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CATALOGUE OF RECENT FISHES IN THE MUSEO DI STORIA NATURALE E DEL TERRITORIO, UNIVERSITÀ DI PISA. I. HYPEROTRETI, HYPEROARTIA, CHONDRICHTHYES

Abstract - The specimens of Recent agnathans (Hyperotreti, Hyperoartia) and cartilaginous fishes (Chondrichthyes) deposited in the zoological collections of the Museo di Storia Naturale e del Territorio of the Università di Pisa are listed. These include approximately 269 specimens in 154 lots, representing at least 77 taxa. Miscellaneous taxonomic and biogeographic problems encountered during the course of preparing this listing are also discussed.

Key words - Hyperotreti, Hyperoartia, Chondrichthyes, catalogue, collections.

Riassunto - *Catalogo dei pesci attuali conservati nel Museo di Storia Naturale e del Territorio dell'Università di Pisa. I. Hyperotreti, Hyperoartia e Chondrichthyes.* Sono elencati gli esemplari di agnati (Hyperotreti, Hyperoartia) e pesci cartilaginei (Chondrichthyes) viventi conservati nelle collezioni zoologiche del Museo di Storia Naturale e del Territorio dell'Università di Pisa. L'elenco comprende circa 269 reperti distribuiti in 154 lotti, e rappresentanti non meno di 77 taxa. Vengono inoltre discusse alcune problematiche di carattere tassonomico e biogeografico emerse durante la realizzazione del catalogo.

Parole chiave - Hyperotreti, Hyperoartia, Chondrichthyes, catalogo, collezioni.

INTRODUCTION

This report begins a sequentially numbered series of catalogues of fish specimens in the collections of the Museo di Storia Naturale e del Territorio (MSNTC), Università di Pisa. Preparation of catalogues of specimens deposited in the MSNTC is fundamental to define the exact size and the scientific value of the natural history collection heritage of the Università di Pisa. Moreover, the detailed survey of the specimens in the MSNTC collections will provide updated information about their current status, in order to correctly estimate the possible damages and/or losses undergoing during the transfer of the Museum to the present location in the Certosa di Calci in the early years of the 1980s.

The collection of Recent fishes of the MSNTC is one of the most ancient of this kind in Italy (see Mancusi *et al.*, 2002); it was mostly developed by Professor Sebastiano Richiardi, a former director of the Museum (see Tortonese, 1973). A catalogue of this collection has never been prepared, except for incomplete lists of agnathans and shark specimens that were published by Professor Celso

Borri, respectively in 1928 and 1934. Even though it consists of a relatively large number of specimens, such a collection has been poorly considered in a survey of Italian ichthyological collections (Tortonese, 1973), and completely neglected in a recently published overview of the Museum collections of the Università di Pisa (Battaglini *et al.*, 2002). Herein, we treat the agnathans (Hyperotreti, Hyperoartia) and cartilaginous fishes (Chondrichthyes) present in the MSNTC collection.

Format

The catalogue includes all known agnathans and cartilaginous fishes deposited in the collections of the MSNTC through 2007. These include approximately 289 specimens in 132 lots. The material consists of liquid-preserved and taxidermied specimens. The supra-generic taxa are presented in phylogenetic order following de Carvalho (1996), McEachran *et al.* (1996) and Nelson (1994), while the genera and species within each family are listed in alphabetical order. For each taxon we include collection number, number of specimens (in parentheses) and, when available, collection data and sex (in parentheses).

