BRITISH DIVING DUCKS

BY

J. G. MILLAIS

VOL. II.

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BRITISH DIVING DUCKS

VOL. II

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EIDER DUCK
adult male and female

BRITISH DIVING DUCKS

BY

J. G. MILLAIS, F.Z.S., M.B.O.U., ETC.

AUTHOR OF "THE MAMMALS OF GREAT BRITAIN AND IRELAND," "NEWFOUNDLAND AND ITS UNTRODDEN WAYS," "THE NATURAL HISTORY OF BRITISH SURFACE-FEEDING DUCKS," "THE WILD-FOWLER IN SCOTLAND," "THE NATURAL HISTORY OF BRITISH GAME-BIRDS," ETC.

VOL. II

WITH FORTY-TWO PLATES (SEVENTEEN OF WHICH ARE COLOURED)
BY ARCHIBALD THORBURN, O. MURRAY DIXON, H. GRÖNVOLD
AND THE AUTHOR

LONGMANS, GREEN AND CO.
39 PATERNOSTER ROW, LONDON
NEW YORK, BOMBAY, AND CALCUTTA
1913

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To

His Most Gracious Majesty King George V.

DEC 8 1919

CONTENTS

FAMILY: *ANATIDÆ*

GENUS: *Somateria*

			PAGE
THE EIDER-DUCK	*Somateria mollissima*	(Linnæus)	5
THE KING-EIDER	*Somateria spectabilis*	(Linnæus)	33
STELLER'S EIDER	*Somateria Stelleri*	(Pallas)	45

GENUS: *Oidemia*

THE COMMON SCOTER	*Oidemia nigra*	(Linnæus)	52
THE VELVET-SCOTER	*Oidemia fusca*	(Linnæus)	65
THE SURF-SCOTER	*Oidemia perspicillata*	(Linnæus)	76

GENUS: *Mergus*

THE GOOSANDER	*Mergus merganser*	Linnæus	85
THE RED-BREASTED MERGANSER	*Mergus serrator*	Linnæus	100
THE HOODED MERGANSER	*Mergus cucullatus*	Linnæus	113
THE SMEW	*Mergus albellus*	Linnæus	117

ON THE VARIOUS METHODS OF SHOOTING DUCKS 126

ON THE REARING OF DUCKS FOR SHOOTING AND THE KEEPING OF ORNAMENTAL WATERFOWL IN CONFINEMENT 136

ADDENDA. THE EIDER-DUCK 152

INDEX 153

LIST OF ILLUSTRATIONS

COLOURED PLATES

EIDER-DUCK—ADULT MALE AND FEMALE . . . . . *Frontispiece*

By A. Thorburn. *Reproduced by* Albert Frisch, Berlin

FACE PAGE

EGGS OF BRITISH DIVING DUCKS xii

By H. Grönvold. *Reproduced by* André & Sleigh, Ltd., Bushey

YOUNG OF BRITISH DIVING DUCKS 4

By H. Grönvold. *Reproduced by* André & Sleigh, Ltd., Bushey

EIDER—ADULT MALE, THIRD ECLIPSE; IMMATURE MALE, FIRST ECLIPSE; IMMATURE MALE, SECOND ECLIPSE 32

By O. Murray Dixon. *Reproduced by* André & Sleigh, Ltd., Bushey

KING-EIDER—ADULT MALE COMING OUT OF ECLIPSE; IMMATURE MALE, 5 MONTHS; IMMATURE MALE, SECOND ECLIPSE 32

By O. Murray Dixon. *Reproduced by* André & Sleigh, Ltd., Bushey

KING-EIDER—ADULT MALE AND FEMALE 40

By J. G. Millais. *Reproduced by* André & Sleigh, Ltd., Bushey

PLUMAGES OF STELLER'S EIDER 48

By J. G. Millais. *Reproduced by* André & Sleigh, Ltd., Bushey

COMMON SCOTER—ADULT MALE AND FEMALE 52

By A. Thorburn. *Reproduced by* Albert Frisch, Berlin

SOFT PARTS OF THE THREE SPECIES OF SCOTER 64

By J. G. Millais. *Reproduced by* André & Sleigh, Ltd., Bushey

VELVET-SCOTER—ADULT MALE AND FEMALE 68

By A. Thorburn. *Reproduced by* Albert Frisch, Berlin

FACE PAGE

SURF-SCOTER—ADULT MALE AND FEMALE 76
By A. Thorburn. *Reproduced by* Albert Frisch, Berlin

GOOSANDER—ADULT MALE AND FEMALE 88
By A. Thorburn. *Reproduced by* Albert Frisch, Berlin

PLUMAGES OF THE GOOSANDER (Skins) 96
Reproduced by André & Sleigh, Ltd., Bushey

RED-BREASTED MERGANSER—ADULT MALE AND FEMALE 100
By A. Thorburn. *Reproduced by* Albert Frisch, Berlin

PLUMAGES OF THE RED-BREASTED MERGANSER (Skins) 104
Reproduced by André & Sleigh, Ltd., Bushey

HOODED MERGANSER 114
By J. G. Millais. *Reproduced by* André & Sleigh, Ltd., Bushey

SMEW—ADULT MALE AND FEMALE 118
By A. Thorburn. *Reproduced by* Albert Frisch, Berlin

SMEW—ADULT MALE IN ECLIPSE AND IMMATURE MALE 128
By O. Murray Dixon. *Reproduced by* André & Sleigh, Ltd., Bushey

GOOSANDER—IMMATURE MALE AND ADULT MALE IN ECLIPSE . . 128
By O. Murray Dixon. *Reproduced by* André & Sleigh, Ltd., Bushey

PHOTOGRAVURES

Reproduced by W. L. Colls, Barnes

EIDERS FEEDING 16
By J. G. Millais

COURTSHIP OF THE EIDER 24
By J. G. Millais

COMMON SCOTERS AT SEA 62
By J. G. Millais

VELVET-SCOTERS COMING IN TO FEED 74
By J. G. Millais

FACE PAGE

RED-BREASTED MERGANSERS COURTING, AND GOOSANDER IN DISPLAY, &c. 112
By J. G. Millais

SMEWS COURTING 120
By J. G. Millais.

COLLOTYPES

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EIGHT PLATES, SHOWING THE CHANGE OF PLUMAGE OF THE MALE EIDER FROM TWO MONTHS TO MATURITY:

EIDER-DUCK—PLATE 1. BREASTS—Young Males, First Year 8
" " 2. BACKS—Young Males, First Year 8
" " 3. BREASTS—Young Males, end of his First and Part of his Second Year 8
" " 4. BACKS—Young Males, end of his First and Part of his Second Year 8
" " 5. BREASTS—Young Males, end of his Second and Part of his Third Year 8
" " 6. BACKS—Young Males, end of his Second and Part of his Third Year 8
" " 7. BREASTS—Adult Males 8
" " 8. BACKS—Adult Males 8

EIGHT PLATES SHOWING THE CHANGE OF PLUMAGE OF THE MALE KING-EIDER FROM TWO MONTHS TO MATURITY:

KING-EIDER—PLATE 1. BREASTS—Young Males, from 2 to 11 Months . . 34
" " 2. BACKS—Young Males, from 2 to 11 Months . . 34
" " 3. BREASTS—Young Males, from 13 to 20 Months . . 34
" " 4. BACKS—Young Males, from 13 to 20 Months . . 34
" " 5. BREASTS—Young Males, from 21 to 33 Months . . 34
" " 6. BACKS—Young Males, from 21 to 33 Months . . 34

FACE PAGE

KING-EIDER—PLATE 7. BREASTS—Adult Males 34

" " 8. BACKS—Adult Males 34

PLUMAGES OF THE COMMON SCOTER (Skins) 56

PLUMAGES OF THE VELVET-SCOTER (Skins) 72

PLUMAGES OF THE SURF-SCOTER (Skins) 80

EGGS OF DIVING DUCKS.

1. Eider.
2. King Eider.
3. Eider (with oil-spots).
4. Common Scoter.
5. Velvet Scoter.
6. Surf Scoter.
7. Smew.
8. Steller's Eider.
9. Red-breasted Merganser.
10. Hooded Merganser.
11. Goosander.

BRITISH DIVING DUCKS

Genus: *SOMATERIA*

Until recently it has been the practice of naturalists to regard certain birds inhabiting large areas under the title of a single species, and although this is not incorrect, it is evident that when a large series is examined, coming from widely separated areas, often isolated by intervening localities of unsuitable habitat across which the species may or may not emigrate, that there are certain differences apparent both in size and details of the plumage. This variation, which we should naturally expect as due to environment, temperature, &c., is very well marked in certain species both of birds and mammals, and it has caused a large percentage of naturalists who have specialised in studying local forms, to adopt a tri-nomial system in dealing with them. Whilst most of us deplore the present muddle as regards nomenclature, and may wish to follow Dr. Hartert in his desire for strict priority, there are many good naturalists who do not agree with the more recent system of naming local races even when well marked, and with those I do not agree, although I respect their views. It is quite plain, however, to all who deal comprehensively with the subject, that we must have some means of recognising these local races, and nothing seems plainer or easier than to attach to them some local appellation which will fix the area within which they dwell. A case in point is the Eider, whose local races are somewhat variable.

Formerly we were led by naturalists, who for the most part suffered from a paucity of specimens, to consider that all European races of Eiders, and even the American ones, belonged to the Swedish race *Somateria mollissima*, and this held good for a time.

In 1831, Brehm, in his *Handbuch der Naturgesch. aller Vögel Deutschlands*, arranged the various races of European Eiders under the titles of *Somateria danica*, *norwegica*, *platyuros*, *færöeensis*, *megauros*, *islandica*, *borealis*, *leisleri*, and *planifrons*, the three last named applying to the Greenland race. The race *S. megauros* is supposed to inhabit "the islands of the extreme North, perhaps even to be found on the coasts of Germany." It was also said to be as small as the Færöese race and to have 16 tail feathers, but Mr. Schiöler states that no far-north skins exhibit these characters. Neither can the form *S. platyuros* be accepted, as its only distinction is 16 feathers in the tail, a character found in various other local races. At present it is difficult to separate the Eiders of the British Isles, Denmark, Norway, and those from Finmark eastwards along the north coasts of Russia to the peninsula of Yalmal (Kara Sea), which may be described as the eastern limit of the species.

For many years I have made a special study of this duck and its allied races and their changes of plumages, and a good part of my time in shooting them and adding to my collection of skins, which is now a large one. Moreover, I have never missed

an opportunity of studying on the spot all the best public and private collections in Europe, so that I have been able to handle and separate some hundreds of specimens. Some of the local races only differ in the matter of size, but a large series from any one area generally shows how constant this difference is.

The following list shows the distinctive characters and distribution of the various local races of Eider-ducks during the breeding and migrating season:

1. *Somateria mollissima mollissima* (Linnæus), 1758.—Bothnia, Sweden, the Finnish Skerries, the Cattegat. Coming west in winter to the Norwegian coast approximately as far as Christiansand and south to the Danish Isles, where a few breed, and possibly N. Germany in winter. By far the largest of the European races. Bill of adult male olive green. Frontal angles of the bill on the sides of the forehead narrow and pointed. Nail-bone yellow.

2. *Somateria mollissima borealis*, Brehm.[1]—Breeds in Greenland, Davis Straits, Baffin Land, Labrador coast, Hudson Bay, Cumberland Peninsula, also in Spitsbergen (Koenig and Le Roi), Bear Island, and probably in Franz Josef Land (*Jackson-Harmsworth Expedition*, vol. ii. p. 356). In winter it migrates as far north as the St. Lawrence, but in summer the birds that breed there and in Newfoundland are *S. m. dresseri*. A constant character is the deep yellow bill of the adult male, legs, and toes. The Greenland birds are smaller than *S. m. mollissima* or *S. m. dresseri*, and differ from the last named in having the frontal angles of the bill narrow and pointed.

3. *Somateria mollissima britannica* (sub-species nov.).—The British Isles. Smaller than either of the above, as well as the Norwegian birds, but larger than the Færöese race. The bill of the adult male dull olive-green above, shading into French blue-grey below, and again into pale yellowish near the nail. Greenish-yellow near the nail, which is bone-yellow; legs and toes deep brown with a green suffusion.[2]

4. *Somateria mollissima dresseri*, Sharpe.—Atlantic coast of North America from North Labrador to Long Island, New York. Probably overlaps the Greenland bird in its northern range. If the two races are found not to interbreed, Mr. W. Rothschild thinks that this bird should be treated as a distinct species (*Bull. Brit. Ornith. Club*, February 24, 1905), and with this view I certainly agree; but on the other hand, my friend Mr. Schiöler states that *S. m. dresseri* breeds with the West Greenland Eider, and is an occasional visitor at all seasons. Up to date it has never occurred in Europe, and it does not frequent the coast of East Greenland.

The American Eider, as this bird is called in the New World, breeds in Newfoundland, where I have seen it in summer and autumn, and from Maine north along the Labrador coast up to Hudson Strait and south in Hudson and James Bay. Also on the north shore of the Gulf of St. Lawrence. On migration it is regularly found on the coasts of Massachusetts, and rarely on the seaboard of Virginia.

The male is easily distinguished by the shape of the naked frontal angles on the sides of the forehead, which are broad, rounded, and much corrugated. The colour, too,

[1] Brehm made four or five sub-species of Greenland Eiders which can scarcely be accepted.

[2] The colour of the soft parts of the Eider fades very rapidly, even an hour after death. Eiders in confinement never attain the rich colours of wild birds. Gould (*Birds of Great Britain*, Part XVII.) alone gives a correct representation of the bill of a British Eider. If the above characters prove to be constant, I propose to name the British Eider as above.

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of these parts, as well as the rest of the bill, is somewhat different from the other races. In a specimen shot by myself in Nova Scotia in November 1899, the frontal angles were orange-yellow, and this colour extends down the bill and its sides to near the nail, when it becomes clear bone-yellow. The nail itself is very pale bone-yellow, almost white. The legs and toes pure yellow, with the webs dusky brown-black. Toe and nails brown. The nostril is large.

Enormous flocks of this Eider sometimes congregate in Nantucket Sound in winter, and Mr. George Mackay states (*The Waterfowl Family*, p. 169) that on March 18, 1890, "he saw, near Nantucket, a flock containing about twelve thousand of this species."

These Eiders are shot to decoys all along the Canadian and Atlantic coasts of America, and are known as Sea-duck, Shoal-duck, Wamp, and Black and White Coot.

5. *Somateria mollissima færöeensis*, Brehm.—Færöes. This may best be described as a dwarf race of Eiders, which are most closely allied to the British birds. The females are very dark in colour, more so than those of any other race, and this was quite constant in a number of specimens shown to me by Mr. Schiöler. The frontal angles of the bill are short and pointed. At present I have not yet been able to ascertain the exact colour of the bill of the adult male.

6. *Somateria mollissima islandica*, Brehm.—Iceland. Possibly extending to Russian Lapland and the White Sea and its islands. This may or may not be considered a good sub-species, but in viewing a large series of Eiders it is not difficult to pick out the Icelandic birds, which are nearly akin to, but larger than, the Norse race. Colour of the bill green, with long and pointed frontal angles. The Icelandic birds are similar to those found by Mr. Manniche in N.E. Greenland.

7. *Somateria mollissima norwegica*, Brehm.—Extends from the island of Jaederen (opposite Christiania) to Spitsbergen along the whole of the Norwegian coast, and east from Finmark along the Russian Lapland coast, the White Sea, the Russian Islands to the peninsula of Yalmal (Kara Sea).[1] This bird seems to be identical with *S. m. danica* (Brehm), which is resident on the coasts of Denmark and Jutland.

Birds of this race also breed sparingly in Denmark (Winge and Schiöler), in Germany, in the North Frisian Islands, Sylt, and Norderoog (Naumann, Durnford, *Ibis*, 1874, p. 403, &c.); Holland (Vlieland in 1906, Van Oort, *Orn. Monatsberichte*, 1906, p. 173, &c., and on Terschelling, Van Oort, *List of Dutch Birds*, p. 153); France, breeds on an islet off the coast of Brittany (C. Ingram, *Zool.*, 1912, p. 232).

Winters along the coasts of Europe, and occasionally is met with far inland; a few E. Prussia (Hartert, *Ibis*, 92, p. 519); France, winters on coasts chiefly of N. and W.; accidental on Mediterranean (P. Paris, *Cat. des Oiseaux de la France*, p. 50), [not in Spain or Portugal]; Azores, once (*Nov. Zoolog.*, xii. p. 119); Switzerland, on lakes (Fatio, *Oiseaux de la Suisse*, ii. p. 1403); Italy, about 17 or 18 occurrences (Giglioli, *Avifauna Italica*, 2° Resoc. p. 489); Austria-Hungary, 14 occurrences (Reiser, *Orn. Jahrb.*, 1895, p. 260); Styria and Vorarlberg (*Orn. Jahrb.*, 98, p. 72); Bosnia once, and once in Balkan peninsula (Reiser, *Orn. Jahrb.*, 95, p. 260).

Smaller than the typical Swedish birds, but equal to the British race in size. Frontal

[1] At present it seems uncertain as to the local race to which these Eiders belong, but probably both *S. m. borealis* and *S. m. norwegica* are found there.

angles of the bill on the sides of the forehead long and pointed. Colour of bill green, with bone-yellow nail.

[*Somateria mollissima thulensis*, Malmgren, 1864.—The recent researches of Professor Koenig and Dr. le Roi proved that this is identical with *S. m. norwegica* of Brehm.]

8. *Somateria mollissima V-nigra*, Gray.—N.W. America and N.E. Asia. At present we do not know how far this sub-species extends along the north coast of Asia, but probably it is found as far west as the Taimyr Peninsula. Dresser and Buturlin mention it as an inhabitant of these regions, and Nordenskiold found it in many places.

The Pacific Eider breeds along the coast of Arctic N. America as far as Franklin Bay, and probably as far as James Bay. It is a common breeding species from the mouth of the Mackenzie to Point Barrow, and down the coast of Alaska as far as Cook's Inlet and the Aleutian Isles, being numerous at the mouth of the Yukon. It breeds also on the Commander Isles. It winters in Behring Sea and about the Aleutian Isles, and passes south as far as Wrangel (S. Alaska), where I saw specimens killed in November, and probably as far as the north-west coast of British Columbia. It also occurs on migration in Japan. Mr. Schiöler has five males from West Greenland, where he considers it to be rare. The shape and colour of the bill of the male are similar to *S. m. borealis*, but it differs in possessing a conspicuous and large black V-shaped mark on the throat. Traces of this mark are occasionally found in *S. m. dresseri*, *S. m. islandica*, *S. m. borealis*, and *S. m. britannica*. In size this Eider is similar to the Swedish race.

Adult Males.	Total Length from Point of Bill to End of Tail.	Wing.	Tarsus.	Nail to Point of Forehead.	Nail to Upper Angle of Bill.
Somateria mollissima mollisima	26	11	2	$2\frac{4}{16}$	3
Somateria mollissima borealis	25	11	2	2	$2\frac{12}{16}$
Somateria mollissima britannica	22–23	11	$1\frac{12}{16}$	$2\frac{4}{16}$	$2\frac{12}{16}$
Somateria mollissima dresseri	26	11	2	2	3
Somateria mollissima færöeensis	20–21	10	2	$1\frac{4}{16}$	$2\frac{8}{16}$
Somateria mollissima islandica	25	11	2	$2\frac{4}{16}$	3
Somateria mollissima norwegica	22–24	11	2	$2\frac{4}{16}$	$2\frac{14}{16}$
Somateria mollissima V-nigra	26	11	2	$2\frac{1}{2}$	3

Measurements in inches and 16ths of an inch.

YOUNG OF DIVING DUCKS IN DOWN.

1. Hooded Merganser.
2. Red-breasted Merganser.
3. Goosander.
4. Common Scoter.
5. Velvet Scoter.
6. King Eider.
7. Eider.
8. Steller's Eider.

EIDER-DUCK

Somateria mollissima (Linnæus)

Anas mollissima, Linn., Syst. Nat., ed. x., i. p. 124 (1758).
Anas mollissima, Linn., Syst. Nat., ed xii., i. p. 198 (1766).
Anser lanuginosus, Leach, Syst. Cat. Mamm. et B. Brit. Mus., p. 37 (1816, ex Briss.).
Somateria mollissima, Boie, Isis, 1822, p. 564; Yarrell, Saunders, Dresser, &c.
Anas cuthberti, Pall., Zoogr. Rosso-Asiat., ii. p. 235 (1831).
Somateria danica, Brehm, Isis, 1830, p. 998; Vög. Deutschl., p. 890 (1831).
Somateria norwegica, id. tom. cit., p. 998; tom. cit., p. 892, Taf. xliii., fig. 1.
Somateria platyuros, id. tom. cit., p. 998; tom. cit., p. 892.
Somateria færöeensis, id. tom. cit., p. 998; tom. cit., p. 893.
Somateria megauros, id. tom. cit., p. 998; tom cit., p. 894.
Somateria islandica, id. tom. cit., p. 998; tom. cit., p. 895.
Somateria borealis, id. tom. cit., p. 998; tom. cit., p. 896.
Somateria leisleri, id. tom. cit., p. 998; tom. cit., p. 896.
Somateria planifrons, id. tom. cit., p. 998; tom. cit., p. 897.
Somateria St. Cuthberti, Eyton, Cat. Brit. B., p. 58 (1836).
Somateria thulensis, Malmgr., Œfr. K. Vet.-Ak. Förh., 1864, p. 380; J. F. O., 1865, p. 396.
Somateria mollissima mollissima (L.), Joint auth., a Hand-list British Birds, p. 144 (1912).

Local Names.—Eider-duck, Common Eider, St. Cuthbert's duck, Eider-goose, Moss-cock, Moss-ducker (Forfarshire), Dunter (E. Scotland and Shetland) (*English*); Lach mhor, Colk (*Gaelic*); Gochach (*St. Kilda*); Morillon, Eider (*French*); Eidergans (*German*); Eidereend (*Dutch*); Edderand, Edderfugl, Uhand (*Danish*); Ejder, Eidergas, Ejderfugl, Aerbult, Helsingbock (male), Skrya (female), Helsing (male), Skroja (female), Gudange (male), Ana (female), &c. (*Swedish*); Estegg, Efugl, Edderfugl, Aerfugl (*Norwegian*); Gagka Normota, Gaga (*Russian*); Hauda (*Lappish*); Eava, Aeda, Aeva, Blikur (*Færöese*); Haaka, Kalkas, Auhti, Haahkatelkkä, Hauho (*Finnish*); Eider-pihle (*Esthnian*); Hurn-snoabelt (*Heligoland*); Avok, Malersertak, Ugpatekortok (*Greenland*); Edredone, Anatra del piumino (*Italian*); Kaczka erdordrenowa (*Polish*); Lagy Dunna (*Hungarian*).

Egg.—The number of eggs seems to vary greatly according to locality. On the Farnes it is often 4 to 5, but other nests with 9, 11, 12, 13, 18, or 19 eggs are recorded (G. Bolam, *B. of Northumberland*, p. 406); 4 to 6 seems to be the usual number in Scotland and the adjacent islands, whilst Saxby states that sets of 5 are rare in the Shetlands. On Spitsbergen Le Roi gives 4, 5, 6, and occasionally 7, twice 8 and once 9 (*Avif. Spitzbergensis*). Professor Collett says 14 have been found in a nest in Norway, but the usual number in Scandinavia is 4 to 6, occasionally 7, and the occasional cases in which 10 or 12 eggs are found in one nest are ascribed to two ducks laying together. The average size of 426 eggs, given by H. Goebel, is 77.9×52.2 mm. Max. 89×52.5, 86×56.5; min., 69×47 and 75×46. Average weight of 350 eggs, 858 cg., varying from 648 to 1146 cg.

The shape is usually somewhat oval, fairly rounded at both ends. Sometimes they are pointed and almost pear-shaped.

The colour of the eggs is usually of a pale olive, but they vary considerably even in the same clutch. Sometimes they are of a deep blue colour (see Jourdain, *British Birds*, vol. vi., p. 241). It is not uncommon to find what look like oil spots on the eggs.

The breeding season in the Farnes is about May 12 (G. Bolam). In Orkney I have found fresh eggs from June 1 to July 1, and in Shetlands fresh eggs are found from

mid-May to mid-July (Saxby). Incubation is by the female alone, and it seems she does not leave the nest at all once she has commenced to sit (W. H. St. Quintin, *Avic. Mag.*, 1899, p. 115; Saxby, *B. of Shetlands*, p. 249; Blaauw, &c.). The period of incubation lasts from 27–31 days. (W. Evans, *Ibis*, 1891, p. 73, 27–28 days; *C. Life*, March 21, 1908, p. 409, and *British Birds*, ii. p. 65. F. G. Paynter, 31 days; Saxby, *B. of Shetlands*, 4 weeks; F. E. Blaauw, 28 days; Tiedemann, 28 days.) For details of the down (which varies considerably in colour) I must refer my readers to Mr. H. Noble's paper in *British Birds* (vol. ii. p. 39, pl. II., fig. 13, 13).

Many accounts have appeared in the works of naturalists on the subject of the plumage of the male and female Eider (*Somateria m. mollissima*) and the age at which the sexes arrive at maturity. In nearly all of these there is much guesswork owing to the small series of specimens examined, although in several of the accounts it is stated correctly that the male bird becomes adult in its third year.

So long ago as 1756 we find the description of the typical (Swedish) Eider by M. Thrane Brünnich, who, roughly, yet accurately, states that it is not until the third year that the male "in all things resembles the adult male," and "they do not pair until the third year unless through an irregularity or an occasional wantonness." With his description of the plumages of the immature female I cannot agree, for he states that "during the first year the female bird alone attains almost the same plumage as the mother bird, the only difference being that they are somewhat lighter," &c. Later in his Supplement III. he states that the two white bands on the wings do not become distinct until after several years' moulting. This is somewhat contradictory. Various authors such as Nilsson, Lilljeborg, M. von Wright, all give descriptions of various stages of the plumage, but in no way seem to come to definite conclusions. Faber (*Prodromus der Isländischen Ornith.*, p. 70, 1822) says that the male bird is not capable of procreation until its fifth summer, and that it retains its youthful plumage four years. Kjaerbölling (*Skandinaviens Fugle*, p. 691) thinks that in the first and second year the male bird lacks the beautiful markings on the head, and the white is entirely absent on the neck or begins on the throat. Brehm, too (*Handbuch der Naturgeschichte alle Vög. Deutsch.*), is equally inaccurate in his statements about the age when the male gets its full plumage. After Brünnich, Holböll (*Ornith. Beitrag zur Fauna Grönlands*, pp. 69–73) seems to have been the next author who diagnosed the plumage-change of the Eider correctly. On page 72 he says that, having compared a great number of young birds of both species (*S. mollissima* and *S. spectabilis*), he has come to the conclusion that both require two years to become full grown, so that young birds which were hatched in 1840 were full grown in the autumn of 1842, and had attained a complete winter-plumage in October.[1] This period, he states, is alike for both sexes. During the first year the female bird is quite grey, without the white bands on the wings; in the second year she attains almost the same colour as the old birds, only differing from these by the absence of the white bands on the wings. Professor Collett gives (*Minor Communications Avifauna Norway*, 1881–1892, pp. 284–6) a detailed account of the plumage-change which seems to leave the reader in a state of some doubt, for he believes that the young males do not begin to turn white until the second winter. Most English authors, except Booth, say very little

[1] Broadly speaking this is quite correct, although many males do not attain full plumage until December, owing to the delay in moulting.

about the plumages of the Eider, and what they do is strictly of a non-committal order. By far the best account of the sequence of plumages of *S. mollissima* and its allied races is to be found in Mr. E. Lehn Schiöler's paper "on *Somateria mollissima* L., and some of its allied races," which was published in *Dansk Ornithologisk Forenings Tidsskrift* (vol. iii. June 1908, pp. 109–49). This contains a very complete summary of Mr. Schiöler's views on the plumage passage of the Eider, as well as notes on skeletons, breeding habits, and the distribution of allied races.

In the following descriptions of the plumages of the Common Eider, I have taken specimens whose plumage is normal at the days mentioned. Sometimes there is a delay or advance of several months, according to the condition or early hatching of the bird. All birds described are, for the sake of explanation, supposed to have been hatched on July 1.

Male: Down-plumage.—Crown, cheeks, wings, back, and rump brown, with long hair-like down of brownish-grey on shoulders and wings (over the whole of the back there is an olive-green tinge which soon vanishes), darker towards the rump and tail; eye-stripe, chin, breast, and belly grey, grey-yellow, or very pale brown; neck brownish-grey; thighs brown. Bill blue-grey; nail bone-yellow; feet blue-grey; irides brown. Length at four days, 9 inches.

