

Report of the Biological Survey of Mutsu Bay.  
7. Birds of Mutsu Bay.\*

By

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(With Plates V-XIII.)

INTRODUCTION

At the time of the beginning of investigations on the marine animals in Mutsu Bay, I was asked by Professor HATAI, the Director of the Marine Biological Station at Asamushi, by Professor HÔZAWA of the Biological Institute in Tohoku Imperial University, and by Mr. KOKUBO, an Assistant Professor, to investigate the birds in Mutsu Bay. I have accepted that duty willingly under the consideration that this work is very useful for the study of the zoogeography and the distribution of birds.

As the first step I have collected several reports on the birds found in this bay, and found that there are very few of these reports except my own (1916 and 1925), Mr. WADA's (1922 and 1926), Dr. WATASE's (1926), and Dr. UCHIDA's (1927).

As Mutsu Bay is divided into the two inlets of Noheiji and Aomori Bays, with the Natsudomari Peninsula projecting out between them I have limited the circle of my investigation to the inner part bounded outside by a line between Kusôtomari-saki and Tairadate-saki, complying with the suggestion of Prof. HÔZAWA.

Hitherto, Mr. WADA reported that the birds in the whole of Aomori Prefecture, including Mutsu Bay, consist of over seventy forms, and wrote me recently that the birds to be found in the bay are of forty six forms; but my personal examination in August, 1916 and April, 1927, at the location and of the collections by Mr. KOKUBO, of the above mentioned Biological Station, and the collections in Tohoku Imperial University and in Aomori Normal School, indicate that the

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\*A contribution from the Marine Biological Station, Asamushi, Aomori-Ken.

birds in the bay consist of only thirty five species and subspecies. However, this number will be increased in the future with the progress of studies on these birds.

My report now to be made public mentions only the exact forms of the birds, but as an appendix I have added herewith the lists of the water-fowls reported by Mr. WADA (but not seen by me), and of ones to be seen only on the coast of the bay, and of the land-birds on the coast and islets, which would be good reference material for the study of all birds on the coast of Mutsu Bay.

This report aims to let a person not conversant with this study distinguish easily the several forms of the birds, and I have inserted therein keys as to their orders, families, genera, species, subspecies, and subfamilies necessary to study them. These keys also show the differences in sex, plumage (summer and winter), and age (adult and juvenile) under the heading of species and subspecies.

I have also tried to simplify the descriptions, habits, and distribution of the birds as much as possible, and at the end of the report have inserted plates illustrating the specimens of all forms, for the purpose of easily identifying their names.

In the preparation of this paper I tender my sincere thanks for every assistance given me by Assistant Professor KOKUBO, Mr. WADA and Mr. KITAMURA, an Assistant-engineer, who has recently been transferred to the position of assistant-engineer of the Miye Prefectural Office.

AN ANNOTATED LIST OF THE BIRDS OF MUTSU BAY.

The following 35 species and subspecies of birds were examined by me from actual specimens collected in Mutsu Bay.

Key to 7 orders of birds occurring in Mutsu Bay.

- 1 { All four toes connected by webs.....Steganopodes.
- { Three front toes connected by webs or lobed .....2
- { Tarsus decidedly compressed laterally; toes lobed or connected by webs; bill strong and rather thick.....Pygopodes.
- 2 { Tarsus not decidedly compressed laterally; toes lobed or not connected by webs; bill weak and linear.....Limicolæ.
- { Tarsus not decidedly compressed laterally; toes connected by webs .....3

- 3 { Nostrils tubular, united or separated.....Tubinares.
- { Nostrils not tubular.....4
- 4 { Edges of mandibles with rows of lamellæ; mandibles with "nails" at tips .....Anseres.
- { Mandibles with no lamellæ nor nails .....5
- 5 { Wings long and pointed; hind toe usually present.....Lari.
- { Wings short and not pointed; hind toe absent or rudimentary .....Alcae.

Order PYGOPODES.

Key to families of order Pygopodes.

- Three front toes completely connected by webs; claws normal; tail short, 16-20 rectrices.....Colymbidæ.
- Toes lobed; claws flat; tail soft and fur-like.....Podicipidæ.

Family Colymbidæ.

Genus COLYMBUS LINNÆUS (1758)

Key to species and subspecies of genus Colymbus.

- { Fore-neck black with greenish gloss; head and hindneck dark grey; culmen 57.5-73 mm.....C. a. viridigularis, æst.
- 1 { Fore-neck reddish brown in middle; culmen 49-56 mm. C. stellatus, æst.
- { Fore-neck white .....2
- 2 { Dorsal side with round white spots or bars. C. stellatus, hiem. & juv.
- { Dorsal side with or without white bands to the feathers.....3
- 3 { Back with more or less white bands. C. a. viridigularis, hiem.—æst.
- { Back with or without grey edges to the feather. C. a. viridigularis, hiem. & juv.

1. Colymbus stellatus PONTOPPIDAN.

(Pl. VI, Fig. 1.)

Colymbus stellatus PONTOPPIDAN, Danske Atlas, I, p. 621 (1763 — Denmark).

Red-throated Diver, Red-throated Loon.

Abi. Local names: Sensu, Sensu-gamo, Ikkanne.

1 ♂ hiem., Aomori Bay, 20. iii. 1920 (Aomori Normal School Coll.).

*Adult male and female in summer.*—Throat with a large patch of rusty red; crown deep blue-grey streaked with black; nape and hind neck black with white margins; upper parts brownish black, spotted with white; sides of head, neck, and throat blue-grey; wings and tail-feathers blackish brown, the latter tipped with dirty white; flanks blackish brown; under parts pure white. *Winter.*—Crown and hind neck blackish-grey, finely spotted with white; under parts white; no red patch on throat.

*Juvenile.*—Similar to winter adult but upper parts much browner and not so black as adult and spots more greyish.

*Soft parts.*—Bill pale grey with dark line on culmen; tarsus and toes outside, and outer toe black, the rest pale grey, with dark grey at joints of toes; webs flesh coloured in middle with dark grey margins; iris wine-red in adult, reddish-brown in young.

*Measurements.*—Wing, 251–283; tail, 48–50; tarsus, 69–78; exposed culmen, 49–56; total length, 590–657 mm. Tail composed of 18–20 (rarely 22) feathers.

*Distribution.*—Breeds in northern portions of both Hemispheres and also in Kamtschatka, and migrates in winter to the Mediterranean Seas, Lower Egypt, Japan, Formosa, China, etc. In America, in winter, as far as California, Maine, etc.

*Habits.*—Found often in bays and pools, sometimes in mouths of rivers. It flies swiftly, but usually on the water. It is a splendid swimmer and diver. Its note is a loud weird shriek, or another note which is recorded as a hoarse "kork." Its food consists chiefly of fish.

In Mutsu Bay, it is probably a rarer species than the next, judging from the fact that only one specimen was taken in this bay in March. It is a winter visitor.

## 2. *Colymbus arcticus viridigularis* (Dwight).<sup>1)</sup>

(Pl. VI, Figs. 2 & 3.)

*Gavia viridigularis* Dwight, Auk, 1918, p. 189 (North-east Siberia).

<sup>1)</sup>Mr. WADA reported *C. adamsii* and *C. arcticus pacificus* from Aomori Bay, but I could not find these specimens from any collections which have no examples from this bay.

Siberian Black-throated Diver.

*Ōhamu.* Local names: *Sensu-gamo*, *Shichiri*.

7 specimens (including 3 summer and 4 winter plumages) examined from: near Aomori and Asamushi, both in Aomori Bay, vi. 1912, iii. 1920, 18. iv. 1922, 5. iii. and end of v. 1927 (5 specimens are preserved in the Marine Biological Station at Asamushi, 1 in the Normal School at Aomori and 4 in my own collection).

*Adult male and female in summer.*—Size much larger than *stellatus*. Head and hind neck ashy grey, darker on forehead; upper parts glossy black banded with white cross bars; chin and throat black, with a distinct metallic green gloss, sometimes tinged with a purplish lustre sides of throat striped with white, and a patch of white stripes on upper throat. *Winter.*—Upper parts dull blackish marked with brownish white; chin, throat, and under parts white. Examples in the transitional stages from winter to summer plumages have a few white bands on scapulars.

*Juvenile.*—Head and hind neck like winter adult but browner; upper parts dark brown, feathers margined with ashy-grey.

*Soft parts.*—Culmen, apical third of lower mandible and near commissure of both mandibles black; basal third of sides of upper mandible and basal 2/3 of lower mandible [pale bluish; inner aspect of feet, toes, and webs flesh colour with some bluish wash; outer aspect of tarsus, outer toe and webs near middle toe black; iris deep wine-red (♀ ad., hiem. -æst.).

*Measurements.*—Wing, 294–317; tail, 52.5–57.5; tarsus, 72–83; exposed culmen, 57.5–69; height of bill at base, 16–19; outer toe and claw, 92.5–106; total length, 700–710 mm.

*Distribution.*—Probably breeds on both sides of Bering Sea (including Kamtschatka and Sakhalin), which may extend westward into the interior of Siberia, and winters in Japan, from North Hondo to Central Hondo (Sagami and Suruga Bays). In central and southern parts of Hondo it seems probable that this larger form, *viridigularis*, is replaced by a smaller form, *pacificus*, during the period from winter to spring.

*Habits.*—It does not essentially differ from the red-throated diver, but is as a rule rather more shy. Its note is a very loud cry.

It is a rather common migrant in Mutsu Bay, where it arrives at the middle of December and stays till the end of May. It is said

that it is very abundant in the early part of March. It is a winter resident.

### Family Podicipidæ.

Key to genera, species, and subspecies of family Podicipidæ.

- |   |   |  |
|---|---|--|
| 1 | { | With elongated tufts of feathers on crown or sides of head of head or with rufous on neck. . . . . 2                             |
|   |   | Without elongated tufts on crown or sides of head, neck white or grey without rufous. . . . . 3                                  |
| 2 | { | Throat grey, fore-neck rich chestnut; bill black with lemon-yellow base. . . . . <i>Pedetaithya griseigena holboellii</i> , æst. |
|   |   | Throat and neck black; bill blue-grey with pinkish base and whitish tip. . . . . <i>Proctopus n. nigricollis</i> , æst.          |
| 3 | { | Wing over 170 mm. . . . . <i>Pedetaithya g. holboellii</i> , hiem. & juv.  |
|   |   | Wing under 155 mm., but over 120 mm. . . . . <i>Proctopus n. nigricollis</i> , hiem. & juv.                                      |

Genus PEDETAITHYA KAUP (1829).

#### 3. *Pedetaithya griseigena holboellii* (REINHARDT).<sup>1)</sup>

(Pl. VI, Fig. 4.)

*Podiceps Holboellii* REINHARDT, Videnskab. Meddelelser, p. 76, 1853 (Greenland). Eastern Red-necked Grebe, Holboell's Grebe.

*Akaeri-kaitsuburi*. Local name: *Don-kuguri*.

5 specimens (including 1 summer and 4 winter plumages) examined from: near Asamushi, Aomori Bay, i. -3. iv. 1926, xii. and early in iv. 1927 (2 specimens are preserved in the Tohoku Imperial University, 2 in the Marine Biological Station at Asamushi, and 1 in my collection).

*Adult male and female in summer*.—Head and hind neck black; chin, upper throat, and cheeks ashy grey; with a slightly developed ruff; fore neck and sides of neck rusty red; upper parts blackish with pale margins; wings blackish with a white patch on outer secondaries; flanks streaked with a greyish colour; under parts silvery white. *Winter*.—Head and hind neck dark greyish brown, the back being darker brown with brown-grey margins to the feathers; no ruff on

<sup>1)</sup>Mr. WADA reported *Podiceps c. cristatus* from Aomori Bay, but I have not examined this specimen from this bay.

crown; under and hind eye mottled with greyish brown; from chin to vent silky-white, with some slight blotches of a brownish colour on sides of body.

*Juvenile*.—Resembles summer adult but upper parts browner; chin, upper throat and sides of head dull buff-white with two broad brownish black stripes behind eye; lower throat and lower neck buffy chestnut but paler than in summer plumage.

*Soft parts*.—Bill black with lemon-yellow on base of lower mandible and tomia; tarsus and toes blackish on outer aspect of the former and on under side of lobes; yellowish-white on inner aspect of tarsus and on upper side of lobes; nails horny brown; iris dark brown in adult and yellowish in young.

*Measurements*.—Wing, 177-190; tail down, 34-42; tarsus, 56.5-67; exposed culmen, 49-58; total length, 490-570 mm.

*Distribution*.—Breeds in northeastern Asia, Greenland and North America and winters in Japan and China. In America, it winters in the United States.

*Habits*.—This grebe is an expert swimmer and diver, but very clumsy on land. Frequents inland lakes in summer, and rivers and sea coast in winter. It is a quick bird and can fly tolerably swiftly. It breeds in Hokkaido. It feeds on small fish, aquatic insects, crustacea, etc. In the stomach many of its own feathers are found.

Rather common in Mutsu Bay in winter, where it arrives early in December<sup>1)</sup> and stays till early April.

Genus PROCTOPUS KAUP (1829).

#### 4. *Proctopus nigricollis nigricollis* (BREHM).<sup>2)</sup>

(Pl. VI, Fig. 5.)

*Podiceps nigricollis* BREHM, Handb. Naturg. Vög. Deutschl., 1831, p. 963 (Eastern Germany).

Black-necked Grebe.

*Hajiro-kaitsuburi*. Local names: *Mamedori*, *Don-kuguri*.

5 specimens (including 1 summer and 4 winter plumages) examined from: near Asamushi and Futagojima, both in Aomori Bay, 15. i.

<sup>1)</sup>A left foot apparently belongs to this form, sent me by Mr. WADA. It was taken in Aomori Bay, 3. xii. 1913.

<sup>2)</sup>Mr. WADA reported *Dytes auritus* from Aomori Bay, but I have not ascertained its actual occurrence.

and 4. ii. 1926, and 23. iv. 1927 (2 specimens are in the Tohoku Imperial University, 2 in the Marine Biological Station at Asamushi, and 1 in my collection).

*Adult male and female in summer.*—Culmen directed slightly upward or straight; head and neck black; back dark brown; a broad stripe of golden yellow from eye to auricular regions; flanks foxy-red and vent greyish black; a white patch on secondaries. *Winter.*—Upper parts, including head, black with some brownish-grey wash; on each side of lower nape with a white patch; no auricular tufts; lower throat brown; chin, cheeks, upper throat and under parts silky-white; flanks with some brown spots.

*Juvenile.*—Very similar to winter adult, but upper parts rather more brown, sides of nape washed with buff and flanks less marked with brown.

*Soft parts.*—Bill black; tarsus and toes lead-grey with an olive-grey wash on outer aspect; iris bright red (♂ aest).

*Measurements.*—Wing, 124–135; tail down, 26–41; tarsus, 41.5–45; exposed culmen, 21–27; total length, 315 mm.

*Distribution.*—North Europe and temperate Asia, south to Japan and China.

*Habits.*—Usually found in bays and in habits it resembles its larger allies, but is not so clumsy on land. The food consists of insects, mollusca, crustacea, and small fish. Numerous feathers can be found in its stomach.

Rather common in Mutsu Bay as a winter resident where it probably arrives in November (according to Mr. WADA) and stays until the end of April.

Order ALCÆ.

Family Alcidae.

Key to genera, species, and subspecies of family Alcidae.

- 1 Tail composed of 12 (rarely 14) rectrices; bill rather high and long ..... 2
- 1 Tail composed of 14 (rarely 16) rectrices; bill not high ..... 3
- 1 Tail composed of 14–16 (rarely 18) rectrices; bill distinctly high ..... 10

- Upper parts blackish grey; head and throat chocolate colour; under parts from chest downwards, white. *Uria aalge californica*, aest.
- 2 Upper parts blackish grey; sides of face white with a long narrow line from lores through upper ear-coverts dark blackish grey; whole under parts white. *Uria a. californica*, hiem.
- 3 Tarsus shorter than middle toe and claw ..... 4
- 3 Tarsus nearly equal to middle toe and claw ..... 8
- 4 Width of upper mandible at base much shorter than its depth; bill slenderer; wing over 130 mm. .... 5
- 4 Width of upper mandible at base about equal to its depth; bill stouter; wing under 100 mm. .... 9
- 5 Size larger; wing over 187 mm.; nostril linear; feet red; orbital region white. .... 6
- 5 Size smaller; wing under 138 mm.; nostril rounded; feet flesh colour; orbital region white ..... 7
- 6 Plumage uniform slaty black, somewhat paler on under parts. *Cephus carbo*, aest.
- 6 Under parts white and black. .... *C. carbo*, hiem.—aest.
- 6 Under parts white. .... *C. carbo*, hiem.
- 6 Middle of under parts white; orbital region less white. *C. carbo*, juv.
- 7 Upper parts barred with a dull twany colour and buff; chin and throat white; rest of under parts white heavily tipped with smoky-brown. *Brachyramphus m. perdix*, aest.
- 7 Upper parts blackish grey; scapulars mostly white; a white collar round back of neck; under parts pure white. *B. m. perdix*, hiem.
- 7 Feathers of upper parts margined with whitish buff; feathers of under parts fringed with smoky brown. *B. m. pardix*, juv.
- 8 Throat and fore-neck sooty black; sides of head with a band of white. .... *Synthliboramphus antiquus*, aest.
- 8 Chin only sooty grey; sides of head with a few white feathers

- S. antiquus*, hiem.—æst.
- 8 } Throat and fore-neck white; sides of head without a band of white.....*S. antiquus*, hiem.
- } With a tubercle at base of culmen; white plumes on forehead and lores; under parts white with smoky-black fore-neck and upper chest.....*Ciceronia pusilla*, æst.
- 9 } Without a tubercle at base of culmen; nearly without white plumes on forehead and lores; whole under parts white with dark grey chin.....*C. pusilla*, hiem.
- } Without a tubercle at base of culmen; without white plumes on head; under parts white; white parts on scapulars larger.....*C. pusilla*, juv.
- } With a large horn at base of culmen; two bands of elongate white feathers on each side of face; breast and abdomen white, more or less marbled with smoky-grey; bill larger and mostly orange-yellow.
- Cerorhinca monocerata*, ♂ & ♀ æst.
- 10 } With a small horn at base of culmen; a few white feathers on each side of face; breast and abdomen pure white.
- } *C. monocerata*, ♂ & ♀ pass.
- } Without a horn at base of culmen; a few white feathers on each side of face; breast and abdomen white.
- C. monocerata*, ♂ & ♀ hiem.
- } Without a horn at base of culmen; without white feathers on sides of face; bill smaller and browner.
- C. monocerata*, ♂ & ♀ juv.

