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FISHES FROM THE NORTHERN PACIFIC AND FROM BRISTOL BAY

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Since the end of the Second World War, the Japanese Northern Pacific Salmon Fisheries has fortunately been able to resume its operation on and after 1952 in a comprehensive area extending from the northern part of the Pacific Ocean to the southern part of the Bering Sea, about 48°N, to 55°N, and 154°30′E, to 175°W, as indicated by the dotted lines in Fig. 1. The annual season runs from May to September.

A considerable number of pelagic fishes which have been taken by the salmon drift-net or hand-line come into the writers' hands for study, through the courtesy of many gentlemen. In 1952, some valuable specimens were kindly presented by Mr. I. Takeuchi of the Hokkaido Regional Fisheries Research Laboratory. In 1953 and 1954, the "Oshoro Maru", a training ship of Hokkaido University, brought many specimens taken from the Northern Pacific, during the fishing for salmon in her cruises. Here cordial thanks are expressed to Capt. S. Mishima and members of his crew. In 1954, others were kindly contributed to the ichthyological laboratory through the kindness of Messrs. T. Igarashi and T. Nakamura, inspectors of the Fisheries Agency of Japan, from the "Ginyō Maru" (a mother ship of Northern Pacific Salmon Floating Factory of the Hokkaido Fisheries Corporation), the "Miyajima Maru" (the same of the Nichiro Fisheries Company) and their catcher boats. Also, in the summer 1955, some specimens were collected by the Oceanographic Investigation in the Bering Sea by the training ship "Oshoro Maru", and

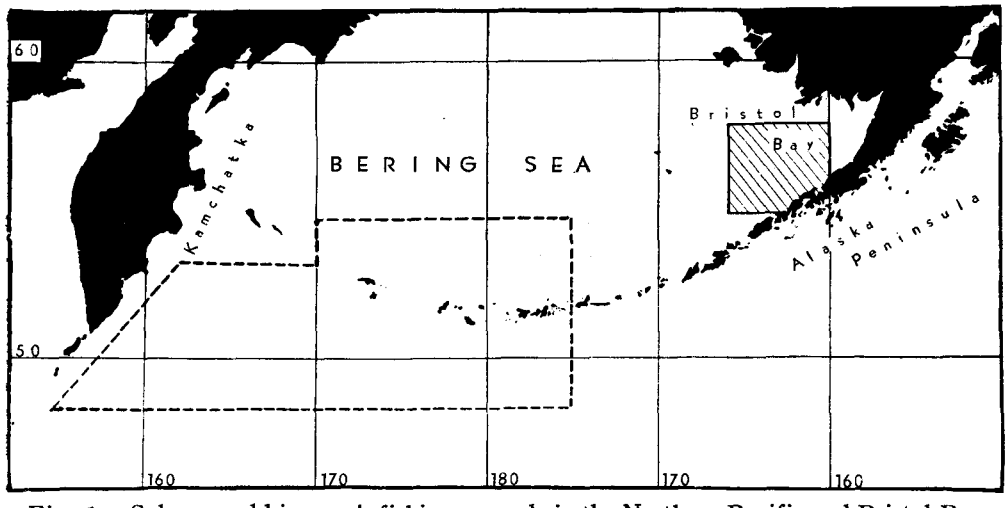

Fig. 1. Salmon and king-crab fishing grounds in the Northern Pacific and Bristol Bay
salmon fishing ground; king-crab fishing ground

added to those described in this paper.

Furthermore, the floating factory for king-crab (*Paralithodes camtschatica*) has also been re-opened after 1953 in Bristol Bay, north side of Alaska Peninsula, in the area extending over 55°N, to 58°N, and 160°W, to 166°W, as indicated by the thick line in Fig. 1.

Messrs. T. Taniwaki and M. Kawasaki of the Research Division, Fisheries Agency of Japan, then, who were on board the "Tōkei Maru" (a mother ship of the Nihon Suisan Fisheries Company for king-crab's Floating Factory) during the fishing seasons of 1953 and 1955 in the capacity of inspectors and investigators of the Japanese Government. Through their kindness many specimens of bottom fishes caught by the ground-tangle-net and bottom-trawls for crab fisheries from depths of about 50m to 200m, have come to the hands of the writers.

In 1954, Mr. S. Nakae, then a college student of this university, made a collection of bottom-fauna of Bristol Bay for purposes of investigation during his travelling on the "Oshoro Maru" and "Tōkei Maru" above noted.

Moreover, it was made possible by courtesy of Mr. K. Yamahira for the present writers to observe some specimens from Bristol Bay, which were collected by the "Tōkō Maru", an inspection vessel of the Fisheries Agency of Japan.

Therein it is proposed to make a report on observations and examinations of those fishes collected from the Northern Pacific and Bristol Bay between 1952 to 1955.

The writers express here their cordial thanks to the above mentioned gentlemen for their kindness in presentation and collection of many various specimens. Also, their indebtedness is acknowledged to Prof. R. Ishiyama of the Shimonoseki College of Fisheries, who has given painstaking instructions regarding the Rajidae of northern seas; finally heartfelt thanks are offered to Prof. S. I. Sato of this university for his various sorts of advice and kind encouragement in the prosecution of this work.

Family **Rajidae**

Breviraja parmifera (*BEAN*)

Nom. Jap. Tsuno-kasube

Five specimens from Bristol Bay, of which two are female (Fig. 2). The proportional measurements of the present specimens are given in Table 1.

Body is flat, having broad disc and robust tail which is shorter than half of the total length. The greater part of disc is smooth except for sparse prickles distributed in marginal portion of disc, back of the rostral region and midbelt of disc. Anterior oblique margin of disc having gentle undulating bend, presents a narrow but rough band of prickles on each side, prickles being to disperse and widely scattered posteriorly. Snout is thickened, prominently projecting, with somewhat indefinite notches on both sides. Rostral cartilage has no segment, clearly belonging to the Breviraja-type. Eye is rather

Fig. 2. *Breviraja parmifera* (*BEAN*), 737mm in total length (Sp. No. 13081)

large, its diameter is longer than that of spiracle. Interorbital space is broad, weakly concave, without prickles except the orbital rims, which are armed with about 10 to 12 strong, small spines. Teeth are small, arranged in oblique rows; those rows are 26 on upper jaw and 29 on lower jaw in the smallest specimen (Sp. No. 13040).

A pair of minute but distinct mucous pores present at a little behind the interorbital space, and behind that there are opposite rows of similar pores which to set as ×-shape. Three large nuchal spines form a short line on the middle of back; at a short distance from the last one, a longitudinal series of 22 to 33 large spines run along the median-line of disc and tail to the first dorsal fin, 1 or 2 spines lie between the two dorsal fins. The longitudinal series of large spines accompanying with thickly prickled band beside it, and prickles in lower lateral side of tail are denser and larger anteriorly. One or 2 large spines set on each shoulder region (three specimens with 1, the rest with 2 spines in number).

Ventral fin is of moderate size, clearly notched, dividing into two distinct lobes. The anterior lobe is thickened and finger-shape; on the contrary, the posterior lobe is flat and leaf-like. Claspers are rather short, undeveloped as perhaps the fishes are not fully

Table 1. Comparison of proportional measurements and counts of body parts in five specimens of *Breviraja parmifera* from Bristol Bay

Station	161°20′W 56°42′N	161°15′W 56°57′N	161°15′W 56°57′N	161°15′W 56°57′N	168°25′W 58°49′N
Date	1953,6,12	1954,6,10	1954,6,10	1954,6,10	1954,6,25
Sp. No.	12860	13039	13040	13041	13081
Sex	female	female	male	male	male
Disc length in total length	1.70	1.73	1.72	1.75	1.70
Disc width in total length	1.45	1.39	1.46	1.45	1.43
Tail length in total length	2.13	2.13	2.08	2.05	2.09
Head length in disc length	1.96	1.88	1.88	1.90	1.94
Snout in disc length	4.07	3.98	3.65	4.00	3.75
Precaudal length in disc length	1.54	1.54	1.57	1.50	1.58
Distance between mouth and cloaca in disc length	1.62	1.77	1.87	1.78	1.79
Preoral length in head length	1.93	1.93	1.92	2.04	1.92
Base length of the first dorsal fin in snout length	4.78	4.61	4.57	4.45	4.42
Base length of the second dorsal fin in snout length	5.79	5.30	5.02	4.45	4.79
Interorbital width in snout length	2.90	2.87	3.31	3.06	3.29
Diameter of orbit in snout length	4.78	4.08	4.00	3.63	3.59
Width of mouth cleft in snout length	1.69	1.63	1.65	1.61	1.77
Length of clasper in snout length	——	——	1.63	1.58	1.29
Width of tail origin in snout length	2.82	2.94	3.00	2.72	3.02
Number of nuchal spines	3	2-1	3	3	3
Number of shoulder spines	4	2	2	2	4
Number of spines in median row of disc and tail	26	23	33	24	22

adult. Caudal fin is small but distinct. Dermal folds along the both sides are developed, occupying about posterior one-third of the tail, and becoming broader posteriorly. As for color of specimens in formalin solution, back is uniformly dark-brown without evident blotchs and patterns; under side of disc is almost white, but some obscure dark blotches are scattered on the under surface of tail.