Juvenile-plumage.—At four weeks feathers appear on the shoulders, and the legs and feet become lead-blue, and grow to a large size. The irides, too, become more red-brown. By August 12 the young are three-parts grown, and by September 1 they are clothed in their first plumage and are able to fly. It is generally stated that the young at first resemble the adult female, but this is hardly the case on close examination.

Head and neck grey with dark-brown centres to the feathers; eye-stripe light grey with dark-brown centres; nape, shoulders, scapulars blackish-brown with narrow sandy edges; rump brown-black; upper tail-coverts black edged with reddish-brown; centre of the wing blackish-brown edged with sandy-brown; primaries brown; secondaries grey-brown edged with pale sandy-brown; throat grey; chest and lower-parts blackish-brown with sandy edges to the feathers (in some examples the lower-belly and vent are a uniform grey-brown, whilst others are almost black with the feathers edged with sandy-brown); thighs reddish-brown and barred with black-brown. Feet and toes lead-grey; bill green above, running into blue-grey below and in front of the nostrils.

First Winter-plumage.—There is little change until the middle of October,[1] when a very general moult commences through the plumage except on the mantle, wings, lower-breast and belly, and rump—these portions of the plumage not being renewed, as a rule, until the chief moult in July. On examining a large series of young males between October and July of the first year, the most remarkable variation is noticeable in the time of shedding the tail-feathers. In some examples the worn juvenile-feathers are moulted in October, and a new black set is obtained by the 19th of that month, whilst in others they are being renewed in April, and yet in others in July after the birds have passed into their first eclipse-plumage.

Between October and February the quantity of new plumage acquired by young males by fresh moult is extremely variable, some being as far advanced at the end of October as others by the end of February.

First Stage.—The average young male in November has the crown and sides of the

[1] Sometimes a few white feathers come into the scapulars as early as September.

head rich red-brown; eye-stripe from sandy-yellow to russet-brown; over the eye a black-brown patch of feathers; cheeks and sides of the neck almost black; nape, neck-collar, and upper tail-coverts black; back and inner scapulars black and white or brown and white intermixed; chin, front of the neck, lores, and cheeks pale grey-brown, showing small blackish markings; upper-chest white with black edgings or brown bars; sides of the upper-chest and feathers on flanks that cover the wings black. The wings, mantle, rump, and lower-parts usually retain the juvenile-plumage, but fade considerably as the season advances. Many examples, however, assume a large number of black feathers, from the lower portion of the white-and-cream chest-shield to the rump.

So the advance continues—new feathers coming in and old ones "wearing" and moulting—to April, when the young male seems to have effected all the plumage-change he will do until the eclipse-plumage commences.

Second Stage.—By the middle of April many advanced young males have the whole of the chin, chest, and nape white and cream-buff as in old birds; the crown and sides of the back of the head remain reddish-brown; the black patches above, below, and in front of the eye to the bill are generally half changed;[1] the sea-green patch over and behind the ear-coverts is also completely developed or intermixed with black-and-brown feathers of the first stage; the cheeks too are usually mixed dark brown and white; a line of black feathers is now fully developed along the upper flanks; upper and lower tail-coverts are renewed and black; scapulars are white with broad or narrow edges of black. As previously stated, the crown, mantle, rump, and wings, and nearly all the lower-parts remain in juvenile-plumage, and the feathers of these parts are not shed until July. The change of the tail also varies in individuals. The most interesting feature of the plumage of the nine-months-old male in April, is that when gaining the white chin and throat it nearly always leaves a broad V-shaped line of the brown feathers. This characteristic mark is often retained throughout the summer, and forms an interesting parallel to the V-shaped mark found in many of the adult males of *S. m. mollissima* and its local races.

First Eclipse-plumage.—From April until the end of June little or no change takes place except the usual fading and wearing of the feathers, and then the first eclipse-plumage begins to make its appearance, and may be said to be complete by the end of July.

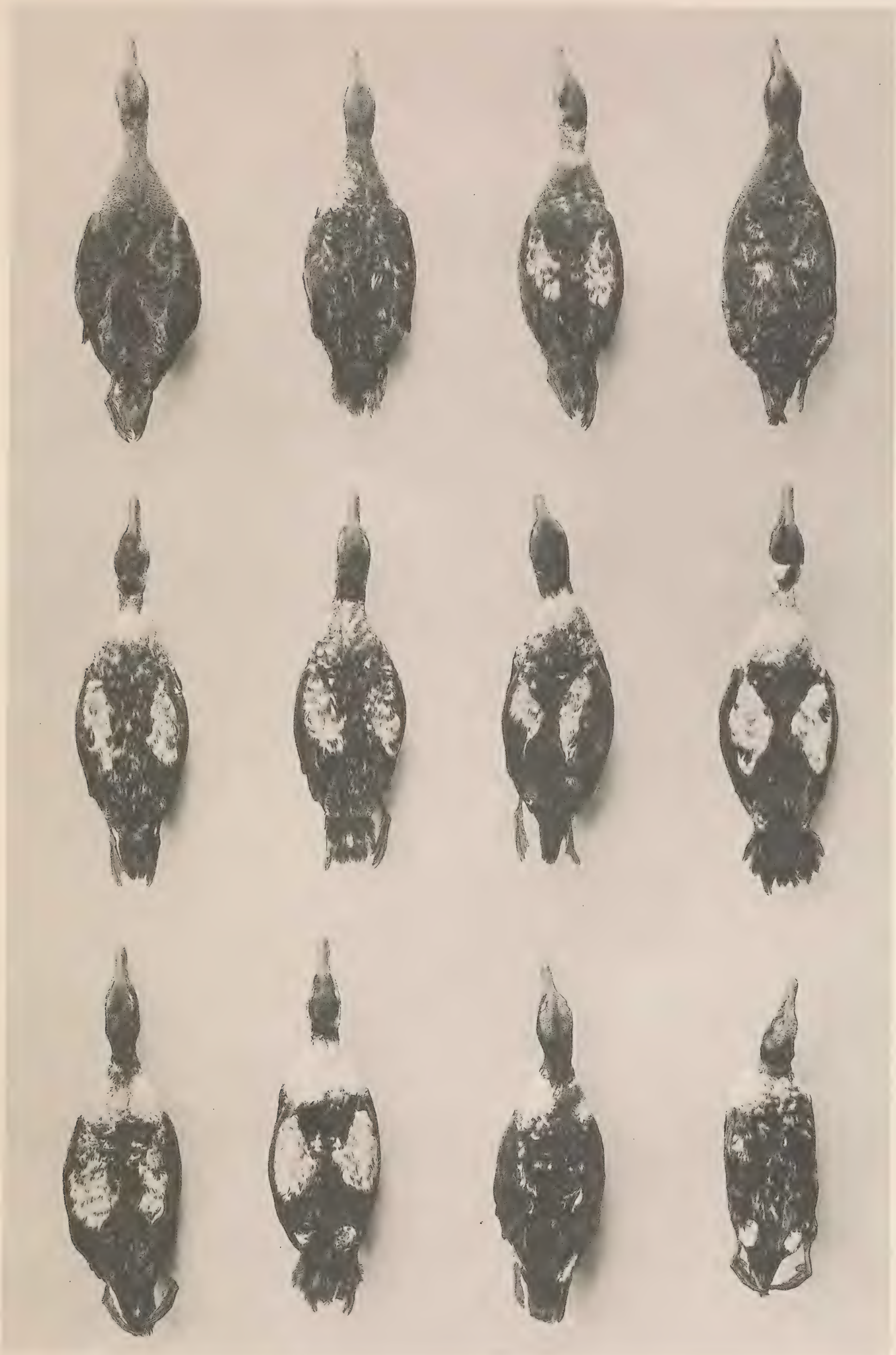
The feathers of the whole head and neck are shed and replaced in a few days by a plumage resembling, but somewhat darker than, that of the juvenile; eye-stripe dull white with blackish markings; crown, upper parts of cheeks, and back of head and neck black; rest of cheeks and throat grey-brown; mantle and scapulars blackish-brown. In a bird killed on July 6 at Fitfulhead, Shetland, which has effected the above change, the wings, tail, and nearly all the lower parts are still in juvenile-plumage, much worn and faded; the white-and-buff shield on the upper-chest and its sides is replaced by a new set of feathers —white with brown-black bars, and edged with reddish-brown; the long faded scapulars are still unshed and sandy-yellow as well as the primaries.

Second Winter-plumage.—So the plumage remains until the middle of August, when the wings and tail are generally renewed, though this is sometimes not accomplished until early September. Towards the end of August the next change to second winter-plumage

[1] The change, when it takes place on the crown, as it does in a few advanced birds, is effected by a wearing process. The red-brown tips wear off, and the upper parts of the feathers which are black with a blue gloss are revealed.

EIDER DUCK, BREASTS, YOUNG MALES FIRST YEAR.

1. Sept. Age, 2 months.
5. Dec. 6th. Age, 5 months and 6 days.
9. Jan. 30th. Age, 6 months and 30 days.
2. Oct. 28th. Age, 3 months and 28 days. 1st winter plumage commencing.
6. Dec. 12th. Age, 5 months and 12 days.
10. Mar. 24th. Age, 8 months and 24 days.
3. Nov. 1st. Age, 4 months.
7. Dec. 16th. Age, 5 months and 16 days.
11. April 13th. Age, 9 months and 13 days.
4. Nov. 18th. Age, 4 months and 18 days. Backward bird.
8. Jan. 8th. Age, 6 months and 8 days.
12. May 29th. Age, 10 months and 29 days.

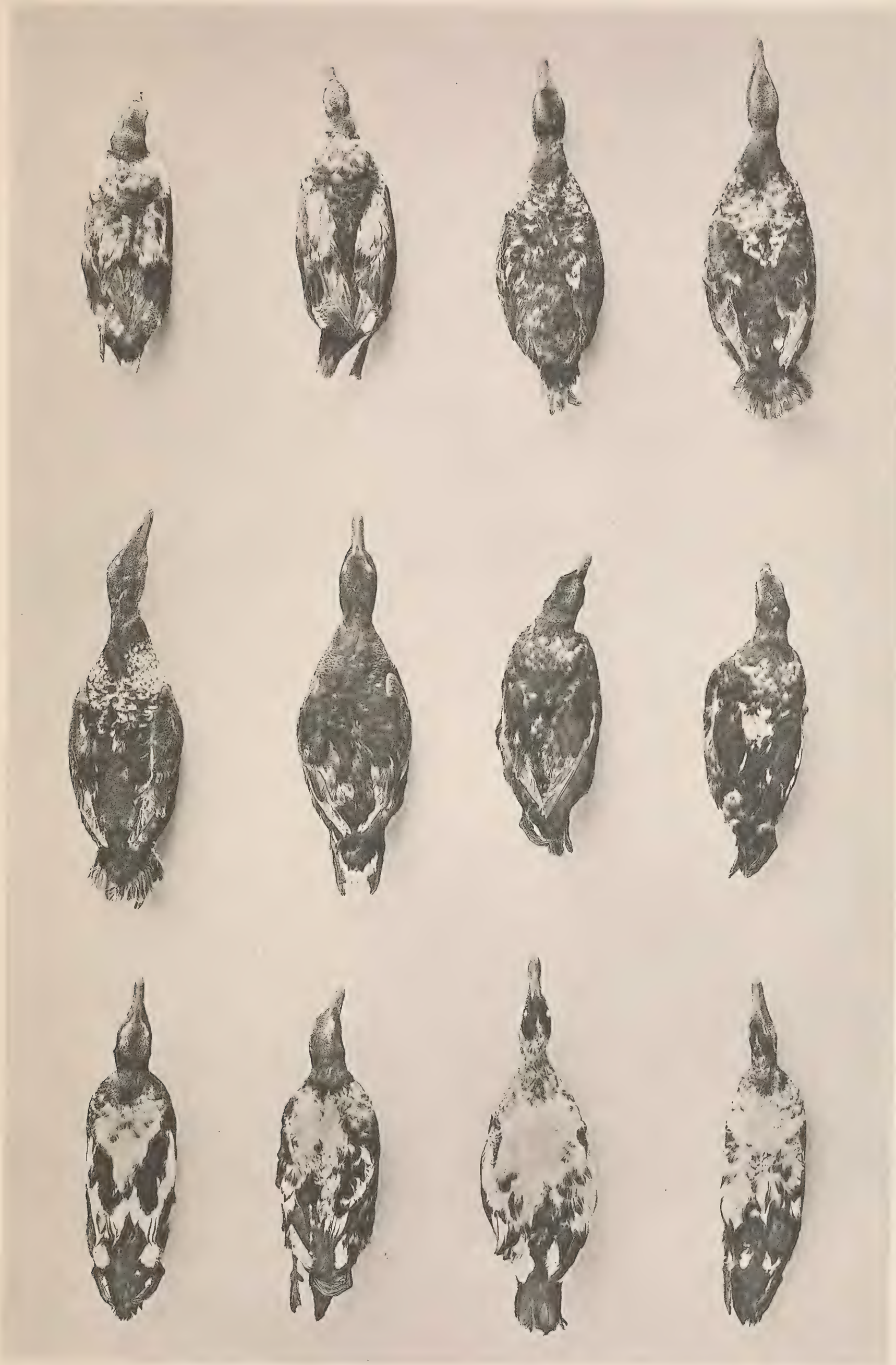


EIDER DUCK, BACKS, YOUNG MALES FIRST YEAR.

1. Sept. Age, 2 months.
2. Oct. 28th. Age, 3 months and 28 days.
3. Nov. 1st. Age, 4 months.
4. Nov. 18th. Age, 4 months and 18 days.
5. Dec. 6th. Age, 5 months and 6 days.
6. Dec. 12th. Age, 5 months and 12 days.
7. Dec. 16th. Age, 5 months and 16 days.
8. Jan. 8th. Age, 6 months and 8 days. Very advanced bird.
9. Jan. 30th. Age, 6 months and 30 days.
10. Mar. 24th. Age, 8 months and 24 days.
11. April 13th. Age, 9 months and 13 days.
12. May 29th. Age, 10 months and 29 days.

EIDER DUCK, BREASTS, YOUNG MALES.
End of his first and part of his second year.

13. June 9th. Age, 11 months and 9 days.
14. June 12th. Age, 11 months and 12 days.
15. June 27th. Age, 11 months and 27 days, end of his first year. First eclipse nearly complete.
16. July 7th. Age, 12 months and 7 days, beginning of second year.
17. July 9th. Age, 12 months and 9 days. Very backward bird.
18. July 23rd. Age, 12 months and 23 days. First eclipse complete.
19. Aug. 3rd. Age, 13 months and 3 days.
20. Sept. 4th. Age, 14 months and 4 days.
21. Sept. 7th. Age, 14 months and 7 days.
22. Sept. 9th. Age, 14 months and 9 days. 2nd winter plumage commencing.
23. Oct. 16th. Age, 15 months and 16 days. 2nd winter plumage well advanced.
24. Nov. 6th. Age, 16 months and 6 days; a late moulting bird.



EIDER DUCK, BACKS, YOUNG MALES.
End of his first and part of his second year.

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17. July 9th. Age, 12 months and 9 days. Very backward bird.
18. July 23rd. Age, 12 months and 23 days. First eclipse complete.
19. Aug. 3rd. Age, 13 months and 3 days.
20. Sept. 4th. Age, 14 months and 4 days.
21. Sept. 7th. Age, 14 months and 7 days.
22. Sept. 9th. Age, 14 months and 9 days. 2nd winter plumage commencing.
23. Oct. 16th. Age, 15 months and 16 days. 2nd winter plumage well advanced.
24. Nov. 6th. Age, 16 months and 6 days; a late moulting bird.

EIDER DUCK, YOUNG MALES, BREASTS.
End of his second and part of his third year.

25. Nov. 10th. Age, 16 months and 10 days, last feathers of first eclipse on the back of neck.
29. Feb. 26th. Age, 19 months and 26 days.
33. July 10th. Age, 24 months and 10 days.
26. Nov. 18th. Age, 16 months and 18 days.
30. March 22nd. Age, 20 months and 22 days.
34. July 10th. Age, 24 months and 10 days.
27. Dec. 12th. Age, 17 months and 12 days.
31. April 13th. Age, 21 months and 13 days.
35. Aug. 30th. Age, 25 months and 30 days. Second full eclipse.
28. Feb. 8th. Age, 19 months and 8 days; 2nd winter plumage complete.
32. June 1st. Age, 23 months; 2nd eclipse commencing.
36. Oct. 11th. Age, 27 months and 11 days, third winter plumage, which is that of the adult commencing.

EIDER DUCK, YOUNG MALES, BACKS.
End of his second and part of his third year.

25. Nov. 10th. Age, 16 months and 10 days, last feathers of first eclipse on the back of head and neck.
29. Feb. 26th. Age, 19 months and 26 days.
33. July 10th. Age, 24 months and 10 days.
26. Nov. 18th. Age, 16 months and 18 days.
30. March 22nd. Age, 20 months and 22 days.
34. July 10th. Age, 24 months and 10 days.
27. Dec. 12th. Age, 17 months and 12 days.
31. April 13th. Age, 21 months and 13 days.
35. Aug 30th. Age, 25 months and 30 days. Second full eclipse.
28. Feb. 8th. Age, 19 months and 8 days; 2nd winter plumage complete.
32. June 1st. Age, 23 months; 2nd eclipse commencing.
36. Oct. 11th. Age, 27 months and 11 days, third winter plumage, which is that of the adult now commencing.

EIDER DUCK. ADULT MALES. BREASTS.

37. Nov. 4th. Age, 28 months and 4 days. Final state of the immature male, a few 2nd eclipse feathers moulting. The male Eider is adult at 29 months.

38. Feb. 10th. Full Breeding dress.

39. June 23rd. Third eclipse commencing.

40. June 27th. Third eclipse coming in rapidly.

41. July 6th. Late moulting bird.

42. July 10th. Nearly full eclipse

43. July 23rd.

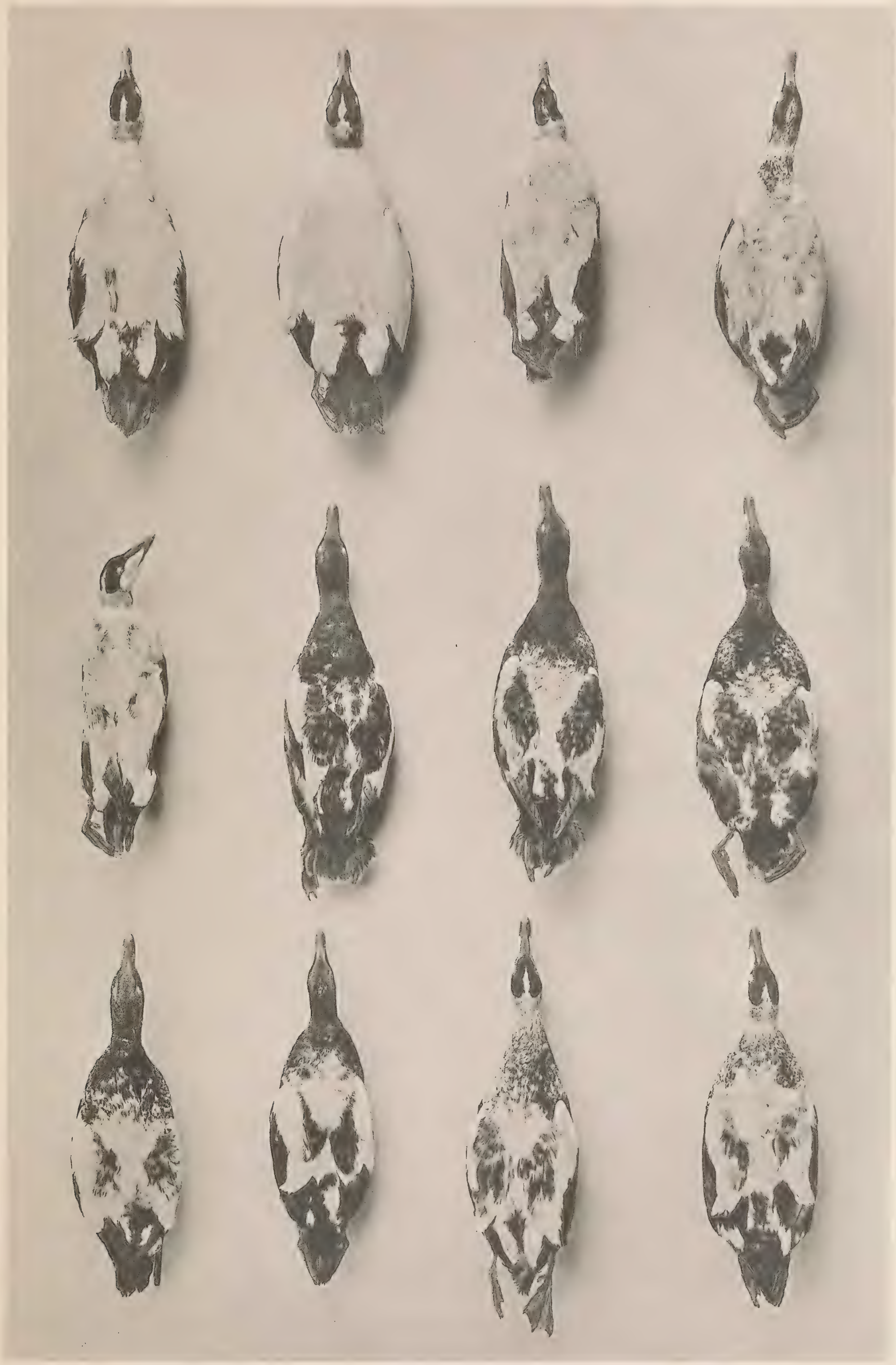
44. Aug. 4th.

45. Sept. 22nd.

46. Oct. 17th.

47. Nov. 17th.

48. Nov. 26th. After which the bird will pass to same plumage as No. 2 by Dec. 1st—Dec. 10th.



EIDER DUCK. ADULT MALES. BACKS.

37. Nov. 4th. Age, 28 months and 4 days. Final state of the immature male, a few 2nd eclipse feathers moulting. The male Eider is adult at 29 months.

38. Feb. 10th. Full Breeding dress.

39. June 23rd. Third eclipse commencing.

40. June 27th.

41. July 6th. Late moulting bird.

42. July 10th. Nearly full eclipse

43. July 23rd.

44. Aug. 4th.

45. Sept. 22nd.

46. Oct. 17th.

47. Nov. 17th.

48. Nov. 26th. After which the bird will pass to same plumage as No. 12 by Dec. 1st—Dec. 10th.

commences, and all the lower parts and flanks are changed to black for the first time,[1] and a general moult takes place throughout the whole plumage. The moult proceeds somewhat slowly, and is not as a rule complete until the end of November, whilst a few late birds even retain an occasional feather or so of the eclipse until February. The general character of the second winter-plumage is similar to that of adult males, except that the former can always be distinguished by the black edges to the long curled sickle-feathers of the inner-secondaries. Moreover, these feathers are never so large or so well curled as in adults. This character is invariable, as well as the "mottled" appearance of the wing. The wing in the second winter-plumage is generally black all round its edges, from the primary-coverts to the shoulders, whilst the lesser, median, and secondary-coverts have the feathers broadly or narrowly edged with black, these portions in the adult male always being pure white. By April all traces of immaturity have gone except on the wings.

Second Eclipse-plumage.—This often begins to appear as early as June 1, and, like the first eclipse, the moult commences on the head and neck, the dark colours next coming in by means of a moult over the chest, back, and scapulars, so that all the bright colours may be quickly obliterated. The feathers of the lower-parts, rump, wings, and tail are not shed, and remain in second winter-plumage.

The second eclipse is for the most part similar in colouring to the first eclipse—that is to say, in the case of the new feathers that have been gained in July; but these second-eclipse Eiders can always be distinguished in this month from first-eclipse and adult birds by the colourings of the wings and curled secondaries, which remain as in second-winter birds. The whole of the lower-parts also are jet-black as in adult birds. Moreover, males in the second eclipse never lose *all* the white feathers on nape, back, and scapulars as adults do, and this plumage has an incomplete appearance.

Adult Winter-plumage.—The breast, lower-parts, long sickle-feathers, wings, rump, under and upper tail-coverts are only shed once—between July 1 and October 1, by which date the male has half-shed his second eclipse, and has taken on half of his first adult winter-plumage. So the first adult winter-plumage continues to advance until it is often quite complete by November 1. Wherefore the full plumage of the male Eider is obtained in 2 years and 4 months. Many, however, do not attain full plumage until December.

Top of the head rich bluish-black, divided in the centre of the crown, which blends in the sea-green colour that covers the back of the head, the nape, and the auricular region; cheeks, back, and scapulars white, with the latter tinged with yellow; centre of back, rump, and upper tail-coverts deep black; a conspicuous white patch on either side of the rump; tail brown, with a grey suffusion; primaries brown; secondaries black, with innermost short feather white, with broad black margin; lesser and medium wing-coverts white, with a slight tinge of yellow; chin, throat, and lower neck white; upper-breast buff; flanks, lower-breast, belly, and under tail-coverts deep black; inner secondary-coverts long and curled and white. Bill olive-green above, blending into blue-grey below and in front of the nostril; nail bone-yellow, a line of blue-grey along the side of the lower mandible; feet and legs brown, suffused with green, webs black; irides rich brown. Length, 22 to 25 inches. Wing, 11¼ inches; tarsus, 1¾ inch.

[1] Instances of a young bird getting its black lower-parts in the first year are somewhat rare, but I have seen examples of this.

Adult Eclipse-plumage.—In May the males have lost the full beauty of their plumage, the upper-breast feathers become dull, the bird loses the fine yellow tint on the scapulars, and the rich green on the head fades, and by June the sickle-feathers are worn and abraded.

Sometimes as early as June 23, and more generally about July 1–4, the eclipse-plumage of the adult male begins to appear on the neck and mantle. Some birds change the bright parts of the plumage, such as the head, neck, upper-breast, back and upper scapulars, in a week, the rest of the moult—which embraces the lower-parts, wings, inner-secondaries, tail-coverts, and tail—are then slowly changed only once into direct winter-plumage. The bird may be said to be in full eclipse about August 5, when it has a very "black" appearance on the water.

Head and neck, except for a very small space of grey and black feathers over the eye, black with upper parts of the feathers brown; nape, mantle, and scapulars black; sometimes the black feathers in the centre of the back are finely edged with white, but this wears off in October; wings and tail as in winter; upper-breast white barred with black and edged with reddish-brown; rest of under-parts black as in winter.

Note.—Some examples are not so dark as above described and have the chin and throat suffused with grey; others never completely lose the white feathers on the nape, but renew in September directly into white again. I do not feel certain as to what extent the feathers on the upper-breast are changed, and think this region is shed differently according to individuals, some taking on temporary eclipse-feathers, and others only renewing once between July 1 and October 1. I think, however, the region nearest to the neck is generally renewed twice, and that nearest to the lower-breast and belly only once, because we find males in every degree of feather "wearing" from October 1 to the end of November. The black-edged feathers in October and November are not shed again during these months to pure buff ones, but wear the black edges away.

Briefly, to summarise the plumages of the male Eider, the duckling passes from the down-state to juvenile-plumage, which it only retains in part, varying greatly in individuals, for a short time. The "speckled" first winter-plumage is attained through the first winter and early spring. The juvenile wing, sometimes the tail, and more rarely the lower-parts, are retained for a whole year. At 12 months the greater part of the first eclipse-plumage is assumed, and this again is soon moulted with the parts of the plumage that only change once a year. From 15–18 months the second winter-plumage is gained, and the bird is like the adult male except for the pied fore-wing and the black-edged curled secondaries. This plumage is kept until 24 months, when the second eclipse is assumed. At 27 months the third winter is in full progress, and the bird attains adult plumage with perfect white fore-wing and curled secondaries at 28–30 months.

The male therefore goes through one complete moult every year, in which the moulting of the head, neck, upper-breast, and back are renewed twice, and the wings, tail, long secondaries, upper and under tail-coverts only once.

There is not the least doubt that, as Mr. Schiöler points out, the male bird becomes more brilliant in plumage and more massive in skeleton in the fourth spring, but to all intents and purposes it is adult at 28–30 months, and will pair and breed in the following spring. It may be possible that the immature male may pair and breed in its second year, though we have no conclusive proof that it does so, for it is usual to see these immature

males in flocks at the pairing time; whilst if they attempt to interfere with the females, they are driven off by the adult males. As I have myself seen, they go through the full "show" of the adult, and are capable of copulation, although their testes are very small at this period. Whether the eggs of females paired to these 2-year-old males are fertile or not I cannot say.