Genus **URIA** BRISSON (1760).

5. **Uria aalge californica** (BRYANT).<sup>1)</sup>

(Pl. VII, Figs. 1 & 2.)

*Catarractes californica* BRYANT, P. Bost. Soc. Nat. Hist., VIII, p. 142 (1861—Farallone Islands, California).

California Guillemot.

*Umi-garasu*. Local name: *Umi-gamo*.

5 specimens (including 3 winter and 2 summer plumages) examined

<sup>1)</sup>*U. lomvia arra* is reported from Aomori Bay by Messrs. MOMIYAMA and WADA, but I have no example from this bay for examination.

from: near Aomori and Asamushi, 3. i. 1923, xii. 1925, 20. iv. 1926, and 5. iii. 1927 (1 specimen is in the Tohoku Imperial University, 2 in the Marine Biological Station at Asamushi, and 2 in my own collection).

*Adult male and female in summer*.—Upper parts including head, neck wings, and tail dark brown; back washed with slate colour; secondaries tipped with white; under parts from chest to vent pure white, flanks streaked with a brownish colour. *Winter*.—Upper parts darker than in summer; sides of face and throat white with slight brown mottlings; a well marked dark streak behind eyes through the side of head.

*Juvenile*.—Resembles adult in winter plumage, but upper parts dark brown, feathers margined with blackish brown giving a more or less squamated appearance and no brown streaks on flanks.

*Soft parts*.—Bill nearly pure black; hind aspect of tarsus, webs, and toes black; front aspect of tarsus and toes brownish-yellow with brown joints; webs light brownish; claws black; iris brownish black (♀ ad., æst.).

*Measurements*.—Wing, 202–224; tail, 45.5–56; tarsus, 35–39.5; exposed culmen, 41.5–47.5; height of bill at front of nostril, 13–14.5; total length, 475 mm. Tail composed of 12–14 rectrices.

*Distribution*.—North Pacific Ocean, south to Japan and Korea, and in America, south to Southern California in winter.

*Habits*.—It is a marine species, usually keeping in companies. Its food consists of small fish, which it obtains by diving.

Rather common winter resident in Mutsu Bay where it appears the early part of January and stays till the end of May. Mr. WADA informed me that 50 or 60 individuals of this guillemot were frequently captured by a fishing-net in Aomori Bay in winter.

Genus **CEPPHUS** PALLAS (1769).

6. **Cephus carbo** PALLAS.

(Pl. VI, Fig. 6.)

*Cephus Carbo* PALLAS, Zoogr. Rosso-Asiat., II, p. 350 (1827—Kurile Islands). Sooty Guillemot.

*Keimafuri*. Local name: *Aka-ashi*.

9 specimens (including 5 winter and 4 summer plumages) examined

from: near Asamushi and Bentenjima, both in Mutsu Bay, 17. xii. 1925, 9. iii. and iv. 1926, 5. iii-15. v. 1927 (1 specimen is in the Tohoku Imperial University, 2 in the Marine Biological Station at Asamushi, and 6 in my collection).

*Adult male and female in summer.*—Above slaty black, paler below, tinged with brown on shoulders, under wing-coverts, and axillaries; orbital region white; an alar patch white. *Winter.*—Under parts white or black and white.

*Juvenile.*—White on orbital region less in area and middle of under parts white.

*Soft parts.*—Bill black; tarsus, toes and webs bright vermilion; hind aspect of tarsus and toes dusky; claws black and much curved; iris dark brown (♂ hiem.—æst.).

*Measurements.*—Wing, 181-202; tail, 43.5-57; tarsus, 35-39; exposed culmen, 40-42.5; total length, 370-410 mm. Tail composed of 14 (rarely 12 ?) rectrices.

*Distribution.*—North Pacific Ocean south to Kuriles, coasts of Japan and Korea.

*Habits.*—It is essentially a sea bird. Its flight is swift and direct, and it swims and dives with ease. Its food consists of small fish and crustacea, which it obtains chiefly by diving.

In Mutsu Bay, it arrives at the middle of December and winters there until May. I can not say whether this guillemot breeds on cliffs of Bentenjima, mouth of Mutsu Bay, or not. But Assist. Prof. KOKUBO states that it has bred on these cliffs (1. vi. 1927, *in litt.*).

Genus **BRACHYRAMPHUS** BRANDT (1837).

7. **Brachyramphus marmoratus perdix** (PALLAS).

(Pl. VII, Fig. 3.)

*Cephus Perdix* PALLAS, Zoogr. Rosso-Asiat., II, p. 251, pl. LXXX (1827 — Bering and Ochotsk Seas).

Partridge Auk.

*Madara-umisuzume.*

6 specimens (including 5 winter and 1 summer plumages) examined from: near Asamushi, 11. iii.—iv. 1926, 5. iii.—15. v. 1927 (2 specimens are in the Tohoku Imperial University, 2 in the Marine Biological Station at Asamushi, and 2 in my collection).

*Adult male and female in summer.*—Upper parts, including head and neck, brown marbled with dull tawny buff and buff white; chin and upper throat white, very slightly spotted with a blackish colour; under parts from chest to vent white mottled with blackish brown. *Winter.*—Upper parts deep slate or blackish grey; scapulars mostly white; a white collar on neck; under parts pure white.

*Juvenile.*—With whitish buff margins to the feathers of upper parts and with smoky brown fringes to the feathers of under parts.

*Soft parts.*—Bill horny black; tarsus and toes fleshy-white; webs dusky grey; hind aspect of tarsus, toes, and webs black; iris dark brown. (♂ hiem.)

*Measurement.*—Wing, 125-143; tail, 32-38; tarsus, 17.5-18.5; exposed culmen, 20-22; total length, 277-297 mm. Tail composed of 14 (rarely 12 ?) rectrices.

*Distribution.*—North Pacific from Kamtschatka to Kuriles, south in winter to coasts of Japan.

*Habits.*—In habits it is essentially a sea bird. It feeds on small fish and crustacea, swimming and diving with ease like *Synthliboramphus*.

In Mutsu Bay this auk probably appears from November on and winters there till the middle of May, 15. v. 1927.

Genus **SYNTHLIBORAMPHUS** BRANDT (1837).

8. **Synthliboramphus antiquus** (GMELIN).<sup>1)</sup>

(Pl. VII, Fig. 4.)

*Alca antiqua* GMELIN, Syst. Nat., I, 2, p. 554 (1789—*from W. N. America to Kamtschatka and Kuriles*).

Ancient Auk.

*Umi-suzume.* Local name: *Suzume*.

9 specimens (6 winter and 3 summer plumages) examined from: near Asamushi, 27. i.—iv. 1926, 5. iii.—16. v. 1927 (1 specimen is in the Tohoku Imperial University, 2 in the Marine Biological Station at Asamushi, and 6 in my collection).

*Adult male and female in summer.*—Crown, hind neck, chin, throat, and flanks black; nape, sides of lower hind neck and upper mantle with white ornamental feathers; back dark slaty-grey; wings and

<sup>1)</sup>Mr. WADA reported *S. wumizusume* from Aomori Bay, but I have not yet ascertained this fact.

tail-feathers black with a slaty-grey wash; under parts from fore neck downwards pure white. *Winter*.—Throat and fore-neck white and without a band of white on sides of head.

*Juvenile*.—Very similar to the winter plumage of adult, but duller in colour on upper part.

*Soft parts*.—Bill whitish grey; nasals, culmen and base of both mandibles black; tarsus and toes bluish white-grey with dusky joints; webs greyish-black; hind aspect of tarsus, toes and webs black; iris dark brown. (♂ aest.).

*Measurements*.—Wing, 130–140.5; tail, 32.5–40.5; tarsus, 26–28.5; exposed culmen, 13–15; total length, 246–283 mm. Tail composed of 14 (rarely 16) rectrices.

*Distribution*.—North Pacific from Kamtschatka to Aleutians, and Kuriles, south in winter to Japan and Korea.

*Habits*.—In habits it does not differ from *Brachyramphus*. It is a more common bird than the above mentioned species, and it reaches Mutsu Bay early in November and stays there until the early or middle part of May.

Genus *CICERONIA* REICHENBACH (1852).

9. *Ciceronia pusilla* (PALLAS).

(Pl. VII, Fig. 5.)

*Uria pusilla* PALLAS, Zoogr. Rosso-Asiat., II, p. 373 (1827 — Kamtschatka).

Least Auk.

*Ko-umisuzume*. Local name: *Suzumeko*.

1 specimen (adult in winter) examined from: near Asamushi, 17. xii. 1926. This is the only specimen which I have examined from this bay, and is preserved in the Marine Biological Station at Asamushi.

*Adult male and female in summer*.—Upper parts, wings, tail, chin, and a narrow band on neck, black; under parts white with smoky-black fore-neck and upper chest; small white plumes on forehead and lores, and some white lines behind eye; with a tubercle at base of culmen. *Winter*.—Without a tubercle at base of culmen; nearly without white plumes on forehead; under parts white with only chin dark grey.

*Juvenile*.—White on scapulars larger than in adults; without a tubercle on culmen, and without white plumes on head.

*Soft parts*.—"Bill dark reddish on the terminal half, basal half and tubercle dusky; legs and feet light whitish cobalt-blue, the joints darker; webs blackish; iris white." (Dresser.)

*Measurements*.—A specimen obtained by Asist. Prof. KOKUBO near Asamushi measures as follows: Wing, 90.5; tail, 25.5; tarsus, 18.5; exposed culmen, 8; entire culmen, 17.5; height of bill, 6 mm. Other specimens I have preserved measure: Wing, 95–95.5; tail, 28–29; tarsus, 19–19.5; exposed culmen, 8.5–8.9; total length, 166 mm. Tail composed of 14 rectrices.

*Distribution*.—North Pacific and the Arctic Oceans: Alaska, Kamtschatka, Commander and Kurile Islands, and Japan in winter.

*Habits*.—In habits it does not differ from its allies, except that it seems to be a more active bird than the preceding two species.

In Mutsu Bay it is probably a rare winter visitor as already stated by Mr. WADA.

Genus *CERORHINCA* BONAPARTE (1828).

10. *Cerorhinca monocerata* (PALLAS).

(Pl. VII, Figs. 6 & 7.)

*Alca monocerata* Pallas, Zoogr. Rosso-Asiat., II, p. 362 (1827 — coast of Alaska).

Hornbilled Puffin.

*Urb.* Local name: *Hanadori*.

13 specimens (including 1 winter and 12 summer plumages) examined from: near Asamushi and mouth of Noheji Bay, both in Mutsu Bay, 20. iv. 1926 and 20.–23. iv. 1927 (1 specimen is in the Tohoku Imperial University, 3 in the Marine Biological Station at Asamushi, and 9 in my collection).

*Adult male and female in summer*.—Upper parts brownish black; under parts white, more or less marbled with smoky-grey; two bands of elongate white feathers on each side of face; chin, neck, chest, and flanks brownish smoky-grey; a large horn at base of culmen. *Winter*.—Without a horn at base of culmen; a few white feathers on each side of head; breast and abdomen white without marblings. Sexes similar and only differing from each other in the greatest height of the bill of breeding birds — ♂♂ 18.6–19.5; ♀♀ 17.1–18 mm.

*Juvenile*.—Very similar to the adult in winter dress, but the bill much smaller, browner, and without horn, and without white feathers



on sides of head.

*Soft parts.*— Bill orange-yellow, tomia dusky; culminal ridge black; edges of horn also black; tarsus and toes whitish-yellow, dusky at joints; hind aspect of tarsus and sole black; iris dull yellow. (Adult in summer.)

*Measurements.*— (both sexes in adult summer).— Wing, 172–182; tail, 50–62; tarsus, 28–31.5; exposed culmen, including horn, 32–38.5; culmen from skull, 44–51; greatest height of bill without horn, 17.1–19.5; height of horn from upper edge of nasal opening, 14–19.5; total length, 345–379 mm. Tail composed of 14 (in 4 examples) to 16 (in 6 examples) or rarely 15 (in 2 examples—without dropping one feather) and 18 rectrices.

*Distribution.*— North Pacific from Kamtschatka, Kuriles to Japan and Korea. In America from Alaska to southern California.

*Habits.*— Essentially an ocean bird. It swims well and dives with ease, but it flies not so swiftly as does *Cephus*. It feeds on small fish and mollusca, which it obtains by diving.

I probably breeds in or around the coasts of Mutsu Bay, for several female specimens were obtained there in April which contained very large ovarian eggs. Moreover, I have always found pairs of this bird in April in that bay during my collecting tour. Mr. WADA also has stated that this species breeds near Aomori. It is nearly without doubt one of the summer residents in this bay.

#### Order LARI.

##### Key to families of order Lari.

- Bill without a cere; sternum with two notches. . . . . Laridae.  
Bill with a cere; sternum with one notch. . . . . Stercorariidae.

#### Family Laridae.

##### Key to genera, species, and subspecies of family Laridae.

- 1 { Size larger; bill stout and large; angle of gonyx prominent;  
head white in summer, streaked in winter (*Larus*) . . . . . 2  
Size smaller; bill slender and small; angle of gonyx flattened;  
head hooded in summer, nearly white in winter (*Hydro-  
coloeus*) . . . . . 13

- 2 { With entirely white tail. . . . . 3  
With grey or drab and white tail.  
*L. hyperboreus*, juv., 2nd & 3rd years.  
With partially white tail. . . . . 6  
3 { Size larger; wing over 390 mm.; culmen over 40 mm.; bill  
yellow with red spot at prominent angle. . . . . 4  
Size smaller; wing under 390 mm.; culmen under 40 mm.;  
bill greenish-yellow with no red spot at less prominent  
angle. . . . . *L. canus major*, ad.  
4 { Primaries wholly white or grey with white pattern.  
*L. hyperboreus*, ad.  
Primaries black with white mirrors or tongues. . . . . 5  
5 { Mantle darker, slaty. . . . . *L. schistisagus*, ad.  
Mantle paler, silvery or pearl grey. . . . . *L. argentatus vegae*, ad.  
6 { Tail blackish tipped with white. . . . . *L. crassirostris*, juv.  
Tail patterned black and white. . . . . 7  
7 { Tail with a large black band. . . . . 8  
Tail with dusky brown freckles, spots, bars, etc. . . . . 9  
8 { Tail distinctly banded. . . . . *L. crassirostris*, ad.  
Tail rather indistinctly banded. . . . . *L. canus major*, juv.  
9 { Tail dark in colour with white pattern. . . . . 10  
Tail white with dusky blotches or a partial band. . . . . 11  
10 { Barring of tail with fine speckling, the dusky area usually  
exceeding the white. . . . . *L. argentatus vegae*, juv.  
Barring of tail with coarse spotting, the white area usually  
exceeding the dusky. . . . . *L. schistisagus*, juv.  
11 { Size larger; wing over 390 mm. . . . . 12  
Size smaller; wing under 390 mm.  
*L. canus major*, 2nd & 3rd years.  
12 { Mantle silvery or pearl grey. . . . . *L. arg. vegae*, 2nd & 3rd years.  
Mantle slaty. . . . . *L. schistisagus*, 2nd & 3rd years.  
13 { Tail entirely white; head hooded; bill dark red.  
*Hydrocoloeus r. sibiricus*, ad., aest.  
Tail entirely white, head white with a dusky patch on auri-  
culars; bill red. . . . . *H. r. sibiricus*, ad., hiem.  
Tail end blackish brown; head white with a dusky patch on  
auriculars; bill brownish tipped with dusky.

13{

*H. r. sibiricus*, juv.

Genus LARUS LINNÆUS (1758).

11. *Larus crassirostris* VIEILLOT.

(Pl. VIII, Figs. 1 &amp; 2.)

*Larus crassirostris* VIEILLOT, Dict. d'Hist. Nat., XXI, p. 508 (1818—Nagasaki, Kiusiu).

Black-tailed Gull.

*Umineko*. Local name: *Gome*.

4 specimens (1 adult and 3 young) examined from: near Asamushi, 10. viii. 1915, ix. 1925 and spring, 1927 (1 specimen is in the Marine Biological Station at Asamushi and 3 in my collection).

