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**ANNOTATED CHECKLISTS OF FISHES**

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**Family Molidae Bonaparte 1832**

molans or ocean sunfishes

By

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Molas, also commonly called ocean sunfishes, are a small family of oceanic fishes with an unusual body shape. The rear of the body appears to be cut off, with the caudal fin reduced to a leathery flap or pseudocaudal (clavus). Mouth tiny; teeth united and beaklike. Fins without spiny rays. First dorsal fin opposite anal fin, far back; used for locomotion. Pelvic fins absent. Skin leathery and thick. Gill openings small, in front of pectorals. No lateral line. No swim bladder. Vertebrae 16–18. Slow-swimming, epipelagic plankton feeders; some eat jellyfishes but also feed on algae, crustaceans, and fishes. Molas are gray above, silvery gray-brown on sides, paler or dusky below. Two species grow to about 3 m (over 10 ft) in length, largest to 1,500 kg (3,300 lb). Fecundity can register an estimated 300,000,000 eggs in *Mola mola*. Young are spiny and differ markedly from adults. Found worldwide in tropical to temperate seas. The last major revision of this group was by Fraser-Brunner (1951 [ref. 19546]). A phylogenetic hypothesis based on a cladistic analysis was recently proposed by Santini and Tyler (2002 [ref. 25998]). About 19 nominal genera and 54 nominal species but only 4 valid species in 2 or 3 genera depending on author.

**Genus *Masturus* Gill 1884**

*Masturus* Gill 1884:425 [ref. 1727]. Type species *Orthogoriscus oxyuropterus* Bleeker 1873. Type by original designation (also monotypic).

*Pseudomola* Cadenat 1959:1115 [ref. 708]. Type species *Pseudomola lassarati* Cadenat 1959. Type by monotypy.

REMARKS: Sometimes recognized as a synonym of *Mola* Koelreuter 1766. One species.

***Masturus lanceolatus* (Liénard 1840)**

*Orthogoriscus lanceolatus* Liénard 1840:291 [ref. 17537] (Port Louis, Mauritius). No types known.

*Orthogoriscus oxyuropterus* Bleeker 1873:151, Pl. [ref. 17089] (Ambon I., Moluccas Is., Indonesia). Holotype (unique): RMNH.

*Pseudomola lassarati* Cadenat 1959:1115, Figs. 9–11 [ref. 708] (off Vridi, Ivory Coast). Holotype (unique): whereabouts unknown.

DISTRIBUTION: All tropical and temperate seas except the eastern Pacific.

REMARKS: Some authors (e.g., Matsuura in Masuda et al. 1984:366 [ref. 6441]) have regarded *oxyuropterus* as a distinct species or suggested that *oxyuropterus* and *lanceolatus* represent different sexes of the same species. Sometimes considered valid as *Mola lanceolata* (e.g., Robins and Ray 1986:310 [ref. 23100], Scott in Fischer et al. 1995:1276 [ref. 22829], Pequeño 1997:84 [ref. 23536], Balart et al. 2000:156 [ref. 25095], Nakabo 2000:1435 [ref. 25182]).

**Genus *Mola* Koelreuter 1766**

- Mola* Koelreuter 1766:337 [ref. 23086]. Type species *Mola aculeata* Koelreuter 1766. Type by monotypy.
- Mola* Cuvier 1798:323 [ref. 5558]. Type species *Tetraodon mola* Linnaeus 1758. Type by monotypy (also by absolute tautonymy).
- Orthroriscus* Bloch & Schneider 1801:510 [ref. 471]. Type species *Tetraodon mola* Linnaeus 1758. Type by subsequent designation.
- Cephalus* Shaw 1804:437 [ref. 4015]. Type species *Cephalus brevis* Shaw 1804. Type by monotypy.
- Orthragus* Rafinesque 1810:17 [ref. 3594]. Type species *Tetraodon mola* Linnaeus 1758. Type by subsequent designation.
- Diplanchias* Rafinesque 1810:17 [ref. 3594]. Type species *Diplanchias nasus* Rafinesque 1810. Type by monotypy.
- Trematopsis* Ranzani 1839:74, table [ref. 3605]. Type species *Trematopsis willugbei* Ranzani 1839. Type by monotypy.
- Tympanomium* Ranzani 1839:74, table [ref. 3605]. Type species *Tympanomium planci* Ranzani 1839. Type by monotypy.
- Ozodura* Ranzani 1839:75, table [ref. 3605]. Type species *Ozodura orsini* Ranzani 1839. Type by monotypy.
- Molacanthus* Swainson 1839:195, 329 [ref. 4303]. Type species *Molacanthus pallasii* Swainson 1839. Type by monotypy.
- Pallasia* Nardo 1840:112 [ref. 3149]. Type species *Orthroriscus hispidus* Bloch & Schneider 1801. Type by monotypy.
- Acanthosoma* DeKay 1842:330 [ref. 1098]. Type species *Diodon carinatus* Mitchill 18285. Type by monotypy.
- Aledon* Castelnau 1861:76 [ref. 767]. Type species *Aledon storeri* Castelnau 1861. Type by subsequent designation.

