

JAPANESE SHORE FISHES COLLECTED BY THE UNITED STATES BUREAU OF FISHERIES STEAMER "ALBATROSS" EXPEDITION OF 1906.

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This report deals mainly with the collections made by members¹ of the U. S. Bureau of Fisheries steamer *Albatross* expedition of 1906, who were detached from the ship and intrusted with a study of the shore fishes of Japan. It was intended that the shore party should direct its attention to the species inhabiting the tide pools and shallow water immediately offshore, and accordingly collecting stations were occupied where the coast was of such a nature that large areas were exposed at low tides, and where markets of considerable size were within reach. These stations included Hakodate, Mororan, and Otaru in Hokkaido, Same, Aikawa, Misaki, and Shimizu on the eastern coast of Hondo, and Kagoshima, Akune, and Tanegashima near the southern end of Kiusiu. A trip was also made to Okinawa, one of the Riu Kiu Islands, the results of which appear in a separate report.²

There are remarkably rich collecting grounds near Mororan, Misaki, and Tanegashima, where one finds small, quiet bays with sandy or muddy bottoms and gently sloping beaches, together with broad expanses of open coast where the waves have worn innumerable pot-holes and large pools in the surface of the soft rocks. Small fishes often fairly swarm in these pools³ and at low tide may be seen quietly swimming about or darting here and there among the broken rocks, corals, or masses of algæ. A good representation of the fish fauna of Japan may be secured at these places, the fishes of Mororan con-

¹ The shore work was mainly done by the writer and Mr. Michataro Sindo, a student of Stanford University, who is an enthusiastic collector and a good naturalist. Profs. S. Nozawa, S. Saito, and K. Otaki were each a volunteer member of the party for a time, and rendered valuable assistance.

² Proc. U. S. Nat. Mus., vol. 42, p. 487.

³ For example, a pool near Misaki, roughly measuring 19 feet in circumference and 3 feet at its deepest part, contained 123 specimens representing 16 different species. The pools in the vicinity of Misaki appear to support an unusually large number of species, and in addition to a rich native fauna there are many stragglers from the tropics, the young of various *Chætodonts*, *Pomacentrids*, *Teuthids*, and others which appear to have drifted northward in the Kurosiwo far beyond a point where the species are able to maintain themselves.

sisting largely of northern species related to those of the Kuriles and Kamchatka, those of Misaki and the great Tokyo market being typically Japanese, while at Tanegashima and Kagoshima the fauna is more tropical, many of the species ranging to the Philippines, East Indies, and the South Seas.

Care has been taken throughout the paper to designate species which are represented by individuals purchased in the markets, although it is quite probable that all such were taken by the local fishermen. The color notes were made from living examples, unless otherwise stated. The drawings were made by Messrs. William S. Atkinson and Sekko Shimada. The descriptions of the new species were published in previous volumes of these proceedings.

The writer wishes to express his appreciation of the interest shown by the Japanese officials with whom he came in contact, by the officers connected with the Imperial bureau of fisheries at various stations, especially Otaru, Tokyo, and Tanegashima, and by members of the zoological faculty of the Imperial University and the Misaki Biological station.

The writer is indebted to Dr. Charles H. Gilbert, naturalist in charge of the expedition, for many valuable suggestions. Dr. David Starr Jordan has been frequently consulted in matters pertaining to nomenclature.

Family PETROMYZONIDÆ.

ENTOSPHEMUS JAPONICUS (Von Martens).

One very small example from Yamaguchi.

LAMPETRA PLANERI (Bloch).

Young examples of this species were collected in the Ishikara River at Sapporo.

Family HETERODONTIDÆ.

HETERODONTUS JAPONICUS (Duméril).

Misaki market.

Family SCYLLIORHINIDÆ.

HALÆLURUS RUDIS (Pietschmann).

A specimen from Hakodate measuring 420 millimeters has the white spots conspicuous on the posterior parts only.

Family GALEIDÆ.

MUSTELUS MANAZO Bleeker.

Otaru, Hakodate, and Kagoshima markets.

One example 4½ feet long was seen and carefully identified in the Hakodate market. A large specimen was also noted in the market at Tokyo.

TRIAKIS SCYLLIUM Müller and Henle.

Tokyo and Misaki markets.

Family SPHYRNIDÆ.

SPHYRNA ZYGÆNA (Linnæus).

Tokyo market.

Family MITSUKURINIDÆ.

MITSUKURINA OWSTONI Jordan.

After examining a figure of this species several fishermen at Mororan stated that it has been taken there.

Family SQUALIDÆ.

SQUALUS MITSUKURII Jordan and Snyder.

Mororan, Tomakomai, and Misaki markets.

Young examples have a row of white spots along the sides, each as long as the pupil. A spot similar to these is on the upper surface near base of first dorsal spine, another a little beyond base of fin, and a third below base of second spine.

ETMOPTERUS LUCIFER Jordan and Snyder.

Reported by fishermen as being occasionally caught near Mororan.

Family SQUATINIDÆ.

SQUATINA JAPONICA Bleeker.

Many large examples in the Tokyo market were said to have been caught by local fishermen.

Family NARCOBATIDÆ.

NARKE JAPONICA (Temminck and Schlegel).

Misaki and Kagoshima markets. Said to be rarely seen.

Family RAJIDÆ.

RAJA MEERDERVOORTI Bleeker.

Otaru, Mororan, and Hakodate markets.

DISCOBATUS SINENSIS (Bloch and Schneider).

Tokyo market.

Family DASYATIDÆ.

DASYATIS AKAJEI (Müller and Henle).

Otaru, Shiogama, Tokyo, and Misaki markets.

One example has two strong spines in the tail, one immediately behind the other; the back without thorny spines.

Color in life: Dorsal surface gray, growing yellowish toward the edges of disk; edges of snout, a narrow region below eyes, sides of tail, and edges of ventrals orange; ventral surface dead white, with six unsymmetrically arranged orange spots on the belly; edge of disk on under side, including snout and ventrals, bright orange.

PTEROPLATEA JAPONICA Temminck and Schlegel.

Tokyo market.

UROLOPHUS FUSCUS Garman.

Tokyo market.

Family ACIPENSERIDÆ.

ACIPENSER MIKADOI Hilgendorf.

Otaru and Hakodate markets.

A specimen from Otaru, 526 millimeters long, has 10 dorsal, 30 lateral, and 8 ventral plates. A stuffed skin from Hakodate 1,580 millimeters long has 10 dorsal, 33 lateral, and 9 ventral plates (8 on one side). Interposed between some of the larger dorsal plates are 5 smaller ones, 3 of which have reached a considerable size and with some additional growth might be enumerated with the others.

The following measurements are of the Otaru example: Head, 3.4 in length to base of caudal; depth, 7; depth caudal peduncle, 8.8 in head; snout, 1.7; eye, 14.5; interorbital space, 3.4; length pectoral, 2.2; height dorsal, 4.7; height anal, 4.2; length caudal, 1.3.

Family PTEROTHRISSIDÆ.

PTEROTHRISSUS GISSU Hilgendorf.

Tokyo market.

Family ALBULIDÆ.

ALBULA VULPES (Linnaeus).

Kagoshima market.

Family DOROSOMATIDÆ.

KONOSIRUS PUNCTATUS (Temminck and Schlegel).

Tokyo, Misaki, and Kagoshima markets.

Family CLUPEIDÆ.

STOLEPHORUS JAPONICUS (Houttuyn).

Nagasaki market.

AMBLYGASTER MELANOSTICTUM (Temminck and Schlegel).

Otaru, Mororan, Tomakomai, Hakodate, and Misaki; taken near shore in the seine.

SARDINELLA ZUNASI (Bleeker.)

Specimens were collected in the harbor at Nagasaki with the surface net at night. The following proportional measurements are from examples 120 millimeters long: Head, 4.2 in length to base of caudal; depth, 3.3; depth caudal peduncle, 9.5; eye, 2.7 in head; snout, 4.2; maxillary, 2.3; interorbital space, 4; D., 16; A., 18; scales in lateral series, 40. There is a single row of very minute teeth on each palatine bone, and a similar row on the hypobranchials, the tongue being naked. Adipose eyelids are present and well developed.

CLUPEA PALLASII Cuvier and Valenciennes.

Otaru market; Tomakomai with seine.

Family ENGRAULIDÆ.

ENGRAULIS JAPONICUS Temminck and Schlegel.

Otaru, Misaki, and Hakodate markets; Otaru, with the seine.

Family SALMONIDÆ.

PLECOGLOSSUS ALTIVELIS Temminck and Schlegel

Tokyo and Tsuruga markets.

Family SALANGIDÆ.

SALANX MICRODON Bleeker.

Same; taken in small seine.

Family ARGENTINIDÆ.

OSMERUS DENTEX Steindachner.

Tomakomai, seine; Hakodate and Mororan markets.

MESOPUS OLIDUS (Pallas).

Mori and Tomakomai, with the seine; Hakodate market.

There appears to be no difference between this species and *M. japonicus*. The ventrals show some slight variation in position. Some specimens have been found with 9 dorsal and 12 or 13 anal rays, and also with 10 dorsal and 13 to 15 anal rays. The dorsal rays number from 9 to 13, the anal 12 to 15.

Family SYNODONTIDÆ.

SAURIDA ARGYROPHANES (Richardson).

Tokyo market; Shimizu and Kagoshima, where specimens were seined near shore.

SYNODUS JAPONICUS (Houttuyn).

Misaki market.

TRACHINOCEPHALUS MYOPS (Forster).

Otaru, Tokyo, and Misaki markets; seined near shore at Shimizu and Kagoshima.

Family SILURIDÆ.

PARASILURUS ASOTUS (Linnæus).

Tokyo market; Takamatsu R., Akune.

LIOBAGRUS REINI Hilgendorf.

Yamaguchi.

PLOTOSUS ANGUILLARIS Lacépède.

Misaki, Kagoshima, and Tanegashima pools.

Individuals about 350 millimeters were usually abundant in the more shallow, sandy pools. In life they were brownish black, lighter and tinted with golden below; yellow lateral stripes; fins tinged with golden brown.

Family COBITIDÆ.

MISGURNUS ANGUILLICAUDATUS (Cantor).

Hakodate and Tokyo markets; Takamatsu R., Akune.

Specimens from Hakodate and Akune were very slender while those from Tokyo were deep and fat. There are often 8 rays in the dorsal and 7 in the anal.

COBITIS TÆNIA Linnaeus.

Nanao; Yamaguchi. In ditches near the rice fields.

ORTHRIAS OREAS Jordan and Fowler.

Thirty-two specimens of this species were collected in the Ishikari River at Sapporo. The head measures about 4.4 in the length to base of caudal; depth 6.5. There are 8 rays in the dorsal and 6 in the anal. The edge of the caudal is slightly emarginate and the upper and lower lobes are rounded.

Family CYPRINIDÆ.

CARASSIUS AURATUS (Linnaeus).

Niigawa; Same; Takamatsugawa, Akune; Yamaguchi; Dogo Island.

HEMIBARBUS BARBUS (Temminck and Schlegel).

Near Tokyo.

LEUCOGOBIO MAYADÆ (Jordan and Snyder).

Yamaguchi.

PSEUDOGOBIO ESOCINUS (Temminck and Schlegel).

Yamaguchi.

ZEZERA HILGENDORFI (Ishikawa).

Yamaguchi; 3 specimens.

ACHEILOGNATHUS LANCEOLATUM (Temminck and Schlegel).

Yamaguchi.

ACHEILOGNATHUS LIMBATUM (Temminck and Schlegel).

Niigawa; Same.

ZACCO PLATYPUS (Temminck and Schlegel).

Takamatsugawa, Akune.

ZACCO TEMMINCKI (Temminck and Schlegel).

Yamaguchi.

RICHARDSONIUS HAKUENSIS (Günther).

Otaru market; Sapporo; Tomakomai; Hakodate market; Niigawa, Same; Aikawa; Dogo Island.

Family LEPTOCEPHALIDÆ.

The following key will serve to distinguish the Japanese species of the genus *Leptocephalus*.

- a*¹ Dorsal fin beginning at a point above or anterior to base of pectoral.
 - b*¹ Tail short, rather blunt, not more than 3.5 times length of head; dorsal and anal with black borders throughout.
 - c*¹ Pectorals pointed; eye small, 5.5 in head; fins narrowly bordered with black.....*anago*.
 - c*² Pectoral rounded; eye large, 4.7 in head; fins broadly and indistinctly bordered with black.....*flavirostris*.
 - b*² Tail long, very slender and pointed, about 4.5 times length of head; dorsal and anal with black borders only posteriorly.....*retroinctus*.
- a*² Dorsal fin beginning behind base of pectoral.
 - d*¹ Dorsal fin beginning at a point above or slightly anterior to middle of pectoral.
 - e*¹ Maxillary long, extending to posterior border of orbit.
 - f*¹ Dorsal and anal with black margins throughout; tip of tail black.....*riukiuanus*.
 - f*² Dorsal and anal with black margins only on posterior parts; tip of tail white.....*megastomus*.
 - e*² Maxillary short, not extending beyond posterior edge of pupil.
 - g*¹ Pectoral pointed; dorsal and anal with black margins posteriorly.....*nystromi*.
 - g*² Pectoral broadly rounded; dorsal and anal immaculate.....*heterognathos*.
 - d*² Dorsal fin beginning at a point behind middle of pectoral.
 - h*¹ Dorsal and anal with black borders.
 - i*¹ Lateral line with distinct whitish spots, as wide as the interspaces, one for each pore.....*myriaster*.
 - i*² Lateral line without white spots.
 - j*¹ Maxillary extending to posterior border of orbit; pectorals pointed.....*kiusiuanus*.
 - j*² Maxillary extending only to posterior border of pupil; pectorals rounded.....*erebennus*.
 - h*² Dorsal and anal light, without black borders.....*japonicus*.

LEPTOCEPHALUS ANAGO (Temminck and Schlegel).

Misaki and Tokyo markets.

The dorsal is usually inserted directly above base of pectoral, although cases are sometimes seen where it is a little anterior or posterior.

LEPTOCEPHALUS FLAVIROSTRIS Snyder.

Plate 51, fig. 1.

Leptocephalus flavirostris SNYDER, Proc. U. S. Nat. Mus., vol. 35, 1909, p. 93.

Misaki; said to have come from near shore.

LEPTOCEPHALUS RETROINCTUS Jordan and Snyder.

Kagoshima market. This may be easily distinguished among other Japanese species by the very long pointed tail with its dense black fins.

LEPTOCEPHALUS MEGASTOMUS (Günther).

Yokohama market.