ANNOTATED LIST OF SPECIMENS

Subphylum HYPEROTRETI
Order MYXINIFORMES
Family MYXINIDAE

Myxine glutinosa Linnaeus, 1758

Pe 0001, (1), liquid-preserved; Golfo di Napoli, Italy. Remarks: The single specimen of hagfish present in the MSNTC (Fig. 1) measures 285 mm. In his 1928s version of the Catalogue, Borri pointed out the biogeographic relevance of this individual. This species is usually considered as not present in the Mediterranean Sea, even though there are at least two confirmed records in the southern sector of the basin, respectively from the Algerian and Moroccan coasts (see Bigelow & Schroeder, 1958; Tortonese, 1956). Tortonese (1956) suggested that the specimen in question was mislabelled, and that its geographic origin is certainly different. However, he did not provide any evidence to support such a hypothesis, which was certainly influenced by the considerations of Bigelow & Schroeder (1948),

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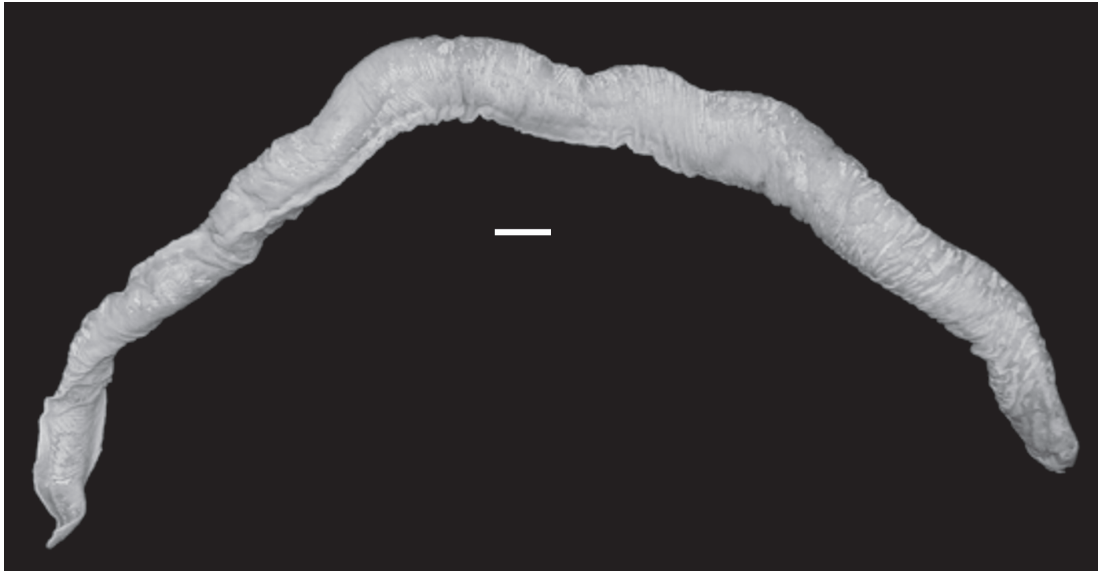


Fig. 1 - *Myxine glutinosa* Linnaeus, 1758. MSNTC Pe 0001. Right lateral view. Scale bar 10 mm.

who concluded that *Myxine glutinosa* is not a member of the ichthyofauna of the inner portion of the Mediterranean, thereby implying that the specimens from the Adriatic Sea cited by Garman (1899), and subsequently reported by other authors (*e.g.*, Tortonese, 1935), have a different provenance, and that they were mislabelled in the Museum of Comparative Zoology, Harvard University. Since the biogeographic considerations of Bigelow & Schroeder (1948) and Tortonese (1956) are not supported by reliable data but, rather, by mere hypotheses, it is our opinion that the presence of the hagfish *Myxine glutinosa* in the Mediterranean must be considered as valid. This species possibly does not represent a regular member of the Mediterranean fauna, but it occasionally may occur in many sectors of the basin.

Subclass HYPEROARTIA
Order PETROMYZONTIFORMES
Family PETROMYZONTIDAE

Caspiomyzon wagneri (Kessler, 1870)
Pe 0002, (1), liquid-preserved; Volga River, Russia.