*Adult male and female in summer*.—Entire head, neck, whole under parts, upper tail-coverts, and under wing-coverts snowy white; mantle slaty grey; tail white, except the outermost one, with a broad subterminal black band, base of tail-feathers pale grey; scapulars and secondaries edged with white; five outer primaries blackish with white tips, increasing in size inwards. *Winter*.—Similar, but with greyish brown mottlings on head and nape.

*Juvenile*.—Very similar to young of *canus*-group, but always distinguishable from it by the bill being very much stouter. Young in the first year has its plumage sooty brown and the tail largely blackish tipped with white. Many transitional stages from sooty brownish, grey and white, to adult plumage, are observable.

*Soft parts*.—Bill greenish yellow with an orange tip, and with a black subapical cross band; tarsus, toes, and webs greenish yellow; iris straw-yellow, eyelid vermilion. In juvenile specimen, bill mostly black with no orange wash at tip and flesh coloured base; legs fleshy or fleshy brownish; iris brown.

*Measurements*.—Wing, 340–370; tail, 129–155; tarsus, 52–60; exposed culmen, 43.5–56; total length, 478–526 mm. Tail composed of 12 feathers.

*Distribution*.—From Eastern Siberia to Sakhalin, Japan, Korea, and China, south to Formosa and Amoy.

*Habits*.—It is a native species of the East and breeds in flocks on small islets on the Pacific side as well as along the coasts of the Sea of Japan. As it has a narrow distribution, Kabushima in Aomori

Prefecture, one of its breeding grounds is protected by law. It arrives at Kabushima about the equinoctial week of spring, lays eggs during the month of May, and hatches them at the end of the month. Its nest is built in a depression in the ground or among rocks, where "Matsuba-suge" (*Carex*), are grown. The number of eggs in a clutch is 2 or 3, sometimes but very rarely 4, which vary in ground colour from yellowish grey to pale olivaceous, and are spotted, blotched, and scattered with blackish-brown or yellowish brown, in size measuring about 65 × 44 mm. Its principal food consists of sardines, small cuttlefish, small crustaceans, worms and insects.

In Mutsu Bay this gull is observed during its breeding season, from early in March to the end of August.

12. *Larus canus major* MIDDENDORFF.

(Pl. VIII, Fig. 3.)

*Larus canus* L. var. *major* MIDDENDORFF, Sibirische Reise, Zool. II, 2, p. 243, pl. XXIV, fig. 4 (1853—Stanovoi Range to Ochotsk Sea).

Asiatic Common Gull.

*Kamome*. Local name: *Gome*.

1 specimen examined from: Moura near Asamushi, 5. ii. 1927. It is preserved in the Marine Biological Station at Asamushi.

*Adult male and female in summer*.—Head, neck, under parts, upper tail-coverts, and tail pure white; mantle light neutral grey; primaries black with broad white tips; secondaries also with broad white tips. *Winter*.—Head and nape streaked with brownish.

*Juvenile*.—Mantle pale clove-brown with narrow buff edges to the feathers; head greyish white faintly streaked with brownish-buff; under parts greyish clove-brown; no white tips to quills; tail with a black or clove-brown terminal band.

*Soft parts*.—Bill greenish yellow; legs varying from dull straw colour to greenish yellow; iris golden brown or greyish white; orbital ring vermilion. In young, bill dull black with flesh-coloured base; legs flesh-coloured with some dull wash; iris brown with black eyelid.

*Measurements*.—An adult female obtained by Assist. Prof. KOKUBO at Asamushi, measures as follows: Wing, 358; tail, 147; tarsus, 52; exposed culmen, 35; entire culmen, 51; bill at angle, 11; breadth of bill at front of feathering, 10 mm. Other specimens measure: Wing,

345-383; tail, 138-165; tarsus, 52-58; exposed culmen, 35-42; bill at angle, 10.5-12.2; breadth of bill at front of feathering, 9-11; total length, 453-497 mm. Tail composed of 12 rectrices.

*Distribution*.—Breeds in Eastern Siberia and winters in Japan,<sup>1)</sup> China, and Formosa.

*Habits*.—In habits this gull does not differ from *crassirostris*. In Mutsu Bay it seems to be a rather rare winter visitor.

### 13. *Larus argentatus vegæ* PALMÉN.

(Pl. VIII, Fig. 4.)

*Larus argentatus* BRÜNN var. *Vegæ* PALMÉN, Vega Exped. Vetensk. Arb., V. p. 370 (1887—Pidlin, coast of N. E. Siberia).

Vega Herring Gull.

*Seguro-kamome*. Local name: *Tara-gome*.

2 specimens (young in first year) examined from: Aomori Bay and Moura near Asamushi, middle of xii. 1915 and 5. ii. 1927 (1 specimen is in the Marine Biological Station at Asamushi and the other specimen is in my collection).

*Adult male and female in summer*.—Head, neck, rump, tail, and entire under parts pure white; mantle silvery or pearl grey; greater wing-coverts, secondaries and scapulars broadly tipped with white; three outer primaries black, broadly white-tipped, with white tongues and two mirrors. *Winter*.—Similar, but head and hind neck streaked with pale brown.

*Juvenile*.—Mantle pale clove-brown, the feathers broadly edged and notched with pale buff; under parts clove-brown, greyer than the back; head like mantle, thickly streaked with greyish white; primaries blackish or clove-brown; tail clove-brown with coarse irregular white bars, the dark area usually exceeding the white one.

*Soft parts*.—Bill citron-yellow with a large red spot at angle of lower mandible; tarsus, toes and webs flesh-colour; iris yellowish white with dark mottlings; edge of eyelid dark red. In young, bill flesh-colour with a dull black apical patch; legs and feet flesh-colour; iris brownish.

*Measurements*.—Wing, 410-465 (393-431 in juv.); tail, 161-188;

<sup>1)</sup>The occurrence of *L. canus brachyrhynchus* in Japan proper, is little, if any, doubt that it is indeed an error.

tarsus, 63-75.5 (60.5 in juv.); exposed culmen, 50-62.5 (46.5 in juv.) mm. Total length, 620-715 mm. Length of a black band on central rectrices in young, 66-84 mm. Tail composed of 12 feathers.

*Distribution*.—It is found extending eastward along the Siberian coast to Anadyr Bay. In winter *vegæ* reaches the coasts of Japan and China and as far south as the Bonin Islands, and the Gulf of Tonquin, and also occurs on the coasts of Alaska to the Aleutian Islands (Dwight).

*Habits*.—It frequents the sea coasts where it finds small fish, especially herrings and sardines, mollusca, crustaceans, worms, and insects. It is a great egg robber in breeding grounds of other sea birds.

It is a rather common winter visitor to Mutsu Bay, where it seems to appear at the middle of December and remains until the end of March.

### 14. *Larus schistisagus* STEJNEGER.

(Pl. VIII, Fig. 5.)

*Larus schistisagus* STEJNEGER, Auk, 1884, p. 231 (Bering Islands, Kamtschatka). Slaty-backed Gull.

*Ō-seguro-kamome*. Local name: *Tara-gome*.

1 specimen (adult) examined from: Moura near Asamushi, 5. ii. 1927. This fine specimen is preserved in the Marine Biological Station at Asamushi.

*Adult male and female in summer*.—Head, neck, under parts, and tail pure white; scapulars and secondaries tipped with white; mantle dark slaty coloured; three outer primaries mostly black, the rest with diminished tongues and one or two mirrors. *Winter*.—Similar, but crown and neck with brown spots in lines.

*Juvenile*.—Similar to young of *vegæ*, but mantle pale clove-brown, the feathers broadly edged and banded with buff, the banding and mottling more longitudinal rather than cross-barred like *vegæ*; tail deep clove-brown with coarse snake-like spotting predominant, and obscurely banded, the white area usually exceeding the dusky one.

*Soft parts*.—Bill rich yellow with a red spot at angle of lower mandible; tarsus, toes, and webs dull purplish flesh-colour; iris pale yellow. In young, the bill is darker, while other soft parts are much like those of the young of *vegæ*.

*Measurements*.—Wing, 415-448; tail, 162-193; tarsus; 61.5-73;

exposed culmen, 52.5–60; total length, 600–654 mm. Length of a black band on central rectrices in young, 49–59.5 mm. Tail composed of 12 rectrices.

*Distribution.*— It breeds in Kamtchatka, eastern Siberia, and Kuriles, and winters on coasts of Japan (reaching to middle parts of Hondo in the Pacific side). There are records of stray birds from Alaska, Mackenzie, etc.

*Habits.*— It does not differ from *vegæ*. It seems also not uncommon in Mutsu Bay in winter.

#### 15. *Larus hyperboreus* GUNNERUS.

(Pl. VIII, Fig. 6.)

*Larus hyperboreus* GUNNERUS, in LEEM'S, Beskr. Finn. Lapper., p. 226, footnote (1767 — northern Norway).

Glaucous Gull.

*Shiro-kamome*. Local name: *Gome*.

1 specimen (3rd year) examined from: Moura near Asamushi, 5. ii. 1927. It is preserved in my collection, no. 10921.

*Adults in 4th summer and winter.*— Mantle very pale neutral grey, rest of plumage pure white except quills which are white with grey tips. *3rd winter.*— Head and neck white with slight drab streaks on nape and neck; a dusky eye patch; under parts white with some drab wash on abdomen; primaries white with slight drab on outer webs, tail white with some frecklings.

*Juvenile.*— Mantle pale buff mottled with pale grey-brown; head greyish, inconspicuously streaked with pale clove-brown; under parts and quills pale drab; tail-feathers marbled with white spots, drab-grey lines, and a subterminal buffy band.

*Soft parts.*— Bill yellow with a red patch at angle of lower mandible; tarsus and toes flesh-colour; iris pale yellow; eyelid vermilion. In young, bill pinkish white or flesh colour with a blackish-brown terminal band; tarsus and toes whitish with some pinkish wash; iris brownish.

*Measurements.*— A specimen (adult in 3rd year) obtained measures: Wing, 445; tail, 176; tarsus, 71; exposed culmen, 56.5 mm. Other specimens measure: Wing, 410–487 (405 in juv.); tail, 160–200; tarsus, 68–74.5; exposed culmen, 54–64.5; total length, 612–643 mm. Tail composed of 12 rectrices.

*Distribution.*— It is a circumpolar species and its breeding range spreads north of the Arctic Circle, but in America south to Labrador. It winters south to the Mediterranean, Caspian, and Red Seas, Japanese coasts, Hawaiian Islands, Texas, Cuba, etc.

*Habits.*— It does not differ from *schistisagus* and *vegæ*.

In Mutsu Bay it is probably a rather more rare winter visitor than the above mentioned forms.

Genus HYDROCOLOEUS KAUP (1829).

#### 16. *Hydrocoloeus ridibundus sibiricus* (BUTURLIN).<sup>1)</sup>

(Pl. IX, Figs. 1 & 2.)

*Larus ridibundus sibiricus* BUTURLIN, Mess. Orn., II, p. 86 (1911 — Kolyma Delta and Ussuriland).

Kamtchatkan Black-headed Gull.

*Ô-yuri-kamome*. Local names: *Gome* or *Miyako*.

2 specimens (1 adult in winter and 1 juv.) examined from: near Aomori City, Aomori Bay, 1. iv. 1921 (the both specimens are preserved in the Aomori Normal School).

*Adult male and female in summer.*— Head hooded with a coffee-brown colour; mantle pale neutral grey or a little darker; a narrow eye-ring, lower rump, upper tail-coverts, tail, and entire under parts pure white, the latter faintly tinged with a rosy colour; primaries white, with tips and margins of inner webs black. *Winter.*— No hood on head, with an auricular dusky patch, and lores and occiput slightly washed with grey.

*Juvenile.*— Mantle wood brown with paler margin to the feathers; crown of head mouse grey, with an indefinite white patch above auriculars; under parts white with a buffy band on breast; tail white with broad blackish brown band, extreme tip of tail buffy.

*Soft parts.*— Bill, eyelid, legs, feet and webs lake red; iris deep brown. In winter, bill, legs and feet bright red without any dusky wash. In young, bill dull orange with blackish tip and legs and feet yellowish flesh with dusky webs and joints.

*Measurements.*— Two specimens examined measure: Wing, 307, 315; tail, 119.5, 126; tarsus, 44.5, 45; exposed culmen, 37.5, 38;

<sup>1)</sup>The smaller form, *H. r. ridibundus*, also seems to be occur, but I have not examined it from Mutsu Bay.

bill at angle 8.5, 9 mm. Other specimens measure: Wing, 280-325; tail, 113-129; tarsus, 43-49.5; exposed culmen, 37.5-43; bill at angle, 8.5-9.5; total length, 370-440 mm. Tail composed of 12 (very rarely 14) rectrices.

*Distribution*.—“The race *sibiricus* breeds in extreme eastern Siberia; in winter reaches the coasts of Japan and China.” (Dwight).

*Habits*.—In habits it differs from other gulls in selecting inland waters and rivers. Its flight is graceful and easy, and it swims with ease. Its food consists of small fish, worms, insects, etc. It flocks in winter.

In Mutsu Bay, this gull seems to be confined to near the City of Aomori where small rivers are found. Rather rare along the coasts of this bay in winter.

#### Family Stercorariidae.

Genus STERCORARIUS BRISSON (1760).

#### 17. *Stercorarius parasiticus parasiticus* (LINNÆUS).

(Pl. VIII, Fig. 8.)

*Larus parasiticus* LINNÆUS, Syst. Nat., X, I, p. 126 (1758 — coast of Sweden).  
Arctic Skua.

*Kuro-tôzokukamome*.

1 specimen (pale phase of adult in summer) examined from: near Aomori in coast, 14. ix. 1923. Collected by Mr. WADA and presented to my collection, no. 7495.

This skua has two colour phases, one is pale and the other is dark.

*Pale phase*.—Upper parts dark umber-brown; a blackish cap; a collar round neck whitish-yellow; lores, under eye, under parts white except sides of breast, flanks and under tail-coverts greyish sooty-brown; primaries and tail blackish umber-brown; middle rectrices elongated and pointed. *Dark phase*.—Upper parts dark umber-brown; under parts uniform sooty-brown with somewhat greyish wash.

*Juvenile*.—Head and hind neck brownish buff streaked with brownish black; back blackish brown, feathers edged with a buffy colour; under parts vary from blackish-brown to white with brownish bars; tail brownish-black.

*Soft parts*.—Bill blackish with lead blue base; tarsus and toes blackish; iris brown.

*Measurements*.—A specimen (adult) obtained measures: Wing, 323; central rectrices, 207; lateral rectrices, 132; difference between tip of central and tip of next rectrices, 75; tarsus, 47; exposed culmen, 34; entire culmen, 44.5 mm. Tail composed of 12 rectrices.

*Distribution*.—Breeds in North Europe; coasts of Siberia to Arctic America and Greenland. Winters in South Europe, Africa, Japan, and Australia, in America to California. Rarely recorded from New Zealand, Peru and Brazil.

*Habits*.—“Like its allies it is a bold, rapacious bird, subsisting chiefly by plunder. It is swift and active on the wing, swims with ease, but does not either dive or plunge. Its cry is plaintive, not unlike the prolonged mew of a cat, and when alarmed it utters a sound between a hiss and a croak.” (Dresser). Mr. WADA observed it on the coast of Awomori, and stated that he saw it on the wing, flying very swiftly, and that it frequently perches on branches of trees.

In Mutsu Bay it is undoubtedly a rare summer migrant.

#### Order TUBINARES.

#### Family Procellariidae.

Key to genera, species and subspecies of family Procellariidae.

- |   |   |   |  |
|---|---|---|--|
| 1 | { | Wing under 170 mm.; tarsus under 30 mm.; general colour |  |
|   |   | bluish-grey .....                                       | <i>Oceanodroma furcata</i> . <sup>1)</sup> |
| 2 | { | Wing over 260 mm.; tarsus over 45 mm.....               | 2  |
|   |   | Under parts white.....                                  | <i>Puffinus leucomelas</i> .               |
|   |   | Under parts uniform brownish grey.....                  | <i>P. t. tenuirostris</i> .                |

Genus PUFFINUS BRISSON (1760).

#### 18. *Puffinus leucomelas* (TEMMINCK).

(Pl. IX, Fig. 3.)

<sup>1)</sup>Genus *Oceanodroma* Reichenbach (1852).

*Oceanodroma furcata* (Gmelin).

*Procellaria furcata* Gmelin, Syst. Nat., 1, 2, p. 561 (1788—“Habitat in glacie maris, Americam at Asiam interfluentis”).

Grey Fork-tailed Petrel.

*Haiiro-umitsuwame*.

1 specimen examined by me at the Aomori Normal School, but the exact locality of this specimen unknown.

*Procellaria leucomelas* TEMMINCK, Pl. Col. 587, livr. 99 c. (1835 — "Les mers du Japon").

Japanese Shearwater or White-fronted Shearwater.

*Ô-mizunagidori*. Local name: "Kamo."

3 specimens examined from: Aomori Bay and between Futagozaki and Ôshima, off Asamushi, 17. xi. 1923 and 22. vi. 1927 (1 specimen is preserved in the Aomori Normal School and 2 specimens in my collection).

*Adult male and female*.—Head, nape and sides of neck white with blackish-brown streaks; upper parts, wings and tail dark brown, feathers of back with narrow greyish white margins; under parts white.

*Juvenile*.—Very similar to the adults, but with the head less spotted.

