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MEDITERRANEAN FISHES OF ISRAEL

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MEDITERRANEAN FISHES OF ISRAEL / Boek

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The determination of the fishes listed in this paper is based chiefly on specimens obtained by the author during the years 1951—1953. These fishes are preserved in the collection of the Sea Fisheries Research Station, which also includes valuable material collected by various members of the staff during previous years. Additional collections examined for this work were provided by Dr. H. Mendelsohn of the Pedagogical Institute for Biology, by Dr. M. Dor and by Mr. B. Safray of kibbutz "Saar", to all of whom I wish to express my sincere appreciation.

The fish were caught by various types of gear as used by local fishermen. The most important of these is the trawl, which is used along the coastal shelf from Acre in the north to Gaza in the south. Occasionally the trawlers work as far south as El-Arish. The fishing grounds are exploited down to a depth of 200 fathoms, but most of the fishing is done between 20—60 fathoms. During the winter months the catch is landed mainly in Haifa, as this is the only port offering protection during stormy weather. In calmer weather, however, the trawlers also use the Tel-Aviv port, which is situated near the southern fishing area. Sardines and some other pelagic fishes are caught by ring nets which are used almost exclusively along with strong lights for attracting the fish. This type of fishing is carried out in Haifa Bay and in the Tel-Aviv—Jaffa area from March to October. The shore seine, trammel and gill nets are in use chiefly during the winter months when the fish are more abundant. The cast net is also of some importance, being used mostly for catching Gray Mulletts and other fish living close to the shore or in the estuaries. Long lines and single lines are used mostly in rocky areas.

Ichthyological literature on fishes of the Palestine coast is rather scarce. W. Steinitz (1927) identified and partly described 65 species from Haifa Bay. Lieberman (1934) gives a list of 64 species and Hornell (1935) 72 species (including those from fresh water), most of which were identified by J. R. Norman. A fuller list was published by Bodenheimer (1935, 1937). Haas and H. Steinitz (1947) reported 10 species of Erythrean origin caught in the Mediterranean waters of Palestine. H. Steinitz (1949) described in detail *BLENNIIDAE* of the Mediterranean coast. Bruun (1935) identified *Parexocoetus mento* and Mendelsohn (1947) recorded the presence of *Cyprinodon dispar* near Tel-Aviv and Atlit. A list of inshore fishes of Caesarea was given by the author (1953^a) who also reported in another communication (1953^b) the presence of 10 Indo-Pacific species previously unknown from the Mediterranean coast of Israel.

Papers dealing with the classification of fishes from other Levant countries should also be mentioned. Fowler (1923) identified 15 fishes collected at Beirut. Gruvel (1931) dealt with the fishery and the fishes of Syria. Tortonese (1948) identified the fishes of Rhodes. H. Steinitz (1952) specified 16 species from Cyprus. Many authors dealt with fishes of the Suez Canal (Tillier 1901; Norman 1926, 1929; Chabanaud 1933, 1934; Gruvel 1936; Tortonese 1948). This area is of special interest as many Indo-Pacific species penetrated through the Canal to the eastern Mediterranean. Some of them are now common along the Israeli coast. The presence of Red Sea fishes in this area is discussed by W. Steinitz (1929), Kosswig (1950) and Tortonese (1951).

In this paper 211 species, collected from the Mediterranean coast of Israel, are determined. The classification and the nomenclature are adopted mostly from Fowler (1935). In cases when the fish has been mentioned previously from this area its name, as given by the author who reported it first, is also cited. All other synonyms are omitted. Full systematic description is given only for new species and for the fishes of Indo-Pacific origin. Some notes relating to the life history and the importance of the fish in local fishery are described as far as they have been observed.

The length of the body is given as standard length (from snout tip to base of caudal fin). When total length is used it is so stated. The range in lengths of preserved specimens is given in most cases. When this is exceeded by larger specimens observed in the field, it is noted by the expression "reaching" with the figure of the measurements.

Special attention has been paid to the fishes of Indo-Pacific origin now thriving in the eastern Mediterranean. Some morphological changes may be expected as a consequence of their adaptation to the new environmental conditions (lower temperatures, salinity etc.). Therefore their description as given is based on the Mediterranean specimens. They are illustrated by original drawings by Miss Lyka Bograd of the Sea Fisheries Research Station. The described species of Indo-Pacific origin are as follows:

Dussumieria productissima Chab.
Saurida grandisquamis Gnthr.
Cyprinodon dispar (Rüpp.)
Hemiramphus far (Forsk.)
Dollfusichthys sinus-arabici Chab.
Holocentrum rubrum (Forsk.)
Sphyraena obtusata C.V.
Hepsetia pinguis (Lac.)

Istiophorus gladius (Brouss.)
Apogon thurstoni Day
Leiognathus klunzingeri (Steind.)
Mulloidichthys auriflamma (Forsk.)
Siganus rivulatus (Forsk.)
Platycephalus indicus (L.)
Stephanolepis ocheticus Fras. Brunn.
Tetrodon spadiceus (Rich.)

Caranx djeddaba (Forsk.) was found also on this coast but is not described, as the only available specimen was sent to the American Museum of Natural History. Four other fishes, namely two species of *Mugil*, *Callionymus* and *Upeneus* also seem to be of Indo-Pacific origin but have not yet been finally determined.

Two new fishes are described from this coast. One of them, a new genus and species *Lophenchelys fowleri* belongs to a small family, HETERENCHELYIDAE, which is characterized by an extremely long tail and a very short trunk. Two other genera of this family are known only from West Africa. The presence of a representative of this family in our area is of great interest from a zoogeographical point of view. The other new species is *Epinephelus haifensis*, found at a depth of 60—120 fathoms.

Mr. H. W. Fowler of the Academy of Natural Sciences of Philadelphia examined 6 species from this coast and identified two of them as new species (personal correspondence). They belong to the genera *Upeneus* and *Callionymus*. A full description of these fishes will be published by him in the near future. His kind help in the determination of these species is greatly appreciated by the author.

I wish to express my acknowledgements to Mr. J. T. Nichols of the American Museum of Natural History for the determination of four species of CARANGIDAE, namely *Caranx djeddaba*, *Caranx rhonchus*, *Caranx crysos* and *Trachurus mediterraneus*.

Occasional collections were made from the estuary of the Naaman river. Some of the fishes are of fresh water origin, the others coming from the sea. Among

them was found a Cyprinid belonging to the genus *Acanthobrama*, which seems to be a new species and which will be described at a future date. The fishes are as follows:

<i>Epinephelus aeneus</i> Geof. St. Hil.	<i>Muraena anguilla</i> L.
<i>Epinephelus guaza</i> (L.)	<i>Tilapia galilaea</i> (Artedi)
<i>Johnius hololepidotus</i> (Lacép.)	<i>Tilapia nilotica</i> (L.)
<i>Sardinella maderensis</i> Lowe	<i>Tilapia zillii</i> Gerv.
<i>Mugil saliens</i> Risso	<i>Barbus canis</i> V.
<i>Mugil auratus</i> Risso	<i>Acanthobrama</i> sp.
<i>Mugil cephalus</i> L.	

The present work does not pretend to embrace all species of this coast. It should rather be considered as a step toward this goal. It may be expected that many more species as well as details about their biology will be found during further investigation.

I owe a debt of gratitude to Dr. H. Steinitz, who guided me in fish systematics and showed encouraging interest in the progress of this work. My thanks are due to Miss L. Bograd for her kind help in preparing the English text and to Mrs. E. Kraus for technical assistance. I wish to express my thank to Dr. Reich for valuable suggestions and criticism of the manuscript.

Subclass SELACHII

HEXANCHIDAE

Heptranchias perlo (Bonnaterre)

Not preserved but photographed. Total length 2500 mm. (approximately).

SCYLIORHINIDAE

Scyliorhinus canicula (Linné)

Scyllium canicula C. Gruvel, p. 73.

Rare. Met with beyond depths of 80 fathoms. Length 360 mm.

CARCHARHINIDAE

Carcharhinus milberti (Müller and Henle)

Total length 660 mm. Reaching 2000 mm.

Carcharhinus limbatus (Müller and Henle)

One specimen caught by hook in Haifa Bay. Not preserved. Total length 2100 mm.

MUSTELIDAE

Mustelus mustelus (Linné)

? *Mustelus laevis* Risso. Gruvel, p. 74.

Distinguished when fresh by white spots along the body. Caught by trawl. Length 250—560 mm.

Mustelus canis (Mitchill)

? *Mustelus vulgaris* Müll. and Hen. Gruvel, p. 74.

Seems to be more common than the former. Length 200—650 mm. Reaching 1100 mm.

SPHYRNIDAE

Sphyrna zygaena (Linné)

Zygaena malleus V. Gruvel, p. 75

Two specimens in collection of Pedagogical Institute for Biology. Total length 1190 mm. (male) and 970 mm. (female).

SQUALIDAE

Oxynotus centrina (Linné)

Caught seldom by trawl, only in depths greater than 60 fathoms. Length 410—420 mm. Reaching 800 mm.

Squalus acanthias Linné

Acanthias vulgaris Risso. Steinitz W., p. 317.

Squalus blainvilliei Risso

Caught by trawl near Tel-Aviv at 100 fathoms depth. Length 570 mm.

SQUATINIDAE

Squatina squatina (Linné)

Squatina squatina L. Gruvel, p. 75.

Often caught by trawlers. Length 450—650 mm. Reaching 1400 mm.

PRISTIDAE

Pristis pectinatus Latham

Pristis pectinatus Lat. Gruvel, p. 77.

Only rostrum preserved in collection. Rostral teeth 27.

RHINOBATIDAE

Rhinobatos cemiculus Geoffroy St.-Hilaire

Common in shallow water. Reaching 1200 mm.

RAJIDAE

Raja miraletus Linné

Raja miraletus L. Steinitz W., p. 318.

Often caught by trawlers. Total length 120—360 mm.

Raja montagui Fowler

Total length 320—534 mm.

Raja quadrimaculata Risso

Total length 234 mm.

Raja clavata Linné

Raja clavata L. Gruvel, p. 78.

Total length 75—300 mm.

Raja undulata Lacépède

Total length 400 mm.

Raja oxyrinchus Linné

Caught in considerable depths. Length 252—755 mm.

TORPEDINIDAE

Torpedo narke Risso

Torpedo narke Risso. Steinitz W., p. 138.

Length 180 mm.

Torpedo torpedo (Linné)

Torpedo marmorata Risso. Gruvel, p. 77.

Length 120—220 mm.

DASYATIDAE

Dasyatis pastinaca (Linné)

Dasyatis pastinaca (L.). Fowler (1), p. 35.

Common. Reaching 400 mm. (without tail).

Pteroplatea altavela (Linné)

Length 172—450 mm.

MYLIOBATIDAE

Myliobatis aquila (Linné)

Myliobatis aquila C. Gruvel, p. 78.

Length 320—370 mm.

Pteromylaeus bovinus (Geoffroy St.-Hilaire)

Length 180—330 mm.

Rhinoptera marginata (Geoffroy St.-Hilaire)

Length 230—360 mm.

Subclass TELEOSTEI

CLUPEIDAE

Sardinella aurita Valenciennes

Sardinella aurita C.V. Gruvel, p. 83.

Distinguished when fresh by the golden stripe along the sides. A common fish forming the bulk of the sardine catch. Young specimens of 17—30 mm. were collected during July and August in Haifa Bay. Spawning occurs in summer, from middle of June to end of August. Length 17—270 mm.

Sardinella maderensis Lowe

Harengula granigera (V.). Fowler (1), p. 35.

Distinguished from other sardines of this coast by greater depth of body, which is about 3.5 in length, by dark spot at base of first 3—4 dorsal rays and dark blotch besides operculum. It appears frequently but in much smaller quantities than the former species. Length 50—160 mm.

Sardina pilchardus (Walbaum)

Clupea pilchardus Walb. Gruvel, p. 84.

Distinguished by striae on operculum. Dark spots along sides of body visible in most fresh specimens. Lacking economical importance. Ripe females observed in February and March. Length 80—140 mm.