Even the young males of 10 months go through the full courtship show, and make the courting-call similar to the adult, though they do not evince much desire to pair with a female. Such, however, is not always the case. On May 1, 1912, at Scampston, Mr. St. Quintin had on his river-pond four 10-months-old males and one adult female, which was most anxious for a mate. All the young males were "showing" and calling, and the old female literally hunted the most advanced young male until she got underneath him in the water and forced him to pair. Mr. St. Quintin and I witnessed the act twice. The female laid eggs, but they were not fertile; so we must presume that such abnormal pairing is unusual and ineffective.

Female: Down-plumage.—Like that of the male but generally darker on the under-parts and the eye-stripe narrower and shorter.

Juvenile-plumage.—Head and neck brownish-grey with darker centres; eye-stripe light grey with dark-brown centres; mantle, scapulars, back, and rump dark brown with light sandy-brown edges; tail brown and worn at the tips; upper-wing above and including the secondary-coverts blackish-brown edged with rich brown; primaries nearly black; secondaries blackish-brown with a very narrow edge of pale greyish-brown; throat grey; breast and belly pale grey-brown crossed with dark greyish-brown bars and with sandy grey-brown (the dark bars on the upper-breast are much broader and more clearly defined than those on the belly, while the flank-feathers near the rump are also more heavily barred).

Note.—The juvenile female can be distinguished from the juvenile male by its smaller eye-stripe and by its paler upper-parts and darker upper-breast.

First Winter-plumage.—As a rule, the moult is slower in the case of the female, which does not commence its first winter-moult until early November. Then the first feathers with broad reddish-brown edges appear on the shoulders, lines of a chestnut-brown come in on the head, and new black-barred rich brown ones on the upper-breast and belly. So the advent of a first semi-adult plumage proceeds slowly until March, when the bird has an appearance somewhat similar to the adult female except that the wings, tail, and long secondaries have not been renewed, and on close examination there are still a large number of the feathers of the juvenile-plumage on the breast and belly. The tail is a most variable feature. As a rule it is not renewed until the end of the first year, but in very forward birds one or two (generally those in the centre) new feathers are gained in spring. By May these 10-months-old females have the whole of the breast- and belly-feathers changed and similar to adults. These young birds can, however, always be distinguished from adult females by the dark and faded long scapulars and secondaries, and by the absence of white on the secondaries and secondary-coverts.

In July these immature females of one year flock together and are again easily recognised by their "black" appearance on the water and their faded wings. In many

of them the mantle and scapulars appear to be almost black, for the sandy-coloured edges are nearly worn off prior to moulting.

Second Winter-plumage.—The moult commences at the end of July, and during August and September the whole plumage undergoes a complete change to that of the second winter. In October these second-year females are very similar to adult females except that the white band on the lower edge of the secondaries and secondary coverts is very narrow. On examining several of these females, the plumage seems more heavily barred and not so red-brown as adult females, nor are the birds themselves so large. Neither do they moult quite so early as adults. On the other hand, in spring they lose colour more quickly than adult females, and have a worn and faded appearance as early as June. The black bars on the flanks and breast are very conspicuous, and the whole of the head and upper parts are much darker than in adults. The secondaries and secondary coverts are worn greyish-brown with the narrow white edge still showing.

The oviduct of these second-year females is larger than that of the 5-months females, but is not developed like that of an old bird. Schiöler remarks that the ovary presents a somewhat different appearance, the single eggs being discernible and a few of them being a little enlarged. It may be possible that some of these immature females of 22 months breed; yet I think that the majority do not do so, for I have shot several consorting with the small packs of 9-months-old females which kept quite apart all the spring and summer from the breeding birds, whilst all Mr. Schiöler's examinations go to prove that female birds do not breed until the third spring.

Adult Plumage.—At the age of 2 years the bird commences another complete moult similar to that of the year before, and changes directly into its third winter plumage, which is that of the adult female. This is generally finished in November, when the female may be said to be adult at 28 months—in fact, maturity is reached at the same time as in the case of the male.

In the following spring she breeds. Females in the fourth year are more brilliant than those in the third year.

The female is in her best plumage in February. Head and neck sandy-rufous speckled with black; crown dark brown with sandy borders; mantle, scapulars, upper parts of the wing, back, and rump dark brown, the feathers edged with sandy or rufous; tail brown; primaries nearly black; secondaries and secondary coverts brown with paler edges, the outer edges broadly transversed with white and forming two alar bars; the five inner secondaries are a rich sandy-rufous; chin inclined to grey; upper breast, flanks, and under tail coverts dark brown, the feathers edged with sandy or rufous; rest of under parts greyish-brown. Legs and toes brownish-slate with green suffusion; bill like that of the male, only paler. Length 24 in., wing 11 in., tarsus 1.75 in.

Note.—With age there is an inclination on the part of the long secondaries to curl downwards, but not to such an extent as is seen in the male.

Breeding Range.

British Isles.—In England the Eider breeds only on the coast of Northumberland. Its chief resort is the Farne Islands, though it breeds occasionally on the coast (*Bird Life*

of the Borders, 2nd ed., pp. 370–1). Until about 1856 three pairs bred on the Coquet Isles, but Mr. A. H. Evans thought these had long since disappeared (*Fauna of Tweed*, p. 168). Mr. G. Bolam, however, gives details of nesting there in 1874 and probably in 1875. Several pairs nest on Ross Links, Northumberland, and occasionally on Holy Island (t. c., p. 167). Full details of the nesting of Eiders in Northumberland are given in Mr. G. Bolam's *Birds of Northumberland and E. Borders* (pp. 402–8). There are no records of the nesting of this species in Wales, whilst the first record of breeding in Ireland in Co. Donegal in 1912 is to be found in *British Birds*, vi. pp. 106, 166.

Scotland.—It occasionally nests on the Berwickshire coast (Bolam, t. c., p. 403), and becomes more numerous towards the north. I have seen old females and young off Dunbar and Aberlady sands, near North Berwick, in August. It also breeds on the islands of the Forth, particularly the Isle of May, and a few nest on the coast of S. Fife. In N.E. Fife it is common, and at least ten to twenty bring off broods on Tents Muir every year. It also nests from Monifieth to Carnoustie on the Buddon Ness sandhills, and between Carnoustie and Arbroath I have generally seen ten to twenty females with young in August. In this locality it is known by the curious name of "Moss-cock," as well as "Dunter." All along the coast of Forfarshire as far as Aberdeen a few Eiders breed, but are much harried by the local salmon fishers. It breeds abundantly at the mouth of the Ythan, in Aberdeenshire (G. Sim, *V. F. of Dee*, p. 152). I have seen Eiders with young off E. Culbin Sands, Morayshire, and I think it also nests on the Banff coast. It does not seem to come west of Forres except in winter, and is not again found breeding till we come to the Sutherland coast about Brora and Helmsdale, where I have seen females with small young ones. It breeds in varying numbers from John o' Groat's to Cape Wrath about the mouth of the Naver and down the west coast of Sutherland (for details of its increase in this area, see *V. F. of N.W. Highlands*, pp. 242–9). In all the western islands the Eider is now extending its range. When I first used to go to N. Uist, thirty years ago, Eiders were comparatively scarce, now they breed in large numbers down the west side of both N. and S. Uist, whilst a few nest also on the eastern side. They are also very common in Harris and the Lews on the Atlantic side. The bird is also extending its range through all the inner isles (cf. *V. F. Argyll*, p. 135), and is to be found breeding on Islay, Jura, Gigha, Colonsay, and on nearly all the small islets off Skye and the north-west coasts of Ross and Argyll. In fact, when seal-hunting in summer and autumn, I have rarely failed to observe parties of old and young Eiders in the neighbourhood of islands from Sutherland to the mouth of the Clyde. It also breeds on Haskeir and St. Kilda and the west side of Mull, Iona, and Cantyre. On the mainland it is said to be spreading in the Clyde area (*A. S. Nat. Hist.*, 1910, p. 183), and was first found breeding in Kirkcudbright in 1908 (*Birds of Dumfries*, p. 293).

The Eider is abundant in Orkney, and I have found it breeding wherever the coastline falls to the sea, so that females may have no difficulty in bringing their broods to the water. They particularly prefer small islands on which to nest, and I have seen as many as ten nests on one small island in the Bay of Firth. Along the north side of Hoy, and on the islands of Reisa Little and other islands of the Bring, many Eiders breed, as well as on Rousay and on all the other islands where the cliffs are not too steep. The species is very common throughout the Shetlands, and I have seen breeding birds in numbers on

every island of the whole group except Foula, which I have not visited. They are particularly numerous in the sound between Yell and North Rooe and all the adjoining Voes as well as in Unst. Eiders do sometimes nest far from the water, for I put a female off her nest high up on the cliffs of the Ramma Stacks in 1899.

Winter Range.—Our winters are seldom if ever sufficiently severe to cause the Eider to make much change in its habitat. In fact, this duck is a very stay-at-home species, and seldom moves far from the place it first saw the light. In winter it gathers in flocks in the neighbourhood of good feeding grounds, and seems to care little whether the situations of these are exposed or not, provided food is abundant. On the east coast of Scotland the Fife Eiders frequent St. Andrews Bay and the skerries of the Forth, the Buddon Ness and Arbroath Eiders the adjoining coasts, whilst a few immatures work up to the Moray Firth, where they are never seen in summer. So, too, in the Orkneys, the Eiders do not go far from their breeding grounds, although they will resort to the wildest and most exposed situations if they contain skerries where there are mussels and *Conchylia*. In Shetland most of the favourite Eider resorts in winter are somewhat sheltered voes indenting the mainland and islands, but the birds also affect many exposed situations between Hillswick and Papa Stour, and south to Dunrossness. The same applies to all the resorts in the western islands.

In winter a few Eiders, often immatures, come south and frequent the coasts of Yorkshire and Lincolnshire. They are almost regular visitors, too, to the English Channel, and flocks are observed nearly every winter off Rye, in Sussex, the coast of Hants, Dorset, and occasionally Cornwall. In N. Wales the Eider has only been observed on two or three occasions, in Anglesey (Forrest, *Fauna of N. Wales*, p. 291), and Colwyn Bay (*Brit. Birds*, viii. p. 33), but several records from Pembroke and Carmarthen are given by M. A. Mathew (*Birds of Pembrokeshire*, p. 73). To the Irish seaboard the Eider is only a rare and uncertain migrant in winter, and generally to the north coast. It shows how very local Eider-ducks are, that the species has so seldom been observed in Ireland, even about Rathlin, for instance, for that island is less than 20 miles from Islay in Scotland, where the birds breed freely.

Habits.—Essentially a lover of the open sea, the Eider seldom visits estuaries, and does not visit fresh water unless it has lost its way on migration. Where they are numerous they assemble in large flocks on the open sea, often far from land, and will brave out the wildest storms of the North Atlantic. About the skerries where they feed they break up in small companies, but much of their time is spent a mile or more from shore in rough water, where few ducks or divers, except the Velvet-Scoters are seen to rest. From the top of the Black Craig to the north-west of the village of Stromness in the Orkneys, I have seen parties of Eiders that have finished feeding flying out above the thundering breakers of the Atlantic, and settle far out in the ocean itself and ride for hours amongst the white-capped breakers with ease and comfort. They are gregarious birds, and it was often interesting to note the small flocks whose feeding grounds were some five or six miles away near the sheltered island of Graemsay, passing down the Bring and heading out to sea in search of their comrades, whose food was found about the Churchyard rocks. The Graemsay birds would fly down the tideway, and when they reached the ocean would take long tacks along the coast, going further

and further to sea with each journey until they saw the big flocks already resting, and these they would join. At the period of high-water this big flock would sometimes number a hundred to two hundred birds, and they would all keep paddling to maintain their position, until half-tide warned them that the feeding hour was near. Then they could be seen breaking away from the main flock in small parties and heading south to Hoy, east to Graemsay and the Churchyard rocks, and north along the coast. Day after day the same manœuvres were repeated, and it was rare to see even a single bird come within gun-range of the shore, though I have more than once killed them in a gale of wind.

All Eider resorts are not so wild as the West Orkneys, for in Shetland they frequent deep voes and narrow channels on the east side of the islands, where big waves are never encountered, but only heavy tide-rips, on whose edge they love to sleep and dream away the lazy hours of high-tide. On the east coast of Scotland, too, and the Western Islands, their resting places, though often far off-shore, are not as a rule very exposed. Yet it does not seem that these are chosen for shelter, but merely because they are near the favourite skerries where they feed and the low-lying coastlands where they breed in summer. Their usual resorts are low-lying islands, rising above the surface of the sea, in the vicinity of some low-lying coasts off whose shore lie ridges of rocks surrounded by mussel-banks. Many of the east Scotch resorts are, however, long shallows off a sand-dune coast where there are no rocks, and where the feeding grounds are sandy at the bottom and doubtless full of crabs and *Conchylia*. I have seen them diving for hours for these off the end of Buddon Ness, nearly a quarter of a mile from shore; and the birds that frequent this neighbourhood are there throughout the winter, and do not seem to join or overlap the Carnoustie-Arbroath birds or those of Tents Muir.

Especially in spring and autumn, Eiders like to go ashore and rest and preen in the sun close to the water's edge, and here they will sleep on some bunch of seaweed, the colour of the male being very conspicuous at a great distance. As a rule, however, they are more watchful when on shore than on the sea, and generally keep a sentinel on the look-out. In Norway, where they are seldom molested, it is common to see Eiders resting on the rocks at all hours, but in our islands they are more cautious, and one seldom sees them taking a siesta except on small islands where disturbance is unlikely, and then so close to the water that one quick movement will allow them to get afloat at once. I have, however, often seen them asleep on the west coast of the Hebrides, where all birds are much tamer than they are in Scotland or the northern isles. In summer they spend much of their time ashore even in our islands, and especially so at night. L. Lloyd, in his interesting *Game Birds and Wild Fowl of Norway*, says:

> "During the daytime the Eider, unless disturbed, spends fully as much of its time on land, or rather on the cold naked rocks so common in the 'Skärgård,' as in the water, and, as it would appear, in a state of repose. What may be the case in the winter, I know not: but in the summer it would seem always to pass the night on *terra firma;* for when boating by moonlight we frequently started these birds from their roosting places in the rocks, but never saw them on the water. If this be really the case, it would look as if the Eider, unlike most other birds of the Duck tribe, which obtain the greater part of their sustenance during the hours of darkness, feeds only in the daytime."

The male Eider is easily distinguished by its brilliant black-and-white plumage,

though the female may be confounded with the female Velvet-Scoter if it is not in flight, in which case the white secondaries of the latter at once determine the species. At short range, however, the long shape of the head of the female Eider is very noticeable. The flight is easy and rapid, and though they have some difficulty in rising, and display a certain clumsiness if there is no wind, it is strong and well sustained once the bird is fairly launched. It is generally performed at a height of from ten to twenty yards above the water and is very direct, without swaying from side to side as so many diving ducks do. They never pass over rocks or strips of land if they can possibly help it, and the shots that a shore gunner gets at these birds are few indeed.

There is an old fable, common alike in Norway and our northern isles, that if an Eider accidentally loses sight of the sea its powers of flight are gone, and that it stands on the land in a state of bewilderment, and so will allow itself to be taken by hand. This legend doubtless has its origin in birds that have on migration descended on rough ground from which they could not rise and were therefore captured, for the northern peasants have always noted how tenaciously the Eider keeps to the sea-coast in flight, and how rarely it ever flies except above the water. When passing from one bay to another, Eiders follow all the indentations of the coast rather than cross the narrowest neck of land.

On alighting in the water they often descend abruptly or glide into the sea with a great splash, seemingly careless of consequences. I have seen them hit the water and pass underneath for a yard or two as if enjoying the pleasure of resting again in their natural element. They are happy, joyous, affectionate birds in all their attitudes towards each other, and show less fear of man than any other sea-birds once they have known the meaning of protection, for both in confinement and in a wild state they are of a most confiding disposition to all whom they have learned to trust.

When standing still the back is carried in a horizontal position, but in their slow and rolling walk they hold the breast more erect, and this is still more the case if they are harried or frightened. But this position with the tail raised and the primaries dropped is only maintained for a few yards, then they sink forward, pick themselves up again and hurry forward with lowered head and neck. By this time they have probably reached the water, but if this is not the case they take to flight at once off the land, apparently dissatisfied with their slow mode of progression. Poor walkers as they are, the Eiders make up for their want of skill on land by their dexterity in the water. In swimming and diving they are surpassed by no other species of diving duck, being capable of holding their own in the roughest breakers, and diving to a great depth for food. It has been proved that they can take their food regularly at a depth of 25 to 35 feet and more without inconvenience. Any gunner who has wounded an Eider in a rough sea knows how easily it becomes lost to sight, whilst even in perfectly smooth water it is wonderful how this bird can hide itself, and scarcely make a ripple as it touches the surface only to disappear again.

I have several times followed the progression of an Eider under water in my gunning punt, by giving directions to my puntsman as I observed the line of direction pursued by the bird under water. This was only possible in perfectly still weather, and in some place where the water was not too deep. When much frightened the Eider invariably used its wings, but without in any way extending the primaries. This additional assistance

Walter L Collo. Sc

Eiders feeding.

certainly added to the speed of the bird under water. When actually forced to come to the surface for air, the Eider when pursued only reveals on the surface the edge of the bill and nostrils, and then only for a second. In consequence it is very difficult to see a wounded Eider if there is the slightest ripple on the surface of the sea. In his paper on the Eider, Mr. E. Schiöler narrates the extraordinary diving skill of a female Eider, with only one leg, which he shot in Denmark. He says:

"Though a cripple it swam and dived astonishingly well, and it was only after many exertions the bird came within gunshot. The weather was calm that day, the Fjord was smooth as a mirror, every little object on the surface of the water could be seen from a long distance, which rendered it possible to observe the wonderful art of swimming of this bird. When the boat came too near it disappeared like lightning below the surface, only appearing a long way off, without being able to tell beforehand in which direction it had been swimming, and all that appeared was just an insignificant part of the head and beak; if the bird had been out of its reckoning and discovered that it got too near the boat, it was seen swimming with just as little of the beak above the surface of the water as the tiny wake on the bright plane betrayed. At intervals it had to have the whole of the head and neck above the water when it lay and rested. At last we succeeded in shooting it at long range.

"I mention this in order to give an idea of the amazing diving capacity of these birds—one must not forget that this individual was previously wounded and crippled, and I have no doubt that the story of the wounded duck seizing with its teeth the algæ at the bottom of the lake (sea) and dying among these is based on similar experiences; one may shoot an Eider-duck flying past and see it fall down and dive, and never see it again. The fact is that, when these birds come up to breathe, knowing to be in danger, so little of them is visible that they are quite hidden if the water is only slightly stirred—in more calm weather they know how to cover themselves by ripples here and there on the surface. I have seen still more astounding feats of diving being performed by old male birds, also in calm weather; several times I have succeeded in seeing them swimming deep down in the dark bright water; the white back was visible, but the position and the movements were not seen until these birds came nearer to the surface. The neck was slightly curved and inclined backwards, the wings were half opened, and the feet working alternately. I cannot say whether they fly under water, using the wings in moving forward; in these cases a faint movement of the wings could be seen, but of course the birds were being pursued. The wings were not outstretched, only lifted away from the body, and the tips were pointed behind, but it is certain that the bones of the arm did not appear much influenced, not being modified by the resistance of the water as is the case with the bones of the auk, these having grown quite flattened."

Personally, I have the gravest doubts of the truth of the statement made by many writers, that the Eider and other sea-ducks "hold on" to the sea-weed at the bottom of the ocean rather than allow themselves to come to the surface and be shot. One morning in February 1866, I pursued an old male Eider which I had winged from a flock into some shallows off the island of Reisa Little, in the Orkneys. The white back of the bird could be plainly seen under water entering some dark weeds amongst small rocks near the shore. Presently it disappeared in the tangle, and as the bird did not again come to the surface, I leaned over the side of the boat and made search for it. I had seen it enter a comparatively small area of dark ground round which there were sand spaces, so I concluded it must be hidden amongst the fronds, and after a short search I saw the white back gleaming beside a small rock, the head and neck being concealed under the sea-weed. It occurred to me that it would be interesting to see whether the bird would voluntarily leave this position or not, so after waiting for a quarter of an hour, during which it did not move, I gave it a lift with my long seal-gaff, when it at once floated to the surface quite dead. The mouth was half open; some thin weeds encircled the neck. Doubtless this bird allowed itself

to be drowned, as its half-opened bill showed; but that it was actually holding on to the weeds, I could see no sign. I could narrate several instances of a similar character, which would only tend to show that whilst the birds both voluntarily get into positions under water from which they will not move until death overtakes them, and also into crannies and encircling weeds from which they cannot escape owing to lack of strength, yet there is not actual proof that they hold on to the weeds at the bottom of the sea, as Naumann suggests.

"The strong hold they have on life," says Naumann, "is very remarkable, and if a shot is not mortal they always try to save themselves by diving, or if the feet are injured, they steer with their wings, and birds damaged in the wing can hardly be tired out by cleverly steered and swiftly rowed light boats, from which it was intended to kill them with a blow from the oar. The strength of their vitality, as with many other animals, is particularly striking at the mating period, when the stories about it must often appear incredible to people who have had no experience of it. Even ducks of this species which have been damaged in the brain live for a long while, or dive under in order to hold on to the growths at the bottom of the sea with the beak and there to die"—(*Naturgeschichte der Vögel Mitteleuropas*, x. p. 231).

The Eider subsists chiefly on *Conchylia*, and more on bivalvular than monovalvular species. They also eat many species of crabs, sea-urchins, and all sorts of molluscs. They will catch small fish, and it is said that they will eat the entrails of fish that have been gutted and thrown into the sea, bringing them to the surface and breaking up and swallowing them. Whilst breaking up large substances on the surface, they are often robbed by the larger gulls, and I have seen a Great Black-back seize what looked like a large sand-eel from the mouth of an Eider that had brought it to the surface for dinner.

The common edible *Mytilus* seems to be preferred by the Eider to all other food, and their stomachs are often found filled with them. The birds are so greedy in devouring these that the gullet and neck is often seen distended with them, and it is a common sight to see an Eider swimming around gasping and trying to clear its gorged and inflated neck. I remember once, in Orkney, running down to a flock of feeding Eiders that for the moment had vanished beneath the waves. One rose near the boat with something like a thick stick projecting 5 or 6 inches from its mouth, which it was unable to close. I shot the bird, an old female, and found that the obstruction, when drawn out, was a razor-shell (*Ensis siliqua*), 10 inches long and 3 inches in circumference. How any bird, even with the digestion of a sea-duck, could assimilate so tough a morsel with a hard and thick shell seemed a marvel; but it is doubtless the case that they are able to break them up, and eject the shells as pellets. Naumann says that "in addition to other species of the genus *Mytilus*, they sometimes subsist on some species of the genera *Venus*, *Cardium*, and others, as well as univalves, such as *Nerita* and others, even *Buccinum undatum*. Moreover they also live on small common crabs and other crustacea, on small sea-urchins and such like, much less often on fish" (*Naturgeschichte der Vögel Mitteleuropas*, x. p. 231).

In the gizzards of Eiders I have dissected I have often found quantities of both periwinkles and limpets. The shells of these are doubtless disintegrated, as Mr. H. W. Robinson suggests (*British Birds*, vol. ii., March 1909, p. 344), partly by the gastric juices and partly by the trituration of the gizzard. Mr. Robinson adds (*id.*): "The Eider is also fond of limpets. My boatman once reared an Eider drake, which was the terror of the limpet-pickers on the island, for it would steal the limpets as fast as they were detached

from the rocks, and would attack the pickers with great spirit, using beak, wings, and feet, should they object to the levying this toll!"

Eiders obtain all their food from the bottom of the sea, and are able to reach such depths as 30 to 35 feet with ease. Most of their feeding grounds are on the "lee" side of skerries, but in many instances the feeding ground is situated on the skerry itself, or a shelving bank where large waves are constantly breaking. The flock often vanishes for several minutes, and, even when they appear amongst the worst breakers, they possess so sure an instinct of where it is possible to float with safety that a few strokes backwards or forwards with their powerful paddles is sufficient to place them in such a position that they are not overwhelmed. Unlike their neighbours, the Long-tailed Ducks, who have a habit of just sliding through a breaker to the other side as it is about to fall upon them, Eiders dive again at once in search of food, as if it were a waste of time to bother about temporary comfort.

Where mussels are abundant, large flocks sometimes of a hundred and more may be seen feeding together, whilst on the coasts of Norway as many as a thousand are often noted, and a large party diving amongst the breakers is at all times a pretty and interesting sight. They dive in a somewhat clumsy fashion, with the afterpart of the body thrown well up, with the tail spread, and in heavy currents the half-opened wings are used under water to assist progression. They continue to feed for two or three hours, but desist as soon as the incoming tide causes too great a depth on the feeding ground. Then they leave in small parties, flying away to more sheltered channels and islands, where they can spend a few hours in rest and preening. In winter, in our islands, they seldom go ashore, except in the most deserted islands and coasts of the Orkneys and Shetlands, where they are never subject to molestation; but as the spring advances they seem to exhibit greater tameness, and to come more and more to land edges, until by March and April it is common to see them sitting on the rocks in the warm hours of the day.

In winter Eiders are very silent birds, like all the sea-ducks except the Long-tail, and their voice is not often heard except when single individuals are searching for their friends. The male, when swimming, occasionally utters a hoarse grating call like the words "Kor-er-korkorr-kor," and the female a slightly higher note, "Kar-er-karkar-kāā." The female also utters this call when she is flying. It is not until the approach of the mating season that the male makes use of the soft call, "Aa-hūh" or "Aa-oo," and this, I think, is distinctly a love-call. But it may frequently be heard as early as January on fine days, and in very early seasons, such as that of 1913, Eiders were in full "show" by the middle of that month as my friend Mr. St. Quintin informs me. I do not think that the male ever utters any note when flying; at least I have never heard one. The young in down make a "peeping" cry like the Common Mallard, and when following the mother keep up a gentle "Peip, peip" if left behind.

The courtship of the Eider[1] is a very simple one, and somewhat undemonstrative. It is essentially in accordance with the gentle disposition of the bird. The female seems to be at least as amorous as the male, and pays considerable court to the object of her affections. Having selected a mate she follows him round and round in all his movements, stretching her neck out and sinking low in the water, calling and pushing herself against

[1] See *Auk*, 1910, p. 179, and Jourdain, *Brit. Bird Book*, § 11, p. 280.

his side until he responds. The male, on his part, makes a very slight "lift" in front, the bill being lowered and the neck drawn up. At the same time he inhales, and on releasing the air as he slightly sinks forward, he utters a gentle "Pu-whoo" or "Aā-u," almost a dove-like cry. At the moment the call is emitted, the mouth is slightly opened. The call of the male is repeatedly uttered, and is often made without "lifting" in front. At such times the head is held forward, then erected to the normal position as the cry is given. At the moment of calling, the whole throat is somewhat distended. When a general display is in progress amongst a flock of Eiders the males and females are in a constant state of movement and activity. The males often make half-turns and bows towards their inamorata, and utter a high soft note like the syllable "Whoop."

The courtship of the Eider varies greatly in different localities. I have generally noticed it in the first warm days of March, but like many other birds which get into condition early in the spring, the mating instinct is at once chilled on the resumption of cold weather, so that in the case of Partridges the pairs of Eiders may be made up in March, although the flock still keeps together, but it is unusual at least in other islands to observe Eiders definitely paired until the 1st of April. In very mild seasons, such as 1913, Eiders were in full display at Scampston in the middle of January, but this is somewhat abnormal. During the first outbreak of sexual excitement the adult male drives away any first- or second-year male that may happen to be with the flock of adult birds, but as a rule these immatures keep in flocks apart and conduct a courtship of their own, which is neither so full nor so serious as in the case of the older birds. In the event of the absence of adult males the females will, however, pursue assiduously any young male that happens to come near them, and will be so strenuous as to force them to pay attention to their desires. On May 1, 1910, Mr. St. Quintin and I both witnessed the act of copulation between a 10-months-old male and an adult female, and though other young males of the same age were on the lake their courtship was only half-hearted, and they seemed to fear to go near the female in question. The result in this case was that the female made a nest and laid eggs which were unfertile, but I do not know if the pairing of the second-year male and the said female would be successful or not. Mr. Schiöler says that the testes of second-year males are still somewhat incomplete. That these second-year males do actually pair with the female is undoubted, but that the act is only casual and not that of binding marriage seems to be the case, for I have not yet met any observer who has seen a pair of immature Eiders together in May when the female has actually made or is making her nest. Even if one female mated for a time with an immature, it is likely that he would sooner or later be driven off by an adult male who would in turn definitely pair with the female.[1]

As soon as the courtship has fully set in in April, the pairs seem to separate more and more from the flock, and even if they repair daily to the same feeding ground it will be noticed that each pair keeps apart and frequently welcome each other at almost every return to the surface. When the appetite is satiated the pair then fly off by themselves, and repair to some quiet spot near the land or island which they intend to make their summer home.