*Soft parts*.—Bill horny bluish with rami of lower mandible bluish pink; legs and feet pinkish flesh-colour or whitish yellow with the outer toe darker; iris umber brown.

*Measurements*.—Wing, 293–337; tail, 135–157; tarsus, 47.5–53.5; exposed culmen, 48–51.5; total length, 535 mm. Tail composed of 12 rectrices.

*Distribution*.—Japanese Seas only (from Kuriles to Japan proper, Korea and Formosa), but sparsely extending through Philippines, N. Borneo, Moluccas, and as far south as New Guinea.

*Habits*.—It is essentially an ocean bird, only visiting coasts during the feeding time after groups of fish, and visiting land during the breeding season. Its flight is swift-like, close to the surface of the water. It flies usually in flocks. Its food consists of small fish, which it obtains by diving under water about 3–4 feet, stretching out both wings. In habits it is a rather more shy bird than other members of the same genus. This species breeds in several islands of the Japanese Empire, recorded especially from Mikurajima, one of Seven Islands of Izu; Kammurijima in Prefect. Kyôto and Birôjima in Prefect. Kôchi. In these islets it makes a hole in the ground and deposits only one white egg.

It is not certain that it breeds near Aomori, but it is probably one of the residents of that region, for it was obtained in autumn (17. xi. 1923), observed during winter (according to Mr. WADA) and captured at the end of June (coll. by Mr. KOKUBO). The last example obtained in June has large ovarian eggs.

### 19. *Puffinus tenuirostris tenuirostris* (TEMMINCK).

(Pl. IX, Fig. 4.)

*Procellaria tenuirostris* TEMMINCK, Pl. Col. text to Pl. 587 (1835 — Japanese Seas).

Slender-billed Shearwater.

*Hashiboso-mizunagidori*.

1 specimen is preserved in the Aomori Normal School. It was obtained in Aomori Bay, 27. vii. 1920.

*Adult male and female*.—Upper parts uniform blackish-brown, the feathers of mantle edged with pale brown; under parts also uniformly brownish-ashy; throat with a bluish tinge; under wing-coverts paler grey.

*Juvenile*.—Very similar to adult.

*Soft parts*.—Bill black with greyish base; tarsus and toes pale grey with hind aspect of tarsus and outer toes blackish; iris brown.

*Measurements*.—Wing, 253–272; tail, 80–87.5; tarsus, 48–50.5; exposed culmen (including nares) 31.5–34.5 mm. Tail composed of 12 rectrices.

*Distribution*.—Pacific Ocean from Kamtschatka, Alaska and Kuriles to coasts of Japan and Korea; south to Australia and New Zealand Seas.

*Habits*.—It is also an ocean bird. In habits it does not differ from its allies, except that it is not a shy bird and we can easily approach it on the water by boats. It frequently flocks in large numbers, but not rarely in pairs on the surface of water. It is rather a weak bird and is killed by storms or even by attacks from skuas, as in case of *Puffinus griseus*.

In Mutsu Bay, this bird seems to be rather more rare than *P. leucomelas*.

#### Order STEGANOPODES.

#### Family Phalacrocoracidae.

Key to genera, species and subspecies of family Phalacrocoracidae.

- |   |   |   |   |
|---|---|---|---|
| 1 | { | Size larger; with 14 rectrices ( <i>Phalacrocorax</i> ).....  | 2 |
|   |   | Size smaller; with 12 rectrices ( <i>Urile</i> ).....   | 6 |
| 2 | { | Head and neck with long white filamentous plumes; a large white patch on each flank; under parts not white..... | 3 |
|   |   | Head, neck and flanks with no white plumes; under parts   |   |

- not white ..... 4
- 2 { Neck with or without slight white linear plumes; no white patch on flanks; under parts white or blackish with white mottlings ..... 5
- 3 { Feathers near base of lower mandible white; upper parts bronze-brown margined with dark steel-blue; under parts dark bluish-green. *Phalacrocorax carbo hanedae*, breed. pl.<sup>1)</sup>
- 3 { Feathers near base of lower mandible white with greenish black spots; upper parts greenish-bronze margined with dark green; under parts dark oil-green  
*P. capillatus*, breed. pl.
- 4 { Smaller; bill slender and shorter; exposed culmen, 55.5-69 mm. .... *P. carbo hanedae*, non-breed. pl.<sup>2)</sup>
- 4 { Larger; bill stouter and longer; exposed culmen, 63-74 mm.  
*P. capillatus*, non-breed. pl.
- 5 { Bill slender; size smaller. .... *P. carbo hanedae*, juv.<sup>3)</sup>
- 5 { Bill stouter; size larger. .... *P. capillatus*, juv.
- 6 { Plumage metallic greenish and purplish; neck (bluish violet), lower back and rump with a few white filamentous plumes; a large white patch on each flank; with two crests, one on crown and another on nape  
*Urile p. pelagicus*, breed. pl.
- 6 { Plumage uniform metallic as in preceding with no white plumes; no crests. .... *U. p. pelagicus*, non-breed. pl.
- 6 { Plumage uniform brown. .... *U. p. pelagicus*, juv.

Genus PHALACROCORAX BRISSON (1760).

20. *Phalacrocorax capillatus* (TEMMINCK & SCHLEGEL).

(Pl. IX, Fig. 5.)

*Carbo capillatus* TEMMINCK & SCHLEGEL, in Siebold's Fauna Japonica, Aves, Pl. 83, 83B (1850).

*Carbo filamentosus*, *id.*, *op. cit.*, p. 129 (1850—Japan).

Temminck's Cormorant.

*Umi-u* or *Shimatsu*. Local names: *U* or *Unodori*.

<sup>1)</sup>—<sup>3)</sup> *P. carbo hanedae* KURODA breeds on trees at Saruka, Minami-tsugarugōri, Prefect. Aomori, and I have an example of this form sent me by Mr. WADA from the breeding place. Although Mr. WADA tells me that it seems to occur in Aomori Bay for feeding, I have no example which was obtained in the bay.

3 specimens (all juveniles) examined from: near Asamushi, 1. x. 1926 and end of iv. 1927 (2 specimens are in the Marine Biological Station at Asamushi and 1 in my collection).

*Adult male and female in breeding plumage* (winter to spring).—Entire plumage black with oil-green tinge; upper parts greenish-bronze margined with dark green; head and neck dark greenish blue with long white filamentous plumes; a large white patch on each flank; white area bordering gular pouch with dark greenish black spots.  
*Non-breeding plumage* (spring to winter).—Similar to the breeding plumage except that white filamentous plumes on head and white patch on flanks are cast.

*Juvenile* (young in first plumage).—Upper parts dull brown; head, neck, and mantle somewhat glossed with bluish green; feathers on scapulars, mantle, and wing-coverts with wide dark margins; throat and under parts white, with sides, flanks and under tail-coverts dark brownish black.

*Soft parts*.—Bill blackish brown with sides and base yellowish; naked skin on face orange-yellow; legs and feet black; iris bluish green.

*Measurements*.—Wing, 312-327; tail, 139.5-167; tarsus, 63.5-68; exposed culmen, 65-74; total length, 818-865 mm. Tail composed of 14 (rarely 15) rectrices.

*Distribution*.—It is an East Asiatic species and it is found only along the coasts of eastern Siberia, Japan, Korea and China.

*Habits*.—It is essentially a sea bird and usually roosts on sea rocks and cliffs, where it breeds. Its food consists of fish of various sizes, from very small to about 330 mm. in length.

In Mutsu Bay it is a rather common resident and it probably breeds on the cliff of Tateishi (Pl. XIII, Figs. 4 & 5), a small islet in the mouth of this bay, where several specimens were observed in end of April, 1927. Mr. WADA also stated that it is a resident.

Genus URILE BONAPARTE (1855).

21. *Urile pelagicus palagicus* (PALLAS).

(Pl. IX, Figs. 6 & 7.)

*Phalacrocorax pelagicus* PALLAS, Zoogr. Rosso-Asiat., II, p. 303 (1827—Eastern Kamtschatka and Aleutian Islands).

Pelagic Shag.

*Hime-u* or *U-garasu*. Local names: *Umi-garasu* or *Kurozu*.

9 specimens (4 adult and 5 juveniles) examined from: near Asamushi; Futagojima; and Tateishi and Bentenjima in the mouth of Mutsu Bay; 20. xi. 1925, iii. 1926, 23. and 27. iv. 1927 (2 specimens are in the Tohoku Imperial University, 3 in the Marine Biological Station at Asamushi, and 4 in my collection).

*Adult male and female in breeding plumage*.—Head and neck metallic violet-black, purplish towards the head, the lower neck washed with steel-blue; with two crests on head and neck; scapulars and upper wing-coverts green, tinged with bronzy purple; rump and under parts dark green; a few narrow white filamentous feathers on neck and rump; a large white patch on flanks (or sides of rump). *Non-breeding plumage*.—Similar to the above mentioned plumage except that white filamentous feathers and crests on head and nape are cast.

*Juvenile*.—General plumage dull brown; back and scapulars glossed with dull green; under parts somewhat paler.

*Soft parts*.—Bill black; sides of upper and whole lower mandibles horny brownish-black; gular sac and lores bright red or dusky red; legs and feet black; iris pale greenish; inside of mouth pale orange. In nonbreeding specimens or juveniles, bill more brownish; gular sac and lores greyish black with some olive wash; iris pale greenish; eyelid black. In nestlings, bill brownish black with black culmen; eyelid and bar parts of face brownish black.

*Measurements*.—Wing, 240–266; tail, 140.5–156; tarsus, 49–55; exposed culmen, 48–52; total length, 637–725 mm. Tail composed of 12 rectrices.

*Distribution*.—Kamtschatka, Kuriles and Commander Islands, south to Japan and China in winter. In America from Alaska to Washington State.

*Habits*.—The shag is also a sea bird and is usually found on rocks. Its food consists of fish and small crustaceans. In habits it is rather less shy than *capillatus* which is much more difficult to approach by boats.

In Mutsu Bay it is probably a rather common winter resident, and stays there during its breeding season (winter—spring). I have collected a fledgeling young on a cliff of Bentenjima (23. iv. 1927) (Pl. XIII, Figs, 4–6) in the mouth of this Bay, where a few breeding birds were also shot.

## Order ANSERES.

## Family Anatidæ.

## Key to subfamilies of family Anatidæ.

- 1 { Hind toe distinctly lobed. . . . . 2
- 1 { Hind toe slightly lobed. . . . . 3
- 2 { Bill broad and depressed, with rows of fine lamellæ. . . . . Marilinæ.
- 2 { Bill narrow and rather compressed, with sharp "teeth" . . . . . Merginæ.
- 3 { Lores feathered. . . . . 4
- 3 { Lores bare . . . . . Cygninæ.
- 4 { Wing with a metallic speculum. . . . . Anatinæ.
- 4 { Wing with no metallic speculum. . . . . Anserinæ.

## Subfamily MERGINÆ.

## Key to genera, species and subspecies of subfamily Merginæ.

- 1 { Size larger; tarsus shorter than exposed culmen (*Mergus*) . . . . . 2
- 1 { Size smaller; tarsus slightly longer than exposed culmen . . . . . 5
- (*Mergellus*) . . . . . 5
- 2 { Head and upper neck black with or without green gloss. . . . . 3
- 2 { Head and sides of neck rufous. . . . . 4
- 3 { Under parts uniform white more or less tinged with salmon . . . . . 3
- colour. . . . . *Mergus m. merganser*, ♂ ad.<sup>1)</sup>
- 3 { Under parts white with a pinkish-cinnamon patch spotted . . . . . 4
- with black on chest. . . . . *M. s. serrator*, ♂ ad.
- 4 { Bill stouter; back ashy-grey. . . . . *M. m. merganser*, ♀ & juv.<sup>2)</sup>
- 4 { Bill slender; back brownish-grey . . . . . *M. s. serrator*, ♀ & juv.
- 5 { Head and neck white with black patches in front of eyes and . . . . . 5
- on sides of occiput. . . . . *Mergellus albellus*,<sup>3)</sup> ♂ ad.
- 5 { Head and neck cinnamon-brown or russet. . . . . *M. albellus*,<sup>4)</sup> ♀ & juv.

<sup>1)</sup> and <sup>2)</sup> Mr. WADA recorded it as a winter visitor to Aomori Bay, but I have no specimen from this bay for the present study.

<sup>3)</sup> and <sup>4)</sup> Mr. WADA has a photo of a male specimen of *M. albellus*, which was said to occur in Aomori Bay. But I could not ascertain its existence there.



Genus **MERGUS** LINNÆUS (1758).

22. **Mergus serrator serrator** LINNÆUS.

(Pl. X, Figs. 1 & 2.)

*Mergus Serrator* LINNÆUS, Syst. Nat., ed. X, I, p. 129 (1758 — Sweden).

Red-breasted Merganser.

*Umi-aisa*. Local name: *Aisa*.

4 specimens (2 ♂ ad., 1 ♀ ad. and 1 ♂ juv.) examined from: near Asamushi, I. iv. 1926 (2 specimens are preserved in the Tohoku Imperial University and 2 in the Marine Biological Station at Asamushi).

*Adult male in winter*.—Head and upper neck blackish green with some purplish lustre; elongated feathers on crown and nuchal parts; a white collar around neck with a black line behind; chest reddish brown, spotted with brownish black; feathers in front of shoulder white, broadly margined with black; mantle and scapulars black with a purple gloss; rump and upper tail-coverts white, vermiculated with black; upper wing-coverts and secondaries white, the latter bordered with black on the outer web; two black bars across white speculum; under parts white faintly washed with warm buff; flanks white with white margins; primaries and tail dark greyish brown. *Adult female*.—Head and crest reddish brown; chest mottled with an ashy colour and white; back and flanks deep ashy-colour; speculum with one black bar.

*Juvenile*.—Very similar to adult female.

*Soft parts*.—Bill and iris bright red; culminal ridge darker; legs and feet orange red; in female bill and feet dull orange; iris brown.

*Measurements*.—Wing, ♂ 232-240, ♀ 210-215; tail, ♂ 76-84.5, ♀ 71.5-75; tarsus, ♂ 45-48.5, ♀ 42.5-44; exposed culmen, ♂ 57-64, ♀ 50-55.5; crest, ♂ 69-94, ♀ 51.5; total length, ♂ 550-570, ♀ 500-528 mm. Tail composed of 16-18 (rarely 17 and 20) rectrices.

*Distribution*.—It is a cosmopolitan bird; breeds in North Europe, North Asia, and North America. In winter to North Africa, Japan, China, North India, and in America south to Bermuda.

*Habits*.—It is an expert diver and feeds chiefly on fish. It frequently visits rocky coasts as well as bays and mouths of rivers. Sometimes it flocks in large numbers, but usually only a few individuals are seen together.

In Mutsu Bay it is a winter resident from the end of October to the middle of April.

Subfamily MARILINÆ (or FULIGULINÆ).

Key to genera of subfamily Marilinæ or sea ducks.

- 1 { Primaries uniform blackish or dark brown.....2
- 1 { Primaries not uniform blackish or dark brown, but partly white .....6
- 2 { General colour of males velvety black, of females greyish-brown; maxilla of adult male with swollen portion on top at base; size larger.....3
- 2 { General colour of males not black; maxilla of adult male without swollen portion; size smaller.....4
- 3 { Wing without white speculum; inner toe without claw, much longer than length of commissure; tail composed of 16 rectrices .....*Oidemia*.
- 3 { Wing with a white speculum; inner toe without claw, much shorter than length of commissure; tail composed of 14 rectrices .....*Melanitta*.
- 4 { Bill thick and strong; head crested.....5
- 4 { Bill pointed and weak; head not crested.....*Histrionicus*.
- 5 { Central rectrices of adult male long and pointed; edges of maxilla more or less bent inwardly.....*Clangula*.
- 5 { Rectrices not long and pointed; edges of maxilla not bent inwardly .....*Glaucionetta*.
- 6 { Bill not decidedly broader near end than at base of maxilla; head without crest.....*Nyroca*.
- 6 { Bill broader near end than at base of maxilla; head with or without crest.....7
- 7 { Head smooth; size larger; bill longer.....*Marila*.
- 7 { Head with a pendent crest; size smaller; bill shorter.....*Fuligula*.

Genus **HISTRIONICUS** LESSON (1828).

Key to ♂, ♀ and juvenile of genus *Histrionicus*.

- 1 { Rectrices pointed.....2
- 1 { Rectrices with abraded ends.....3
- 2 { A triangular white patch on lores; a small white auricular spot; an oval white patch on sides of neck  
*Histrionicus h. pacificus*, ♂ ad.

- 2 { A white patch in front and below eye; another white auricular spot. . . . . *H. h. pacificus*, ♀ ad.  
 3 { Plumage darker with some darker patches  
       *H. h. pacificus*, ♂ pass.  
 Plumage paler and duller. . . . . *H. h. pacificus*, ♂ juv. & ♀ juv.

23. *Histrionicus histrionicus pacificus* BROOKS.

(Pl. X, Figs. 3 & 4.)

*Histrionicus histrionicus pacificus* BROOKS, Bull. Mus. Comp. Zool. Harvard College, LIX, p. 393 (1915—Kamtschatka).

Pacific Harlequin Duck.

*Shinori-gamo*. Local name: *Kamo*.

5 specimens (2 ♂♂, 1 ♀ and 2 ♂♂ juv.) examined from: near Asamushi, 11. i. and iv. 1926 (3 specimens are in the Tohoku Imperial University and 2 in the Marine Biological Station at Asamushi).