Alosa fallax (Lacépède)

Very rare along our coast. Two specimens in collection; one of them caught by trawl near Mersin (Anatolian coast of Turkey). Length 240—245 mm.

ENGRAULIDAE

Engraulis encrasicolus (Linné)

Engraulis encrasicolus L. Gruvel, p. 85.

Appears often together with sardines but never seen in big schools in vicinity of this coast. Length 52—110 mm.

DUSSUMIERIDAE

Dussumieria productissima Chabanaud

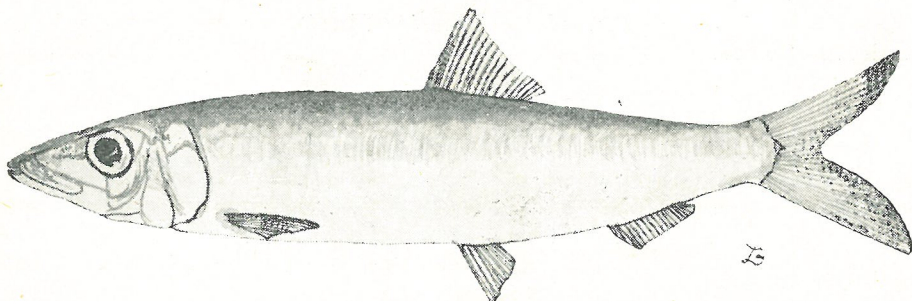


Figure 1

Dussumieria sp. Lissner, p. 18.

This fish is doubtlessly of Erythrean origin and was described by Chabanaud (1933) from Suez Canal as species nova. He indicated that its nearest Indo-Pacific relative is *Dussumieria hasselti* Bleek., known from India, the Philippines and Indonesia. Single specimens are caught occasionally by trawl or by ring nets. It reaches 165 mm. The material from the Suez Canal as dealt with by Chabanaud did not contain fishes above 146 mm. It is of great interest to note that the fish has already reached the Anatolian coast of Turkey; a few specimens were found by trawler near Iskenderun on August 1952.

The description is based on 20 specimens. Length 102—130 mm.

D. 19—21; A. 18—19; P. 12—14; V. I 7; L. 1. 52.

Head 3.7 in length of body; depth 4.6—5.3; predorsal 1.8—1.9. Snout 2.6—3.0 in head; eye 3.6—4.2; interorbital 4.2—5.0; upper jaw 2.6—3.1; base of dorsal 1.7—2.1; base of anal 2.1—2.4; length of pectoral 1.8—2.3; length of ventral 2.5—3.1.

Head conical. Snout pointed, its length equal to postorbital part of head. Jaws equal, maxillary reaching front of eye. Thin adipose lid covers the eye which is situated in center of head. Two lateral ridges border top of head. In addition, a shorter ridge runs along medial line, from snout tip to point above pupil. Small but distinct teeth on jaws. Patches of teeth on palatines, pterygoids and tongue. Front of dorsal equally far from root of caudal as from front edge of eye. Origin of ventrals below first third of dorsal. Gill rakers 30—32 on lower part of first arch and 14—16 on upper one. Scales very deciduous. No abdominal scutes.

Colour (fresh); A wide dark-grey band along back; immediately below on each

side a band of steel-grey, sharply marked off ventrally from silvery-green streak which fades into the silver-white on lower half of body.

SYNODONTIDAE

Synodus saurus (Linné)

Saurus griseus Lowe, Gruvel, p. 86.

Frequently caught by trawl. Length 120—220 mm.

Saurida grandisquamis Günther

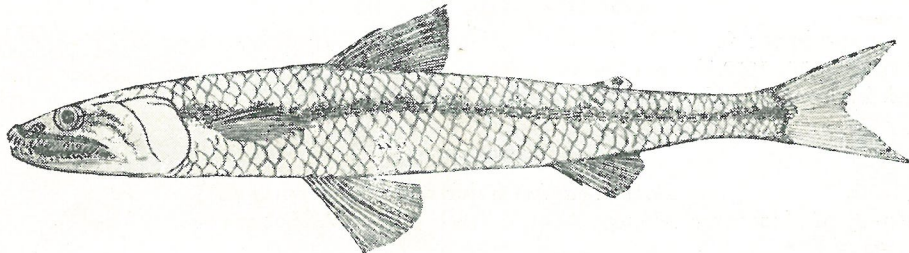


Figure 2

Indo-Pacific species not known previously from Mediterranean. Caught sometimes by trawl but much rarer than *Synodus saurus*. Distinguished from the former by two rows of teeth on palatines and brown border on the upper lobe of caudal fin. Described from 4 specimens, 165—202 mm.

D. 12—13; A. 10—11; P. 13—14; V. 9; L. 1. 48—49; L. tr. 4/6.

Head 4.2—4.5 in length of body; depth 7.0—7.6. Snout 3.8—4.3 in head; eye 5.3—5.7; interorbital 4.9—5.6; predorsal scales 16.

Body elongated, subcylindrical. Head oblong, its length equal to distance between end of dorsal and adipose fin. Mouth cleft very wide. Lower jaw little inferior. Length of upper jaw equal to length of ventral fin. Eye covered partly by adipose lid, its diameter slightly less than interorbital which is broad and concave. A low ridge leads from anterior upper border of the eye to nostrils. Teeth in jaws in two or three irregular rows, of different sizes, conical and depressible, visible also when mouth is closed. Two bands of similar teeth on palatines; anterior one long with 1—2 rows of teeth, inferior one much shorter with teeth in many rows. Small teeth on tongue and branchial arches. Dorsal much higher than its length; its height 1.2 in head; its length 1.5—1.7. Adipose fin as long as diameter of eye. Pectoral shorter than ventral; its length equal to depth of body, 1.6—1.7 in head; ventral 1.3—1.5; height of anal 2.0—2.2, its length 2.3—2.4.

Colour (in formalin): Upper part of body dark brown, ventral part whitish. Two brown lines between eye and posterior edge of preoperculum. 9—10 dark blotches along lateral line. Upper edge of tail and anterior rays of dorsal with brown dots. A dark spot on distal part of adipose fin.

CHLOROPHTHALMIDAE

Chlorophthalmus agassizi Bonaparte

Caught often by trawl in depths greater than 100 fathoms. Length 105—120 mm.

ARGENTINIDAE

Argentina sphyraena Linné

Common in depths greater than 80 fathoms. Length 102—132 mm.

STERNOPTYCHIDAE

Argyropelecus hemigymnus Cocco

Length 35 mm.

SUDIDAE

Paralepis speciosus Bellotti

Three specimens found in stomach of *Thunnus thynnus* caught near Cyprus on November 10, 1952. Preserved in good condition. Distinguished by four longer teeth in front of each side of premaxilla. Length 30—60 mm.

CYPRINIDAE

Barbus canis Cuvier and Valenciennes

Estuary of Naaman river near Acre. A fresh water fish. Length 89 mm.

Acanthobrama sp

Estuary of Naaman river. Seems to be a new species, distinguished by few gill-rakers (12 on lower part of anterior arch), by considerable depth of body and by inferior lower jaw. Three specimens. Length 94—95 mm.

ANGUILLIDAE

Muraena anguilla Linné

Muraena anguilla L. Hasselquist, p. 223.

Common in streams flowing to Mediterranean. Total length 120—555 mm.

CONGRIDAE

Conger conger (Linné)

Conger vulgaris C. Gruvel, p. 79.

Total length 160—440 mm.

Bathycongrus mystax (De la Roche)

Caught in depths greater than 80 fathoms. Total length 210 mm.

Ariosoma balearica (De la Roche)

More common in winter months. Total length 180—275 mm.

Echelus myrus Linné

Total length 190—380 mm.

OPHICHTHYIDAE

Sphagebranchus imberbis De la Roche

From the collection of Dr. Dor. Total length 370 mm.

Ophichthys remicaudatus (Kaup)

Caught by trawl in depth of 90 fathoms. Total length 325 mm.

MURAENIDAE

Muraenophis helena (Linné)

Muraena helena L. Gruvel, p. 80.

Rare. Total length 280 mm.

HETERENCHELYIDAE

Lophenchelys fowleri gen. and sp. nov.

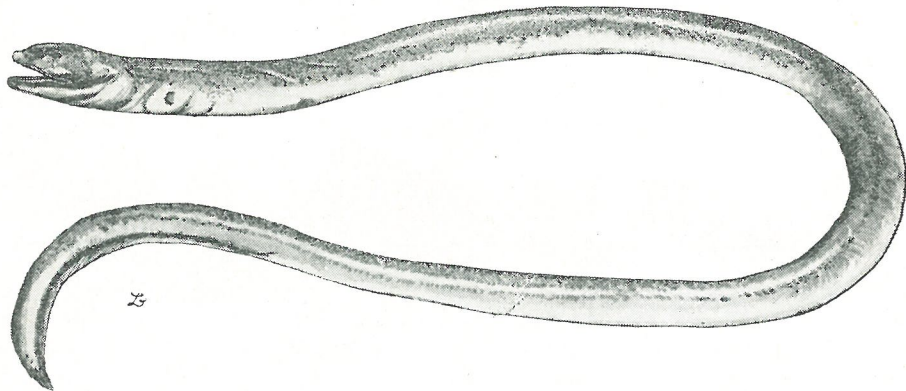


Figure 3

Rare eel, living on muddy bottom at depth 15—30 fathoms.

Holotype : The Sea Fisheries Research Station, Haifa. No. M/168. Total length 524 mm.

Paratype: The Academy of Natural Sciences of Philadelphia. Total length 440 mm. (approximately).

The full description of this new fish was sent to "Notulae Naturae" of the Academy of Natural Sciences of Philadelphia.

Length of head 10.5—11.5 in total length; trunk 1.6—1.7; tail 1.2; depth 40—44. Snout 5.7—5.8 in head; mouth cleft 3.3—3.4; interorbital 9.0—9.2; trunk 1.4—1.6.

Body very elongated, subcylindrical, lacking pectorals and ventrals. Dorsal and anal very low, confluent at caudal which is prominent. Body naked. Anus not far from head, trunk shorter than head. Tail very long, 5.5—6.0 times longer than rest of body. Snout conical, jaws equal. Eyes minute, nearer to mouth corner than to snout tip. Two pairs of nostrils, anterior behind snout tip, small and round; posterior one in front of eyes, larger and elongated. Branchial openings on ventral side, separated by distance approximately equal to length of each one. Interorbital less than half of mouth cleft. Teeth in jaws biserial, larger in outer series, mostly conical. On vomer mostly granular, in one row, biserial only in middle.

Colour (in formalin): Dorsal surface mottled brown-black, ventral cream-white.

CYPRINODONTIDAE
Cyprinodon dispar (Rüpell)

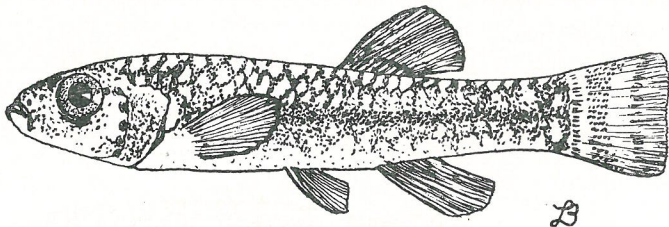


Figure 4a. Male.

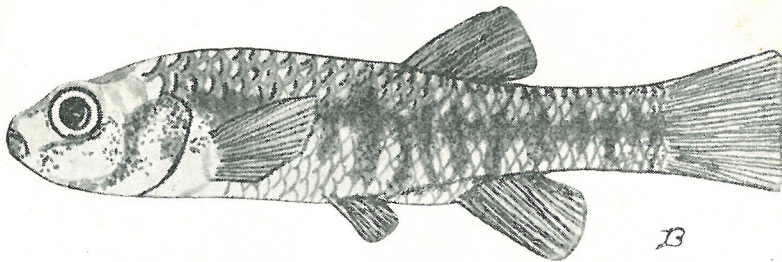


Figure 4b. Female.

Cyprinodon dispar (Rüpp.). Haas and H. Steinitz.