The scientific name of this species is here provisionally stated by the writers because the original discription was unavailable and accurate figures of this species were lacking, but it is certain that the specimens belong to Breviraja judging from the construction of rostral cartilage and other external features.

In order to make certain of the identification of this species two specimens (one female and one male) were sent to Prof. Ishiyama, an authority on the classification of northern sea rays and skates.

It will probably be made certain soon whether the specific name of this specimen is correctly applied.

Family **Clupeidae**

Clupea pallasii CUVIER & VALENCIENNES

Nom. Jap. Nishin

Two specimens were collected from Bristol Bay, their body length was 205 and 210 mm respectively (Sp. Nos. 13015, 13016).

Family **Salmonidae**

Oncorhynchus nerka (WALBAUM)

Nom. Jap. Beni-masu

The specimens were most abundantly collected among the salmon from the Northern Pacific and Bering Sea. Twenty specimens are included in the present collection (Sp. Nos. 12630, 12631, 12640, 12642-12644, 12651, 12655, 12656, 12991, 12994, and 9 other specimens).

Oncorhynchus gorbuscha (WALBAUM)

Nom. Jap. Karafuto-masu

Fourteen specimens of humpback salmon have been gathered; it seems to be abundant in the Northern Pacific and Bering Sea (Sp. Nos. 12633, 12634, 12639, 12650, 12652-12654, 12657, 12981, 12989, and 4 other specimens).

Oncorhynchus tschawytscha (WALBAUM)

Nom. Jap. Masuno-suke

Five specimens of king salmon have been added to our collection (Sp. Nos. 12632, 12648, 12988, and 2 other specimens).

Oncorhynchus keta (WALBAUM)

Nom. Jap. Sake

Thirteen specimens of dog salmon are at hand collected from the Northern Pacific and Bering Sea (Sp. Nos. 12627-12629, 12641, 12647, 12659, 12983-12985, and 4 other specimens).

Oncorhynchus kisutch (WALBAUM)

Nom. Jap. Gin-masu

It seems that the silver salmon is inferior in number as compared with other salmon of the Northern Pacific, four specimens have been received in our hands (Sp. Nos. 12646, 12996, and 2 other specimens).

Salvelinus malma (WALBAUM)

Nom. Jap. Oshoro-koma

It appears that the specimens sometimes were taken mingled with other salmon, by

the drift-net. There are six specimens in our collection (Sp. Nos. 12660, 12986, 12987, 12997, and 1 other specimen).

Family **Osmeridae**

Mallotus catervarius (PENNANT)

Nom. Jap. Karafuto-shishamo

There are sixteen specimens in the present collection, of which five are male, others are female (Sp. Nos. 13068, 13099–13113). The proportional measurements and counts of body parts are given in the following table (Table 2).

Table 2. Measurements and counts of *Mallotus catervarius* from Bristol Bay

Sex	male	female
Number of specimens	5	11
Body length in mm	115–150	82–150
Length of head in body length	4.21–4.64	4.14–4.42
Depth of body in body length	6.24–7.28	6.15–8.54
Depth of caudal peduncle in head length	3.67–4.07	4.23–4.81
Length of snout in head length	3.15–3.40	2.91–3.29
Length of maxillary in head length	2.10–2.28	2.14–2.40
Interorbital width in head length	3.98–4.46	4.21–4.82
Diameter of orbit in head length	4.02–4.39	3.49–4.31
Length of dorsal ray in head length	1.79–1.88	1.88–2.21
Length of pectoral ray in head length	1.66–1.83	1.74–2.33
Length of anal ray in head length	2.66–2.98	2.73–4.42
Length of ventral ray in head length	1.52–1.74	1.70–2.06
Number of dorsal rays	13–14	13–15
Number of pectoral rays	17–18	16–18
Number of anal rays (branched rays)	21–23(16–17)	19–22(16–18)
Number of ventral rays	8	8
Number of gill rakers on the first arch above angle	8–11	8–11
Number of gill rakers on the first arch below angle	27–29	24–30
Total number of gill rakers on the first arch	36–38	34–41

Scales are very small, cycloid. Male has two villous bands along each side of body.

Family **Anotopteridae**

Anotopterus pharao ZUGMAYER

Nom. Jap. Mizu-uwo-damashi

A single specimen, measuring 876mm in total length and 817mm in body length, was added to our collection (Sp. No. 12976). The present specimen was taken by salmon drift-net of the "Rinkō Maru" of a catcher boat belonging to the fleet of the "Ginyō Maru", at 49°45′N, 170°25′E, on June 8, 1954 (Fig. 3).

Fig. 3. *Anotopterus pharao ZUGMAYER*, 876mm in total length (Sp. No. 12976)

Table 3. Measurements of body part of *Anotopterus pharao* are expressed in ratio to body length (B. L.) and head length (H. L.).

Items	Measurement (mm)	Ratio to B. L.
Length of head	194	4.20
Depth of body	52	15.69
Length of snout	110	7.41
Length of premaxil'ary	133	6.13
Length of lower jaw	146	5.58
Distance from tip of snout to adipose fin	735	1.11
Distance from tip of lower jaw to base of pectoral fin	201	4.06
Distance between pectoral fin to ventral fin	278	2.83
Distance between ventral fin to anal fin	222	3.67
Distance from tip of lower jaw to anal fin	524	1.56
		Ratio to H. L.
Greatest width of head	20	9.70
Length of snout	110	1.76
Length of premaxillary	133	1.46
Length of lower jaw	146	1.33
Diameter of orbit	18	10.77
Diameter of pupil	5	34.80
Length of caudal peduncle (from the last of anal fin to origin of caudal fin)	59	3.29
Depth of caudal peduncle	14	13.85
Postorbital part of head	70	2.77
Base length of pectoral fin	18	10.77
Base length of anal fin	53	3.66
Base length of ventral fin	13	14.91

A. 17; P. 13 on each side; V. 10 on the left, 9 on the right side; C. xiii-18-xiii; Branchiostegals 7 on each side; Gill rakers are entirely lacking; Gills are 4 in number.

Palatine teeth are very remarkable, blade-shaped or lancet-like, arranged in a row on each palatine, anterior two on each side are fixed, the third and fourth of each side are the largest among the palatine teeth, and those of left side are fixed, but those of right side are movable, the posterior-most ones on each side are shorter, and movable. The teeth on lower jaw are small, but are sharply pointed, numbering 16 on right side and 13 on left side. Premaxillary teeth are minute, arranged in a single row. The lateral pores are 83 on the right side and 82 on the left, in number, forming pairs of blackish pores; they run as close-set parallel lines from the occipital region to the base of caudal fin along the median line of body. Additionally, it is noteworthy that the present specimen has thin, caducous cycloid scales chiefly scattered in a lateral line on under part of body.

The upper lobe of the first gill arch on each side is connected with the inside of opercular bone by a thin membrane, and gill rakers are lacking on both lobes. Measurements of this specimen are presented in Table 3.

Family **Alepisauridae**

Alepisaurus ferox (*LOWE*)

Nom. Jap. Mizu-uwo

Nine specimens were taken by salmon drift-net from the Northern Pacific in 1953 and 1954 (Sp. Nos. 12311-12313, 12661, 12662, 12972-12975) (Fig. 4).