Lampetra fluviatilis (Linnaeus, 1758)
Pe 0003, (2 ♂), liquid-preserved; Fiume Arno, Italy; II.1908. **Pe 0004**, (5 ♂), liquid-preserved; Fiume Arno, Italy; II.1908. **Pe 0005**, (8), liquid-preserved; Fiume Arno, Italy; 19.IV.1915. **Pe 0006**, (4 ♂), liquid-preserved; Fiume Arno, Italy; 11.IV.1909. **Pe 0007**, (5), liquid-preserved; Fiume Arno, Italy; 26.II.1929. **Pe 0008**, (2 ♂), liquid-preserved; Fiume Arno, Italy. **Pe 0009**, (11), liquid-preserved. **Pe 0010**, (9), liquid-preserved. **Pe 0011**, (11), liquid-preserved. **Pe 0012**, (9), liquid-preserved. **Pe 0013**, (1), liquid-preserved. **Pe**

0014, (3), liquid-preserved. **Pe 0015**, (11), liquid-preserved. **Pe 0016**, (1), liquid-preserved. **Pe 0017**, (12), liquid-preserved. **Pe 0018**, (1), liquid-preserved.

Lampetra cf. planeri (Bloch, 1784)
Pe 0019, (1), liquid-preserved.

Petromyzon marinus (Linnaeus, 1758)
Pe 0020, (1), liquid-preserved; Fiume Arno, Italy. **Pe 0021**, (1 ♂), liquid-preserved; Fiume Arno, near San Michele degli Scalzi, Pisa, Italy; 21.V.1915. **Pe 0022**, (1), liquid-preserved; Gloucester, United Kingdom. **Pe 0023**, (1), liquid-preserved. **Pe 0024**, (1), liquid-preserved. **Pe 0025**, (1), liquid-preserved. **Pe 0026**, (1), liquid-preserved. **Pe 0027**, (1), liquid-preserved. **Pe 0028**, (1), liquid-preserved. **Pe 0029**, (1), liquid-preserved. **Pe 0030**, (2), liquid-preserved. **Pe 0031**, (2), liquid-preserved. **Pe 0032**, (2), liquid-preserved.

Ammocoetes larvae
Pe 0033, (12), liquid-preserved; Chivasso, Italy. **Pe 0034**, (5), liquid-preserved; Chivasso, Italy. **Pe 0035**, (6), liquid-preserved; 16.VI.1908. **Pe 0036**, (3), liquid-preserved.

Class CHONDRICHTHYES
Subclass Elasmobranchii
Division GALEOMORPHII
Superorder HETERODONTOIDEA
Order HETERODONTIFORMES
Family HETERODONTIDAE

Heterodontus japonicus (Macclay & Macleay, 1884)
Pe 0037, (1 ♂), liquid-preserved; Japan.

Superorder GALEOIDEA
Order ORECTOLOBIFORMES
Family HEMISCYLLIIDAE

Chiloscyllium indicum (Gmelin, 1789)
Pe 0038, (1 ♂), liquid-preserved; Borneo. **Pe 0039**, (1 ♂), liquid-preserved; Indian Ocean.

Chiloscyllium punctatum Müller & Henle, 1838
Pe 0040, (1 ♂), liquid-preserved; Java.

Family ORECTOLOBIDAE

Orectolobus maculatus (Bonnaterre, 1788)
Pe 0041, (1 ♂), liquid-preserved; Australia.

Family STEGOSTOMATIDAE

Stegostoma fasciatum (Hermann, 1783)
Pe 0042, (1 ♂), liquid-preserved; India.

Order LAMNIFORMES
Family ALOPIIDAE

Alopias superciliosus (Lowe, 1839)
Pe 0043, (1 ♂), taxidermied; Livorno, Italy.

Alopias cf. vulpinus (Bonnaterre, 1788)
Pe 0044, (1 ♂), liquid-preserved; Livorno, Italy.

Family CETORHINIDAE

Cetorhinus maximus (Gunnerus, 1765)
Pe 0045, (1 ♂), taxidermied; Forte di Bibbona, Cecina, Italy; 4.XII.1928.

Family LAMNIDAE

Isurus oxyrinchus Rafinesque, 1810
Pe 0046, (1 ♂), liquid-preserved; Livorno, Italy.

Lamna nasus (Bonnaterre, 1788)
Pe 0047, (1 ♂), taxidermied; Nice, France.