This fish appears in shallow water along the coast. Reported by Mendelsohn from Tel-Aviv and Atlit, and by the author from Caesarea. Known from the vicinity of the Dead Sea, the Suez Canal and Abyssinia. According to Mendelsohn, "The marine specimens differ distinctly in body shape and colour from specimens from the brackish springs in the neighbourhood of the Dead Sea".

D.10; A.11; P.16; V.I 6; L.1. 27—28; L.tr. 9.

Head 3.5 in length of body; depth 4.1—4.2; predorsal 1.6—1.7. Snout 3.3—3.4 in head; eye 3.2—3.3; interorbital 2.1—2.3; length of pectoral 1.5; of ventral 2.1—2.2; length of longest dorsal ray 1.2; length of longest anal ray 1.3.

Body elongated. Top of head broad and flat. Head longer than depth of body. Eye diameter equal to snout and to mouth-cleft. Interorbital as long as ventrals. Dorsal does not reach caudal if laid backwards. In females front of dorsal is midway in total length. In males dorsal fin is situated more forward, being midway between posterior eye border and caudal root. Caudal peduncle as deep as combined lengths of snout and eye. Caudal fin truncate. Gill-rakers 14 on the whole first arch.

Colour (in formalin): Females with dark vertical bars along sides of body. Males with grey reticulated pattern on lateral surfaces; belly white; caudal fin with two semilunar cross bars.

This fish differs considerably from the description of *Cyprinodon dispar* given in Günther's Catalogue, Vol. VI, p. 303, in that the dorsal and anal fins are shorter, not reaching caudal in either sex, in having higher number of rays in dorsal and anal and by the lesser body depth.

POECILIDAE

Gambusia affinis Girard

Common in all fresh water streams. Found dead or dying on sea-shores, brought by strong current of the rain-swollen stream Hephzibah.

EXOCOETIDAE

Cypsilurus rondeletii (Valenciennes)

Very common flying fish along this coast. Length 140—205 mm.

Cypsilurus exsiliens (Linné)

Length 197—205 mm.

HEMIRAMPHIDAE

Hemiramphus far Forskal

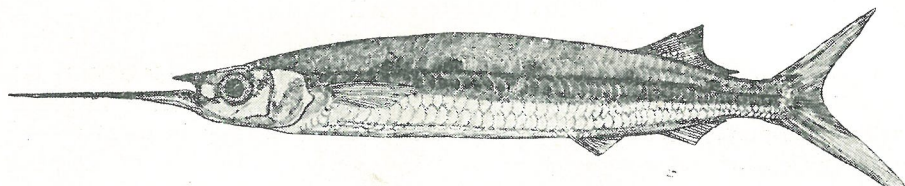


Figure 5

Hemiramphus far (Forsk.). Hornell, p. 83.

Widely distributed through the Indo-Pacific area where it attains 650 mm. length (Smith 1950). Rather a rare fish in eastern Mediterranean, occasionally caught by ring net or gill net. Has reached Rhodes, as I had an opportunity to recognize it during my visit to the Island in November, 1952. Three specimens in collection. Total length 182—380 mm.

D.13—14; A.10—12; P.12; V.15; L.1. 52—54.

Head 4.4—4.6 in length measured from upper jaw tip to root of caudal; depth 6.0—6.2. Snout 2.7 in head measured from upper jaw tip; inter-orbital 3.9; eye 4.4.

Small teeth in jaws in 2—4 series. Length of pectoral equal to depth of body. Length of lower jaw beyond extremity of upper jaw about equal to distance from end of pectoral to base of ventral. Upper jaw broader than long. Interorbital space little larger than eye diameter. Snout subequal to base of anal. Ventrals midway from base of pectorals to end of middle caudal rays. Base of dorsal longer than base of anal.

Colour (in formalin): Yellowish green with silverish blue lateral band. 5—8 dark blotches along sides, little above the band.

Hemiramphus gamberur (Lacépède)

Common along the shores. Not exceeding 120 mm. (without beak and tail). Determined by Mr. Henry W. Fowler.

BELONIDAE

Belone belone (Linné)

Rare. Length 110—225 mm.

Strongylura acus (Lacépède)

Belone acus Risso. Steinitz W., p. 325.

Caught in considerable quantities during winter and spring months. Length 214—700 mm.

CORYPHAENOIDIDAE

Coelorhynchus coelorhynchus (Risso)

Caught by trawl in depths over 100 fathoms. Total length 110—170 mm.

GADIDAE

Phycis b'ennioides (Brünnich)

Caught near Tel-Aviv at considerable depth. From the collection of Pedagogical Institute for Biology. Length 232 mm.

MERLUCCIIDAE

Merluccius merluccius (Linné)

An important commercial fish. Occurs abundantly along the coast and is taken by trawlers, mostly during the winter and the spring months. Rare in summer. Reaching 500 mm., the bigger specimens being caught usually in greater depths. Length 70—300 mm.

TRACHIPTERIDAE

Trachipterus cristatus (Bonelli)

Collection of Dr. Dor. Found dead on the sea-shore. Length 190 mm.

BOTHIDAE

Arnoglossus laterna (Walbaum)

The small sizes of the examined specimens may be the reason that in all of them the diameter of eye is bigger than snout. Length 52—73 mm.

Arnoglossus grohmani (Bonaparte)

D 81; A 56. Length 62 mm.

Arnoglossus thori Kyle

D 86; A 66. The diameter of the eye is longer than the snout, contradicting the description in literature (Norman 1934). Length 58 mm.

Bothus podas (De la Roche)

Rhomboidichthys podas Gthr. Steinitz, W., p. 328.

Length 65—110 mm.

Citharus linguatula (Linné)

Cytharus linguatula (nec. descr.). Gruvel, p. 82.

Commonly caught in trawl fishing but because of its small size of little economic importance. Length 75—120 mm. Reaching 200 mm.

SOLEIDAE

Solea vulgaris aegyptiaca Chabanaud

Commercially important fish, more abundant during winter months. Length 170—360 mm. Reaching 450 mm.

Solea lascaris (Risso)

Pegusa lascaris Risso. Gruvel, p. 82.

Rare. Length 185 mm.

Symphurus nigrescens Rafinesque

Caught by trawl at depth of 30 fathoms. Rare. Length 52—67 mm.

Monochirus luteus (Risso)

Length 93 mm.

Monochirus ocellatus (Linné)

Length 90—170 mm.

CYNOGLOSSIDAE

Dollfusichthys sinus-arabici Chabanaud

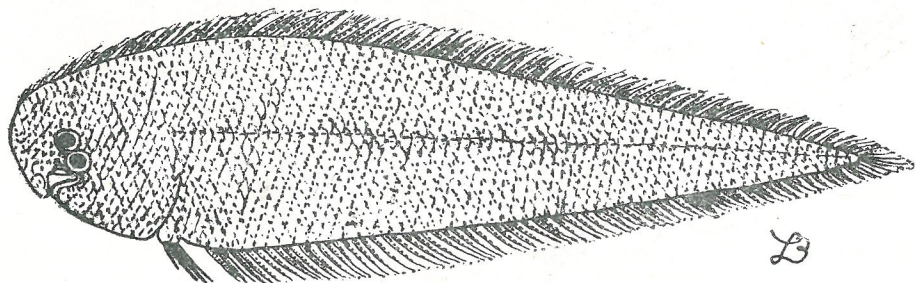


Figure 6

Indo-Pacific species described by Chabanaud (1931) from Red Sea, Gulf of Suez. Gruvel (1936) noted its presence in Suez Canal. As far as known this is the first recorded appearance of this species in the Mediterranean. Rare. Two specimens in the collection. Length 93 mm. and 109 mm. Specimens collected by Chabanaud reach 134 mm.

D. 100—102; A. 72—73; C. 8; V. 4; L.1. 59—63; L. tr. 26—28.

Head 4.9—5.2 in length of body; depth 3.8—4.0. Eye 7.9—8.0 in head.

Body sinistral, oblong-ovoid, attenuated to the caudal. Eyes close together, upper one little advanced. Mouth corner below middle of lower eye. Teeth small, present mostly on right side. Upper nostril on left side opposite interorbital, behind front edge of upper eye; lower nostril tubular, above middle of mouth-cleft. Front nostril of right side above first third of mouth-cleft; second nostril behind middle of mouth-cleft and situated little higher than the first.

Lateral line present only on left side. Fins very long, confluent. Single ventral present on left side of body, connected by membrane with anal.

Colour (in formalin): Left side brownish, right side white.

ZEIDAE

Zeus faber Linné

Zeus faber L. Gruvel, p. 109.

Length 110—280 mm.

TRACHICHTHYIDAE

Hoplostethus mediterraneus Valenciennes

Caught at depth of 100 fathoms. Length 72 mm.

HOLOCENTRIDAE

Holocentrum rubrum (Forsk.)

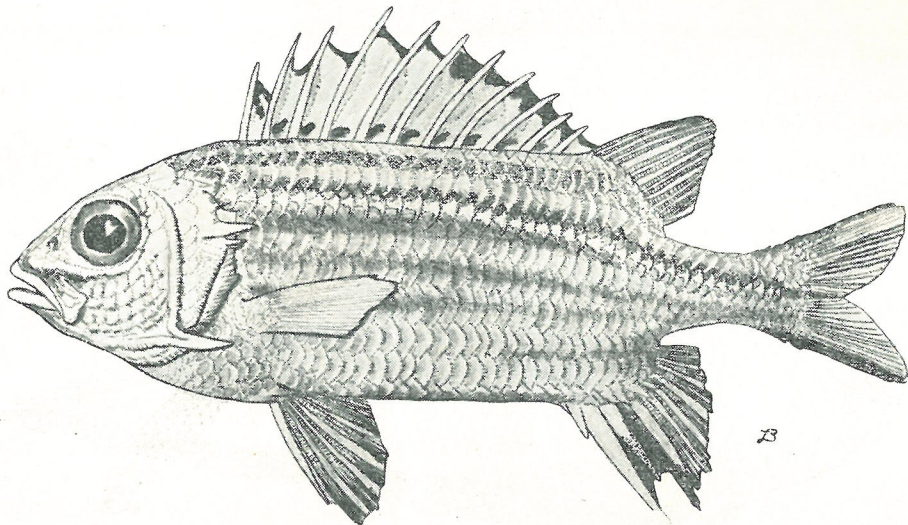


Figure 7

Holocentrum rubrum (Forsk.). Haas and Steinitz H.

Indo-Pacific species, seldom met with along this coast. Described from two specimens caught at Haifa Bay in November, 1947, and November, 1951. Length 170 mm. and 120 mm.

D. XI 13; A. IV 9; V. I 7; P. 14; L. 1. 37—38; L. tr. 3/6.

Head 3.0—3.1 in length of body; depth 2.8—2.9. Snout 4.3 in head; eye 3.0; interorbital 3.9—4.2; maxillary 2.5.

Eye very large, its diameter greater than snout length. Spines and serration on the edges of preorbital, suprascapula, preoperculum, suboperculum and operculum. The biggest spine at angle of preoperculum. Maxilla reaching to below front of pupil.

Colour (in formalin): Cream-whitish with 7—9 longitudinal dark stripes. Two blackish stripes on the spinous dorsal. Outer edges of ventrals black.

SYNGNATHIDAE

Syngnathus acus Linné

Total length 145 mm.

Nerophis maculatus Rafinesque

Single specimen in collection of Dr. Dor. The hinder part of the body mutilated. D 25. Vent situated opposite the 8-th dorsal ray as described by Moreau (1881). According to Fowler (1935) the vent is situated opposite the middle of the dorsal fin.

Hippocampus hippocampus (Linné)

Hippocampus guttulatus Cuvier

MACRORHAMPHOSIDAE

Macrorhamphosus scolopax (Linné)

Met with in depths greater than 80 fathoms. Length 55—80 mm.