[1] Faber states (*Prodromus Islandisch. Ornithologie*, p. 70, 1822) that the male bird "is not capable of procreation until its fifth summer," whilst Professor Collett (*Minor Comm. Avi-Fauna, Norway*, 1881–82, pp. 284–6), in describing the advance of plumage of the male, says that "it may be doubtful if the male birds are capable of procreation while still in their first handsome plumage (2½–3 years). It is not improbable that they only attain puberty when 4 years old." These are views which are not substantiated by fact either in a wild state or in confinement.—J. G. M.

I have not observed that the males fight much at this season. It is common to see one drive another away that has come too near his mate, but the attacked one always seems to give way, and beyond a rush of white water there is no holding and actually fighting as we see in some other species.

In our islands Eiders are now adequately protected by the Wild Birds Preservation Act, whilst in all other European countries it is looked upon as an act of sacrilege to interfere with the Eiders in the breeding season, owing to the fact that the down is an article of value to the neighbouring farmers. In consequence Eiders seem to be on the increase in all their breeding haunts, and there become so tame that they may almost be said to be domesticated. On the Fro Islands opposite Trondhjem, they are so tame and the nests so crowded that it is almost impossible to walk in some places without treading on the birds or their eggs, and on the little island of Videy, opposite Reykjavik, Iceland, my brother took photographs of Eiders on their nests within three paces without disturbing them. Even in Orkney I have stroked a female Eider on her nest without her leaving it, and have seen another on the Isle of May (Firth of Forth) that was equally tame.

Generally about the first week in May, the female Eider seeks some spot not far removed from the water's edge in which to place her nest. The site is often hidden in hollows amongst small or large boulders, and often completely exposed on a tussock, where it can be seen from a distance. Many females nest close together, the nests often touching, and where they are well protected they often make their nests close to, and even on, the sides of human habitations, or amongst old masonry. F. Boie relates that in one place in Norway Eiders are often found breeding in the kitchens of inhabited houses, and that they become so trustful that they will allow themselves to be stroked, lifted from the nest, and replaced again without running or flying away.

The framework of the nest is generally composed of sea-grass (*Zosmarina fera*), and sea-weed (*Fucus vesiculosus*), and other kinds, whilst moss or the stalks of dry plants are often placed on the sides or bottom of the cavity. The bowl is often wide and deep and firmly put together. In one island of the Bay of Firth, near Kirkwall, I found three Eiders' nests close together that were entirely composed of sea-weed, there being no other material whatsoever except the lining of down.

In Denmark and the southern coast of Norway the eggs are often laid in the beginning of May, but farther north early in June is the common date. Numbers of young Eider are seen in Denmark, I. of Sylt, &c., in the first week in June, but in the Orkneys and Shetlands it is rare to see young Eiders before the 1st of July, and I have seen a brood on the Island of Damsey, Orkneys, just hatched so late as the 1st of August.

Speaking of the nesting habits and the period of hatching of Eider-ducks in Denmark, Mr. E. Lehn Schiöler says in his paper:

"If the bird is not frightened away from the nest she remains calmly sitting, especially if it be near the end of the hatching season, allowing one to come quite close to her. On May 23, 1905, I again saw brooding Eider-ducks on Saltholm; one female bird let me come so near that I succeeded in photographing her with a hand-camera, within the distance of a few yards. There were three of us, and we all stood erect next to the bird. Another female bird left the nest and we saw the eggs break—the young ones were on the point of bursting the shell. Finally a third female left the nest hurriedly, though we drove past it, and revealed six newborn ducklings, one of which broke out of the family crowd, and

made an attempt to escape beyond the downy edge of the nest across the field after the mother, who in the well-known fashion, with drooping wings, waddled and tumbled about, pretending to be ill and disabled. In the following year, on May 18, 20, and 23, newborn ducklings were to be seen; on June 10 I sailed, together with H. Winge and Th. Krabbe, from the preserved Svaneklapper, south of Saltholm, back to Dragör, and on the way I noticed several female birds with broods of ducklings a good way from land. The ducklings were the size of a teal and dived cleverly. One duckling a little bigger is exhibited in the Zoological Museum (April 19, 1892). It is covered with feathers on the belly, the shoulders, and the top of the head, otherwise with down.

"Nilsson states 'that eggs are to be found in the beginning of May, and even in the beginning of June'; von Wright, in Chapter I. p. 84, communicates that in the Bohuslän Skerries the Eider-ducks 'at the commencement of the hatching season in April push still farther towards land, and brood in the innermost fjords.'

"Seeing that most of the Eider-ducks found and shot here on our coasts during the winter are sure to be hatched either here or in Sweden and South Norway, one cannot be far wrong in fixing June 1 as the day of their birth; therefore, when speaking of the age stated in months as regards the typical Eider-duck, this is on an average reckoned from June 1."

In our northern islands I have seldom noticed more than 4 or 5 eggs in the nest, 4 being the usual number. When the last egg has been laid the female plucks out much of her own down to use for the surrounding parts of the nest, and to this she daily adds more until it forms a dense covering, in case by any chance she might be forced to leave. Of all sea-ducks the Eider provides more down for her nest than any other species. If undisturbed, she sits for the whole period of incubation; but if disturbed, the mother bird only goes a very short distance and *squats* on the ground, as if exhausted by the effort, and then waddles back to her nest as soon as the intruder has passed. Female Eiders on their nests seem to exhibit various degrees in their fear or tameness towards man, and in this show that all individuals are not alike. I remember once walking very quietly into a colony of Eiders in Iceland which were nearly all sitting closely, as the date, June 10, was about the hatching time. Some of the females flew straight away from their nests in some fear, and settled out on the sea about 100 yards distant. Others left their nests and flew round me, uttering a gentle croaking cry, and then alighted and waddled about in uneasy fashion. Others sprang out of their nests, ran a few yards, and sat down watching me, but in no unfriendly way, whilst the majority paid little heed to my intrusion beyond depressing their necks as they sat on their eggs. Many were so tame that I am sure they could have been touched and remain on their nests, whilst my brother adjusted his stand-camera and took photographs at a range of 2 or 3 yards. As we approached the colony, three females, each with four newly-hatched young, were found sitting on the shore, but these at once put to sea with haste, the mothers swimming with powerful strokes, and the young scurrying after in the slight back-wash immediately behind her scapulars. In the case of two of these families, the mother stopped after a short time and allowed two young ones to mount her back, and thus burdened she looked like a little boat with her passengers. Whilst we stayed in the Eider colony two males occasionally came in from the sea and flew round us, as if they still betrayed some anxiety for their respective families, but I saw no others in the neighbourhood.

As long as the female is laying eggs the male stays close by, and is often to be seen sitting on the shore or swimming in the sea close at hand. Once, however, the female begins to sit continuously, the male gradually withdraws to the society of other males,

and these form small parties which move away to isolated skerries or rocks, where they seem anxious to avoid observation.

I spent the month of June and early July in 1885 in Stromness, Orkneys, being anxious to obtain male Eiders going into or assuming eclipse plumage. A very few were still found singly about the nesting places on Hoy and Pomona until June 10. Then parties of males, still in the black-and-white plumage, were noticed almost daily off Lywra Burn, Reisa Little, and a small island in the middle of the Bring known as the Barrel of Butter. These parties became larger as the month proceeded, but when found were remarkably tame, and I could always sail my boat to within 30 yards of them before they took to wing. On July 1 I missed them, and it was two days before I sighted a large flock resting on the Barrel of Butter quite three-quarters of a mile away. The day was very calm, and I was astonished to see the birds rush into the water and make all haste to disappear as if much frightened. I then noticed that at least two-thirds of the birds were unable to fly, and were flapping over the water in a helpless manner. After going some distance they ceased this mode of progression, and all dived and scattered in every direction, only three or four birds, still in the black-and-white plumage, taking to wing. I did not obtain a single shot. During the following week I found the male Eiders three times, and on every occasion they took fright at distances ranging from a quarter to three-quarters of a mile, and it was only by chance I killed one male in half-eclipse.

Subsequent journeys in search of eclipse birds in the Orkneys, Shetlands, and the Hebrides have convinced me that great fear comes upon these birds whilst in the flightless stage, and that it is not until the beginning of September, when the eclipse plumage is quite complete, and the wings are just capable of bearing them in flight that the male Eider is again approachable. I have, however, twice surprised large parties of eclipse males when at rest on shore, and driven them shorewards without their scattering. This, however, required slow and careful manœuvring. In both cases on the west coast of N. Uist the birds took to the rocks, evidently fearing to dive towards the boat, and after running over them, those which could fly took to wing and came past me within easy range. I secured two on the first occasion, and five on the second, before they flew out of shot.

These N. Uist birds were tamer than any I have seen in the Orkneys or Shetlands in the autumn, and yet when stalking seals I have often been surprised at their quick eyesight and retreat from the rocks when I essayed a stalk off-shore. I never once succeeded in stalking one I had previously marked, although the rocks were favourable to a hidden advance, but one day having failed in a stalk at a seal, I took a shot with my Mannlicher rifle at a male Eider that was sitting out on the sea at about 230 yards, and was lucky enough to kill it dead. It was the best specimen of an eclipse bird I have secured, and is figured by Mr. Murray Dixon in the coloured plate.

I think the young remain in the nest for several hours after they are hatched, in fact until they are quite dry. I was stalking seals on Damsey Island, Orkneys, one morning about the end of June, and disturbed a female Eider from her nest in which were four newly-hatched young, quite wet, with the broken egg-shells beside them. At midday the young were still there, with the mother sitting beside them; but in the evening, as I left the island, I saw the female with her young on the water's edge.

Very often the female Eiders adopt a sort of kindergarten system of juvenile education such as I have also noticed occasionally amongst Common Wild Ducks and Sheld-Ducks. One day in early July I saw three female Eiders with young, the only ones that nested that year on the Cleston shore, Pomona, and on passing the same place next day I saw only one female with twelve young ones following her. There was no sign of the other two mothers. Three or four days afterwards I passed the same place, and saw the three females again, each with their four young ones. Now this seems to point to an interesting fact in Eider domestic health or economy. What were the two absent mothers doing by going away by themselves? I can only surmise that they had departed for a short time to some better feeding ground where they could find an abundance of food, and so recuperate quickly after the long and trying privations incidental to incubation.

I noticed exactly the same thing in August 1899 on the west coast of N. Uist, where there were three female Sheld-Ducks, each with about ten young ones. On certain days I could see each mother with her own brood, and then for a day or two the whole thirty young ones would be with one old female, and again after the lapse of another day or two the separate families would be reunited. I think the fact is interesting, and one that I have not seen touched upon by naturalists.

At first the female Eider stays with her young in quiet nooks near the shore, and here she teaches them to search for spawn, and small crabs, and small *Conchylia*, as the tide recedes. She is an excellent mother, and very anxious and brave in the defence of her young. Gradually she takes them further and further to sea, often on her back, and I have seen the mother dive when they are still in this position, as if to teach them to follow her in any sudden movement. Not that the young require much teaching, for at the end of the first week they dive with facility, although they cannot reach any great depth. By the time the scapulars begin to show, they are expert divers, and will go far to sea and will face very rough water. So their education progresses, the parent bird staying with her young until October, when they are quite capable of looking after themselves in the big flocks of immatures that assemble together.

In places where the eggs are regularly plundered, the female Eider will lay again usually only three eggs, and if these are taken she will generally lay only one more, and often of a small size. In Denmark the young are capable of flight by the middle of July; but in our islands it is generally about the middle of August before they are seen on the wing, whilst backward birds of a second hatching may not fly till September. Eiders are easily scared from their breeding grounds by shooting, and will soon desert a place if subjected to such treatment. In the north of Iceland, where I was only shooting a few specimens of other ducks in eclipse, the inhabitants always begged me not to fire my gun within a mile of any Eider colony, as they feared it would alarm the birds, so I did not do so.

About the beginning of October the winter flocks begin to come together, and the old males may be seen with the females again; but in our islands it is unusual to find adults and young birds of the year mixing to any extent. In the Baltic and on the Norwegian and Danish coasts immense numbers, often consisting of both adults and immatures, come together and frequent the Cattegat and open stretches of water; but as the winter comes on these again split up and move west and south in smaller parties, according to the variations

Walter L. Collins, Sc.

Courtship of the Eider.

of the temperature. Both in Iceland and Northern Finmark Eiders stay all the winter, as there is generally open water about the mouths of the fjords; and these birds probably never move south at all, as the large Swedish race does in exceptional conditions. Whilst on migration in autumn a wandering individual may sometimes be found on fresh-water lakes; but the circumstance is rare, and those that occur at intervals in the fresh-water ponds of England, Central Germany, and even Switzerland, are just stragglers that have lost their way.

Being quite unfit for the table, Eiders should never be killed except as specimens for the museum, although hundreds are annually exposed for sale in the shops of Norway, Denmark, and Germany. I have met fishermen on the east coast of Scotland who say they are as good as Mallard to eat; but I must confess that the only one I ever tried was worse than most ducks feeding on shell-fish, and that is giving it a pretty poor character as a table-bird. When specimens are wanted—and there is no bird in the world whose complete series of plumages are more interesting to collect—it will be found that Eiders are for the most part somewhat difficult to obtain in winter. There are always places where the adults can be shot with certainty by one who knows the local habitats of this bird and is able to handle a gun effectively in a rocking boat; but to shoot the immatures and adults in the various states of plumage found in the first, second, and third year is far from easy, and is a task that will tax the powers of the most energetic hunter. To obtain second-year males and some of the eclipse plumages, I have always found a most difficult task, for these often lead a solitary existence, and they avoid the regular feeding grounds affected by adults, often going to places for their food so exposed and stormy that it is highly dangerous to pursue them. Even if found, the turmoil of the waves is so great that it is found difficult to keep one's seat in the boat, whilst shooting can only be of a snap-shot order.

Of course this makes the charm of the Eider and other sea-ducks all the more interesting to the true naturalist, for it is a truism in human nature that the more difficult a thing is to obtain the more we value it. There is, therefore, a certain pride amongst gunners that they should themselves shoot what is not easy to obtain, and the personal capture of a series of Eiders makes one of the greatest triumphs of sport upon the open sea. If any of my readers desires a task that requires eight or ten years of assiduous hunting amongst the northern seas let him try to collect a series of Eider skins, and at the end of that time I think he will agree with me that he will at least have had a very agreeable experience of sea-shooting before his labours were completed.

Eiders at sea can usually be detected by the white backs of the males. While most sea-ducks generally keep paddling directly head to wind, this is not the case with the Eider, and one of the first things you will notice in sighting these birds is that both males and females keep turning round and round in the water, first head and then tail to wind, as if indifferent to the elements.

If the birds are downwind and the wind not too strong, they may be directly sailed to; but if the wind behind is strong the boat is sure to make a slight crashing as it overlaps the more slowly moving waves, and this alarms the birds very considerably. The only thing here to do is to lower the sail to such an extent that the boat just drifts downwind at a pace consistent with silent approach. Unless much shot at Eiders will generally permit the sailing boat to approach to within 80 yards. They then put up

their necks, cock their tails up, and rise in a body or a string, coming past the boat within gun shot.

If viewed upwind it is necessary to make several short tacks until the boat is in a position to sail directly down on the birds, for if approached on a side-wind they are apt to take alarm easily and to pass away out of shot. The best day to shoot Eiders—in fact, any of the true sea-ducks—is one when the sea is calm and there is just sufficient wind to drive the boat along at a pace a little faster to that at which the ducks are moving. They are then loath to rise, and keep retreating until they may be sometimes jammed in on the rocks, from which they will break towards the boat at very close range.

The first three seasons I hunted Eiders on the Orkneys, I only obtained two shots at second-year males, both of them in a high sea. The first I missed, and the second I knocked down but lost; it was not until several seasons had passed and I had an intimate local knowledge of these birds in various other resorts that I succeeded in killing all the various plumages I required, and this only after many failures.

I have killed a few immature Eiders from the double-handed gunning punt, but these occasions were rare, for the difficulty was to find Eiders in such a place that a double punt could be used at them with safety. In every instance where I have run to them with the punt they have shown a complete lack of suspicion of this class of boat, and have allowed me to come as near as I wished. I found ten immature male Eiders in Campbelltown Bay, Moray Firth, in February 1892, and lay for some months within 20 yards of them. Only one was a specimen I desired, so I shot him. On one or two rare occasions I have towed my punt to the little isles in the Bring, and twice used it with success at Eiders and Velvet-Scoters, and twice in St. Andrews Bay, Fife, although on the second occasion I was glad to get back to the lugger, as a nasty sea got up and nearly upset the punt. But for wild sea-fowl that cannot be approached by any other method, there is no boat that can vie with the double gunning punt, provided the shooter is prepared to undertake some risk.

In the winter Eiders have few enemies except man, though sea eagles often attack them along the coast-line in Norway; whilst the Great Black-backed Gull has a wonderful eye for a "pricked" bird, and will hunt it until it falls a prey owing to exhaustion. In the summer Eiders have many enemies in their arctic home, and a few in our islands. Even in the Orkneys and Shetlands a few of the young fall a prey to both Lesser and Greater Black-backed Gulls; whilst Richardson's Skua is not wholly above suspicion. In Unst the Great Skua has been seen to attack and swallow young Eiders. In Iceland numbers of young Eiders are killed by Richardson's Skua, sea-eagles, and a few by the Iceland Falcons. Arctic foxes are not numerous here as they are in the Russian islands, Greenland, and Labrador, where these animals levy heavy toll on the old birds on the nests as well as the young. Polar bears also kill quantities of young Eiders, and will break and eat their eggs. In West Greenland the Harp Seal is said to catch Eiders on the water, coming up and seizing them from below, and it is possible that the small whale *orca gladiator* kills a few. In North-east Greenland the chief marauder of all sea-birds is the Glaucous Gull, which creates much havoc amongst young ducks.

Certain parasitic insects, as yet unidentified, harbour in the feathers of Eiders, whilst Von Limstow gives the following formidable list of parasites that infest the entrails: *Strongylus modularis*, Rud; *Strongylus acutus*, Lundahl; *Tropidocerca inflata*, Dies;

Echinorhynchus polymorphus, Brems; *Distomum constrictum*, Mehlis; *Monostomum alveatum*, Mehlis; *Monostomum flavum*, Mehlis; *Holostomum erraticum*, Duj; *Notocotyle triserialis*, Dies: *Taenia tenuirostris*, Rud; *Taenia microsoma*, Crepl; *Taenia teres*, Krabbe; *Taenia fallax*, Krabbe; *Distomum somateriæ*, Levinsen; *Distomum pygmæum*, Levinsen; *Notocotyle triserialis*, Dies.

The eggs of the Eider are much sought after for food by the inhabitants of the far north, in spite of the fact that they have a somewhat rancid and oily flavour. In many places, such as Denmark and Norway, it is not actually forbidden to take the eggs, so the nests are often robbed twice, until in fact there is only one egg left.[1] In Northern Norway, the Færöes, Iceland, and Greenland, the nests are plundered as often as occasion suits the natives, sometimes without regard to future consequences. The most important economic use of the Eider is the down, which is surpassed by no other material in lightness and softness, and is therefore greatly prized for the stuffing of quilts, cushions, and pillows. The down of the Eider is superior to that of swans, geese, and other ducks, and only that of the Sheld-Duck bears any comparison to it in quality, if we except that of the King-Eider. Each single spray of down is brownish-grey, being whitish towards the root. It clings closely together: so much so, that it is difficult to separate. Nevertheless it never becomes lumpy, or in any sense hard, and can therefore be compressed within a small space. Yet a cushion once freed expands again quickly, and is always warm to the touch. Its value, therefore, for all forms of stuffing where warmth and lightness are essential, is very great, and the material, once cleansed and made up, always commands a good price. Five pounds of eider-down is sufficient to stuff a whole mattress for a bed, and in Germany, where it is much used, 1 lb. of cleansed down fetches from 4 to 5 thalers.

In places where the collection of the down is a regular industry, such as in Denmark and the west of Norway, no shooting is permitted near the breeding colonies, nor are any dogs allowed to approach. The less these places are visited by human beings the better these birds thrive, but they soon become trustful and confiding in the proximity of persons whom they have learnt by experience will do them no harm, and Eiders will even breed in shelters provided for them quite close to buildings. The eider-down that is collected from the nests is what the female plucks from her breast and belly. It is heaped up all round her as she sits, and forms a compact wreath. This down seems to be of better quality than that which is afterwards plucked from the breasts of the birds after they have been killed, because it is procured when it is in its most suitable condition. The down is generally collected from the nests immediately the young have left, but some men are so greedy to secure a larger share that they take it once and even twice whilst the female is making her pile around her, and so she is frequently rendered bare on the under parts owing to repeated pluckings. It has been said that under such circumstances the male comes to the rescue and furnishes his quota of down to help his wife, but this seems to be only a pretty story which has no foundation in fact. Down taken from the nest is cleaner than down plucked by man, yet it is always intermixed with particles of dry grass, heather, moss, sea-grass, or sea-weed, and has to be thoroughly cleansed before it is marketable. This is effected by rubbing, pulling apart, and shaking between the hands after being dried in the sun, and in

[1] In Iceland the nests are not robbed of *all* the eggs, but two or three are always left, and the rest taken. This is done with great care, the eggs being marked with indelible pencil to ensure the removal of fresh eggs only.

this process the most difficult parts to extract are the small horny bits of sea-weed with tough, leather-like edges. The latter are difficult to remove without blemish, and so two qualities of down are created, namely, that which has contained particles of sea-grass, &c., and that which has been much pulled about by the extraction of sea-weed.

Eider-down loses more than half its weight by the removal of foreign matter. Even after a nest has been robbed three times, a single Eider only produces about ¼ lb. of marketable down; and even this has to be subjected to further treatment by drying in the sun, for the purpose of eradicating the tiny bits of salt which adhere to it and attract moisture.

The business of collecting the eider-down is generally vested in the local inhabitants of the far north. Although, properly speaking, the lands may belong to the Crown, local landowners have always claimed the right, and deal directly with various companies who send their agents to collect the down at the end of the summer. The Icelandic companies generally make a profit of about 100 per cent. by the business. As an example of the methods employed, the collection, sale, and prices of eider-down, R. Blasius says, in the new edition of Naumann (*Vögel Mitteleuropas*, x. p. 235):

"On the Fro Island, belonging to Tobias U. Borthen, situated west of Drontheim, and which I visited this summer, there nest about 4000 to 5000 pairs of Eider-Ducks. Out of a total number of about 2400 large and small skerries, crags, and islands, some dozens are inhabited by Eider-Ducks. The fishermen's families always living on the islands have the duty of collecting the down. Each family has its own district, and scours the nests in the middle of June. The down is later cleaned in Drontheim; 1 kg. of cleaned down is procured from 6 to 6.5 kg. of uncleaned. On an average, 50 to 70 kg. of cleaned down is procured annually. The kilogram costs at present 28 kröne—31 marks in Drontheim. The price varies, moreover, very much; thus, according to information given me by Herr Karl Langerfeldt of Brunswick, Trömso eider-down was sold this spring in Copenhagen for 54 marks the kilogram, Greenland eider-down for 46 marks." [1]

In the Færöes I have seen large colonies of Eiders from which the down is taken as a regular business.

On the shores of Isafiardarjup there is a great colony of the ducks. So thick are the nests clustered among the stones, that it is almost impossible to walk without treading upon them. For generations the birds have bred there, and, indeed, every inducement is held out for them to make the island their home. This island, some three-quarters of a mile in length, is a huge farm for Eiders. A little way above high-water mark a strong breakwater has been built, but at the foot of the wall and along the sides there is a cavity where every second stone should have been laid. These compartments form excellent nesting places, and there the ducks make their tiny homes. Everywhere on the island similar provision is made for the birds—even a farm-house has its full complement of nests. Ducks hatch their eggs in "apartments" in the walls, in the window embrasures, on the ground around the house, and even on the roof itself. Brown-feathered backs in the season may be seen popping out of every and any unexpected place. They would make a nest on the door-knocker if one were there and remained steady enough. Hillocks are cut into squares like immense draughtboards, rocks are carefully arranged, mounds are dug with caution, all for the purpose of giving the little brown Eider a chance to nest and hatch her eggs.

[1] Pearson and Bidwell (*Ibis*, 1894, p. 233) estimate the value of 1 lb. of cleaned eider-down at 15s. 7d. to 16s. 8d.

Only twice in the season is the Eider robbed of her down. The third time would be fatal to the gatherer's purpose. When the birds arrive they select a site for their home in a niche, a ledge, or a hollow, and in this four or five pale-green eggs are laid and the hen sits down to her task. As the days pass she plucks the soft, warm down from her body, and with it builds up a small barricade around her. When she has done this the man with the bag comes along and lifts the hen, gathers up the beautiful down and the eggs, lays the hen back on her harried nest, and walks on to the next. But the Eider is a philosopher. With little protestation she begins to build up a new home, and this time her eggs generally number three. They, too, are buried in a pillow of soft grey down; and again the man with the bag appears and robs her. After this, however, she is left in peace for the rest of the season.

The Greenlanders—that is, the half-breed Danes and Esquimaux—who make a practice of shooting Eiders and King-Eiders in the spring, pluck the whole of the breast and lower parts of the outer feathers, and then skin and dry these parts, which are sent to Copenhagen, Bergen, and Throndhjem. Here they are used for the edgings of superior bed-quilts, and on the outside edges of these are also placed the beautiful head and neck-skins (unplucked) of the male Eider and King-Eider. This makes a lovely ornament for any bed, and they are worked into shape in large numbers by the firms of Brandt (Bergen) and Brunn (Throndhjem). One of these quilts cost from £10 to £12, and they often figure in the lists of wedding presents in London drawing-rooms.

The Greenlanders also sew these plucked skins together and wear them as shirts, the down side resting against the bare skin, for which they are considered the best possible protection.

Varieties of the Eider are extremely rare. I remember about thirty years ago going to visit the late Frederick Bond, who possessed such a remarkable collection of albinos and varieties, at Staines. I was accompanied by Mr. E. Bidwell, who carried with him as a gift to the old naturalist, a beautiful white Eider-Duck, which I think had been killed in Norway. This bird is now in the collection of Mr. J. Whitaker of Rainworth, Notts, who purchased the "Bond" collection after the death of the owner. The only other white specimen I know of is now in the National collection at Copenhagen. It is figured by Mr. E. Lehn Schiöler in his paper, *Lidtom Ederfuglen, Somateria mollissima, L., og Nogle af dens racer*, p. 146, Copenhagen, June 1908.

In the Natural History Museum at Christiania, I recently examined an interesting example of an old female Eider partially assuming the plumage of the male, killed on the Norwegian coast. The long secondaries are unusually curled, and there is much black on the flanks and white in the scapulars of the bird in question. Hybrids between this species are also extremely rare. A few years ago I examined in London two very beautiful adult male hybrids between the Greenland Eider and the King-Eider. The plumage of these two specimens was a remarkable blending of the plumage of both species, and they were both figured by Mr. H. Grönvold for the *Proceedings of the Danish National Museum*, where the specimens now are. Both birds were killed at the same time in spring on the west coast of Greenland.

Mr. W. Eagle Clarke has given (*Scot. Nat.*, 1912, p. 198, Pl. V.) a description and figure of a remarkable hybrid between an Eider and a Wild Duck. It is a drake, and was

shot by Mr. Laidlaw on the island of Auskerry, Orkneys, early in 1912. Mr. Eagle Clarke and Dr. C. B. Ticehurst believe they saw a similar specimen on the Pentland Skerries in May 1912.

Naumann, in his admirable work on European birds, considered that it was impossible to keep this bird in confinement, owing to the fact, as he thought, that it could not live without a constant supply of fresh mussels and *Conchylia*, and the presence of sea-water. But his theory is disproved by certain skilful aviculturists, and the fact that the bird occasionally breeds in a wild state on fresh-water lakes seems to show that the Eider has no definite objection to fresh water, provided certain foods of compensating character are supplied. I think it was the late Mr. E. T. Booth who first kept this species in confinement in our islands, and acclimatised them to various conditions of life so successfully that they bred.