Order CARCHARHINIFORMES
Family SCYLIIORHINIDAE

Atelomycterus marmoratus (Bennet, 1830)
Pe 0048, (1 ♂), liquid-preserved; Borneo.

Galeus cf. melastomus Rafinesque, 1810
Pe 0049, (2 ♂; 1 ♂; 1 undetermined sex), liquid-preserved; Genova, Italy.

Halaelurus buergeri (Müller & Henle, 1838)
Pe 0050, (1 ♂), liquid-preserved; Tokyo, Japan.

Scyliorhinus canicula (Linnaeus, 1758)
Pe 0051, (1 ♂), liquid-preserved; Levanto, Italy. **Pe 0052**, (2 ♂), liquid-preserved; Livorno, Italy. **Pe 0053**, (1 ♂), liquid-preserved; Mediterranean Sea.

Scyliorhinus stellaris (Linnaeus, 1758)
Pe 0054, (1 ♂), liquid-preserved. **Pe 0055**, (1 ♂), taxidermied; Mediterranean Sea.

Family TRIAKIDAE

Mustelus asterias Cloquet, 1821
Pe 0056, (1 ♂), liquid-preserved; Livorno, Italy.

Mustelus manazo Bleeker, 1854
Pe 0057, (1 ♂; 1 ♂), liquid-preserved; Tokyo, Japan.

Mustelus mustelus (Linnaeus, 1758)
Pe 0058, (2 ♂), liquid-preserved; Livorno, Italy.

Family CARCHARHINIDAE

Carcharhinus brachyurus (Günther, 1870)
Pe 0059, (1 ♂), liquid-preserved; Tokyo, Japan. **Pe 0060**, (1 ♂), liquid preserved; Tokyo, Japan.

Carcharhinus cf. brevipinna (Müller & Henle, 1839)
Pe 0061, (1 ♂), liquid-preserved; Tokyo, Japan.

Carcharhinus longimanus (Poey, 1861)
Pe 0062, (1 ♂), liquid-preserved.

Carcharhinus melanopterus (Quoy & Gaimard, 1824)
Pe 0063, (1 ♂), liquid-preserved.

Carcharhinus plumbeus (Nardo, 1827)
Pe 0064, (1 ♂), liquid-preserved; Livorno, Italy. **Pe 0065**, (1 ♂), liquid-preserved. **Pe 0066**, (1 ♂), taxidermied; Mediterranean Sea.

Remarks: The specimen MSNTC Pe 0066 measures 1820 mm. It is poorly preserved, taxidermied and completely painted. Tortonese (1950b) tentatively assigned it to *C. obscurus*, but the morphological analysis of the upper dentition justifies its assignment to the sandbar shark *C. plumbeus*.

Carcharhinus sorrah (Valenciennes, 1839)
Pe 0067, (1 ♂), liquid-preserved; Borneo.

Prionace glauca (Linnaeus, 1758)
Pe 0068, (1 ♂; 1 ♂), liquid-preserved; Palermo, Italy. **Pe 0069**, (1 ♂), liquid-preserved; Livorno, Italy. **Pe 0070**, (1 ♂), taxidermied; Livorno, Italy.

Rhizoprionodon acutus (Rüppell, 1837)
Pe 0071, (1 ♂), liquid-preserved; Indian Ocean.

Family SPHYRNIDAE

Sphyrna tiburo (Linnaeus, 1758)

Pe 0072, (1 ♂), liquid-preserved; Bahia, Brazil.

Sphyrna tudes (Valenciennes, 1822)

Pe 0073, (1 ♂), liquid-preserved; Livorno, Italy.

Remarks: The juvenile small eye hammerhead shark specimen housed in the MSNTC (Fig. 2) measures 50 mm. Tortonese (1950a, 1951) first assigned this specimen to *S. tudes*, confirming the presence of this western Atlantic hammerhead shark also in the Mediterranean Sea. MSNTC Pe 0073 represents the second known Mediterranean record of *S. tudes* (McEachran & Séret, 1987).