SPHYRAENIDAE

Sphyraena obtusata Cuvier and Valenciennes

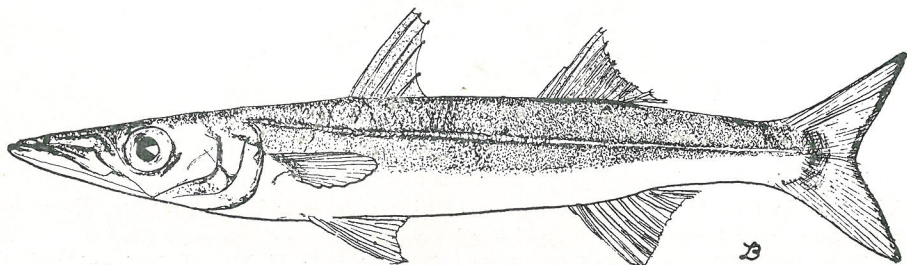


Figure 8.

An Indo-Pacific species widely distributed through Red Sea, Indian coast, Indonesia, Philippines, Australia and South Africa. Reported from Suez Canal by Chabanaud (1934). Found in Eylath, Gulf of Aqaba (Ben-Tuvia and H. Steinitz 1952). Its penetration to the Eastern Mediterranean must have taken place many years ago as the fish is now very common all year around. It is usually more abundant than its Mediterranean relative *Sphyraena sphyraena*. According to Smith (1947) it reaches almost 2000 mm. In these waters its length is mostly 100—200 mm. The maximum observed was 350 mm. During summer months many young specimens 40—80 mm. were collected in Haifa Bay. Mature fishes found in July and August.

D¹. V; D². 19; A. II 9; V. I 5; P. 14; L.1. 83—86 and 8—10 on caudal peduncle; L. tr. 6—7/7—8.

Head 3.1 in length of body; depth 6; predorsal 2.3; preanal 1.5; preventral 3.0. Snout 2.3 in head; eye 4; interorbital 6—7.8; length of first dorsal base 3.0; second dorsal base 2.9; height of dorsals 3.0; pectorals 2.6; distance between dorsals 1.3.

Snout as long as, or shorter than depth of body. Maxillary reaching nostrils. Eye much bigger than interorbital. Length of head equal to distance from base of pectoral to front of anal. Teeth in jaws small. Two pair of canines in front of upper jaw, the first one smaller than the second. Canine teeth at symphysis of mandible. One row of teeth on palatines, two or three of them in front longer. Ventrals commencing under middle of pectorals. Origin of first dorsal opposite end of pectorals or little before. Front of second dorsal before anal. Pectorals, ventrals, bases of dorsals and anal of about the same length.

Colour (fresh): Brown-grey above, silvery below. Ends of first dorsal and caudal blackish. Second dorsal, pectoral and caudal yellow.

Sphyraena sphyraena (Linné)

Sphyraena vulgaris C. Steinitz W., p. 340.

Caught often by ring net together with sardines and other pelagic fishes. Reaching 1000 mm.

ATHERINIDAE

Hepsetia pinguis (Lacépède)

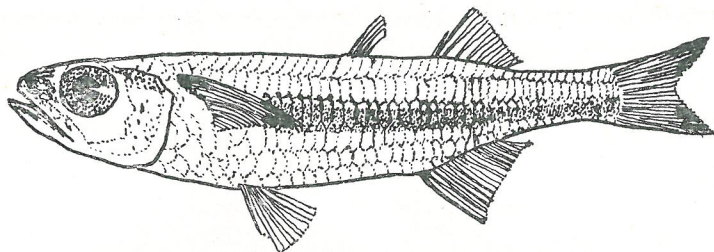


Figure 9

Atherina (*Hepsetia*) *pinguis* Lacép. Norman (1), p. 615.

A fish of Indo-Pacific origin, common now along shores of this country. Described from 15 specimens from Haifa Bay. Length 60—97 mm.

D¹. V—VI; D². I 8—10; A. I 11—13; P. I 13—16; V. I 5; L.1. 41—43; L. tr. 5.5—7.

Head 3.8—4.0 in body length; depth 4.6—5.0; predorsal 1.7—1.8; preventral 2.3—2.6; preanal 1.5. Snout 3.6—4.2 in head; eye 2.4—2.7; interorbital 2.2—2.6.

Length of head equal to distance from front of first dorsal to end of second dorsal. Upper surface of head flattened. Eye big, its diameter equal to interorbital and to postorbital part of head. Snout much shorter. Jaws equal, maxillary reaching to below front of pupil. The origin of first dorsal midway between root of caudal and front edge of pupil, somewhat behind vent. Second dorsal inserted behind front of anal, their bases ending on the same line. Base of pectoral in middle of predorsal length. Length of pectorals subequal to depth of body. Small teeth in bands on jaws, pterygoids, palatines and vomer. Gill-rakers 20—21 on lower part of anterior arch and 5—8 on upper one.

Colour (fresh): Brownish above, silvery beneath. Broad silvery lateral band. Upper surface of head, ends of caudal and upper part of pectorals dark. Blackish line along lower border of mandible.

Atherina mocho Cuvier and Valenciennes

Less common and smaller. Length 45—60 mm.

MUGILIDAE

Mugil cephalus Linné

Mugil cephalus Hasselquist, p. 226.

Distinguished by prominent adipose eyelid and axillary scale at base of pectoral. Common. Enters estuaries and streams. Young during May and June. Length 35—220 mm. Reaching 560 mm.

Mugil saliens Risso

Mugil saliens Risso. Gruvel, p. 88.

Distinguished by pointed snout. Scales on top of head descending to anterior nostrils. Common. Entering estuaries and streams. Young found in May and June. Length 30—180 mm. Reaching 400 mm.

Mugil auratus Risso

Mugil auratus Risso. Gruvel, p. 88.

Resembles *M. saliens*; differs by longer teeth in jaws. Rather common. Enters estuaries. Young found during May, June and July. Length 35—185 mm.

Mugil provensalis Risso

Mugil chelo C. Steinitz W., p. 348.

Distinguished by papillae on upper lip. Found only in sea. Length 80—165 mm.

Mugil labeo Cuvier

Distinguished by thick upper lip. Occurred only in sea. Length 220—285 mm.

Mugil sp. A.

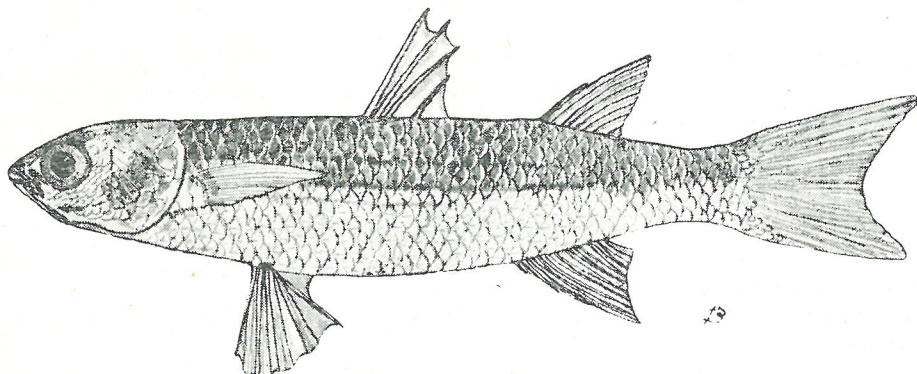


Figure 10

Distinguished by big eye; its diameter larger than snout. Rare. Length 218—136 mm.

Mugil sp. B.

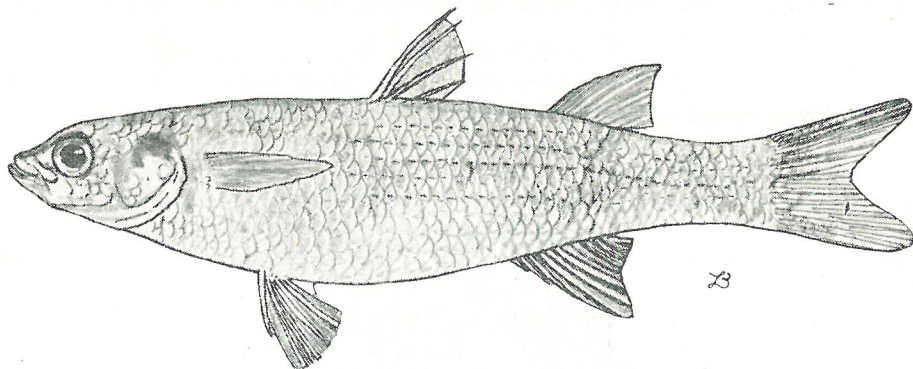


Figure 11

Distinguished by concave profile of snout. Lower jaw projecting. Rather common. Found in sea and in estuaries. Length 105—155 mm.

SCOMBRIDAE

Scomber japonicus Houttuyn

Scomber colias Gmel. Gruvel, p. 107.

Common pelagic fish caught mostly by ring net. Young found in summer. Reaching 300 mm.

Auxis thazard (Lacépède)

Auxis bisus Raf. Gruvel, p. 108.

Distinguished by the considerable distance between the first and the second dorsal fins. Caught often in Haifa Bay. Length 160—320 mm.

Euthynnus alleteratus (Rafinesque)

Most common among the species of tuna being caught along this coast. Reported also from Eylath, Gulf of Aqaba (Ben-Tuvia and H. Steinitz). Distinguished by large dark spots under pectoral fin. Length 110—300 mm.

Thunnus thynnus (Linné)

Orcynus thynnus L. Gruvel, p. 106.

Many young specimens caught by trolling near Haifa and near Cyprus. Fresh specimens with light transversal irregular streaks; front of second dorsal yellow-green. Length 360—580 mm.

Germo alalunga (Bonnaterre)

Distinguished by the long pectoral fin. Length 330—680 mm.

Sarda sarda (Bloch)

Pelamys sarda Risso. Gruvel, p. 107.

Rarely seen near the coast. About 20 specimens caught by gill net on April 1953 near Haifa Bay. Length 350—400 mm.

TRICHIURIDAE

Trichiurus lepturus Linné

Trichiurus haumela Forsk. Fowler (1), p. 36.

According to Smith (1947) it is a synonym to *Trichiurus haumela* which is widely distributed through the Indo-Pacific. It occurs commonly in trawl fishing during winter months, but not considered as a food fish. Total length 150—340 mm.

CORYPHAENIDAE

Coryphaena hippurus Linné

Two specimens caught by trolling in vicinity of Cyprus. Length 380—385 mm.

ISTIOPHORIDAE

Istiophorus gladius (Broussonet)

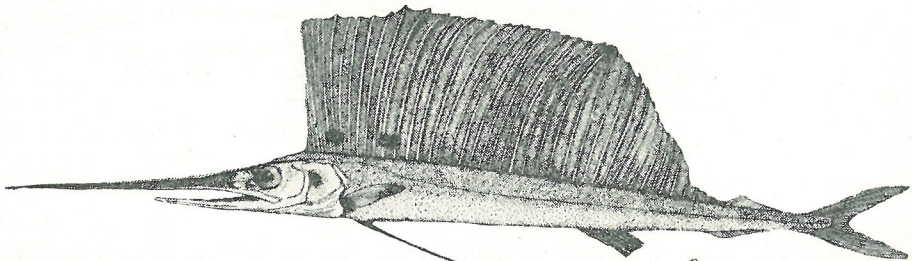


Figure 12

A young sail-fish was caught by ring net together with sardines, at Haifa Bay on October, 1952. It is without doubt an Indo-Pacific immigrant which arrived to the Mediterranean through the Suez-Canal. Length 324 mm.

D. XLVI 6; A.X 7; V. 2.

Head 2.5 in length of body; rostrum (from front of eye) 3.3; depth 14; lower jaw 6.9; postocular part of head 13; height of dorsal 5.4. Eye 2.1 in postocular part of head; interorbital 2.8; length of pectoral 1.1.

Body strongly compressed. Rostrum triangular, its upper profile descending in straight line. Tip of lower jaw reaches to middle of distance from end of rostrum to front of dorsal. First dorsal very high and connected by low membrane with small second dorsal. First anal inserted in middle of ventral origin and caudal base. Small granular teeth in jaws, continuing on upper jaw little beyond the end of lower jaw. Body covered by rectangular scutes, each one with a small protuberance in the centre.

Colour (in formalin): Bluish above, silvery white below. Dorsals, ventrals and first anal blackish. Two black blotches as big as eye at base of front part of first dorsal.

STROMATEIDAE

Stromateus fiatola Linné

Length 160—240 mm.

