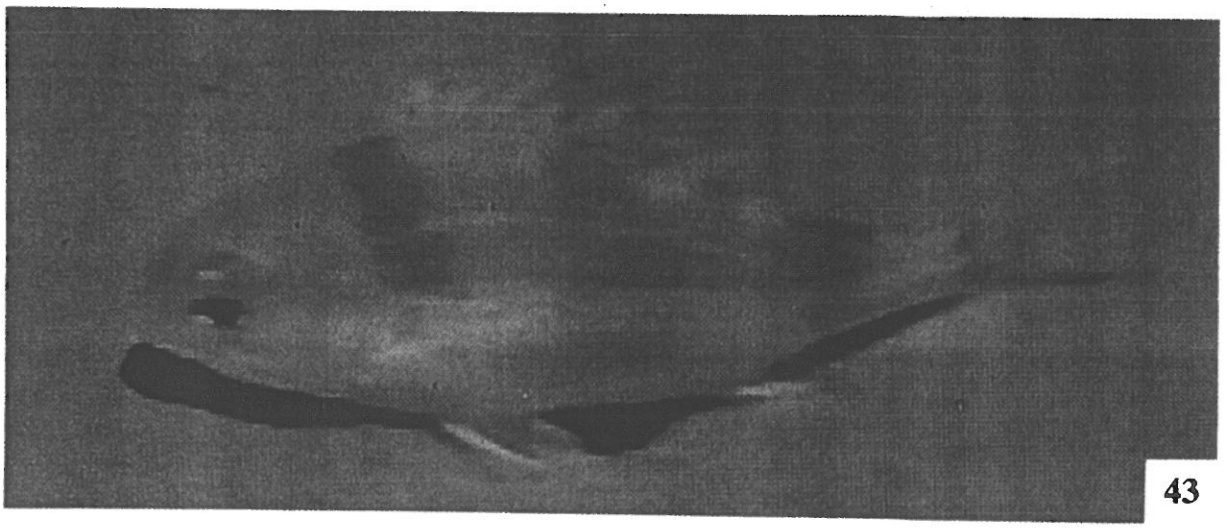


Plate XII. Fig. 40. *Argyrops spinifer*, HUJ 13761, 202 mm. Fig. 41. *Polysteganus coeruleopunctatus*, HUJ 17040, 200 mm.





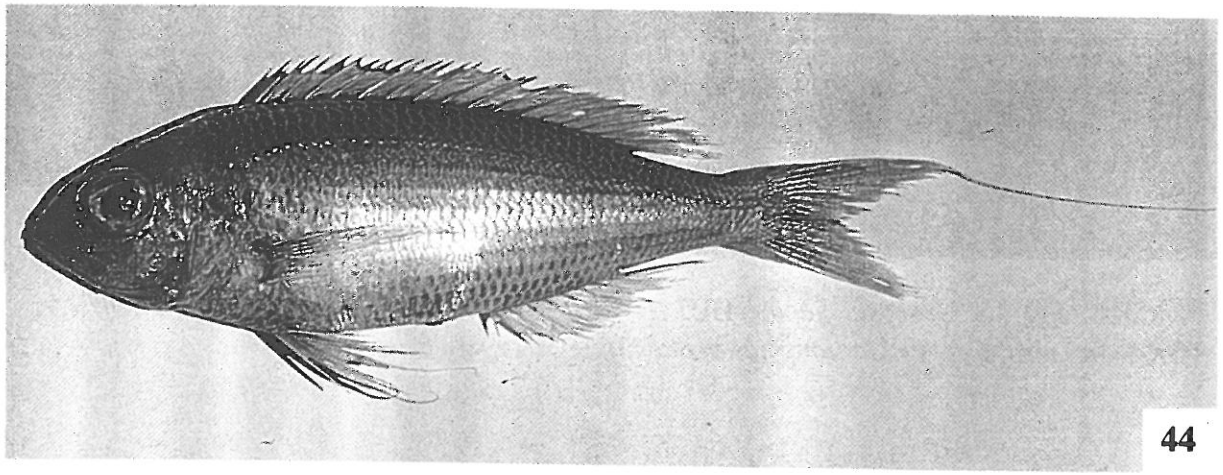
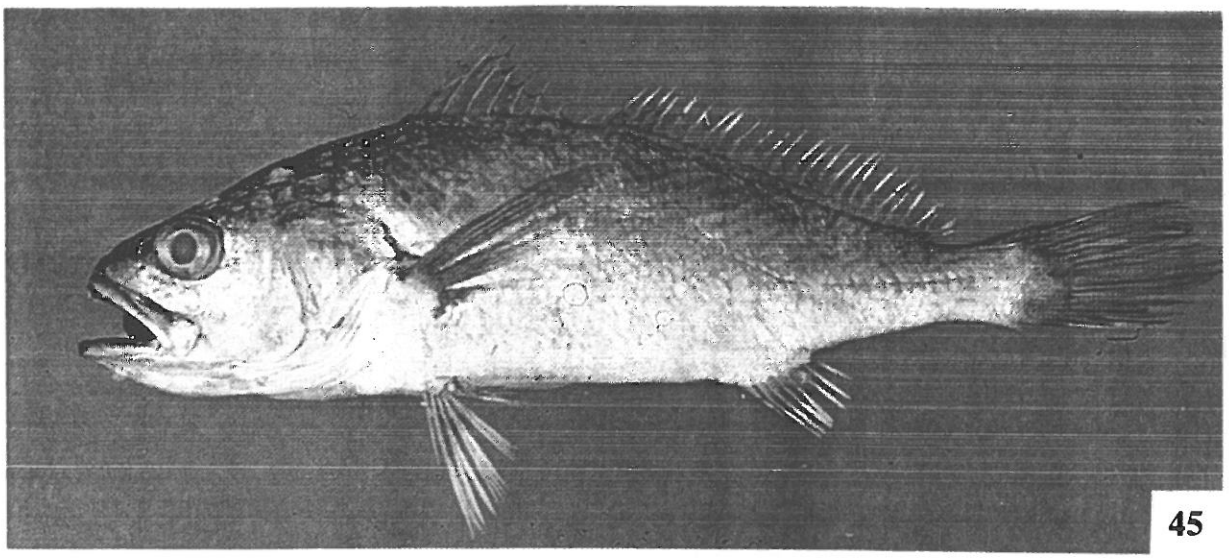
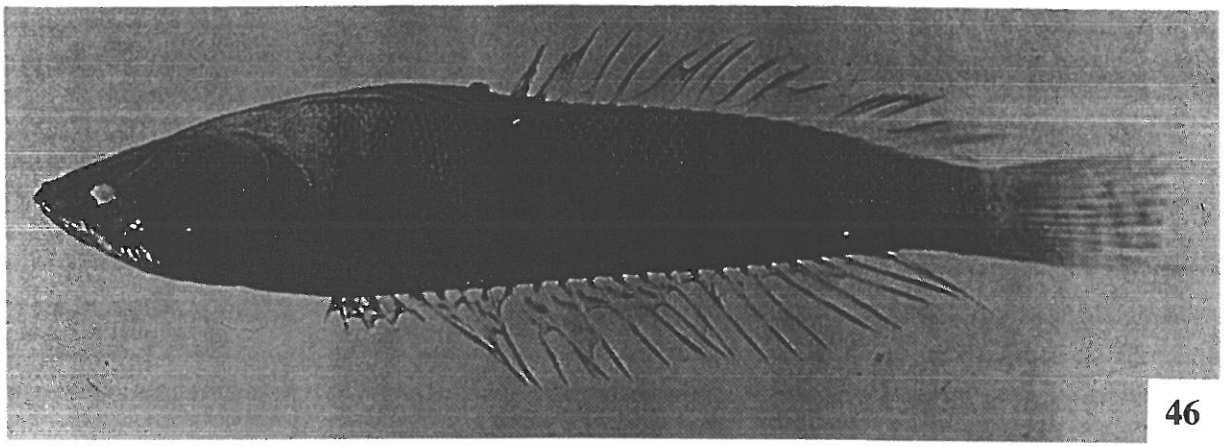