Sphyrna zygaena (Linnaeus, 1758)

Pe 0074, (1 ♂), taxidermied; Livorno, Italy. **Pe 0075**, (1 ♂), taxidermied; Palermo, Italy.

Division SQUALEA

Superorder NOTIDANOIDEA

Order HEXANCHIFORMES

Family HEXANCHIDAE

Heptranchias perlo (Bonnaterre, 1788)

Pe 0076, (1 ♂), liquid-preserved; Livorno, Italy. **Pe 0077**, (1 ♂), taxidermied; Palermo, Italy.

Hexanchus griseus (Bonnaterre, 1788)

Pe 0078, (1 ♂), liquid-preserved; Cape of Good Hope, South Africa. **Pe 0079**, (1 ♂), taxidermied; Mediterranean Sea. **Pe 0080**, (1 ♂), taxidermied; Palermo, Italy.

Superorder ECHINORHINOIDEA

Order ECHINORHINIFORMES

Family ECHINORHINIDAE

Echinorhinus brucus (Bonnaterre, 1788)

Pe 0081, (1 ♂), taxidermied; Palermo, Italy.

Superorder SQUALOIDEA

Order SQUALIFORMES

Family DALATIIDAE

Dalatias licha (Bonnaterre, 1788)

Pe 0082, (1 ♂), liquid-preserved; Viareggio, Italy; 28.II.1937. **Pe 0083**, (1 ♂), liquid-preserved; Nice, France. **Pe 0084**, (1 ♂ foetus), liquid-preserved. **Pe 0085**, (1 ♂), taxidermied; Viareggio, Italy; 30.I.1922.

Etmopterus spinax (Linnaeus, 1758)

Pe 0086, (3 ♂), liquid-preserved; Genova, Italy.

Oxynotus centrina (Linnaeus, 1758)

Pe 0087, (1 ♂), liquid-preserved; Porto Santo Stefano, Italy; VII.1937. **Pe 0088**, (1 ♂), liquid-preserved; Nice, France. **Pe 0089**, (2 ♂ foetus), liquid-preserved. **Pe 0090**, (1 ♂), taxidermied; Mediterranean Sea. **Pe 0091**, (1 ♂), taxidermied; Mediterranean Sea.

Somniosus rostratus (Risso, 1826)

Pe 0092, (1 ♂), liquid-preserved; Nice, France. **Pe 0093**, (1 ♂), taxidermied; Nice, France.

Family CENTROPHORIDAE

Centrophorus granulosus (Bloch & Schneider, 1801)

Pe 0094, (1 ♂), liquid-preserved. **Pe 0095**, (1 ♂, foetus), liquid-preserved. **Pe 0096**, (1 ♂), liquid-preserved. **Pe 0097**, (1 ♂), taxidermied; Palermo, Italy. **Pe 0098**, (1 ♂), taxidermied; Nice, France.

Family SQUALIDAE

Squalus acanthias Smith & Radcliffe, 1912

Pe 0099, (1 ♂), liquid-preserved; Livorno, Italy. **Pe 0100**, (1 ♂; 1 ♂), liquid-preserved; Livorno, Italy. **Pe 0101**, (3 ♂, foetus), liquid-preserved. **Pe 0102**, (2 ♂, foetus), liquid-preserved. **Pe 0103**, (1 ♂, foetus), liquid-preserved.