Stromateus fasciatus (Risso)

D 44; A 33. Brownish grey with 8 darker transversal bands. Length 64 mm. According to Soljan (1948) it is only young of *Stromateus fiatola*.

CARANGIDAE

Seriola dumerili (Risso)

Seriola dumerili Risso. Liebman, p. 325.

Length 95—365 mm. Reaching 1000 mm.

Decapterus rhonchus (Geoffroy St.-Hilaire)

Caranx rhonchus Geoff. Steinitz W., p. 325.

Caught in considerable quantities by ring net. Length 80—220 mm.

Caranx crysos (Mitchill)

Caranx fusus Geoff. Hornell, p. 83.

Often caught by ring net too. Length 80—180 mm.

Caranx djeddaba (Forsk.)

This Indo-Pacific species has been reported as far north as the Suez Canal (Gruvel 1936). The only specimen caught near this coast was sent for determination to Mr. J. T. Nichols of the American Museum of Natural History.

Trachurus mediterraneus Steindachner

Trachurus mediterraneus (Steind.) Fowler (1), p. 36.

Common commercial fish caught mostly by trawl. Length 80—200 mm.

Trachurus trachurus (Linné)

Less common. Length 160—180 mm.

Scyris alexandrina (Geoffrey St.-Hilaire)

Scyris alexandrina (G. St.-Hil.). Fowler, p. 36.

Length 140—320 mm.

Caesiomorus glaucus (Linné) [▲]

Lichia glauca L. Gruvel, p. 109.

Common along the shores. Length 70—310 mm.

POMATOMIDAE [▲]

Pomatomus saltatrix (Linné)

Pomatomus saltatrix L. Gruvel, p. 109.

Caught in great quantities near the coast, especially during winter and spring.

Length 70—290 mm. Reaching 350 mm.

APOGONIDAE

Apogon thurstoni Day

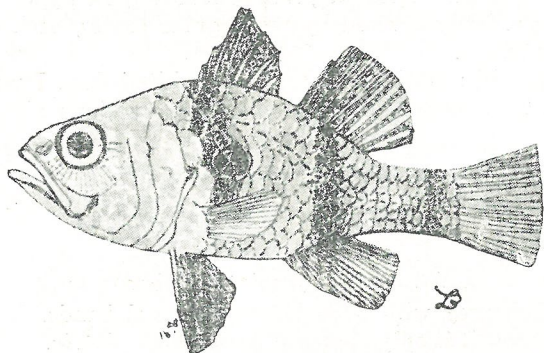


Figure 13

Indo-Pacific species, new in Mediterranean. Known from Red Sea, Indian Ocean, South Africa and Indonesia. Reported from Suez Canal (Norman 1927; Tortonese 1948). This fish is often met with near the shores at Haifa-Bay. Length 69—87 mm.

D¹. VII; D². II 8; L.1. 24—26; L. tr. 2/6.

Head 2.5—2.6 in length of body; depth 2.4—2.5; predorsal 2.3. Snout 3.8—3.9 in head; eye 3.5—3.6; interorbital 3.8; maxillary 1.9; height of longest dorsal spine (the third) 2.0; height of second dorsal 1.5; height of anal 1.6; length of ventrals 1.6; of pectorals 1.7.

Length of head about equal to length of dorsal bases. Snout, eye and interorbital subequal. Preoperculum serrate. Jaws even. Upper jaw almost reaching hind border of eye. Small teeth on jaws, vomer and palatines. 9 gill-rakers on lower part of first arch and 4 rudimental. Depth of body subequal to length of head. Caudal truncate.

Colour (in formalin): Dark ocellus with white margin above middle of pectoral fin, little smaller than diameter of eye. Three transversal dark bands; first one from front of spiny dorsal through ocellus to middle of ventrals; second — from middle of second dorsal to the anal (including dorsal and anal fins); third — across the caudal peduncle. Dorsals and anal fins dusky. The distal part of the ventrals blackish. Pectorals and caudal yellowish.

Barnard (1925), who renamed this species as *Apogon duops*, writes: "The new specific name is in allusion to the two "eyes", one on each side." (Marine fishes of South Africa, p. 522).

Apogon imberbis (Linné)

Distinguished when fresh by deep red colour. Length 42—55 mm.

SERRANIDAE

Anthias sacer Bloch

Caught by trawl in depth 120 fathoms. Length 91 mm. In addition to this 2 young specimens in collection, found in the stomach of *Thunnus thynnus*, caught near Cyprus. They were preserved in excellent condition, suitable for determination and fitting the description of Fage (1918). Total length 14—18 mm.

Epinephelus haifensis sp. nov.

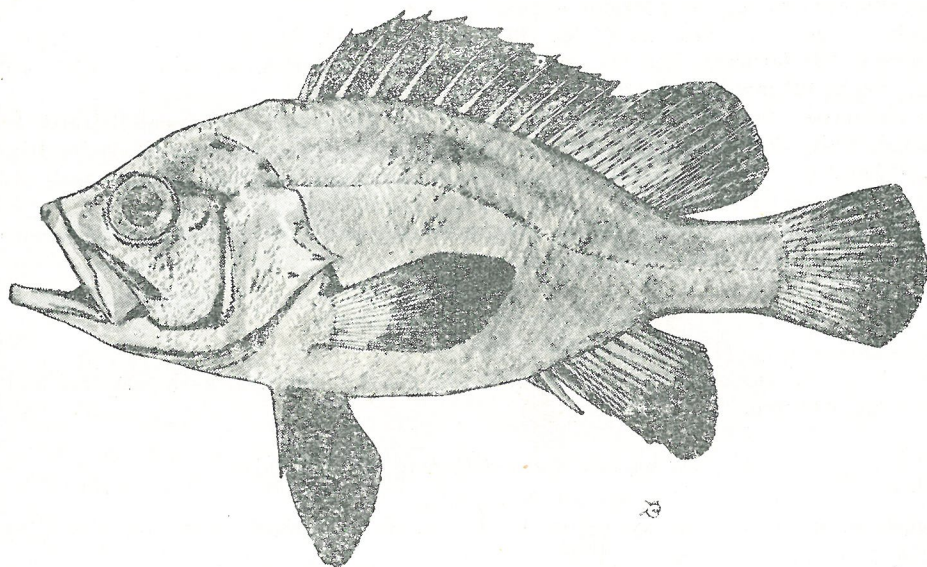


Figure 14

D. XI 14—15; A. III 9; P. 17; V. I 5; L.1. 89—94; L.r. 74—76; L.tr. 23—25/ 44—45.

Head 2.6—2.7 in length of body; depth 2.5—2.6; predorsal 2.7. Snout 4.1—4.4 in head; eye 4.4—4.5; interorbital 4.7—4.8; maxillary 1.9—2.0; length of pectoral 1.3—1.6; length of ventral 1.5—1.8; length of third dorsal spine 2.7—2.8; length of longest dorsal rays 2.1; of longest anal rays 2.0.

Body compressed, deep. Head large, almost as long as depth of body. Eye big, subequal to interorbital. Snout of the same length or little longer (in larger specimens). Nostrils close to eye, anterior one with a flap, hind one simple pit, bigger than former. Mouth protractile. Maxillary reaches opposite hind border of pupil; its length equal to postorbital part of head. Supplemental bone present. Teeth in jaws in several rows; an outer row of stout and fixed teeth in upper jaw; a somewhat larger canine-like tooth on each side of symphysis of premaxilla; behind them a group of depressible slender teeth, the hinder ones longer; narrow band of minute teeth on each side of maxillary. Two rows of teeth on sides of mandible; the outer one smaller and fixed, the inner one longer and depressible. Two small canines in front of jaw. Teeth on vomer and palatines. Preoperculum feebly serrated. Three opercular spines, the middle one nearer to lower than to upper. Opercular flap pointed. Front of dorsal above base of pectorals. Its spines increase in length to the third, which is the longest. First anal spine half the length

of second, the third one the longest. Pectorals long, reaching anal fin in young specimen; in grown specimen only to vent. Ventrals shorter. Caudal rounded. Scales cycloid on head, ctenoid on trunk and tail. Maxillary scaleless. Lateral line curved. Gill-rakers 14 on lower part of anterior arch, 3 on upper part. Their length less than gill filaments.

Colour (fresh): Uniformly deep brown. Fins darker with a narrow white edge. A black oblique streak above the lower part of maxillary.

Lives on sea-bottom, in depth greater than 50 fathoms, Caught occasionally by trawlers working at considerable depth.

Holotype: The Sea Fisheries Research Station. M 411. Caught by trawl, Cæsarea, 120 fathoms, May 17, 1953. Total length 400 mm., standard length 320 mm.; depth 127 mm.; head 125 mm.

Paratype: Sent to Mr. H.W. Fowler of the Academy of Natural Sciences of Philadelphia. Collected by Dr. H. Mendelsohn of the Pedagogical Institute for Biology, Tel-Aviv. Caught in Mediterranean (no further details). Total length 157 mm.; standard length 132 mm.; depth 50 mm.; head 48 mm.

This species is distinguished by deep body, big head, big eyes and 23—25 scales in transversal line above the lateral line.

Epinephelus guaza (Linné)

Epinephelus guaza (L.). Fowler (1), p. 36.

Occurs mostly among rocks near shores. Caught by hooks. Length 160—240 mm. Reaching 600 mm.

Epinephelus aeneus Geoffroy St. — Hilaire ^{♂ ♀}

Epinephelus aeneus Doderl. Steinitz W., p. 333.

Commercially important fish, caught by trawlers. Length 90—225 mm. Reaching about 1000 mm.

Epinephelus alexandrinus Valenciennes

Epinephelus alexandrinus Val. Fowler, p. 36.

Smaller than the former species and much less estimated as a food fish. Length 220—240 mm.

Paracentropristis hepatus (Linné)

Often found among fishes caught by trawl. Small, not surpassing 100 mm. Length 45—70 mm.

Paracentropristis scriba (Linné)

Serranus scriba C. Steinitz W., p. 333.

Rare. Two specimens in the collection. Length 110—120 mm.

Paracentropristis cabrilla (Linné) [♂]

Serranus cabrilla (L.). Hornell, p. 83.

Common. Length 105—128 mm.

Dicentrarchus punctatus (Bloch)

Morone punctata Bloch. Gruvel, p. 99.

Length 44—105 mm.

LOBOTIDAE

Lobotes surinamensis (Bloch)

Rare. Length 79—285 mm.

POMADASYIDAE

Pomadasyus incisus (Bowdich)

Dacymba bennetti (Lowe). Hornell, p. 83.

Inshore fish. Length 90—170 mm.

SPARIDAE

Pagellus erythrinus (Linné)

Pagellus erythrinus L. Gruvel, p. 92.

One of the most important fishes in trawl fishery. Especially common on rocky grounds. Spawning season in summer. Reaching 220 mm.

Pagellus mormyrus (Linné)

Sparus mormyrus. Hasselquist, p. 223.

Abundant along the shores. Reaching 200 mm.

Pagellus acarne (Risso)

Rare. Length 113—133 mm.

Diplodus sargus (Linné)

Sargus Rondeletti C. V. Steinitz W., p. 338.

Common along the shores. Length 85—118 mm.

Diplodus vulgaris (Geoffroy St.-Hilaire)

Sargus vulgaris Geoffr. Liebman, p. 323.

Diplodus annularis (Linné)

Common. Length 78—123 mm.

Diplodus trifasciatus (Rafinesque)

Sargus fasciatus C. V. Liebman, p. 323.

Rather rare. Length 140—160 mm.

Dentex dentex (Linné)

Length 170 mm.

Dentex filiosus Valenciennes

Length 110—140 mm.

Dentex macrophthalmus (Bloch)

Common only in depths more than 80 fathoms. Length 93—145 mm.

Pagrus pagrus (Linné)

Pagrus vulgaris C. V. Steinitz W., p. 337.

Length 152 mm.

Pagrus auriga Valenciennes

Length 100—250 mm.

Pagrus ehrenbergii Valenciennes ➤

Pagrus Ehrenbergi C. V. Steinitz W., p. 338.

Common inshore fish, caught by hooks, shore seine and gill-net. Length 100—245 mm. Reaching 550 mm.

