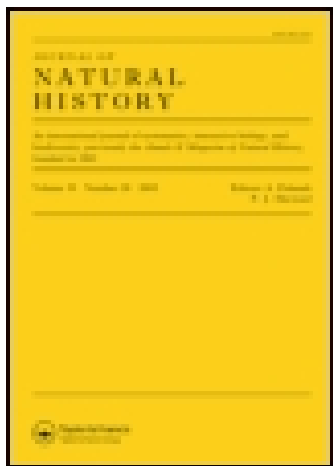


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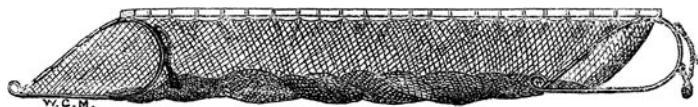
LIII.—*On the Invertebrate Marine Fauna and Fishes of St. Andrews.* By W. C. M'INTOSH.

[Concluded from p. 349.]

Subkingdom VERTEBRATA.

Class PISCES.

Contrasted with the extreme shores of Britain the fish-fauna of St.-Andrews bay exhibits certain interesting differences, though of course its features are common to many other parts of the north-east coast. There are, for instance, no shoals of young wrasses (chiefly Jago's goldsinny) gliding amongst the seaweeds, or swarms of grey mullets, as in the tide-runs of the sandy flats and inland seas of the western shores; no large rock-fish (Ballan wrasse) hiding like dark shadows under the tangles, groups of black gobies between tide-marks, or of young congers breaking the border of the flowing tide into a seething expanse, as in the quiet bays of the southern parts—just as the “schulls” of glittering pilchards do on the surface of the open water. The curious *Hippocampi*, exquisite red mullets, and the splendid conger-fishing also belong to the latter region, together with the abundance of the smaller sharks in-shore. The sandy western shores of England are also distinguished by the greater variety of large Pleuronectidæ, and the frequent occurrence of red gurnards, angel-fishes, and spotted rays. The adjoining bay, moreover, does not present that richness of finny life—from the little bimaculated sucker nestling beside its ova in the hollows of the gigantic tangles to the fine cod and coal-fish of the Zetlandic seas, which also possess the rarer *Chimæra*. While it is thus vain to look for the vast variety or the gorgeous colours of the species which a few hours' fishing off the shores of Guernsey brings before the investigator, or for the plenitude of large forms which in the north soon fill the boat to overflowing, yet there is sufficient success to reward exertion, either in deep water or off the sea-margin. Good white and flat fish occur in the bay, the latter especially abounding on the sandy flats off the West Sands, which thus form a rich ground for the trawlers, who are for the most part strangers. The trawl in



common use (see accompanying figure) consists of a beam of

wood about 28 feet long, borne on the top of the bulbous ends of two pear-shaped iron structures. A large bag-net is fixed to the apparatus, which is dragged behind the boat by ropes attached to the convex portion of the iron supports. The under surface of the latter is flattened, and the point of the apex (which is posterior) turned upwards—the whole thus forming a kind of subaqueous sledge, which glides over the sand and embraces in its progress every thing loose. Young coal-fishes occur all round the rocks and harbour; occasionally a sea-trout is captured off the former; sand-eels frequent the sand near low water; and the salmon-nets are often very productive. In the rock-pools swim hundreds of little two-spotted gobies, swarms of the beautifully coloured young of the lumpsucker, and strings of young sand-eels sport in the sunshine amongst the fringes of seaweeds like flashes of silvery light—affording with other littoral forms, such as shannies and blennies, ample food for the aquatic birds that frequent the beach.

The rarer forms include the lancelet, gar-fish, doree, opah, oar-fish, and bonito.

In the following list the arrangement adopted is that of Dr. A. Günther in his valuable and laborious 'Catalogue of Fishes in the British Museum.'

Subclass I. TELEOSTEI.

Order I. ACANTHOPTERYGII.

Fam. Gasterosteidæ.

Genus GASTEROSTEUS, Artedi.