Later, Mr. F. E. Blaauw was equally successful, and has described the methods he took to ensure success in the following paper, *Ueber die Zucht und Entwickelung der Eiderente, &c.* (On the Breeding and Development of the Eider-Duck, &c.), which he kindly sends to me:

"In December of the year 1890 I received a living specimen of the Eider-Duck, which had been caught in a fish-net north of Gröningen.

"It was a bird of the preceding spring and a male. Contrary to my expectation, the duck soon became tame, and grew accustomed to being fed on cut-up fish, meat, white bread, buck wheat, and spinage. The bird, which was rather weak, soon recovered completely, and in the spring grew a partially complete full plumage; while, at the same period, it began to make its cry heard, this being accompanied by the head and neck being craned backwards and forwards.

"In the following July, the bird moulted and assumed the familiar blackish summer plumage.

"Towards the end of August, the bird finally began to get its full plumage, this time completely, except that the crooked white wing-feathers still had black points. Since then it has got its full plumage every autumn, always with the same completeness, with pinkish breast and green neck feathers of wonderful beauty. (This is about to take place for the eleventh time.) Three years ago I procured a female of the same species, which was greeted with great joy by the old male bird. It had been imported from Norway. In the spring of the year 1900, I noticed during the month of May that both birds, which were usually fairly quiet, became more and more excited, and flew backwards and forwards against the grating which enclosed the duck-pond. It was not difficult to account for this behaviour: they wanted an opportunity of nesting.

"I placed a round, covered basket, provided with one entrance and with some hay and rushes in it, in what seemed to me a suitable spot, and soon noticed the Eider-Duck enter it. In the early days of June, I found that she was sitting steadily on a sitting of three blue eggs, which were embedded in an abundance of down. The bird sat very faithfully and was not once seen on the water during the period of hatching, so that she must have been there in the early morning.

"On the 1st of July, I noticed that there were young in the nest, and, after more careful examination, it became evident that all three eggs had hatched out. As I was afraid lest rooks might rob the delicate young, I removed the nest with mother and young to an enclosure, roofed in with wire netting, where there was a small pool in addition to a little plot of grass."

Mr. Blaauw then proceeds to describe the upgrowth and subsequent plumages of the young Eider until maturity, all of which agree with the conclusions I have already expressed. Subsequently also, in a letter to me (September 6, 1900), Mr. Blaauw agreed that the male Eider did not obtain its complete plumage until the autumn of the third year —that is, at 2½ years old.

Another very successful breeder of Eiders is Mr. W. H. St. Quintin of Scampston Hall, Yorks, whose keeper of the birds, Mr. A. F. Moody, has kindly furnished me with the following interesting notes that may be of value to any of my readers who wish to keep these birds in confinement. He says:

"The Eider is an interesting and beautiful species, and is one that is rarely seen in confinement. For the past twenty-five years, however (since 1886), they have without a break been represented in the Scampston collection, and provided sufficient deep water can be allowed them to exercise their diving powers and due attention is paid to food and regularity of feeding, &c., they may be classed as moderately long-lived and fairly easy to keep (one particular female living eleven years). Like other sea-ducks, however, and particularly such as are not thoroughly established, they are not altogether unmindful of severe frost, and are occasionally subject to short attacks of cold or indisposition; the moult also in some cases proves a severe trial, and it is not unusual from one of these causes for an Eider to become much reduced by refusing food for several days in succession. At these times nothing can be done except to frequently tempt the bird by throwing pieces of food within its reach at intervals during the day, and to make provision that plenty of grit is within reach, and that immediately the bird's appetite returns a supply of tempting and nourishing food is not lacking.

"As to diet, Eider-Ducks rarely eat grain, and we do not encourage them to do so, but feed our birds almost entirely upon barley meal and pieces of fresh bullock's, sheep's, or rabbit's liver. They like it, and have thriven upon this food alone for years; and it is only comparatively recently since we have included Smew, Long-tailed, &c., in the collection, that the Eiders have taken to securing an occasional course of fish. We feed our Eiders and other sea-ducks twice per day by throwing food to each bird piece by piece from the hand; the meal is given first, and they are encouraged to dive into deep water for it, and although by feeding in this way a certain amount of food is taken or robbed by the fresh-water species, the exercise and excitement produced by having to work for their living must undoubtedly be beneficial to these denizens of the open sea. As to the species' habits, generally in confinement it is rather a distinct bird, and as far as I have had opportunities of observing there is no other duck (except wounded or hard-pressed birds) that uses its wings to such an extent under water. They are also, for diving ducks, good walkers, and spend a considerable portion of their time upon land; and if by any means their feeding time was unduly delayed, it used to be no uncommon sight when we possessed several pairs to see the whole drove bodily come waddling to meet one at a distance of 50 yards from the water, and if this broad hint was not immediately attended to, the tameness of the drakes was such that they would try to further matters by inflicting several determined taps at a person's legs. This excessive familiarity was, to the best of my recollections, chiefly noticeable in breeding examples. Regarding breeding, the nesting habits of the Eider are so well known, and have been so frequently described in a state of nature, that beyond stating the fact that they have repeatedly bred here, little need be said concerning their nidification in confinement. One peculiarity, however, which in spite of the bird's tameness would be difficult to observe under natural conditions, is that during the whole of the twenty-eight days which the female Eider incubates, she never or rarely takes food, and although I have occasionally seen them leave the nest for a hurried splash, they are extremely anxious to return to the eggs; nor will they eat if vessels of food be continuously left by the nest side, the consequence being that at the end of this self-imposed and prolonged fast the birds are in rather a reduced state and require high feeding to restore them to their normal condition.

"As to rearing, we usually transfer the eggs before hatching to steady hens, and substitute for them two or three domestic ducks' eggs similarly incubated, which as a reward and encouragement to breed we allow the Eider to hatch and rear. The young Eiders themselves are rather difficult to start, and although they partake of the ordinary duckling's fare, and eventually strips of liver, &c., they are for the first few weeks largely dependent on earthworms; once, however, fairly started, they grow rapidly, but care has to be taken that they do not remain too long in the direct rays of the hot sun, otherwise we found them subject to sunstroke. *Re* the sexes, the young males in their first feather can usually be separated from the females by their voice, their darker and more uniform appearance; also, I have thought, by a whiter edged wing-bar, and although they moult into an incomplete black-and-white plumage the first autumn (in one instance I noticed a bird, hatched on June 11, first began to change by assuming a few

white feathers on the breast during the first week in October). They are always, during the winter, to be distinguished from the mature males up to the fourth winter's moult by the presence of a certain amount of black or grey on the white of the upper parts. Thus a bird in its second winter has the lower half of the larger, and as yet imperfectly-formed, sickle-shaped, inner territories blackish, and the pure white of the back marred by several of the feathers having grey or blackish margins. The third winter, the tips only of the sickles are dark, and the grey margins on the back are much reduced in number. The fourth winter, as far as can be observed without handling, the bird appears adult as the sickles come white, and it is only on looking very closely that a few indistinct grey lines can be discerned on the back. Concerning the seasonal change of the male Eider, the eclipse or summer plumage may roughly be described as a dull black, and of a certain drake I have notes to the effect that this phase of plumage was commenced on May 15, completed on August 18, and lasted only a day or two, when the beautiful winter dress was commenced by the sides of the head becoming hoary, and completed in its turn on November 12. The call of the male Eider is a wild and musical Coo-oo or Ah-oo, which can be heard at a considerable distance. They usually begin to call on assuming the nuptial dress,[1] but become more vociferous and amorous as the breeding season approaches.

"With reference to the proportions of the different foods mentioned for Eiders and other diving sea-ducks, no fixed rule is made, but the meal constitutes their staple diet, and is usually only supplemented by an allowance of a few pieces of fish (chiefly herring) or animal food each bird per day; some discretion, however, has to be used in feeding, as it is noticeable that a too free use of these latter items appears too stimulating. However, it may be taken as a safe rule that it is well to supply foods of such a nature liberally during the moult and in severe weather, and more sparingly at other seasons; in fact, in the case of established specimens that have completed their moult, I have found it beneficial to occasionally withhold the greater part of a meal to encourage them to take exercise in search of more natural food."

In the summer of 1912 a young Eider was reared from the egg in the Zoological Gardens, Regent's Park, though it is forty-three years since they possessed an example. It has thriven well on a diet of gentles, chopped liver, bullock's heart, and fish.

[1 The males frequently begin to call in November, and continue throughout the winter in fine weather.—J. G. M.]

EIDER.

Adult Male; third eclipse. Immature Male; first eclipse. 12 months. Immature Male; second eclipse. 24 months.

KING EIDER.

Adult Male; coming out of eclipse. Immature Male. 5 months. Immature Male; second eclipse. 24 months.

KING-EIDER

Somateria spectabilis Linnæus

The Grey-headed Duck, Edw., Nat. Hist. Birds, iii. pl. 154 (1750).
Anas spectabilis, Linn., Syst. Nat., ed. x., i. p. 123 (1758).
Anas freti hudsonis, Briss. Orn., vi. p. 366 (1760).
Anas spectabilis, Linn., Syst. Nat., ed. xii., i. p. 195 (1766).
Canard à tête grise, Buff., Hist. Nat. Ois., xii., p. 253 (1783).
Bering Goose, Lath. Synop., iii. p. 465, No. 24 (1785).
Anas beringii, Gmel., Syst. Nat., i. p. 508 (1788, *ex* Lath.).
Platypus spectabilis (L.), C. L. Brehm, Lehrbuch Naturg. Eur. Vog., ii. p. 816 (1824).
Somateria spectabilis (L.), Boie, Isis, 1822, p. 564. Yarrell, Saunders, Dresser, &c.
Fuligula spectabilis (L.), Bp. Synops., p. 389, No. 332 (1828).
Somateria megarhynchos, C. L. Brehm, Vogelfang, p. 389 (1855).
Somateria altensteini, C. L. Brehm, Vogelfang, p. 389 (1855).

LOCAL NAMES.—King-Eider, King-Duck (*English*); Canard à tête grise (*French*); Prachtente, Pracht-Eiderente (*German*);[1] Krasna Gavka (*Croatian*); Kahajka Krasna (*Czechish*); Pragt-Ederand, Pragt-Ederfugl, Konge-Ederfugl, Pukkelnachet-Ederfugl (*Danish*); Krahschnä-pihle (*Esthnian*); Eavekongur, Aedukongur (*Færöese*); Pukska-haakka (*Finnish*); Ekonge, Erkonge, Spitzberg-Erkonge (*Norwegian*); Prakg-Ejder, Kamgiding, Kamgudunge, Aederkong (*Swedish*); Aederkongur, Blikakongur (*Icelandic*); Kaczk okazala (*Polish*); Pistrak (*Russian*); Re degli Eider (*Italian*); Siorakitsok, Arnaniartak, Kingalik (male), Kaiortak (female), (*Greenlandic*); Kingaling (*i.e.* noisy bird), (*Point Barrow Esquimaux*).

Egg.—The usual number of eggs is 4 to 6 (Macfarlane and Manniche), and occasionally 7. They are decidedly smaller than those of the Common Eider, but similar in shape and colour. The average size of eggs (37 measured by Goebel and 30 by Jourdain) is 66.41 × 44.18 mm.; max., 74.6 × 49.4 and 73.5 × 50; min., 61.3 × 45 and 62.5 × 41.5 mm. (Jourdain); average weight (31 eggs) is 477 cg., varying from 396 to 540 cg.

Down.—"Dull sooty-grey; male feathers greyish-white at the base, and bill rather light-brown on terminal portion" (H. E. Dresser). Down in the collection of Mr. P. F. Bunyard is a pale chocolate-brown. An example in the collection of Major Proctor (from Alaska) is described as "very dark brown, feathers lighter brown, with perpendicular dark-brown streaks and banded lighter brown." In another nest from Alaska, in the Jourdain collection, the down is darker than that of the Common Eider.

The nesting site is often amongst Common Eiders (*cf.* Le Roi in Koenig's *Avif. Spitzbergensis*, p. 246, &c.). In North-East Greenland, Mr. Manniche tells me, the King-Eiders generally nest beside fresh-water pools at a short distance from the sea, and occasionally in company with Long-tailed Ducks.

The nesting season seems to be similar to the Common Eider in its circumpolar home.

Young in Down.—Somewhat smaller than the Common Eider and also lighter in colour, with a tinge of yellowish-grey on the upper parts. Even in its earliest stages the

[1] Various German names (trans.) are Glory-Duck, Glory Eider-Duck, Glory Eider-Goose, King's-Duck, King's-Goose, King's Eider-Goose, Hump-beaked Eider-Bird, Short-beaked Eider Diving-Duck.

young King-Eider can be distinguished by the form of the bill and the down-covered portions near this part; bill and feet lead colour.

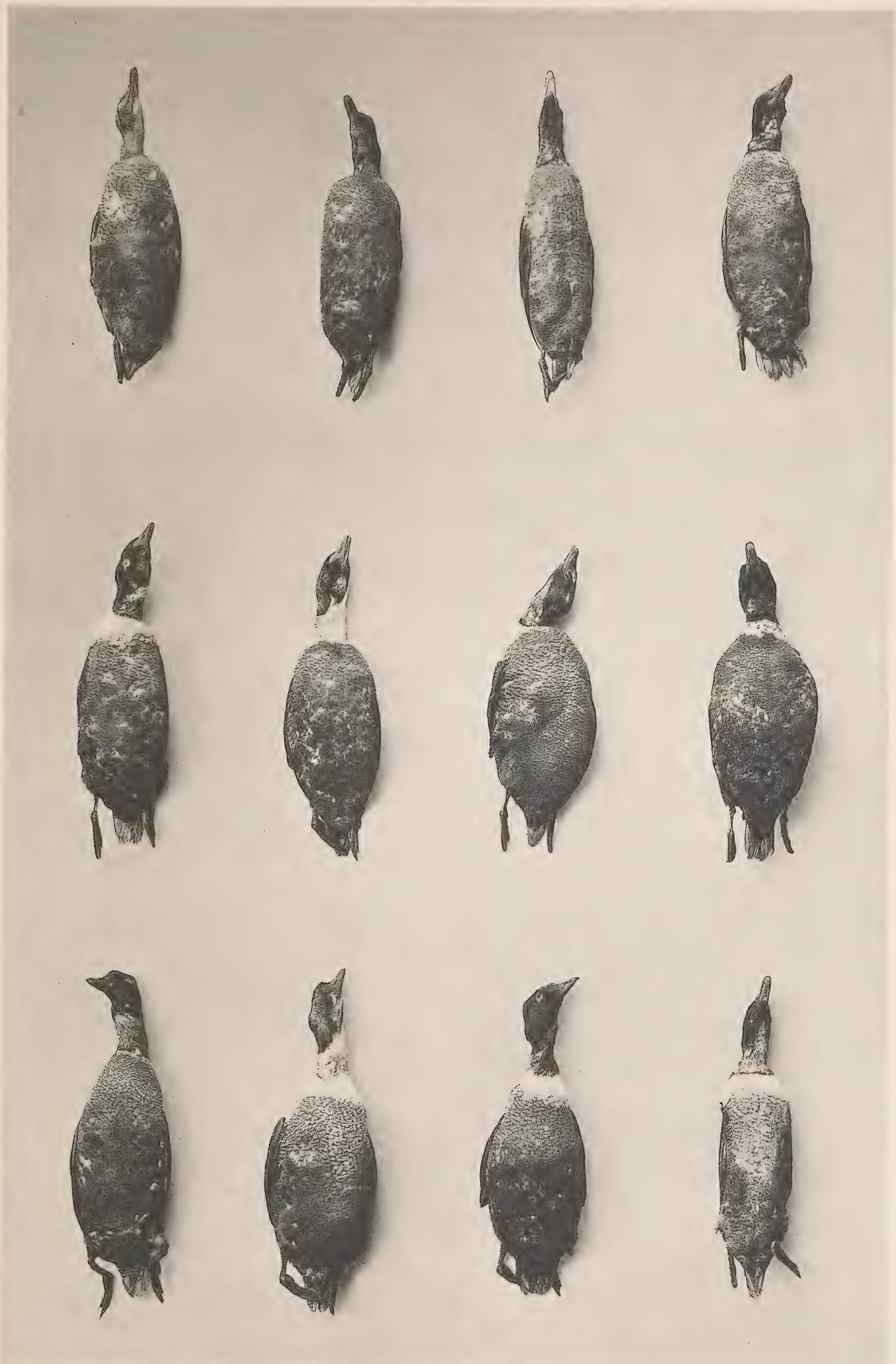
Immature Male: First Year.—The young male in first plumage is easily distinguished from the young female, as well as from Common Eider of a similar age, by the shape of the head and bill, which show some resemblance to the form of the adult male, even at 3 months. The plumage of a young male killed at the end of October, aged nearly 4 months, near Stromness, in the Orkneys, and now in my possession, is as follows:

The new first winter crown and cheeks have already been acquired. These parts are grey beneath, crossed with black, and edged with russet-brown. Chin and throat white with pale brown markings on the upper and dark-brown ends on the lower throat. Mantle and scapulars and upper wing dark brown with pale sandy edges; secondaries dark brown, edged with a rich vandyke brown (a colour not seen in the Common Eider) and tipped with sandy-yellow; primaries very dark brown; tail-coverts and thighs each red-brown, barred with black; tail brown with a greyish suffusion; upper breast pale sandy-yellow barred with light brown; under parts brown-grey with faint sandy vermiculations, flanks grey with brown bars and sandy-grey edges. A few black feathers are appearing on the lower flanks. In first plumage in early September the crown and cheeks of a Greenland bird before me resemble the young male of the Common Eider, except that the dark spots are smaller and the swelling of the bill not so pronounced as in November males. The progress of plumage of the young male King-Eider seems to be identical with that of the Common Eider. The first winter plumage continues to come in and displace the first plumage as the season advances. Thus a typical young male in this collection, aged nearly 9 months, and killed at Holstenborg, Greenland, on March 22, 1910, has the plumage as follows: crown as in early November; cheeks brownish-black with small rich brown edge; lower neck darker than in October, forming into a black ring above the upper chest which is now cream with black edges. Under parts as in October but with a few more black feathers on the flanks; some new feathers have been acquired in the tail, and the scapulars and upper mantle are now black; other parts as before. The bill now begins to swell and broaden at the upper angles.

As can be seen by reference to Plate I. (breasts), Figs. 9 and 10, there is the same difference in the assumption of the plumage as in the case of Common Eider. Here are shown two birds both of the same age, No. 9 being very backward and No. 10 very precocious. In fact the latter has the form and size of an adult, and has assumed the broad V on the throat, and black tail-coverts, whilst the scapulars and rest of the plumage, except the head and neck, which are far advanced, are still in the first plumage. The tail is new and complete in this specimen. From this date (early April) until the first eclipse commences, there is no further advance in the plumage of the young male, consequently we see as in Figs. 11 and 12 on the same plate, immature males killed in May and June less forward than No. 10 killed on April 5.

The first eclipse commences to come in at the end of June when the bird is one year old.

Immature Male: Second Year.—The first eclipse follows exactly the same course as the first eclipse plumage of the Common Eider. Those portions of the plumage which were renewed twice between July 1 and November 1 are somewhat smaller in their markings but of much the same colour as the Common Eider. The wings, tail, lower scapulars, flanks, under parts, and upper and lower tail-coverts, which are only renewed once early in August,



KING EIDER. PLATE I. BREASTS.

1. Immature male. Aug. 28th. Age, 1 month and 28 days.
2. Immature male. Nov. 9th. Age, 4 months and 9 days.
3. Immature male. Dec. 4th. Age, 5 months and 4 days.
4. Immature male. Dec. 8th. Age, 5 months and 8 days.
5. Immature male. Jan. 8th. Age, 6 months and 8 days.
6. Immature male. Jan. 24th. Age, 6 months and 24 days.
7. Immature male. Jan. 26th. Age, 6 months and 26 days
8. Immature male. Jan. 27th. Age, 6 months and 27 days.
9. Immature male. April 5th. Age, 9 months and 5 days.
10. Immature male. April 5th. Age, 9 months and 5 days.
11. Immature male. May 10th. Age, 10 months and 10 days
12. Immature male. June 2nd. Age, 11 months and 2 days.

KING EIDER. PLATE 2. BACKS.

1. Immature male. Aug. 28th. Age, 1 month and 28 days.
2. Immature male. Nov. 9th. Age, 4 months and 9 days.
3. Immature male. Dec. 4th. Age, 5 months and 4 days.
4. Immature male. Dec. 8th. Age, 5 months and 8 days.
5. Immature male. Jan. 8th. Age, 6 months and 8 days.
6. Immature male. Jan. 24th. Age, 6 months and 24 days.
7. Immature male. Jan. 26th. Age, 6 months and 26 days
8. Immature male. Jan. 27th. Age, 6 months and 27 days.
9. Immature male. April 5th. Age, 9 months and 5 days.
10. Immature male. April 5th. Age, 9 months and 5 days.
11. Immature male. May 10th. Age, 10 months and 10 days
12. Immature male. June 2nd. Age, 11 months and 2 days.

KING EIDER. PLATE 3. BREASTS.

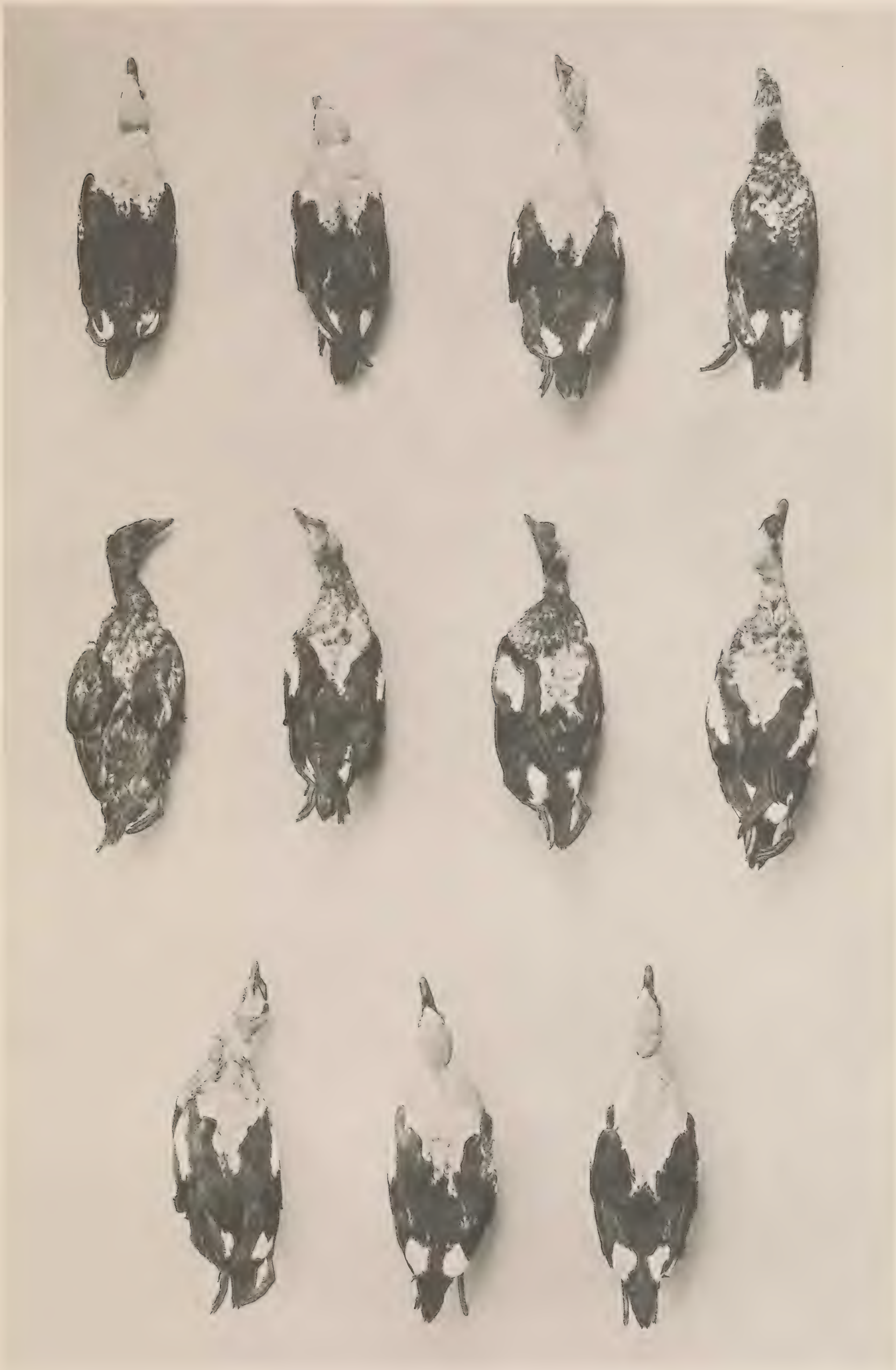
1. Immature male. Aug. 5th. Age, 13 months and 5 days. First eclipse.
2. Immature male. Aug. Age, 13 months.
3. Immature male. Sept. 17th. Age, 14 months & 17 days.
4. Immature male. Sept. 17th. Age, 14 months & 17 days.
5. Immature male. Oct. 5th. Age, 15 months and 5 days.
6. Immature male. Oct. 8th. Age, 15 months and 8 days.
7. Immature male. Oct. 29th. Age, 15 months & 29 days. Moulting, first eclipse.
8. Immature male. Nov. 15th. Age, 16 months & 15 days. Second winter plumage.
9. Immature male. Jan. 13th. Age, 18 months and 13 days.
10. Immature male. Jan. 19th. Age, 18 months and 19 days.
11. Immature male. Feb. 23rd. Age, 19 months & 23 days.
12. Immature male. March 4th. Age, 20 months and 4 days.

KING EIDER. PLATE 4. BACKS.

1. Immature male. Aug. 5th. Age, 13 months and 5 days.
2. Immature male. Aug. Age, 13 months.
3. Immature male. Sept. 17th. Age, 14 months & 17 days.
4. Immature male. Sept. 17th. Age, 14 months & 17 days.
5. Immature male. Oct. 5th. Age, 15 months and 5 days.
6. Immature male. Oct. 8th. Age, 15 months and 8 days.
7. Immature male. Oct. 29th. Age, 15 months & 29 days.
8. Immature male. Nov. 15th. Age, 16 months & 15 days.
9. Immature male. Jan. 13th. Age, 18 months and 13 days.
10. Immature male. Jan. 19th. Age, 18 months and 19 days.
11. Immature male. Feb. 23rd. Age, 19 months & 23 days.
12. Immature male. March 4th. Age, 20 months and 4 days.

KING EIDER. PLATE 5. BREASTS.

1. Immature male. April 19th. Age, 21 months and 19 days.
2. Immature male. May 20th. Age, 22 months and 20 days.
3. Immature male. June 16th. Age, 23 months and 16 days.
4. Immature male. July 9th. Age, 24 months and 9 days. Second eclipse commencing.
5. Immature male. Aug. 5th. Age, 25 months and 5 days. Second eclipse complete.
6. Immature male. Oct. 24th. Age, 27 months and 24 days. Passing out of second eclipse
7. Immature male. Nov. 7th. Age, 28 months and 7 days.
8. Immature male. Nov. 15th. Age, 28 months and 15 days.
9. Immature male. Nov. 23rd. Age, 29 months and 23 days.
10. Immature male. Jan. 16th. Age, 31 months and 16 days.
11. Adult male. March 20th. Age, 33 months & 20 days. Now adult at this age.



KING EIDER. PLATE 6. BACKS.

1. Immature male. April 19th. Age, 21 months and 19 days.
2. Immature male. May 20th. Age, 22 months and 20 days.
3. Immature male. June 16th. Age, 23 months and 16 days.
4. Immature male. July 9th. Age, 24 months and 9 days. Second eclipse commencing.
5. Immature male. Aug. 5th. Age, 25 months and 5 days. Second eclipse complete.
6. Immature male. Oct. 24th. Age, 27 months and 24 days. Passing out of second eclipse
7. Immature male. Nov. 7th. Age, 28 months and 7 days.
8. Immature male. Nov. 15th. Age, 28 months and 15 days.
9. Immature male. Nov. 23rd. Age, 29 months and 23 days.
10. Immature male. Jan. 16th. Age, 31 months and 16 days.
11. Adult male. March 20th. Age, 33 months & 20 days. Now adult at this age.