LEPTOCEPHALUS NYSTROMI Jordan and Snyder.

Tokyo and Kagoshima markets.

It is scarcely probable that this species and *L. heterognathus*¹ are synonymous, as suggested by Jordan and Richardson.² *L. nystromi* has long, pointed pectorals, and the dorsal and anal have black borders in the region of the tail. In *L. heterognathus* the pectorals are broadly rounded and the vertical fins are immaculate.

LEPTOCEPHALUS MYRIASTER (Brevoort).

Hakodate and Tokyo markets; seined in shallow water at Shiogama.

LEPTOCEPHALUS KIUSIUANUS Jordan and Snyder.

Misaki market.

LEPTOCEPHALUS EREBENNUS Jordan and Snyder.

Many specimens procured in the pools at Misaki.

Head, 1.6 in the trunk; head and trunk, 1.6 in tail; lower jaw usually equal to the upper in length, sometimes slightly included; maxillary, 2.5 in head; distance from gill opening to origin of dorsal, 2.3 in head; height of dorsal, 6 in head. Pectorals very broad; rounded in outline. Dorsal inserted near a point above tip of pectoral; sometimes an eye's diameter before or behind it.

Family MURÆNESOCIDÆ.

MURÆNESOX CINEREUS (Forskål).

Kagoshima.

Family OPHICHTHYIDÆ.

OPHICHTHUS ASAKUSÆ Jordan and Snyder.

A specimen examined in Yokahama had the origin of the dorsal above the anterior third of the pectoral.

PISOODONOPHIS ZOPHISTIUS Jordan and Snyder.

Misaki pools; Kagoshima market.

The dorsal and anal increase in height just before reaching tip of tail.

MICRODONOPHIS ERABO Jordan and Snyder.

One specimen obtained in a pool near Misaki. The original description of this species errs in stating that the head and trunk are a little shorter than the tail, the opposite being true. A young specimen from a pool at Misaki, apparently belonging to this species, was bright grayish olive in life, the dorsal bordered by pearly blue.

Family ANGUILLIDÆ.

ANGUILLA JAPONICA Temminck and Schlegel.

Mororan, Shiogama, Tokyo, Misaki, and Kagoshima markets; seined near mouth of river at Akune.

¹ Bleeker, Vijf. Bijd. Ichthyol. Japan, p. 9, pl. 3, fig. 1.

² Fishes Formosa, Mem. Carnegie Mus., vol. 4, p. 112.

Family MURÆNIDÆ.

GYMNOTHORAX KIDAKO (Temminck and Schlegel).

Misaki Market; Tanegashima pools.

GYMNOTHORAX RETICULARIS Bloch.

Kagoshima market.

GYMNOTHORAX LAYSANUS (Steindachner).

One specimen from a tide pool at Tanegashima belongs without doubt to this species.

GYMNOTHORAX ODIOSUS Snyder.

Plate 51, fig. 2.

Gymnothorax odiosus SNYDER, Proc. U. S. Nat. Mus., vol. 35, 1903, p. 94.

A rather characterless species, with a heavy body, a short tail, and a high dorsal.

One specimen from Kagoshima.

AEMASIA LICHENOSA Jordan and Snyder.

An example from the pools at Misaki, measuring 380 millimeters, agrees with specimens previously described except for a slight difference in the length of the head, which is contained 2.7 times in the trunk, 7.5 in the total length. The teeth are markedly short and blunt in this specimen. A smaller individual was secured in the same locality.

Family POECILIIDÆ.

ORYZIAS LATIPES (Temminck and Schlegel).

Shiogama; Yamaguchi; Akune; Nanao; Dogo Island; in small streams and ditches.

Family PEGASIDÆ.

PEGASUS UMITENGU (Jordan and Snyder).

One small example dipped from surface near Shimizu.

Family SYNGNATHIDÆ.

SYNGNATHUS SCHLEGELI Kaup.

Mori; Same; Misaki; taken near shore with a small seine.

SYNGNATHUS YOSHI (Snyder).

Plate 51, fig. 3.

Siphostoma yoshi SNYDER, Proc. U. S. Nat. Mus., vol. 36, 1909, p. 597.

CORYTHOICHTHYS TANAKÆ Jordan and Starks.

Tanegashima; many females and a few males were taken in the pools. A well-developed anal fin is present. The males have larger head tentacles than the females, while there are rows of tentacles present along the lateral ridges of the body in both sexes.

CORYTHOICHTHYS QUINQUARIUS Snyder.

Plate 52, fig. 1.

Corythoichthys quinquarius SNYDER, Proc. U. S. Nat. Mus., vol. 40, 1912, p. 526.

Tanegashima, Japan.

Thirteen specimens, one male and twelve females, were secured by seining in shallow water. All are much alike in color. The dorsal covers 6.5 to 7 rings. The dorsal rays number from 26 to 28.

TRACHYRHAMPUS SERRATUS (Temminck and Schlegel).

Misaki; one specimen from a pool.

UROCAMPUS RIKUZENIUS Jordan and Snyder.

One specimen was taken in Matsushima Bay where the species was first seen. In this example the dorsal fin is confined to 4 rings. Otherwise it is like the type.

MICROPHIS OCELLATUS Snyder.

Tanegashima pools, where the species appear to be rare.

MICROPHIS BRACHYURUS (Bleeker).

Three specimens taken with the seine near shore at Tanegashima do not appear to differ from Samoan examples.

HIPPOCAMPUS JAPONICUS Kaup.

Shiogama; Tsuruga.

HIPPOCAMPUS MOHNIKEI Bleeker.

Misaki.

HIPPOCAMPUS CORNATUS Temminck and Schlegel.

Misaki.

Family AULORHYNCHIDÆ.

AULICHTHYS JAPONICUS Brevoort.

Hakodate, Shiogama, and Misaki; collected with the seine.

In life dark brown or dark olive above, brassy below; small pearly spots along the sides.

Family FISTULARIIDÆ.

FISTULARIA PETIMBA Lacépède.

Misaki market; Shimizu, seined in shallow water.

The interorbital area is almost flat; ridges and serrations weak.

FISTULARIA SERRATA Cuvier.

Shimizu; collected with the seine in shallow water.

The specimens identified with this species have a deeply concave interorbital area, the ridges of the snout more pronounced and the serrations of the same better developed. The body is deeper, the caudal peduncle broader, and the lateral line much more strongly armed posteriorly. The snout is longer, deeper, and heavier.

Family GASTEROSTEIDÆ.

GASTEROSTEUS CATAPHRACTUS (Pallas).

Tomakomai.

PYGOSTEUS TYMENSIS (Nikolsky).

Sapporo; Tomakomai; taken in fresh water with the seine.

Family EXOCOETIDÆ.

CYPSELURUS AGOO (Temminck and Schlegel).

Aikawa and Tokyo markets.

CYPSELURUS POECILOPTERUS (Cuvier and Valenciennes).

Three specimens identified with this species were found in the market at Tokyo. The pectorals have elongate, blackish spots with dusky borders, arranged in transverse rows which become more or less zigzag near the end of the fin. The membranes of the lower 5 or 6 rays are unspotted. The other fins are immaculate or slightly dusky. The tip of the pectoral is formed by the third ray; the first ray is simple, the second branched and longer, its tip being about half way between that of the first and third. Head, 4.6 in length to base of dorsal; depth, 4.8; depth caudal peduncle, 2.7 in head; eye, 2.5; snout, 4.2; interorbital space, 2.5; D. 12; A. 8; P. 16.

Family HEMIRHAMPHIDÆ.

HYPHORHAMPHUS SAJORI (Temminck and Schlegel).

Otaru; Kagoshima.

The following measurements were made from a specimen 300 millimeters long: head, 4.9 in the length to base of caudal; head from lower jaw, 3.3; depth, 9; snout, 2.4 in head; eye, 5; interorbital space, 4.5. One 140 millimeters long measures as follows: head, 4.5; head from lower jaw, 2.5; depth, 11; snout, 2.5 in head; eye, 4.5; interorbital space, 4.2.

Many small specimens were dipped from the surface at Otaru, having been attracted by the ship's lights.

Family ESOCIDÆ.

TYLOSURUS ANASTOMELLA (Cuvier and Valenciennes).

Echigo, Tokyo and Kagoshima markets.

TYLOSURUS GIGANTEUS (Temminck and Schlegel).

Kagoshima market.

Family SPHYRAENIDÆ.

SPHYRAENA JAPONICA Cuvier and Valenciennes.

Tokyo and Kagoshima markets.

SPHYRAENA PINGUIS (Günther).

Hakodate market.

Doctor Jordan recognizes 3 species of Sphyraena in Japan, separating them thus:

Scales about 95.....*pinguis*.

Scales 110 to 125.

Fins pale, ventrals behind dorsal.....*japonicais*.Fins black, ventrals before dorsal.....*nigripinnis*.Specimens of *S. nigripinnis* were not seen.

Family MUGILIDÆ.

MUGIL CEPHALUS Linnaeus.

Misaki pools; Tokyo market.

LIZA HÆMATOCHILA (Temminck and Schlegel).

Tokyo market.

Family MONOCENTRIDÆ.

MONOCENTRUS JAPONICUS Houttuyn.

Misaki.

Family BERYCIDÆ.

BERYX SPLENDENS Lowe.

Misaki.

Family TRACHICHTHYIDÆ.

GEPHYROBERYX JAPONICUS (Döderlein).

Shimizu market.

HOPLOSTETHUS MEDITERRANEUS Cuvier and Valenciennes.

Kagoshima market.

Family HOLOCENTRIDÆ.

HOLOCENTRUS RUBER (Forskål).

Tanegashima.

HOLOCENTRUS SAMMARA (Forskål).

Tanegashima. The lateral stripes are pale but the dorsal spot is jet black.

MYRIPRISTIS MACROLEPIS Bleeker.

Tanegashima market.

Family POLYMIXIIDÆ.

POLYMIXIA JAPONICA (Steindachner.)

Shimizu market.

Family SCOMBRIDÆ.

SCOMBER JAPONICUS Houttuyn.

Otaru and Hakodate markets.

EUTHYNNUS PELAMIS (Linnaeus).

Misaki market.

EUTHYNNUS ALLETERATUS (Rafinesque).

Tokyo and Kagoshima markets.

Family RUVETTIDÆ.

ACANTHOCYBIUM SOLANDRI (Cuvier and Valenciennes).

Misaki market.

JORDANIDIA RAPTORIA Snyder.

Plate 52, fig. 2.

Jordanidia raptoria SNYDER, Proc. U. S. Nat. Mus., vol. 40, 1912, p. 527.

Tanegashima market.

Family TRICHIURIDÆ.

TRICHIURUS JAPONICUS Temminck and Schlegel.

Tokyo and Kagoshima markets.

Color in life, bright silvery with metallic reflections; the fins transparent.

TRICHIURUS HAUMELA (Forskål).

Tokyo market.

Two orange stripes along the sides, the lower bordering the lateral line.

Family CARANGIDÆ.

SCOMBROIDES ORIENTALIS (Temminck and Schlegel).

Kagoshima market.

SERIOLA AUREOVITTATA Temminck and Schlegel.

Aikawa, Misaki, Tsuruga, and Kagoshima markets.

Several specimens are identified with doubt as the above species.

SERIOLA PURPURASCENS Temminck and Schlegel.

Tokyo, Misaki and Kagoshima markets.

DECAPTERUS MUROADSI (Temminck and Schlegel).

Tokyo and Misaki markets.

TRACHURUS JAPONICUS (Temminck and Schlegel).

Otaru, Hakodate, Aikawa, Tokyo, Misaki, and Kagoshima markets.

CARANX EQUULA Temminck and Schlegel.

A specimen 170 millimeters long from Kagoshima has 6 or 7 very faint dark bars extending downward from the darker upper half of the body. These bands are more prominent on smaller examples.

CARANX DELICATISSIMUS Doderlein.

One example from Misaki apparently belongs to this species.

CARANX FLAVOCÆRULEUS Temminck and Schlegel.

Kagoshima market.

Examples of this species may be easily distinguished from those of *C. ignobilis*, which they resemble, by the sharper snout. The young of *C. flavocaeruleus* are conspicuously barred.

CARANX IGNOBILIS (Forskål).

Kagoshima market.

The specimens here identified as *C. ignobilis* appear to agree in all details of structure with those from Hawaii described and figured by Jordan and Evermann.¹

CARANX ARMATUS (Forskål).

Kagoshima market.

ALECTIS CILIARIS (Bloch).

Misaki market.

When compared with examples of *A. major* from Formosa, specimens of this species may be recognized at a glance by the heavier body, smaller head, which is much broader between the eyes, and the darker dorsal surface with the distinct curved lateral bands.

¹ Fishes, Hawaii, p. 188, fig. 72.

Family LEIOGNATHIDÆ.

LEIOGNATHUS ARGENTIUM Lacepede.

Suruga market.

LEIOGNATHUS RIVULATUM (Temminck and Schlegel).

Kagoshima market.

Family LAMPRIDÆ.

LAMPRIS REGIA Bonnaterre.

A large specimen was examined in the Aomori market. The color was dark bluish gray, growing lighter and becoming silvery beneath; body with small white spots with dusky borders; fins and lips bright red. D. 49; A. II, 36; P. 18; V. 15. The Japanese name is *Mombo*.

Family STROMATEIDÆ.

PSENOPSIS ANOMALA (Temminck and Schlegel).

Tokyo market.

Family PEMPHERIDÆ.

CATALUFA UMBRA Snyder.

Plate 52, fig. 3.

Catalufa umbra SNYDER, Proc. U. S. Nat. Mus., vol. 40, 1912, p. 528.

One specimen from Misaki.

Family CHEILODIPTERIDÆ.

APOGONICHTHYS CARINATUS (Cuvier and Valenciennes).

Shimizu market.

AMIA NIGRA (Döderlein).

Shimizu and Kagoshima markets.

AMIA MARGINATA (Döderlein).

Kagoshima market.

AMIA UNICOLOR (Döderlein).

One small specimen from the pools at Tanegashima. In life the body is strongly suffused with bright red, the color more intense and clear on the fins. The first dorsal spine is minute and almost concealed beneath the scale preceding it.

AMIA LINEATA (Temminck and Schlegel).

Tokyo market; Misaki pools; Nanao market.

AMIA SEMILINEATA (Temminck and Schlegel).

Misaki pools; Shimizu, seined in shallow water.

AMIA NOTATA (Houttuyn).

Kagoshima market; Tanegashima pools.

AMIA KIENSIS (Jordan and Snyder).

Seined in shallow water near Shimizu.

SCOMBROPS BOOPS (Houttuyn).

Tokyo market.