*Adult male in winter*.—Loral and auricular spots white; sides of neck with an oval white patch; from above each eye to nape a broad rusty red stripe; rest of head and neck blackish blue; back and breast dull blue; quills, rump and rectrices black; scapulars and tertiaries with white markings; speculum on secondaries glossy purple; an interrupted white collar on lower fore neck and another on sides of chest; under parts brown washed with bluish-grey; flanks chestnut-red; under tail-coverts black with a small white spot on both sides. *Adult female*.—Above greyish-brown, paler below; loral and auricular spots white; breast and abdomen mottled with white.

*Juvenile*.—General plumage paler and duller with no distinct chestnut-red patch on flanks. In female the plumage much paler and greyer. Ends of rectrices usually much abraded.

*Soft parts*.—Bill lead-blue, nail yellowish; tarsus and toes brownish; iris very dark brown.

*Measurements*.—Wing, ♂ 181 (juv.)—205 (ad.), ♀ 172 (juv.)—183 (ad.); tail, ♂ 71 (juv.)—103 (ad.), ♀ 75 (juv.)—86 (ad.); tarsus, ♂ 36—39, ♀ 37—37.5; exposed culmen, ♂ 26 (juv.)—30 (ad.), ♀ 26 (juv.)—26.5 (ad.); total length, ♂ 415—470, ♀ 360 mm. Tail composed of 14 rectrices.

*Distribution*.—Northeastern Siberia, Kamtschatka, Kuriles, Alaska, Pribiloff and Aleutian Islands, and North America. In winter south

to Japan and Korea, in America to California.

*Habits*.—It is an expert diver and it can fly swiftly, usually not so high above the surface of the water. It inhabits bays and seas and roosts on rocks near water. Its food consists of small mollusca, aquatic insects and their larvæ.

In Mutsu Bay this duck arrives early in October and stays there till the end of April. It is not very common in the bay during winter.

Genus *OIDEMIA* FLEMMING (1822).

Key to ♂, ♀ and juvenile of genus *Oidemia*.

- 1 { General plumage entirely black; basal half of upper mandible, including knob yellow or orange  
       *Oidemia n. americana*, ♂ ad.  
 General plumage brown with black patches  
       *O. n. americana*, ♂ pass.  
 2 { General plumage brown; bill uniform blackish. . . . . 2  
 Bill blackish, irregularly marked with yellow; light part of head darker; ends of rectrices pointed  
       *O. n. americana*, ♀ ad.  
 Bill greyish black; light part of head much lighter; ends of rectrices abraded. . . . . *O. n. americana*, ♂ juv. & ♀ juv.

24. *Oidemia nigra americana* SWAINSON.

(Pl. X, Figs. 5 & 6.)

*Oidemia Americana* SWAINSON, in SWAINSON & RICHARDSON, Fauna Bor. Amer., II, p. 450 (1832—Hudson Bay).

American Black Scoter.

*Kurogamo*. Local names: *Urushi-gamo* or *Karasu*.

3 specimens (2 ♂♂ and 1 ♀) examined from: near Asamushi, 13. i. and 4. iv. 1926 (1 specimen is in the Tohoku Imperial University and 2 in the Marine Biological Station at Asamushi).

*Adult male in winter*.—Entire plumage deep glossy black, under parts duller. *Adult female*.—Dull dark brown; sides of head greyish with many narrow and linear spots; chin and throat white; middle of abdomen white marked with brown.

*Juvenile*.—Light part of head much lighter than adult female; ends of tail-feathers abraded. *Immature male* is brown with black patches.

*Soft parts.*—Bill brilliant yellow at base, black at tip; nail of upper mandible blackish and hooked downward; legs and feet blackish brown; iris dark brown. In female, bill with some yellowish wash about nostril.

*Measurements.*—Wing, ♂ 210–215, ♀ 210; tail, ♂ 84–96, ♀ 75; tarsus, ♂ 43–46.5, ♀ 41.5; exposed culmen, ♂ 41–42.5, ♀ 41 mm. Tail composed of 16 rectrices.

*Distribution.*—Breeds in Western Alaska and northeastern Asia, migrates to Japan, Korea and interior of North America.

*Habits.*—It is a marine duck, usually found in flocks. It is an expert diver, and flies low but swiftly. Its food consists of small mollusca, marine insects, worms, etc. which it obtains chiefly by diving.

In Mutsu Bay this scoter arrives early in November and remains there till early in April. It is found rather fewer in number in this bay than the next scoter.

Genus MELANITTA BOIE (1822).

Key to ♂, ♀ and juvenile of genus *Melanitta*.

- |   |   |  |   |
|---|---|--|---|
| 1 | } | General plumage black; a small white mark under eye; knob of upper mandible very high                              | <i>Melanitta fusca stejnegeri</i> , ♂ ad. |
|   |   | General plumage brown with black patches   | <i>M. f. stejnegeri</i> , ♂ pass.         |
| 2 | } | General plumage brown; two whitish spots on each side of head; upper mandible with or without slight knob. . . . . | 2   |
|   |   | Plumage darker greyish-brown, tail end pointed   | <i>M. f. stejnegeri</i> , ♀ ad.           |
|   |   | Plumage paler greyish-brown; tail end abraded  | <i>M. f. stejnegeri</i> , ♂ juv. & ♀ juv. |

25. *Melanitta fusca stejnegeri* (RIDGWAY).

(Pl. X, Fig. 7.)

*Oidemia stejnegeri* RIDGWAY, Man. N. Amer. B., p. 112 (1887—Kamtschatka to Japan).

Eastern Velvet Scoter.

*Birodo-kinkuro*. Local name: *Kinkuro*.

4 specimens (2 ♂♂ and 2 ♀♀) examined from: near Asamushi, i. and 8 ii. 1926, middle of iii. and early in iv. 1927 (1 specimen is

in the Tohoku Imperial University, 1 specimen in the Marine Biological Station at Asamushi, and 2 in my collection).

*Adult male in winter.*—Entire plumage deep velvety black, under parts somewhat duller; a small patch below and behind eye, and speculum in secondaries, white. *Adult female.*—Head neck, and upper parts blackish brown; under parts brown with dull white marks; loreal region and behind eye with dull white patches.

*Juvenile.*—Plumage paler greyish-brown; ends of tail-feathers abraded. In *Immature male*, the general plumage brown with several large black patches.

*Soft parts.*—A knob at base of culmen, nasal openings and base of upper mandible black; culmen from nasal to nail whiter, the latter yellowish; sides of upper mandible bright red; legs and feet dark orange red with dusky joints; webs blackish; iris bluish white. In female bill brownish black; legs and feet duller hazel with a pinkish wash; joints and webs blackish; iris brown.

*Measurements.*—Wing, ♂ 256–267, ♀ 238–244; tail, ♂ 76.5–91, ♀ 76.5–81; tarsus, ♂ 45–46, ♀ 44.5–46.5; exposed culmen including knob, ♂ 43.5–47.5, ♀ 41–43; greatest breadth of upper mandible, ♂ 28, ♀ 26.1; height of knob from lower edge of nasal, ♂ 19.5, ♀ 11; size of knob of ♂, 14.5 × 11.5 mm.; total length, ♂ 565–583, ♀ 507 mm. Tail composed of 14 rectrices.

*Distribution.*—Northeastern Siberia, Kamtschatka, Japan, Korea, Mongolia, and China in winter.

*Habits.*—It swims with ease and is an expert diver. It flies low but rather swiftly and on land it is clumsy and heavy. Its food consists of mollusca, marine insects, worms, etc. It is also a marine duck usually found in flocks.

In Mutsu Bay this scoter is one of the common winter visitors and it arrives probably in autumn and stays there till the end of April. I observed it fairly commonly in Noheji Bay near the Natsudomari Peninsula, but I could not with it in Aomori Bay in April.

Genus CLANGULA LEACH (1819).

Key to ♂, ♀ and juvenile of genus *Clangula*.

- |   |   |  |   |
|---|---|--|---|
| 1 | { | Two central rectrices very long and pointed. . . . . | 2 |
|---|---|--|---|

- 1 { Rectrices not elongated. . . . . 3  
 { Head and neck white; forehead and sides of face sooty grey;  
 { an oval brown patch on each side of neck  
 2 { *Clangula hyemalis*, ♂ hiem.  
 { Head and neck dark brown with white on sides on head  
 { *C. hyemalis*, ♂ aest.  
 3 { Ends of rectrices pointed; sides of face mostly white with an  
 { auricular brown patch. . . . . *C. hyemalis*, ♀ hiem.  
 { Ends of rectrices pointed; sides of face mostly dark brown  
 { with a white patch. . . . . *C. hyemalis*, ♀ aest.  
 4 { Ends of rectrices abraded; sides of face whiter or browner. . . . 4  
 { Scapulars greyish-white; an auricular patch black; sides of  
 { face whiter. . . . . *C. hyemalis*, ♂ juv.  
 { Scapulars dark brown with chestnut margins; an auricular  
 { patch dark brown; sides of face browner  
 { *C. hyemalis*, ♀ juv.

26. *Clangula hyemalis* (LINNÆUS).

(Pl. V, Figs. 1-5 and Pl. XI, Figs. 1-3.)

*Anas hyemalis* LINNÆUS, Syst. Nat., ed. X, I, p. 126 (1758—North Sweden).

Long-tailed Duck.

*Kôrigamo*. Local names: *Awona*.

10 specimens (6 ♂♂ and 4 ♀♀) examined from: Aomori Bay and near Asamushi, 7. i. 1921, 9. i. —4. iv. 1926, and 20. iv. 1927 (3 specimens are in the Tohoku Imperial University, 5 in the Marine Biological Station at Asamushi and 2 in my collection).

*Adult male in winter*.—Forehead and sides of face sooty grey, with a white eye ring; a large oval brown patch on sides of neck, becoming chestnut-red below; rest of head, neck, mantle and scapulars pure white; lower back, rump, chest, upper tail-coverts, and two central tail-feathers black; lateral tail white; quills brownish black with chestnut wash on secondaries; lower breast abdomen white. (Pl. V, Fig. 1.) *Adult male in summer*.—Head, neck and upper chest dark brown with a greyish white patch on sides of head; a white patch on each eye; upper parts black, feathers margined with rusty-red; under parts white. (Pl. V, Fig. 2.) *Adult female in winter*.—Crown and nape blackish brown; hind neck greyish; upper parts

blackish; scapulars chestnut with ashy margins and with dark centres; sides of face dull white with a brown patch; chest with a narrow blackish brown band. (Pl. V, Fig. 3.) *Adult female in summer*.—Resembles adult female in winter, but head and hind neck dark brown, sides of face also dark brown; throat pale brown with dull white mottlings; a white eye patch; feathers at base of bill somewhat buffy white; a dark brown band on lower fore-neck; sides of lower neck with a large dull white patch; lower hind neck brownish grey; chest with a broad ashy brown band; upper parts much darker blackish with chestnut margins; wing coverts margined with an ashy colour. (Pl. V, Fig. 4.)

The summer plumage begins to appear in early March.

*Juvenile*.—Similar to adult female in winter but scapulars greyish-white (in ♂) or dark brown with chestnut margins (in ♀); an auricular patch black (in ♂) or dark brown (in ♀). (Pl. V, Fig. 5.)

*Soft parts*.—♂: bill blackish plumbeous with a pinkish red patch; legs and feet plumbeous; iris reedish brown. ♀: bill plumbeous; legs and feet pale plumbeous; iris brown.

*Measurements*.—Wing, ♂ 210-225, ♀ 195 (juv.) —203; tail, ♂ 168-221, ♀ 58.5 (juv.) —76; distance between tip of central tail-feathers to tip of lateral ones, ♂ 78.5-130; tarsus, ♂ 31.5-36, ♀ 32-35.5; exposed culmen, ♂ 26.5-30.5, ♀ 24.5-28.5; total length, ♂ 558-580 mm. Tail composed of 14 rectrices.

*Distribution*.—Breeds in northern parts of Europe, Asia, and America, and winters in southern Europe, in Asia south to Japan and Korea and in North America south to South Carolina.

*Habits*.—It is a very noisy duck, its peculiar cry, "awo-awo," being uttered incessantly. It swims and dives extremely well, and obtains its food chiefly under water, feeding on small mollusca, crutacea, and probably on small fish.

In Mutsu Bay, it arrives in early November or more usually in early December and stays there till the middle or even the end of April. It is not uncommon in Mutsu Bay, where it is more common in Noheji Bay than in Aomori Bay, according to my observations 20-23. iv. 1927.

Genus *GLAUCIONETTA* STEJNEGER (1885).Key to ♂, ♀ and juvenile of genus *Glaucionetta*.

- |   |   |  |
|---|---|--|
| 1 | } | Head and upper neck dark glossy green; a round white patch on cheeks; scapulars and lower hind neck very much white. . . . . <i>G. c. clangula</i> , ♂ ad.                           |
|   |   | Head and upper neck dark green; a round white patch on cheeks mottled with brown; scapulars less white; lower hind neck mottled with brown. . . . <i>G. c. clangula</i> , ♂ pass.    |
| 2 | } | Head and upper neck hair brown. . . . . 2  |
|   |   | General plumage brighter; a dull white colour round neck; chest grey with less white margins to the feathers; end of tail normal. . . . . <i>G. c. clangula</i> , ♀ ad.              |
|   |   | General plumage duller; a whitish collar round neck much more obscure; chest grey with more white margins to the feathers; end of tail abraded. . <i>G. c. clangula</i> , ♂ & ♀ juv. |

27. *Glaucionetta clangula clangula* (LINNÆUS).

(Pl. XI, Figs. 4 &amp; 5.)

*Anas Clangula* LINNÆUS, Syst. Nat. ed. X, I, p. 125 (1758 — Sweden).

Golden-Eye.

*Hôjiro-gamo*. Local name: *Kamo*.

3 specimens (1 ♂ and 2 ♀♀) examined from: Aomori Bay and near Asamushi, xi. 1921, winters of 1926 and 1927 (2 specimens in the Marine Biological Station at Asamushi and 1 in my collection).

*Adult male in winter*.—Head and upper neck dark glossy green; head somewhat crested; lower neck and whole under parts pure white; a round white patch on cheeks; upper parts including rump, lesser wing-coverts, primaries and tail black, the last tinged with a greenish lustre; speculum white; scapulars white with black external margins; lower flanks and crissum with black. *Adult female*.—Upper neck deep brown; upper parts greyish black; a dull white collar around neck; chest grey with some white margins; rest of under parts whiter, flanks greyish brown.

*Juvenile*.—Similar to adult female, but general plumage duller; a whitish collar on neck more obscure; chest grey with more white margins; tail end abraded.

*Soft parts*.—Bill blackish or blue-black; legs and feet orange-yellow

with greyish webs; iris golden yellow. In female, bill bluish black with a bright yellow tip; rest of soft parts as in the male.

*Measurements*.—Wing, ♂ 195–218, ♀ 191–195; tail, ♂ 85–93.5, ♀ 72–79; tarsus, ♂ 37–41, ♀ 32–35; exposed culmen, ♂ 33.5–39, ♀ 31–32.5; total length, ♀ 400 mm. Tail composed of 14–16 rectrices.

*Distribution*.—From Iceland and Scandinavia, in Asia south to Japan, Korea, China, and Formosa.

*Habits*.—In winter it frequents the sea-coasts, and it is a very shy bird. It dives well, obtaining its food under water and feeds on small crustaceans, marine insects, etc. The flight is rather swift with a whistling sound.

In Mutsu Bay it is probably an uncommon duck in winter, and it stays there from November to April.

Genus *MARILA* REICHENBACH (1852).Key to ♂, ♀ and juvenile of genus *Marila*.

- |   |   |   |
|---|---|---|
| 1 | } | Head and neck black with a green gloss; chest black; back distinctly vermiculated with white. . . <i>M. m. mariloides</i> , ♂ ad.                                   |
|   |   | Head and neck black with less green gloss; chest black margined with white; back dark brown vermiculated with less white. . . . . <i>M. m. mariloides</i> , ♂ pass. |
| 2 | } | A distinct white patch at base of front; the rest of head, neck and chest brown; back dark brown slightly vermiculated with whitish . . . . . 2                     |
|   |   | (End of tail normal; plumage paler. . . <i>M. m. mariloides</i> , ♀ ad.   |
|   |   | (End of tail abraded; plumage darker. . <i>M. m. mariloides</i> , ♂ juv.  |

28. *Marila marila mariloides* (VIGORS).

(Pl. X, Figs. 8 &amp; 9.)

*Fuligula Mariloides* VIGORS, Zool. BEECHY'S Voy. Blossom, p. 31 (1839 — Northern Pacific Ocean).

Eastern Scaup-Duck.

*Suzu-gamo*. Local name: *Kamo*.

2 specimens (♂ and ♀) examined from: near Asamushi, 2. iii. 1926 (both specimens are preserved in the Marine Biological Station at Asamushi).

*Adult male in winter*.—Head and neck black with a bottle-green

gloss; upper mantle, breast, rump, upper and under tail-coverts, and tail black, upper parts white finely vermiculated with black; speculum white, tipped with black; under parts white, vent somewhat vermiculated with black. *Adult female*.—A distinct white patch at base of front; rest of head, neck and chest brown; back dark brown very slightly vermiculated with a whitish colour.