Gasterosteus aculeatus, Albert. Mag.; Günther, Catalogue of Fishes in the British Museum, vol. i. p. 2.

Frequent on the West Sands after storms.

Gasterosteus spinachia, L.; Gthr. *op. cit.* i. p. 7.

Abundant in the rock-pools.

Fam. Sparidæ.

Genus PAGELLUS, Cuv. & Val.

Pagellus centrodontus, De la Roche; Gthr. *op. cit.* i. p. 476.

Not uncommon in the bay.

Fam. Triglidæ.

Group *COTTINA*.Genus *COTTUS*, Artedi.

Cottus scorpius, Bloch ; Gthr. *op. cit.* ii. p. 159.

Common in the rock-pools. Small sucking-fishes, shrimps, *Terebellæ*, and fragments of green algæ occur in the stomach of this form.

Cottus bubalis, Euphrasen ; Gthr. *op. cit.* ii. p. 164.

Frequent in the rock-pools. Distomes are common in this species.

Genus *TRIGLA*, Artedi.

Trigla pini, Bloch ; Gthr. *op. cit.* ii. p. 199.

Occasionally procured in the bay.

Tigla hirundo, Bl. ; Gthr. *op. cit.* ii. p. 202.

Rare. A single specimen occurs in the University Museum.

Trigla gurnardus, L. ; Gthr. *op. cit.* ii. p. 205.

Abundant at all seasons.

Group *CATAPHRACTI*.Genus *AGONUS*, Bl.

Agonus cataphractus, L. ; Gthr. *op. cit.* ii. p. 211.

Fine specimens are common on the West Sands after storms.

Fam. Trachinidæ.

Group *TEACHININA*.Genus *TRACHINUS* (Artedi), Cuv.

Trachinus draco, L. ; Gthr. *op. cit.* ii. p. 233.

Frequent on the West Sands after storms.

Trachinus vipera, Cuv. & Val. ; Gthr. *op. cit.* ii. p. 236.

Not uncommon in the same locality, and brought in by the fishermen.

Fam. **Scombridæ.**

Group *SCOMBRINA*.

Genus **SCOMBER**, Artedi.

Scomber scomber, L. ; Gthr. *op. cit.* ii. p. 357.

Common.

Genus **THYNNUS**, Cuv. & Val.

Thynnus pelamys, L. ; Gthr. *op. cit.* ii. p. 364.

A fine specimen, about 3 feet long, was procured by Dr. Moir, of St. Andrews, from a salmon-net near the mouth of the Kenley Burn in July 1873, and described by Mr. R. Walker in the 'Scottish Naturalist' for January 1874.

Group *CYTTINA*.

Genus **ZEUS** (Artedi), Cuv.

Zeus faber, L. ; Gthr. *op. cit.* ii. p. 393.

Rather rare.

Group *CORYPHÆNINA*.

Genus **BRAMA** (Schneid.), Risso.

Brama Raii, Bl. ; Gthr. *op. cit.* ii. p. 408.

A specimen occurs in the University Museum.

Genus **LAMPRIS**, Retzius.

Lampris luna, Retzius ; Gthr. *op. cit.* ii. p. 416.

Rare. A single specimen from the bay exists in the University Museum.

Fam. **Carangidæ.**

Group *CARANGINA*.

Genus **TRACHURUS**, Cuv. & Val.

Trachurus trachurus, L. ; Gthr. *op. cit.* ii. p. 419.

Not uncommon.

Fam. **Gobiidæ.**

Group *Gobiina*.

Genus **Gobius**, Artedi.

Gobius niger, L. ; Gthr. *op. cit.* iii. p. 11.

Mr. Robert Walker states that he has found this species. It has not occurred in my collection.

Gobius Ruthensparri, Euphrasen ; Gthr. *op. cit.* iii. p. 76.

Common in the rock-pools and in the stomachs of cod and haddock.

Group *CALLIONYMINA*.

Genus *CALLIONYMUS*, L.