REMARKS: *Orthroriscus* Bloch & Schneider 1801 (earliest type designation not researched) was spelled *Orthroriascus* by early authors, who regarded the original as misprinted although the name was spelled *Orthroriscus* on pages lvii, 510, and 583 as well as on plate 97.

The type species of *Orthragus* Rafinesque 1810 was first designated by Bory de Saint-Vincent (1827:503 [in v. 12] [ref. 3853]; see Whitley 1935:137 [ref. 6396]); although Bory de Saint-Vincent spelled the genus as *Ostragus*, it is clear he was referring to Rafinesque's genus.

*Pallasia* Nardo 1840 also appeared as new in Nardo (1840:190 [ref. 27080]). The name was misspelled as "*Pallasina*" in Eschmeyer (1998:1271, 2054 [ref. 23416]).

The earliest type designation known for *Aledon* Castelnau 1861 is Jordan and Evermann (1898:1753 [ref. 2444]).

***Mola mola* (Linnaeus 1758)**

- Tetraodon mola* Linnaeus 1758:334 [ref. 2787] (Mediterranean Sea). No types known.
- Mola aculeata* Koelreuter 1766:337, Pl. 8 (figs. 2, 3) [ref. 23086] (no locality). No types known.
- Diodon mola* Pallas 1770:39, Pl. 4 (fig. 7) [ref. 12293] (Guinea). No types known.
- Diodon nummularis* Walbaum 1792:600 [ref. 4572] (no locality). No types known.
- Mola rotunda* Cuvier 1798:324 [ref. 5558] (France). No types known.
- Orthroriscus fasciatus* Bloch & Schneider 1801:511 [ref. 471] ("mari septentrionali" [in the northern ocean]). No types known.
- Orthroriscus hispidus* Bloch & Schneider 1801:511 [ref. 471] (no locality). No types known.
- Cephalus brevis* Shaw 1804:437, Pl. 175, top [ref. 4015] (European seas). No types known.
- Cephalus pallasianus* Shaw 1804:440 [ref. 4015] (tropical seas). No types known.

- Orthragus luna* Rafinesque 1810:17 [ref. 3594] (Sicily). No types known.
- Diplanchias nasus* Rafinesque 1810:17 [ref. 3594] (Sicily). No types known.
- Mola aspera* Nardo 1827:26, 35 (no. 26) [ref. 3146] (Adriatic Sea). No types known.
- Mola hispida* Nardo 1827:104 [ref. 26236] (tropical seas). No types known.
- Cephalus ortagoriscus* Risso 1827:173 [ref. 3757] (Nice, France). No types known.
- Diodon carinatus* Mitchill 1828:265 [ref. 17780] (off Massachusetts, 38°N, 62°W, U.S.A.). No types known.
- Pedalion gigas* Guilding in Swainson 1838:199, Fig. 33 [ref. 4302] (West Indies). No types known.
- Molacanthus pallasii* Swainson 1839:329 [ref. 4303] (no locality). No types known.
- Tympanomium planci* Ranzani 1839:74, table [ref. 3605] (Adriatic Sea). Holotype (unique): whereabouts unknown.
- Trematopsis willugbei* Ranzani 1839:74, table [ref. 3605] (“Ocean” [Atlantic]). Holotype (unique): not found at MZUB.
- Ozodura orsini* Ranzani 1839:75, 80–81, table, Pl. 6 (right) [ref. 3605] (Adriatic Sea). Holotype (unique): mount on wall at MZUB.
- Orthragoriscus alexandrini* Ranzani 1839:75, 78–79, table, Pl. 6 (left) [ref. 3605] (Adriatic Sea). No types known.
- Orthragoriscus ghini* Ranzani 1839:75, table [ref. 3605] (Mediterranean Sea). No types known.
- Orthragoriscus redi* Ranzani 1839:75, table [ref. 3605] (Mediterranean). No types known.
- Orthragoriscus retzii* Ranzani 1839:75, table [ref. 3605] (no locality). No types known.
- Orthragoriscus rondeletii* Ranzani 1839:75, table [ref. 3605] (Mediterranean Sea). No types known.
- Orthragoriscus blochii* Ranzani 1839:76, table [ref. 3605] (“mari Oceano” [ocean sea], possibly Atlantic). No types known.
- Orthragoriscus elegans* Ranzani 1839:76, table [ref. 3605] (Atlantic). No types known.
- Orthragoriscus lunaris* Gronow in Gray 1854:165 [ref. 1911] (Mediterranean Sea). No types known.
- Orthragoriscus analis* Ayres 1859:31, Fig. 5 (p. 54) [ref. 155] (Santa Barbara Channel, California, U.S.A.). Holotype (unique): CAS (lost in 1906).
- Pedalion capensis* Castelnau 1861:75 [ref. 767] (Table Bay, South Africa). No types known.
- Aledon storeri* Castelnau 1861:76 [ref. 767] (Boston Bay [and Nahant?], Massachusetts, U.S.A.). No types known.