*Juvenile*.—Very similar to adult female, but young male has its plumage darker. *Immature male*.—Head and neck black with less green gloss; feathers of chest black margined with white; white lines on back less in number.

*Soft parts*.—Bill, legs and feet plumbeous; webs blackish; iris yellow. In female the soft parts as in the male except that they are darker in colour.

*Measurements*.—Wing, ♂ 205 (juv.) -210, ♀ 201-208.5; tail, ♂ 50 (juv.) -50.5 (juv.), ♀ 54-60; tarsus, ♂ 36.5-38.5, ♀ 36-39; exposed culmen, ♂ 45.5-47.5, ♀ 39-44; greatest breadth of upper mandible, ♂ 23.5 (in skin), ♀ 24.9-26 (both in fresh); total length, ♀ 441-450 mm. Tail composed of 14 rectrices.

*Distribution*.—Eastern Siberia from Bering Island and Kamtschatka, and in winter to Japan, Korea, and China.

*Habits*.—It frequents bays in large flocks, rather than sea coasts. It is an expert diver, obtaining its food by diving. It consists of small shellfish, crustacea, marine plants, etc. It flies fairly swiftly and usually close the surface of the water.

It seems that this duck is not common in Mutsu Bay.

Genus FULIGULA STEPHENS (1824).

Key to ♂, ♀ and juvenile of genus *Fuligula*.

- 1 { Head greenish black with a distinct purple gloss; neck, chest and upper parts black; a pendent occipital crest long  
*F. fuligula*, ♂ ad.
- 1 { Head black with no green or purple gloss; chest black with white margins to the feathers; back black and brown; an occipital crest short. . . . . *F. fuligula*, ♂ pass.
- 2 { Head, upper parts and chest dark brown; crest short. . . . . 2
- 2 { General colour very dark brown nearly black; no white

- 1 { feathers near base of upper mandible. . . . . *F. fuligula*, ♀ ad.
- 2 { General colour very pale brown; many white feathers near base of upper mandible. . . . . *F. fuligula*, juv.

29. *Fuligula fuligula* (LINNÆUS).

(Pl. XI, Fig. 6.)

*Anas fuligula* LINNÆUS, Syst. Nat. ed. X, I, p. 128 (1766—Sweden).

Tufted Duck.

*Kinkuro-hajiro*. Local name: *Hajiro* or *Kuguri*.

1 specimen (♀ juv.) from coast of Harabetsu, near Aomori, 24. xii. 1919. It is preserved in the Aomori Normal School.

*Adult male in winter*.—Head and neck greenish purple with a long pendent occipital crest; upper parts, wings, upper breast and under tail-coverts black; speculum white tipped with black; mantle with a few indistinct vermiculations; under parts white, vent washed with a greyish colour. *Adult female*.—Head, neck, chest and upper parts blackish brown with a very faint purplish gloss; under parts white with abdomen brownish grey; crest very short.

*Juvenile*.—Plumage very pale brown; many white feathers near base of upper mandible forming a whitish patch; crest far shorter than in adult female. *Immature male* has a black head with no green or purple gloss: chest black with white margins to the feathers; back mottled with black and brown patches; crest short.

*Soft parts*.—Bill plumbeous tipped with black; legs and feet olive-plumbeous, webs blackish; iris bright yellow. In young bird, bill blackish plumbeous; legs darker; iris greyish-yellow.

*Measurements*.—Wing, ♂ 180-200, ♀ 170 (juv.) -197; tail, ♂ 49 (juv.) -59, ♀ 43 (juv.) -57; tarsus, ♂ 33-37, ♀ 31.5-36.5; exposed culmen, ♂ 38-42.5, ♀ 36-40; total length, ♂ 400 (juv.) -432, ♀ 372 (juv.) -428 mm. Tail composed of 14 rectrices (very rarely 15).

*Distribution*.—Europe and Asia. In winter to North Africa, Asia east to Japan, China and India, and of accidental occurrence in Philippines, Malay Archipelago and Polynesian and Micronesian waters.

*Habits*.—In habits it most closely resembles *Marila* and usually is found in fresh-water (lakes, ponds, lagoons, etc.) rather than on sea coasts. It feeds on aquatic insects and plants, frogs, etc. On the

sea coasts it feeds on small shellfish in winter. It is an expert diver like the Scaup.

In Mutsu Bay it is undoubtedly a rare visiter in winter, for only one specimen has been obtained. This duck is very abundant from winter to spring (until the end of April) in the Ogawara Lagoon, very near to Mutsu Bay.

Genus NYROCA FLEMING (1822).

Key to ♂, ♀ and juvenile of genus *Nyroca*.

- |   |   |  |
|---|---|--|
| 1 | { | Head and upper neck chestnut rufous; lower neck and chest glossy black; iris red or yellowish-red. . . . . <i>N. f. ferina</i> , ♂ ad. |
|   |   | Head and upper neck paler chestnut; lower neck and chest dark brown; iris yellowish-red. . . . . <i>N. f. ferina</i> , ♂ pass.         |
| 2 | { | Head, neck and chest reddish-brown or brownish-red; throat buffish-white; iris dark brown. . . . . 2                                   |
|   |   | Head and neck reddish-brown. . . . . <i>N. f. ferina</i> , ♀ ad.   |
|   | { | Head and neck brownish-red. . . . . <i>N. f. ferina</i> , ♂ juv.   |

30. *Nyroca ferina ferina* (LINNÆUS).

(Pl. XII, Fig. 1.)

*Anas ferina* LINNÆUS, Syst. Nat. ed. X, I, p. 126 (1758 — Sweden).

Pochard.

*Hoshi-hajiro*. Local name: *Hajiro*.

1 specimen (adult male) examined from Aomori Bay, 27. i. 1926. This specimen is preserved in the Aomori Normal School.

*Adult male in winter*.—Head and neck ruddy chestnut, with or without a small white mental patch; lower neck, upper mantle, chest, rump, upper and under tail-coverts black; the rest of upper parts white, finely vermiculated with black; quills brown tipped with a blackish colour; speculum greyish; tail blackish brown tipped with grey; under parts white faintly vermiculated with a blackish colour.

*Adult female*.—Head and neck dull reddish-brown with dark brown crown; chin and throat buffy white; mantle dark brown finely vermiculated with dark brown; scapulars grey also vermiculated; breast and under tail-coverts brownish grey; abdomen white.

*Juvenile*.—Young male has the head and neck brownish red; rest of plumage much similar to that of adult female. *Immature male* has

the chest dark brown; head and upper neck paler chestnut.

*Soft parts*.—Bill black with a band of light blue across the middle; legs and feet plumbeous; webs blackish; iris varying from bright red to bright yellow, depending on the age of the bird and the time of year. In female, bill like that of male, but not so bright; legs and feet slaty with blackish webs; iris dark brown.

*Measurements*.—Wing, ♂ 198–214, ♀ 198–208; tail, ♂ 51.5–58, ♀ 51.5–62; tarsus, ♂ 35–42, ♀ 37–40; exposed culmen, ♂ 44–51.5, ♀ 45.5–54; total length, ♂ 455–480, ♀ 440–465 mm. Tail composed of 14 rectrices.

*Distribution*.—Europe and North Asia, in winter to South Europe; Asia east to Japan, south to Northern India.

*Habits*.—In habits it resembles its allies and does not essentially differ from *Fuligula* and *Marila*. Its food consists of aquatic insects and vegetable matter which it obtains by diving.

It is a rather rare bird in our country, as also in Mutsu Bay, where only one specimen was secured. But it is fairly common in Teganuma, Prov. Shimōsa in winter.

Subfamily ANATINÆ.

Key to genera of subfamily Anatinae.

Sexes similar; speculum on wing blue, with a more or less green gloss; central tail-feathers of ♂ not curled up

*Polionetta*.

Sexes dissimilar; speculum on wing purple-blue; central tail-feathers of ♂ curled up. . . . . *Anas*.

Genus POLIONETTA OATES (1899).

Key to ♂, ♀ and juvenile of genus *Polionetta*.

Larger and blacker; lower breast and abdomen nearly uniform brown; under tail-coverts blackish brown; apical yellow band of upper mandible broader, 11.5–14 mm.

*P. s. zonorhyncha*, ♂ ad.

Smaller and paler; lower breast and abdomen with whitish edges to many of the feathers; apical yellow band of upper mandible narrower, 9.9–12 mm.

*P. s. zonorhyncha*, ♀ ad.

Much paler even than the adult female; under parts with small dusky spots; yellow band of upper mandible dusky and paler. . . . . *P. s. zonorhyncha*, juv.

31. *Polionetta superciliosa zonorhyncha* (SWINHOE).<sup>1)</sup>

(Pl. XII, Fig. 2.)

*Anas zonorhyncha* SWINHOE, Ibis, 1866, p. 394 (Ningpo).

Dusky Mallard, Ring-billed Duck, Gray Duck or Eastern Spot-billed Duck.

*Karu-gamo*. Local name: *Doro-gamo*.

2 specimens (♂ and ♀) examined from: off Nonai in Aomori Bay, 25. iv. 1927. These two specimens were obtained by Mr. KOKUBO and are preserved in the Marine Biological Station at Asamushi.

*Adult male*.—Top of head, a broad orbital stripe and another ill-defined stripe, running back from angle of jaw, dark brown; a superciliary stripe, sides of head and throat whitish (with a somewhat creamy wash); mantle blackish brown with paler margins; rump, upper tail-coverts and tail-feathers uniform dark blackish brown; lower neck and chest dull whitish buff with dusky centre to the feathers; lower breast and abdomen brown or blackish brown, and under tail-coverts very dark blackish brown, nearly black; speculum blue with a more or less green gloss. *Adult female*.—Very similar to the adult male, only with smaller and paler under parts and the yellow band on bill narrower, 9.9–12 mm. instead of 11.5–14 mm. as in the male.

*Juvenile*.—Similar to the adult female, but paler and the under parts with small dusky spots.

*Soft parts*.—Bill black, with the apical band, except the tip of the nail, yellow or orange yellow; legs and feet orange red; iris brown. In the young bird, the light parts of bill and feet, paler and a dusky orange yellow.

*Measurements*.—Wing, ♂ 248–292, ♀ 248–274; tail, ♂ 85 (juv.)–102, ♀ 82 (juv.)–97; tarsus, ♂ 41–51, ♀ 41.5–48; exposed culmen, ♂ 47.5–59.5, ♀ 45–58; total length, ♂ 542–640, ♀ 523–588 mm. Tail composed of 18 rectrices (rarely 20).

<sup>1)</sup> Dr. HARTERT unites *zonorhyncha* to *poecilorhyncha* as one of the subspecies, but M. DELACOUR considers it to be a subspecies of *superciliosa* rather than of *poecilorhyncha*.

Distribution.—It is essentially an Asiatic form. It is distributed from the Kuriles, Sakhalin, Japan proper, Korea, Riu Kiu Islands, Mongolia, Manchuria, China, and Formosa to the Philippines.

*Habits*.—It is a rather shy bird, flies swiftly and walks well. It feeds by night on rice, seeds, roots, worms, mollusca, insects, etc. It sleeps in daytime on salt water or on sea rocks, or more frequently floats on ponds as well as on sandy deltas of rivers and in fields. It breeds in several localities in Japan, from May to June, nesting on the ground in grass, and depositing 6–13 eggs, which are ivory-white, and measure about 55 × 42 mm.

In Mutsu Bay it is rather common near Nonai in Aomori Bay, where flocks were observed. It probably breeds on the coasts of this bay as already stated by Mr. WADA.

Genus ANAS LINNÆUS (1758).

Key to ♂, ♀ and juvenile of genus *Anas*.

- |   |  |                                     |
|---|--|-------------------------------------|
| 1 | Bill uniform yellowish-green; head and upper neck glossy green. . . . .  | <i>A. p. platyrhyncha</i> , ♂ ad.   |
|   | Bill greenish with two dusky spots between nasals; head and neck dusky green; under parts spotted  | <i>A. p. platyrhyncha</i> , ♂ pass. |
| 2 | Bill orange or pale greenish with or without a large brown-black patch on culmen; head brown or blackish with small blackish spots. . . . .          | 2                                   |
|   | Bill orange or very rarely pale greenish olive with a large brown-black patch on culmen; head browner; under parts spotted; generally paler. . . . . | <i>A. p. platyrhyncha</i> , ♀ ad.   |
|   | Bill greenish with two dusky spots between nasals; crown of head blacker; under parts streaked; generally darker                                     | <i>A. p. platyrhyncha</i> , ♂ juv.  |

32. *Anas platyrhyncha platyrhyncha* LINNÆUS.

(Pl. XII, Figs. 3 & 4.)

*Anas platyrhyncha* LINNÆUS, Syst. Nat. ed. X, I, p. 125 (1758 — Sweden). Mallard.

Magamo. Local name: *Aokubi*.

2 specimens (♂ and ♀) examined from: near Asamushi, 1. iv.



1927 (these specimens are preserved in the Marine Biological Station at Asamushi).

*Adult male in winter.*—Head and neck bright green with a purplish gloss when seen under certain lights, fore part of crown darker and somewhat brownish; a white neck ring interrupted behind; mantle and scapulars grey, vermiculated with brown; middle of back dark brown with paler margins; rump, upper and under tail-coverts and two pairs of recurved rectrices velvety black; rest of tail-feathers whitish with some brown mottlings; quills brown-grey; speculum purple-blue margined above and below with white; chest deep chestnut maroon; rest of under parts greyish white very indistinctly barred with a brownish colour. *Adult female.*—Above brown, marked with buff; sides of head paler with fine elongate spots; chin and throat brownish buff with no mottlings; tail-feathers whitish with brown mottlings; under parts buff with brown marks; chest darker and browner.

*Juvenile.*—Very similar to adult female in winter, but the general plumage darker; crown of head blacker; and under parts streaked.

*Soft parts.*—Bill olive yellow with some pinkish wash; legs and feet reddish orange; iris brown. In female, bill orange with a large dark brown patch on upper mandible. In young male, bill pale olive green with two dusky spots between nasals; legs dark orange.

*Measurements.*—Wing, ♂ 253–285, ♀ 240–275; tail, ♂ 81–99, ♀ 78–96; tarsus, ♂ 43–49, ♀ 40–47; exposed culmen, ♂ 51–62, ♀ 43.5–57; greatest breadth of upper mandible, ♂ 22.5–24.5, ♀ 21–23.5; total length, ♂ 544–650, ♀ 520–600 mm. Tail composed of 18–20 rectrices.

*Distribution.*—It is a cosmopolitan duck, breeds in Europe, Asia and America, and migrates in winter to North Africa, Central India, China, Korea and Japan; in America to Mexico. In Japan a few of these ducks breed in high mountain ponds in Hondo.

*Habits.*—It is a shy bird, as is *Polionetta*. In habits it resembles the latter duck. It feeds by night and, it is occasionally met with on the sea coasts.

In Mutsu Bay it is probably fewer in number than *Polionetta* in winter, but it seems that some examples of *platyrhyncha* remain for breeding near this bay.

Subfamily ANSERINÆ.

Key to genera, species and subspecies of subfamily Anserinæ.

- |   |   |   |   |
|---|---|---|---|
| 1 | { | Size much smaller; bill smaller and black. . . . .  | 2 |
|   | { | Size much larger; bill larger and black with an orange patch. . . . .   | 3 |
|   | { | With a conspicuous white collar interrupted on nape; greater wing-coverts and secondaries not broadly tipped with white; with white edgings to the flank feathers | 2 |
|   |   | <i>Branta b. nigricans</i> , ad.  |   |
|   | { | With an indistinct white collar on nape; greater wing-coverts and secondaries broadly tipped with white; flanks uniform brownish grey. . . . .                    | 3 |
|   |   | <i>Branta b. nigricans</i> , juv.   |   |
|   | { | Length of whole culmen including nail on maxilla more than four times that of nail in adults, and four times in younger ones; culmen 74–92; wing 450–550 mm.      | 3 |
|   |   | <i>Melanonyx fabalis sibiricus</i> . <sup>1)</sup>  |   |
|   | { | Length of whole culmen including nail on maxilla less than four times that of nail; culmen 61–74.5; wing 425–495 mm. . . . .                                      | 3 |
|   |   | <i>Melanonyx f. serrirostris</i> . <sup>2)</sup>  |   |

Genus BRANTA SCOPOLI (1769).

33. *Branta bernicla nigricans* (LAWRENCE).

(Pl. XII, Fig. 5.)

*Anser nigricans* LAWRENCE, Ann. Lyc. Nat. Hist. New York, IV, p. 171, pl. XII (1846 — New Jersey).

Black Brent or Black Brant.

*Koku-gan*. Local name: *Gan*.

1 specimen (juv.) from near Kominato, Mutsu Bay, 17. ii. 1913. The only specimen from this bay is preserved in my collection.

*Adult male and female.*—Head, neck, mantle and rump almost uniform brown-black with paler margins to the feathers; a conspicuous white collar complete or sometimes interrupted behind; under parts from chest to lower breast almost black, sharply contrasted with pure white of hind part of belly and vent; upper and under tail-coverts long and pure white; tail brown-black.

<sup>1)</sup> and <sup>2)</sup> Messrs. KOKUBO and WADA observed and reported *Melanonyx* from the coasts of Aomori Bay, but I have not examined examples of these from this bay.

*Juvenile*.—White collar obscurely marked or wanting in birds in first plumage; secondaries and greater wing-coverts with white tips; feathers on flanks greyish-brown without white tips.