Family AMBASSIDÆ.

AMBASSIS LAFA Jordan and Seale.

Young examples of this species measuring about 45 millimeters in length were taken in the pools at Tanegashima. They appear to be like Samoan examples in every particular except that the eye is somewhat larger and the third dorsal spine is slightly longer.

Family KUHLIIDÆ.

BOULENGERINA TÆNIURA (Cuvier and Valenciennes).

Misaki and Tanegashima pools.

It appears that the young only live in the pools, the specimens there found usually measuring about 50 millimeters.

Family SERRANIDÆ.

MALAKICHTHYS GRISEUS Döderlein.

Kagoshima market. Three specimens. The pectorals extend to origin of anal fin.

LATEOLABRAX JAPONICUS (Cuvier and Valenciennes).

Tokyo, Misaki, and Kagoshima markets.

BRYTTOSUS KAWAMEBARI (Temminck and Schlegel).

Yamaguchi.

STEREOLEPIS ISCHINAGI (Hilgendorf).

Young examples from the markets at Otaru and Hakodate.

AULACOCEPHALUS TEMMINCKI Bleeker.

One example from the market at Shimizu.

EPINEPHELUS CHLOROSTIGMA (Cuvier and Valenciennes).

Kagoshima market.

EPINEPHELUS CRASPIDURUS Jordan and Richardson.

Kagoshima market.

EPINEPHELUS AKAARA (Temminck and Schlegel).

Tokyo market.

The teeth become more numerous with increasing age, the patch of fine teeth present on the anterior part of the jaws of younger individuals growing wider and extending backward as the body increases in size. The maxillary extends far beyond the orbit in large examples while in smaller ones it scarcely reaches it.

One specimen has 4 rather definite dark, saddle-shaped bars on the back.

EPINEPHELUS FARIO (Thunberg).

The young of what appears to be this species were taken at Misaki. There are 2 well marked black blotches at the base of the spinous dorsal.

EPINEPHELUS EPISTICTUS (Temminck and Schlegel).

A specimen from Misaki measuring 380 millimeters, differs in color from that figured by Jordan and Richardson. There are 2 sharply defined, dark stripes passing backward from the eye, one to the upper edge of the pectoral where it ends, the other midway between the latter and angle of opercle, from where it turns downward and then extends backward as a row of small, closely apposed spots along the side of body to base of caudal. A stripe originates on upper edge of opercle and extends along body to caudal; like the above, after leaving the head, it is made up of spots more or less closely apposed, and posteriorly it is broken up into reticulations. Above these fairly definite stripes are numerous spots, each of which is about as large as a scale. A dusky band, narrow in front and broadening posteriorly extends along side of head just above maxillary to edge of preopercle.

EPINEPHELUS PÆCILONOTUS (Temminck and Schlegel).

Misaki market. One specimen has 15 dorsal rays. The color pattern is that illustrated by Temminck and Schlegel, the dark region of the spinous dorsal extending downward on the back forming a large oval spot not connected with the longitudinal stripes.

EPINEPHELUS MOARA (Temminck and Schlegel).

Misaki pools; Shimizu market.

EPINEPHELUS SEPTEMFASCIATUS (Thunberg).

Misaki.

EPINEPHELUS CÆRULEOPUNCTATUS (Bloch).

Tanegashima pools.

CHELIDOPERCA HIRUNDINACEA (Cuvier and Valenciennes).

One specimen from Tanegashima.

ANTHIAS MARGARITACEUS Hilgendorf.

Three specimens measuring about 100 millimeters in length were taken in a pool at Misaki. There is a dense, black blotch on the posterior part of spinous dorsal. The species is said to inhabit deep water, its occurrence in a pool being unusual.

PSEUDANTHIAS VENATOR Snyder.

Plate 53, fig. 1.

Pseudanthias venator SNYDER, Proc. U. S. Nat. Mus., vol. 40, 1912, p. 529.

One specimen from the Kagoshima market. This species is somewhat like *Anthias nobilis* lately described by Franz,¹ but its maxillary is broader and longer, the spinous dorsal is much lower, and there are other differences including color pattern.

SAYONARA SATSUMÆ Jordan and Seale.

Two specimens from the Kagoshima market.

¹ Abh. der Math. Phys. Klasse der k. bayer. Akademie der Wissenschaften, vol. 4, 1910.

Family THERAPONIDÆ.

THERAPON OXYRHYNCHUS Temminck and Schlegel.

Tokyo, Shimizu, and Kagoshima markets; Akune, where specimens were secured with the seine.

THERAPON SERVUS Bloch.

Several specimens from the market at Kagoshima.

PLECTORHYNCHUS PICTUS (Thunberg).

One small specimen from the market at Kagoshima.

PARAPRISTOPOMA TRILINEATA (Thunberg).

Tokyo and Misaki markets.

Family SPARIDÆ.

SPARUS LATUS Houttuyn.

Tokyo and Kagoshima markets.

SPARUS ARIES Temminck and Schlegel.

Tokyo market; Shimizu; Kagoshima.

TAIUS TUMIFRONS Temminck and Schlegel.

Kagoshima market.

EVYNNIS CARDINALIS (Lacepede).

Aikawa, Misaki, Tokyo, and Kagoshima markets; also observed in the markets of Otaru, Mororan, and Hakodate, where specimens shipped from the south were offered for sale.

GYMNOCRANIUS GRISEUS (Temminck and Schlegel).

Tokyo, Misaki, and Nagasaki markets.

ENTHYOPTEROMA VIRGATUM (Houttuyn).

Tokyo and Kagoshima markets; Shimizu, with the seine.

ENTHYOPTEROMA BATHYBIUM (Snyder).

Nemipterus bathybius SNYDER, Proc. U. S. Nat. Mus., vol. 40, 1912, p. 532, vol. 41, p. 566, fig. 6.

Kagoshima market.

Family KYPHOSIDÆ.

GIRELLA PUNCTATA Gray.

Misaki, Akune, Kagoshima, and Tanegashima pools. Common in the pools at Akune, where it is associated with *G. melanichthys*, a species not represented in such large numbers.

GIRELLA MELANICHTHYS (Temminck and Schlegel).

Tokyo market; Misaki pools; Akune and Tanegashima.

A specimen 360 millimeters long from the Tokyo market has 15 dorsal spines, 64 scales in the lateral series, and a broad dusky edge on the opercle.

GIRELLA MEZINA Jordan and Starks.

Small examples were taken in the Misaki pools.

Family GERRIDÆ.

XYSTÆMA ERYTHROURUM (Bloch).

Tanegashima pools.

Family SCIAENIDÆ.

SCIÆNA MITSUKURII (Jordan and Snyder).

Tokyo market.

SCIÆNA SCHLEGELI (Houttuyn).

Kagoshima market.

Family OPLEGNATHIDÆ.

OPLEGNATHUS FASCIATUS (Temminck and Schlegel).

Hakodate and Tokyo markets; Tanegashima pools.

Family HISTIOPTERIDÆ.

EVISTIAS ACUTIROSTRIS (Temminck and Schlegel).

Tokyo market.

HISTIOPTERUS TYPUS Temminck and Schlegel.

One specimen seen in the Tokyo Market, where it is said to be rare.

Family PRIACANTHIDÆ.

PRIACANTHUS JAPONICUS Temminck and Schlegel.

Tokyo and Misaki markets.

PRIACANTHUS HAMRUR (Forskål).

Misaki. In life, brilliant red with a bright metallic sheen; the fins darker, especially toward the tips. The bright color fades after death, dark bars then appearing on the back. In life only the merest trace of the bars is apparent.

Family MULLIDÆ.

UPENEOIDES TRAGULA Richardson.

Kagoshima market; Tanegashima pools.

Color in life: Body with a reddish brown lateral stripe, above which it is light greenish with a brassy tinge, the scales variegated with reddish brown; below, whitish, tinged with yellowish and greenish, variegated with spots of brown and light cherry red; under parts white; barbels orange; dorsals yellowish, clouded with brown and cherry red; spinous dorsal with an orange spot; caudal lemon yellow, barred with red, becoming darker below; deep brown on lower lobe; ventrals and anal lemon yellow, indistinctly clouded with red; pectorals barred with yellow and red.

UPENEOIDES SULPHUREUS (Cuvier and Valenciennes).

Kagoshima market.

UPENEOIDES BENSASI (Temminck and Schlegel)

Misaki, Shimizu, and Kagoshima markets.

Family APLODACTYLIDÆ.

GONIISTIUS ZONATUS Cuvier and Valenciennes.

Misaki market.

Family POLYNEMIDÆ.

POLYDACTYLUS AGONASI Jordan and McGregor.

Kagoshima market.

Family SILLAGINIDÆ.

SILLAGO JAPONICA Temminck and Schlegel.

Misaki, Tokyo, Shimizu, Kagoshima, and Tsuruga markets.

SILLAGO PARVISQUAMIS Gill.

Tokyo market.

Family LATILIDÆ.

LATILUS JAPONICUS (Houttuyn).

There are at least 2 distinct species of *Latilus* in Japan. One may be recognized by its large eye (3.4 in head), and by the presence of a narrow, black stripe which occupies a sharp, median ridge extending from the interorbital area to the base of the dorsal. This is *L. ruber* Kishinouye.¹ The other has a much smaller eye (4.1 in head), while the region of the occiput and nape is immaculate. It is quite probable that the latter is *L. japonicus*, the species described by Houttuyn,² Cuvier and Valenciennes,³ and by Temminck and Schlegel. Each describes the color, not mentioning a black nuchal stripe. Temminck and Schlegel's figure⁴ portrays the small eye and immaculate nape. Jordan and Snyder also refer to this species.⁵

Doctor Kishinouye of the Imperial University furnishes the following description of the color: "Pinkish, with many transverse yellow bands on the side; 2 or 3 wavy, yellow lines near to and parallel with the posterior margin of the caudal; region between the occiput and origin of dorsal pale gray."

The species appears to be rather rare. Two examples were secured, one in the Tokyo market and the other at Shimizu.

LATILUS RUBER Kishinouye.

In a paper published in Japanese by Dr. K. Kishinouye⁶ the species distinguished by the black nuchal stripe and large eye is described. The author furnishes the following translation:

D. VIII, 15; A. 13; scales 7, 22; 67; vertebræ 24; head $4\frac{1}{2}$ in the total length; eye 3 in length of head.

The tip of pectoral reaches a vertical from the fourth ray of dorsal, while the tip of the latter, when depressed reaches a little beyond the base of the caudal fin. The

¹ Zoological Magazine, Tokyo, vol. 19, Feb., 1907.² Holl. Maats. Wet. Harlem, vol. 20, 1872, p. 311.³ *L. argentatus*, Nat. des Poissons, vol. 5, p. 368, and vol. 9, p. 495.⁴ Fauna Japonica, pl. 28, fig. 2.⁵ Proc. U. S. Nat. Mus., vol. 24, 1902, p. 489.⁶ Zoological Magazine, Tokyo, vol. 19, Feb., 1907.

posterior end of the ethmoid appears as a long, narrow process between the anterior part of the frontal bones. The hæmal process of the first caudal vertebra is strong, nonflexible, and is curved a little anteriorly.

The color is bright red, with many transverse yellow bands. There are two longitudinal yellow bands in the caudal fin. They originate at the base of the caudal and gradually approach each other toward the posterior margin of the fin. On the upper part of the fin there are two or three short, yellow bands, while the lower half is pale blue. There is a median, black stripe between occiput and origin of dorsal, the lateral boundaries of which are very distinctly marked. More of a literal species than the preceding.

This is the species figured and described by Otaki, Fujita, and Higurashi.¹

Numerous specimens were secured in the Tokyo market. Two were purchased at Kagoshima.

Family CEPOLIDÆ.

CEPOLA SCHLEGELI Bleeker.

A specimen measuring 300 millimeters was found in the Tokyo market.

Head, 9.2 in the length to base of caudal; depth, 12.5; snout, 5 in head; eye, 3.3; maxillary, 2.3; width interorbital space, 5.3; D. 68; A. 55; P. 19. The maxillary extends to a point below posterior border of pupil. There is a single row of curved canine teeth in each jaw, beyond which, on the lower jaw, are 3 strong teeth on each side of the symphysis. The head is entirely naked. The pectoral is broadly rounded, its length contained 2.1 times in the head.

ACANTHOCEPOLA KRUSENSTERNI (Temminck and Schlegel).

Shimizu, Mitajiri, Kagoshima, and Nagasaki markets. The dorsal has from 80 to 84 and the anal 78 to 80 rays.

Family EMBIOTOCIDÆ.

DITREMA TEMMINCKI Bleeker.

Same, Aikawa, and Misaki pools; Otaru and Tokyo markets.

NEODITREMA RANSONNETI Steindachner.

Hakodate and Misaki markets; Aikawa.

Several specimens measured 150 millimeters in length.

Family POMACENTRIDÆ.

CHROMIS NOTATUS (Temminck and Schlegel).

Misaki pools; Tokyo market.

ABUDEFDUF SORDIDUS (Forskål).

Misaki and Tanegashima pools. Only young examples of this species were found. They were common in the pools at Tanegashima. Fifteen specimens were collected at Misaka, the largest of which measures 55 millimeters.

¹ Fishes, Japan, vol. 1, No. 1, 1903.

ABUDEFDUF SAXATILIS (Linnæus).

Misaki and Tanegashima pools. None but small specimens were seen.

ABUDEFDUF BENGALENSIS (Bloch).

Tanegashima pools. The two specimens collected agree with the figure published by Day.¹

ABUDEFDUF SEXFASCIATUS (Lacépède).

Tanegashima pools. One small individual.

ABUDEFDUF CLARKI Snyder.

Plate 53, fig. 2.

Abudefduf clarki SNYDER, Proc. U. S. Nat. Mus., vol. 40, 1912, p. 534.

Pools at Misaki.

ABUDEFDUF ZONATUS (Cuvier and Valenciennes).

Tanegashima pools; 4 specimens, the largest measuring 35 millimeters.

ABUDEFDUF ANTJERIUS (Kuhl and Van Hasselt).

Tanegashima pools; 3 specimens.

This is a very brightly colored species, the brilliant hues fading rapidly after death. The body is yellowish olive, darker above, with a purplish tinge on region between anal and spinous dorsal, becoming orange on caudal peduncle and tail, lighter and grayish in region covered by pectoral, and on belly; chin, throat, and breast bluish gray; pores of lateral line yellow; eye very dark, with a conspicuous dash of white on the iris below pupil; a purple stripe bordered by dusky extending from eye to dorsal and then along base of fin and finally joining an ocellus on posterior part of spinous dorsal; base of soft dorsal with a purple edged ocellus on its posterior end; dorsals purplish brown above which is a narrow orange stripe, then one of purple which in turn is followed by an orange edge; anal yellowish olive narrowly edged with blue; pectorals orange; ventrals suffused with orange, the spine bluish.