Plate XIII. Fig. 42. *Parascolopsis eriomma*, HUJ 15158, 210 mm. Fig. 43. *Parascolopsis sp.*, (Underwater photography) cf 100 mm. Fig. 44. *Nemipterus randalli*, cf 170 mm.





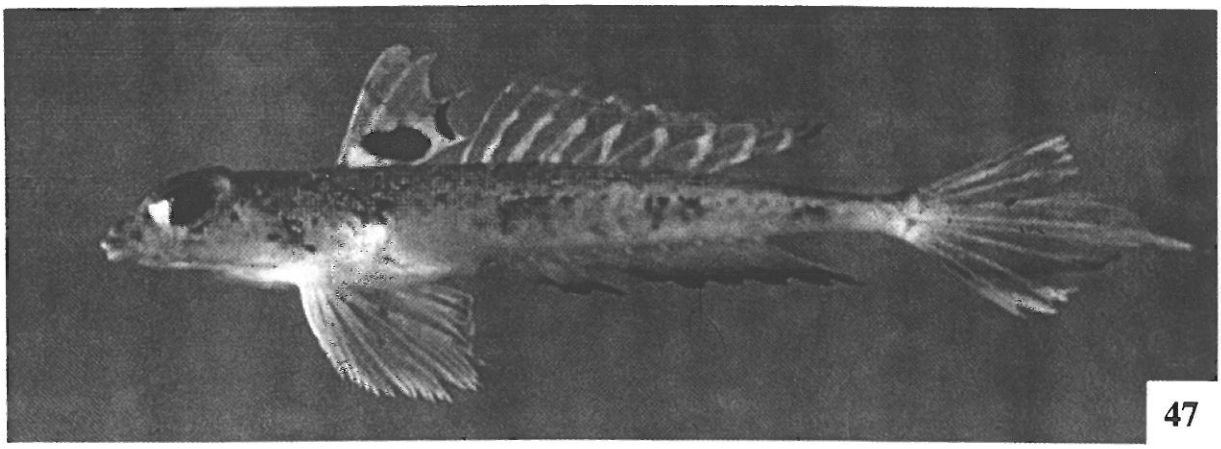
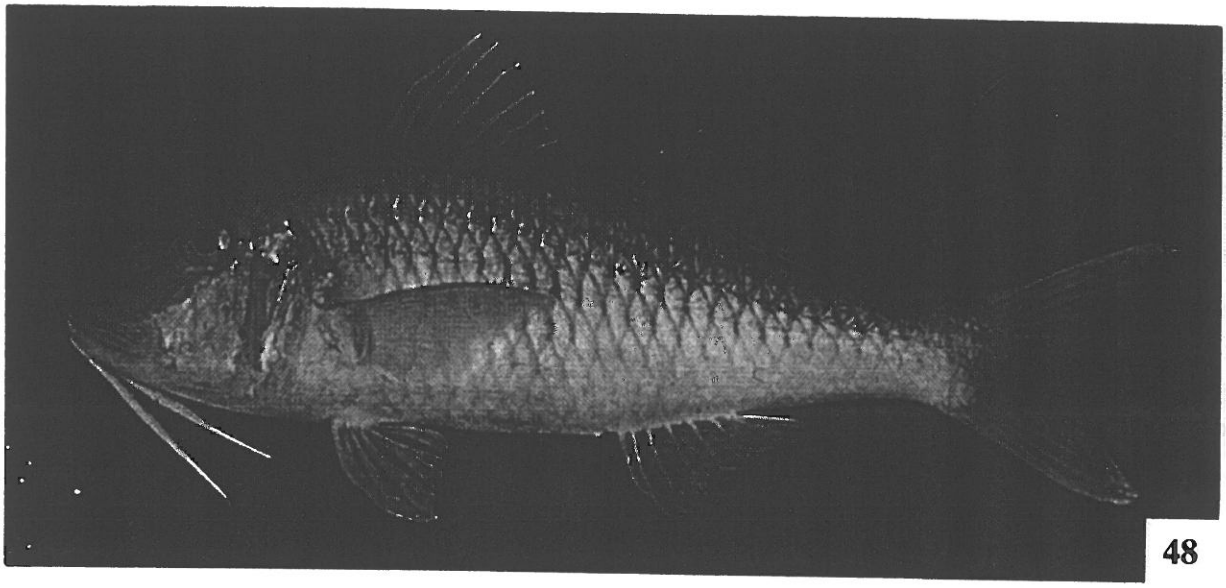
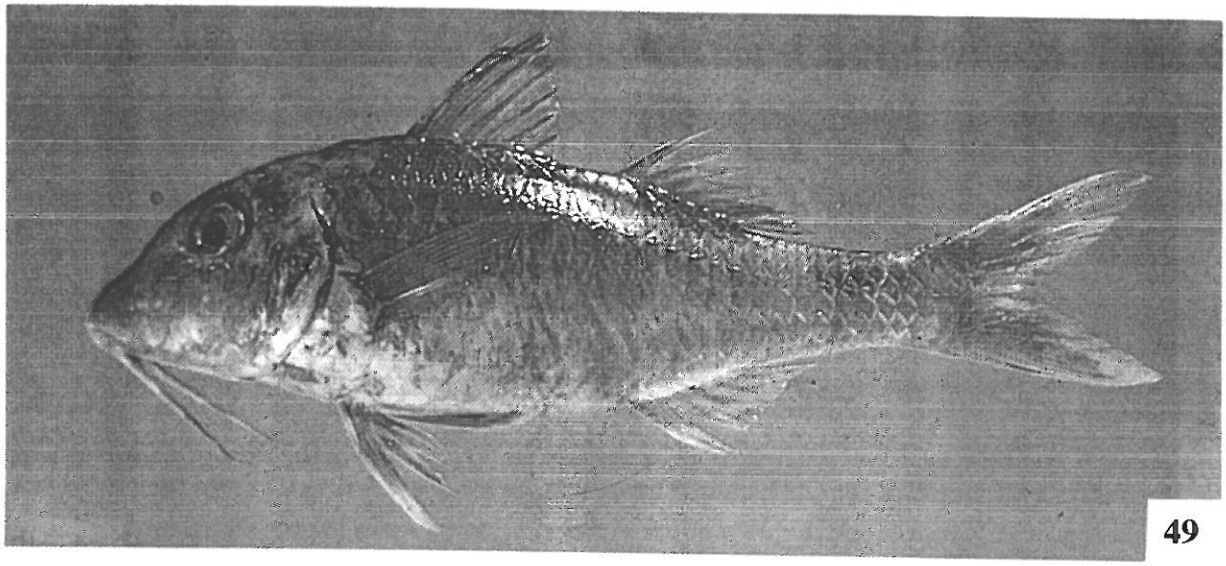


Plate XIV. Fig. 45. *Atrobucca geniae*, HUJ 16427, 233 mm. Fig. 46. *Parapercis somaliensis*, HUJ 16464, 140 mm. Fig. 47. *Callionymus bentuviai*, HUJ 16989, 63 mm.