Callionymus lyra, L. ; Gthr. *op. cit.* iii. p. 139.

Common in deep water, and in the stomach of the cod.

Fam. *Discoboli*.

Group *CYCLOPTERINA*.

Genus *CYCLOPTERUS*, Artedi.

Cyclopterus lumpus, L. ; Gthr. *op. cit.* iii. p. 155.

Frequent on the West Sands after storms, and occasionally in the stomach of the cod. The young abound in the rock-pools in autumn.

Group *LIPARIDINA*.

Genus *LIPARIS*, Artedi.

Liparis vulgaris, Flem. ; Gthr. *op. cit.* iii. p. 159.

Occasionally.

Liparis Montaguï, Donov. ; Gthr. *op. cit.* iii. p. 161.

Abundant in rock-pools, in the laminarian region, and in deeper water, as well as in the stomachs of cod and haddock.

Fam. *Pediculati*.

Genus *LOPHIUS*, Artedi.

Lophius piscatorius, L. ; Gthr. *op. cit.* iii. p. 179.

Common off the West Sands, and frequently captured in the salmon-nets. One of the specimens had acute pericarditis.

Fam. *Blenniidæ*.

Genus *ANARRHICHAS*, Artedi.

Anarrhichas lupus, L. ; Gthr. *op. cit.* iii. p. 208.

Frequent in deep water. The stomach of this form contains fragments of *Echinus esculentus*, *Buccinum undatum*, *Trochi*, *Nassa incrassata*, *Natica*, *Mya*, starfishes, *Stenorhynchus rostratus*, and *Galathea*.

Genus BLENNIUS, Artedi.

Blennius pholis, L. ; Gthr. *op. cit.* iii. p. 226.

Abundant between tide-marks in moist crevices and rock-pools. Feeds on *Balani*, small littoral shells, and sessile-eyed crustaceans.

Genus BLENNIOPS, Nilss.

Blenniops Ascanii, Walbaum ; Gthr. *op. cit.* iii. p. 284.

Not uncommon in deep water, and occasionally in the stomach of the cod.

Genus CENTRONOTUS, Bl.

Centronotus gunellus, L. ; Gthr. *op. cit.* iii. p. 285.

Abundant between tide-marks and on the West Sands after storms. The food of this form includes *Hippolyte*, sessile-eyed Crustacea, annelids, starfishes, and small Mollusca (*Rissoa*, *Skenea*, &c.).

Genus ZOARCES, Cuv.

Zoarces viviparus, L. ; Gthr. *op. cit.* iii. p. 295.

Not uncommon between tide-marks and on the West Sands after storms. Sessile-eyed Crustacea and small starfishes occur in its stomach ; but in confinement it swallows its fellows.

Fam. Trachypteridæ.

Genus REGALECUS, Brünn.

Regalecus Banksii, Cuv. & Val.(?) ; Gthr. *op. cit.* iii. p. 309.

An imperfect specimen, 7 feet 2 inches long, occurred amongst the West Rocks, and was described by Mr. R. Walker*.

Fam. Atherinidæ.

Group Atherinina.

Genus Atherina, Artedi.

Atherina presbyter, Cuv. ; Gthr. *op. cit.* iii. p. 392.

A specimen in the University Museum. Rare.

* Ann. & Mag. Nat. Hist. July 1862.

Fam. **Mugilidæ.**Genus **MUGIL**, Artedi.*Mugil capito*, Cuv. ; Gthr. *op. cit.* iii. p. 439.

Not uncommon in the bay.

Fam. **Gobiesocidæ.**Genus **LEPADOGASTER**, Gouan.*Lepadogaster bimaculatus*, Flem. ; Gthr. *op. cit.* iii. p. 514.

Occasionally in the laminarian region, and in the stomachs of the cod and haddock.

Order II. **ACANTHOPTERYGII PHARYNGOGNATHI.**Fam. **Labridæ.**Group **LABRINA.**Genus **LABRUS** (Artedi), Cuv.*Labrus maculatus*, Bl. ; Gthr. *op. cit.* iv. p. 70.