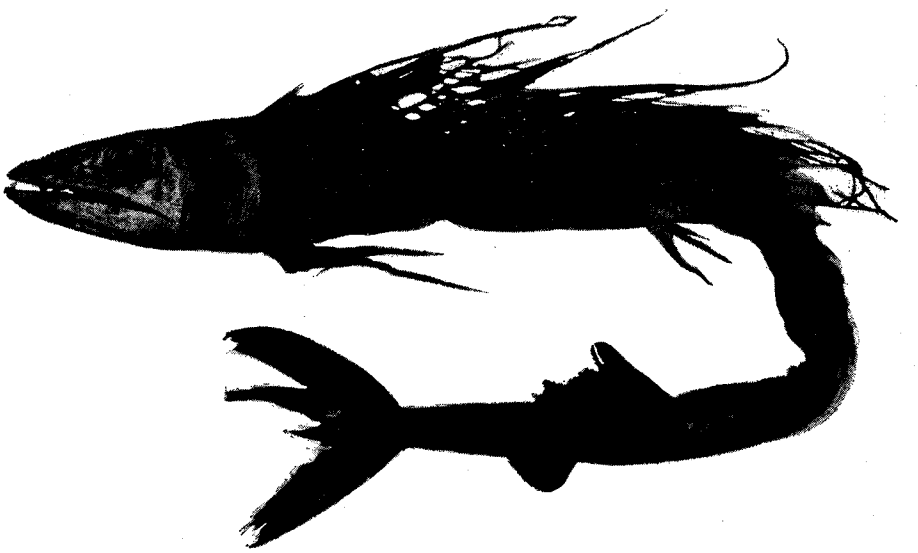

Fig. 4. *Alepisaurus ferox* (*LOWE*), 1124mm in total length (Sp. No. 12311)

Table 4. Measurements and counts of *Alepisaurus ferox*

Items	No.	Range
Total length in mm	9	640–1365
Body length in mm	9	580–1220
Length of head in body length	9	5.09–5.72
Greatest depth of body in body length (at origin of dorsal fin)	9	10.00–12.24
Base length of dorsal fin in body length	9	1.55–1.69
Base length of anal fin in body length	9	8.24–10.58
Distance between tip of snout and origin of dorsal fin in body length	9	5.20–5.85
Distance between pectoral fin and ventral fin in body length	9	3.63–4.45
Distance between ventral fin and anal fin in body length	9	3.04–3.54
Distance between dorsal fin and adipose fin in body length	9	16.76–19.56
Longest ray of dorsal fin in body length	6	4.04–5.22
Longest ray of pectoral fin in body length	9	4.72–6.54
Longest ray of anal fin in body length	5	15.28–17.76
Longest ray of ventral fin in body length	5	11.43–14.35
Longest ray of caudal fin in body length	5	6.14–7.62
Length of snout in head length	9	2.33–2.74
Greatest width of head in head length (at anterior part of opercular bone)	9	3.67–4.19
Length of premaxillary in head length	9	1.32–1.42
Length of lower jaw in head length	9	1.35–1.42
Width of mouth cleft in head length	5	6.66–7.60
Diameter of orbit in head length	8	5.13–6.22
Diameter of pupil in head length	7	18.00–19.55
Least width of interorbital space in head length	9	5.26–6.53
Least depth of caudal peduncle in head length	9	6.60–7.65
Length of caudal peduncle in head length (from the last ray of anal ray to origin of caudal fin)	9	2.05–2.64
Length of postorbital part of head in head length	9	2.24–2.47
Base length of pectoral fin in head length	9	5.08–6.94
Base length of ventral fin in head length	6	10.13–11.85
Number of dorsal fin rays	9	35–38
Number of anal fin rays	9	15–17
Number of pectoral fin rays on each side (left:right)	9	13–14:13–14
Number of ventral fin rays on each side (left:right)	9	9:9
Number of gill rakers on the first arch	8	4–6+18–23
Number of vertebrae	3	48

The above table (Table 4) indicates range of relative ratios our specimens of *Alepisaurus ferox*.

Premaxillary teeth are very small, more than 70 in number on each side, arranged in a single row, and each premaxillary bone is not united at anterior tip. Number and arrangement of teeth on lower jaw and palatine are conspicuously variant not only between

individuals but also on both sides of one individual. Some teeth on lower jaw and palatines are strikingly elongated and become sharp canine teeth, and also, some anterior ones are movable but posterior ones are all immovable, triangular in shape. The first ray of dorsal, anal and pectoral are thickened, and armed with minute serrations on their outer margins.

Family **Acrotidae**

Acrotus willoughbyi BEAN

Seven specimens of this peculiar fish have been obtained through the courtesy of Mr. T. Igarashi. The specimens were taken from the sea near 49°N, 170°E, at the middle of June, 1954 (Sp. Nos. 12965–12971) (Fig. 5).

Fig. 5. *Acrotus willoughbyi BEAN*, 686mm in total length (Sp. No. 12967)

Body length measures 478 to 745mm; body is elongate, elliptical, and greatly compressed. No scales on body so, body is very smooth and limp. Caudal fin is very broad, fan-like, and continues as a very slender caudal peduncle. Pelvic fins are entirely absent. Lateral line is slightly arched above the pectoral fin, henceforth, it runs straight along the median of body backward to caudal fin base. Small spinous processes are found on the lateral line.

D. 50–55; A. 33–39; P. 18–21; C. 27–33; B. 7 (on each side)

Head 4.71–5.47 in body length; depth of body 3.52–4.59. Snout 2.90–3.54 in head length; maxillary 2.29–2.97; interorbital width 2.16–2.66; diameter of orbit 6.33–8.46; depth of caudal peduncle 3.73–4.97; the longest ray of dorsal fin 3.10–3.69; the same of pectoral fin 1.50–1.81; the same of anal fin 2.78–3.41. Length of dorsal fin base 1.47–1.65 in body length; the same of anal fin 2.40–2.78; distance between tip of snout and vent 2.27–2.85. Gill rakers on the first arch are 5–7+9–10 in number. Vertebrae are 70 in number in one specimen. Color is chocolate brown uniformly, mouth-cavity and inside of gill opening are blackish dark brown.

There are some distinctions in which there are differences from other past references, namely, depth of body is shorter, length of snout, diameter of orbit, and interorbital width etc. are longer, and also, number of dorsal rays and branchiostegal rays are more

compared to the description until now.

Family **Hexagrammidae**

Pleurogrammus monopterygius (*PALLAS*)

Nom. Jap. Kitano-hokke

Seven specimens had been taken by salmon drift-net from the Bering Sea in 1955, measuring 208–261mm in body length (Sp. Nos. 14248-14253, and one other specimen).

D. 47-49; A. 24-27; P. 23-25

Head 3.96-4.24 in body length; depth of body 4.34-4.98. Snout 2.98-3.17 in head length; maxillary 2.66-2.78; interorbital width 2.98-3.20; diameter of orbit 4.70-5.59; depth of caudal peduncle 4.00-4.20; the longest ray of ventral fin 1.93-2.08. Number of gill rakers are $\frac{2-3+12-15}{7-8+18-19}$ on the first gill arch from four specimens.

The third lateral line reaches to 16th or 20th ray on the left side, and 15th or 20th on the right side. The lateral pores are 139–149 on the second lateral line, but one specimen has 160 pores.

Color, greenish dark blue, and almost always seven darkish stripes appear on the body side.

This species is very nearly related to *P. azonus*, but differs from it in respect to total number of dorsal and anal fin rays, and second lateral line scales are less than *P. azonus* in number.

Family **Cottidae**

Icelus uncinalis GILBERT & BURKE

Nom. Jap. Hime-kori-kajika

Two specimens were collected from Bristol Bay, measuring 84 and 88mm in body length (Sp. Nos. 13019, 13022).

D. IX-X, 19-21; A. 16-18; P. 18-19; V. I, 3

Head 2.70-2.76 in body length; depth of body 4.66-4.89. Snout 3.44-3.45 in head length; maxillary 1.85-1.88; depth of caudal peduncle 7.75-7.95; interorbital width 15.5-15.9; diameter of orbit 3.22-3.24; length of eye 3.52-3.65; length of longest dorsal spine 3.10-3.31; longest dorsal ray 2.48-2.54; pectoral ray 1.32-1.37; anal ray 3.03-3.18. Number of plates on lateral line 41-42, and under the dorsal fin series 33-37. Small verrucacae are found on the upper eye bole. Preopercular spines 4, the upper one is branched, nasal spines and those on each side of nape are very sharp. Lacks cross-folds on the breast, hole on posterior last gill arch, and gill rakers fused. Interorbital space narrow and rain pipe like. Teeth on vomer and palatines.