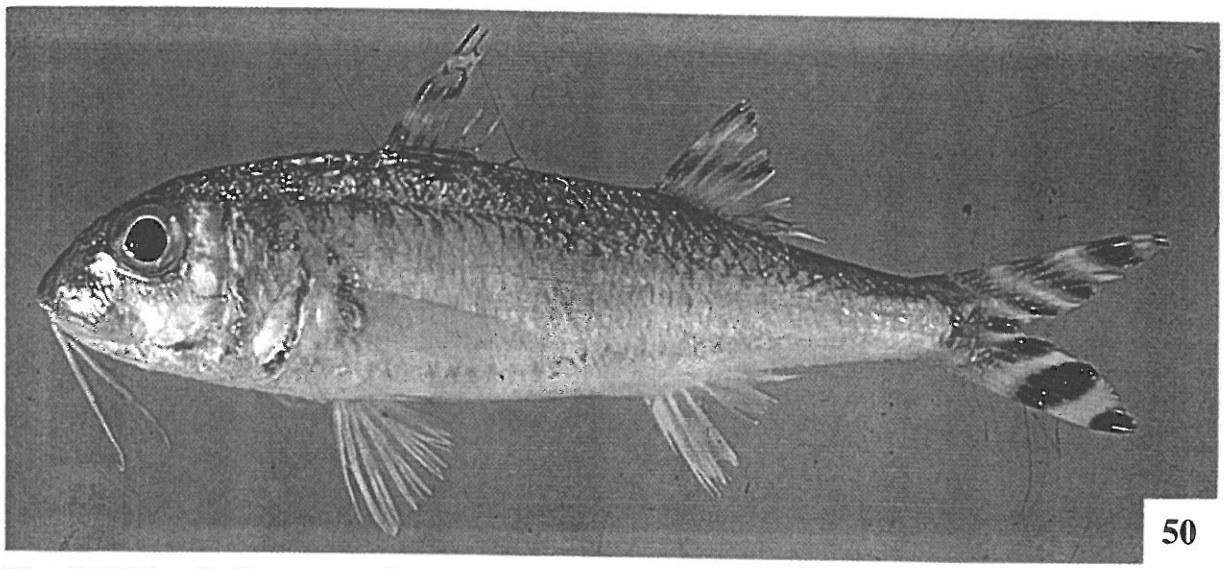
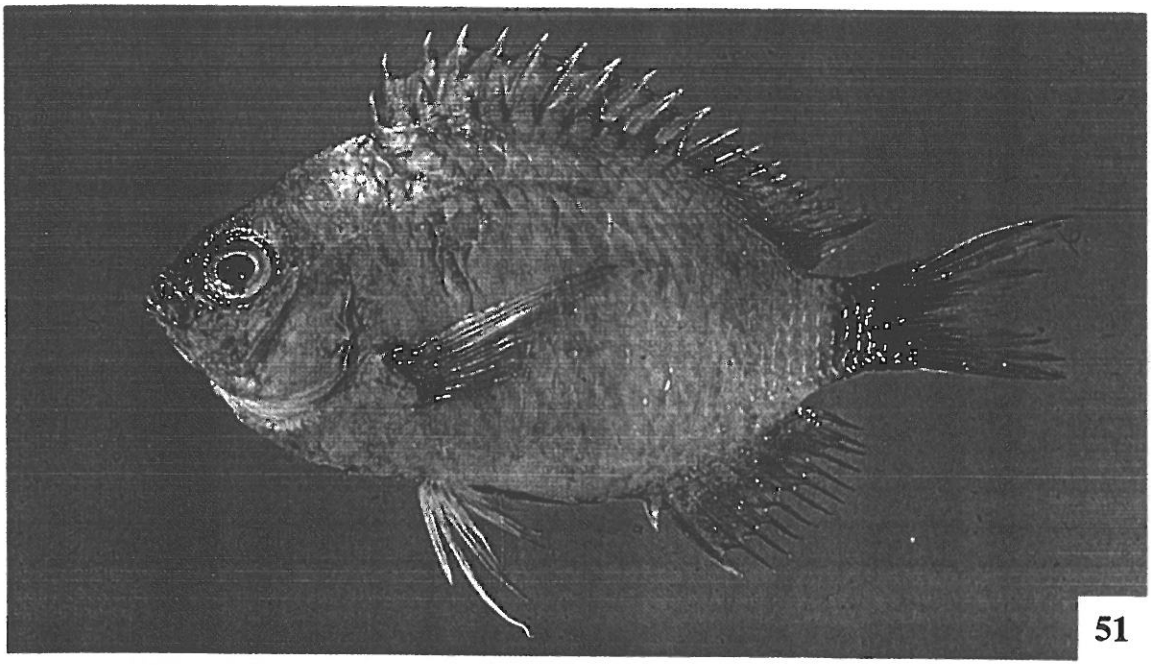
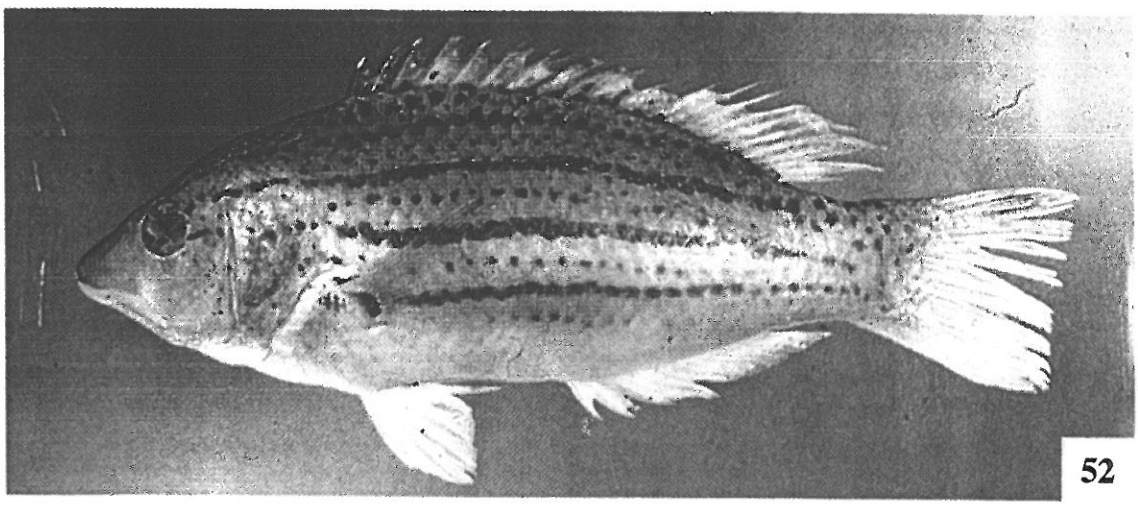


Plate XV. Fig. 48. *Parupeneus heptacanthus*, 234 mm. Fig. 49. *Parupeneus rubescens*, HUJ 14148, 175 mm. Fig. 50. *Upeneus subvittatus*, HUJ 14130, 150 mm.