Sparus aurata (Linné)

Chrysophrys aurata C. Steinitz W., p. 338.

Rare. Length 160 mm.

Puntazzo puntazzo (Cetti)

Charax puntazzo C.V. Liebman, p. 323.

Rare. Length 120—350 mm.

Sarpa salpa (Linné) ✕

Box salpa C. V. Steinitz W., p. 339.

Common shore fish, feeding on seaweeds. Length 107—272 mm.

Boops boops (Linné) ➤

Boops vulgaris C. Steinitz W., p. 339.

Caught in considerable quantities by trawl and ring net. Rarely exceeds 200 mm.

Oblada melanura (Linné)

Oblata melanura C. V. Steinitz W., p. 338.

Length 165—220 mm.

Spondyliosoma cantharus (Linné)

Rare. Length 175 mm.

MAENIDAE ➤

Merolepis maena (Linné)

Caught in considerable quantities by trawl. Length 124—132 mm.

LEIOGNATHIDAE

Leiognathus klunzingeri (Steindachner)

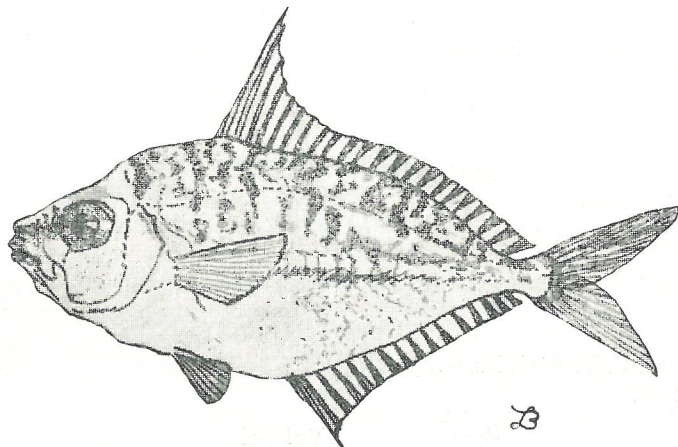


Figure 15

Equula Klunzingeri Steind. Gruvel, p. 110.

A Red Sea fish well established now in eastern Mediterranean, common in shallow water along this coast. Found as far as Turkey (reported by Erazi 1942, as *Leiognathus mediterraneus*). Its determination was confirmed by H. W. Fowler who examined a specimen from this coast. Length 32—82 mm. Reaching 110 mm.

D. VIII 15—16; A. III 15—16; P. I 14—15; V. I 5;

Head 3.6—3.7 in length of body; depth 2.4. Snout 2.8 in head; eye 2.7; interorbital 2.9—3.1; length of pectoral 1.3—1.4; of ventral 2.0—2.2.

Body compressed. Mouth very protractile. Protracted part as long as or longer than half length of head; when extended, directed downwards. Length of head equal to length of second dorsal spine. Top of head bordered on each side by a supraorbital ridge, commencing from nuchal spine and uniting posteriorly above base of pectorals. Eye, interorbital and snout subequal. Ventrals little longer. Pectorals as long as distance from tip of snout to posterior edge of eye. Dorsal long, its origin above ventrals. Its first spine minute, second the longest. Small spines along the base of dorsal. Scales medium sized. Lateral line continuous, ending before end of dorsal fin. Gill-rakers 12—14 on lower part of first arch and 3—4 more on upper part; each one bearing two rows of small protuberances.

Colour (fresh): Dorsal part of body mottled grey with rose pink patches along the sides. Black line along each side of base of dorsal. Belly silverish. Iris gold. Black border on lower edge of preorbital. Fins pale.

✕ ✕ MULLIDAE

Mullus barbatus Linné

Mullus barbatus L. Fowler, p. 36.

One of the most important fishes which forms the bulk of the trawl fishery. Its biology on this coast was studied by Wirszubski (1953). According to him the reproduction period begins at the end of April and continues to the middle of June. The females reach 240 mm., the males 170 mm.

Mullus surmuletus Linné

Mullus surmuletus C. Steinitz W., p. 337.

Less common. Seems to be slightly more abundant in shallow water along the coast than in deep water. Adult specimens easily distinguished by the short maxillary which does not reach the eye, by the three yellow bands along the body, by the dark horizontal streaks on dorsal and the transversal streaks on caudal. The females reach 280 mm., the males 230 mm. (Wirszubski 1953).

Mulloidichthys auriflamma (Forsk.)

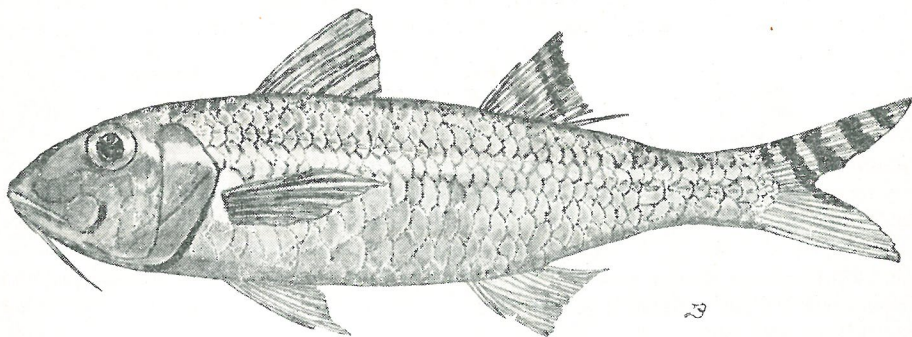


Figure 16

Mulloides auriflamma (Forsk.). Haas and Steinitz H.

Taken in great quantities by trawl fishing. Ripe females observed during July, August, September and October (Gottlieb 1953). According to Klunzinger (1884) this fish spawns in the Red Sea from June to August. Specimens of 360 mm. were caught in Eylath, Gulf of Aqaba, in October 1949. The fish is widespread through the Indo-Pacific. In the eastern Mediterranean it reaches Turkey and the Dodecanese Islands. Distinguished from other Red Mulletts by a prominent yellow stripe along the body. The systematic description is based on five specimens, 122—178 mm., from Haifa Bay.

D¹. VIII; D². I 8; A. I 6; P. 15—16; V. I 5; L. 1.36—38; L. tr. 2—3/5—6.

Head (measured to end of opercular spine) 3.3—3.5 in length of body; depth 4.0—4.3; predorsal 2.7—2.8. Snout 2.6—2.7 in head; eye equal to interorbital 3.5—3.8; barbels 1.6—1.9, ending little before hind margin of preoperculum; pectoral 1.1—1.3; ventral 1.6—1.8; height of first dorsal 1.6—2.0, equal to its base; height of second dorsal 1.8—2.1, equal to height of anal.

Eye situated in middle of head. Small flat spine on operculum. Lower jaw somewhat inferior. Small teeth in jaws in several rows. Maxillary reaching or overpassing front of eye. First spine very small, almost obsolete, second and third spines the highest. Scales ctenoid, wanting on snout and operculum. Gill-rakers 15 on lower part of first arch and 9 on upper part.

Colour (fresh): Darker above, white silverish below. A broad yellow stripe from front margin of eye to root of caudal; at front part it runs under lateral line, crossing it opposite anterior edge of second dorsal. Caudal and dorsals with oblique dark streaks.

Its maximal length in Mediterranean about 200 mm. In Indo-Pacific reaching 400 mm. (Smith 1950).

The fish seems to undergo some changes after settling in the Mediterranean; the body relations are different as compared with the description of Indo-Pacific specimens (Weber and Beaufort 1911—1940, part VI). In examined specimens the centre of the eye is in middle of the length of the head (and no nearer to the hind margin of the operculum), the maxillary little overpasses the front eye (according to the literature it does not reach the eye), pectoral much longer than ventral, barbels do not reach angle of preoperculum, preoperculum scaleless. The diameter of the eye is equal to the interorbital as described by Barnard (1925) but in disagreement with Weber and Beaufort's description which states: "interorbital space much broader than eye". (Vol. VI, p. 378).

Upeneus sp.

Often met with in shallow water along coast. No commercial importance. Mr. H.W. Fowler who examined a specimen from our coast, informed me that the fish is a new species.

SCIAENIDAE

AX

Johnius hololepidotus (Lacépède)

Sciaena aquila Risso. Steinitz W., p. 340.

Commercially important fish caught by different kinds of gear. Fishing season mostly during winter and spring months. Reaching 800 mm.

Johnius umbra (Linné)

Corvina nigra Bloch. Gruvel, p. 105.

Length 140—160 mm.

Sciaena cirrosa (Linné)

Umbrina cirrosa C. Steinitz W., p. 340.

Length 130—170 mm.

CEPOLIDAE

Cepola rubescens Linné

Cepola rubescens L. Gruvel, p. 96.

Caught in considerable depth. Length 120 mm. and 125 mm.

CAPROIDAE

Capros aper (Linné)

Occurs in depth greater than 60 fathoms. Length 63—66 mm.

SIGANIDAE

Siganus rivulatus (Forsk.)

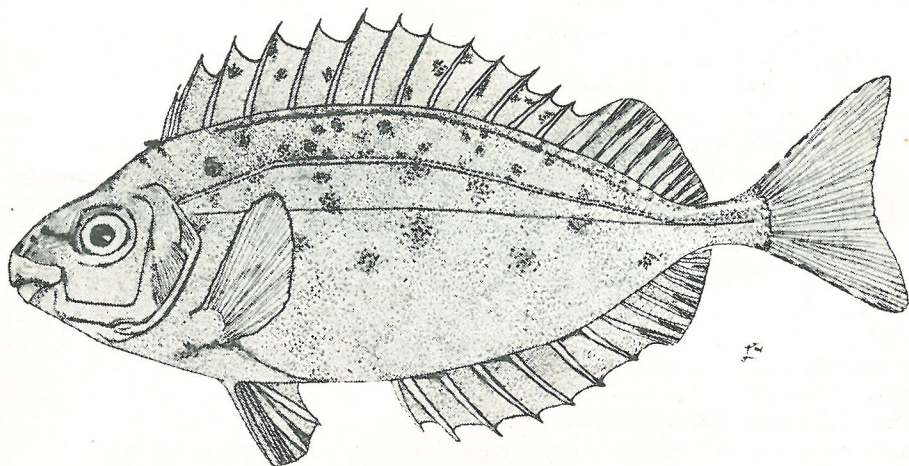


Figure 17

Teuthis sigana Gthr. Steinitz W., p. 351.

A fish of Red Sea origin, common along this coast. Has no commercial value. Reported from Cyprus (Norman 1929) and from Rhodes (Tortonese 1947).

D. I, XII—XIII 10; A. VII 9; P. 15—16; V. I 3 I.

Head 3.9—4.0 in body length; depth 2.8—3.0. Snout 2.6—2.7 in head, eye 3.3—3.5; interorbital 3.2—3.3; maxillary 3.4—3.7; length of pectoral 1.3—1.5; of ventral 1.6—1.8.

Body strongly compressed, covered by minute scales. Upper lip high, equal to the length of first spine (projecting forward). Teeth in jaws in one series, incisor-like; most of them with two uneven cuspids; the main cusp big, the second small lateral projection. Maxillary surpassing front nasal pore which is in middle of snout. Dorsal fin begins a little behind base of pectoral. Spinous dorsal three time longer than soft one. Spines strong and sharp. Beginning of anal below the 9th spine (including recurved one). Soft anal and soft dorsal of about the same length. Ventral with two spines, their length equal to length of middle caudal rays.

Colour (fresh): Greenish-grey above with vague dots. Paler below. 9 golden undulating streaks along the sides below the lateral line. Edges of caudal, dorsal and anal as well as spines and rays greenish brown.

SCORPAENIDAE

Scorpaena scrofa Linné

Scorpaena scropha L. Steinitz W., p. 339.

Length 110—160 mm.

Scorpaena porcus Linné

Scorpaena porcus L. Steinitz W., p. 339.

Rather rare. Length 93—140 mm.

Scorpaena ustulata Lowe

Found in depth of 120 fathoms. Length 88 mm.