DISTRIBUTION: Warm and temperate zones of all oceans. Eastern Pacific: British Columbia to Peru and Chile. Eastern Atlantic: Scandinavia to South Africa (occasionally western Baltic, Mediterranean). Western Atlantic: Newfoundland to Argentina. Pelagic down to 300 m.

REMARKS: *Diodon mola* Pallas 1770 is an unneeded new name for *Mola aculeata* Koelreuter 1766. *Mola aspera* Nardo 1827 also appeared in Nardo (1827:col. 477 and 483 [ref. 19740]) and Nardo (1827:104 [ref. 26236]). *Mola hispida* Nardo 1827 also appeared in Nardo (1828:438 [ref. 27079]). *Aledon storeri* Castelnau 1861 was based on *Orthragoriscus mola* of Storer (1839: 515–519 [170–173 of separate], Pl. 3 [= Pl. 8], fig. 1 [ref. 4278]); although only one specimen was illustrated, a second specimen was described in the text.

*Aledon capensis* Castelnau 1861:76 [ref. 767] was a new combination for *Pedalion capensis* described by Castelnau in the same paper, then put in the new genus *Aledon* at the end of the article.

***Mola ramsayi* (Giglioli 1883)**

- Orthragoriscus ramsayi* Giglioli 1883:315 [ref. 19994] (N.S.W., Australia). No types known.
- Orthragoriscus eurypterus* Philippi 1892:14, Pl. 6 (fig. 1) [ref. 22759] (Chañaral, Chile). No types known.

DISTRIBUTION: Southern Indian and Pacific oceans.

REMARKS: The name *Orthagoriscus eurypterus* also appeared in Philippi (1893:15, Pl. 6 (fig. 1) [ref. 14560]), which is a German translation of Philippi (1892 [ref. 22759]).

**Genus *Ranzania* Nardo 1840**

*Ranzania* Nardo 1840:111 [ref. 3149]. Type species *Ranzania typus* Nardo 1840. Type by monotypy (also by use of *typus*).

*Centaurus* Kaup 1855:221 [ref. 2571]. Type species *Ostracion boops* Richardson 1845. Type by monotypy.

REMARKS: *Ranzania* also appeared as new in Nardo (1840:190 [ref. 27080]).

***Ranzania laevis* (Pennant 1776)**

*Ostracion laevis* Pennant 1776:129, Pl. 19 [ref. 18528] (Cornwall, England). No types known.

*Tetodon truncatus* Retzius 1785:121 [ref. 18621] (no locality [Europe]). No types known.

*Diodon dimidiatus* Walbaum 1792:600 [ref. 4572] (no locality [Cornwall, England]). No types known.

*Orthagoriscus oblongus* Bloch & Schneider 1801:511, Pl. 97 [ref. 471] (Atlantic). No types known.

*Cephalus varius* Shaw 1804:439 [ref. 4015] (no locality [Indian Ocean]). No types known.

*Cephalus oblongus* Shaw 1804:439, Pl. 176 [ref. 4015] (no locality). No types known.

*Orthragus oblongus* Rafinesque 1810:17 [ref. 3594] (Sicily). No types known.

*Mola planci* Nardo 1827:26, 35 [ref. 3146] (Adriatic Sea). No types known.

*Cephalus elongatus* Risso 1827:173 [ref. 3757] (Nice, France). No types known.

*Cephalus cocherani* Traill 1832:381, Pl. 6 (fig. 2) [ref. 20837] (off s. Peru, 18°S, 81°W [stomach content]). Holotype (unique): whereabouts unknown.

*Orthagoriscus battaræ* Ranzani 1839:76, table [ref. 3605] (Adriatic Sea). No types known.

*Ranzania typus* Nardo 1840:111 [ref. 3149] (Mediterranean). No types known.

*Ostracion boops* Richardson 1845:52, Pl. 30 (figs. 18–21) [ref. 3740] (South Atlantic). Holotype (unique): type lost before publication.