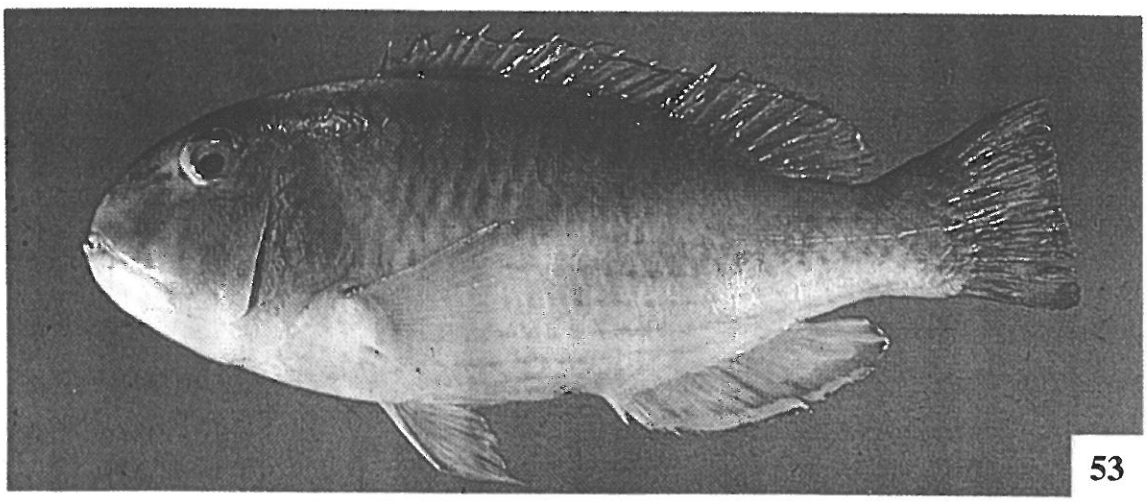
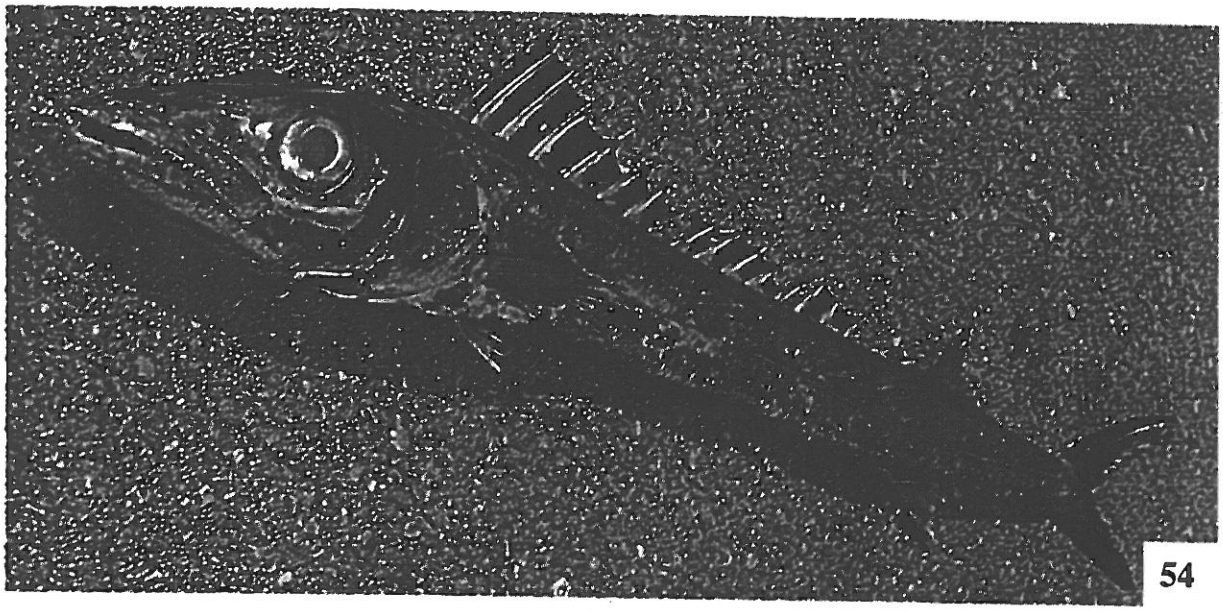


Plate XVI. Fig. 51. *Chromis pelloura*, HUJ 14571, 100 mm. Fig. 52. *Bodianus leucostictus*, HUJ 13667, 242 mm. Fig. 53. *Choerodon robustus*, HUJ 15156, 255 mm.