ABUDEFDUF GLAUCUS (Cuvier and Valenciennes).

One young individual from a pool at Misaki, and numerous specimens from the pools at Tanegashima measuring from 20 to 65 millimeters in length.

ABUDEFDUF AMABILIS (De Vis).

One specimen from a pool at Tanegashima.

Family LABRIDÆ.

CHOERODON AZURIO (Jordan and Snyder).

Misaki, Shimizu, and Kagoshima markets.

Occasionally small (75 to 100 millimeters long) specimens may be found without posterior canine teeth. Some examples have 28 scales in the lateral line.

¹ Fishes India, pl. 83, fig. 3.

SEMICOSSYPHUS RETICULATUS (Cuvier and Valenciennes).

One young specimen was found in the Tokyo market.

DUYMÆRIA FLAGELLIFERA (Cuvier and Valenciennes).

Tokyo and Nagasaki markets.

Young examples have the head markedly larger than adults, an example 120 millimeters long having the head contained but 2.5 times in the length to base of caudal.

PSEUDOLABRUS JAPONICUS (Houttuyn).

Tokyo, Misaki, Shimizu, Tsuruga, and Nagasaki markets.

PSEUDOLABRUS GRACILIS (Steindachner).

Shimizu market. A specimen about 90 millimeters long has 6 converging, oblique, blackish lines on the caudal peduncle. Another example has a small, sharply outlined, black spot on membrane of dorsal fin between first and second dorsal spines.

STETHOJULIS STRIGIVENTER (Bennett).

One specimen from a pool at Tanegashima.

Color in life olive above, silvery below, bluish on breast and abdomen, tinged with purple on lower part of head; a pearly blue line below eye, narrowly bordered with brown; lower half of body with alternating stripes of silver and olive; a small brownish black spot on caudal peduncle; dorsal pale orange, narrowly edged with pearly white, a dark spot on posterior part bordered by a ring of transparent membrane; middle of caudal suffused with orange, the outer rays tinted with blue; anal like dorsal; pectorals pinkish; ventrals bluish. Specimens examined (mostly from Okinawa) appear to have no posterior canine.

STETHOJULIS KALOSOMA (Bleeker).

Stethojulis terina JORDAN and SNYDER, Proc. U. S. Nat. Mus., vol. 24, 1902, p. 631.

Stethojulis zatima JORDAN and SEALE, Proc. U. S. Nat. Mus., vol. 28, 1905, p. 788.

Some small fishes, 30 to 40 millimeters long, from the rock pools at Misaki are identified as the young of the above species. The smaller ones have a distinct spot at the base of the caudal just above the lateral line, and an ocellus on the soft dorsal. There is a dusky stripe from snout to caudal below which are several rows of dark spots, one on each scale, and a black dot on each side of the tip of the snout.

These specimens are in all respects like a cotype of *S. zatima* Jordan and Seale, and they agree with the description of the species. The figure of *S. zatima* is probably incorrect in that it illustrates 1 anal and 7 dorsal spines when there are 2 and 9 respectively.

STETHOJULIS AXILLARIS (Quoy and Gaimard).

Three specimens were collected from the pools at Tanegashima.

STETHOJULIS PHEKADOPLEURA Bleeker.

Tanegashima pools; 4 examples.

HALICHOERES POECILOPTERUS (Temminck and Schlegel).

Hakodate, Nagasaki, and Oki Island markets; Misaki pools and market.

HALICHOERES BLEEKERI (Steindachner and Döderlein).

Tokyo market.

HALICHOERES OPERCULARIS (Günther).

Tanegashima pools, 5 specimens. In life the body is silvery with a greenish cast, most of the scales edged with brick red or reddish brown, the color darker dorsally where it nearly covers the scales; lighter ventrally; much deeper in region of the dark spots; a pale golden stripe, bordered by greenish blue below eye; a greenish stripe on snout before eye. Dorsals variegated with red, the membrane tinged with golden; ring surrounding ocellus transparent below, orange above. Inner rays of caudal dotted with red; fin narrowly edged with red. Anal greenish yellow with red bands. Pectorals suffused with pink; ventrals deep red at base, broadly edged with dead white.

HALICHOERES TRIMACULATUS (Quoy and Gaimard).

Four specimens 50 millimeters and less in length, from Tanegashima, are believed to be the young of this species. Three of them have the characteristic axillary and caudal spots, the latter being absent on the smallest. In addition all have a black dot on lateral line at base of caudal, and 5 broad dusky bands on the body. Of the bands, the second and third tend to coalesce and the first and fourth are rather faint in one example.

THALASSOMA CUPIDO (Temminck and Schlegel).

Misaki; Tanegashima; Akune. Very abundant in the pools at Tanegashima.

In life the dark parts along the back and sides are bluish black, the connecting network brick red, the latter color bright and clear between the stripes, while becoming dark on approaching them. There is a brick red stripe along the lower half of body, the parts near it being bright green. The head and a restricted region below the pectoral tinted with brassy; stripe extending backward from mouth, pale red; chin, throat, breast, and belly tinged with bright red. The dorsal has a narrow transparent border below which is a stripe of brick red, then in succession one of yellowish green, reddish, and brownish black. Caudal green at base, then bluish tinged with red, then yellowish green followed by red. Anal with a basal stripe of reddish brown below which is a yellowish green stripe bordered by blue, then a red stripe and finally a pale greenish border. Pectorals lightly suffused with blue.

INIISTIVUS DEA (Temminck and Schlegel.)

Misaki and Shimizu markets.

The head is not entirely naked, there being a few small scales behind eye and at upper edge of opercle. A specimen from the

Tokyo market measuring about 150 millimeters in length has small dark spots, one on each scale, on the lower and posterior part of the body. The spots are elongate in shape and are arranged in straight lines.

Family SCARICHTHYIDÆ.

CALOTOMUS JAPONICUS (Cuvier and Valenciennes).

Tokyo and Misaki markets.

Family CHÆTODONTIDÆ.

CHÆTODON SETIFER Bloch.

Tanegashima pools. Two young examples, the first recorded from Japan.

CHÆTODON VAGABUNDUS Linnæus.

Misaki and Tanegashima pools.

But three small specimens were secured.

CHÆTODON COLLARIS Bloch.

Kagashima market.

CHÆTODON NIPPON Doderlein.

Misaki, in the deep pools.

CHÆTODON LUNULA (Lacépède).

Aikawa, Misaki, Akune, and Tanegashima pools.

This species was reported as *Chaetodon modestus* by Jordan and Fowler,¹ an example of which they later describe as *Coradion desmotes*, new species.

Only the young of this species has been reported from Japan. Like many others it is apparently carried by currents to the northward far beyond a latitude where it is able to reach maturity. Young examples from Tanegashima were very light gray with a bluish tint, reddish orange posteriorly; dorsal, caudal, and anal edged with dead white; ventrals and pectorals pale blue.

CORADION MODESTUM (Schlegel).

Coradion desmotes JORDAN and FOWLER, Proc. U. S. Nat. Mus., vol. 25, 1903, p. 539—SMITH and POPE, Proc. U. S. Nat. Mus., vol. 31, 1907, p. 480.

Temminck and Schlegel's figure appears defective in not showing dark edges to the cross-bands. The caudal is nearly truncate, not lunate as in this figure nor rounded as represented by Jordan and Fowler.

Smith and Pope record a specimen from Urado. The fish dealers at Kagoshima recognizing the species from a figure, stated that it is occasionally found there.

MICROCANTHUS STRIGATUS (Cuvier and Valenciennes).

Misaki pools.

HOLACANTHUS BISHOPI Seale.

One specimen 17 millimeters long was found in a pool at Misaki. Adults were taken at Okinawa.

¹ Proc. U. S. Nat. Mus., vol. 25, 1903, p. 535.

Family HEPATIDÆ.

XESURUS SCALPRUM (Cuvier and Valenciennes).

Tokyo market; Misaki pools and market.

HEPATUS TRIOSTEGUS (Linnæus).

Young examples from the pools at Tanegashima.

CTENOCHAETUS STRIATUS (Quoy and Gaimard).

This species is represented by a specimen 50 millimeters long from Misaki. This, among others, is a good example of a form carried to the northward by the warm currents, far beyond a point where it is able to maintain itself.

Family SIGANIDÆ.

SIGANUS FUSCESCENS (Houttuyn).

Tokyo market; Shimizu, taken with the seine.

Family TRIACANTHIDÆ.

TRIACANTHUS BREVIROSTRIS Temminck and Schlegel.

Numerous specimens of this species which appears to be rare in Japan were taken with a seine near shore at Shimizu. They measure about 105 millimeters.

Family BALISTIDÆ.

CANTHIDERMIS ROTUNDATUS (Procé).

Five specimens of this species were collected from the tide pools at Misaki. They measure from 55 to 128 millimeters in length. The larger ones are almost uniform blue black, the light spots being scarcely perceptible. It is possible that this species may only occasionally appear along the coast of Japan.

Family MONACANTHIDÆ.

MONACANTHUS CIRRHIFER Temminck and Schlegel.

Tokyo market; Misaki pools; Shimizu, seined in shallow water.

MONACANTHUS JAPONICUS Tilesius.

Kagoshima.

CANTHERINES MODESTUS (Günther).

Otaru, Hakodate, Nanao, and Tokyo markets.

RUDARIUS ERCODES Jordan and Fowler.

Misaki in shallow water.

ALUTERA MONOCEROS (Osbeck).

One small specimen was found in a pool at Misaki. D. 48; A. 49.

Family OSTRACIIDÆ.

OSTRACION IMMACULATUM Temminck and Schlegel.

Misaki.

OSTRACION DIAPHANUM Bloch and Schneider.

Misaki.

One example has the sides of carapace parallel to about the base of pectoral, where they rather abruptly flare outward.

LACTOPHRYS TRITROPIS Snyder.

Plate 54, fig. 1.

Lactophrys tritropis SNYDER, Proc. U. S. Nat. Mus., vol. 40, 1912, p. 535.

Misaki pools.

Family TETRAODONTIDÆ.

SPHEROIDES SPADICEUS (Richardson).

Misaki; Shimizu; Kagoshima.

In life the specimen from Shimizu was light brown above with a golden tinge, the lower parts suffused with golden yellow; spots dark brown; iris orange red.

SPHEROIDES ALBOPLUMBEUS (Richardson).

Mororan, Hakodate, and Tokyo markets; Mori, with the seine; Otaru, Mororan; Aikawa, and Misaki pools.

This species, very like the above, may be distinguished by its generally larger and fewer spots, by the absence of minute white tubes above and below the lateral line, and by the large, dusky blotch on the caudal.

In some specimens of *S. alboplumbeus* the white spots are numerous enough and sufficiently close together to appear like ocelli; in some specimens the spots have a narrow dark border; while in other examples the spots join, forming light reticulations. Sometimes the latter tend to meet, thus inclosing round, dark spots, and causing the individual to resemble one of *S. pardalis*. Specimens of *S. pardalis* are easily distinguished by the presence of numerous small thickenings of the surface of the skin which look much like embedded scales. There appears to be some doubt concerning the validity of *S. borealis* Jordan and Snyder, it being possible that the species is founded on an extreme variation of *S. alboplumbeus*.

SPHEROIDES STICTONOTUS (Temminck and Schlegel).

Aikawa; Tokyo market.

Three specimens are closely spotted and finely reticulated above.

SPHEROIDES PARDALIS (Temminck and Schlegel).

Mororan and Tokyo markets; Aikawa, Misaki, and Shiogama pools.

SPHEROIDES EXASCURUS Jordan and Snyder.

One specimen from Misaki is in all particulars like the type of the species.

SPHEROIDES NIPHOBLES Jordan and Snyder.

Aikawa; Misaki, Mitajiri, Kagoshima, and Tanegashima; both markets and pools.

The posterior part of the lateral line is bordered both above and below by a row of minute mucous pores that are rendered conspicuous because of their white openings. The caudal fin is mostly light in color, an occasional specimen having a slight touch of dusky near the border. In some young specimens the lateral blotches are continued across the back, forming a fairly well-defined saddle.

SPHEROIDES CHRYSOPS (Hilgendorf).

Misaki.

CANTHIGASTER RIVULATUS (Temminck and Schlegel).

Misaki market and pools.

CANTHIGASTER JACTATOR (Jenkins).

Misaki pools. Three specimens, measuring 37 millimeters in length, do not differ from Laysan Island examples. This species has not heretofore been taken except in the region of Hawaii.

Family DIODONTIDÆ.

DIODON HOLACANTHUS Linnæus.

Misaki. A specimen 260 millimeters long has comparatively short frontal spines and very long post-pectoral ones. It is spotted above and white beneath.

Family SCORPAENIDÆ.

SEBASTOLOBUS MACROCHIR (Günther).

Shimizu market.

SEBASTODES TACZANOWSKII Steindachner.

Hakodate and Mororan markets. The species may be recognized among others from Japan by the white-tipped caudal. One specimen has 14 dorsal spines.

SEBASTODES ITINUS Jordan and Starks.

Hakodate market.

SEBASTODES STEINDACHNERI (Hilgendorf).

Otaru market.

SEBASTODES INERMIS (Cuvier and Valenciennes).

Otaru market; Misaki and Aikawa pools; Shiogama, seined.

Jordan and Starks are followed in the identification of *S. inermis* and *S. tokionis*. The first of these is deeper than the other, the depth being considerably greater than the length of head, and it has a smaller eye. These differences are especially striking when examples of the same size are compared. Either species might be identified with *S. inermis* as described by Cuvier and Valenciennes.¹

¹ Vol. 4, p. 346.

Günther¹ refers a specimen to *S. inermis*, remarking that the height of the body is equal to the length of the head, which would seem to indicate that he had an example of *S. tokionis*. Temminck and Schlegel describe and figure what appears to be one of these species (*S. ventricosus*). "L'oeil est très volumineux" and it is so illustrated in the figure which thus agrees with *S. tokionis*, but the depth measured on the figure is considerably greater than the length of the head, as in the form called *S. inermis* by Jordan and Starks. There seems to be no way to definitely determine which of these species is the *S. inermis* of Cuvier and Valenciennes, or whether either of them is. It appears probable that *S. inermis* Günther, *S. ventricosus* Temminck and Schlegel, and *S. tokionis* Jordan and Starks are synonymous.