Triglops beani GILBERT

Nom. Jap. Hokkyoku-kajika

Five specimens were collected from Bristol Bay (one specimen was damaged), measuring 116–184mm in body length (Sp. Nos. 13020, 13021, 13023–13025).

D. X–XI, 24–26; A. 23–25; P. 17–19; V. I, 3

Head 3.45–3.57 in body length; depth of body 6.30–7.30. Snout 3.03–3.20 in head length; maxillary 2.09–2.24; depth of caudal peduncle 7.93–8.69; diameter of orbit 3.49–3.71; length of eye 3.61–4.32. Interorbital width 2.80–3.31 in diameter of orbit. Not forming high orbital rims. Eyes small, their diameter smaller than length of snout. Length of longest dorsal spine 2.54–3.38 in head length; longest dorsal ray 2.68–2.94; longest pectoral ray 1.29–1.42; longest anal ray 2.99–3.14. Number of scales along lateral line 48–51, and plates under dorsal 26–35; gill rakers on the first gill arch above angle $\frac{1-2}{0}$, belw angle $\frac{8-9}{5-7}$; preopercular spines 4. Cross-folds on the breast.

Hemilepidotus gilberti JORDAN & STARKS

Nom. Jap. Yokosuji-kajika

One specimen collected from Bristol Bay, measuring 179mm in body length (Sp. No. 13027).

D. XI, 22; P. 18; A. 18; V. I, 4

Head 2.82 in body length; depth of body 3.95. Snout 3.30 in head length; maxillary 2.26; depth of caudal peduncle 5.37; diameter of orbit 3.50; length of eye 4.14; first dorsal spine 3.30; third dorsal spine 3.20; fourth dorsal spine 2.75: third dorsal ray 2.12: fifth pectoral ray 1.42; fourth anal ray 2.94; middle caudal ray 1.58. Interorbital width 1.28 in eye. Number of scales on lateral line 67, scales of under dorsal fin 72 and wart-like scales in single line on upper series of anal fin, they are very obscure. Number of gill rakers $\frac{0+8}{2+6}$ on the first gill arch; preopercular spines 4.

Filaments: large single one on the maxillary, small branched filaments on the orbital and on each side of nape, and large branched one on the upper base of opercle.

Myoxocephalus polyacanthocephalus (PALLAS)

Nom. Jap. Toge-kajika

Ten specimens were collected from Bristol Bay, measuring 296–630mm in body length (Sp. Nos 12861-12864, 13031-13035, 13038).

D. IX–X, 14–15; A. 12–13; P. 18–19; V. I, 3

Head 2.22–2.39 in body length; depth of body 3.70–4.95. Snout 2.87–3.40 in head length; maxillary 1.75–1.96; depth ef caudal peduncle 6.42–7.23; interorbital width 5.70–7.21; diameter of orbit 5.18–6.07; length of eye 7.50–10.01; depth of head 1.76–2.54; length of third dorsal spine 2.47–3.29; fifth dorsal ray 2.27–2.69; longest pectoral ray 1.70-1.90; longest anal ray 2.88–3.88; longest ventral ray 2.38–3.11; middle caudal ray 2.26–2.70. Preopercular spines number three or four; length of upper preopercular spine

5.00-8.38 in head length, and distance from tip of upper preopercular spine to tip of opercle 4.19-6.20 in head length.

The postorbital spine is rather conspicuous. Teeth on vomer, but palatines toothless. Number of pores on lateral line 38-43, sometimes lateral line is not clear. Small rounded warts scatter on the upper and lower lateral line, sometimes they are not clear. In one specimen there is a clear one under the first dorsal fin, however obscure in the other specimens. Number of gill rakers $\frac{1+6-11}{0-1+6-7}$ on the first gill arch.

Color, bright brown, several clear white spots occur on the body sides.

Myoxocephalus jaok (*CUVIER & VALENCIENNES*)

Nom. Jap. Oku-kajika

Only two specimens collected from Bristol Bay, measuring 273 and 278mm in body length (Sp. Nos. 13030, 13091).

D. IX-X, 16; A. 14-15; P. 18; V. I, 3

Head 2.40-2.44 in body length; depth of body 5.18-5.58. Snout 3.27-3.37 in head length; maxillary 1.98-2.04; depth of caudal peduncle 7.87-7.91; interorbital width 6.09-6.30; diameter of orbit 5.41-5.43; length of eye 7.15 7.71; length of upper preopercular spine 6.06-6.43; distance from tip of upper preopercular spine to tip of opercle 7.01-7.23; depth of head 2.76 2.78; third dorsal spine 3.27-3.70; fifth dorsal ray 2.41-2.59; longest pectoral ray 1.52-1.54; longest anal ray 3.27-3.50. Number of pores on lateral line 41-42; preopercular spines 3; gill rakers $\frac{1+7-8}{1+5-7}$ on the first gill arch.

In the adult, an irregular series of circular spinous plates appears above the lateral line, and strong spinous prickles below the lateral line; they are directed backward. Interorbital space rather smooth, and the postorbital spine very small. Color, in formalin generally fades.

This species is very nearly related to *M. verrucosus*, but differs from it in possessing a larger number of anal rays and pores on lateral line, and depth of head is smaller than that of the latter.

Myoxocephalus verrucosus (*BEAN*)

Three specimens were collected from Bristol Bay, measuring 287-329mm in body length (Sp. Nos. 13029, 13036, 13037).

D. X. 16; A. 12-13; P. 17; V. I, 3

Head 2.20-2.48 in body length; depth of body 3.81-4.58. Snout 3.04-3.43 in head length; maxillary 1.88-1.97; interorbital width 6.09-7.51; diameter of orbit 4.93-5.15; eye 6.53-7.32; depth of caudal peduncle 6.43-6.99; depth of head 2.04-2.14; length of upper preopercular spine 7.64-8.27; distance from tip of upper preopercular spine to tip of opercle 3.98-6.11; third dorsal spine 2.05-2.87; fifth dorsal ray 1.92-2.28; longest

pectoral ray 1.34–1.46; longest anal ray 2.55–2.83; longest ventral ray 1.96–2.30; middle of caudal ray 1.96–2.14. Number of pores on lateral line 39–42; preopercular spines 3; gill rakers $\frac{1+6-7}{1+6-7}$ on the first gill arch.

This species is very nearly related to *M. verrucosus* sub sp. *ochotensis* SCHMIDT, differing in respect to the smaller eye and the wider interorbital space.

The spinous bony plates are drawn up in about single file on upper lateral series and scattered in lower series, and one or three of them on the occiput. The nasal and upper orbital spines very small, and interorbital space rather smooth. Males have osseous tubercles on the inner side of rays of the pectoral and ventral fins, but they are absent in female. Very clear dark brown stripes are observed on fins, namely, two on first dorsal, five on second dorsal, four on pectoral, two or three on ventral, six on anal and three on caudal fins. Some clear white spots exist on the belly.

Dasycottus setiger BEAN

Only one specimen collected from Bristol Bay, measuring 256mm in body length, (Sp. No. 13028).

D. VIII, 14; A. 15; P. 25; V. I, 3

Head 2.34 in body length; depth of body 4.81. Snout 3.44 in head length; maxillary 1.98; depth of caudal peduncle 6.83; interorbital width 3.97; diameter of orbit 4.45. Number of pores on lateral line about 19; gill rakers $\frac{1+8}{3+9}$ on the first gill arch; branchiostegals 7; preopercular spines 4; uppermost preopercular spine is smaller than the other spines, and hooked in shape. Bony plates on nape and under the dorsal series. Teeth on vomer, but palatines toothless.

This species is very nearly related to *D. japonicus*, differing in length and shape of uppermost preopercular spine.

Gymnocanthus pistilliger (PALLAS)

Nom. Jap. Hage-kajika

Only one male collected from Bristol Bay, measuring 118mm in body length (Sp. No. 13096).