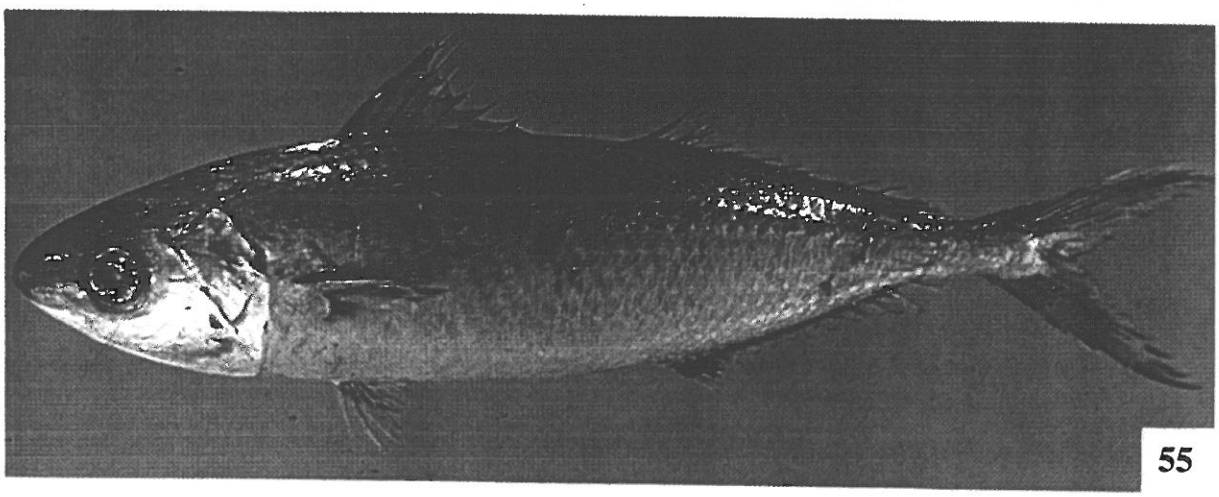
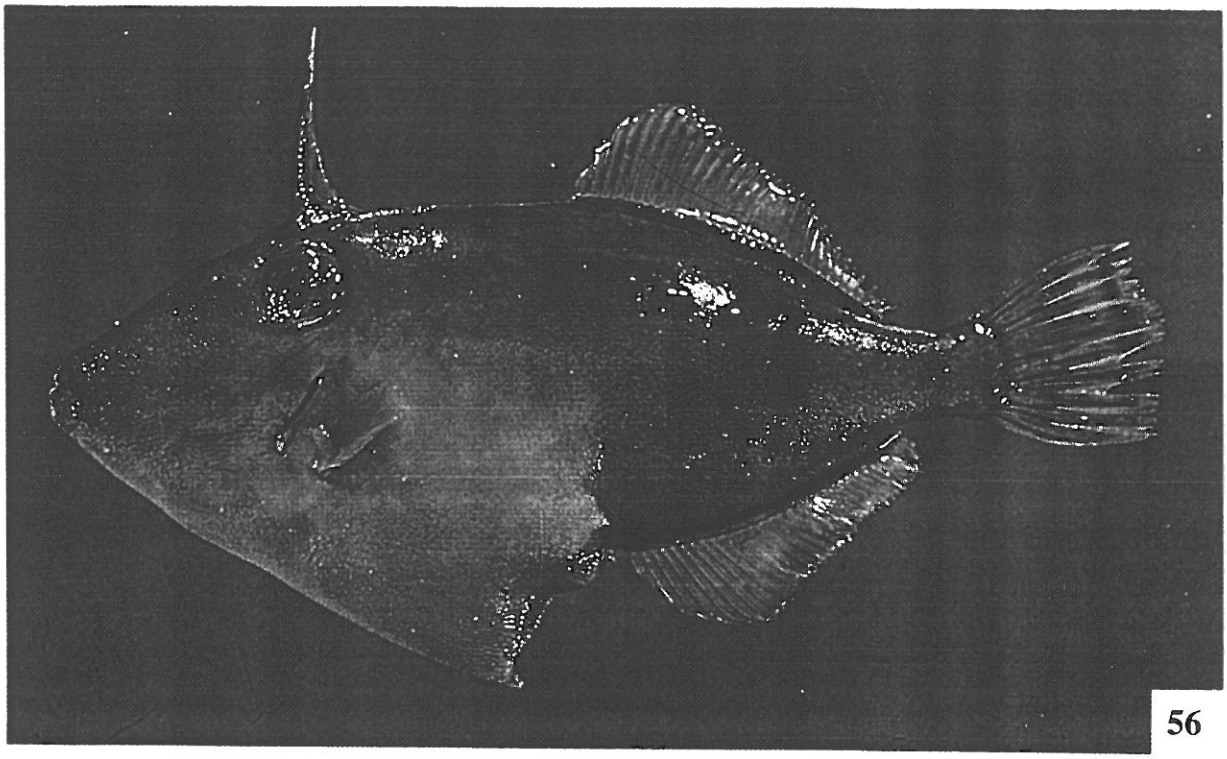


Plate XVII. Fig. 54. *Thyrsitoides marleyi*, HUJ 14072, 998 mm. Fig. 55. *Ariomma brevimanus*, HUJ 13660, 587 mm.



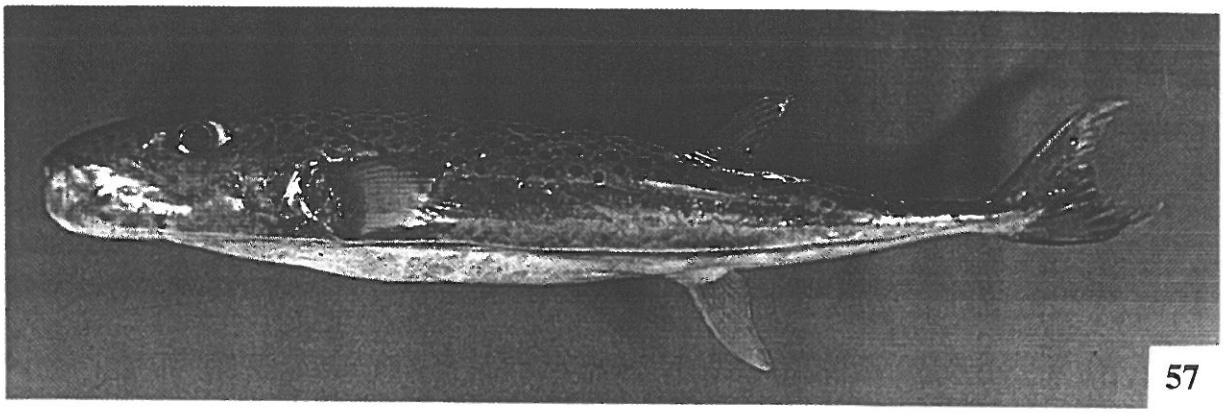
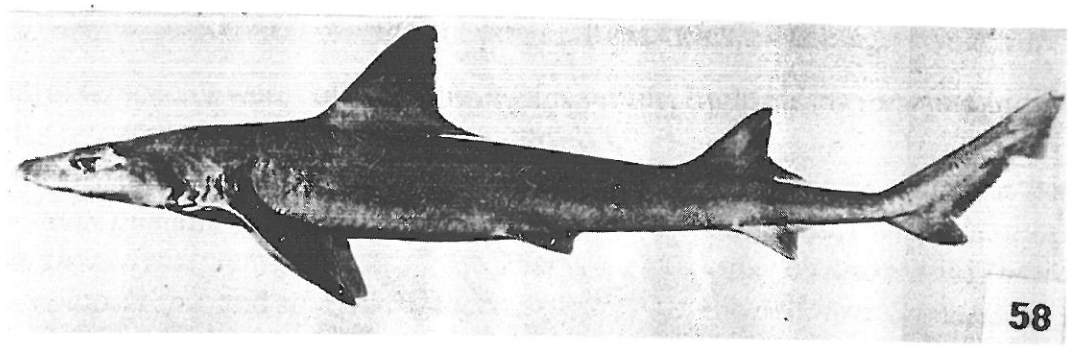
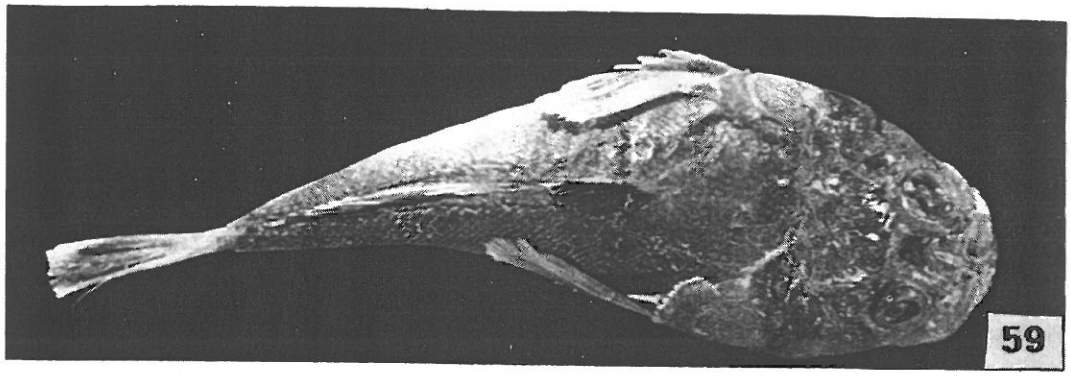


Plate XVIII. Fig. 56. *Thamnaconus modestoides erythraeensis*, HUJ 14129, 161 mm. Fig. 57. *Lagocephalus scleratus*, HUJ 15077, 415 mm.