Occasionally brought from deep water. Many young examples occur in the rock-pools in autumn.

Genus **CRENILABRUS**, Cuv.*Crenilabrus melops*, L. ; Gthr. *op. cit.* iv. p. 80.

Not common.

Order III. **ANACANTHINI.**Suborder **ANACANTHINI GADOIDEI.**Fam. **Gadidæ.**Genus **GADUS**, Artedi.*Gadus morrhua*, L. ; Gthr. *op. cit.* iv. p. 328.

Common. It is hard to find an inhabitant of the sea that is not swallowed by this fish.

Gadus aeglefinus, L. ; Gthr. *op. cit.* iv. p. 332.

Common.

Gadus merlangus, L. ; Gthr. *op. cit.* iv. p. 334.
Frequent.

Gadus minutus, L. ; Gthr. *op. cit.* iv. p. 335.
Common.

Gadus luscus, L. ; Gthr. *op. cit.* iv. p. 335.
Not uncommon.

Gadus pollachius, L. ; Gthr. *op. cit.* iv. p. 338.
Occasionally from deep water.

Gadus virens, L. ; Gthr. *op. cit.* iv. p. 339.
Abundant.

Genus MOLVA, Nilss.

Molva vulgaris, Flem. ; Gthr. *op. cit.* iv. p. 361.
Common.

Genus COUCHIA, Thomps.

Couchia argentata, Reinh. ; Gthr. *op. cit.* iv. p. 363.
A single specimen in the stomach of a cod.

Genus MOTELLA, Cuv.

Motella mustela, L. ; Gthr. *op. cit.* iv. p. 364.
Common in rock-pools. Feeds often on sessile-eyed Crustacea.

Motella cimbria, L. ; Gthr. *op. cit.* iv. p. 367.
In a rock-pool at West Rocks. Rare.

Genus RANICEPS, Cuv.

Raniceps trifurcus, Walb. ; Gthr. *op. cit.* iv. p. 367.
Not uncommon. The specimens have chiefly been procured from the West Sands after storms.

Genus BROSMIUS, Cuv.

Brosmius brosme, O. F. Müller ; Gthr. *op. cit.* iv. p. 369.
Not common.

Fam. **Ophidiidæ.**Group *AMMODYTINA*.Genus *AMMODYTES*, Artedi.

Ammodytes lanceolatus, Lesauvage; Gthr. *op. cit.* iv. p. 384.

Frequent in the débris of storms on the sands, as well as in the latter near low-water mark. Bands of young occur in the tidal pools in May.

Ammodytes tobianus, L.; Gthr. *op. cit.* iv. p. 385.

Occasionally with the former.

Suborder **ANACANTHINI PLEURONECTOIDEI.**Fam. **Pleuronectidæ.**Genus *HIPPOGLOSSUS*, Cuv.

Hippoglossus vulgaris, Flem.; Gthr. *op. cit.* iv. p. 403.

Not rare. The parasitic *Epibdella hippoglossi* is often seen. On the *Caligus* of this fish, *Udonella caligorum* also is common.

Genus *RHOMBUS*, Klein.

Rhombus maximus, Will.; Gthr. *op. cit.* iv. p. 407.

Common. In the abnormal examples, which swim on their edges, both dextral and sinistral surfaces are coloured, and each has an eye.

Rhombus lævis, Rondel.; Gthr. *op. cit.* iv. p. 410.

Abundant.

Rhombus megastoma, Donov.; Gthr. *op. cit.* iv. p. 411.

Occasionally.

Rhombus punctatus, Bl.; Gthr. *op. cit.* iv. p. 413.

Not common.

Genus *PLEURONECTES* (Artedi), Cuv.

Pleuronectes platessa, L.; Gthr. *op. cit.* iv. p. 440.

Abundant. The gulls are fond of emptying the stomachs of those thrown on the sands after storms.

Pleuronectes limanda, L. ; Gthr. *op. cit.* iv. p. 446.