*Soft parts*.—Bill, legs and feet black; iris dark brown.

*Measurements*.—Wing, 323–349; tail, 90 (juv.) –120.5; tarsus, 56.5–60; exposed culmen, 33.5–36; total length, ♂ 609 mm. Tail composed of 16 rectrices.

*Distribution*.—Breeds in Western North America and winters in Lower California; east coast of Asia from Kamtschatka, south in winter to Manchuria and Japan.

*Habits*.—This brent is usually found on the sea coasts and is seldom found far from the coasts. Its food consists of vegetable matter and probably also small shellfish and marine insects.

In Mutsu Bay it is one of the rarest species and only one example was obtained by Mr. WADA.

#### Subfamily CYGNINÆ.

Key to species and subspecies of subfamily Cygninæ.

- 1 { Bill black with yellow base.....2
- 1 { Bill black with white base or nearly entirely flesh colour...5
- 2 { Size larger; yellow portion of upper mandible reaching to nostril.....3
- 2 { Size smaller; yellow portion of upper mandible not reaching to nostril by at least 1 cm.....4
- 3 { Plumage entirely white; base of bill yellow.....*C. cygnus*, ad.
- 3 { Plumage ashy-brown with some white margins  
*C. cygnus*, juv. in 2nd year.
- 4 { Plumage entirely white; base of bill deep yellow  
*C. b. jankowskii*, ad.<sup>1)</sup>
- 4 { Plumage white with head and breast distinctly washed with rusty; base of bill lemon-yellow  
*C. b. jankowskii*, juv. in 2nd winter.<sup>2)</sup>
- 5 { Plumage ashy-brown; bill dull flesh-colour with black tip and margins; with a reddish-orange band across nostrils;

<sup>1)</sup>and <sup>2)</sup> *Cygnus bewickii jankowskii* ALPHERAKY is reported by Mr. WADA from Aomori Bay as a rare migrant. But I have not ascertained its actual occurrence.

- 5 { base and lores greenish white.....*C. cygnus*, juv.
- 5 { Plumage greyish brown; base of bill white; culmen mottled with pinkish-brown.....*C. b. jankowskii*, juv.<sup>1)</sup>

Genus CYGNUS BECHSTEIN (1803).

#### 34. *Cygnus cygnus* (LINNÆUS).

(Pl. XII, Fig. 6.)

*Anas Cygnus* LINNÆUS, Syst. Nat. ed. X, I, p. 122 (1758 — Sweden).

Whooper Swan.

*Ô-hakuchô*. Local name: *Hakujiyô*.

3 specimens (1 ad. and 2 juvs.) examined from: Aomori Bay and Asadokoro, Kominato in coast of Mutsu Bay, early in February, 1924 and middle of March, 1925 (2 specimens were sent me by Mr. WADA and 1 specimen is preserved in the Hotel To-o-kwan at Asamushi).

*Adult male and female*.—Plumage entirely snowy white. Sexes similar. ♂ > ♀.

*Juvenile*.—Plumage ashy-brown with some white margins to the feathers (young in second year). Young in first plumage is uniform ashy-brown.

*Soft parts*.—Colour of bill in adult and young is mentioned in the above key. Legs, feet and webs black; iris dark brown.

*Measurements*.—Wing, 615, juv. 562, 563; tail, 192, juv. 145, 149; tarsus, 121.5, juv. 110, 117.5; exposed culmen, 106, juv. 89; bill from gape 100.5, juv. 97, 99; middle toe and claw, 143.5–150 mm. Tail composed of 20–22 rectrices.

*Distribution*.—Northern portions of Europe and Asia, in winter south to Mediterranean Seas, China, Korea, Japan and rarely in India.

*Habits*.—It frequents lakes, bays, and rivers and the coasts chiefly in winter. It swims with ease and grace, but is clumsy on land. Its clear trumpet-like note may be heard when flocks are passing. Its food consists of soft portions of aquatic plants, aquatic insects, to a small extent of fish. I does not unusually feed on land like geese.

In the Mutsu Bay this swan flocks at coasts of Asadokoro near Kominato (Pl. XIII, Figs. 2 & 3) and Ôminato. In the former locality, swans have been carefully protected as one of the natural monuments

<sup>1)</sup>cf., Foot note of p. 348.

in our country. They arrive at Kominato in early November and stay there till the end of March or rarely early April.

Order LIMICOLÆ.

Family **Charadriidæ**.

Subfamily PHALAROPINÆ.

Only the following one genus and one species occur in the Mutsu Bay (excluding its coasts).

Genus **LOBIPES** CUVIER (1817).

Key to ♂, ♀ and juvenile of genus *Lobipes*.

- |   |   |   |
|---|---|---|
| 1 | { | With a rufous patch on each side of neck.....2  |
|   | { | Without a rufous patch on neck.....3  |
|   | { | Size slightly larger; neck patch brighter (fox red)   |
| 2 | { | <i>L. lobatus</i> , ♀ aest.   |
|   | { | Size slightly smaller; neck patch paler (rufous)  |
|   | { | <i>L. lobatus</i> , ♂ aest.   |
| 3 | { | Upper parts pale grey or ashy with white margins to the feathers..... <i>L. lobatus</i> , ♂ & ♀ hiem. |
|   | { | Upper parts blackish, streaked with a dark ochreous colour  |
|   |   | <i>L. lobatus</i> , juv.  |

35. **Lobipes lobatus** (LINNÆUS).

(Pl. XII, Fig. 7.)

*Tring lobata* LINNÆUS, Syst. Nat., ed. X, I, p. 148 (1758 — Hudson Bay).

Red-necked Phalarope.

*Akaeri-hireashi-shigi*.

1 specimen (♂ aest.) examined from: off Asamushi (between Asamushi and Bentenjima) in Mutsu Bay, 29. v. 1927. This fine specimen was shot by Mr. KOKUBO from a small group (5-6 in number) and sent me by him.

*Adult female in summer* (breeding plumage).— Upper parts including crown and nape dark slaty, mantle and scapulars margined with an ochreous colour; wings and tail slaty blackish brown; upper wing-coverts tipped with white; sides of face, a pectoral band and flanks slaty grey, the first slightly marked with an ochreous colour; a rufous patch on each side of neck; under parts white. *Adult male in summer*.

— Similar to the breeding female, but not so brightly coloured, the rufous neck patch being paler and less developed. *Winter*.— Upper parts pearl grey or ashy with white edges to the feathers; hind crown white with a few ashy tips; nape blackish; lores, eyebrow, rest of head and under parts white; eye ring and ear-coverts black.

*Juvenile*.— Resembles winter adult, but general colour of upper parts blackish, streaked with a dark ochreous colour.

*Soft parts*.— Bill black; legs and feet greyish-blue, outer aspect of tarsus, outer toe and joints dark greyish; iris dark brown.

*Measurements*.— Wing, ♂, 100-103.5, ♀ 103-108; tail, ♂ 44-47, ♀ 46.5-49; tarsus, ♂ & ♀ 19-20.5; exposed culmen, ♂ 19.5-21, ♀ 22-23.5 mm. Tail composed of 12 rectrices.

*Distribution*.— North Europe and Asia, in winter to South Europe and North Africa; in Asia to China, Japan, India and Malay Archipelago; in America from Arctic regions, south in winter to Guatemala.

*Habits*.— It swims with ease and even dives. Its food consists of small worms, small crustacea, and marine plankton. This phalarope visits several bays of Japan in spring in flocks of some hundreds. But in Mutsu Bay this is probably not common in May. It frequents mouths of rivers and coasts of seas in autumn. It is an extremely tame bird in the wild state.

The following list of birds from Aomori Bay has been already recorded by Mr. WADA, or I have recently been informed of their occurrence by him *in litt*. But unfortunately, I have not yet examined any of the actual specimens from Aomori and Noheji Bays, both in Mutsu Bay, so that I have excluded them from the former annotated list in the present paper. They are:

Order PYGOPODES.

Family **Colymbidæ**.

- |    |  |            |
|----|--|------------|
| 1. | <i>Colymbus arcticus pacificus</i> LAWRENCE. | See antea. |
| 2. | <i>Colymbus adamsii</i> GRAY.                | See antea. |

Family **Podicipidæ**.

- |    |  |            |
|----|--|------------|
| 3. | ? <i>Podiceps cristatus cristatus</i> (LINNÆUS). | See antea. |
| 4. | <i>Dytes auritus</i> (LINNÆUS).                  | See antea. |

## Order ALCAE.

Family **Alcidae**.

5. *Uria lomvia arra* (PALLAS). See antea.  
 6. *Synthliboramphus wumizusume* (TEMMINCK). See antea.

## Order TUBINARES.

Family **Procellariidae**.

7. *Oceanodroma furcata* (GMELIN). See antea.

## Order STEGANOPODES.

Family **Phalacrocoracidae**.

8. *Phalacrocorax carbo hanedae* KURODA. See antea.

## Order ANSERES.

Family **Anatidae**.

## Subfamily Merginæ.

9. *Mergus merganser merganser* LINNÆUS. See antea.  
 10. *Mergellus albellus* (LINNÆUS). See antea.

## Subfamily Anatinæ.

11. *Spatula clypeata* (LINNÆUS).  
 12. *Dafila acuta acuta* (LINNÆUS).  
 13. *Querquedula querquedula* (LINNÆUS).  
 14. *Nettion formosum* (GEORGI).  
 15. *Eunetta falcata* (GEORGI).<sup>1)</sup>

## Subfamily Anserinæ.

16. *Melanonyx fabalis sibiricus* ALPHÉRAKY. See antea.  
 17. *Melanonyx fabalis serrirostris* (SWINHOE). See antea.

## Subfamily Cygninæ.

18. *Cygnus bewickii jankowskii* ALPHÉRAKY. See antea.

The following examples of Limicolæ (shore-birds) may be added

<sup>1)</sup> I have observed a pair of this species in Noheji Bay, 23. iv. 1927, but none of the actual specimens have come to my hand.

to the above list; but in my opinion, these are essentially littoral, and not sea or bay birds, except *Lobipes* which is included in the annotated list, I have only pointed out their names here in a list. "R.," "S. R.," "W. V.," and "M." indicate those species and subspecies as residents, summer residents; winter visitors, and migrants (spring and autumn) respectively.

## Order LIMICOLÆ.

Family **Charadriidae**.

## Subfamily CHARADRIINÆ.

1. *Chararius placidus* GRAY. S. R.  
 2. *Charadrius dubius curonicus* GMELIN. S. R.  
 3. *Leucopoliis alexandrinus dealbatus* (SWINHOE). S. R.  
 4. *Cirripidesmus mongolus mongolus* (PALLAS). M.  
 5. *Pluvialis dominicus fulvus* (GMELIN). M.  
 6. *Squatarola squatarola hypomelena* (PALLAS). M.

## Subfamily Arenarinæ.

7. *Arenaria interpres interpres* (LINNÆUS). M.

## Subfamily Tringinæ.

8. *Pelidna alpina sakhalina* (VIEILLOT). M.  
 9. *Pisobia minuta ruficollis* (PALLAS). M.  
 10. *Pisobia temminckii* (LEISLER). M.  
 11. *Pisobia minutilla subminuta* (MIDDENDORFF). M.  
 12. *Eurymorhynchus pygmaeus* (LINNÆUS). M.

## Subfamily Totaninæ.

13. *Glottis nebularius* (GUNNERUS). M.  
 14. *Tringa ochropus* LINNÆUS. M.  
 15. *Heteroscelus incanus brevipes* (VIEILLOT). M., S. R.  
 16. *Actitis hypoleucos* (LINNÆUS). S. R. Breeds near Aomori.  
 17. *Vetola lapponica baueri* (NAUMANN). M.  
 18. *Phaeopus phaeopus variegatus* (SCOPHLI). M.  
 19. *Numenius arquata lineatus* CUVIER. M.  
 20. *Numenius cyanopus* VIEILLOT. M.

## Subfamily HÆMATOPODINÆ.

21. *Hæmatopus ostralegus osculans* SWINHOE. W. V.

The following land birds were also collected or recorded from Yunoshima (Pl. XIII, Fig. 1) and the coasts of Aomori Bay. They are as follows:

## Order ACCIPITRES.

## Family Aquilidæ.

1. *Haliaëtus albicilla albicilla* (LINNÆUS). W. V.  
2. *Milvus migrans lineatus* GRAY. R.

## Family Falconidæ.

3. *Falco peregrinus calidus* LATHAM. R.?

## Family Pandionidæ.

4. *Pandion haliaëtus haliaëtus* (LINNÆUS). R.

## Order HALCYONES.

## Family Alcedinidæ.

5. *Alcedo atthis japonica* BONAPARTE. S. R.

## Order CYPSELL.

## Family Micropodidæ.

6. *Micropus pacificus pacificus* (LATHAM). S. R. Observed off Asamushi.

## Order PASSERES.

## Family Motacillidæ.

7. *Motacilla alba lugens* KITTLITZ. S. R. Breeds on Yunoshima.  
8. *Motacilla alba grandis* SHARPE. R.?

## Family Turdidæ.

9. *Turdus chrysolaus* TEMMINCK. S. R. Observed on Yunoshima.  
10. *Monticola solitaria magna* (LA TOUCHE). R.

## Family Sylviidæ.

11. *Horornis cantans cantans* (TEMMINCK & SCHLEGEL). S. R. Observed on Yunoshima.  
12. *Hirundo rustica gutturalis* SCOPOLI. S. R. Found on coast of Asamushi.  
13. *Delichon urbica dasypus* (BONAPARTE). S. R. Breeds on roofs of the Hotel Tô-ô-kwan at Asamushi.

## Family Corvidæ.

14. *Corvus coronoides japonensis* BONAPARTE. R. Found in coast of Asamushi.  
15. *Corvus corone interpositus* LAUBMANN. R. Observed on Yunoshima.

## Family Zosteropidæ.

16. *Zosterops palpebrosa japonicus* TEMMINCK & SCHLEGEL. S. R. Observed on Yunoshima.

## Family Fringillidæ.

17. *Chloris sinica minor* (TEMMINCK & SCHLEGEL). R. Observed on Yunoshima.  
18. *Passer montanus saturatus* STEJNEGER. R. Found on coast of Asamushi.  
19. *Emberiza cioides ciopsis* BONAPARTE. S. R. Observed on Yunoshima.

## SUMMARY AND CONCLUSION.

The location of Aomori Prefecture (Prov. Mutsu), is a very interesting place for the study of the distribution of mammals as well as birds.

It is separated from Hokkaido by the Tsugaru Strait (the so called Blackiston's line) forming the boundary of the distribution of birds between the two bodies of land, as a result of which there are very many interesting phenomena in their distribution, which cannot be found in other provinces. The important meaning of this line holds true for migratory water birds as well as for land birds. It seems to

me, therefore, very necessary for the study of zoogeography to investigate the migration of the birds and at the same time to know their winter haunts in southern Japan.

The value of examination depends upon collecting the birds and studying exactly their distribution and migration in all bays and coasts in every part of Japan, as well as in Mutsu Bay. Hitherto I have tried to make collections in Tokyo Bay, Sagami Sea, Suruga Sea, Mikawa Bay, Ise Sea and Hakata Bay, and recently have been informed that the same kind of investigation has gone on at the Ariake Sea in Kiusiu. I earnestly wish that these investigations would be carried on in every part of Japan in the near future.

After all, the birds in Mutsu Bay are mostly migratory species and not so numerous as the breeding ones, among which only three species and subspecies, *Cerorhinca monocerata* (with some doubt), *Phalacrocorax capillatus* (almost without doubt) and *Urile pelagicus pelagicus* (without any doubt), are known to exist there.

I have an especially deep interest in the following phenomena occurring there:

1. The migration of *Clangula hyemalis* there in winter. (This duck does not come to the southern parts of Japan; and it has been reported only twice from the vicinity of Miyako in Miyagi Prefecture, once from Chiba Prefecture, and the Sagami Sea.)

2. The abundance of the species and subspecies of the sea or bay ducks, the gulls, auks, and guillemots.

3. The graceful sight of crowding swans (*Cygnus cygnus*) in Kominato and Ōminato remaining there in the winter time.

4. The existence there in plentiful numbers of the grebs and cormorants, in addition to the above-mentioned divers.

As my observation and examination of the water-fowls and sea-birds in Mutsu Bay are not yet completed, some additional forms will be reported at a suitable time in the progress of my investigation.

#### LITERATURE CONCERNING THE BIRDS OF MUTSU BAY.

1916 — KURODA, N. — "Tōhoku chihō ni okeru Kaki no Chōrui" (Birds of northeastern parts of Hondo in summer). "Tori," Vol. I, no. 3, pp. 1-9 (31 Dec., 1916). (In Japanese.)

This short paper contains 14 species and subspecies of birds observed and collected by the author near Asamushi in summer.

1922 — WADA, K. — "Aomori-ken San Chōrui Mokuroku" (A List of the Birds of Prefecture Aomori). "Tori," Vol. III, nos. 12-13, pp. 120-133 (30 March, 1922). (In Japanese.)

This list contains 260 forms of birds found in the prefecture.

1925 — KURODA, N. — "Nippon no Ten-nen Kinen Butsu to shite no Chōrui" (Birds as Natural Monuments of Japan). "Tori," Vol. IV, no. 19, pp. 277-279 (23 April, 1925). (In Japanese.)