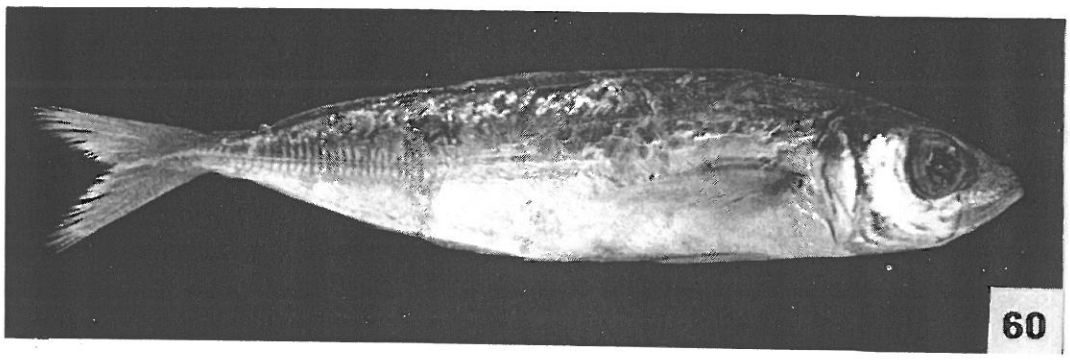
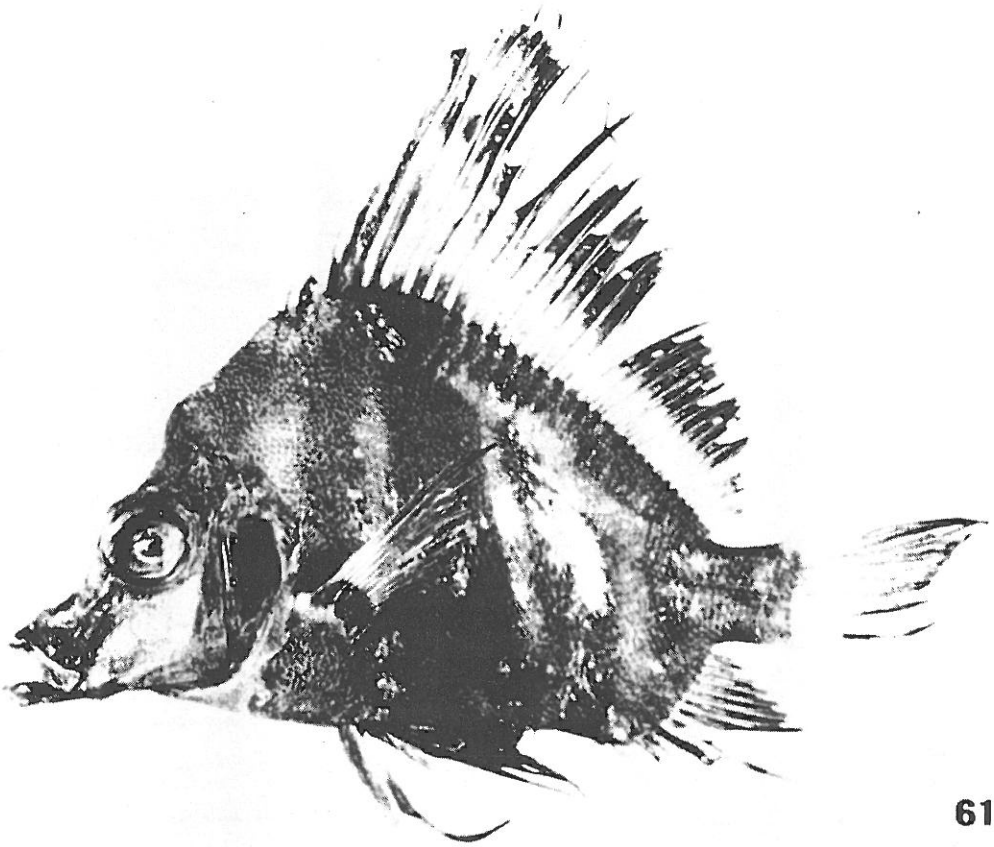
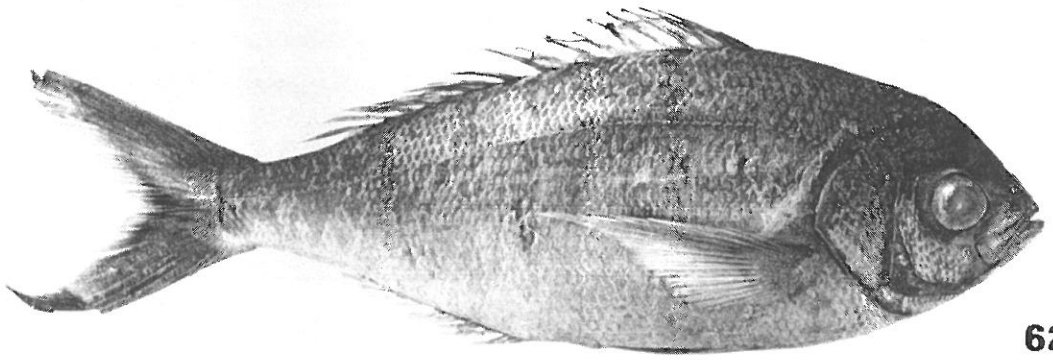


Plate XVIIII. Fig. 58. *Mustelus mosis* Fig. 59. *Uranoscopus marisrubri*, HUJ 13712, 153 mm. Fig. 60. *Decapterus russelli*, HUJ 15996, 246 mm.





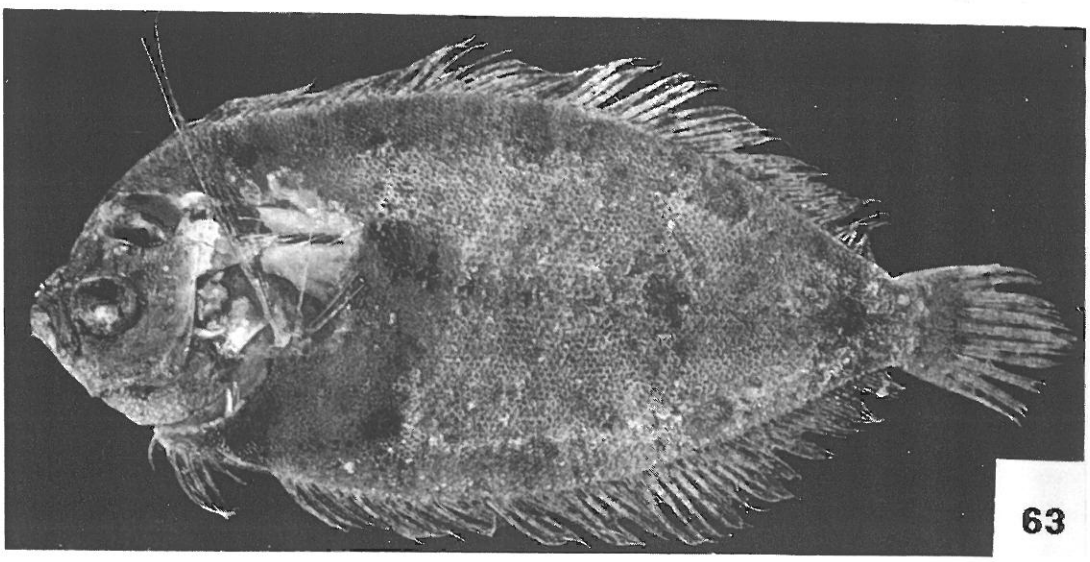


Plate XX. Fig. 61. *Histiopterus typus*, HUJ 13194, 160 mm. Fig. 62. *Paracaesio sordidus*, HUJ 16462, 360 mm. Fig. 63. *Bothus pantherinus*, HUJ 16980, 141 mm.