Examples of the one here called *S. inermis* generally have 7 or 8 rays in the anal. Günther counts 6 rays in *S. inermis*. Temminck and Schlegel record 7 and figure 8 for *S. ventricosus*.

SEBASTODES TOKIONIS Jordan and Starks.

Tokyo market.

SEBASTODES JOYNERI (Günther).

Hakodate and Tokyo markets.

SEBASTODES IRACUNDUS Jordan and Starks.

A specimen measuring 340 millimeters from the market at Mororan is identified as *S. iracundus*. It agrees with the type of this species except in color and squamation, where some slight differences appear. The Mororan example is without the black spot which appears on the side of the body just below the spinous dorsal in the type. This spot is variable in size, however, as its diameter on one side of the single specimen is about equal to that of 5 scales, while on the other it is scarcely more than that of 1. The Mororan specimen has a broad, dark blotch on the upper part of the opercle, an indistinct, narrow, dusky border along the spinous dorsal, and a few indefinite, dusky clouds on the dorsal half of the body. These marks do not appear on the type, although the dark opercular spot is faintly indicated. Both specimens have the branchiostegal membranes blackish where they are covered with the opercles, and the lining of the gill chambers and the mouth also black, except the upper surface of the mouth and tongue. The squamation of the type is remarkably complete, minute scales covering the tip of the snout, maxillaries, mandibles, chin, throat, and branchiostegals rays. The Mororan specimen has naked spots in these regions, an occasional pit indicating that the scales may be deciduous in limited areas.

Sebastodes iracundus is closely related to *S. melanostomus* of the California coast, with which it may even be identical. Two

¹ Cat. Fish. Brit. Mus., pl. 2, p. 97.

examples of the latter, somewhat larger than the smaller Japanese specimen, have comparatively heavier and longer spines on the head, shorter dorsal spines, and slightly wider interorbital areas. These species are related to *S. introniger*, and a direct comparison of Japanese and California specimens does not contribute anything to an easy discrimination of either form.

SEBASTODES FUSCESCENS (Houttuyn).

Mororan, Hakodate, and Tokyo markets; Same, where taken in the pools.

SEBASTODES TANAKÆ Snyder.

Plate 54, fig. 2.

Sebastes tanakæ SNYDER, Proc. U. S. Nat. Mus., vol. 40, 1812, p. 536.

Market at Hakodate.

This species was named for Mr. Shigeo Tanaka.

SEBASTICHTHYS VULPES (Steindachner and Döderlein).

Hakodate.

SEBASTICHTHYS NIVOSUS (Hilgendorf).

Hakodate and Tokyo markets.

SEBASTICHTHYS TRIVITTATUS (Hilgendorf).

Otaru and Hakodate markets.

SEBASTICHTHYS MITSUKURII (Cramer).

Shiogama; Tokyo and Nanao markets.

SEBASTICHTHYS ELEGANS (Steindachner and Döderlein).

Toyko and Misaki pools.

SEBASTICHTHYS PACHYCEPHALUS (Temminck and Schlegel).

Otaru, Hakodate, Aikawa, Misaki, Akune, and Tokyo; pools and market.

Small specimens from the pools at Aikawa and Misaki have 3 dense black bands crossing the body, one passing through dorsal fin and the other on the caudal peduncle. One specimen has no tympanic spine developed.

SEBASTISCUS MARMORATUS (Cuvier and Valenciennes).

Hakodate, Tokyo, Misaki, Nanao, Kagoshima, and Nagasaki markets.

One of the specimens from Nanao is rather light in color, has the spines rather more slender than the others, and in other respects resembles *S. albofasciatus*. It has no trace of a subocular spine.

HELICOLENUS HILGENDORFI Döderlein.

Shimizu market.

The writer is inclined to follow Döderlein¹ in regarding this species as distinct from *H. dactylopterus* (De La Roche). In comparing several Japanese specimens with others from the Atlantic, it is found that the former have a considerably larger eye and a narrower interorbital space, the median channel of which is also narrower.

¹ Fische Japans, vol. 4, 1884, p. 34.

SCORPÆNA FIMBRIATA Döderlein.

Tokyo market.

One specimen has 8 dorsal rays, not the usual 9 or 10.

SCORPÆNA ONARIA Jordan and Snyder.

Shimizu; young example seined near shore.

SCORPÆNA CIRRHOSA (Thunberg).

Two specimens of this species from Kagoshima are like adults in almost every detail except that the fins are longer and higher. The ventrals extend to the anal opening in one specimen, somewhat beyond in the other. The pectorals extend a little beyond the base of the third anal spine. The caudal, anal, and dorsal rays are slightly longer than those of adults. These specimens agree in most respects with the description of *S. kagoshimana* of Steindachner and Döderlein,¹ which is probably the young *S. cirrhosa*.

DENDROCHIRUS JORDANI (Regan).

Specimens of this species, associated with *Pterois lunulata* were taken with a seine along the sandy shores near Shimizu. They are beautifully banded with pale brown, each band having a narrow, dusky edge. There are 5 bands on the head, one near tip of snout, another from edge of eye to mouth, a third extending downward below pupil, a fourth crossing occiput and passing over middle of opercle, the last extending from occiput to upper part of opercle. The first band of body is broken above the shoulder, thus forming a saddle over the nape and a short band behind the pectoral. Five other bands occur on the body, the last being near the base of caudal. Dorsal, anal, and caudal with small, dusky spots. Ventrals and pectorals black, the latter with a few large, light spots on its upper edge. Maxillary with a long flap which extends to edge of preopercle. Specimens were from 36 to 90 millimeters long.

PTEROIS LUNULATA Temminck and Schlegel.

Misaki and Shimizu markets.

Small specimens seined near the beach at Shimizu have the pectoral filaments extending far beyond the tip of the caudal.

APISTUS EVOLANS Jordan and Starks.

A specimen from Kagoshima almost exactly resembles the type of this species in color. It has 63 scales in the lateral series. Another from Nagasaki with a color pattern much like that of the type of *A. venenans* has 65 scales in the lateral series. These specimens appear to agree in all other respects with both *A. evolans* and *A. venenans*.

MINOUS ADAMSI Richardson.

Kagoshima and Nagasaki markets.

¹ Fische Japans, vol. 3, 1884, p. 28; vol. 4, 1887, pl. 3.

INIMICUS JAPONICUS (Cuvier and Valenciennes).

Nanao, Misaki, and Tokyo markets.

A series of specimens, mostly from the Tokyo market, ranging in color from bright orange to deep reddish brown seems to indicate that *I. japonicus* and *I. aurantiacus* are identical.

PARACENTROPOGON RUBRIPINNIS (Temminck and Schlegel).

Misaki and Shimizu pools.

Family **HEXAGRAMMIDÆ**.**AGRAMMUS AGRAMMUS** (Temminck and Schlegel).

Otaru, Hakodate, Same, Aikawa, Shiogama, and Tokyo markets.

Observed in pools from Otaru to Aikawa.

HEXAGRAMMUS OTAKII Jordan and Starks.

Plate 55, fig. 1.

Otaru, Hakodate, and Tokyo markets.

In an examination of a considerable number of specimens of this species, certain variations in the arrangement of the lateral lines of the breast and abdomen appear which serve to cast doubt on the validity of *H. aburaco* Jordan and Starks. The latter appears to have been distinguished from *H. otakii* in not having the fifth lateral lines connected with each other nor with the median line of the breast. This character is not constant. In one example from Aikawa the fifth line joins the median one posterior to the anal opening as usual, and then sends a branch forward and outward. In another the fifth line ends near the anal opening while its fellow of the opposite side joins the median line. A specimen from the Tokyo market has the lines arranged as in *otakii* on one side and as in *aburaco* on the other. Lesser variations sometimes occur, the median line being more or less irregular and broken, and the point of union between the median and fifth lines being near the anal opening or far forward near the base of ventrals. The color, fin rays, scales, etc., of a specimen from Hakodate, having the lateral lines of *H. aburaco* do not differ from those of typical *H. otakii*. This particular individual has a large, black spot on the posterior dorsal spines.

HEXAGRAMMUS OCTOGRAMMUS (Pallas).

Tide pools at Hakodate.

HEXAGRAMMUS LAGOCEPHALUS (Pallas).

One example from the market at Mororan.

Family **COTTIDÆ**.**RIKUZENIUS PINETORUM** Jordan and Starks.

Thirty specimens were collected in the pools at Hakodate. They resemble examples collected by the Bureau of Fisheries steamer *Albatross* at moderate depths near shore in all particulars except that they are darker in color. There are three ventral rays, large orbital tentacles, and a pair of cirri near the edge of the maxillary.

CERATOCOTTUS DICERAUS (Pallas).

Mororan and Hakodate markets; three specimens.

CERATOCOTTUS NAMİYÆ Jordan and Starks.

A male specimen from the Otaru market about 245 millimeters long (the type of the species measured the same) has 8 dorsal spines. The width of the interorbital space is contained five times in the head measured to end of opercular flap. The occipital ridges converge somewhat behind. There are many small prickles scattered along the back above the lateral line, in a region that is perfectly smooth in the type. The color pattern is like that of the type, except that the markings are everywhere distinct, the clouds, spots, and bars being deep brownish black. Both the Mororan example and the type have long, slender tentacles scattered over the lower half of the body behind the pectorals.

DSAYCOTTUS SETIGER Bean.

Otaru market.

COTTUS POLLUX Günther.

Yamaguchi.

Many specimens of *Cottus pollux* from Tachikawa collected by Jordan and Snyder have 1 spine and but 3 rays in the ventral fin. Others from Utsonomiya have similar ventrals. Specimens taken at Morioka have 4 rays. The examples from Morioka have 14 pectoral rays (except one which has 13), those from Tachikawa 13, and those from Utsonomiya 13 or 14. No other differences were found, and it is probable that they belong to the same species, the number of ventral rays being variable. *Cottus pollux* closely resembles the American *C. gulosus* and *C. punctulatus*, each of which occasionally produces individuals with 3 rays in the ventral fin.

COTTUS NOZAWÆ Snyder.

Plate 55, fig. 2.

Cottus nozawæ SNYDER, Proc. U. S. Nat. Mus., vol. 40, 1912, p. 537.

Ishikari R. at Sapporo, Hokkaido, Hakodate market.

Cottus nozawæ is distinguished from other Japanese species of the genus by the following combination of characters: Three preopercular spines, naked palatines, 4 ventral rays, and a very short maxillary which reaches to anterior border of eye and not beyond anterior border of pupil.

Cottus pollux has but 1 preopercular spine, the preopercle being smooth below this in specimens examined. The palatines are smooth, the maxillary long, reaching beyond the middle of pupil, or even well beyond the eye in large examples. The caudal peduncle is deeper than in *C. nozawæ*. *C. reinii*, which the writer has not seen, has 3 preopercular spines, thus differing from *C. pollux*, and a very long maxillary, which serves to distinguish it from *C. nozawæ*.

C. kazika has 4 preopercular spines, the upper one being especially large, prominent nasal spines, a very prickly skin, wide bands of palatine teeth, and long maxillary.

MYOXOCEPHALUS POLYACANTHOCEPHALUS (Pallas).

Otaru market.

MYOXOCEPHALUS EDMUS Jordan and Starks.

Mororan pools.

MYOXOCEPHALUS NIVOSUS (Herzenstein).

Mororan market.

MYOXOCEPHALUS RANINUS Jordan and Starks.

Hakodate market; Mororan, Same, and Aikawa pools.

MYOXOCEPHALUS YESOENSIS Snyder.

Plate 55, fig. 3.

Myoxocephalus yessoensis SNYDER, Proc. U. S. Nat. Mus., vol. 40, 1912, p. 538.

Hakodate market.

MYOXOCEPHALUS ENSIGER (Jordan and Starks.)

Several examples of the young of this species were collected in the pools at Hakodate by Jordan and Snyder and also by members of the Bureau of Fisheries steamer *Albatross* expedition. They measure about 80 millimeters in length. In life they were brilliant in color, like the coralline algæ, with three dark bands passing over the body; the first crosses the back beneath the spinous dorsal and passes downward and forward, enveloping the base of the pectoral fin; the second passes over the tail at the base of the soft dorsal, being nearly as broad as the fin is long, and extends downward to the anal; its lower anterior part is cut by a more or less definite large white spot; the third band covers the greater part of the caudal peduncle; its posterior edge has a deeply shaded concavity, which appears to be peculiar to the species. The color pattern here described is vaguely outlined in the type and cotypes. The young specimens have a smooth head, while only a trace of the strong occipital ridges and the elevated bony crest of the suborbital stay appear. The third preopercular spine is present in all.

GYMNOCANTHUS INTERMEDIUS (Temminck and Schlegel).

Hakodate pools; Hakodate market and pools.

In small examples the bony plates do not extend forward over the interorbital space.

GYMNOCANTHUS HERZENSTEINI Jordan and Starks.

Otaru markets and pools.

CROSSIAS ALLISI Jordan and Starks.

Hakodate, Same, and Aikawa pools.

COTTIUSCULUS SCHMIDTI Jordan and Starks.

Mororan market; Hakodate pools.

Seven specimens measuring 80 to 100 millimeters in length were procured from the tide pools near Hakodate. They were all females,

and resemble the cotypes of the species which were dredged off Kinkozan by the Bureau of Fisheries steamer *Albatross*, except that they were very dark in color, the general pattern of coloration remaining the same. Other examples, very light in color, were obtained by the deep-water fishermen at Mororan.

ALCICHTHYS ALCICORNIS (Herzenstein).

Hakodate market. Occasionally an example has one or both of the opercular spines bifid or trifid, the upper prong being longest.

FURCINA OSIMÆ Jordan and Starks.

Hakodate, Aikawa, and Misaki pools. A small patch of prickles is present behind the base of the pectoral.

FURCINA ISHIKAWÆ Jordan and Starks.

Aikawa pools.

OCYNECTES MASCHALIS Jordan and Starks.

Same and Misaki pools.

This species is recorded from Sakhalin by Tanaka,¹ but this identification is not without doubt as his specimen has 17 dorsal and 14 anal rays, while *O. maschalis* has 13 or 14 dorsal and 10 or 11 anal rays, many specimens not showing any variation from these numbers.

OCYNECTES MODESTUS Snyder.

Plate 56, fig. 1.

Ocynectes modestus SNYDER, Proc. U. S. Nat. Mus., vol. 40, 1912, p. 539.

Pools at Same.

O. maschalis has simple or bifid tentacles attached to the fleshy covering of the nasal spines. The posterior nostrils are tubular and located behind the nasal spines. The tentacles of the lateral line are similar to those of *O. modestus*.

PSEUDOBLENNIUS PERCOIDES Günther.