This paper contains the breeding place of *Larus crassirostris* at Kaburashima and the winter haunt of a large group of *Cygnus cygnus* are noted as natural monuments in the Aomori Prefecture.

1926 — KURODA, N. — Birds as Natural Treasures of Japan. The Japan Magazine, Vol. XVI, No. VI-VII, pp. 156-168, 13 text-figs., "March-April, 1926" (25 May, 1926). (In English.)

1926 — WADA, K. — "Mutsu no Wataridori" (Migratory Birds of Mutsu, Hondo), pt. I—II. "Aomori-ken Sōsho," Vol. IV, 78 pp. (1 June, 1926); Vol. V, 86 pp. (15 August, 1926). (In Japanese.)

This two little books contain the general and very detailed accounts on the birds of Province Mutsu where the author has observed and collected the birds during several years.

1926 — WATASÉ, S. — Preservation of Zoological Natural Monuments. In "Preservation Natural Monuments in Japan," pp. 37-40 (1926). Issued by the Department of Home Affairs, Tokyo.

The report has notes on swans at Kominato and the black-tailed gulls at Kaburashima, both in Aomori Prefecture.

1927 — UCHIDA, S. — The Present Condition of the Protection of Birds and Mammals in Japan. Issued by Department of Animal Industry, Ministry of Agriculture and Forestry, Tokyo. Pp. 15, 16, 18 and 19, pls. VII and VIII.

The report has also notes on swans and black-tailed gulls in Aomori Prefecture.

#### EXPLANATION OF PLATES.

##### PLATE V.

Fig. 1. *Clangula hyemalis* (LINNÆUS). ♂ ad., hiem.

Fig. 2. *Clangula hyemalis* (LINNÆUS). ♂ ad., æst.

Fig. 3. *Clangula hyemalis* (LINNÆUS). ♀ ad., hiem.

Fig. 4. *Clangula hyemalis* (LINNÆUS). ♀ ad., æst.

Fig. 5. *Clangula hyemalis* (LINNÆUS). ♂ juv.

##### PLATE VI.

Fig. 1. *Colymbus stellatus* Pontoppidan. ♂ juv.

Fig. 2. *Colymbus arcticus viridigularis* (DWIGHT). Ad., æst.

Fig. 3. *Colymbus arcticus viridigularis* (DWIGHT). Ad., hiem.-æst.

Fig. 4. *Podiceps griseigena holboellii* (REINHARDT). Ad., æst.

Fig. 5. *Proctopus nigricollis nigricollis* (BREHM). Ad., hiem.

Fig. 6. *Cephus carbo* Pallas. Ad., hiem.-æst.

## PLATE VII.

- Fig. 1. *Uria aalge californica* (BRYANT). Ad., aest.  
 Fig. 2. *Uria aalge californica* (BRYANT). Ad., hiem.  
 Fig. 3. *Brachyramphus marmoratus ferrix* (PALLAS). Ad., hiem.  
 Fig. 4. *Synthliboramphus antiquus* (GMELIN). Ad., hiem.  
 Fig. 5. *Ciceronia pusilla* (PALLAS). Ad., hiem.  
 Fig. 6. *Cerorhinca monocerata* (PALLAS). Ad., aest.  
 Fig. 7. *Cerorhinca monocerata* (PALLAS). Juv., hiem.  
 Fig. 8. *Stercorarius parasiticus parasiticus* (LINNÆUS). Ad. (pale phase).

## PLATE VIII.

- Fig. 1. *Larus crassirostris* VIEILLOT. Ad., aest.  
 Fig. 2. *Larus crassirostris* VIEILLOT. Juv. in 2nd year.  
 Fig. 3. *Larus canus major* MIDDENDORFF. ♀ ad., 3rd winter.  
 Fig. 4. *Larus argentatus vegæ* Palmén. Juv. in 1st year.  
 Fig. 5. *Larus schistisagus* STEJNEGER. ♂ ad., 4th winter.  
 Fig. 6. *Larus hyperboreus* GUNNERUS. Ad., 3rd year.

## PLATE IX.

- Fig. 1. *Hydrocoloeus ridibundus sibiricus* (BUTURLIN). ♀ ad., aest.  
 Fig. 2. *Hydrocoloeus ridibundus sibiricus* (BUTURLIN). ♂ juv.  
 Fig. 3. *Puffinus leucomelas* (TEMMINCK). Ad.  
 Fig. 4. *Puffinus tenuirostris tenuirostris* (TEMMINCK). Ad.  
 Fig. 5. *Phalacrocorax capillatus* (TEMMINCK & SCHLEGEL). Juv. in 1st year.  
 Fig. 6. *Urile pelagicus pelagicus* (PALLAS). ♀ ad. in breeding plumage.  
 Fig. 7. *Urile pelagicus pelagicus* (PALLAS). ♂ ad. in non-breeding plumage.

## PLATE X.

- Fig. 1. *Mergus serrator serrator* LINNÆUS. ♂ ad., hiem.  
 Fig. 2. *Mergus serrator serrator* LINNÆUS. ♀ ad., hiem.  
 Fig. 3. *Histrionicus histrionicus pacificus* BROOKS. ♂ ad., hiem.  
 Fig. 4. *Histrionicus histrionicus pacificus* BROOKS. ♀ ad., hiem.  
 Fig. 5. *Oidemia nigra americana* SWAINSON. ♂ ad., hiem.  
 Fig. 6. *Oidemia nigra americana* SWAINSON. ♀ ad., hiem.  
 Fig. 7. *Melanitta fusca stejnegeri* (RIDGWAY). ♂ ad., hiem.  
 Fig. 8. *Marila marila mariloides* (VIGORS). ♂ vix ad.  
 Fig. 9. *Marila marila mariloides* (VIGORS). ♀ ad., hiem.

## PLATE XI.

- Fig. 1. *Clangula hyemalis* (LINNÆUS). ♂ ad., hiem.

- Fig. 2. *Clangula hyemalis* (LINNÆUS). ♂ ad., aest.  
 Fig. 3. *Clangula hyemalis* (LINNÆUS). ♂ juv.  
 Fig. 4. *Glaucionetta clangula clangula* (LINNÆUS). ♂ ad., hiem.  
 Fig. 5. *Glaucionetta clangula clangula* (LINNÆUS). ♀ vix ad.  
 Fig. 6. *Fuligula fuligula* (LINNÆUS). ♂ ad., hiem.

## PLATE XII.

- Fig. 1. *Nyroca ferina ferina* (LINNÆUS). ♂ ad., hiem.  
 Fig. 2. *Polionetta superciliosa sonorhyncha* (SWINHOE). ♂ ad.  
 Fig. 3. *Anas platyrhyncha platyrhyncha* LINNÆUS. ♂ ad., hiem.  
 Fig. 4. *Anas platyrhyncha platyrhyncha* LINNÆUS. ♀ ad.  
 Fig. 5. *Branta bernicla nigricans* (LAWRENCE). Juv.  
 Fig. 6. *Cygnus cygnus* (LINNÆUS). Ads.  
 Fig. 7. *Lobipes lobatus* (LINNÆUS). Ad., aest.

## PLATE XIII.

- Fig. 1. A view of Yunoshima (an islet) from Asamushi near Aomori.  
 Fig. 2. The posts built, one for the protection of Swans at Asadokoro, Kominato, as a Natural Monument, by the Department of Home Affairs (right) and other as the sanctuary for birds by the Department of Agriculture and Commerce (left).  
 Fig. 3. A large flock of Swans at Asadokoro, Kominato, in the coast of Noheji Bay. Mr. K. TAGO photo.  
 Fig. 4. A view of Bentenjima and Tateishi near the mouth of Mutsu Bay.  
 Fig. 5. Tateishi as the breeding place of Cormorants.  
 Fig. 6. The head of Bentenjima as the breeding place of Cormorants (*Urile pelagicus pelagicus*).

Fig. 3.

Fig. 5.

Fig. 4.

Fig. 2.



N. KURODA: Birds of Mutsu Bay.  
*Clangula hyemalis* (LINNÆUS), adult and young.





Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.



Fig. 5.



Fig. 6.





Fig. 1.



Fig. 2.



Fig. 5.

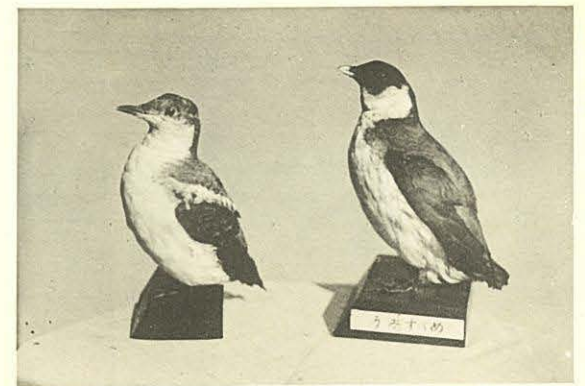


Fig. 3.

Fig. 4.

Fig. 6.

Fig. 7.

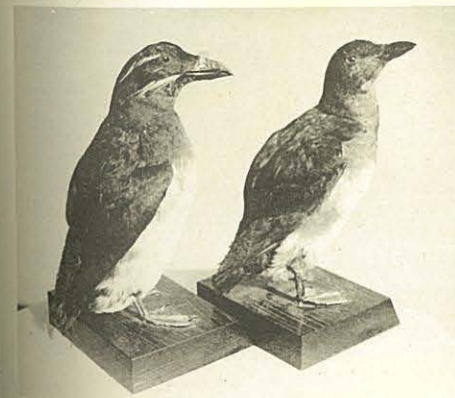


Fig. 8.

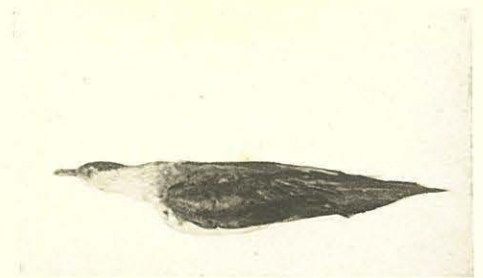




Fig. 2.



Fig. 1.



Fig. 3.



Fig. 4.



Fig. 6.



Fig. 5.



Fig. 3.

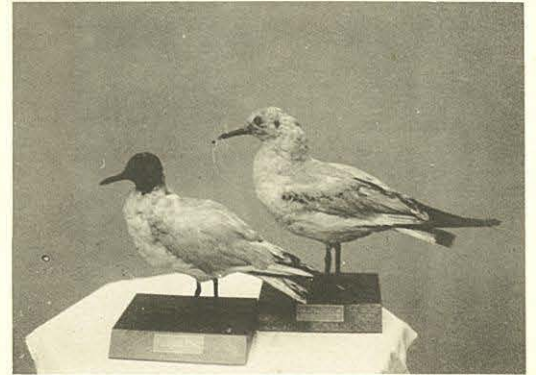


Fig. 1. Fig. 2.

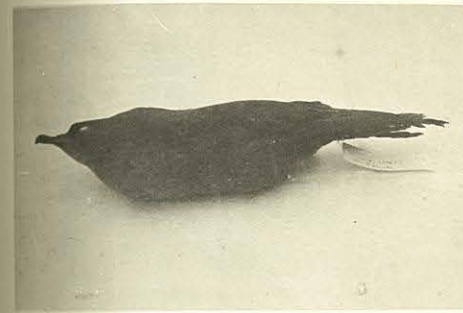


Fig. 4.



Fig. 5.



Fig. 6.



Fig. 7.

Fig. 6.

Fig. 5.

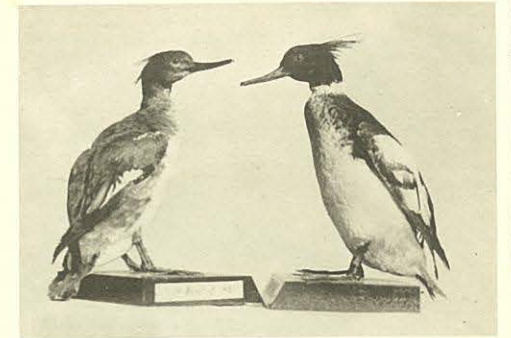
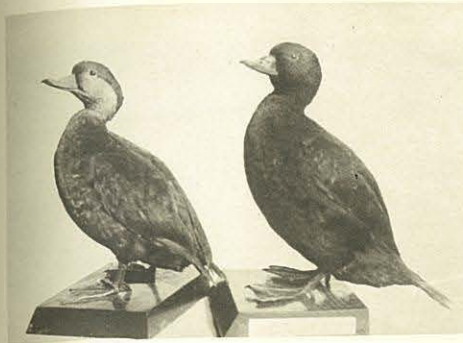


Fig. 2.

Fig. 1.

Fig. 7.



Fig. 3.

Fig. 9.

Fig. 8.

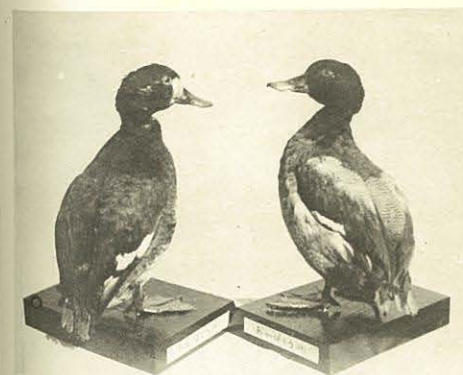


Fig. 4.

Fig. 2.



Fig. 1.

Fig. 4.

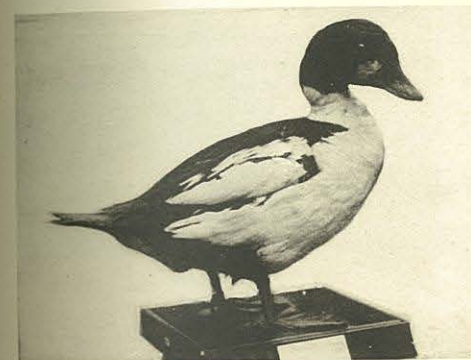


Fig. 3.

Fig. 5.



Fig. 6.



Fig. 1.

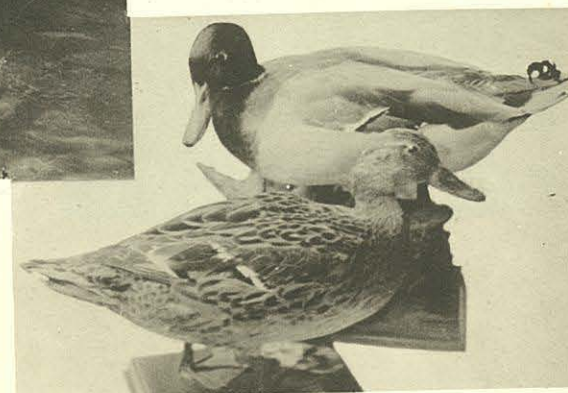


Fig. 4.

Fig. 3.

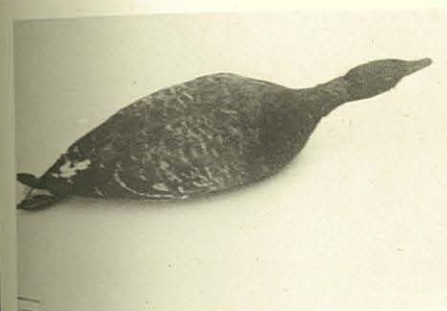


Fig. 5.

Fig. 2.



Fig. 7.

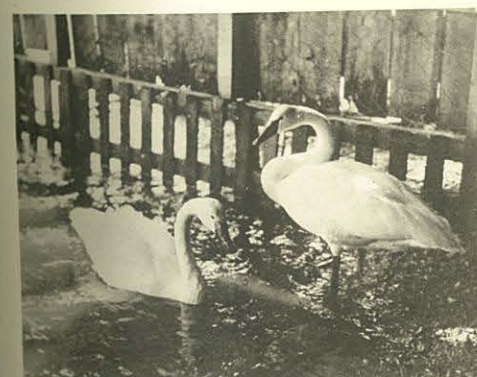


Fig. 6.





Fig. 5.

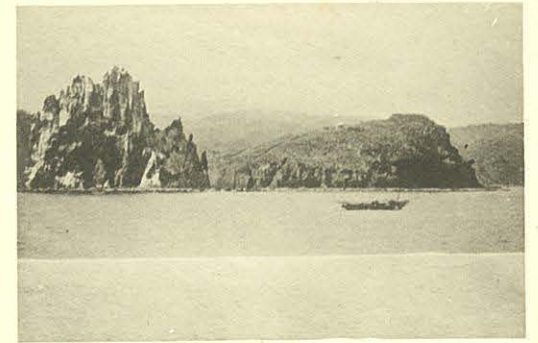


Fig. 4.



Fig. 1.

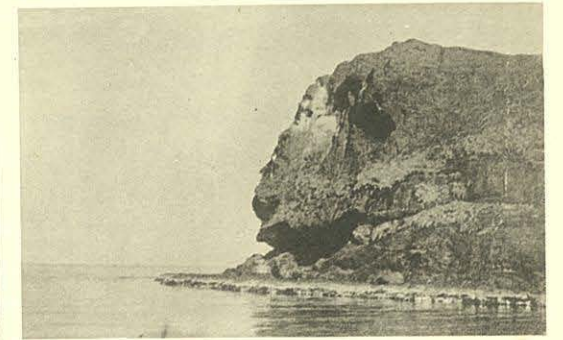


Fig. 6.

Fig. 2.

Fig. 3.