ECOLOGICAL REMARKS

A total of 69 species were collected during this survey. Eight elasmobranchs and 61 teleost species representing 45 families were sampled.

Fifteen species are endemic to the Red Sea: *Mustelus mosis*, *Narcine bentuviai*, *Rhinobatos punctifer*, *Ophichthus echeloides*, *Rhynchoconger sp.*, *Physiculus marisrubri*, *Ostichthys hypsipterygion sufensis*, *Pterygotrigla sp.*, *Uranoscopus marisrubri*, *Parascolopsis sp.1* and *sp. 2*, *Artrobucca geniae*, *Chromis pelloura*, *Samariscus sp.*, and *Thamnaconus modestoides erythaeensis*.

Eleven species are new records for the Red Sea: *Gymnothorax johnsoni*, *Rhynchoconger sp.*, *Synodus doaki*, *Pterygotrigla sp.*, *Chelidoperca pleurospilus*, *Carangoides equula*, *Parascolopsis sp. 1* and *sp. 2*, *Bodianus leucostictus*, *Paracaesio sordidus*, and *Samariscus sp.* Two species, *Cociella crocodila* and *Parascolopsis eriomma*, are first substantiated records for the Red Sea.

Iago omanensis and *Mustelus mosis* (Triakidae), and *Argyrops spinifer* and *Polysteganus coeruleopunctatus* (Sparidae) were the most abundant species in our samples. In each species pair a clear bathymetric division was observed which may serve as a means of resource partitioning (Golani and Baranes, 1991; Waller and Baranes, in press; Galil and Goldshmidt, pers. comm.). We found that the bathymetric distribution of all species collected during this study did not differ throughout the year, which may be expected considering the temperature and circulation regime in the Gulf of Aqaba.

A dive to 400 m with the *Jago* submersible, in front of the IUI, enabled us to photograph the feeding behavior of some benthic fishes. Quantities of small mesopelagic fishes such as *Vinciguerria* sp., *Champsodon* sp., *Benthosema* sp., and *Diaphus* sp. were observed. It seems that the deep waters of the Gulf are well provided with sustenance at all trophic levels, including abundant benthic fauna. These mesopelagic fishes were found also among the stomach contents of *Iago omanensis* (Waller and Baranes, in press). The plentiful mesopelagic and benthic fauna observed during our preliminary survey is in contrast to the conclusions of Marshall and Bourne (1964) concerning the biomass in deep waters of the Gulf of Aqaba and probably the Red Sea itself.

No "typical" deep-sea ichthyofauna was found among the Gulf's benthos. Most of the species recorded in the present study appear in deeper waters in the Red Sea than elsewhere in their geographical range, a phenomenon that may be attributed to the Gulf"s homothermy.

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REFERENCES

Abe, T. and Shinohara, S. 1962. Description of a new lutjanid fish from Ryukyu Islands. Jpn. J. Ichthyol. Vol. IX, 1–6: 163–172.

Ajiad, A.M. 1987. First record of *Aulacocephalus temmincki* Bleeker, 1857 from the Red Sea and four more species from Aqaba, Jordan. Cybium 11: 104–105.

Ajiad, A.M. and El-Absy, A.H. 1986. First record of *Lycodontis elegans* (Pisces: Muraenidae) from the Red Sea. Cybium 10: 297–298.

Ajiad, A.M. and Mahasneh, D. 1986. Re-description of *Ariomma brevimanus* (Klunzinger, 1884), a rare stromateoid from the Gulf of Aqaba (Red Sea). Cybium 10: 135–142.

Ajiad, A.M., Jafari, R., and Mahasneh, D. 1982. *Thyrsitoides jordanus* (Teleostei: Gempylidae): a new species from the Gulf of Aqaba (Red Sea). J. Mar. Biol. Assoc. India 24: 12–14.

Allen, G.R. 1985. FAO species catalogue. Snappers of the world. An annotated and illustrated catalogue of lutjanid species known to date. FAO Fisheries Synopsis No. 125. Vol. 6, 208 pp., 28 pls.

Aron, A. and Goodyear, R.H. 1969. Fishes collected during a mid-water trawling survey of the Gulf of Elat and the Red Sea. Isr. J. Zool. 18: 237–244.

Baranes, A. and Ben-Tuvia, A. 1979. Two rare carcharhinids, *Hemipristis elongatus* and *Iago omanensis* from the northern Red Sea. Isr. J. Zool. 28: 39–50.

Baranes, A. and Randall, J.E. 1989. *Narcine bentuviai*, new torpedinoid ray from the northern Red Sea. Isr. J. Zool. 36: 85–101.

Bauchot, M.-L. and Mauge, L.A. 1978. Premiere capture d'un *Thamnaconus* dans le golfe d'Aqaba: *Thamnaconus modestoides erythraeensis* n. sp. (Pisces, Monacanthidae). Bull. Mus. Natl. Hist. Nat., Paris. 3e Serie 520, Zoologie 356: 539–545.

Bayoumi, A.R. 1972. Recent biological investigations in the Red Sea along the A.R.E. coasts. 1. On some demersal fishes of economic importance from the Red Sea with note on migration of fish through the Suez Canal. Bull. Inst. Oceanogr. Fish., Cairo 2: 157–183.

Ben-Tuvia, A. 1982. New records of fishes from the deep waters of the Gulf of Aqaba, Red Sea. IV Congr. Eur. Ichythyol., Hamburg. Abstract No. 26.

Ben-Tuvia, A. and Trewavas, E. 1987. *Atrobucca geniae*, new species of sciaenid fish from the Gulf

of Elat (Gulf of Aqaba). Red Sea. Isr. J. Zool. 34: 15–21.

Brüss, R. 1986. Tiefenwasser-und Tiefseefische aus dem Roten Meer. X. *Physiculus marisrubri* n. sp. von der Kuste Ostafrikas. Senckenbergiana Biol. 66 (4/6): 215–249.

Brüss, R. and Ben-Tuvia, A. 1983. Tiefenwasser-und Tiefseefische aus dem Roten Meer. VIII. Uber des Vorkommen von *Acropoma japonicum* Günther 1859. Senckenbergiana marit. 15 (1/3): 27–37.

Castle, P.H.J. 1984. Muraenesocidae. In: Fischer, W. and Bianchi, G., eds. FAO species identification sheets for fishery purposes. Vol. III. Western Indian Ocean (Fishing area 51). FAO of the United Nations, Rome.