D. X, 15; A. 16; P. 19; V. I, 3

Head 2.87 in body length; depth of body 4.84. Snout 3.30 in head length; maxillary 2.67; depth of caudal peduncle 6.71; interorbital width 27.3; diameter of orbit 3.38; width of head 1.69; first dorsal spine 1.89; third dorsal spine 1.39; ninth dorsal spine 5.06; last dorsal spine 10.5; fourth dorsal ray 1.49; middle pectoral ray 1.41; longest anal ray 2.49; middle caudal ray 1.70. Number of pores on lateral line 41; preopercular spines 4; gill rakers $\frac{1+6}{1+3}$ on the first gill arch. Verrucacae on the back of pectoral and ventral fins. Spatula-like process on body side of under the pectoral. Especially, ventral

fin rays are developed, length of their longest ray 2.05 in body length.

Color brown about seven white spots on the first dorsal fin.

Gymnocanthus galeatus BEAN

Only one specimen collected from Bristol Bay, measuring 260mm in body length (Sp. No. 13026).

D. XI; 16; A. 19; P. 19; V. I, 3

Head 3.11 in body length; depth of body 5.00. Snout 4.22 in head length; maxillary 2.46; depth of caudal peduncle 6.74; interorbital width 12.4; diameter of orbit 3.88; width of head 1.34; first dorsal spine 2.88; third dorsal spine 2.68; ninth dorsal spine 4.89; last dorsal spine 11.3; fourth dorsal ray 2.53; middle pectoral ray 1.66; longest anal ray 3.68; longest ventral ray 1.93; middle caudal ray 2.02. Number of pores on lateral line about 42; preopercular spines 4; gill rakers $\frac{1+7}{1+7}$ on the first gill arch. Interorbital region covered with bony granulations. The spinous process are under the pectoral and base of pectoral fin.

Family **Agonidae**

Occa dodecaedron (TILESIUS)

Nom. Jap. Kamuto-sachi-uwo

Only one specimen collected from Bristol Bay, measuring 141mm in body length (Sp. No. 13097).

D. XI, 9; A. 16; P. 15; V. I, 2

Head 4.05 in body length; depth of body 7.92. Snout 3.66 in head length; maxillary 2.94; depth of caudal peduncle 6.96; width of caudal peduncle 8.48; interorbital width 5.89; diameter of orbit 5.19; length of first dorsal base 1.09; second dorsal base 1.29; longest dorsal spine 2.20; longest dorsal ray 2.23; longest anal ray 3.22; longest ventral ray 2.61. Length of longest pectoral ray 3.97 in body length. Number of plates on lateral line 37, and the plates of belly nearly smooth. Supraocular, occipital and temporal ridges spineless. Cheeks nearly vertical, suborbital ridge developed, spineless. A large spine projecting from preopercle.

Podothecus acipenserinus (TILESIUS)

Fifteen specimens collected from Bristol Bay, three specimens of which are male, measuring 196–244mm, while the other 12 specimens are female, measuring 143–231mm in body length (Sp. Nos. 12865, 13058-13064, 13069–13073, 13092, 13098).

D. VIII–IX, 7–8; A. 7–8; P. 16–19; V. I, 2

Head 3.40 3.82 in body length; depth of body 6.37–8.30. Snout 2.00–2.18 in head length; depth of caudal peduncle 13.0–15.9; width of caudal peduncle 10.9–14.8; interorbital

width 3.76-4.96; diameter of orbit 4.22-4.84; length of the first dorsal base 1.62-2.09; the second dorsal base 2.00-2.58; longest dorsal spine 2.26-2.84; longest dorsal ray 1.91-2.48; longest pectoral ray 1.32-1.51; longest anal ray 1.81-2.50; longest ventral ray 2.50-2.93 on male and 4.95-6.93 on female. Number of plates on lateral line 38-39; gill rakers $\frac{0\text{-}2+8\text{-}12}{0\text{-}2+10\text{-}13}$ on the first gill arch. Teeth on jaws.

This species is very nearly related to *P. veternus*, but differs therefrom in that it is toothed on jaws and the number of pectoral rays is more than in *P. veternus*. Especially distinctive of this species is that the depth of caudal peduncle is generally greater than its width.

Family **Cyclopteridae**

Aptocyclus ventricosus (PALLAS)

Nom. Jap. Hotei-uwo

The specimen which has come into our hands was collected by Mr. T. Igarashi, on the deck of the "Ginyō Maru", from among many salmon catches brought up by the "Zinkai Maru", in the area about 49°N, 170°E, on June 8, 1954 (Sp. No. 12977).

It seems that the present specimen may have been taken from stomach or mouth cavity of salmon or lancet fish, many deep scars were found, and these scars may be wound from sharp teeth, but the body is not sufficiently heavy to enable exact examination of the specimen. The measurements and counts of body part of the present specimen given in the following table (Table 5).

Family **Ammodytidae**

Ammodytes personatus GIRARD

Nom. Jap. Ikanago

Only one specimen was collected from Bristol Bay, on June 13, 1955, measuring 146mm in total length.

Family **Blenniidae**

Lumpenus lampetraeformis (WALBAUM)

Three specimens collected from Bristol Bay, measuring 242-314mm in body length (Sp. Nos. 13065-13067).

D. LXXII-LXXIII; A. 49-51; P. 15-16; C. 17-18; V. I, 3

Head 7.05-7.45 in body length; depth of body 15.2-16.7. Snout 3.42 3.81 in head length; maxillary 3.26 3.34; depth of caudal peduncle 4.57-5.27; interorbital width 5.35-6.38; diameter of orbit 4.63-5.27; middle dorsal spine 3.23 3.66; longest pectoral ray 1.26-1.33; longest anal ray 3.34-4.43; middle caudal ray 1.29-1.48; longest ventral ray 2.98-3.11. Number of gill rakers $\frac{0+14}{3\text{-}7+11\text{-}13}$ on the first gill arch. No teeth on palatines.

Table 5. Measurements of body part of *Aptocyclus ventricosus* are expressed in ratio to body length (B. L.) and head length (H. L.).

Items	Measurement (mm)	Ratio to B. L.
Total length	151	
Body length	122	
Length of head	48	2.54
Depth of body	56	2.18
Distance between posterior margin of ventral disk and origin of anal fin	61	2.00
		Ratio to H. L.
Length of snout	15	3.20
Length of maxillary	15.5	3.10
Width of interorbital space	26.5	1.81
Width of head at cheek	34	1.39
Depth of caudal peduncle	11	4.36
Diameter of orbit	8	6.00
Diameter of ventral disk	26	1.84
Longest ray of dorsal fin	20	2.40
Longest ray of anal fin	18	2.67
Longest ray of pectoral fin	42	1.14
Longest ray of caudal fin	30	1.60
Base length of dorsal fin	24	2.00
Base length of anal fin	15	3.20
Base length of pectoral fin	34	1.39
Distance between anus and anal fin	22	2.18
Distance between posterior margin of ventral disk to anus	38	1.26
Number of dorsal rays	10	
Number of anal rays	8	
Number of caudal rays	11	
Number of pectoral rays (left:right)	20:20	

The cheeks scaly. The first three or four rays of dorsal fin are short and almost free.

Color, about 15 faint brown blotches of different sizes, some of them confluent and extending, and about seven clear cross bands on caudal fin.

Family **Bathymasteridae**

Bathymaster signatus COPE

The present one specimen has been received through the courtesy of Mr. T. Takeuchi (Sp. No. 12001, 293mm in total length); the detailed description of this species has already been by Sato and Ueno in 1953. (See, Sato & Ueno's "On a rare fish, *Bathymaster signatus COPE*, taken from the Northern Pacific, and notes on allied species."

Bull. Fac. Fish. Hokkaido Univ. 4, (3). pp. 203–211.)

Family **Zoarcidae**

Lycodes turneri BEAN

A single matured female specimen, measuring 710mm in total length (Sp. No. 13080), taken at 58° 49′N, 168° 28′W, in Bristol Bay, was received through courtesy of Mr. K. Yamahira. Measurements and counts are given in Table 6 (Fig. 6).

Fig. 6. *Lycodes turneri BEAN*, 710mm in total length (Sp. No. 13080)

According to Andriashev (1954), the present species has generally been treated as identical with *Lycodes polaris* and *L. coccineus* by older or recent ichthyologists, or with *L. angnostius* according to Vladykov. But, as a result of careful examination of *Lycodes* based upon the many recent specimens collected from the Arctic Seas and Sea of the Far East of the Soviet Union, the present species must be treated as a species independent from *L. polaris*, *L. coccineus* and *L. agnostius* because of having many remakable characters, longer dorsal and anal fins, more numerous fin rays and vertebrae, more depressed head, wider interorbital space, characteristic form of gill opening, and peculiar colourations.