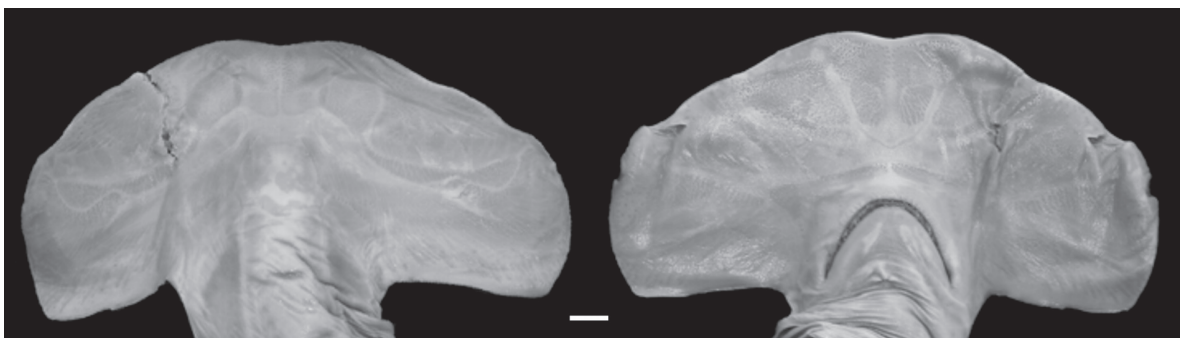


Fig. 2 - *Sphyrna tudes* (Valenciennes, 1822). MSNTC Pe 0072. Dorsal (left) and ventral (right) views of the head. Scale bar 10 mm.

Squalus cf. megalops (MacLeay, 1881)

Pe 0104, (1 ♂), liquid preserved. Livorno, Italy.

Remarks: The specimen measures 620 mm. Borri (1934) assigned it to *S. blainvillei*, but several features justify its assignment to the shortnose spurdog *S. megalops* (Garrick, 1960; Compagno, 1984; Muñoz-Chápuli & Ramos, 1989), including: a diagonal distance from the centre of the snout tip to the inner edge of nostril about equal to the distance from nostril to upper labial furrow, an inner margin of the pectoral fin about 8.38% of total length, and presence of dagger-shaped dermal denticles. Nevertheless, MSNTC Pe 0104 (Fig. 3) shares with *S. blainvillei* a pectoral fin with a rounded free rear tip and a posterior margin not strongly concave. The presence of *S. megalops* in the MSNTC ichthyological collection provides new evidence of the occurrence of this bathyal shark in the Mediterranean Basin (Muñoz-Chápuli & Ramos, 1989), extending its geographical range to the northern Tyrrhenian Sea.

Superorder HYPNOSQUALEA

Order SQUATINIFORMES

Family SQUATINIDAE

Squatina aculeata Dumeril, 1829

Pe 0105, (2 ♂, foetus), liquid-preserved.

Squatina squatina (Linnaeus, 1758)

Pe 0106, (1 ♂), liquid-preserved; Livorno, Italy. **Pe 0107**, (2 ♂), liquid-preserved; Livorno, Italy. **Pe 0108**, (1 ♂), taxidermied; Mediterranean Sea.

Superorder BATOIDEA

Order TORPEDINIFORMES

Family TORPEDINIDAE

Torpedo marmorata Risso, 1810

Pe 0109, (1 ♂), liquid-preserved. **Pe 0110**, (1 ♂; 3 ♂), liquid-preserved.

Torpedo torpedo (Linnaeus, 1758)

Pe 0111, (1 ♂), liquid-preserved. **Pe 0112**, (2 ♂, foetus), liquid-preserved.

Torpedo sp.

Pe 0113, (1 ♂; 1 undetermined sex), liquid-preserved.

Pe 0114, (1 ♂), liquid-preserved. **Pe 0115**, (2 ♂), liquid-preserved.

Order PRISTIFORMES

Family PRISTIDAE

Pristis pectinata Latham, 1794

Pe 0116, (1 ♂), taxidermied; Mediterranean Sea.

Order RHYNCHOBATIFORMES

Family RHYNCHOBATIDAE

Rhinobatos cemiculus Geoffroy St-Hilaire, 1817

Pe 0117, (1 ♂), liquid-preserved.

Rhinobatos granulatus Cuvier, 1829

Pe 0118, (1 ♂), liquid-preserved; Borneo.

Rhinobatos rhinobatos (Linnaeus, 1758)

Pe 0119, (1 ♂), liquid-preserved. **Pe 0120**, (1 ♂), taxidermied; Mediterranean Sea.

Rhinobatos cf. thouin (Anonymous, in Lacepede, 1798)

Pe 0121, (1 ♂), liquid-preserved.

Order RAJIFORMES

Family RAJIDAE

Dipturus batis (Linnaeus, 1758)

Pe 0122, (1 ♂), liquid-preserved.