Castle, P.H.J. and McCosker, J.E. 1986. Muraenidae. In: Smith, M.M. and Heemstra, P.C., eds. Smith's Sea Fishes. Macmillan South Africa, Johannesburg, pp. 165–176.

Cohen, D.M. 1973. Zoogeography of the fishes of the Indian Ocean. In: Zeitzchel, B. and Gerlach, S.A., eds. The biology of the Indian Ocean. Springer-Verlag, Berlin, pp. 450–463.

Cressey, R. 1981. Revision of Indo-West Pacific lizardfishes of the genus *Synodus* (Pisces: Synodontidae). Smithson. Contrib. Zool. 342: 1–53.

D'Ancona, U. 1928. Murenoidi (Apodes) del Mar Rosso e del Golfo di Aden. Materiali racolti..."Ammiraglio Magnaghii" 1923–24. Memorie (Comitato Talassografico Italiano, Italy) 146: 1–146.

Diamant, A. and Porter, C. 1983. Occurrence of Japanese threadfin bream *Nemipterus japonicus* (Bloch, 1791), in the northern Red Sea. Cybium 7: 59–60.

Dor, M. 1984. CLOFRES — Checklist of the fishes of the Red Sea. Israel Academy of Sciences, Jerusalem, 437 pp.

Eschmeyer, W.N. 1986. Scorpaenidae. In: Smith, M.M. and Heemstra, P.C., eds. Smith's Sea Fishes. MacMillan, South Africa, pp. 463–478.

Fowler, H.W. 1929. New and little-known fishes from the Natal coast. Ann. Natal Mus. 6: 245–258.

Fowler, H.W. 1945. The fishes of the Red Sea. Sudan notes and records. McCorquodale and Co. (Sudan) Ltd., Khartoum. 26: 113–137.

Golani, D. 1984. The squirrelfish *Ostichthys hypsipterygion sufensis*, a new subspecies from the Red Sea. Cybium 8: 97–102.

Golani, D. Niche separation between colonizing and indigenous goatfish (Mullidae) in the Mediterranean coast of Israel. J. Fish Biol., in press.

Golani, D. and Baranes, A. 1991. Some ecological observations of the deep water ichthyofauna of the Gulf of Elat. Proc. XII conf. Interuniversity Inst. Elat, pp. 27–28.

Golani, D. and Ben-Tuvia, A. 1982. First records of the Indo-Pacific daggertooth pike-conger, *Muraenesox cinereus* in the eastern Mediterranean and in the Gulf of Elat (Gulf of Aqaba). Isr. J. Zool. 31: 54–57.

Gomon, M.F. and Randall, J.E. 1983. Labridae. In: Fischer, W. and Bianchi, G. eds. FAO species identification sheets for fishery purposes. Vol. III. Western Indian Ocean (Fishing area 51) FAO of the United Nations, Rome.

Haedrich, R.L. 1967. The stromateoid fishes: systematics and a classification. Bull. Mus. Comp. Zool., Harvard 135 (2): 31–136.

Hardy, G.S. 1983. A revision of the fishes of the family Pentacerotidae (Perciformes). N.Z. J. Zool. 10: 177–220.

Heemstra, P.C. and Randall, J.E. 1986. Serranidae. In: Smith, M.M. and Heemstra, P.C., eds. Smith's Sea Fishes. MacMillan, South Africa, pp. 509–537.

Johnson, R.K. and Feltes, R.M. 1984. A new species of *Vinciguerria* (Salmoniformes: Photichthyidae) from the Red Sea and Gulf of Aqaba, with comments on the depauperacy of the Red Sea

mesopelagic fish fauna. Fieldiana, Zool. New Series 22: 1–35.

Klausewitz, W. 1980. Tiefenwasser- und Tiefseefische aus dem Roten Meer. I. Einleitung und Neunachweis fur *Bembrops adenensis* Norman, 1939 und *Histiopterus spinifer* Gilchrist 1904 (Pisces; Perciformes: Pentacerotidae). Senckenbergiana Biol. 61 (1/2): 11–24.

Klausewitz, W. 1986. Zoogeographic analysis of the vertical distribution of the deep Red Sea ichthyofauna, with a new record. Senckenbergiana marit. 17(4/6): 279–292.

Klausewitz, W. 1989. Evolutionary history and zoogeography of the Red Sea ichthyofauna. Fauna of Saudi Arabia 10: 310–337.

Klausewitz, W. and Thiel, H. 1982. Tiefenwasser- und Tiefseefische aus dem Roten Meer. VI. Uber das vorkommen des Haifisches *Iago omanensis* (Norman) (Pisces: Chondrichthyes: Elasmobranchii: Carcharhinidae) und des Messerzahnaals *Muraenesox cinereus* (Teleostei: Apodes: Muraenesocidae), beide mit Hilfe der fotofalle beobachet und gefangen. Senckenbergiana marit. 14 (5/6): 227–243.

Klunzinger, C.B. 1884. Die Fisches des Roten Meers. Eine kritische Revision mit Bestimmungs-Tabellen. Acanthopteri veri Owen. IX. Stuttgart, 133 pp.

Marshall, N.B. and Bourne, D.W. 1964. A photographic survey of benthic fishes in the Red Sea and Gulf of Aden, with observations on their population density, diversity and habit. Bull. Mus. Comp. Zool., Harvard Univ. 132(2): 223–244.

McCosker, J.E., Baranes, A., and Golani, D. 1993. Description of the adult of *Leptocephalus echeloides* D'Ancona (1928), a deepwater snake eel, genus *Opichthus* (Pisces: Ophichthidae), from the Gulf of Aqaba. Cybium 17: 165–170.

Nakamura, I. 1980. New record of a rare gempelid, *Thyrsitoides marleyi*, from the sea of Japan. Jap. J. Ichthyol. 26: 357–360.

Porter, C. and Diamant, A. 1984. Note on the occurrence of freckled tiltfish *Branchiostegus sawakinensis* Amirthalingam 1969 (Branchiostegidae) in the northern Red Sea. Cybium 8: 97–99.

Post, von, A. and Svoboda, A. 1980. Strandfunde mesopelgischer fische aus dem Golf von Akaba. Archiv. Fuer Fischereiwissenschaft 30: (2/3): 137–143.

Randall, J.E. 1983. Red Sea reef fishes. IMMEL Publ. London, 192 pp.

Randall, J.E. 1986. Labridae. In: Smith, M.M. and Heemstra, P.C., eds. Smith's Sea Fishes. MacMillan, South Africa, pp. 683–703.

Randall, J.E. and Heemstra, P.C. 1991. Revision of Indo-Pacific groupers (Perciformes: Serranidae: Epinephelinae), with descriptions of five new species. Indo-Pacific Fishes 20: 1–332.

Regan, C.T. 1902. A revision of the fishes of the family Streomateidae. Ann. Mag. Nat.Hist. (7) 10: 115–131.

Reiss, Z. and Hottinger, L. 1984. The Gulf of Aqaba. Ecological micropaleontology. Ecological Study 50. Springer-Verlag, Berlin, 354 pp.

Waller, G.N.H. and Baranes, A. Food of *Iago omanensis*, a deep-water shark from the northern Red Sea. J. Fish. Biol., in press.