Among the *Lycodes* from Bering Sea, the present species is most like *Lycodes mucosus coccineus*, but is distinguishable from it by entirely lacking scales, having wider interorbital space, more numerous vertebrae, and by its peculiar colourations.

Family **Pleuronectidae**

Atheresthes stomias (*JORDAN & GILBERT*)

Three specimens, measuring 458–483mm in body length, were collected from Bristol Bay (Sp. Nos. 12791, 13053, 13054) (Fig. 7).

D. 102–114; A. 84–87; P. 14 (eyed side); V. 6 (each side);
Lateral scales about 100; Gill rakers on the first arch 4+11–13

Head 3.51–3.66 in body length; depth of body 2.73–2.80. Snout 3.67–3.89 in head length; maxillary 1.63–1.79; interorbital width 12.70–13.61; diameter of orbit 4.55–5.67; depth of caudal peduncle 3.38–3.49; longest ray of dorsal fin 2.54–3.09; the same of anal 3.14–3.32; the same of pectoral (eyed side) 2.49–2.72.

Table 6. Measurements of body part of *Lycodes turneri* are expressed in ratio to body length (B. L.) and head length (H. L.).

Items	Measurement (mm)	Ratio to B. L.
Length of body	680	
Depth of body at dorsal origin	98	6.94
Length of head	200	3.40
Greatest width of head	163	4.17
Distance from ventral fin to anus	95	7.16
Distance from anus to posterior end of caudal fin	352	1.93
Distance from tip of snout to anus	359	1.89
Distance from tip of snout to dorsal fin	220	3.09
Distance from tip of snout to anal fin	353	1.92
Distance from tip of snout to ventral fin	143	4.76
		Ratio to H. L.
Length of snout	72	2.78
Length of maxillary	125	1.60
Length of mandible	84	2.38
Length of interorbital width	40	5.00
Diameter of orbit	20	10.00
Diameter of eye-ball	13	15.36
Height of dorsal fin	43	4.65
Height of anal fin	34	5.38
Length of pectoral fin	97	2.06
Length of ventral fin	25	8.00
Length of caudal fin	23	8.70
Length of gill opening	81	2.47
Length of postorbital part of head	116	1.73
Distance between both lower angles of gill opening	75	2.67
Length of palatine bone	15	13.31
Length of vomer	13	15.41
Width of head	163	1.23
Depth of head at occipital region	101	1.98
Interspace of both pectorals	80	2.50
Number of dorsal fin rays	86	
Number of anal fin rays	76	
Number of pectoral fin rays	19	
Number of ventral fin rays	3	
Number of caudal fin rays	11	
Number of gill rakers on the first arch	2+12	
Number of branchiostegal rays	6	

Fig. 7. *Atheresthes stomias* (*JORDAN & GILBERT*), 545mm in total length (Sp. No. 12791)

The upper eye reaching edge of head. Teeth are arranged in two rows on each jaw, and those on inner row are enlarged, thick, and movable, those on outer ones are smaller, sharply pointed and fixed on premaxillary and dentary bones. Gill rakers are slender, comb-teeth like, pointed at tips, and many minute serrations are present on their inner margins. Interorbital space is broad, furnished with 4–5 rows of small ctenoid scales. The middle rays of pectoral fin are branched. Some hindermost rays of dorsal and anal fin are also branched. Lateral line is slightly arched above the pectoral fin.

Hippoglossus stenolepis SCHMIDT

Nom. Jap. Ohyō

Nineteen specimens, measuring 241–560mm in body length, were collected from Bristol Bay (Sp. Nos. 12798-12801, 13050–13052, 13079, 13082–13085, 14099–14104, 14120).

D. 96–105; A. 70–77; P. 16–18 (eyed side); V. 6; Lateral scales 157–183; Gill rakers on the first arch 1–2+8–10; Branchiostegals 6

Head 3.49–3.85 in body length; depth of body 2.78–3.20. Snout 3.82–4.82 in head length; maxillary 2.74–3.14; interorbital width 7.40–15.26; diameter of orbit 4.64–7.21; depth of caudal peduncle 3.42–4.10; the longest ray of dorsal fin 2.30–2.94; the same of anal 2.51–3.03; the same of pectoral (eyed side) 1.93–2.38. Distribution of number of dorsal, anal and pectoral fin rays is presented in table (Table 7).

Hippoglossoides elassodon (*JORDAN & GILBERT*)

Nom. Jap. Uma-garei

Ten specimens were collected from Bristol Bay, measuring 271–375mm in body length (Sp. Nos. 12841–12846, 13055–13057, 14121) (Fig. 8).

D. 80–89; A. 61–68; P. 10–11 (eyed side); V. 6; Lateral scales 87–95; Gill rakers on the first arch 3–5+15–19; Branchiostegals 7

Table 7. Number of dorsal, anal and pectoral fin rays of 19 specimens of *Hippoglossus stenolepis* from Bristol Bay

Dorsal fin rays	96	97	98	99	100	101	102	103	104	105
No.	3	3	3	2	2	2	2	0	1	1

Anal fin rays	70	71	72	73	74	75	76	77
No.	2	2	0	4	2	4	2	3

Pectoral fin rays	16	17	18
No.	5	9	5

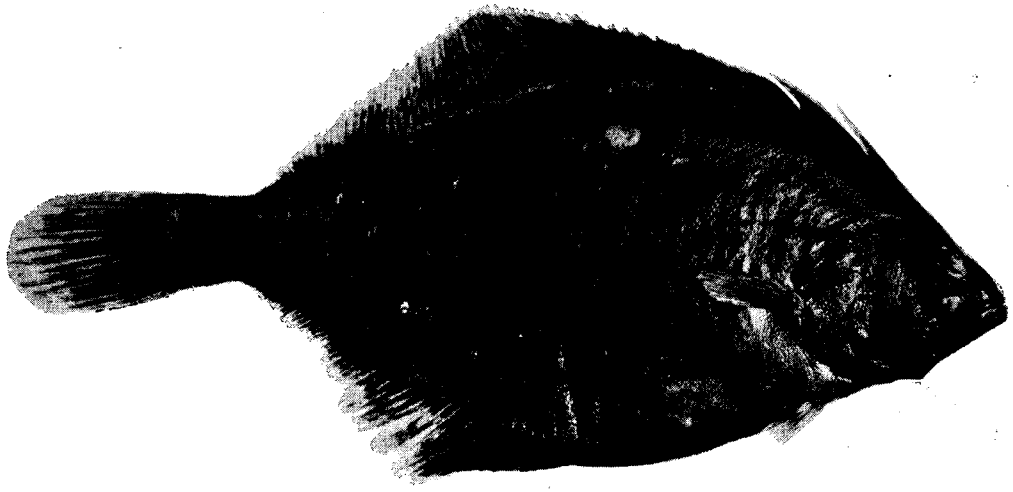

Fig. 8. *Hippoglossoides elassodon* (JORDAN & GILBERT), 415mm in total length (Sp. No. 13057)

Head 3.08–3.67 in body length; depth of body 2.07–2.36. Snout 4.87–6.78 in head length; maxillary 2.29–2.93; interorbital width 24.00–30.08; diameter of orbit 4.24–533; depth of caudal peduncle 2.60–3.91; longest ray of dorsal fin 2.10–2.85; the same of anal 2.10–2.84; the same of pectoral 2.05–2.93.

Hippoglossoides robustus GILL & TOWNSEND

Nom. Jap. Doro-garei

The present specimen measures 369mm in body length (Sp. No. 13076).

D. 73; A. 57; P. 9 (eyed side); V. 6; Lateral scales 87;

Gill rakers on the first arch 3+13; Branchiostegals 7

Head 3.55 in body length; depth of body 2.34. Snout 4.55 in head length; maxillary

2.74; interorbital width 26.00; diameter of orbit 5.78; depth of caudal peduncle 3.35; longest ray of dorsal fin 2.39; the same of anal 2.92; the same of pectoral (eyed side) 2.74.