Dipturus oxyrinchus (Linnaeus, 1758)

Pe 0123, (1 ♂; 2 ♂), liquid-preserved; two specimens are from the south of Isola di Giannutri, Italy, while the other was collected near Porto Santo Stefano, Italy; VII.1937.

Remarks: All these specimens were collected at depth between 300 and 400 m.

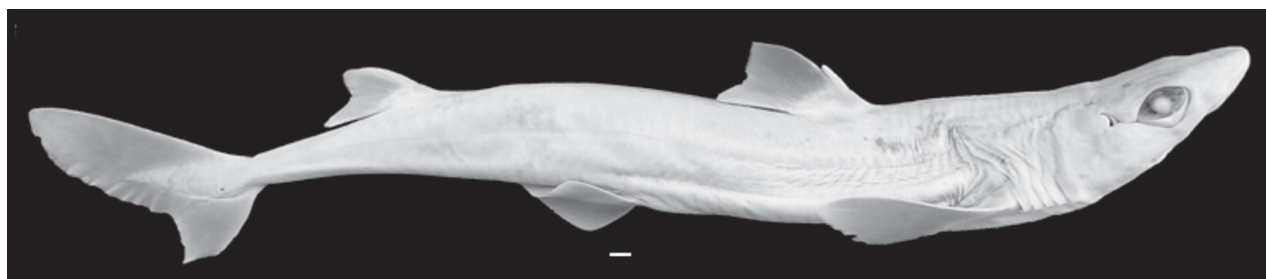


Fig. 3 - *Squalus cf. megalops* (MacLeay, 1881). MSNTC Pe 0104. Right lateral view. Scale bar 10 mm.

Leucoraja naevus (Müller & Henle, 1841)
Pe 0124, (1 ♂), liquid-preserved.

Raja asterias Delaroche, 1809
Pe 0125, (1 ♂), liquid-preserved. **Pe 0126**, (2 ♂), liquid-preserved.

Raja clavata Linnaeus, 1758
Pe 0127, (1 ♂), liquid-preserved.

Raja miraletus Linnaeus, 1758
Pe 0128, (1 ♂), liquid-preserved; this specimen was collected near Porto Santo Stefano (Italy) at depth between 300 and 400 m; VII.1937. **Pe 0129**, (1 ♂), liquid-preserved.

Raja montagui Fowler, 1910
Pe 0130, (2 ♂), liquid-preserved; this specimens was collected south of Isola di Giannutri (Italy), at depth between 300 and 400 m; VII.1937.

Raja rondeleti Bougis, 1959
Pe 0131, (1 ♂), liquid-preserved.
 Remarks: The specimen (Fig. 4) measures 210 mm. *R. rondeleti* is a rare endemic Mediterranean ray, known only for four specimens (Bougis, 1959; Vanni, 1992). Although *R. rondeleti* is considered by some authors as a doubtful taxon (see Serena, 2005), we prefer to con-

sider it as a valid taxon until a more detailed morphological study of the syntypes will be realized in order to properly clarify its correct taxonomic status. MSNTC Pe 0131 represents the fifth documented record of *R. rondeleti*.

Raja cf. undulata Lacépède, 1802
Pe 0132, (1 ♂), liquid-preserved.

Raja sp.
Pe 0133, (1 ♂), liquid-preserved.

Rostroraja alba Lacépède, 1803
Pe 0134, (1 ♂), liquid-preserved.

Order MYLIOBATIFORMES
 Family DASYATIDAE

Himantura cf. jenkinsii (Annandale, 1909)
Pe 0135, (1 ♂), liquid-preserved.

Dasyatis cf. bennetti (Müller & Henle, 1841)
Pe 0136, (1 ♂), liquid-preserved.

Dasyatis aff. leylandi Last, 1987
Pe 0137, (1 ♂), liquid-preserved.