*Orthagoriscus solaris* Gronow in Gray 1854:165 [ref. 1911] (Mediterranean Sea). No types known.

*Ranzania makua* Jenkins 1895:779, Pl. (frontispiece); Figs. 1–3 [ref. 18331] (mouth of Pearl Harbor, Honolulu, Oahu I., Hawaiian Is., U.S.A.). Holotype (unique): USNM 75155.

DISTRIBUTION: Cosmopolitan. Western Atlantic: Florida, Martinique, and Brazil. Eastern Atlantic: Madeira to Scandinavia; Dakar, Senegambie, and Sierra Leone; South Africa; Mediterranean Sea (rare). Eastern Pacific: central California to Chile; rare north of Mexico.

REMARKS: *Diodon dimidiatus* Walbaum, based on the “Oblong diodon” of Pennant, is a new synonym. *Mola planci* Nardo 1827 also appeared in Nardo (1827:104 [ref. 26236]) and Nardo (1828:437 [ref. 27079]).

**Summary Lists**

**Genus-Group Names of Family Molidae**

*Acanthosoma* DeKay 1842 = *Mola* Koelreuter 1766

*Aledon* Castelnau 1861 = *Mola* Koelreuter 1766

*Centaurus* Kaup 1855 = *Ranzania* Nardo 1840

*Cephalus* Shaw 1804 = *Mola* Koelreuter 1766

*Diplanchias* Rafinesque 1810 = *Mola* Koelreuter 1766

*Masturus* Gill 1884 = *Masturus* Gill 1884

*Mola* Cuvier 1798 = *Mola* Koelreuter 1766

*Mola* Koelreuter 1766 = *Mola* Koelreuter 1766

*Molacanthus* Swainson 1839 = *Mola* Koelreuter 1766  
*Orthroragoriscus* Bloch & Schneider 1801 = *Mola* Koelreuter 1766  
*Orthragus* Rafinesque 1810 = *Mola* Koelreuter 1766  
*Ozodura* Ranzani 1839 = *Mola* Koelreuter 1766  
*Pallasia* Nardo 1840 = *Mola* Koelreuter 1766  
*Pseudomola* Cadenat 1959 = *Masturus* Gill 1884  
*Ranzania* Nardo 1840 = *Ranzania* Nardo 1840  
*Trematopsis* Ranzani 1839 = *Mola* Koelreuter 1766  
*Tympanomium* Ranzani 1839 = *Mola* Koelreuter 1766

**Incertae Sedis Genus-Group Names**

None

**Unavailable Genus-Group Names**

*Mola* Linck 1790:37 [ref. 4985]. Not an original description. In the synonymy of *Mola* Koelreuter 1766.  
*Orthroragoriscus* Cuvier 1816:148 [ref. 993]. An incorrect subsequent spelling of *Orthroragoriscus* Bloch & Schneider 1801. In the synonymy of *Mola* Koelreuter 1766.  
*Pedalion* Guilding 1838:199 [ref. 4302]. Type species *Pedalion gigas* Guilding 1838. Type by monotypy. Without a description but with a figure in 1838; also in Swainson (1839:195, 329 [ref. 4303]). *Pedalion* Swainson [= Guilding in Swainson] 1838 was placed on Official Index (Opinion 326) as a junior homonym of *Pedalion* Dillwyn 1817. In the synonymy of *Mola* Koelreuter 1766.