PLATYCEPHALIDAE

Platycephalus indicus (Linné)

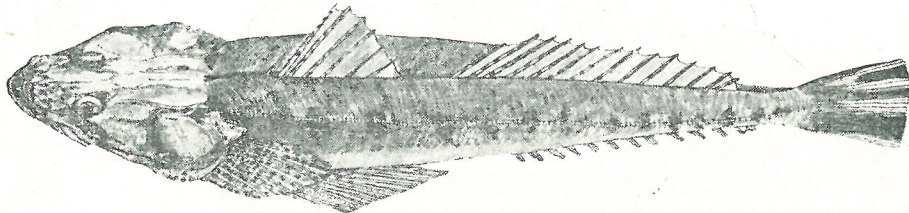


Figure 18

Platycephalus sp. Haas and Steinitz H.

An Indo-Pacific species, rarely appearing along our coast. Length 260 mm.

D. VII 14; A. 13; P. 18; V. I 5; L. 1. 120.

Head (measured from tip of upper jaw) 3.5 in length of body; depth 8.1. Snout 3.6 in head; eye 7.9; interorbital 6.0; maxillary 2.9, equal to distance between outer sides of eyes.

Head strongly depressed; its width 1.6 in its length. Two preopercular spines, the upper rather shorter than the lower. Low ridges and flat spines on head. Top of head covered by scales. Upper jaw reaching front of eye. Lower jaw prominent. Teeth on jaws, vomer and palatines. Distal part of tongue free. Lateral line distinct but unarmed. Scales small. First dorsal as long as ventrals. Pectorals shorter. Ventrals reaching front of anal.

Colour (in formalin): Brownish above, variegated with darker blotches and dots. White below. Spine and rays of dorsal, pectorals and upper side of ventrals spotted, Anal pale. Caudal with three horizontal black streaks separated by white.

PERISTEDIIDAE

Peristedion cataphractum (Linné)

Occurs at depth greater than 80 fathoms. Length 90—150 mm.

TRIGLIDAE

Lepidotrigla cavillone (Lacépède)

Rather small, not exceeding 110 mm. Lives usually in depths greater than 50 fathoms.

Trigla lyra Linné

Trigla lyra L. Gruvel, p. 98.

Often caught in depths greater than 80 fathoms. Length 80—110 mm.

Trigla lastovitza Brünnich

Often caught by trawl. Length 80—110 mm.

Trigla corax Bonaparte

Rather common. Length 160—230 mm.

CEPHALACANTHIDAE

Cephalacanthus volitans (Linné)

Dactylopterus volitans C. V. Steinitz W., p. 339.

Common. Length 40—340 mm.

CICHLIDAE

Tilapia galilaea (Artemi)

Found in estuary of Naaman. Fresh water fish.

Tilapia nilotica (Linné)

Found in estuary of Naaman. Fresh water fish.

Tilapia zillii Gervais

Found in estuary of Naaman. Fresh water fish.

LABRIDAE

Thalassoma pavo (Linné)

Julis pavo C. V. Steinitz W., p. 329.

Common shore fish. Length 28—110 mm.

Symphodus mediterraneus (Linné)

Length 80—90 mm.

Symphodus quinquemaculatus (Risso)

Crenilabrus quinquemaculatus Risso. Steinitz W., p. 328

Rather common. Length 53—76 mm.

Symphodus cinereus Bonnaterre

Crenilabrus griseus Gthr. Steinitz W., p. 329.

Length 65—72 mm.

Symphodus ocellatus (Forsk.)

Length 48 mm.

Symphodus pavo (Brünnich)

Length 63 mm.

Coris julis (Linné)

Julis julis (L.). Fowler (1), p. 36.

Length 105 mm.

Xyrichtys novacula (Linné)

Novacula novacula (L.). Fowler (1), p. 36.

Length 114—117 mm.

CALLYODONTIDAE

Sparisoma cretense (Linné)

Scarus cretensis L. Gruvel, p. 90.

Length 140—155 mm.

GOBIIDAE

Gobius jozo (Linné)

Gobius jozo L. Steinitz W., p. 345.

Often caught by trawl. Length 44—67 mm.

Gobius cruentatus Brännich

Common among rock-pools. Length 51—123 mm.

Gobius paganellus (Linné)

Length 154 mm.

Gobius quadrimaculatus Cuvier and Valenciennes

Length 44—49 mm.

Aphya pellucida (Risso)

Length 26.7—29.8.

ECHENEIDAE

Echeneis naucrates (Linné)

Echeneis naucrates. Hasselquist, p. 223.

D. II 36; A. II 35; 22 laminae in sucking disc. Length 160—430 mm.

Remora remora (Linné)

Distinguished by less (only 16) number of laminae in sucking disc and by rounded pectorals. Less common. Length 270 mm.

TRACHINIDAE

Trachinus radiatus (Cuvier)

Trachinus radiatus C. Gruvel, p. 112.

Not rare. Length 120—420 mm.

Trachinus draco (Linné)

Trachinus draco L. Steinitz W., p. 339.

Length 110—160 mm.

URANOSCOPIDAE

Uranoscopus scaber (Linné)

Uranoscopus scaber L. Fowler (1), p. 36.

Rather common. Length 55—190 mm.

BLENNIIDAE

Tripterygion tripteronotus (Risso)

Tripterygion tripteronotus (Risso). Steinitz H., (1) p. 133.
One specimen in the collection of Dr. Dor. Length 25 mm.

Blennius pavo (Risso)

Blennius pavo Risso. Steinitz H., (1), p. 60.
Common in rock-pools. Length 25—90 mm.

Blennius sphinx (Cuvier and Valenciennes)

Blennius sphinx C. V. Steinitz H., p. 146.
Length 36—44 mm.

Blennius galerita (Linné)

Blennius galerita L. Steinitz W., p. 346.
Length 31 mm.

Blennius gattorugine Brünnich

Blennius gattorugine Brünn. Steinitz H., p. 194.
Length 112—125 mm.

Blennius ocellaris Linné

Blennius ocellaris (L.). Steinitz H., p. 140.
Caught in depths greater than 30 fathoms. Length 110—130 mm.

Blennius canevas (Vinciguerra)

Length 46 mm.

Blennius zvonimiri Kolombatovic

Length 46 mm.

Blennius sanguinolentus Pallas

Blennius palaestinensis Steinitz W., p. 347.
Length 100 mm.

Blennius trigloides Valenciennes

Blennius trigloides C. V. Steinitz H., p. 178.
This species, determined from this coast by Steinitz H., is not represented in the collection of the Sea Fisheries Research Station.

Blennius crinitus Cuvier and Valenciennes

Blennius crinitus C. V. Steinitz W., p. 346.
Determined from this coast also by Steinitz H. Not represented in the collection of the Sea Fisheries Research Station.

Clinus argentatus (Risso)

Clinus argentatus (Risso). Steinitz H., p. 136.
Collection of Pedagogical Institute for Biology. Length 25—61 mm.

CALLIONYMIDAE

Callionymus maculatus Rafinesque

Found in considerable depth. Length 46—69 mm.

Callionymus phaëton Günther

Found in considerable depths. Length 90—124 mm.

Callionymus belenus Risso

Callionymus belenus Risso. Steinitz W., p. 346.

Length 37—41 mm.

Callionymus sp.

Callionymus cf. *brunneus* Fowler. Ben-Tuvia (1953^b).

According to Mr. H. W. Fowler who examined two specimens from this coast, it is a new species. It resembles some of the Indo-Pacific species and it is quite probable that the fish is of Red Sea origin. It is common along the shores and appears often among the fishes caught by trawlers. Length 50—125 mm.

OPHIDIIDAE

Ophidion barbatum Linné

Length 90—160 mm.

GOBIESCICIDAE

Lepadogaster lepadogaster (Bonnaterre)

Length 18 mm.

BALISTIDAE

Balistes carolinensis Gmelin

Caught occasionally by trawl. Length 80—250 mm.

MONACANTHIDAE

Stephanolepis ocheticus Fraser and Brunner

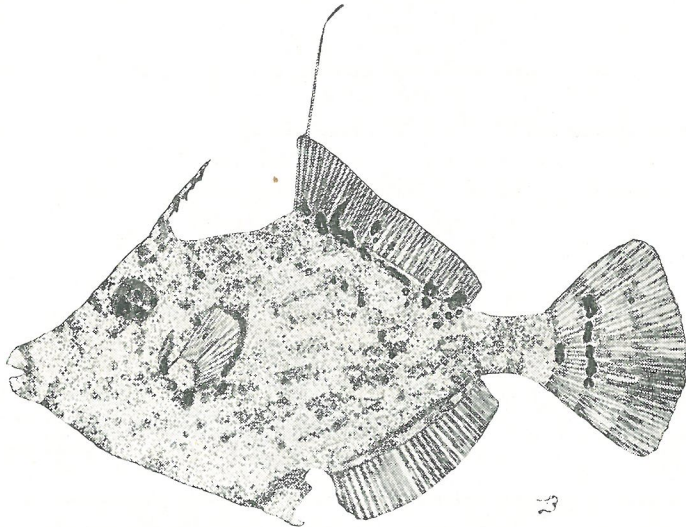


Figure 19

Monacanthus setifer (not Benn.) Steinitz W., p. 319.

Common fish in shallow water. Its distribution in eastern Mediterranean as far as Rhodes (Tortonese 1947). It seems to be of Red Sea origin. Length 62—135 mm.

D. I 29—31; A. 29—30; P. 13.

Head 3.2—3.5 in length of body; depth 2.1—2.2; base of dorsal 2.7; of anal 2.9—3.0. Snout 1.3—1.4 in head; eye 3.7—3.8; interorbital 3.3; length of pectoral 2.2—2.4; length of dorsal spine 1.5—1.6.

Body strongly compressed, covered by minute denticles and protuberances. Upper profile of snout concave. Branchial opening on the same line as hind edge of eye and dorsal spine. Length of the last equal to snout without lip. Eye smaller than interorbital. Dorsal as long as distance from snout tip to dorsal spine. In a number of specimens the second dorsal ray is produced into a long filament equal to length of dorsal base.

Colour (in formalin): Brownish with numerous irregular streaks and dots arranged in longitudinal lines.

TETRODONTIDAE

Tetrodon spadiceus Richardson

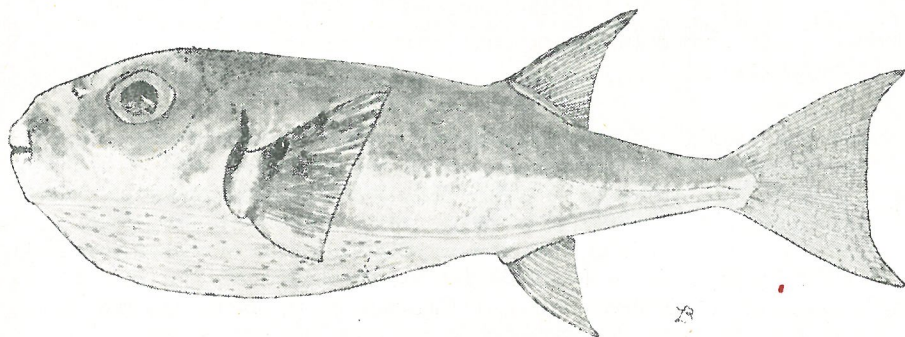


Figure 20

Tetrodon lunaris Kosswig, p. 206:

Rare along Palestinian coast. Kosswig (1950) reported it as common in the Iskenderun. This was confirmed also by my observations, as I had occasion to recognize many specimens caught by trawlers near Iskenderun and Mersin. Sanzo (1931) reported this species for the first time from the Mediterranean from the Dodecanese Islands. Ananiades (1952) communicated its appearance near Samos Island. Distribution: Indo-Pacific, Australia, eastern Mediterranean. Described from two specimens; 240 mm. and 154 mm.

D. 13; A. 12; P. 17—18.

Head 3.4—3.5 in length of body; depth 3.7—3.8; predorsal 1.5—1.6; width 6.0—6.1. Snout 1.8—2.0 in head; eye 3.5—3.8; interorbital 2.2—2.5; distance between front nostrils 3.8—4.5; length of pectoral 1.6—1.7; length of dorsal base 2.8—3.3; length of anal base 3.0—3.4; height of dorsal 1.7; height of anal 1.7—1.8; length of branchial opening 2.8—3.0.