Teeth are sharp, conical, and arranged in a single row on both jaws. Anterior-most teeth of upper jaw are enlarged. There are 6 distinct mucous pores on the side of lower jaw. Gill rakers are slender, comb-teeth like, but entirely smooth. The middle rays of pectoral fin are branched. No anal spines. Lateral line marks a low arch above the pectoral fin.

The present species very closely resembles *Hippoglossoides elassodon* in general forms, being distinguishable from it by the smaller number of dorsal, anal, and pectoral fin rays and gill rakers.

Inopsetta ischyra (JORDAN & GILBERT)

A single specimen from Bristol Bay, taken on May 5, 1953, measuring 456mm in body length (Sp. No. 12859) (Fig. 9).

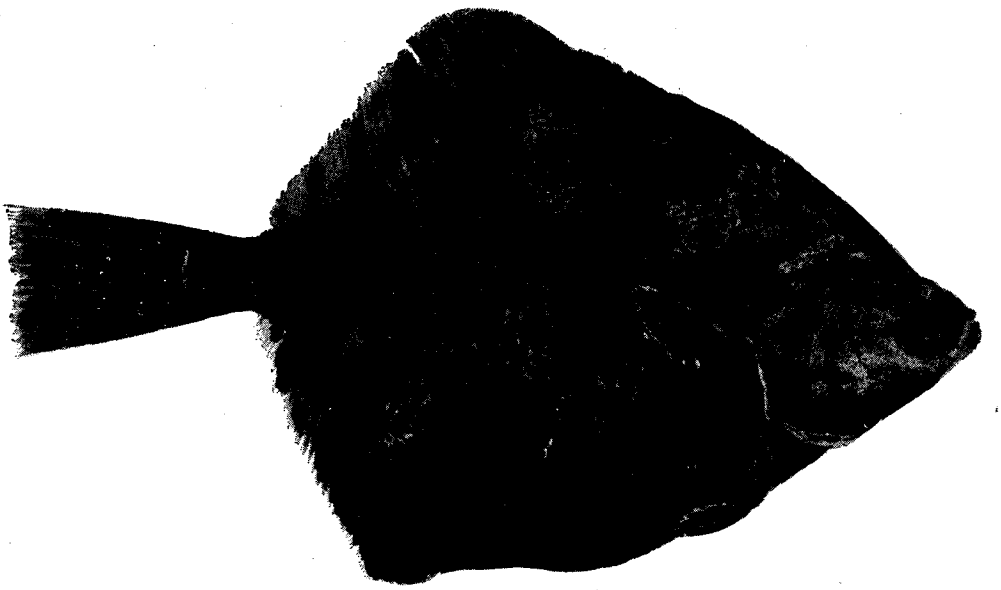

Fig. 9. *Inopsetta ischyra* (JORDAN & GILBERT), 545mm in total length (Sp. No. 12859)

D. 69; A. 49; P. 11 (eyed side); V. 6; Lateral scales 80;
Gill rakers on the first arch 2+7; Branchiostegals 7

Head 3.10 in body length; depth of body 1.78. Snout 4.59 in head length; maxillary 4.08; interorbital width 12.25; diameter of orbit 7.74; longest ray of dorsal fin 2.53;

the same of anal 2.26; the same of pectoral (eyed side) 2.41.

The upper profile of head is somewhat concave. Interorbital space is broad, slightly concave, furnished two irregular rows of rough ctenoid scales. There are 8 bony tubercles on occipital region behind the eye. Those tubercles are irregular in size and arranged in a short row. The lower eye is slightly in advance of the upper. Gill rakers are short, triangular, and their tips are bluntly pointed. All rays of dorsal and anal fin are covered with strong ctenoid scales. Anal spine is strong and sharply projected. There are some distinct broad black bands on the dorsal and anal fin. The scales on eyed side are almost ctenoid, above all, the those on head becoming strong ctenoid. Lateral line has a slight curve above the pectoral fin. The branched line of lateral line with a short prolongation which runs backward, and extends to under the ninth dorsal ray.

Lepidopsetta bilineata (*AYRES*)

Nom. Jap. Shumushu-garei

Twenty-eight specimens, measuring 149-384mm in body length (Sp. Nos. 12803-12824, 14122-14127), were collected.

D. 72-81; A. 55-62; P. 10-12 (eyed side); V. 6; Lateral scales 85-95; Gill rakers on the first arch 3-5+6-8

Head 3.07-3.69 in body length; depth of body 1.96-2.28. Snout 3.00-5.00 in head length; maxillary 3.75-4.85; interorbital width 17.5-29.3; diameter of orbit 4.21-5.61; longest ray of dorsal fin 2.04-2.68; the same of anal 2.13-2.80; the same of pectoral (eyed side) 1.95-2.28.

Teeth on both jaws are conical, arranged in a single row. Gill rakers are short, triangular, but sharply pointed. Lower pharyngeal bones are narrow, each one closed at anterior part in V-shape. Interorbital space with 3-4 rows of small ctenoid scales. The median rays of pectoral fin are branched. Anal spine is short but strongly pointed. Scales on eyed side are all ctenoid, whereas those on blind side are all cycloid. The variable number of dorsal, anal and pectoral fins are recorded in Table 8.

Table 8. Number of dorsal, anal and pectoral fin rays of 28 specimens of *Lepidopsetta bilineata* from Bristol Bay

Dorsal fin rays	72	73	74	75	76	77	78	79	80	81
No.	3	2	4	2	3	5	4	1	2	2

Anal fin rays	55	56	57	58	59	60	61	62
No.	1	5	3	5	4	4	2	4

Pectoral fin rays	10	11	12
No.	5	10	13

Limanda aspera (*PALLAS*)

Nom. Jap. Rosuke-garei

It seems that the present species is most common and most abundant among the flounders of Bristol Bay together with *Lepidopsetta bilineata* (*AYRES*); 28 individuals, measuring 159–359mm in body length, are found in our collection (Sp. Nos. 12825–12834, 12836, 12837, 12866, 13074, 13078, 13086, 13089, 14110–14119, 14128).

D. 64–73; A. 49–56; P. 10–13; V. 6; Lateral scales 78–89;
Gill rakers on the first arch 3-9+8-10

Head 3.14-4.07 in body length; depth of body 1.59–2.27. Snout 3.91-5.77 in head length; maxillary (eyed side) 3.28-4.41; diameter of orbit 4.33-6.52; interorbital width 11.1-21.4; depth of caudal peduncle 2.43-3.80; the longest ray of dorsal fin 1.77–2.27; the same of anal fin 1.69–2.35; the same of pectoral fin (eyed side) 1.62–2.12.

Eyed side of head and body covered with rough ctenoid scales; those on body arranged in irregular rows anteriorly and regular rows posteriorly, are hidden by the thin skin, and armed with a short, strong prickle which projects backward through the skin. Scales on head of eyed side are conspicuously rough, and armed with 8–9 shorter prickles. There is a conspicuous scale-bush in front of lower orbital rim. All fin rays of eyed side also covered with rough comparatively small ctenoid scales, but are entirely smooth on blind side.

Occipital ridges have no remarkable bony granules. Interorbital space is slightly convex, and covered with 1 to 4 rows of small ctenoid scales. Gill rakers are short, nearly triangular in shape, not armed with prickles. Lateral line has a high arch above the pectoral fin. Median rays of both pectorals are branched. There are yellow-orange bands along the dorsal and anal fin bases of blind side.

Limanda proboscidea GILBERT

Nom. Jap Hana-garei

Only one specimen, measuring 144mm in body length, is included in collections at hand (Sp. No. 13093).

D. 65; A. 49; P. 11; V. 6; Lateral scales 84; Gill rakers
on the first arch 5+10; Branchiostegals 7

Head 3.00 in body length; depth of body 2.21. Snout 4.00 in head length; maxillary (eyed side) 4.00; diameter of orbit 6.86; interorbital width 4.80; depth of caudal peduncle 3.43; the longest ray of dorsal fin 2.82; the same of anal fin 3.00; the same of pectoral fin (eyed side) 3.43.

The present species most resembles *L. punctatissima* (*STEINDACHNER*), but is distinguishable from it in following points:

1–Dorsal outline of head is more strongly curved, and snout is more projected.

2-Lateral scales more numerous in number, namely 90-95 in the present species, but 65-78 in *L. punctatissima*.

3-Color of body of blind side has a tinge of light-yellow uniformly, but lacks characteristic yellow bands running along the dorsal and anal fin bases.