One example was secured in the market at Tokyo which has the small, blue spots on the side as figured by Temminck and Schlegel.² Many other examples had the blue underlaid with dusky, and the former disappearing in the preservative has left dark spots. Some of these are surrounded by lighter rings. In occasional examples the upper half of the body is finely speckled, there being in addition a mere trace of dusky bars. Usually the same region is more or less definitely barred, in rare instances the bars fusing and forming an almost solid brownish coat. In spite of this variation the color is quite distinctive, the lower parts being always spotted, the lateral line not having conspicuous blackish spots either elongate or grouped in twos or threes, and there being no coin-like silver spots on the sides. Ocelli are present on the upper and lower caudal rays. The snout is notably long and pointed, the maxillary extends well beyond the eye, the nasal tentacles are very small, the orbital tentacles are broad and fringed along one or both edges, and no nuchal or

¹ Annotations Zoologicæ Japonenses, vol. 6, pt. 4, 1908, p. 249.

² Fauna Japonica pl. 79a, figs 2 and 3, labeled *Pseudoblennius*.

lateral line tentacles appear. The species appears to grow larger than the others, there being individuals 220 millimeters long in the collection.

PSEUDOBLENNIIUS JAPONICUS (Steindachner).

Misaki tide pools.

This species is apparently distinct from *Podabrus cottoides* Richardson.¹ The contour of the body is different, the caudal peduncle deeper, the spinous dorsal lower and also differing in shape, the outline of the fin being less evenly curved; the color of the fins also differs, the spinous dorsal being broadly edged with dusky and having a dark spot on the membrane between the second and third rays, the soft dorsal and anal with eight or more oblique rows of small spots on the rays, and the caudal with about four broad, vertical, dusky bars. Richardson does not mention nasal or supraorbital tentacles which are so conspicuous on the Japanese specimens. There are three or four slender, flat tentacles always present on the lateral line near the tip of the pectoral fin in *P. japonicus*.

The short maxillary, not usually extending beyond the pupil, the presence of tentacles on the lateral line, and also of broad, leaf-like nasal and supraorbital tentacles which are not conspicuously fringed, the series of brownish black spots, often in twos and threes along the lateral line, and the absence of large, round, silvery spots on the lower half of the body, form a combination of characters which will serve to distinguish this species among others of the genus known to occur in Japan.

Slender nuchal tentacles are usually present. The nasal spines protrude from the skin.

PSEUDOBLENNIIUS ARGENTEUS (Döderlein).

Hakodate, Aikawa, and Nanao markets and pools.

Individuals of this species are adorned in life with large, brilliant silvery spots on the sides. This may be known from other Japanese species by the long maxillary which usually extends beyond the orbit, unfringed nasal and suborbital tentacles, by the absence of tentacles on the nape and lateral line and by the conspicuous, silvery stripes on the sides. Solutions of formalin utterly destroy the silvery pigment (which is well preserved in alcohol), and then the species is apt to be confused with *P. percoides* and *P. japonicus*.

PSEUDOBLENNIIUS MARMORATUS (Döderlein).

Tokyo market; Misaki pools.

In this species the snouts of the males are conspicuously blunter than those of the females. In both sexes there is a small barbel near the posterior end of the maxillary, and there are usually a few minute, dermal flaps on the lateral line near the end of the pectoral.

¹ Voyage Samarang, Fishes, p. 13, pl. 1, figs. 1-6; not *Pseudoblennius cottoides* Jordan and Starks, Proc. U. S. Nat. Mus., vol. 27, 1904, p. 311, which is the present species.

BERO ELEGANS (Steindachner).

Aomori, Hakodate, and Same pools.

BERO ZANCLUS Snyder.

Plate 56, fig. 2.

Bero zanclus Snyder, Proc. U. S. Nat. Mus., vol. 40, 1912, p. 540.

VELLITOR CENTROPOMUS (Richardson).

Misaki pools; only eight specimens collected.

BLEPSIAS DRACISCUS Jordan and Starks.

Mororan; Hakodate; pools and markets.

HEMITRIPTERUS VILLOSUS (Pallas).

Mororan; Hakodate; Misaki.

Family **PLATYCEPHALIDÆ**.

THYSANOPHRYS SPINOSUS (Temminck and Schlegel).

Shimizu; 2 small specimens taken in shallow water with the seine.

THYSANOPHRYS MACROLEPIS (Bleeker).

Shimizu; seine.

THYSANOPHRYS MEERDERVOORTII (Bleeker).

Tokyo; Kagoshima and Shimizu markets; with seine at Shimizu.

THYSANOPHRYS JAPONICUS (Tilesius).

Tokyo, Misaki, and Kagoshima markets.

THYSANOPHRYS CROCODILUS (Tilesius).

Kagoshima markets.

PLATYCEPHALUS INDICUS (Linnæus).

Tokyo and Kagoshima markets.

Family **TRIGLIDÆ**.

LEPIDOTRIGLA ALATA (Houttuyn).

Shimizu, Kagoshima, and Nagasaki markets.

LEPIDOTRIGLA STRAUCHI Steindachner.

Otaru, Same, Hakodate, Aikawa, Tokyo, and Tsuruga markets.

In an occasional specimen the black blotch of the dorsal is very faint or even entirely wanting.

LEPIDOTRIGLA ABYSSALIS Jordan and Starks.

Kagoshima market.

LEPIDOTRIGLA KISHINOUI Snyder.

Plate 56, fig. 3.

Lepidotrigla kishinouyi SNYDER, Proc. U. S. Nat. Mus., vol. 40, 1912, p. 543.

Kagoshima market.

LEPIDOTRIGLA GUNTHERI Hilgendorf.

Tokyo and Kagoshima markets; the specimen from Kagoshima measures 240 millimeters.

The pectoral bears a very definite color pattern on the inner side. The edge, sides, and base of the fin are immaculate. The remainder

is pale, bluish black, with a splash of dense blue black, broad near base of fin and rapidly narrowing outward to a tip near end of seventh ray, counting from above. In young examples the black region of the pectoral has a few elongate, pearly marks of very irregular shape.

LEPIDOTRIGLA JAPONICA (Bleeker).

Kagoshima and Nagasaki markets.

CHELIDONICHTHYS KUMU (Lesson and Garnot).

Tokyo, Misaki, Tsuruga, and Kagoshima markets. Specimens from the Tokyo market measure 380 millimeters in length.

Family **CEPHALACANTHIDÆ**.

DACTYLOPTENA GILBERTI Snyder.

Plate 57, fig. 1.

Dactyloptena gilberti SNYDER, Proc. U. S. Nat. Mus., vol. 36, 1909, p. 604.

Kagoshima.

Dactyloptena jordani Franz appears to be identical with this species.

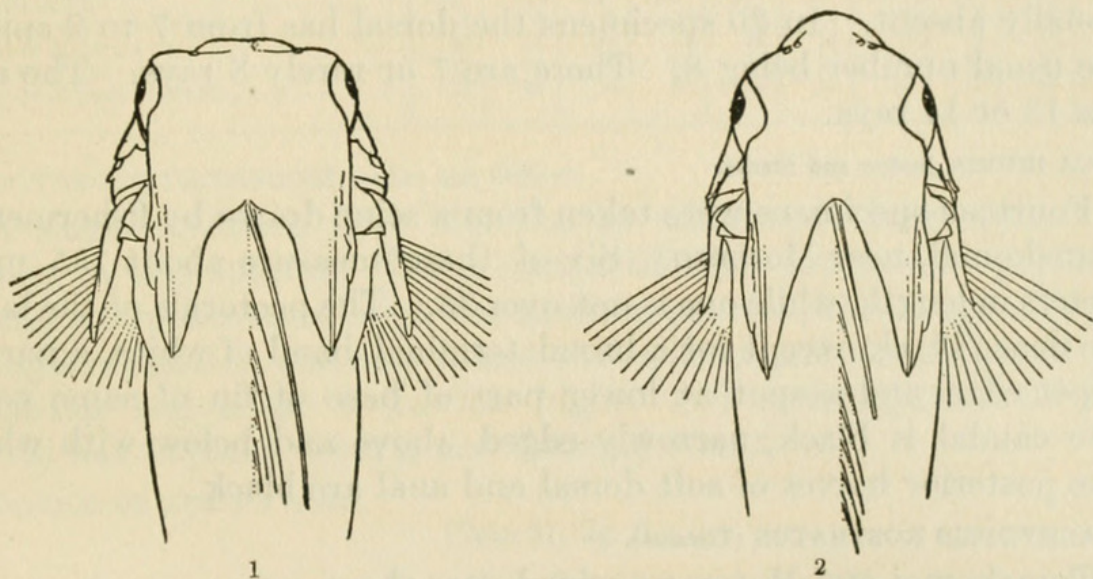


FIG. 1.—COMPARISON BETWEEN SNUOT, INTERORBITAL SPACE, AND IN ANGULATION OF REGION BETWEEN POSTTEMPORAL PROCESSES OF *DACTYLOPTENA GILBERTI* (1) AND *DACTYLOPTENA ORIENTALIS*.

Family **AGONIDÆ**.

TILESINA GIBBOSA Schmidt.

Many specimens that have been dredged in rather deep water were found in the market at Mororan. They appear to have the head somewhat more smooth than those described by Schmidt. The maxillary is also longer, reaching considerably beyond the middle of the snout.

AGONOMALUS PROBOSCIDALIS (Valenciennes).

One example from Otaru measures 105 millimeters in length. The dorsal has 10 spines, 6 rays; the pectoral 10 rays. The abdomen is devoid of spines, each lateral plate bearing a minute, rounded knob. The supraocular ridges are pronounced, thus making the interorbital area very concave. A larger specimen (155 millimeters long) was

secured in the market at Hokaido. The sides have an irregular, light cloud narrowly bordered with white extending from near the base of the pectoral to near the base of second dorsal. A band, similar in color, passes from the posterior half of the soft dorsal across the tail and the anal fin. The breast has white vermiculations on a dark brown ground.

AGONOMALUS JORDANI Schmidt.

Both males and females were secured among fishes dredged off shore by the Mororan fishermen. The males are small, measuring from 120 to 130 millimeters in length. The barbel is minute, the color lighter than that of the females, the lateral stripe broader and blacker, and the spots more distinct. Females measure from 130 to 170 millimeters. The male specimens from Mororan have a row of distinct, black spots along the plates below the lateral stripe, and a second row of spots below the latter, the lower row appearing only beneath the pectoral, and above the middle and posterior parts of the anal. In some examples the lateral band is much broader than in others and the lower row of spots varies somewhat and is occasionally absent. In 20 specimens the dorsal has from 7 to 9 spines, the usual number being 8. There are 7 or rarely 8 rays. The anal has 13 or 14 rays.

OCCA IBURIA Jordan and Starks.

Fourteen specimens were taken from a seine drawn by fishermen at Tomakomai, near Mororan. Six of these measure about 155 millimeters in length, while one is not over 35. The pectorals of the latter are dense black except for a broad terminal band of white, a narrow upper edge, and a spot at lower part of base of fin of same color. The caudal is black, narrowly edged above and below with white. The posterior halves of soft dorsal and anal are black.

BRACHYOPSIS ROSTRATUS (Tilesius).

Tomakomai and Mororan; seined near shore.

PALLASINA BARBATA (Steindachner).

Mori, Mororan, and Hakodate.

DRACISCUS SACHI Jordan and Snyder.

Podothecus tokubire Ishikawa.

Mororan; Hakodate.

A considerable number of specimens of this remarkable species were found among heaps of small fishes dredged off shore near Mororan by the native fishermen. One example about 45 millimeters long was found in a pool at Hakodate. In young individuals the dorsal and anal are not developed to the enormous length common in adults. After an individual reaches the length of about 200 millimeters the soft dorsal and anal increase rapidly in height (see appended table of measurements), the other fins, except the caudal,

not materially increasing their length in relation to the size of the body. Small examples resemble species of *Podothecus*, perhaps looking most like *P. xyestes*.

Podothecus tokubire described by Doctor Ishikawa¹ is probably based on an injured example of *D. sachi* from Hokkaido, where dried specimens may occasionally be seen in the small shops.

Proportional measurements of 10 specimens of Draciscus sachi from Mororan.

[The spines on end of snout are not included in the length.]

	1	2	3	4	5	6	7	8	9	10
Length of body in millimeters.....	112	127	155	180	231	257	279	320	385	460
Length head.....	.30	.30	.29	.30	.30	.285	.29	.285	.26	.26
Depth body.....	.13	.125	.13	.135	.14	.13	.135	.135	.14	.145
Length snout.....	.15	.15	.15	.15	.15	.145	.15	.14	.135	.135
Diameter eye.....	.06	.06	.065	.065	.063	.06	.06	.06	.055	.05
Interorbital width.....	.07	.065	.07	.075	.065	.06	.06	.06	.055	.055
Snout to dorsal.....	.35	.35	.35	.36	.35	.34	.34	.34	.32	.31
Snout to ventral.....	.28	.28	.28	.29	.28	.26	.255	.26	.27	.25
Height dorsal spines.....	.12	.10	.11	.11	.12	.115	.125	.13	.135	.13
Height dorsal rays.....	.095	.10	.115	.115	.18	.24	.30	.365	.47	.47
Height anal.....	.08	.09	.10	.10	.18	.26	.28	.36	.45	.43
Length pectoral.....	.22	.20	.21	.22	.24	.23	.24	.22	.21	.20
Length ventral.....	.07	.07	.06	.07	.08	.085	.09	.085	.085	.08
Length caudal.....	.14	.13	.14	.15	.16	.16	.17	.15	.175	.155
Number of dorsal spines.....	8	8	9	9	8	9	9	8	8	8
Number of dorsal rays.....	13	13	14	13	14	13	13	14	13	14
Number of anal rays.....	16	16	16	17	16	17	17	16	16	16
Number of pectoral rays.....	17	16	16	17	17	17	17	18	18	17

PODOTHECUS THOMPSONI Jordan and Gilbert.

A single specimen from Mororan 90 millimeters long appears to belong to this species. When compared with cotypes from Iturup Island (60 millimeters long), the snout appears a little longer, the eye is slightly smaller, and the spines of the head and the ridges of the opercular region are somewhat higher and more spine-like. The dorsal has 9 spines, 6 rays, and the anal 6 rays.

PODOTHECUS XYSTES Snyder.

Plate 57, fig. 2.

Podothecus xyestes SNYDER, Proc. U. S. Nat. Mus., vol. 40, 1912, p. 541.

Family CYCLOPTERIDÆ.

CYCLOPTERICHTHYS VENTRICOSUS (Pallas).