**Species-Group Names of Family Molidae**

*aculeata*, *Mola* Koelreuter 1766 = *Mola mola* (Linnaeus 1758)  
*alexandrini*, *Orthroragoriscus* Ranzani 1839 = *Mola mola* (Linnaeus 1758)  
*analis*, *Orthroragoriscus* Ayres 1859 = *Mola mola* (Linnaeus 1758)  
*aspera*, *Mola* Nardo 1827 = *Mola mola* (Linnaeus 1758)  
*battarae*, *Orthroragoriscus* Ranzani 1839 = *Ranzania laevis* (Pennant 1776)  
*blochii*, *Orthroragoriscus* Ranzani 1839 = *Mola mola* (Linnaeus 1758)  
*boops*, *Ostracion* Richardson 1845 = *Ranzania laevis* (Pennant 1776)  
*brevis*, *Cephalus* Shaw 1804 = *Mola mola* (Linnaeus 1758)  
*capensis*, *Pedalion* Castelnau 1861 = *Mola mola* (Linnaeus 1758)  
*carinatus*, *Diodon* Mitchill 1828 = *Mola mola* (Linnaeus 1758)  
*cocherani*, *Cephalus* Traill 1832 = *Ranzania laevis* (Pennant 1776)  
*dimidiatus*, *Diodon* Walbaum 1792 = *Ranzania laevis* (Pennant 1776)  
*elegans*, *Orthroragoriscus* Ranzani 1839 = *Mola mola* (Linnaeus 1758)  
*elongatus*, *Cephalus* Risso 1827 = *Ranzania laevis* (Pennant 1776)  
*eurypterus*, *Orthroragoriscus* Philippi 1892 = *Mola ramsayi* (Giglioli 1883)  
*fasciatus*, *Orthroragoriscus* Bloch & Schneider 1801 = *Mola mola* (Linnaeus 1758)  
*ghini*, *Orthroragoriscus* Ranzani 1839 = *Mola mola* (Linnaeus 1758)  
*gigas*, *Pedalion* Guilding 1838 = *Mola mola* (Linnaeus 1758)  
*hispida*, *Mola* Nardo 1827 = *Mola mola* (Linnaeus 1758)  
*hispidus*, *Orthroragoriscus* Bloch & Schneider 1801 = *Mola mola* (Linnaeus 1758)  
*laevis*, *Ostracion* Pennant 1776 = *Ranzania laevis* (Pennant 1776)  
*lanceolatus*, *Orthroragoriscus* Liénard 1840 = *Masturus lanceolatus* (Liénard 1840)  
*lassarati*, *Pseudomola* Cadenat 1959 = *Masturus lanceolatus* (Liénard 1840)  
*luna*, *Orthragus* Rafinesque 1810 = *Mola mola* (Linnaeus 1758)  
*lunaris*, *Orthroragoriscus* Gronow 1854 = *Mola mola* (Linnaeus 1758)

*makua*, *Ranzania* Jenkins 1895 = *Ranzania laevis* (Pennant 1776)  
*mola*, *Diodon* Pallas 1770 = *Mola mola* (Linnaeus 1758)  
*mola*, *Tetraodon* Linnaeus 1758 = *Mola mola* (Linnaeus 1758)  
*nasus*, *DiplanCIAS* Rafinesque 1810 = *Mola mola* (Linnaeus 1758)  
*nummularis*, *Diodon* Walbaum 1792 = *Mola mola* (Linnaeus 1758)  
*oblongus*, *Cephalus* Shaw 1804 = *Ranzania laevis* (Pennant 1776)  
*oblongus*, *Orthratoriscus* Bloch & Schneider 1801 = *Ranzania laevis* (Pennant 1776)  
*oblongus*, *Orthragus* Rafinesque 1810 = *Ranzania laevis* (Pennant 1776)  
*orsini*, *Ozodura* Ranzani 1839 = *Mola mola* (Linnaeus 1758)  
*ortagoriscus*, *Cephalus* Risso 1827 = *Mola mola* (Linnaeus 1758)  
*oxyropterus*, *Orthratoriscus* Bleeker 1873 = *Masturus lanceolatus* (Liénard 1840)  
*pallasianus*, *Cephalus* Shaw 1804 = *Mola mola* (Linnaeus 1758)  
*pallasii*, *Molacanthus* Swainson 1839 = *Mola mola* (Linnaeus 1758)  
*planci*, *Mola* Nardo 1827 = *Ranzania laevis* (Pennant 1776)  
*planci*, *Tympanomium* Ranzani 1839 = *Mola mola* (Linnaeus 1758)  
*ramsayi*, *Orthratoriscus* Giglioli 1883 = *Mola ramsayi* (Giglioli 1883)  
*redi*, *Orthratoriscus* Ranzani 1839 = *Mola mola* (Linnaeus 1758)  
*retzii*, *Orthratoriscus* Ranzani 1839 = *Mola mola* (Linnaeus 1758)  
*rondeletii*, *Orthratoriscus* Ranzani 1839 = *Mola mola* (Linnaeus 1758)  
*rotunda*, *Mola* Cuvier 1798 = *Mola mola* (Linnaeus 1758)  
*solaris*, *Orthratoriscus* Gronow 1854 = *Ranzania laevis* (Pennant 1776)  
*storeri*, *Aledon* Castelnau 1861 = *Mola mola* (Linnaeus 1758)  
*truncatus*, *Tetrodon* Retzius 1785 = *Ranzania laevis* (Pennant 1776)  
*typus*, *Ranzania* Nardo 1840 = *Ranzania laevis* (Pennant 1776)  
*varius*, *Cephalus* Shaw 1804 = *Ranzania laevis* (Pennant 1776)  
*willugbei*, *Trematopsis* Ranzani 1839 = *Mola mola* (Linnaeus 1758)