Body elongated, compressed, tapering evenly towards caudal. Length of head less than its distance to base of dorsal, little more than depth of body. Anterior and posterior nostrils close together; the posterior one midway to snout tip and hind

eye border. Distance between nostrils of each side subequal to mouth cleft. Inter-orbital little shorter than snout. Length of pectoral and heights of dorsal and anal almost equal. Lengths of dorsal base and branchial opening about the same. Origin of dorsal anterior to anal. Small spines on nape, interorbital and on belly.

Colour (in formalin): Brown above, whitish below. Fins yellowish.

MOLIDAE

Ranzania truncata (Retzius)

Total length 280 mm.

Mola mola (Linné)

Cohen (1939) reported its capture in Haifa Bay. He gave its length as 2520 mm., depth 1910 mm., weight 900 kg.

LOPHIIDAE

Lophius piscatorius Linné

Caught in depths of more than 80 fathoms. Length 220—310 mm.

Lophius budegassa Spinola

Caught in depths of more than 80 fathoms. Length 180 mm.

REFERENCES

- Ananiades, C. 1952. On the Appearance of the Fish *Tetrodon spadiceus* (Rich.)
Prac. Ellen. Idrob. Inst., vol. 6. p. 75.
- Barnard, K. H. 1925. A Monograph of the Marine Fishes of South Africa, Ann.
South African Mus., vol. 21, p. 1—1065.
- Ben Tuvia, A. and H. Steinitz. 1952. Report on a Collection of Fishes from Eylath,
(Gulf of Aqaba) Red Sea. Sea Fish. Res. Stat. Bull. No. 2, p. 1—12.
- Ben-Tuvia, A., 1953^a. Fishes Caught off Caesarea, on the Mediterranean Coast of
Israel. Bull. Res. Council Israel, vol. 2, No. 4.
- Ben-Tuvia, A., 1953^b. ~~Fishes Caught off Caesarea, on the Mediterranean Coast of~~
~~Israel. vol. 172, p. 464. Nature, vol. 172, p. 464.~~ **NEW ERYTHREAN FISHES FROM**
- Bodenheimer, F. S. 1935. Animal Life in Palestine. Jerusalem, p. 451—506.
- Bodenheimer, F. S. 1937. Prodromus Faunae Palestinae. Mem. Inst. Egypt, vol. 233,
p. 271—275.
- Brunn, A.F. 1935. *Parexocoetus*, a Red Sea Flying Fish in the Mediterranean.
Nature, vol. 136, p. 553.
- Chabanaud, P. 1931. Sur divers poissons soléiformes de la région Indo-Pacifique.
Bull. Soc. Zool. France, vol. 56, p. 291—305.
- Chabanaud, P. 1933. Sur divers poissons de la mer Rouge et du Canal de Suez.
Inst. Oceanogr. Monaco, Bull. No. 627, p. 4—8.
- Chabanaud, P. 1934. Poissons recueillis dans le lac Timsah (Isthme de Suez) par
M. le Professeur A. Gruvel, en 1933. Bull. Mus. Nat. Hist., vol. 6, p. 156—160.
- Cohen, P. 1939. Appearance of *Mola mo'a* in Haifa Bay. Hatteva Vehaaretz, v. 6,
p. 50 (in Hebrew).
- Erazi, R. A. 1943. *Leiognathus mediterraneus* nov. sp. C. R. Soc. Turque Sci.
Phys. Nat. 10 (10), p. 49—53.
- Fage, L. 1918. Shore Fishes. Rep. Dan. Oceanogr. Exped. 1908—1910 Medit. vol.
2, A 3, pp 1—149.
- Fowler, H. W. (1) 1923. Fishes from Madeira, Syria, Madagascar and Victoria

- Australia. Proc. Acad. Nat. Sci. Philadelphia, vol. 75, p. 35—36.
- Fowler, H. W. (2) 1936. The Marine Fishes of West Africa. Bull. Amer. Mus. Nat. Hist., vol. 70, p. 1—1493.
- Gottlieb, E. 1953. On the Biology of *Mulloides auriflamma* (in Hebrew).
- Gruvel, A. 1931. Les Etats de Syrie. Paris, p. 72—134.
- Gruvel, A. 1936. Contribution à l'étude de la bionomie générale et de l'exploitation de la faune du canal de Suez. Mém. Inst. Egypt., vol. 29, p. 147—176.
- Günther, A. 1859—1870. Catalogue of the Fishes in the British Museum. London, vol. 1—8.
- Haas, G. and H. Steinitz, 1947. Erythrean Fishes on the Mediterranean Coast of Palestine. Nature, vol. 160, p. 28.
- Hasselquist, F. 1766. Voyages and Travels in the Levant in the Years 1749—52. London, p. 223—227.
- Hornell, J. 1935. Report on the Fisheries of Palestine. Jerusalem, p. 1—84.
- Klunzinger, C. B. 1884. Die Fische des Rothen Meeres. Stuttgart, p. 1—133.
- Kosswig, K. 1950. Erythraische Fische in Mittelmeer und an der Grenze des Agäis. Sylleg. biol. Fest. Kleinschmidt, p. 203—212.
- Liebman, E. 1934. Contributions to the Knowledge of Palestine Sea Fishes. Rapp. Proc. Verb. Réunion., vol. 8, p. 317—327.
- Lissner, H. 1949. Sardine Fishing in Israel. Sea Fish. Res. Stat. Sci. Tech. Inform. No. 2, p. 1—25.
- Mendelsohn, H. 1947. A New Locality for *Cyprinodon dispar*. Nature, vol. 160, p. 123.
- Moreau, E. 1881—91. Histoire Naturelle des Poissons de la France. Paris, vol. 1—4.
- Norman, J. R. 1926. Report on the Fishes. Zool. Results Camb. to Suez Canal. Trans. Zool. Soc. London, vol. 22, p. 375—389.
- Norman, J. R. 1929. Note on the Fishes of the Suez Canal. Proc. Zool. Soc. London, p. 615—616.
- Norman, J. R. 1934. Monograph of the Flatfishes (Heterosomata). London, vol. 1, p. 1—459.
- Smith, J. L. B. 1950. The Sea Fishes of Southern Africa.
- Soljan, T. 1948. Pisces. Fauna et Flora Adriatica. Split, vol. 1, p. 1—437.
- Steindachner, F. 1898. Über einige neue Fischarten aus dem Rothen Meere. Sitzb. Akad. Wiss. Wien. 107, p. 780—883.
- Steinitz, H. 1949—50. Contributions to the Knowledge of the Blennidae of the Eastern Mediterranean I, II, III. Rev. Fac. Sc. Univ. Istanbul, vol. 14, p. 130—150; 170—197; vol. 15, p. 60—87.
- Steinitz, H. 1952. Notes on Fishes from Cyprus. Inst. Oceanogr. Monaco, Bull. No. 1104, p. 1—12.
- Steinitz, W. 1927. Beiträge zur Kenntnis der Küstenfauna Palästinas, I. Pubbl. Staz. Zool. Napoli, vol. 8, p. 331—353.
- Steinitz, W. 1929. Die Wanderung indopazifischer Arten ins Mittelmeer seit der Quartarperiode. Int. Rev. ges. Hydrob., vol., 22.
- Tillier, J.B. 1901. Le Canal de Suez et sa faune ichthyologique. Mém. Soc. Zool. France, vol. 14, p. 279—318.
- Tortonese, E. 1947. Ricerche zoologiche nell'isola di Rodi. Boll. Pesca, Piscicult. Idrobiol., vol. 23, II, p. 143—192.
- Tortonese, E. 1948. Ricerche zoologiche nel canale di Suez, II. Arch. Zool. Ital., vol. 33, p. 275—292.
- Tortonese, E. 1951. I caratteri biologici del Mediterraneo Orientale e i problemi relativi. Attualita Zool. Arch. Zool. Ital., vol. 7, p. 207—251.

- Weber, M. and L.F. de Beaufort. 1911—1940. The Fishes of the Indo-Australian Archipelago. Vcl. 1—8. Leiden.
- Wirszubski, A. 1953. On the Biology and Biotope of the Red Mullet *Mullus barbatus* L. Sea Fish. Res. Stat. Bull. No. 7, p. 1—20.

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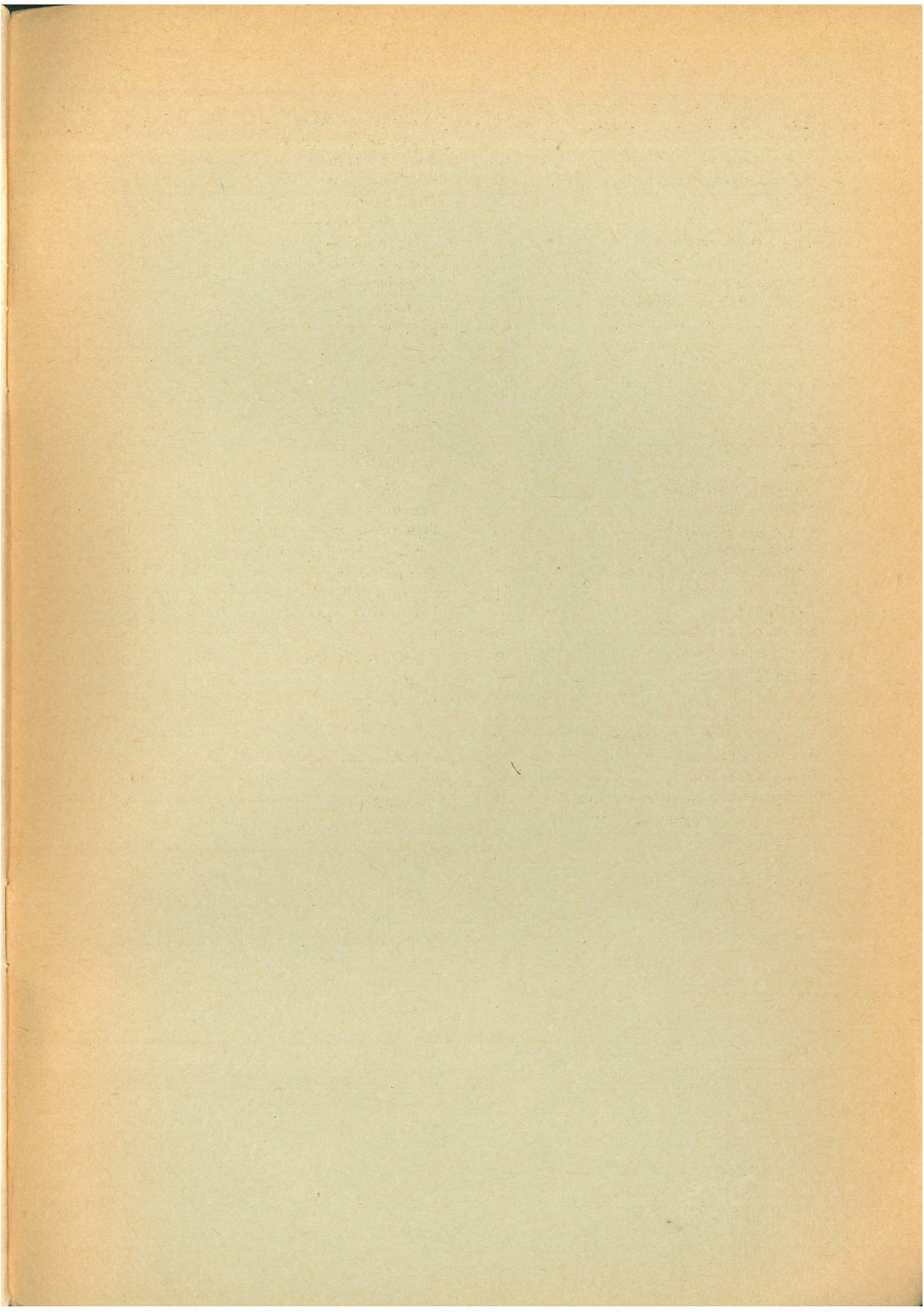
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