One specimen 330 millimeters long secured at Misaki. The species has not heretofore been reported south of Aomori. The Misaki specimen was obtained from Mr. Aoki and the date of its capture is unknown. This example was a female in which the oviducts were filled with eggs. By carefully weighing and counting, it was estimated that there were in all 44,619.

Individuals of this species may be found in pools, under rocks or attached to their sides. They swim very slowly and are perfectly helpless when removed from the water, inflating the body with air

¹ Jordan and Starks, Proc. U. S. Nat. Mus., vol. 27, 1904, p. 592.

until they are scarcely able to flop. The air is taken into the large, thin walled, distensible stomach and apparently retained by the constriction of the muscular walls of the cardiac end. There are 25 pyloric caeca. There is an enlarged, short rectum. No air bladder is present. The liver is large and consists of but a single lobe.

Family CYCLOGASTERIDÆ.

CYCLOGASTER AGASSIZII (Putnam).

Tomakomai, Hakodate, Same, and Aikawa, in pools and near shore.

Family PLEURONECTIDÆ.

SCÆOPS GRANDISQUAMA (Temminck and Schlegel).

Two small specimens were taken with the seine at Shimizu.

PSEUDORHOMBUS CINNAMOMEUS (Temminck and Schlegel).

Misaki and Shimizu markets.

It is the belief of the writer that this species and *P. misakius* Jordan and Starks are synonymous. The latter appears to differ from *P. cinnamomeus* as figured and described by Temminck and Schlegel, in having ocelli above and below the lateral line. These are much less prominent than the one located on the lateral line near the tip of the depressed pectoral, and they often grow less so with age, as is well illustrated by a small series of specimens. The white-bordered ocellus on the lateral line persists and it, together with the smooth scales of the blind side, serves to distinguish the species from *P. oligodon* (Bleeker), a specimen of which is referred to as *P. cinnamomeus* in the description of *P. misakius*.

PSEUDORHOMBUS OLIGODON (Bleeker).

Specimens were taken with the seine at Shimizu. They have 75 to 80 rays in the dorsal and 58 to 64 in the anal. The scales are ctenoid on both sides of the body, 82 to 86 lateral series; 76 to 80 pores in the lateral line. The gillrakers are comparatively heavy and short, the length being less than that of the filaments; 8 or 9 on the lower limb of the first arch. The eyes are large, the diameter of the upper being equal to the distance from edge of orbit to the tip of snout. The fins have many small, dark spots, and there is a brownish spot, varying in distinctness, located on the posterior part of the curve of the lateral line. Small specimens have rows of indistinct ocelli on the dorsal and ventral parts of the body. The specimens from Tsuruga mentioned by Jordan and Starks¹ are representatives of *P. oligodon* and they do not differ in any way from an example of the same species from Formosa.²

PSEUDORHOMBUS OCELLIFER Regan.

Shimizu.

¹ Proc. U. S. Nat. Mus., vol. 31, 1907, p. 174.

² Idem, p. 177.

PSEUDORHOMBUS ARSIUS (Buchanan Hamilton).

Specimens which appear to belong to this species were seined in shallow water at Shimizu and collected in the market at Kagoshima. They have smooth scales on the blind side, thus differing from *P. oligodon* which they resemble in general appearance. They also have larger scales and smaller eyes. They might be confused with *P. cinnamomeus* except for the lack of a white-bordered ocellus on the lateral line, fewer dorsal rays, and a somewhat more slender body. The largest specimen (from Kagoshima) measures 230 millimeters in length. There are 2 dark spots on the lateral line and traces of 2 rows of large ocelli above and below. Smaller examples from Shimizu are brighter in color, the ocelli being more distinct. The dorsal has from 72 to 75 rays; anal, 56 to 58; pores in lateral line, 75 to 77; scales in lateral series, 70 to 72.

PARALICHTHYS OLIVACEUS (Temminck and Schlegel).

Otaru, Tokyo, Shimizu, Nanao, and Kagoshima markets. Specimens from Tokyo have from 72 to 77 dorsal rays.

XYSTRIAS GRIGORJEWI (Herzenstein).

Hakodate market.

VERASPER VARIEGATUS (Temminck and Schlegel).

Tokyo market.

VERASPER MOSERI Jordan and Gilbert.

Tomakomai, with the seine; Mororan and Hakodate markets; Same, in the pools.

HIPPOGLOSSOIDES KATAKURÆ Snyder.

Plate 58, fig. 1.

Hippoglossoides katakuræ SNYDER, Proc. U. S. Nat. Mus., vol. 40, 1912, p. 546.

Otaru.

The dorsal rays number 80, not 90 as originally described.

HIPPOGLOSSOIDES DUBIUS (Schmidt).

Two specimens measuring 300 millimeters in length, from the Otaru market, are identified with this species, with some doubt as to whether the species itself really differs from *H. elassodon*. These specimens differ from others presumed to represent *H. elassodon* in having a more decided curve in the lateral line, somewhat smoother scales, a larger mouth, the maxillary extending to a point about midway between the pupil and posterior border of the eye, and a somewhat broader interorbital area, there being 2 rows of scales on its narrowest part. The Otaru specimens appear to have the anterior teeth in both jaws more decidedly enlarged. The dorsal rays number 82 or 83, anal 64 or 65; pores in lateral line 92 to 94; vertebræ 41; gillrakers 2-14. There are about 100 transverse series of scales.

PROTOPSETTA HERZENSTEINI (Schmidt).

Mororan; Otaru.

Small (190 millimeters long) specimens have much smaller, smoother, and less numerous plates on the head.

PLEURONICHTHYS CORNUTUS (Temminck and Schlegel).

Hakodate, Tokyo, and Tsuruga markets.

LEPIDOPSETTA MOCHIGAREI Snyder.

Plate 58, fig. 2.

Lepidopsetta mochigarei SNYDER, Proc. U. S. Nat. Mus., vol. 40, 1912, p. 547.

Otaru market.

LIMANDA IRIDORUM Jordan and Starks.

Otaru, Mororan, and Hakodate markets.

In life a band of bright orange extends along bases of dorsal, caudal, and anal on the blind side.

LIMANDA ANGUSTIROSTRIS Kitahara.

Otaru and Mororan markets.

LIMANDA YOKOHAMÆ (Günther).

Otaru, Mororan, and Nanao markets.

PLATICHTHYS STELLATUS (Pallas).

Otaru. Commonly seen in the markets as far south as Tokyo.

KAREIUS BICOLORATUS (Basilewsky).

Otaru, Nanao, Hakodate, and Mororan markets; small specimens seined near shore at Shimizu.

CLIDODERMA ASPERRIMUM (Temminck and Schlegel).

Otaru and Hakodate markets.

MICROSTOMUS STELLERI Schmidt.

Otaru, Mororan, and Hakodate markets.

GLYPTOCEPHALUS SASÆ Snyder.

Plate 59, fig. 1.

Glyptocephalus sasæ SNYDER, Proc. U. S. Nat. Mus., vol. 40, 1912, p. 548.

Otaru market.

A specimen of this species appears to have been seen by Doctor Jordan¹ in the museum at Hakodate.

Family **SOLEIDÆ**.

AMATE JAPONICA (Temminck and Schlegel).

Tokyo, Tanegashima, Kagoshima, and Nagasaki markets.

The pectoral fin forms part of a thin, raised rim which surrounds a part of the upper edge of the gill opening. Five short rays are distinctly visible.

ASERAGGODES KOBENSIS (Steindachner).

Small specimens were taken with the seine at Shimizu.

ZEBRIAS ZEBRINUS (Temminck and Schlegel).

Tokyo, Misaki, and Kagoshima markets.

ZEBRIAS JAPONICUS (Bleeker).

Hakodate market.

¹ Proc. U. S. Nat. Mus., vol. 31, 1907, p. 226.

AESOPIA CORNUTA Kaup.

Kagoshima markets.

RHINOPLAGUSIA JAPONICA (Temminck and Schlegel).

Tokyo, Misaki, Otaru, and Kagoshima markets.

ARELISCUS INTERRUPTUS (Günther).

Shimizu and Suruga markets.

This species is easily distinguished from *A. joyneri* by the close proximity of the eyes of the former.

ARELISCUS JOYNERI (Günther).

Kagoshima markets.

TRULLA ITINA Snyder.

Kagoshima, where numerous specimens measuring from 110 to 160 millimeters were taken. Some of them have the dark color more or less distinctly arranged in vertical bars. Scales in lateral line 80 to 86, counting from a point directly above gill opening; dorsal rays 105 to 108; anal rays 85 to 87.

Family GOBIIDÆ.

EVIOTA ABAX (Jordan and Snyder).

Misaki and Tanegashima pools; very abundant at the latter place.

HETERELEOTRIS ARENARIUS Snyder.

Tanegashima pools.

MOGURNDA OBSCURA (Temminck and Schlegel).

Mitajiri; Yamaguchi; Takamatsu R., Akune.

When the lateral dusky bands are present they are narrow or pointed above, and broad and usually united below.

ELEOTRIS OXYCEPHALA (Temminck and Schlegel).

Tanegashima; one small specimen.

MAPO PÆCILICHTHYS (Jordan and Snyder).

Misaki, Akune, and Tanegashima pools.

The species was originally described from a brightly colored female. Male specimens are darker. The first dorsal ray has 5 black dots, and a row of 9 similar dots are on the upper edge of the soft dorsal, the zigzag markings of that fin so conspicuous in the female being almost obliterated by a general dusky color. The tongue is deeply notched. There are usually 34 scales in the lateral series.

But 2 examples were collected at Misaki, while at Akune and Tanegashima the species was numerously represented in the rock pools.

MAPO CRASSICEPS Jordan and Seale.

Twelve specimens of this species were collected at Tanegashima. One of them, presumably a male, is much darker than the others, the fins including the ventrals being blackish.

MAPO ÆOLOSOMUS (Ogilby).

This species is abundantly represented at Tanegashima, where it occurs in the more shallow, sandy pools.

MAPO FUSCUS (Rüppell).

Tanegashima; 13 specimens from the pools. The occiput is scaled, in some cases to the eyes, although a narrow, naked space may usually be found just behind the eyes. Sides with many narrow, indistinct, stripes, which serve to distinguish it from *M. poecilichthys* for which it might easily be mistaken.

GOBIUS ORNATUS Rüppell.

Three specimens were collected in the pools at Tanegashima.

AWAOUS GENIVITTATUS (Cuvier and Valenciennes).

One specimen was taken in the pools at Tanegashima where it appears to be rare.

CTENOGOBIOUS SIMILIS (Gill).

Aikawa; Yamaguchi.

CTENOGOBIOUS GYMNAUCHEN (Bleeker).

Shimizu; Kagoshima; seined in shallow water.

CTENOGOBIOUS HADROPTERUS Jordan and Snyder.

Takamatsu R., Akune; Shimonoseki; Tanegashima.

CTENOGOBIOUS CAMPBELLI Jordan and Snyder.

Akune pools; two specimens.

CTENOGOBIOUS VIRGATULUS Jordan and Snyder.

Shiogama.

ABOMA LACTIPES (Hilgendorf).

Tomakomai; Same, in Niigawa R.; Shiogama; Aikawa.

ABOMA SNYDERI Jordan and Fowler.

Fresh water ponds near Shiogama.

CRYPTOCENTRUS FILIFER (Cuvier and Valenciennes).

Shimizu, seine in shallow water; Tsuruga market.

ZONOGOBIOUS SEMIDOLIATUS (Cuvier and Valenciennes).

Tanegashima.

DORYPTENA TANEGASIMÆ Snyder.

Plate 59, fig. 2.

Doryptena tanegasimæ SNYDER, Proc. U. S. Nat. Mus., vol. 35, 1909, p. 104.

Tanegashima; Akune.

AMBLYGOBIUS NARAHARÆ Snyder.

One example found in a pool at Tanegashima.

ZONOGOBIOUS BOREUS Snyder.

Plate 59, fig. 3.

Zonogobius boreus SNYDER, Proc. U. S. Nat. Mus., vol. 36, 1909, p. 605.

Tide pools at Misaki.

CHÆNOGOBIUS MACROGNATHOS (Bleeker).

Tomakomai; Takamatsu R., Akune.

CHLOEA CASTANEA (O'Shaughnessy).

Nanao; Same; Aikawa; Shiogama; Dogo Island. Collected in the rice fields and small streams.

CHLOEA MORORANA Jordan and Snyder.

Mororan and Shiogama.

Large numbers of this species were secured with a small seine in the shallow water near shore at Mororan. The males are somewhat more slender than the females, and the fins are a little higher and longer. The dorsal surface is often much less reticulated than in the females and the branchiostegal membranes and the ventral, dorsal, and anal fins are dusky or even black in color.

CHASMICHTHYS DOLICHOGNATHUS (Hilgendorf).

Hakodate; Same; Aikawa; Misaki; Shimonoseki; Mitajiri; Tanegashima; Akune pools.

This species appears to be more abundantly represented at Misaki than at any other point visited, where individuals fairly swarm in the shallow pools left near shore by the falling tide.

CHASMICHTHYS GULOSUS (Guichenot).

Aikawa; Misaki; Shimonoseki; Mitajiri; Kagoshima; Akune; in pools.

This is the most common tide-pool species near Kagoshima.

PTEROGOBIOUS VIRGO (Temminck and Schlegel).

One large specimen was taken in a large rock pool at Misaki.

PTEROGOBIOUS ELAPOIDES (Günther).

Shiogama; Misaki pools.

What we now have reason to believe is the male sex of this species was described by Jordan and Snyder as *P. daimio*. Males are to be readily distinguished by their more robust bodies, brighter colors, the dark bands being blacker and almost twice as large as those of the females, and by generally having higher fins. Females are much paler in color, the bands are very narrow and there is an extra band or spot almost always present on the base of the caudal. A round spot is present in the same place on an occasional male. The writer has examined a large series of specimens of both sexes and no intergradation of characters has appeared.¹ In our collecting the sexes were not found together, and the male specimens taken far outnumber the females. The distinct color differences of the sexes, the fact that the two color phases were not found associated, and the poorly preserved specimens examined by Jordan and Snyder lead them to the conclusion that the males belonged to a distinct species.

¹ Regan, Annals and Magazine, ser. 7, vol. 15, Jan., 1905, p. 22.

ACNATHOGOBIUS FLAVIMANUS (Temminck and Schlegel).

Hakodate, Shiogama, Tokyo, Shimizu, and Dogo Island markets.
The species is very abundant in fresh and brackish waters.

CHÆTURICHTHYS SCIISTIUS Jordan and Snyder.

Hakodate and Kagoshima pools.

CHÆTURICHTHYS HEXANEMUS Bleeker.