Not uncommon.

Pleuronectes microcephalus, Donovan. ; Gthr. *op. cit.* iv. p. 447.

Common.

Pleuronectes flesus, L. ; Gthr. *op. cit.* iv. p. 450.

Abundant.

Genus *SOLEA* (Lacép., sp.), Cuv.

Solea vulgaris, Quensel ; Gthr. *op. cit.* iv. p. 463.

Frequent.

Solea minuta, Rondel. ; Gthr. *op. cit.* iv. p. 470.

Common.

Order IV. PHYSOSTOMI.

Fam. Salmonidæ.

Genus *SALMO*, Artedi.

Salmo salar, L. ; Gthr. *op. cit.* vi. p. 11.

Many are caught in the stake-nets on the West Sands, and also off the East Rocks.

Salmo trutta, L. ; Gthr. *op. cit.* vi. p. 22.

Common.

Genus *OSMERUS* (Artedi), Cuv.

Osmerus eperlanus, L. ; Gthr. *op. cit.* vi. p. 166.

Not uncommon. Large numbers are also caught in the Tay.

Fam. Scombresocidæ.

Genus *BELONE*, Cuv.

Belone vulgaris, Flem. ; Gthr. *op. cit.* vi. p. 254.

Occasionally thrown on the West Sands after storms.

Genus *SCOMBRESOX*, Lacép.

Scombresox saurus, Walbaum ; Gthr. *op. cit.* vi. p. 257.

Not uncommon.

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Fam. **Clupeidæ.**Group *CLUPEINA*.Genus *CLUPEA* (Artedi), Cuv.*Clupea harengus*, L. ; Gthr. *op. cit.* vii. p. 415.

Abundant.

Clupea sprattus, L. ; Gthr. *op. cit.* vii. p. 419.

Common.

Clupea alosa, L. ; Gthr. *op. cit.* vii. p. 433.

Not uncommon. In the stomach of a large specimen caught in the Tay were *Confervæ*, Desmids, and a quantity of vegetable débris.

Fam. **Murænidæ.**Subfamily *MURÉNIDÆ PLATYSCHISTÆ*.Group *ANGUILLINA*.Genus *ANGUILLA* (Thunberg), Cuv. Règne Anim.*Anguilla vulgaris*, Turt. ; Gthr. *op. cit.* viii. p. 28.

Abundant in the streams joining the sea, and occasionally between tide-marks ; but the latter occurrence is rare in contrast with the western and southern shores.

Anguilla latirostris, Risso ; Gthr. *op. cit.* viii. p. 32.

Not uncommon in similar localities. A curious instance of the fatal effects of the voracity of this fish was found in the Swilken burn. A specimen about 20 inches long had seized the head of another not much shorter than itself, and attempted to swallow it. In its struggles the victim's tail also entered the mouth of the larger, and passed out at the left gill-slit, so that several inches were free. The body of the victim thus formed a large loop which could not be swallowed, while the impaction of the head and tail, and the direction of the teeth of the large specimen, prevented the ejection of the prey. The marauder became exhausted, and was captured at the edge of the stream at the sands.

Genus *CONGER*, Cuv.*Conger vulgaris*, Cuv. ; Gthr. *op. cit.* viii. p. 38.

Abundant in deep water.

Order V. LOPHOBRANCHII.

Fam. Syngnathidæ.

Genus SYNGNATHUS, Artedi.

Syngnathus acus, L.; Gthr. *op. cit.* viii. p. 157.

Occasionally seen on the beach after storms.

Genus NEROPHIS (Rafinesque), Kaup.

Nerophis æquoreus, L.; Gthr. *op. cit.* viii. p. 191.

Not uncommon on the West Sands after storms.

Nerophis lumbriciformis, Willughby; Gthr. *op. cit.* viii. p. 193.

Often caught by the hand-net amongst the seaweeds bordering pools and rocks as the tide enters; on the West Sands after storms.

Order VI. PLECTOGNATHI.

Fam. Gymnodontes.