4-There is not a reticulate pattern formed by dark lines running along each row of scales on eyed side.

5-In the female, scales on body are all cycloid in each side, while in the male, they are ctenoid on eyed side and cycloid on blind side (In *L. punctatissima*, scales on body are all cycloid in both sexes).

Pleuronectes pallasii STEINDACHNER

Nom. Jap. Tsuno-garei

Twenty-two specimens, measuring 250-482mm in body length, were collected from Bristol Bay (Sp. Nos. 12843, 12847-12858, 13048, 13049, 13075, 13088, 14105-14109).

D. 63-74; A. 47-54; P. 9-12; Lateral scales 78-86; Gill rakers on the first arch 2-4+5-7

Head 2.86-3.39 in body length; depth of body 1.72-2.03. Snout 4.00-5.78 in head length; maxillary 4.13-5.04; interorbital width 9.85-20.0; diameter of orbit 4.75-7.87; depth of caudal peduncle 2.85-4.17; longest ray of dorsal fin 2.23-3.10; the same of anal fin 2.10-3.17; the same of pectoral (eyed side) 2.05-3.31. Variable number of dorsal, anal and pectoral fin rays of 22 specimens are tabulated in Table 9.

Table 9. Number of dorsal, anal and pectoral fin rays of 22 specimens of *Pleuronectes pallasii* from Bristol Bay

Dorsal fin rays	63	64	65	66	67	68	69	70	71	72	73	74
No.	1	1	1	4	3	1	4	1	2	3	0	1

Anal fin rays	47	48	49	50	51	52	53	54	55
No.	2	1	1	3	4	4	2	4	1

Pectoral fin rays	9	10	11	12
No.	2	10	9	1

Upper profile of head is strongly concave above the upper eye. Interorbital space is broad, somewhat convex, smooth and without scales. Gill rakers are tubercular, their tips are bluntly pointed. Lower pharyngeal bones are massive, more than half of inner-margin of each bone is united together, and they have 3 rows of molars, of which the most inner ones are larger. Anal spine is sharply pointed. Median rays of pectoral fin are branched. Lateral line has a short branch directed upward reaching to sixth or seventh

rays of dorsal fin. Scales are all cycloid, and are hidden in the thick bony skin, so that the surface of body of each side is very smooth.

Platichthys stellatus (*PALLAS*)

Nom. Jap. Numa-garei

Seven specimens collected from Bristol Bay, measuring 340–466mm in body length, of which two are right-headed individuals, others are left-headed. Though the relative ratio of occurrence of left-headed versus right-headed ones in Bristol Bay cannot definitely stated, it may probably be that right-headed ones are not so few as they are rare (Sp. Nos. 12802, 12838–12840, 13046, 13047, 13087).

D. 53-61; A. 39-43; P. 10-11; V. 6; Lateral scales 63-78;
Gill rakers on the first arch 3-5+7-9; Branchiostegals 7

Head 2.89-3.34 in body length; depth of body 1.08–1.83. Snout 4.43–5.57 in head length; diameter of orbit 6.16–8.10; interorbital width 9.31-17.86; maxillary (eyed side) 3.66–4.00; depth of caudal peduncle 3.05-3.98; the longest ray of dorsal fin 2.06–2.34; the same of anal fin 1.99-2.23; the same of pectoral fin (eyed side) 2.45-2.93.

Lower pharyngeal bones are wide, connected with each other in their anterior half, external form heart-like or arrowhead-like. The angle forming inner margins of the two pharyngeals is nearly right angle.

Many rough spinal tubercles are scattered on both sides of body, above all, those on head and body of eyed side are numerous and are closely scattered, so that surface of head and body is very rough. There is a regular row of similar tubercles along both dorsal and anal fin bases on eyed side. Dorsal and anal fins have 5-8, and 3-7 black vertical blotches respectively, and also, caudal fin marked by 2 6 similar but indistinct ones. Scales found only along the lateral line, others are reduced to spinal rough tubercles.

Family **Gadidae**

Gadus macrocephalus TILESIUS

Nom. Jap. Ma-dara

Eight specimens were collected from Bristol Bay, measuring 162-682mm in body length (Sp. Nos. 12792, 12793, 12797, 13017, 13042, 13043, 13094, 13095).

Theragra chalcogramma (*PALLAS*)

Nom. Jap. Suketo-dara

Six specimens were collected from Bristol Bay, measuring 161–607mm in body length (Sp. Nos. 12794–12796, 13018, 13044, 13045).

Bibliography

1) Andriashev, A. P. (1937). The fishes from the Bering and Chukchee Seas. *Sfruice Hydrométéorogique l'URSS Inst. Hydrologique* (25), 292-355.

2) ———— (1954). *The fishes of northern seas of the Soviet Union.* 566p. Acad. Sci. CCCP. (SSSR) (in Russian).

3) Bigelow, H. B. & Schroeder, W. C. (1953). Fishes of the Gulf of Maine. *Fish. Bull.* (74), 1-577.

4) Clemens, W. A. & Wilby, G. V. (1949). Fishes of the Pacific coast of Canada. *Bull. Fish. Res. Board Canada* (68), 1-368.

5) Evermann, B. W. & Goldsborough, E. L. (1906). The fishes of Alaska. *Bull. U. S. Bur. Fish.* (26), 219-360.

6) Garman, S. (1892). The Discoboli, Cyclopteridae, Liparopsidae, and Liparidae. *Mem. Mus. Comp. Zool. Harvard College* **14** (2), 1-96.

7) ———— (1913). The Plagiostomia (sharks, skates and rays). *Ibid.* (36), 1-528.

8) Gilbert, C. H. & Burke, C. V. (1912). Fishes from Bering Sea and Kamchatka. *Bull. U. S. Bur. Fish.* **30**, 31-96.

9) Jordan, D. S. & Evermann, B. W. (1898). Fishes of the North and Middle America. *Bull. Proc. U. S. Nat. Mus.* (47), 1-3313.

10) ———— & Gilbert, C. H. (1883). Synopsis of the fishes of North America. *Bull. U. S. Nat. Mus.* (16), 1-1018.

11) ———— & ———— (1899). *The fishes of Bering Sea. (Fur-seals and fur-seal islands of the North Pacific Ocean).* Pt. 3, 433-492.

12) ———— & Starks, E. C. (1904). A review of the Cottidae or Sculpins found in the waters of Japan. *Proc. U. S. Nat. Mus.* **27** (1358), 231-335.

13) Kuronuma, K. (1943). The fishes from Paramushiro Island, Kuril's. *Bull. Biogeog. Soc. Japan* **13** (16), 101-124. (in Japanese).

14) Matsubara, K. (1955). *Fish morphology and hierarchy.* Pt. 1, 789p. Tokyo.

15) Norman, J. R. (1934). *A systematic monograph of the flat-fishes (Hetelosomata).* Vol. 1, Psettodidae, Bothidae, Pleuronectidae. 459p. London.

16) Rendahl, H. (1031). Ichthyologische Ergenbnisse der schwedischen Kamtchatka-Expedition 1920-1922. *Arkiv für Zool.* **22A** (18), 1-76

17) Schmidt, P. (1904). *Pisces Marium Orientalium Imperii Rossici.* 466p. St. Petersburg.

18) ———— (1929). A revision of the Genus *Myoxocephalus* T_{II}. (Pisces, Cottidae) and of some allied genera of the Pacific. *Ann. Mus. Zool. l'URSS* 405-426.

19) Schultz, L. P. (1936). Keys to the fishes of Washington, Oregon and closely adjoining regions. *Univ. Wash. Pub. Biol.* **2** (4), 103-228.

20) ———— (1937). Redescription of the capelin *Mallotus catervarius* (P_{ENNANT}) of the North Pacific. *Proc. U. S. Nat. Mus.* **85** (3029), 13-20.

21) Soldatov, V. K. & Lindberg, G. J. (1930). A review of the fishes of the Seas of the Far-East. *Bull. Pacific Sci. Fish. Inst.* **5**, 1-576.

22) Taranetz, A. J. (1933). New data on the ichthyofauna of the Bering Sea. *Bull. Far-East Acad, Sci. URSS* (3), 67-78.

23) ———— (1937). Handbook for identification of fishes of Soviet Far East and adjacent waters. *Bull. Pacific Sci. Inst. Fish. Oceanogr.* **11**, 1-200.