Hakodate markets.

TRIDENTIGER OBSCURUS (Temminck and Schlegel).

Tomakomai; Same, in the Niigawa; Aikawa; Shiogama; Akune; Dogo Island.

TRIDENTIGER BUCCO Jordan and Snyder.

Shiogama pools.

TRIDENTIGER BIFASCIATUS Steindachner.

Shiogama; Shimonoseki.

Many specimens were collected at Shiogama in the pools.

ASTRABE LACTISELLA Jordan and Snyder.

Misaki and Tanegashima pools.

Four specimens closely resembling the type were taken at Misaki. A broad flap of loose, naked skin extends along the sides of the base of both dorsal and anal fins. One specimen only was taken at Tanegashima. It is somewhat more slender than those from Misaki and a little lighter in color. In life the spots on the head and fins were bright orange; those on body pale lemon yellow, except the one extending across base of pectoral which was white; dark areas, deep brown.

CLARIGER COSMURUS Jordan and Snyder.

Hakodate, Aikawa, and Misaki pools.

Thirty specimens were secured at Misaki. They agree closely with the type, except that in some individuals the lateral stripe is somewhat wider, and there are occasionally 11 rays in the dorsal and anal, the usual number being 12. A more careful examination of the teeth than was possible with the single type specimen shows that they are arranged in two series, an outer single row of stronger teeth which gradually increase in size posteriorly, and an inner broad band of weaker teeth, the posterior of which are larger than the others. In the upper jaw the posterior teeth of the upper band are almost as large as those of the outer row, while the others are very minute and weak. In the lower jaw of some specimens the most posterior tooth is somewhat larger than the others.

Individuals from Aikawa are somewhat lighter in color than the others.

CLARIGER EXILIS Snyder.

Plate 60, fig. 1.

Clariger exilis SNYDER, Proc. U. S. Nat. Mus., vol. 40, 1912, p. 544.

Ten specimens from Tanegashima range in size from 20 to 32 millimeters in length. They were found in the more outlying pools and appeared only after the water had been thoroughly poisoned.

The following measurements, made with all possible care, are recorded in hundredths of the length to base of caudal:

	1.	2.	3.
Length of body, mm.....	28	29	30
Length head.....	.25	.26	.26
Depth body.....	.125	.11	.12
Depth caudal peduncle.....	.115	.11	.115
Length caudal peduncle.....	.18	.17	.19
Length snout.....	.065	.06	.06
Diameter eye.....	.045	.05	.045
Interorbital width.....	.06	.05	.05
Depth head.....	.12	.11	.105
Snout to spinous dorsal.....	.46	.46	.48
Length base of soft dorsal.....	.20	.22	.21
Length base of anal.....	.20	.22	.215
Height soft dorsal.....	.075	.06	.07
Height anal.....	.075	.06	.07
Length pectoral.....	.18	.15	.17
Length ventral.....	.11	.09	.10
Length caudal.....	.21	.16	.20

AINOSUS GENEIONEMUS (Hilgendorf).

One specimen from the pools at Misaki. The tongue is forked and there are about 4 rows of embedded scales on the cheek below the eye.

INU KOMA Snyder.

Plate 60, fig. 2.

Inu koma SNYDER, Proc. U. S. Nat. Mus., vol. 36, 1909, p. 607.

Misaki pools.

INU AMA Snyder.

Plate 60, fig. 3.

Inu ama SNYDER, Proc. U. S. Nat. Mus., vol. 36, 1909, p. 608.

Misaki pools.

LUCIOGOBIUS GUTTATUS Gill.

Mororan, Hakodate, Same, Aikawa, Misaki, Shimonoseki, Akune, and Tanegashima pools.

LUCIOGOBIUS ELONGATUS Regan.

Tanegashima pools.

Nine specimens were collected. The ventrals are minute, but not at all scale-like as described, there being 4 rays distinctly visible under the lens.

EXPEDIO PARVULUS Snyder.

Plate 61, fig. 1.

Expedio parvulus SNYDER, Proc. U. S. Nat. Mus., vol. 36, 1907, p. 606.

Pools at Misaki.

Family **PTEROPSARIDÆ**.

PARAPERCIS PULCHELLA (Temminck and Schlegel).

Seined near shore at Shimizu.

NEOPERCIS SEXFASCIATA (Temminck and Schlegel).

Tokyo and Kagoshima markets; Shimizu, seined.

Family **TRICHODONTIDÆ**.

ARCTOSCOPUS JAPONICUS (Steindachner).

Otaru, Mororan, and Hakodate markets.

Family URANOSCOPIDÆ.

URANOSCOPUS JAPONICUS Houttuyn.

Tokyo market; Shimizu, seined near shore.

URANOSCOPUS BICINCTUS Temminck and Schlegel.

Shimizu, where specimens were collected with the seine.

GNATHAGNUS ELONGATUS (Temminck and Schlegel).

One specimen from the market at Kagoshima.

Family CALLIONYMIDÆ.

CALLIORICHTHYS DORYSSUS Jordan and Fowler.

Hakodate market; Shimizu, in shallow water near shore.

CALLIURICHTHYS JAPONICUS (Houttuyn).

Shimizu; taken with the seine.

CALLIONYMUS LUNATUS Temminck and Schlegel.

A pale colored specimen from Nagasaki closely resembles that figured by Temminck and Schlegel. The first dorsal spine though broken reaches past the middle of the soft dorsal, the spines following it being somewhat shorter than the anterior dorsal rays. The posterior dorsal rays are elongate, reaching the base of caudal; the last anal rays are similar. There is a black, lunate spot on the posterior edge of the spinous dorsal and a diffuse, dark band on the lower part of the caudal; the anal is dusky along its median portion; the soft dorsal has a few elongate, dusky spots, and similar ones appear on the upper part of the caudal. An examination of a series of specimens shows some variation in both structure and color. The height of all the fins is often much reduced, the filament of the first dorsal spine being very short and the last rays of the dorsal and anal not reaching the base of the caudal; the fourth and third dorsal spines are sometimes successively shortened. The color is often intense, the black spot spreading over a considerable part of the spinous dorsal and becoming more or less broken up in an occasional specimen; the dusky region of the anal becoming restricted in area and intense in color, the edge of the fin at the same time growing white, the dusky, lower portion of the caudal becoming modified in a similar way, so that the black band of the anal appears to be continued on the caudal; the dusky spots of both soft dorsal and upper part of caudal growing more elongate, narrow and distinct. The specimen figured by Jordan and Fowler¹ is a brightly colored example with short fins. Mr. Regan's² opinion that this specimen represents *C. inframundus* Gill,³ and that it is not Temminck and Schlegel's species does not

¹ Proc. U. S. Nat. Mus., vol. 25, 1903, p. 949, fig. 5.

² Ann. and Mag. Nat. Hist., vol. 15, p. 24.

³ Proc. Acad. Nat. Sci. Phila., vol. 11, p. 129.

appear to be well founded. Of the color Doctor Gill says: "Light brownish, marbled with white, and with a blackish first dorsal."

The species may be easily recognized by the more or less definite dark bar extending along the lower half of the caudal.

CALLIONYMUS VALENCIENNESI Temminck and Schlegel.

Tokyo, Shimizu, Kagoshima, and Nagasaki markets.

CALLIONYMUS BENITEGURI Jordan and Snyder.

Otaru, Hakodate, and Misaki markets.

Some variation in the structure of the preopercular spine has been observed. There are generally 3 recurved hooks present, but occasional specimens have but 2, a third being sometimes indicated by a sharp elevation, while rarely an example may be found with but 1. All individuals examined have a comparatively wide inter-orbital space, the back covered with numerous ocelli, the anal in the male with white, wavy lines, in the female dusky or immaculate, the caudal with elongate, blackish spots except on the three lower membranes, soft dorsal with ocelli, vermiculations, and at least 1 (median) row of blackish spots.

CALLIONYMUS FLAGRIS Jordan and Fowler.

Hakodate and Shimizu markets.

DRACULO MIRABILIS Snyder.

Plate 61, fig. 2.

Draculo mirabilis SNYDER, Proc. U. S. Nat. Mus., vol. 40, 1912, p. 545.

Tomakomai in Hokkaido.

Family GOBIESOCIDÆ.

ASPASMA MINIMA (Doderlein).

Misaki pools.

ASPASMA MISAKIA Tanaka.

Misaki and Tanegashima pools. This appears to be a rather widely distributed species, being found at least as far south as Okinawa, where specimens were more frequently taken than at Misaki.

Family BLENNIIDÆ.

ENNEAPTERYGIUS TUSITALE Jordan and Seale.

Pools at Tanegashima.

ENNEAPTERYGIUS ETHEOSTOMA (Jordan and Snyder).

This species appears to be equally abundant at Misaki and Tanegashima where it occurs in the tide pools.

ENNEAPTERYGIUS BAPTURUS (Jordan and Snyder).

Misaki pools. One small specimen of this rare species was found.

ZACALES BRYOPE Jordan and Snyder.

Misaki and Aikawa pools. One example at Aikawa.

Some examples possess scarcely a trace of the bright color pattern so commonly found, the whole body and fins being almost uniform.

The species is abundantly represented at Misaki but appears to be rare toward the northward.

ALTICUS ELLIPES (Jordan and Starks).

Tanegashima pools.

ALTICUS MARGARITARIUS Snyder.

Plate 61, fig. 3.

Alticus margaritarius SNYDER, Proc. U. S. Nat. Mus., vol. 35, 1909, p. 106.

Pools at Tanegashima.

PETROCSIRTES LOXOZONUS Jordan and Starks.

Tanegashima pools.

PETROSCIRTES ELEGANS Steindachner.

Aikawa, Misaki, Shiminoseki, Mitajiri, and Akune pools, the latter locality being the most southern record.

SALARIAS LINEATUS Bleeker.

Tanegashima pools.

SALARIAS ANDERSONI Jordan and Starks.

Tanegashima pools.

SALARIAS QUADRICORNIS Cuvier and Valenciennes.

Misaki, Akune, and Tanegashima pools.

SALARIAS TANEGASASIMÆ Jordan and Starks.

Tanegashima pools, where the species is abundantly represented. The males are dark in color, the females having many oblique, black lines with light spaces between. This species is easily distinguished from *S. quadricornis* by the long, fringed orbital tentacles, those of *S. quadricornis* being shorter and without fringed edges. An occipital crest is present in *S. tanegasasimæ*, prominent in the males and very small or absent in the females.

AZUMA EMNION Jordan and Snyder.

Hakodate pools. The figure illustrating this species is incorrect in that the origin of the dorsal should be represented as halfway between occiput and upper edge of gill opening.

BRYOSTEMMA POLYACTOCEPHALUM (Pallas).

Hakodate, Same, and Aikawa pools.

ENEDRIAS NEBULOSUS (Temminck and Schlegel).

Mororan, Hakodate, Same, and Shiogama pools. One of the most abundant tide pool fishes at Same.

CRISTICEPS FLAMMEUS Jordan and Starks.

Tanegashima pools.

PHOLIS TACZANOWSKII (Steindachner).

Hakodate and Same pools. In life the color ranges from the olive brown to the bright red, green and lilac of the algæ, a silver stripe below the eye and a row of spots on the sides standing out in bold and brilliant contrast.

ALECTRIAS BENJAMINI Jordan and Snyder.

Pools at Mororan, Hakodate, and Aikawa.

NEOZOARCES STEINDACHNERI Jordan and Snyder.

Hakodate and Same pools.

ZOARCHIAS VENEFICUS Jordan and Snyder.

Hakodate pools.

DICTYOSOMA BURGERI Van der Hoeven.

Hakodate, Same, Aikawa, and Akune pools. This was the most common tide pool fish at Aikawa while only 5 specimens were found at Same.

OPISTHOCENTRUS OCELLATUS (Tilesius).

Mororan, Hakodate, Same, and Aikawa pools.

OPISTHOCENTRUS ZONOPE Jordan and Snyder.

Mororan pools.

ABRYOIS AZUMÆ Jordan and Snyder.

Pools of Mororan. The species has not yet been seen elsewhere. The young of an inch or so in length have a bright, silvery stripe extending from lower edge of eye through base of pectoral to insertion of anal. The tail has a light border and the spot on the dorsal is indistinct. The head varies from 6.6 in the length in large examples to 5 in the smaller ones.

ERNOGRAMMUS HEXAGRAMMUS (Temminck and Schlegel).

Pools at Hakodate, Same, and Aikawa. Young examples have the dorsal fin considerably elevated posteriorly.

ERNOGRAMMUS EPALLAX Jordan and Snyder.

A single specimen of this species was secured in a deep pool at Hakodate. It agrees with the original description of the species, the dorsal and anal having the same number of spines. The head below the eye is marked with a number of very distinct, white spots. The ventral part of the body has similar spots which are much less distinct in outline. The specimen measures 170 millimeters in length.

OZORTHE DICTYOGRAMMA (Herzenstein).

Hakodate and Same pools.

DINOGUNNELUS GRIGORJEWI (Herzenstein).

Mororan; in the tide pools.

LUMPENUS ANGUILLARIS (Pallas).

Mororan and Hakodate. Two poorly preserved specimens of this species were found, one in the stomach of an example of *Hemipterus villosus* from Mororan, the other on the beach at Hakodate.

Family AMMODYTIDÆ.

AMMODYTES PERSONATUS Girard.

Mororan and Hakodate markets; Same, collected with the seine.

Family BROTLIDÆ.

HOPLOBROTULA ARMATA (Temminck and Schlegel).

Kagoshima market.

SIREMBO IMBERBIS (Temminck and Schlegel).

Nagasaki market.

Family GADIDÆ.

GADUS MACROCEPHALUS Tilesius.

Otaru markets.

ELEGINUS NAVAGA (Kölreuter).

Otaru market.

PHYSICULUS JAPONICUS Hilgendorf.

Hakodate market.

LOTELLA PHYCIS Temminck and Schlegel.

Hakodate and Aikawa markets.

Family LOPHIIDÆ.

LOPHIUS LITULON (Jordan).

Otaru; Hakodate; in the markets.

Family ANTENNARIIDÆ.

PTEROPHRYNE HISTRIO (Linnæus).

A large specimen from Mororan has an immaculate ventral surface and filaments on the sides. It is doubtful if *P. ranina* should be recognized as a distinct species.

ANTENNARIUS TRIDENS (Temminck and Schlegel).

Misaki pools; Shimizu, taken with the seine.



Snyder, John Otterbein. 1912. "Japanese shore fishes collected by the United States Bureau of Fisheries steamer Albatross expedition of 1906." *Proceedings of the United States National Museum* 42(1909), 399–450.

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