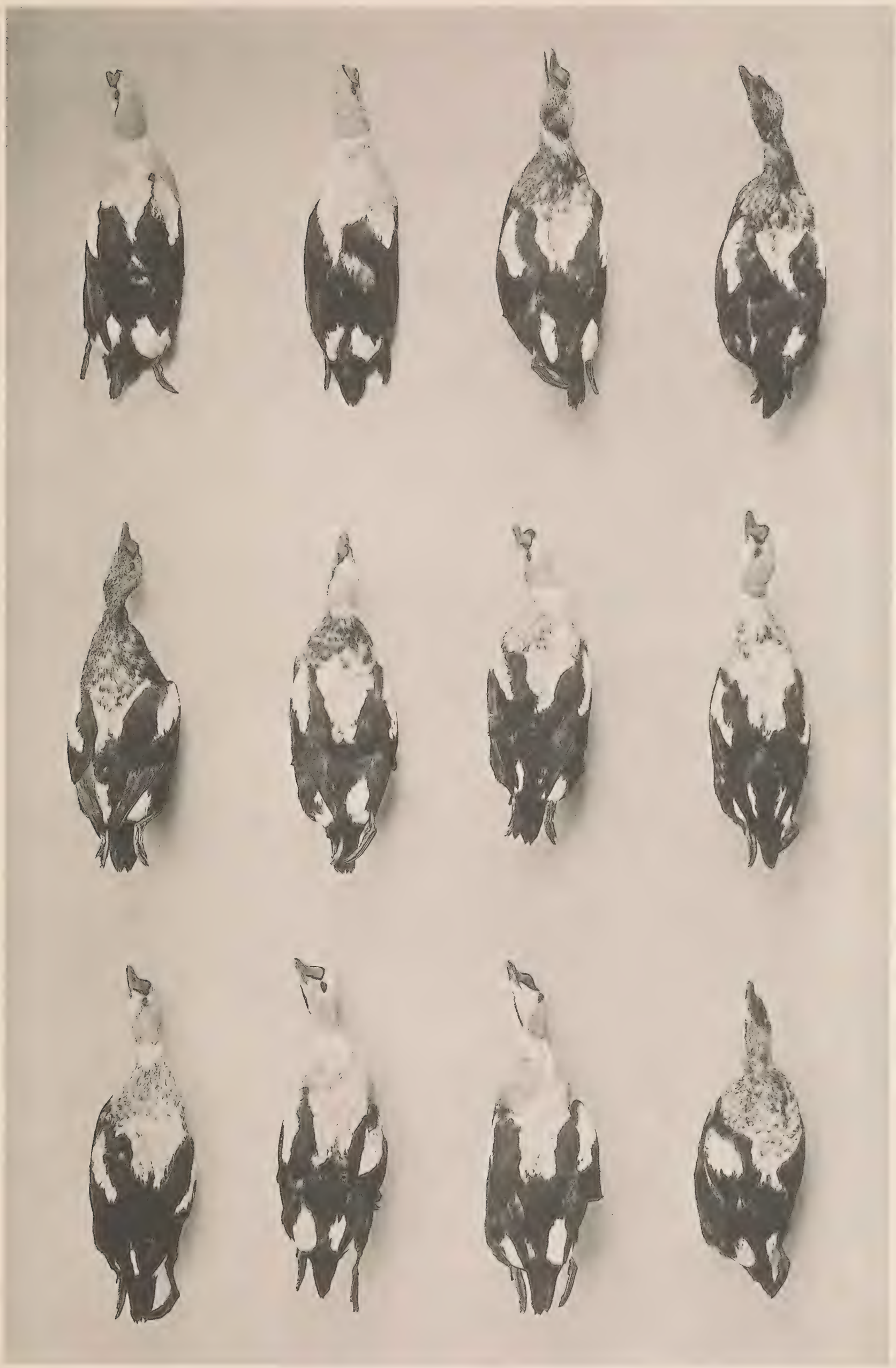
KING EIDER. PLATE 7. BREASTS. ADULT MALES.

1. Jan. 5th.
5. Nov. 15th.
9. Nov. 28th.

2. March 16th.
6. Nov. 19th. Late moulting bird.
10. Dec. 5th. Complete winter plumage.

3. Nov. 9th. Passing out of third eclipse.
7. Nov. 19th. Early moulting bird.
11. Dec. 16th.

4. Nov. 10th. Passing out of third eclipse.
8. Nov. 24th.
12. Jan. 8th. Very late in moulting, third eclipse.



KING EIDER. PLATE 8. BACKS. ADULT MALES.

1. Jan. 5th.
2. March 16th.
3. Nov. 9th. Passing out of third eclipse.
4. Nov. 10th. Passing out of third eclipse.
5. Nov. 15th.
6. Nov. 19th. Late moulting bird.
7. Nov. 19th. Early moulting bird.
8. Nov. 24th.
9. Nov. 28th.
10. Dec. 5th. Complete winter plumage.
11. Dec. 16th.
12. Jan. 8th. Very late in moulting, third eclipse.

change slowly throughout that and the following months, and are not in full beauty until the last of the eclipse feathers have been cast from the head, neck, mantle, and upper breast. All this change to the second winter dress is not effected until November 1. The young male at this date, although slightly smaller than the adult male, is almost exactly similar to that bird, except that the new wing is quite different, and affords a character by which the age of the bird may be easily identified. The winter wing of a second-year male differs from that of the adult male in having the white lesser wing-coverts more or less margined or shaded with sooty-black. These patches in the adult male are always pure white. This mottled portion of the wing is retained until the following August. In July, at the end of the second year, the male passes into its second eclipse dress, which is exactly similar to that worn by the adult male, except that it retains the immature wing until the end of that month.

Immature Male: Third Year.—In August the first adult wing is assumed, and the second eclipse commences to fall, the whole moult the winter preceding, as in the Common Eider. The first complete dress of the adult male is attained about November 28. The male King-Eider is therefore adult in 28½ months.

Adult Male.—Crown and nape and sides of head, in a line above the eye, ash-blue; cheeks pale green; a broad black line of feathers extends from the gape to the front of the eye and up to the front of the crown, surrounding this the large protuberance on the upper mandible; a black spot under each eye, and a large black V-shaped mark on the white throat and chin; this V is sometimes united at its apex and sometimes separated by white feathers; mantle, central parts of the lesser wing-coverts, and a large patch on each side of the rump, white; the rest of the wing, upper and under parts, tail, and wings, black; the inner secondaries are elongated and curled outwards; lower throat and upper breast rich cream-colour; bill reddish-orange, and naked protuberance bright chromium-orange; nail bone-colour; feet dull red-orange; webs dusky-red; irides dark red-brown. Length 21 to 23 inches; wing 10.3; tarsus 1.7; weight 4½ to 5½ lbs.

The eclipse plumage commences to come in at the beginning of July, and is attained and moulted in a manner and at the same time as that plumage in the Common Eider. Those portions that are moulted twice between July 1 and November 20 are not so black as in the Common Eider, the King-Eider eclipse having a "smokier" appearance, but in other respects the plumage is similar.

Immature Female.—In first plumage the young female resembles the young female of the Common Eider, but the bird is smaller, and the dark brown bars on the sides of the breast are more arrow-shaped. It can always be distinguished from the young female Eider by the central line of feathers running down to the nostrils which in *S. mollissima* only reach half-way. Both the bill and head are smaller. The passage of plumage of the young female King-Eider is exactly the same as the Common Eider. Young females keep apart for the first two years, and assume a very dark and worn appearance at 10 and 22 months of age. They attain adult plumage at 28½ months, and will breed the following spring.

Adult Female.—In general appearance the female King-Eider resembles the female Eider-Duck, but it is smaller, and as a rule darker. The shape of the head is not so triangular but more flat on the top. Specimens killed in February when the birds are at their best plumage seem to be uniformly of a very rufous-brown colour, and the blackish-brown cross-bars are narrower, and on the sides of the breast more arrow-shaped than

similar markings on the female Eider; from the centre of the breast to the vent the plumage is sooty-black; chin, throat, and cheeks, chestnut; irides, upper throat with black markings. The chief mark of distinction is the smaller and shorter bill of the female King-Eider, and the fact that the central line of feathers on the upper mandible runs right down to the nostrils, whilst in the eider it stops half-way. Also the bare spaces of each side of their feathered wedge are twice as broad and of a different shape to the Common Eider. These features of distinction were first pointed out by Mr. J. E. Harting (*Proc. Zool. Soc.*, 1871, p. 118). Feet dull yellow with black webs; bill and nail lead colour; weight about 4 lbs.

General Distribution.—The King-Eider inhabits the northern portion of Europe, Asia, and America, only straggling southwards in winter. On the whole it is found further north than the Eider.

Breeding Range.

Europe: Iceland.—Faber (*Prodromus*, pp. 67–8) says that the species bred in 1819 and 1820 on Videy, a small island near Reykjavik. This record may be due to the presence of non-breeding males in summer (*cf.* Hantzsch, p. 197). I saw three males passing into eclipse plumage late in June 1891 at the mouth of the Akuyreri Fjord, but was not sufficiently close to note if they were adult or not. The inhabitants of an island at the mouth of this Fjord recognised a picture of the King-Eider which I showed them, and stated that a pair occasionally bred there in company with the Common Eiders.

Spitsbergen.—A few breed (*cf.* A. Walter, *J. f. O.*, 1890, p. 239; Koenig, *J. f. O.*, 1908, p. 138; also *Avifauna Spitzbergensis*, p. 41, &c., eggs taken and incubating birds shot).

Kolguev.—Breeds commonly, according to S. A. Buturlin, although no nests were found by Pearson, who, however, saw adult birds, as he informed me.

Novaya Zemlya.—Breeds commonly (S. A. Buturlin, as quoted by Dresser); an egg in the Seebohm collection, now in the British Museum, is said to have come from this island.

[*British Isles.*—Bullock, in 1812, stated that he took a nest with 6 eggs in Papa Westray, Orkneys. See also F. M. Ogilvie's notes, quoted in Buckley and Harvie Brown's *Vert. Fauna of Orkneys*, pp. 181–2. Confirmation is required before these records can possibly be accepted as genuine. Dixon (*Ibis*, 1885, p. 88) saw two at St. Kilda, and had "not the slightest doubt that they were nesting on the precipitous island of Doon" (!).]

Asia.—"Breeds along the coast of Siberia east to Kamtschatka and the Commander Isles; on the Kolyma, about as commonly as *Somateria stelleri*" (S. A. Buturlin, quoted by H. E. Dresser in *Eggs of B. of Europe*, p. 583). Middendorff obtained eggs and young in Siberia (Taimyr Pen.), 74° N. Cf. *Sib. Reise*, ii. p. 233, taf. xxii. fig. 1 (pullus), fig. 2 (egg) [1853]. Dr. H. Walter obtained clutches on the Taimyr Peninsula, June 1901 (cf. *Ibis*, 1904, p. 229); *cf.* also *Ibis*, 1908, p. 595. Also breeds on Kanin and Yalmal peninsulas. Breeds on Gr. Liakoff Isles (Bunge, cf. *Ibis*, 1888, p. 351): Lower Lena, more or less widely distributed on tundra (S. A. Buturlin, *J. f. O.*, 1908, p. 293). Commander Isles and Kamtschatka Isles: only mentioned by Stejneger as "winter visitor and rather rare" (*Proc. U.S. Nat. Mus.*, 1887, p. 138).

N. America: Greenland.—Breeds along northern part of west coast, south to a little below Disco Bay; numerous N. of Upernivik (H. Winge, *Grönland's Fugle*, p. 108). Also

breeds on N.E. coast (enormous colony also discovered by Kolthoff in Mackenzie Gulf, N.E. Greenland). A. L. V. Manniche, *Terrestrial Mammals and Birds of N.E. Greenland*, p. 103. *Cf.* also *Zool.*, 1891, p. 245; Grinnell Land, up to 82° 27′ N. (Colonel H. W. Feilden, cf. *Ibis*, 1877, p. 412; and H. C. Hart, *Zool.*, 1880, p. 213.) Breeding at Winter Cove, Prince Albert's Land, *Zool.*, 1879, p. 9. Breeding in N.E. Labrador, Hantzsch, *J. f. O.*, 1908, p. 345; but only in small numbers, in company with Common Eiders. Other Canadian localities mentioned by Macoun in *Cat. Canadian Birds*, 2nd ed., p. 111, are west shores of Davis Straits and abundantly on Parry Islands (Arct. Man.); nest found near Mingan, on Labrador coast (Packard); frequent Ellesmere Island, but no nests found (E. Bay); common north part of Hudson Bay (A. P. Low). Breeds Wales Sound, Hudson Strait (Payne). Herschell Island: eggs taken by Rev. C. E. Whittaker; over 200 eggs collected by Macfarlane in Franklin Bay, 1862–65. Sabine says it breeds on the N. Georgian Isles.

Alaska.—J. Murdoch, *Zool.*, 87, p. 108; breeds sparingly at St. Michael's (L. M. Turner, p. 137). *Cf.* also review in *Ibis*, 86, p. 196, of Murdoch's Report (few stay to breed on Point Barrow, thousands passing on northwards). *Cf.* also E. W. Nelson, *Report*, p. 79.

Migration Range.

British Isles.—A rare straggler and most frequently occurring in the Orkneys and Shetlands.

England.—Three have been obtained in Norfolk, one in Yorks, and two (and others seen) near the Farnes (*Hand-list of Brit. Birds*, p. 144).

Scotland.—Examples have been killed on the coast of Haddington, Firth of Forth, and Fife. Mr. Robert Walker, an excellent field-naturalist, identified six in St. Andrews Bay in March 1872 (*Scottish Nat.*, April 1873); three were killed on the Tay estuary in 1872 (*ibid.*). With regard to the specimens said to have been killed on the Tay estuary in 1879–80, I confess I am unable to accept these records, knowing the source from which they come. Two males were shot at Tents Muir, in Fife, in 1872 and 1899 respectively. One of these is in the Edinburgh Museum and the latter is mentioned in the *Ann. Scot. Nat. Hist.* A good many examples have been killed in the Orkneys, the first a bird exhibited by Gould at a meeting of the Zoological Society in November 1832; and the latest in February 1906; another, a female, was shot by my old friend E. Hargitt in May 1868. I possess a young male killed by the lighthouse-keeper in Graemsay Island in October 1882. The bird was stuffed by S. Begg, a stone-mason who lived in Stromness, from whom I purchased it. In March 1883 I saw a young male King-Eider near the Churchyard Rocks, Stromness, and should, I think, have killed it had not a Shag risen close by and put the bird up (see *The Wildfowler in Scotland*, p. 138). An adult female was killed off the island of Graemsay, Orkneys, by J. Sutherland, on February 21, 1906, and is in the possession of Mr. H. W. Robinson (*Field*, March 17, 1906). A few have also been killed in the Shetlands, the latest obtained February 1899 and June 29, 1910. I possess a fine old male killed by John Gatherer, a tax-collector, who spent all his spare time in hunting northern birds. He saw a party of King-Eiders in Quendale Bay in March 1882, and on April 1 succeeded in shooting a male and a female. I purchased the male from him in 1886, and could not ascertain what came of the female; but it passed into some English museum. A specimen is recorded from the Fair Isle (1910), and the species said to have been seen off Jura and Islay (*Hand-list of British*

Birds, p. 144). Altogether, Mr. Harting, in his *Handbook of British Birds*, mentions eighteen authentic records of the species, but I think that nearly double that number have been obtained.

Ireland.—The authors of the *Hand-list of British Birds* (p. 144) accept records from Ireland as follows: Dublin (one),[1] Down (two), Mayo (one), Rathlin Island, the latest being from Down (November 1897). According to Ussher and Warren the Rathlin specimen was not fully authenticated; whilst the only Dublin specimen recorded by them (a female) seems to have disappeared (*Birds of Ireland*, p. 213).

Continental Europe: France.—Boulogne (Degland and Gerbe); near Dunkerque in 1882 (Van Kempen); *cf.* P. Paris, *Cat. des Oiseaux de la France*, p. 50.

Italy.—Four records (Venetia, 1888; Ravenna, 1892; San Remo, 1901; Venetia, 1904); Giglioli, 2° *Resoconto*, p. 491.

Holland.—Dresser speaks of it as occurring "very rarely on the coasts of Holland and France"; but Blaauw does not include it in his list of Dutch birds, nor does Van Oort mention it.

Denmark.—Rare casual visitor (H. Winge); one in 1849 (Kjaerbölling), and two in 1864–5 (J. C. H. Fischer).

Scandinavia.—Visits the coasts of Finmark and the neighbourhood of Tromsö and the adjacent fjords as far as the mouth of the Pasvig in large numbers in winter. Also the Norwegian coast as far south as Trondhjem. Specimens occasionally taken as far south as Bergen. Also visits the Baltic in smaller numbers (Östergötland, Nilsson; Kelmar, Lundborg); and Finland (occurs annually, Palmen).

Russia.—Once on L. Ladoga (S. A. Buturlin); Archangel (specimens received, H. E. Dresser). Murman coast (*Orn. Jahrb.*, 1902, p. 46).

Færöes.—Occurs in summer, but has never bred (*Zool.*, 1872, p. 3255).

Germany.—Extremely rare casual; near the island of Usedom and near Danzig (Friderich Bau, *Naturgeschichte der Deutschen Vögel*, V. Edit., p. 729).

Heligoland.—One on January 11, 1879 (Gätke, *Heligoland Orn. Observatory*, p. 537).

America.—Occurs rarely and accidentally as far south as Georgia, California, and Iowa. (Cf. *Check List N. Amer. Birds*, last edition). Dresser gives its range as S. to New Jersey, the Great Lakes, and New York (*Eggs of B. of Europe*, p. 583). Also casual to Connecticut, Virginia, and on Pacific side to San Francisco and the Californian coast (*Bull. Nutt. Orn. Club.*, v. p. 189). Iowa (*Auk*, 1895, p. 86), Lake Michigan (Cory, *Birds of Illinois and Wisconsin*, p. 343), &c.

On the eastern side the King-Eider winters in some numbers in the Gulf of St. Lawrence (*The Water-fowl Family*, p. 173); whilst a few are killed on the coasts of Newfoundland, where it is considered rare. It occurs regularly as far south as the coasts of New York (*ibid.*). On the western side large numbers winter in the Aleutian Islands and south along the coast of Alaska. I saw specimens killed at Wrangel, south of which it appears to be rare. Large numbers winter in South Greenland, and some on the north coasts of Labrador and Hudson Bay, where there is open water. Enormous numbers of King-Eiders come from the north coast of Asia in late October, and pass Bering Island,

[1] By a typographical error the five Irish records are credited to co. Dublin, from whence only one specimen has been obtained.—F. C. R. J.

going south and east to the sheltered Aleutians and the chain of islands off the Kodiak Peninsula, where there is open water all the winter.

Habits.—The habits of the King-Eider are said to differ very little from the Common Eider. As long as the sea is not frozen King-Eiders will remain in flocks near the summer breeding places the whole year round, but when driven south by exceptional severity, they migrate in large flocks and keep on the fringe of the most northerly open waters. This is especially the case with the immatures. They are essentially sea-loving ducks, and do not go near fresh water except in the breeding season. They do not seem to affect deep water off rocky coasts, but rather prefer the vicinity of low-lying green islands and tongues of land where the beaches shelve towards mussel banks. They are very gregarious, and will mix with the Common Eiders both in winter and in summer, but at the nesting places the male King-Eider is said to be more restless and quarrelsome than the Eider. F. Boie (*Journeys in Norway*, p. 99) mentions the case of a pair of King-Eiders that intruded themselves into a large colony of Eiders, when it was found necessary to shoot the male owing to its quarrelsome nature. They are exceedingly tame at the breeding place, but are said to be much shyer than the Common Eider in their winter ranges.

The flight seems to be similar to that of the Eider, but they have little fear of cutting across corners of land, and will often fly from one part of the sea to another across promontories. Mr. A. L. V. Manniche, who discovered a large colony of these birds in N.E. Greenland, confirms this, as well as their constant restlessness at the breeding time, and the fact that they often visit pools and small pieces of fresh water, and even nest close to them.

Mr. Manniche found numbers of King-Eiders at Stormkap, Snenaes, and a part of Hvalrosodden, N.E. Greenland, in 1906 and 1907. They arrived early in June, and departed south last year on September 8. His notes, which he has kindly given to me, are of especial interest as relating to the habits and voice of this species :

"The King-Eider," he says (*Terrestrial Mamm. and Birds of N.E. Greenland*, pp. 103–4), "appeared the next summer (1907) on Stormkap, June 10. The same day a few couples were seen in the lakes at the ship's harbour.

"All the King-Eiders appeared in couples, though they no more than other summers nested that summer. Though they often gathered in small flocks, there were always just as many females as males. The King-Eiders appeared in even the smallest ponds of melted snow, and their surprising fearlessness made it possible for me to observe them at quite short distance.

"During their excursions in the field, they always flew very low, and sometimes uttered a slight growling or grunting sound.

"The King-Eider, which at this season always stayed in the fresh waters on the mainland, on which it undoubtedly exclusively nests, hereby forms a contrast to *S. mollissima*, which almost always takes to the cracks or openings in the sea-ice. I never saw the King-Eiders on islands or near these.

"The males disappeared at the end of June, after which the females gathered in small flocks.

"Every day they used to fly from the lakes and ponds inland down to the bay, and especially to the mouth of Stormelven, in which they would lie and dive for food. They used to lie for hours on the grass-clad beaches of the lake in order to rest or to sleep with their heads hidden under their wings.

"At the end of July the last females left the lakes at Stormkap.

"The King-Eider arrived in the summer 1908 on June 16, a few days later than the preceding summer.

"I counted some 20 pairs of nesting birds, which exactly corresponded to what I observed on the same territory in 1907. In the beginning of July the majority of the females were occupied in breeding, and the males disappeared. A few barren females could be seen till the last days of July.

"I did not succeed in finding nests with eggs, but all the old nests I found at Stormkap proved that this bird nests singly. The nests were placed on the lower slopes with luxuriant vegetation, or on small hills in the lowland with large stones surrounded by grass.

"None of the observed nests were far from the bay (as a maximum, 1 kilometer). I think that the young ones soon after their emergence were directed to this.

"The down from the nests was very dark coloured, nearly black, and by this they may be distinguished from that of the Common Eider.

"I secured some breeding females whose breasts and bellies were nearly naked.

"The females would in the breeding season sometimes leave the nest for a short while and fly to the nearest pond for the purpose of bathing and seeking food. Like many other birds the King-Eider is irritable and quarrelsome at this period. One evening I observed a female, which had just left her nest. She flew quickly straight towards me, and so low that she seemed to touch the earth with the tips of her wings. I was standing on the beach of a pond with shallow water. Uttering an angry grunting she circled around, and quite near to me, and then flew to the pond. Having quenched her thirst, and by a pair of quick bounds under the surface put her feathers in order, she swam straight towards me, all the while uttering a peculiar growling and hissing; the feathers on her head were erected, and she seemed to be very much displeased at my presence; now and then she cackled in the shallow water like a domestic duck, again to show her displeasure.

"I secured the King-Eider in order to assure myself that she was a breeding bird, and found her to be very thin and nearly naked on her belly. In the season in which the King-Eider lives in fresh water its food consists principally of plants. In the stomachs which I examined I found, however, many remnants of insects, especially larvæ of gnats. In the stomachs of downy young ones I found indeterminable remnants of crustaceans, plants, and small stones.

"I found no difference worth mentioning in the exterior of the males except in the V-formed mark on the throat, which varied a good deal in extent and intensity.

"The females, on the contrary, vary a good deal. Some birds—very old ones, I think—were very pale, the others were rather dark.

"A female killed (pale in colour) had a well-developed prominence on the forehead; in other females I found a fainter indication of such."

In standing, walking, and swimming, they seem to resemble the Eider, but the males can easily be identified at a considerable distance by the black scapulars and the curious shape of the head.

They obtain their food in winter and spring by diving to the bottom of the sea at considerable depths, and, like the Eiders, feed chiefly on conchylia, mussels, univalves, and crabs. They swallow very large mussels, the shells being broken up in the stomach. They are also said to eat fish, fish-spawn, and other sea creatures, but it is doubtful if they touch any vegetation except in summer. Thompson, who examined the stomach of a female shot in Belfast Bay, says it "was filled with the remains of crustacea and mollusca, viz., an *Inachus* of middle size, the largest *Portunus arcuatus* that I had seen, . . . a *Nucula margaritacea*, and a small buckie whelk (*Buccinum undatum*)." Mr. Dresser (*B. of Europe*, p. 648) says: "Mr. Collett informs me that he dissected a couple of adult males shot at Tromsö in January 1877, and found their stomachs full of mollusca, chiefly of *Pecten islandicus*, *Cyprina islandica*, and *Mytilus modiola;* some of these were broken; but in one of the birds he found five uninjured specimens of *P. islandicus*, the shells of which measured more than an inch in diameter; and in the ventriculus there were several entire examples of the same species."

According to Herluf Winge (*Grönland's Fugle*, p. 110), the following were found in examples from Greenland: *Trophon craticulatus*, *Turritella polaris*, *Pecten islandicus*,

KING EIDER.

and *Mitra groenlandica*. Fabricius mentions the following species: *Mytilus edulis*, *Modiolaria lævigata*, *M. faba*, *Saxicava*, *Leda minuta*, *Echinus*, and corals. The specimen killed near Venice, according to Giglioli, had *Carcinus mœnas* in the stomach.

At Discovery Bay, H. C. Hart found quantities of shrimps in the stomach of King-Eiders (*Zool.*, 1880, p. 213), whilst Le Roi records remains of mollusca and small stones, stalks of *Gramineæ*, and leaves of phanerograms (*Avif. Spitzberg.*, p. 248). Svenander found the limb of a large crab.

The female of this species makes a grunting cry as well as hiss when alarmed, but so far I can find no account of the cry of the male.

Mr. Manniche tells us that the courtship and cooing note of the male is much the same as the Common Eider, the male rising slightly in front as it utters its gentle double note. At the breeding places both males and females appear to be very restless and somewhat quarrelsome, the males chasing and driving off any other ducks that come near.

In their southern range a single pair of King-Eiders are often found nesting amongst Eiders and other sea-birds, and this is also the case in S.W. Greenland, but both in N.E. and N.W. Greenland, Grinnell-land, and N. Asia, King-Eiders are found nesting in large colonies by themselves. Manniche notes their arrival in pairs at the breeding places in N.E. Greenland on June 9, 10, and 16, and Von Middendorff saw them arrive in the Boganida on June 18, and the first pair on the Taimyr Peninsula on June 28, 74° N. lat. Soon afterwards large flocks came. On July 7 he found a nest with fresh eggs there, and at the beginning of August he saw many females swimming about with young in down. Captain Feilden found them breeding on the Floeberg beach in 82° N. lat. in July. At this same date Bunge found young on the New Siberian Islands, whilst MacIlhenny saw young, 3 weeks old, on July 28, at Point Barrow, Alaska.

Apparently these ducks arrive much earlier on the N. Alaskan coast than they do in N. Asia, probably owing to the milder ice conditions, for an American living on the isolated island in Bering Straits reports a continuous procession of ducks—Eiders, King-Eiders, and Steller's Eiders—passing north in the month of April.

MacIlhenny, in his *Expedition to Point Barrow, Alaska*, Wash., 1885, pp. 120–2, thus describes the arrival of the King-Eiders:

"This is by all means the most abundant bird at Point Barrow. Thousands hardly describes the multitudes which passed up during the great migrations, within sight of the station, and yet equally great numbers passed us along the 'lead' of open water several miles off shore.

"They appear in the spring before there is any open water except the shifting 'leads' at a distance from the shore, and travel steadily and swiftly past Cape Smythe to the north-east, following the coast. Some flocks cross to the eastward below Point Barrow, but the majority follow the barrier of grounded ice past the point. It is probable, however, that they turn to the east after passing Point Barrow, because all the returning flocks in the autumn come from the east, hugging the shore of the mainland.

"The first ducks in the spring of 1882 were seen on April 27, a comparatively warm day, with a light southerly wind blowing. They were flying parallel to the coast over the barrier of grounded ice. The natives said they were all 'Kingaling,' 'noisy birds,' or males (referring to the protuberance at the base of the bill), and the first flocks of the migration appear to be composed exclusively of males.

"During the first half of May, 1882, several males came from the south off the land, and gained the ice in a very exhausted condition, frequently so worn out that the natives caught them and killed them with sticks. They were all found to be very much emaciated, and their stomachs were empty of food.

"The season was later in 1883, and no ducks were seen till May 5. There were six great flights in

1882, the first on May 12 and the last on June 11, and five in 1883, the first on May 17 and the last on June 4. As a rule these flights took place on comparatively warm days, with light westerly or south-westerly winds. On one day each year, however, there was a large flight with a light breeze from the east. A warm south-west wind is pretty sure to bring a large flight of Eiders.