Group MOLINA.

Genus ORTHAGORISCUS, Bl.

Orthagoriscus mola, Bl.; Gthr. *op. cit.* viii. p. 317.

Occasionally caught in the bay. A fine specimen occurred in October 1862, measuring 4 feet 8 inches from the tip of the dorsal to the tip of the anal fin, and 3 feet 4 inches from the snout to the posterior margin of the body. Externally there were several specimens of *Tristoma coccineum*; and two wounds existed in the caudal region (from which it was stated the fishermen pulled two animals like leeches, probably specimens of *Pontobdella*). Numerous examples of *Gymnorhynchus horridus* were found in the muscles on dissection. The intestine measured 10 feet 6 inches; and the liver weighed $3\frac{1}{2}$ pounds.

Subclass III. GANOIDEI.

Order CHONDROSTEI.

Fam. Acipenseridæ.

Genus ACIPENSER, Artedi.

Acipenser sturio, L.; Gthr. *op. cit.* viii. p. 342.

Occasionally caught in the salmon-nets.

Subclass IV. CHONDROPTERYGII.

Order II. PLAGIOSTOMATA.

Suborder SELACHOIDEI.

Fam. Carchariidæ.

Group CARCHARIINA.

Genus CARCHARIAS, Cuv.

Carcharias glaucus, L. ; Gthr. *op. cit.* viii. p. 364.

Not uncommon in the bay. Captured by the fishermen in the salmon-nets.

Genus GALEUS, Cuv.

Galeus canis, Rondel. ; Gthr. *op. cit.* viii. p. 379.

Frequently caught in the bay.

Group MUSTELINA.

Genus MUSTELUS, Cuv.

Mustelus vulgaris, Müll. & Henle ; Gthr. *op. cit.* viii. p. 386.

Not uncommon.

Fam. Scylliidæ.

Genus SCYLLIUM, Cuv.

Scyllium canicula, L. ; Gthr. *op. cit.* viii. p. 402.

Not uncommon in the bay.

Fam. Spinacidæ.

Genus ACANTHIAS, Risso.

Acanthias vulgaris, Risso ; Gthr. *op. cit.* viii. p. 418.

Often caught on the deep-sea lines of the fishermen.

Genus LÆMARGUS, Müller & Henle.

Læmargus borealis, Scoresby ; Gthr. *op. cit.* viii. p. 426.

Occasionally caught off the bay, near the estuary of the Forth.

Suborder **BATOIDEI.**

Fam. **Rajidæ.**

Genus **RAJA**, Artedi.

Raja clavata, L. ; Gthr. *op. cit.* viii. p. 456.

Frequent.

Raja radiata, Donovan. ; Gthr. *op. cit.* viii. p. 460.

Not uncommon on the sandy flats.

Raja circularis, Couch ; Gthr. *op. cit.* viii. p. 462.

Not uncommon.

Raja batis, L. ; Gthr. *op. cit.* viii. p. 463.

Common.

Raja lintea, Fries ; Gthr. *op. cit.* viii. p. 466.

This and the following are entered on the authority of Mr. R. Walker, Librarian of the University.

Raja fullonica, L. ; Gthr. *op. cit.* viii. p. 467.

Occasionally seen.

Subclass V. **CYCLOSTOMATA.**

Fam. **Petromyzontidæ.**

Genus **PETROMYZON**, Artedi.

Petromyzon marinus, L. ; Gthr. *op. cit.* viii. p. 501.

Not uncommon. One was captured by attaching itself to a boat.

Fam. **Myxinidæ.**

Genus **MYXINE**, L.

Myxine glutinosa, L. ; Gthr. *op. cit.* viii. p. 510.

Occasionally on the cod.

Subclass VI. **LEPTOCARDII.**

Fam. **Cirrostromi.**

Genus **BRANCHIOSTOMA**, Costa.

Branchiostoma lanceolatum, Pall. ; Gthr. *op. cit.* viii. p. 513.

Rare. Two specimens occurred in the stomach of a cod.