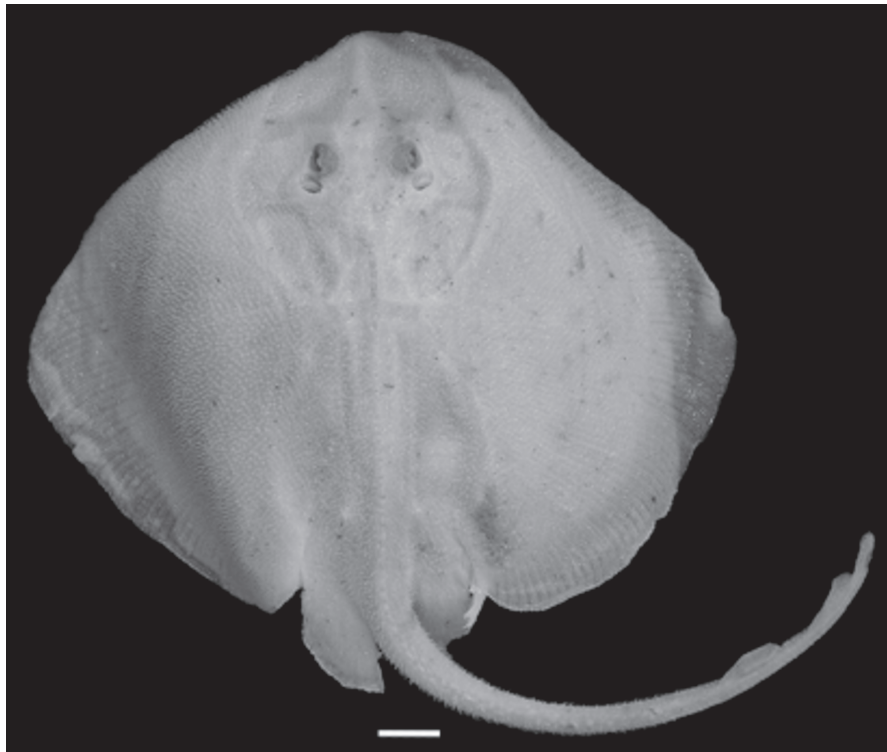


Fig. 4 - *Raja rondeleti* Bougis, 1959. MSNTC Pe 0131. Dorsal view. Scale bar 10 mm.

Dasyatis cf. zugei (Müller & Henle, 1841)

Pe 0138, (1 ♂; 1 ♀), liquid-preserved.

Dasyatis sp.

Pe 0139, (1 ♂), liquid-preserved.

Pteroplatitrygon violacea (Bonaparte, 1832)

Pe 0140, (1 ♂), liquid-preserved. **Pe 0141**, (1 ♂), taxidermied; Mediterranean Sea.

Urolophus cf. circularis McKay, 1966

Pe 0142, (1 ♂), liquid-preserved; Adelaide, Australia.

Dasyatidae indet.

Pe 0143, (2 ♂), liquid-preserved.

Family POTAMOTRYGONIDAE

Potamotrygon sp.

Pe 0144, (1 ♂), liquid-preserved.

Family MYLIOBATIDAE

Aetomylaeus sp.

Pe 0145, (1 ♂), liquid-preserved; Bombay, India.

Myliobatis cf. aquila (Linnaeus, 1758)

Pe 0146, (1 ♂), liquid-preserved. **Pe 0147**, (1 ♂), liquid-preserved.

Subclass HOLOCEPHALI
Order CHIMAERIFORMES
Family CHIMAERIDAE

Chimaera monstrosa (Linnaeus, 1758)

Pe 0148, (2 ♂), liquid-preserved; the specimens were collected near Porto Santo Stefano (Italy) at depth between 300 and 400 m; VII.1937. **Pe 0149**, (1 ♂), liquid-preserved; Livorno, Italy. **Pe 0150**, (1 ♂), liquid-preserved. **Pe 0151**, (1 ♂), liquid-preserved. **Pe 0152**, (1 ♂), liquid-preserved. **Pe 0153**, (1 ♂), liquid-preserved. **Pe 0154**, (1 ♂), taxidermied; Mediterranean Sea.

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