**Incertae Sedis Species-Group Names**

None

**Unavailable Species-Group Names**

*commersoni*, *Orthragus* Rafinesque 1810:17 [ref. 3594]. Nomen nudum.  
*mola*, *Ostracion* Forsskål 1775:xviii [ref. 1351]. Nomen nudum.  
*pallasi*, *Pallasina* Nardo 1840:112 [ref. 3149]. Nomen nudum. In the synonymy of *Mola mola* (Linnaeus 1758). Listed as above in Eschmeyer (1998:1271 [ref. 23416]) but not found in this reference [ref. 3149]. On p. 112 Nardo erected the genus *Pallasia* [not *Pallasina*] for *Orthratoriscus hispidus* Cuvier. Fraser-Brunner (1951:115 [ref. 19546]) reported the species as above, probably copied from Jordan and Evermann (1898:1754 [ref. 2444]), as *Pallasia pallasi*.

**Literature Cited**

- Ayres, W. O. 1859 [ref. 155]. [On new fishes of the Californian coast]. Proc. Calif. Acad. Nat. Sci. (Ser. 1) v. 2 (1858–1862): 25–32.  
 Balart, E. F., J. L. Castro-Aguirre and E. Amador-Silva. 2000 [ref. 25095]. The first eastern Pacific report of the sharptail mola, *Mola lanceolata* (Tetraodontiformes: Molidae). Calif. Fish Game v. 86 (no. 2): 156–158.  
 Bleeker, P. 1873 [ref. 17089]. Description et figure d'une espèce insulindienne d'*Orthratoriscus*. Versl. Akad. Amsterdam (Ser. 2) v. 7: 151–153, Pl.  
 Bloch, M. E. and J. G. Schneider. 1801 [ref. 471]. M. E. Blochii, Systema Ichthyologiae iconibus cx illustratum. Post obitum auctoris opus inchoatum absolvit, correxit, interpolavit Jo. Gottlob Schneider, Saxo. Berolini. Sumtibus Auctoris Impressum et Bibliopolio Sanderiano Commissum: i–lx + 1–584, Pls. 1–110.