"The flight seldom lasts more than two or three hours, beginning about eight or nine in the morning, or between three and four in the afternoon. More rarely a flight begins about ten in the morning and lasts till afternoon.

"During the flights, the great flocks in quick succession appear to strike the coast a few miles from the station, probably coming straight across from the Seahorse Islands, and then follow up the belt of level ice parallel to the coast towards Point Barrow, going pretty steadily on their course, but swerving a little and rising rather high when alarmed.

"Their order of flight was generally in long diagonal lines, occasionally huddling together, so that several could be killed at one discharge. A few flocks in a great flight usually followed up the line of broken ice a mile or two from the shore, and a flock occasionally turned in at the mouth of the lagoon and proceeded up over the land.

"On the days between the flights and when the wind was east, a few flocks would struggle up against the wind, either going up far off the shore or overland; but most of the birds on 'off days' came off the land from the south, and either continued on towards the open water or turned to the north-east along the broken ice. These flocks were never so large as the great flight flocks, and generally flew in more compact order. A few were occasionally seen early in the migrations going back towards the south-west. On many days when there were no ducks in-shore they flew abundantly at the 'lead' of open water.

"The majority of them are paired by the middle of May, and the flocks are made up of pairs flying alternately, ducks and drakes. If a duck is shot down, the drake almost invariably follows her to the ice, apparently supposing that she has alighted.

"Early in June straggling pairs and small parties settle about the tundra pools and breed sparingly in the neighbourhood of the station. A few nests were found. After the main flight and during the latter part of June a few stragglers and small flocks are to be seen almost daily.

"Captain Owen, of the steam whaler *North Star*, who got up to the Station June 25, 1882, reported that the day before there were myriads of Eiders of both sexes in the open water off Point Belcher.

"By the second week in July, before the ice is gone from the sea or from Elson Bay, the males begin to come back in flocks from the east, and from that time to the middle of September there is a flight of Eiders whenever the wind blows from the east. The flocks are all males at first, but mixed flocks gradually appear, and the young of the year were first observed in these flocks on August 30, 1882.

"Most of the flight birds make no stay but continue on to the south-west, generally a couple of miles out at sea, though they occasionally stop to rest, especially when there is much drifting ice. Between the regular flights they continue to straggle along, coming off the land, and occasionally sitting apparently asleep on the beach. Small flocks and single birds are to be seen till the season closes, about the end of October, and in 1882 many were seen as late as December 2, when there were many holes of open water.

"When the birds are flying at Pergniak, it is quite a lively scene, as there is a large summer camp of Eskimos close to the point where the ducks cross when the conditions are favourable. When the wind is east or north-east, and not blowing too hard, the birds come from the east and strike the land at a point which runs out on the shore of the bay about half a mile from Pergniak, close to where the lagoons begin.

"They would be apt to turn and fly down these lagoons were it not for a row of stakes, set up by the natives, running round the semicircle of the bay to the camp. As soon as the flock reaches this critical point, all the natives, and there may be fifty of them on the watch with guns and slings, just at the narrowest part of the beach above the tents, immediately set up a shrill yell. Nine times out of ten the flock will waver, turn, follow round the row of stakes, and naturally whirl out to sea at the first open place, where, of course, the gunners are stationed. With a strong wind, however, the ducks do not follow the land, but come straight on from the east and cross wherever they happen to strike the beach, so that the shooting cannot be depended on.

"The flocks during the fall flight are not so large, and do not follow one another in such rapid succession as in the spring, and though they arrive from the east in the same stringing order, they huddle into a compact body as they whirl along the line of stakes and out over the beach.

"The natives, although as a rule they are far from good shots, are provided with poor guns, and appear particularly averse to putting in enough powder and shot to kill a strong Eider-Duck, nevertheless succeed in capturing a good many with guns and slings. They reap a plentiful harvest of them in the spring, when they are all at home, and the crews of the whaling umiaks out at the open water spend their leisure time while they are waiting for whales in shooting ducks, which form an important article of food. They of course always boil their ducks, as they do all the rest of their food, and usually skin instead of plucking them. They are very fond of the fat which adheres to the skin, scraping it off with their knives industriously till not a particle remains, licking their knives with great relish. The intestines, boiled by themselves, are also considered a great delicacy.

"The males that appear at Pergniak at the beginning of the autumn migrations are at first in full breeding dress, perhaps a little faded, especially about the bill. As the season advances they show more and more extensive patches of brown feathers, until at the end of the migrations they cannot be distinguished from the females except by the white wing and back patches."

The author then proceeds to give an account of males in eclipse plumage, which I have already described.

The nesting materials used by the female King-Eider are the same as the Common Eider, but the down which she plucks from her breast is of a much darker colour, having at a short distance a sooty-black appearance. Full clutches of eggs were taken by MacIlhenny in Alaska on June 15, 19, 22, 29, &c. In Spitsbergen Koenig took two incomplete sets of 3 on July 1, whilst Kolthoff took a nest on June 24. Feilden took eggs in July, and fresh eggs from July 9 to July 15. In Greenland Kolthoff found eggs and saw many young in down on August 1. It is evident that the duck alone makes the nest, as females shot by H. C. Hart and A. L. Manniche had the breast bare. Direct observations of the breeding habits seem to be wanting, yet it is known that the males leave the ducks near the hatching time, and that all the subsequent habits of the species, until the winter flocks are formed, are similar to the Common Eider.

There is a curious saga, common amongst the peasants of Northern Norway and Iceland, to the effect that this duck originated out of small pieces of rotten wood, and for this reason it is named the "Stick" Duck. Also it is maintained by the Icelanders that the male Eider-Duck in advanced age gets a red crown on the top of the head, and is then known as Hedar Kongr (Eider-King). These are the males of the King-Eider. The bird and mammal enemies of this species are the same as prey on the Eider. In the entrails have been found the parasite *Taenia microsoma*.

Immense numbers of King-Eiders are killed by the Esquimaux of West Greenland and Alaska, who shoot them with bows and arrows and shot guns, whilst the American and Dundee whalers also take their toll before the ice allows them to go in pursuit of the cetaceans. The methods of the Greenlanders, who also use javelins, are as follows:

"Several people surround a flock of these duck swimming on the sea, make a cordon round them with their light boats, and approach them as carefully as possible, then suddenly raise a piercing shriek, whereupon the duck are so terrified that they forget to fly away, and immediately dive under, upon which the boatmen quickly close round in their boats, and the birds upon reappearing are again terrified at the unexpected proximity of human beings, and dive again repeatedly until they are worn out and are reached with the above weapons or with an oar, and the spot where a duck is about to reappear is marked by the airbubbles which appear shortly before. Fabricius, who has described these methods of pursuit (*Fauna Groenlandica*, p. 63), has forgotten perhaps the most important thing, namely, that they can only be pursued with success when these birds cannot fly, and are undergoing the moulting and have lost their flight feathers; the same thing applying, too, to the Eider-Duck and others.

"They can be caught like other diving duck in the often-described duck-nets, stretched horizontally under water.

"According to Seebohm, the natives in East Siberia kill a great quantity of them with snares while the birds are flying over a narrow tongue of land."

The plucked skins and heads and necks of the males (unplucked) of this species are sent in large numbers from Greenland to the taxidermists in Copenhagen, Bergen, and Trondhjem, where they are made into beautiful bed-quilts similar in form and even more beautiful than those made from the Eider.

The flesh of this duck is considered to be inferior to that of the Eider, and the excrescence on the bill of the male is considered a delicacy by the Esquimaux.

Up to date no aviculturist has succeeded in obtaining living specimens of this beautiful duck, but it is to be hoped that they may be able to do so in the future, for there is little doubt that they would live and breed in confinement, probably even more happily than the Eider, as they have a greater preference for fresh water.

STELLER'S EIDER

Somateria stelleri (Pallas)

Anas stelleri, Pall., Spic. Zool., fasc. vi. p. 35, tab. v. (1769).
Anas dispar, Sparrm., Mus. Carls., No. VII. (1786).
Anas occidua, Bon. et Vieill, Encl. Méth., i. p. 130 (1790).
Clangula stelleri, Boie, Isis, 1822, p. 564.
Fuligula dispar, Steph., Gen. Zool., xii. p. 206 (1824).
Macropus stelleri, Nuttall, Man. Orn. U. S., ii. p. 451 (1834).
Polysticta stelleri, Eyton, Hist. Rarer Brit. B., p. 79 (1836).
Stellaria dispar, Bonap., Comp. List of B. of Eur. and N. Am., p. 57 (1838).
Eniconetta stelleri, Gray, List of Gen. of B., p. 75 (1840).
Harelda stelleri, Keys. and Blas., Wirb. Eur., p. 230 (1840).
Heniconetta stelleri, Agass, Ind. Univ., p. 178 (1846).
Somateria stelleri, A. Newton, P.Z.S., 1861, p. 400; Dresser, p. 649; Yarrell, iv. p. 468; Saunders, p. 463.

LOCAL NAMES.—Steller's Eider, Steller's Western Duck, Steller's Duck, Kamtschatka Duck (*English*); Steller's And (*Norwegian*); Steller's And Alförrådare[1] (*Swedish*); Ignikau'to (*Point Barrow Esquimaux*).

Egg.—7 to 9 (Middendorff). MacIlhenny took an apparently full clutch of 6 eggs (Alaska). Eggs typical Eiders', but decidedly smaller than those of the Common Eider, pale greenish-grey in colour. *Cf.* figures by Newton, &c.

Average Size.—Average of 22 eggs (11 by Goebel, 6 by Jourdain, and 5 by Meves) =61.39×41.04 mm.; max., 65×42.5; min., 55.5×40.5 and 62.5×38 mm. Average weight of 11 eggs, 462 cg. (372–528 cg., Goebel).

The nest down from Point Barrow (MacIlhenny Exped.) is very dark brown, almost black. Down collected by Buturlin is also sooty blackish-brown, and the small feathers amongst it are dark greyish at the base, but otherwise dark brown (H. E. Dresser).

Young in Down.—Very young examples seem to be unknown at present,[2] but I am indebted to Mr. Walter Rothschild for the loan of a specimen taken at Point Barrow, Alaska, on July 28, 1898 (MacIlhenny Exped.), which is figured in the coloured plate by Mr. Grönvold. The young bird in question is about two to three weeks old. It has the high rising bill characteristic of the adult bird, sloping abruptly from brow to nail. The quills are already sprouting on the scapulars. From bill to lower neck the colour of the down is blackish-brown; in front and over the eye there is a light brown space; edges of the eyelid whitish-brown; upper parts dark brownish-grey, with tinges of smoky brown on the upper chest; chin and throat light brownish-grey; feet and bill blackish-brown.

Immature Male.—In first winter plumage in November the young male in general appearance is a very dark red-brown, so dark, in fact, that residents can easily recognise the species from immature Eiders, not only by the inferior size, but the dark colour. The birds in the winter look almost black. On close inspection the whole head and cheeks are a very dark brown interspersed with flecks and edgings of a dull sandy-yellow, the centre of the

[1] The Pilot or Messenger (lit. traitor) of the Long-tailed Duck (Nilsson).
[2] There are probably specimens in the Smithsonian Institute.

fore part of the neck is lighter in colour, whilst the lower part of the neck is black with light sandy bars. The mantle and breast are black with sandy-brown bars and edgings; the breast and flanks being a rich red-brown; the back is black, suffused with a purple gloss which extends to the lower feathers of the mantle; tail black and brown with purple suffusion; speculum purple shading into black and white extremities; secondary coverts dark brown with white on the lower parts; lesser and median coverts blackish-brown without barred edgings.

Scapulars brown with black centre, the long scapular feathers which form and overlap the speculum being brown on the upper half, greyish-white in the middle, and glossy bluish-purple on the lower half.

Bill dull lead-blue with bone-coloured extremity.

Feet reddish-brown with black webs.

The above describes the dark form of the young male of Steller's duck, but as in nearly all birds, especially ducks, there is another form of much lighter colour. In the latter the whole of the sandy edges to the feathers are much paler and more clearly defined, whilst the whole of the uniform rich red-brown of the lower part and flanks are edged with light red brown bars, the dark brown of the wing too is also edged with light red or sandy-yellow.

The above descriptions are taken from two immature males killed in November near Tromsö, and presented to me by the late Professor Collett.

The change in the young male proceeds slowly until February, when a general paleness, due to fading and outgrowth of the feathers, is noticeable. The long scapulars become more purple, and the chest is very much lighter, whilst the lower chest and breast takes on the first tinges of that rich sienna which is so great an ornament of the adult male. Above this part of the plumage one or two white feathers are seen in the upper scapulars, chest, or fore neck. In very advanced birds the black collar is now seen coming in on the neck with a few of the feathers in metallic blue; the cheeks and crown are also much lighter, whilst the chin and throat may have assumed the new black feathers. But the most striking feature of spring change is seen in the arrival of six or seven of the beautiful long and curled secondaries of blue, black, and white, which are similar to those of the adult male, with the exception that they are tipped with a pale sandy-brown. A young male killed at Vadso (Finmark) on February 12, 1882, bears all the above characters, and is an unusually forward bird, since two other males killed in the same month have changed but little (except that they are paler) from the first plumage birds.

Specimens of Steller's duck in immature plumage are rare, but I have been so fortunate as to obtain the loan of several from Professor Collett of the Christiania Museum, and amongst them is a very interesting young male killed in East Finmark on June 10, 1858. Its plumage shows that the progress of feather change in young male Steller's duck is practically similar to the young Eider drake. The whole plumage of this bird proves that very few new feathers have come in since the slight flush of new feathers in February and March. With the exception of some black feathers suffused with purple on the lower mantle, this bird is the same as it was in February, but with the whole of plumage, especially the light brown and sandy bars, much faded. The breast is more sienna-coloured, and the white of the upper chest and neck more pronounced (see Fig. 6). I have not seen a

specimen, but it is certain that after this stage, and early in July, the young male Steller's duck moults into an eclipse similar in its relation to the old male eclipse that the young male Eider assumes. The wings and tail (and probably a portion of the vent and under and upper tail-coverts) only remain in their worn and faded state until completely renewed in September and October to the next winter change. It is probable also that the young male does not assume the full spring dress and breed at 2 years old, but so far no specimens are available in public or private collections; but with its similarity to the Eiders it seems more than likely that the bird does not pair and breed until it is in its third year.

Adult Male.—Crown, sides of the head, and upper neck, silky-white; local spot and occipital patch forming a slight crest, rich olive-green; chin and throat a narrow line of black, until it forms a broad collar which encircles the neck, glossy blue-black with purplish sheen; a small spot on each side of green occipital band, and also round the eye, black; centre of mantle, back, rump, and upper and under tail-coverts, black shot with bluish-purple; on each side of the mantle and upper scapulars, white; long scapulars lanceolate, bluish-purple, and edged with white along the margins; secondaries bluish-violet edged with white; the innermost feathers sickle-shaped and distinctly tipped with white; upper wing-coverts white; tail and primaries dark brown; under surface of the body almost brown-black, passing in rich sienna and then to cream-buff on upper breast and flanks; a white collar just below black neck circle; bill and feet blue-grey or lead-colour; nail inclined to bone-colour;[1] irides dark brown. Length, 18 inches; wing, 8.4 inches; tarsus, 1.2 inches.

There seems little doubt that the males change to eclipse in July, as is the case with all diving ducks.

The old male in first eclipse I have not seen, but an interesting specimen of an adult male emerging from the eclipse plumage into the winter dress (killed in Finmark in 1847) retains a sufficient portion of the summer dress to show that the whole of the mantle, upper scapulars, chest, and flanks were blackish-brown, with bars and edges of sandy-brown; the lower back and tail-coverts, under and upper belly, were probably black throughout the eclipse, whilst the wings, long scapulars, and tail have only been renewed once, as is usual, without change of colour from the spring dress. The most interesting part of this bird is the fact that the whole of the head, cheeks, and throat is a uniform sandy-brown, without the black or dark-brown spots we usually associate with nearly all eclipse plumages of the Eiders (see Fig. 7).

Immature Female.—Very similar to adult female in winter plumage, but easily distinguished by the absence of black in the lower breast and abdomen. These parts in the young female are somewhat similar to the immature female Eider, and are black with broad sandy edgings. The worn ends of the pale brown first plumage tail are also points of identification. The white alar bars on the wings are present, but the whole plumage on the upper surface is more narrowly barred and not so chestnut in colour as the adult female. The secondaries are brown with a slight purple gloss.

There is a very interesting second year immature female in the Bergen Museum which was killed at Fiskeröen on September 25, 1877. The nape, back, and breast are all of a rich chocolate-brown; rump and vent blackish; cheeks reddish-brown; crown chocolate-brown; the wings have just been moulted, and are as in the adult; the greater part of the

[1] Mr. P. Musters informs me that the feet and bill of an adult male shot by him in Norway were light grey; irides dark brown.

plumage is still unmoulted, and very finely edged with sandy-brown. By the following March, this female, if it had lived, would have resembled the adult female, but, as in the case of the second-year Eider female, would probably not have bred.

Adult Female.—In winter plumage the head is olive-brown, mixed with rufous, and marked with black. There is often a slight purplish gloss on the crown. Cheeks, neck, fulvous and barred with black; upper parts dark brown, mottled with rufous and edged with fulvous yellow; back dark brown; scapulars dark brown edged with rufous and sandy-yellow; wing-coverts dark brown tinged with olive-brown and tipped with white, forming a broad alar bar; tail and primaries dark brown; throat sandy-rufous and spotted finely with very dark brown; upper breast chestnut mottled with black markings; lower breast, abdomen, and vent black, sometimes slightly marked with chestnut; flanks chestnut barred with black; secondary wing-coverts white; tail and primaries dark brown; bill dusky-blue; feet dusky-olive (Turner), but not so rich as the male; irides dark brown; measurements same as the male.

An adult female killed from the nest, June 9, 1898, at Point Barrow, Alaska, has the under parts a rich dark brown; chest reddish-brown, with black, pear-shaped markings; the cheeks are reddish-brown with only a few blackish bars; crown dark brown, and over and under the eyes sandy; throat sandy-yellow; the rest of the plumage as in winter, but with the tail and primaries considerably faded.

General Distribution.—This beautiful duck inhabits the far north, extending from Northern Lapland to the coasts of Kamschatka and the northern coasts of N. America.

Breeding Range.

Europe.—Nordvi obtained many unidentified eggs from an island in the Henö group in Russian Lapland, which he believed to belong to this species, and sent over twenty eggs to the late Professor Newton, who doubted their authenticity (see *Ootheca Wolleyana*, ii. p. 570, note). A. G. Nordvi's original letter, in which he states that he obtained eggs from the Henöerne and from Petschinka appeared in the *Journ. f. Orn.*, 1871, p. 208. W. Meves criticised this statement in the *Journ. f. Orn.*, 1875, p. 433, and identified the eggs in question as those of *Harelda glacialis!* Eggs stated to belong to this species from the Varanger Fjord (Schancke) and from Tromsö, Norway (Nehrkorn coll.), are in the British Museum, but can hardly be accepted without further evidence. In 1902 H. Goebel published an article in the *Ornith. Jahrbuch* (1902, p. 107), on Zip Nawolok (Ribatschi Peninsula, Murman coast), in which he states that though he obtained no eggs, he found two or three nests of Steller's Eiders, from one of which the eggs had been taken by gulls, and also met with pairs of breeding birds. This article has been brought to my notice by Mr. Jourdain, and has apparently been overlooked by all English writers on the subject. S. A. Buturlin informed Dresser that it bred on the Murman coast of Russian Lapland (*Eggs of Birds of Europe*, p. 580), and his statement is probably based on Goebel's researches and not on Nordvi's discredited records. There is also a probability that it breeds on Novaya Zemlya. See *Ornith. Monatsberichte*, 1906, p. 84.

Asia.—First found nesting by Middendorff on the Taimyr Peninsula. See Middendorff, *Sibir. Reise*, ii. 2, p. 234, tab. xxiii. figs. 3–5 (eggs). Egg also figured by Newton, *P. Z. S.*, 1861, p. 400, pl. xxxix. fig. 4. From this point eastward it is found along the

STELLER'S EIDER.

Immature Males. December.
Vardo, Finmark.

Adult Female. June. Point Barrow, Alaska.

Immature Male; in half eclipse. June 10th.
Age 11 months and 10 days.
East Finmark.

Immature Male. March. Age 9 months.
Vadso.

Adult Male. March. Finmark.

Adult Male; in half eclipse. June.
West Finmark.

arctic coasts of Siberia, the new Siberian Isles (Bunge), commonly on the Kolyma (Buturlin), and east to Kamtschatka (Steller).

N. America.—Breeds in Alaska, commonly along the northern shores; also in the Aleutian Isles (*fide* W. H. Dall), though scarce in summer. The nest has been taken on Unalaska (W. H. Dall and E. W. Nelson), and also breeds on St. Lawrence I. (W. H. Dall and E. W. Nelson). Not rare at Point Barrow, but must breed farther north (Murdoch). Eggs were also taken by MacIlhenny on the Simva R. near Point Barrow, Alaska. Stejneger is somewhat sceptical as to breeding on the Aleutians (*Orn. Explorations*, p. 172).

Migration Range.

England.—There seem to be only two well-authenticated records of the occurrence of this duck in our islands. The first, a nearly adult male killed near Caistor, Norfolk, Feb. 10, 1830 (Yarrell, *P. Z. S.*, 1831, p. 35), now in the Norwich Museum. The second is that of a young male killed off Filey Brigg, Yorks, Aug. 15, 1845 (R. J. Bell, *Zoologist*, 1846, p. 1249), now at Kedleston Hall.

Europe.—Steller's Eider occurs sparingly in various parts of Northern Norway, Russian Lapland, but is a regular winter visitor to Tromsö and the Varanger Fjord, where it is also found throughout the year.[1] It is sometimes seen in the Baltic as well as the east coast of Norway, where Mr. P. Musters has shot specimens.

It has also occurred on a few occasions in Denmark (Dresser; Winge): on Heligoland four times (Gätke, *Heligoland, Orn. Observatory*, p. 537): France, once between Boulogne and Calais in 1855 (Degland and Gerbe); and formerly in East Prussia, 1840–50 (Hartert, *Ibis*, 1892, p. 519); *cf.* Homeyer, *J. f. O.*, 1872, p. 308 (*cf.* also Naumann, *Vög. Mitteleuropas*, x. p. 221): Mark Brandenburg (Alturn, *J. f. O.*, 1885, p. 375).

Asia.—Ranges commonly to the coasts of Kamtschatka, the Kuriles and Commander Isles (Seebohm, *Birds Jap. Empire*, p. 257; Stejneger, *Orn. Expl.*, p. 170). Also far inland on the Yana near Verkhoyansk (S. A. Buturlin, quoted by Dresser).

America.—West Greenland, only once recorded from Disco fjord (Winge, *Grönland's Fugle*, p. 93). The only other records from E. N. America are Cumberland Sound (L. Kumlien), and Godbout, and Point des Monts, Quebec. One obtained at Godbout by N. A. Comeau, Feb. 1898, and others probably seen previously. See A. K. Fisher, *Auk*, vol. xvii. p. 65 (1900), and Macoun, *Cat. Can. Birds*, 2nd ed. p. 107. On the west side it is abundant in winter on the Aleutian Isles (W. H. Dall) and the coasts of Alaska (Macoun, *Cat. Can. Birds*, 2nd ed. p. 197; L. M. Turner, *Contrib. Nat. Hist. Alaska*, p. 135; E. W. Nelson, *Rep. on N. H. Collections in Alaska*, p. 75, &c.).

Stejneger observed them in the winter of 1822 on Bering Island and thus records their seasonal movements. He says:

"The first were met with on November 1, and on November 20 specimens were brought down for the first time. They remained on the coast during the whole winter, and preferred the rocky parts, and the places where there were most breakers. Although they were very numerous throughout the

[1] Pastor Sommerfeldt, who resided on the Varanger Fjord, is thus quoted by Dresser (*B. of Europe*, p. 652): "It is found here throughout the year, particularly towards the spring, up the fjords, but in the summer, more frequently in the direction of Vardö, as, for instance, on the Skal and Komage rivers." He does not deny that it breeds in East Finmark or Russian Finmark, but thinks that satisfactory evidence is wanting.

whole winter, yet their numbers increased enormously in the spring; countless hosts covering many acres could be seen swimming on the sea, one quarter to half a mile from the coast in April. And towards the end of this month their numbers noticeably decreased. April 20, May 2, 4, and 5, still fewer were to be seen, and on May 8 only half a dozen male and female were to be seen; on May 10, again great flights were seen, and by about May 25 all had vanished."

Habits.—The general habits of this duck are somewhat similar to the other Eiders, except that they are much shyer in disposition and less amenable to consort with other species. They are very gregarious in winter and fly swiftly and dive with all the skill of the other members of the genus. They move about in large flocks, and even single pairs will not consort with Eiders or King-Eiders. Stejneger found that, except the Golden-Eye, they were the shyest of all duck found on Bering Island. The adult males generally kept apart from the females and young males, and were found in long straggling groups further out to sea.

They feed on fish spawn, young fish, crabs, and possibly on vegetable growths, but principally on conchylia and mussels. These they obtain by diving, and their favourite resorts are mussel-banks lying at the same depths as those frequented by Eiders and Long-tailed Ducks.

Professor Collett tells us that the food consists chiefly of molluscs and crustacea, and has found in stomachs of specimens killed in Finmark the following species: *Litorina palliata*, *Lacuna vincta*, *Trophon truncatus*, *Margarita helicina*, *Pleustes panopla*, *Anonyx lagena*, *Podocerus anguipes*, *Buccinum groenlandicum*, *Anonyx gularis*, *Gammarus*, and species of *Amphithæ*, *Margarita groenlandica*.

Of their arrival and departure in N.W. America, we have the report of the *Expedition to Point Barrow, Alaska*, Wash., 1885, which says:

"Though not common in the sense that the King-ducks and Pacific-Eiders are common, this beautiful little duck is far from a rare bird during the late spring and summer at Point Barrow and in the vicinity.

"The breeding ground, however, appears to be some distance off. Early in June they are to be found at the 'leads' of open water at some distance from the shore, and perhaps the majority of them pass on in this way to their breeding grounds. From the middle to the end of June they appear on land in small parties scattered over the tundra.

"At this time they are in full breeding plumage, and the males are generally in excess in the flocks. They are generally to be found in small 'pond-holes,' frequently sitting on the bank asleep, and are very tame, easily approached within gunshot, and generally swimming together when alarmed, before taking wing, so that several can be secured at one discharge. I have stopped a whole flock of five with a single shot.

"They appear to go off to breed about the end of June, although it is possible that the birds we have on the tundra are non-breeding birds.

"Birds, however, that have bred, judging from the looks of the ovaries, begin to come back from the first to the middle of July, appearing especially at Pergniak and flying in small parties up and down the coast. They generally keep to themselves, but are sometimes found associating with small parties of King-ducks.

"When the open water forms alongshore—that is, in the latter part of July and early part of August—they are to be found in large flocks along the beach, collecting in 'beds' at a safe distance from the shore, feeding on marine invertebrates, especially on gephryean worms. These flocks consist almost exclusively of moulting females, whose ovaries show that they have bred. The males appear to undergo a full change of plumage like the other Eiders, gradually putting on the brown dress of the females. We were, however, unable to secure any specimens to illustrate this change.

"They disappear from the 1st to the middle of August, and when gathered in large flocks are exceedingly wild and hard to approach.

"Though less abundant in the early part of the season of 1883 than they had been in 1882, they were, on the other hand, much more plenty after the sea opened, and stayed considerably later."

Describing this species as a winter inhabitant of Unalaska Island, L. M. Turner (*Contrib. Nat. Hist. Alaska*, pp. 135–6, 1886), says:—

"In winter it abounds in Captain's Harbour on Unalaska Island. It keeps off-shore and ventures nearer only in boisterous weather. It dives deep in the water for its food, and remains under a great length of time. Its food is of an animal nature, procured from the sea."

I can find no notes relating to the courtship of this duck, which may differ from that of the other Eiders.