- Bory de Saint-Vincent, J. B. G. M. 1822–31 [ref. 3853]. [Pisces accounts]. In: Dictionnaire classique d'histoire naturelle. Vols. 1–17.
- Cadenat, J. 1959 (July) [ref. 708]. Notes d'ichtyologie ouest-africaine. XXIV. Molidae ouest-africains avec description d'une espèce nouvelle: *Pseudomola lassarati* de Côte d'Ivoire. Bull. Inst. Fr. Afr. Noire (Sér. A) Sci. Nat. v. 21 (no. 3): 1112–1122.
- Castelnaud, F. L. 1861 [ref. 767]. Mémoire sur les poissons de l'Afrique australe. Paris. i–vii + 1–78.
- Cuvier, G. 1798 [ref. 5558]. Tableau élémentaire de l'histoire naturelle des animaux. Paris. i–xvi + 1–710, Pls. 1–14.
- Cuvier, G. 1816 (Nov.) [ref. 993]. Le Règne Animal distribué d'après son organisation pour servir de base à l'histoire naturelle des animaux et d'introduction à l'anatomie comparée. Les reptiles, les poissons, les mollusques et les annélides. Edition 1. v. 2: i–xviii + 1–532 [Pls. 9–10, in v. 4].
- DeKay, J. E. 1842 [ref. 1098]. Zoology of New York; or the New York fauna; comprising detailed descriptions of all the animals hitherto observed within the state, with brief notices of those occasionally found near its borders. In: Natural history of New York. Part 4. Fishes: 1–415, Fishes Pls. 1–79.
- Eschmeyer, W. N., editor. 1998 (May) [ref. 23416]. Catalog of fishes. Center for Biodiversity Research and Information, Spec. Publ. 1. California Academy of Sciences, San Francisco. 3 vols. 1–2905.
- Fischer, W., F. Krupp, W. Schneider, C. Sommer, K. E. Carpenter and V. H. Niem. 1995 [ref. 22829]. Guía FAO para la identificación para los fines de la pesca. Pacífico centro-oriental. Volumen II. Vertebrados—Parte 1: 647–1200.
- Forsskål, P. 1775 [ref. 1351]. Descriptiones animalium avium, amphibiorum, piscium, insectorum, vermium; quae in itinere orientali observavit ... Post mortem auctoris edidit Carsten Niebuhr. Hauniae [Copenhagen]. 1–20 + i–xxxiv + 1–164, map.
- Fowler, H. W. 1974 [ref. 7180]. A catalog of world fishes (XX). Q. J. Taiwan Mus. (Taipei) v. 27 (nos. 1/2): 1–132 [catalog v. 2, pp. 479–610].
- Fraser-Brunner, A. 1951 [ref. 19546]. The ocean sunfish (family Molidae). Bull. Br. Mus. (Nat. Hist.) Zool. v. 1 (no. 6): 89–121.
- Giglioli, E. H. 1883 (2 Aug.) [ref. 19994]. Zoology at the Fisheries Exhibition. II.—Notes on the Vertebrata. Nature (Lond.) v. 28 (no. 718): 313–316.
- Gill, T. N. 1884 (9–18 Oct.) [ref. 1727]. Synopsis of the plectognath fishes. Proc. U. S. Natl. Mus. v. 7 (no. 448): 411–427.
- Gray, J. E. 1854 [ref. 1911]. Catalogue of fish collected and described by Laurence Theodore Gronow, now in the British Museum. London. i–vii + 1–196.
- Jenkins, O. P. 1895 [ref. 18331]. Descriptions of a new species of *Ranzania* from the Hawaiian islands. Proc. Calif. Acad. Sci. (Ser. 2) v. 5: 779–784.
- Jordan, D. S. and B. W. Evermann. 1898 (3 Oct.) [ref. 2444]. The fishes of North and Middle America: a descriptive catalogue of the species of fish-like vertebrates found in the waters of North America, north of the Isthmus of Panama. Part II. Bull. U. S. Natl. Mus. No. 47: i–xxx + 1241–2183.
- Kaup, J. J. 1855 [ref. 2571]. Uebersicht über die Species einiger Familien der Sclerodermen. Arch. Naturgeschichte v. 21 (no. 1): 215–233.
- Koelreuter, I. T. 1766 [ref. 23086]. Piscium rariorum e mus. petrop. exceptorum descriptiones continuatae. Novi Comment. Acad. Sci. Imp. Petropol. v. 10 (1764): 329–351, Pl. 8.
- Liénard, E. 1840 [ref. 17537]. Description d'une nouvelle espèce du genre mole (*Orthagoriscus*, Schn.) découverte à l'île Maurice. Rev. Zool. v. 3: 291–292.
- Linck, H. F. 1790 [ref. 4985]. Versuch einer Eintheilung der Fische nach den Zähnen. Mag. Neueste Phys. Naturgesch. v. 6 (no. 3): 28–38.
- Linnaeus, C. 1758 (1 Jan.) [ref. 2787]. Systema Naturae, ed. X. (Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis. Tomus I. Editio decima, reformata.) Holmiae [Stockholm]. i–ii + 1–824.
- Masuda, H., K. Amaoka, C. Araga, T. Uyeno and T. Yoshino. 1984 [ref. 6441]. The fishes of the Japanese Archipelago. Tokai University Press, Tokyo. 2 vol. Text: i–xxii + 1–437. Atlas: Pls. 1–370.
- Mitchill, S. L. 1828 [ref. 17780]. Description of an apparently new species of *Diodon*. Ann. Lyc. Nat. Hist. N. Y. v. 2: 264–265.

- Nakabo, T., editor. 2000 [ref. 25182]. Fishes of Japan with pictorial keys to the species. Second edition. Tokai University Press. v. 2: i–vii + 867–1748.
- Nardo, G. D. 1827 [ref. 19740]. Prodrômus observationum et disquisitionum ichthyologiae Adriaticae. Isis (Oken) v. 20 (no. 6): col. 473–489.
- Nardo, G. D. 1827 [ref. 3146]. Prodrômus observationum et disquisitionum Adriaticae ichthyologiae. Giorn. Fisica Chimica Storia Nat. Med. Arti, Pavia Dec. II, v. 10: 22–40.
- Nardo, G. D. 1827 [ref. 26236]. Estratto di una memoria ittologica inedita. Giorn. Fisica Chimica Storia Nat. Med. Arti, Pavia Dec. II, v. 10: 102–105, 209–213.
- Nardo, G. D. 1828 [ref. 27079]. Mémoire sur les genres *Mola* et *Lepadogaster*. Bull. Sci. Nat., Férussac v. 13: 437–438.
- Nardo, G. D. 1840 [ref. 3149]. Considerazioni sulla famiglia dei pesci *Mola*, e sui caratteri che li distinguono. Ann. Sci. R. Lombardo-Veneto, Padova v. 10: 105–112.
- Nardo, G. D. 1840 [ref. 27080]. Adunanza Quarta. In: Atti della Prima Riunione degli Scienziati Italiani Tenuta in Pisa nell'ottobre 1839. Sezione di Zoologia ed Anatomia Comparata. Tipografia Nistri, Pisa: 189–195.
- Pallas, P. S. 1770 [ref. 12293]. Spicilegia Zoologica quibus novae imprimis et obscurae animalium species iconibus, descriptionibus atque commentariis illustrantur. Berolini, Gottl. August. Lange. v. 1 (fasc. 8): 1–56, Pls. 1–5.
- Pennant, T. 1776 [ref. 18528]. British zoology. 4th edition. London.
- Pequeño, G. 1997 (Dec.) [ref. 23536]. Peces de Chile. Lista sistemática revisada y comentada: addendum. Rev. Biol. Mar. Oceanogr. v. 32 (no. 2): 77–94.
- Philippi, R. A. 1892 [ref. 22759]. Algunos peces de Chile. Las rayas, *Callorhynchus* i *Orthogoriscus* Chilenos. An. Mus. Nac. Chile, Prim. secc., Zool. No. 3: 1 + 1–16 + 1, Pls. 1–6.
- Philippi, R. A. 1893 [ref. 14560]. Abbildung und Beschreibung einiger Chilenischer Fische. Die rochen, *Callorhynchus* und *Orthogoriscus* des Chilenischen meeres. F. A. Brockhaus, Leipzig. 1 + 1–18 + 1, Pls. 1–6.
- Rafinesque, C. S. 1810 [ref. 3594]. Caratteri di alcuni nuovi generi e nuove specie di animali e piante della sicilia, con varie osservazioni sopra i medisimi. (Part 1: [i–iv] + 3–69 [70 blank]; Part 2 [with slightly different title]: ia–iva + 71–105 [106 blank]); Pls. 1–20.
- Ranzani, C. 1839 [ref. 3605]. Dispositio familiae Molarum in genera et in species. Novi Comment. Acad. Sci. Inst. Bonon. v. 3: 63–82, Pl. 6 + foldout table.
- Retzius, A. J. 1785 [ref. 18621]. *Tetrodon mola*. Kongl. Vet. Acad. Handl., Stockholm v. 6 (for 1785): 115–121, Pl. 4.
- Richardson, J. 1844–48 [ref. 3740]. Ichthyology of the voyage of H. M. S. Erebus & Terror, ... In: J. Richardson and J. E. Gray. The zoology of the voyage of H. M. S. “Erebus & Terror,” under the command of Captain Sir J. C. Ross ... during ... 1839–43. London. v. 2 (2): i–viii + 1–139, Pls. 1–60.
- Risso, A. 1827 (22 Sept.) [ref. 3757]. Histoire naturelle des principales productions de l'Europe méridionale, et particulièrement de celles des environs de Nice et des Alpes maritimes. F. G. Levrault, Paris and Strasbourg. v. 3: i–xvi + 1–480, Pls. 1–16.
- Robins, C. R. and G. C. Ray. 1986 [ref. 23100]. A field guide to Atlantic coast fishes of North America. Peterson Field Guide Series. Houghton Mifflin, Boston. iii–xi + 1–354.
- Santini, F. and J. C. Tyler. 2002 [ref. 25998]. Phylogeny of the ocean sunfishes (Molidae, Tetraodontiformes), a highly derived group of teleost fishes. Ital. J. Zool. v. 69: 37–43.
- Shaw, G. 1804 [ref. 4015]. General zoology or systematic natural history ... with plates from the first authorities and select specimens. G. Kearsley, London. v. 5 (pt. 2): i–vi + 251–463, Pls. 132–182.
- Storer, D. H. 1839 (Dec.) [ref. 4278]. Report upon the fishes of Massachusetts. Boston J. Nat. Hist. v. 2 (nos. 3–4): 289–558, Pls. 6–8.
- Swainson, W. 1838 [ref. 4302]. The natural history and classification of fishes, amphibians, and reptiles, or monocardian animals. London. v. 1: i–vi + 1–368.
- Swainson, W. 1839 [ref. 4303]. The natural history and classification of fishes, amphibians, and reptiles, or monocardian animals. London. v. 2: i–vi + 1–448.
- Truill, T. S. 1832 [ref. 20837]. Description of a new species of *Cephalus*, which it is proposed to name *Cephalus cocherani*, Cochranes's sunfish. Mem. Wernerian Nat. Hist. Soc. Edinburgh v. 6: 381–383, Pl. 6.



Walbaum, J. J. 1792 [ref. 4572]. Petri Artedi sueci genera piscium in quibus systema totum ichthyologiae proponitur cum classibus, ordinibus, generum characteribus, specierum differentiis, observationibus plurimis. Redactis speciebus 242 ad genera 52. Ichthyologiae, pars iii. Ant. Ferdin. Rose, Grypeswaldiae [Greifswald]. Pt. 3: 1–723, Pls. 1–3.

Whitley, G. P. 1935 (10 July) [ref. 6396]. Ichthyological genotypes. Aust. Zool. v. 8 (pt. 2): 136–139.

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