W. H. Dall describes the nest as built between two tussocks of dry grass, and depression carefully laid with the same material. Nest entirely concealed by overhanging grasses and found by bird flying out at the finder's feet. Middendorff found nests on flat tundra in the moss, and describes them as deep, round, and lined with down. The male keeps in the vicinity of the female, who sits closely and leaves the nest unwillingly. The same naturalist found them breeding in fair numbers on the Taimyr, but less often than *S. spectabilis*. He found fresh clutches on June 25 to 26 (presumably old style, *i.e.* July 7 and 8) on the Boganida. W. H. Dall found a nest with one egg on an islet near Unalaska, but Stejneger throws some doubt on the occurrence. MacIlhenny took eggs at Point Barrow on June 22, and there was a nest with six eggs in the Proctor Collection, which I have examined, also taken by MacIlhenny on June 26, 1898. Von Middendorff states that the female is very unwilling to leave the nest, and when disturbed flies off "with a harsh cry reminiscent of our Teal, but still more harsh." Steller found a nest in Kamtschatka amongst precipitous rocks near the coast.

GENUS: *Oidemia*

THE COMMON SCOTER

Oidemia nigra (Linnæus)

Anas nigra, Linn., Syst. Nat., ed. x. i. p. 123 (1758).
Anas nigra, Linn., Syst. Nat., ed. xii. i. p. 196 (1766).
La Macreuse, Buff., Hist. Nat. Ois., ix. p. 234 (1783).
Anas atra, Pall., Zoogr. Rosso-As., ii. p. 247 (1811).
Oidemia, Flem. (*anas nigra et fusca*), Phil. of Zool., ii. p. 260 (1822).
Melanitta nigra (L.), Boie, Isis, 1822, p. 564.
Platypus niger (L.), C. L. Brehm, Lehrb. Naturg. eur. Vög., ii. p. 820 (1824).
Oidemia nigra (L.), Flem., Brit. Anim., p. 119 (1828).
Oidemia leucocephala, Flem., op. cit., p. 119 (1828, nec Gmel.).
Melanitta nigripes, C. L. Brehm, Vög. Deutschl., p. 901 (1831).
Melanitta megauros et *M. gibbera*, C. L. Brehm, op. cit., p. 902 (1831).
Fuligula nigra (L.), Degl., Orn. Eur., ii. p. 470 (1849).
Oedemia nigra, *O. gibbera*, *O. nigripes*, *O. megauros*, C. L. Brehm, Vogelfang, p. 383 (1855).
Oidemia nigra nigra (L.), Authors' Hand-List Brit. B. (1912).

LOCAL NAMES.—Scoter, Black Scoter, Common Scoter, Black Duck (*English*); Black Coot, Gray Coot, Butterbill, Broadbill Coot (*N. America*); Tunnag-dubh (*Gaelic*); Sortand, Kuland, Svarten, Sort Himmelkund (*Danish*); Merilintu, Mustalintu, Njuorkua, Kuorpisuorsa (*Finnish*); Hrafnsönd, Dukönd (*Icelandic*); Njurkku (*Lappish*); Svartand (*Norwegian*); Sjöorre, Hafsorre Svärta, Wattenorre, Doppand, Svartand (*Swedish*); Macreuse, Grisette (Juv.), Bisette, Mourette, Morillon, Morillon noire, Jeffre noire (*French*); Knobbed (male), Bührn (female) (*Heligoland*); Zwarre Zee-eend, Wigstaart, Noordsche eend (*Dutch*); Trauer-Ente, Schwarze Ente, Vageln, Swart Ant mit en Knust, &c. (*German*); Patka crua, Crni turpan (*Croatian*); Kachna cerna (*Czechish*); Melna pihle (*Esthnian*); Macrosa (*Italian*); Bourk-el-behar (*Moorish*); Negrolla, Negra (*Portuguese*); Pato negro, Morell de Mar (*Spanish*); Fekete recze (*Hungarian*); Chernay-antka, Nyrok sinjga (*Russian*).

Egg.—Usually 5 to 8, and very rarely 9 in number. Clutches of 10 and 11 are said to have been found in Iceland. The egg is large, smooth, fine grained, and of a beautiful warm cream colour when fresh.

Average size of 70 eggs, 65.42 × 44.69 mm. (2.57 × 17.5 in.); max., 72 × 44.3 and 65 × 47 mm.; min., 59 × 42.5 and 60.9 × 42 (Jourdain).

Incubation, which is performed by the female alone, is estimated by Hantzsch at four weeks. Major Trevelyan states that a female sat for thirty-two days. For nesting down I must refer my readers to the description in the *Zoologist*, 1906, p. 376, and the paper by Mr. Heatley Noble in *British Birds*, ii. p. 39, pl. ii. fig. 15. The down found by myself in a nest in Iceland was of a dark smoky-grey.

Young in Down.—Upper parts dark brown; cheeks and abdomen grey; chest crossed by a band of smoky-brown; chin white; bill lead-black; feet and legs greenish-brown.

Immature Male.—In first plumage the bill of the young male is black, with only a very slight touch of reddish-yellow round the nostrils. There is no knob. Irides dark brown; feet dull olive-green, with the joints, webs, and soles dull black; crown and back of the head dark brown; cheeks and throat whitish-grey; upper chest and flanks light

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COMMON SCOTER
adult male and female

brown with greyish-white edges; under parts the same, but with broader white margins; thighs and vent brown; rump, blackish-brown; nape, scapulars, mantle, dark brown with more or less light edges; wings brown, with the secondaries almost black with light edges; primaries blackish-brown; tail brown. In late November the jet-black feathers begin to come in generally on the throat, cheeks, and under tail-coverts, whilst in the following month patches of black feathers may appear on the breast. (In many cases the greater part of this moult is not acquired until March.) The advance in plumage is very slow in the three following months, when a few more patches of black may be attained by April. In very advanced young males the whole of the black plumage may be assumed by April, except on the long scapulars, wings, tail and rump, and under parts, which always appear to be retained in first plumage until the principal moult in July and August. Usually young males retain a considerable portion of their first plumage on the cheeks, neck, and under parts until July, and these feathers fade almost to white in that month. Throughout the winter and spring the knob on the bill develops, and the area of yellow extends in size and becomes richer in colour, so that by April this feature of the bird is sometimes almost as complete as in the adult, in form but not in colour. This, however, is unusual, for a young male in my collection, killed in August at Filey, Yorks, has the bill only half developed, whilst two specimens living in the Zoological Gardens, July 1912, were similarly incomplete.

The principal moult towards maturity commences in July, when the bird is one year old. A number of temporary brown feathers, which may be called the first eclipse, appear on the head and neck, these being again shed in late October. The main parts of the plumage, such as the upper and lower parts, rump, and tail, are now shed, all immature feathers being replaced by glossy black ones. The wings do not seem to be shed until the end of August (a specimen killed on August 10 still showing a faded-white breast and first plumage wings).

In October the head and neck and flanks moult the brown feathers of the first eclipse, and the bird attains its full plumage by the middle of November—that is, at 16½ months—but it can always be identified by the colour of the bill until 21 to 24 months. These young males are never so bright in their plumage, nor are the central tail feathers so long and pointed, as older males, nor do I think any of them breed in the following spring. In all the winter resorts numbers of "black" males are still to be observed throughout the spring and summer, when nearly all the adults have departed for more northerly regions, and there are, I think, males which have attained full plumage but cannot nevertheless be considered quite adult. The same remark may be applied to both the other species of Scoter.

Two males (aged 21 months) killed on March 27, 1913, by the Honourable Gerald Legge, at Patshull Mere, near Wolverhampton, were in plumage adult, but the bills were still incomplete, both in form and colour. One of these had nearly lost all the reddish-yellow in the dip between the knobs of the upper mandible, but the other had still the narrow band and broader expanse of cadmium-orange seen in October birds (see figures, coloured plate of Scoters). In the case of the first or slightly more advanced bird, the bill would doubtless have acquired its full shape and beauty in the course of the next two months. It can therefore be said that the male Common Scoter acquires maturity at from 23 to 24 months. The weight of these two birds were each 1 lb. 14 oz.

Length, 18 inches; irides brown; forepart of the bill-patch pale yellow, becoming reddish-orange round and above the nostrils to space in front of the crown.

Adult Male.—The whole plumage is a deep black with the upper parts glossed with purple-blue; the under parts inclined to be brown. The bill has a large protuberance at the base of the upper mandible through which there is a line (including the nostrils) of rich orange-yellow. The rest of the bill black; legs olivaceous-brown; irides dark brown. Length, 20 to 21 inches; wing, 9.5 inches; tarsus, 1.8 inch.

Like all the Scoters, the local Common Scoter has only a slight eclipse plumage, if it may be so called. At the end of July a few dull brown feathers appear on the cheeks, throat, and neck. Below the lores and on the throat many of these feathers are of a dirty-white colour, and it gives the old male a certain resemblance to a female, and for which they have doubtless been mistaken. No author that I can discover mentions having seen this eclipse plumage, which is retained to late in the autumn, but I have examined two males killed in August in Iceland which exhibit this dress.

Naumann, dealing with this phase of plumage (*Naturgesch. Vögel Mitteleuropas*, x. p. 246), says:

> "As a differently coloured summer plumage of the adult male has not yet been noticed, I am the more sorry to be unable to fill up the gap, for it is more than probable that they have such a plumage, because in the late autumn males have been seen which had, amongst the black feathers, still a few brown ones here and there, and whitish ones at the throat, and these were specimens which could not be considered from all the other signs as young males which had assumed the fully-coloured plumage for the first time. The great rarity of quite black males in the autumn, particularly in this district where at that time of the year only brown specimens appeared, points to this conclusion. Unfortunately, I myself never had the privilege of making observations on this question at the right time in the autumn, in the neighbourhood of the sea, where these ducks are common. [*Note.*—I too have never seen an adult male in the summer plumage.—(R. Blasius.)]"

The birds described by Naumann might very well have been immature males of from 14 to 16 months which had not arrived at adult plumage.

I have noticed that males are perfectly black all over, with the bill-patch bright yellow all through July, but think that a few female-like feathers do appear in front of the eye in August. In a note to me, Mr. O. Murray Dixon says:

> "Is it not uncommon to find Common Scoters so far inland in July? On the 5th of this month (1912) I watched for some time through my glasses three adult males and a female swimming on the reservoir here (Loughborough, Leicestershire). The males were entirely black, with long tail feathers, and yellow on the bill. This is the first time I have ever seen Scoters here."

The windpipe of the adult male is somewhat widened in the middle, but has no "drum" on the lower larynx, but only a formation similar to that found in most female ducks. According to Yarrell, the two bronchial tubes of the male are much widened and twice the size of those of the female.

Immature Female.—Similar to immature male, but somewhat lighter in colour; breast inclined to be spotted. In November the sexes are easily separated, and the plumage of the adult female commences and is only partly complete by April; the same areas of immature feathers are retained until July as in the young male, when a general moult takes place and the wings and tail are shed. The full plumage is gained in November at 16½ months.

Adult Female.—The plumage of the adult female in winter in some degree resembles that of the immature female, but is readily distinguished by the bolder markings, and the uniform band of rich reddish-brown across the upper chest. The feathers round the vent are blackish-brown instead of smoky grey-brown. The flanks and upper parts are rich reddish-brown with broad light grey edges. The whitish-grey under parts extend right up to the blackish-brown vent, and do not grade into pale brown as in the young bird. In old females there is a slight tendency to a knob on the bill which is bluish-black; nail black; feet and legs olive, with yellowish-blue on the instep and back of the toes; irides, red-brown; measurements a little smaller than the male; the central tail feathers not so long or pointed.

There seems to be two very distinct forms of the female Common Scoter. As is the case of the female Tufted Duck, which in summer sometimes, but not always, has a moult all over the lower parts, and becomes rich "golden" brown, the Common Scoter has a similar plumage, though somewhat darker. These dark females seem to be scarcer than the light-breasted ones. One which I killed at Myvatn, Iceland, in June, has rich sandy-yellow edges to the dark upper breast, and is a rich blackish-brown over the whole of the rest of the under parts. The tail is unusually long and pointed. I assume that this is an old and very dark female, and is a marked contrast to another breeding female of the light type (see figures, Common Scoter plate).

General Distribution.—The Common Scoter breeds in the British Isles and in Iceland. From thence eastward it breeds throughout N. Europe and N.W. Siberia as far as the Taimyr Peninsula. On passage, and during winter, it frequents the coasts of Europe, occasionally straying as far south as Spain, Portugal, the Mediterranean, the Azores, and N.W. Africa. It is replaced in N.E. Siberia and N. America by a closely allied race, *Oidemia nigra americana*, which breeds to the north of lat. 52°, from Alaska to Labrador and in eastern Asia, in Kamtschatka, the Kuriles, the Kolyma valley, and, according to Buturlin, sparingly as far east as the Lena.

Breeding Range.

British Isles: Scotland.—Breeds in Caithness (Harvie Brown, Saunders, and others), commonly on "flows."

Sutherland.—Also common, especially on east side (T. E. Buckley, Harvie Brown, Saunders, H. Noble, and others); now extending to the west. First recorded as breeding in 1877 (*cf.* Newton, *Ootheca Wolleyana*, ii. p. 580).

Ross.—In small numbers (H. Noble, *Brit. Birds*, ii. p. 39); *not* in West Ross (see *V. F. of N.W. Highlands*, p. 249).[1]

Inverness.—"High-lying mountain lochs of certain parts of Inverness along Caledonian Canal" (J. A. Harvie Brown, *Brit. Birds*, ii. p. 134).

Cromarty.—Breeds in small numbers (H. Noble, *Brit. Birds*, ii. p. 39).

[1] Mr. Heatley Noble sends me the following note: "Much more numerous as a breeding species in Scotland than generally supposed. Howard Saunders says a 'few remain to breed, &c.' This is wrong; I have seen *numbers* breeding on the lochs near Forsinard, and also at Strathmore, near Halkirk. I know another place where it breeds regularly in Inverness-shire. A nest I found on June 17 contained seven hard-sat eggs. It was in heather and some way from the loch, where the male birds were to be seen. I watched the female fly on to the nest when she got up off the water."

[I can corroborate this, and think the breeding area is rapidly extending in Sutherland and Caithness. I know that several bred near Kinbrace, and one pair on Loch Skelpig, in 1912.—J. G. M.]

Tiree.—Said to have bred in 1897; brood of 5 young seen (P. Anderson, *A. S. Nat. Hist.*, 1898, p. 157).

Shetlands.—Said to have bred in 1911, but no details given (Baxter and Rintoul, *Rep. on Scot. Ornithology*, 1911, p. 8).

Ireland.—One pair found breeding on a lough in N.W. Ireland by Major Trevelyan. The birds were first noticed in 1904, but it was not till 1905 that the first nest was found. From that time onward a nest has been found or young observed every year. See *Field*, July 15, 1905, and July 4, 1908; *Brit. Birds*, ii. pp. 39, 86, 134; iii. p. 197; iv. p. 154, &c.; v. p. 79; *Ootheca Wolleyana*, ii. p. 580.

Europe: Iceland.—Breeds not uncommonly in the north, especially near Myvatn, but rarely seen in south (Slater, *Manual*, p. 74; Hantzsch, *Vogelwelt Islands*, p. 204).

Spitsbergen.—Recorded as breeding in 1905 (Koenig, *Avifauna Spitzbergensis*, p. 231; cf. *J. f. O.*, 1908, p. 138).

Norway.—Breeds in E. Finmark, but rarely farther south.

Sweden.—Breeds in Swedish Lappmark and Jemtland (Westerlund, p. 177).

Russia: Finland.—Chiefly in the north (Finnish Lappmark), south to about lat. 61° 40′ N.; Kola Peninsula (Pleske and H. F. Witherby).

Lapland.—The Archangel Government, the Lower Petschora, rarely in Novaya Zemlya, but commonly on Waigatz (S. A. Buturlin).

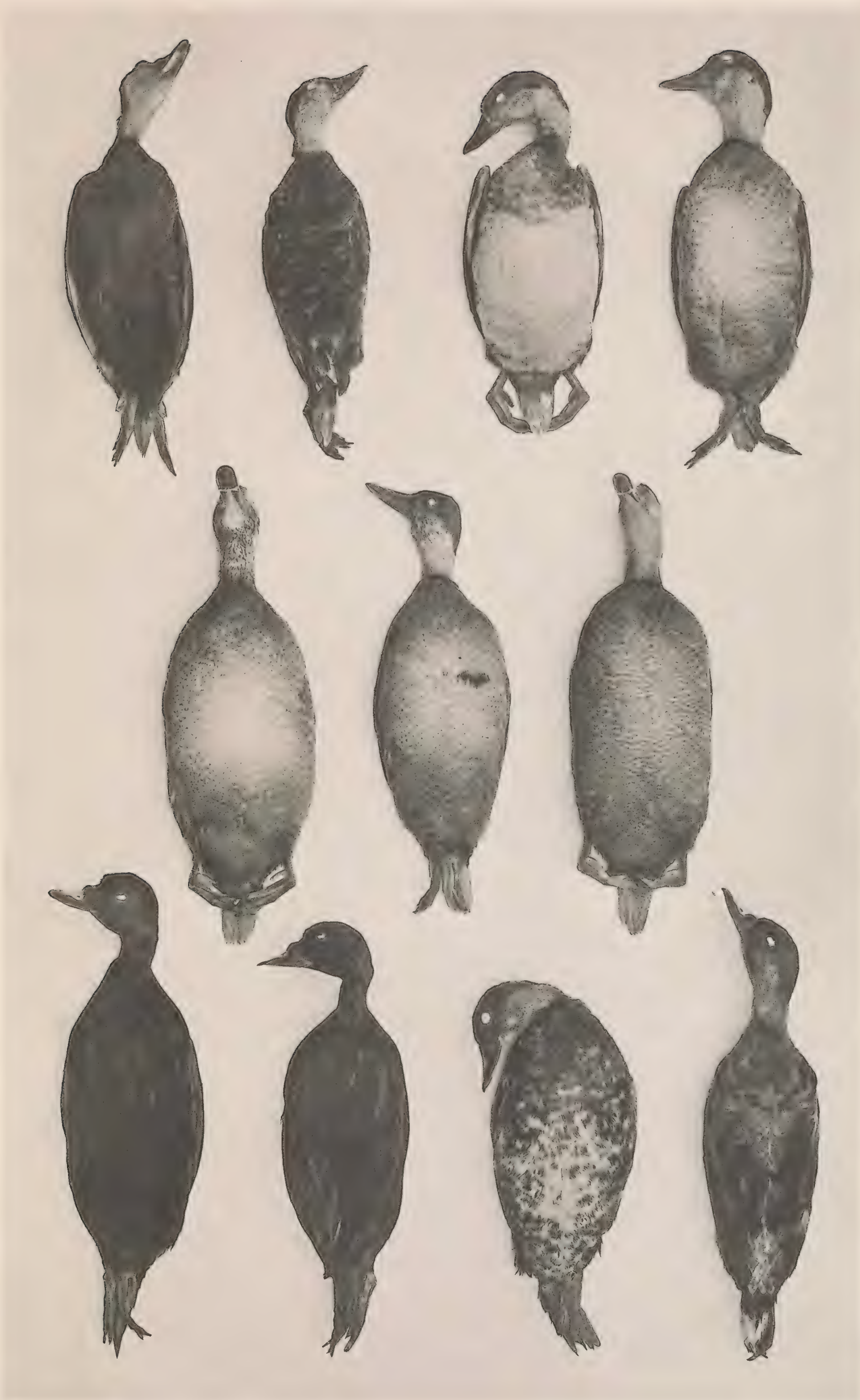
Asia.—Breeds in Siberia east to the Taimyr Peninsula and Boganida, and south to the Lower Tjumen, in the Tobolsk Government (S. A. Buturlin).

Migration Range.

Europe: Færöes.—Occurs, but no proof of breeding. Winters in North Sea, English Channel, and very abundant off the north coasts of Holland and France. A few resort to the south coasts of Norway, and it is numerous on the coasts of Denmark, Jutland, and N. Germany. A few pass south to the coasts of Spain and Portugal (Santander and Gibraltar—L. H. Irby). Portugal (common, Tait, *Ibis*, 1887, p. 378); also to Azores (Godman, p. 37; Hartert, *Nov. Zool.*, xii. p. 109); also along the N.W. African coast (*vide subter.*). In the Mediterranean it has been met with in N. Italy (Venetia, Liguria, Tuscany, &c.) about fifteen times (Giglioli, p. 488), and it is said to have occurred on Sardinia (Arrigoni); possibly also on Corsica (Whitehead). Probably these birds travel overland, as it is known to visit the lakes of Switzerland (Fatio and Studer, *Oiseaux de la Suisse*, p. 1395). It is, however, very rare in Bohemia and Hungary. In S. France, it is rare off the coasts of Provence. In Eastern Europe it migrates down the Volga valley to the Caspian Sea (H. Saunders), and also occurs on the Black Sea and on passage in the Dobrogea (Dombrowski). Pallas and Eichwald record it from the Caspian.

Asia.—Tristram records it in winter off the coast of Palestine, but it apparently does *not* reach the marshes of Mesopotamia, and it is recorded with some doubt from Cyprus by J. A. Bucknill (*Ibis*, 1910, p. 402). Mr. F. R. S. Baxendale, however, saw two near Famagusta in 1912 (*in litt.*), but as no specimens were obtained, it is possible that they may have been Velvet-Scoters.

Africa.—Hartert records it from Rio de Oro, on the west coast of the Sahara, on June 20 (*Nov. Zool.*, x. p. 296), and Irby and C. A. Payton from the coasts of Morocco



COMMON-SCOTER.

1. Adult female, breeding plumage.
2. Immature female. May. Age, 11 months.
3. Immature female. July. Age, 12 months.
4. Immature female. Nov. Age, 4½ months.
5. Immature male. Nov. Age, 4½ months.
6. Immature male. Nov. Age, 5 months.
7. Immature male. Oct. Age, 3½ months.
8. Adult male. Dec.
9. Adult male. Feb.
10. Immature male. Aug. Age, 13 months.
11. Immature male. May. Age, 11 months.

(*cf.* Meade Waldo, *Ibis*, 1903, p. 214; Irby, *Orn. Str. Gibraltar*, p. 230; *Field*, Feb. 23, 1878), while J. I. S. Whitaker says it is a rare casual in Tunisia (*B. of T.*, p. 220). Loche says it is common on the Algerian coast in winter (*Expl. Sci. Alg. Ois.*, ii. p. 386).

O. nigra americana visits Corea, Japan (Ogawa, *List*, p. 349); and in N. America winters on the E. side from Newfoundland to N. Carolina, and casually to Florida; on the W. side from the Aleutian Isles to California.

Habits.—The adult males of this very gregarious species leave the breeding grounds in the north earlier than any of the diving ducks, and are often seen in parties in the Baltic at the beginning of August. It is possible, however, that these are birds which have not migrated north in the previous spring. A few also come to the British coasts at the end of August, and many scattered parties in September. In late October the adult females and young appear, and when they have reached their regular winter quarters assemble together in enormous flocks. Where they are most numerous, such as on the north coasts of Holland and France, I have seen immense flights of these birds, numbering many thousands, sitting on the sea, and often covering a line over a mile in length. When on journeys to Vienna via Ostend in the month of August, in the years 1909–1910, I saw quite a number of Common Scoters in parties from Calais to Ostend. These were birds of all ages, but were mostly males, from adults to young birds of the previous year. I presume they were individuals which had been there all the summer, as I have also seen them off Calais in May in equal numbers. It seems to be a fact, and one that has not been noted, as far as I am aware, that in the case of all the species of Scoter a certain number, even adults (though I cannot speak for certain as regards adult females), do not migrate north in the spring, but stray about singly or in parties on the grounds of their winter habitat. There is not a month in the year that these Common Scoters cannot be seen in the Channel and the east coasts of England and Scotland, and I have observed Velvet-Scoters in Orkney in every month. Whilst on a visit to British Columbia, I saw numbers of single young and adult males of the Surf-Scoter and the White-winged Scoter (*Oidemia deglandi*) in July and August, and was informed that they were numerous all through the summer in the channels between Vancouver Island and the mainland. They were all non-breeding birds that had not proceeded to the breeding grounds.

On migration a few Common Scoter, generally young birds, are driven out of their course and take temporary refuge on large sheets of fresh water, and so it is not unusual to hear of these ducks being killed even at such a place as Patshull, which is in the very centre of England.

The Common Scoter is a true lover of the sea, but does not like broken water or skerries such as are frequented by Eiders and Velvet-Scoters, but open stretches of sea not far from the coast, where the water is not deeper than 12 to 15 feet. They resort to estuaries and open spaces on the coast, situated above both sandbanks and flat mussel-beds, and will feed continuously in the same place unless driven off by rough weather, in which case they will come close in under the lee of the coast, and even ascend estuaries for a considerable distance. I have shot many well up the Eden estuary as they flew between narrow channels, but only after very rough weather, which had driven them from their usual feeding ground in St. Andrews Bay.

One of the best days I ever had at sea-ducks was in November 1887, when, hiring a

small "fairy" launch, I went to look for Velvet-Scoters in Musselburgh Bay. On reaching the turn outside Leith harbour it came on to blow, and we could proceed no further, so I cruised backwards and forwards on the edge of the inner harbour, just outside the shipping, where there was some slight shelter. Presently the ducks, unable to withstand the tempest raging outside, began to come in to feed under the lee of the harbour walls. Black Scoters, which I had scarcely ever seen in the Forth estuary before, came in in hundreds, as well as many Long-tails, a few Velvet-Scoters, and Great Northern and Red-throated Divers. The rolling of the launch made it so difficult to shoot, that I jambed myself in the top of the small gangway, and thus had a fairly secure position. In two hours I had exhausted all my cartridges and picked up 32 Black Scoters, 1 Velvet-Scoter, 10 Long-tailed Ducks, and 3 Great Northern Divers. I also shot about 14 others, which I failed to recover, although I had a long dip-net made for the purpose. The whole of the birds shot were immatures of the year. This was not a bad afternoon's shooting to get practically in the town of Leith. Every Saturday from November to March I cruised the Forth estuary and the Midlothian and Fife coasts, but I cannot recollect that I ever saw another Common Scoter in that time, though I could steam directly to Velvet-Scoters any day I wished. Common Scoters are said to rest occasionally on sandbanks (see Naumann), and I have heard this corroborated by gunners on the coast of Lincolnshire, but I cannot say that I have ever seen one ashore except in the breeding season.[1]

On the water the Common Scoter, when not feeding, is a dull, sluggish bird, drifting for hours with head and neck sunk deep between the shoulders. In feeding it dives somewhat like the Golden-Eye, with a powerful leg-kick, but not with so much spring. The tail generally trails in the water on such occasions, but is held well up when resting.

On land they are dull, sluggish, and clumsy birds, but when frightened they are remarkably active and put down their heads and run, rather like a water-hen. In confinement I have noticed they are very restless, nervous, and jealous when feeding. They are of a greedy nature, and adults chase off with open bill any immatures that come to the feeding trough, at the same time uttering a harsh croak.

Though disliking rough water, they are adept swimmers, and can maintain their position with comparative ease. The only Common Scoter I ever saw in Orkney was with a party of Eiders, in such a rough place that I could not approach without fear of being swamped, and the bird, an old male, was diving and reaching its food with as much facility as any of the weather-beaten Eiders. A few days afterwards he flew past me on the Bring and I killed him.

With its powerful feet and legs the Common Scoter dives frequently when on feed, generally reappearing almost on the same spot; and where they are not constantly disturbed they are seldom seen flying, but drift lazily about in great battalions when not on feed. If there is no wind they rise with some slight difficulty, going for a short distance splashing along the water, but if there is a headwind they lift more easily than the other Scoters. The wings are beaten very rapidly and flight accompanied by a slight "whistling" or rustling noise, which becomes almost a roar when a large flock takes to wing on a still day. As a rule they fly at a medium height, about 20 to 30 feet above the water, but I have seen them in the air at times higher than any of the Scoters or Eiders—in fact, as high as Golden-Eyes.

[1] I saw three adult males ashore on an island in Myvatn in 1889.

They fly in long lines or "wedge" formation, the latter part of the flock often much "strung" out owing to the fact that the whole flock does not rise at once but in succession. In fogs they seem to lose their bearings and to fly about in a promiscuous manner. One winter at Torquay, in Devonshire, I tried several times to shoot some Common Scoters, but could never approach them. One day, when there was a dense sea-fog, my boatman asked me to come out if I did not mind being run down by a steamer, so we rowed to sea with, I must confess, on my part, but little hope of seeing anything. About half a mile from the shore the Scoters were "grunting" and flying in every direction. Several passed close to the boat, and I shot four in a very short time, but the weird booming of fog-horns on all sides was not pleasant, so we soon beat a retreat to the shore.

As is the case with other diving ducks, Common Scoters when in flocks do not associate to any extent with other species. Single birds on migration will join other ducks, but the large packs keep apart on their own areas of sea, where they rest and feed. In North America the American Scoter frequently flies in company with Eiders, but does not feed in the same places. Common Scoters are the shyest members of the genus, and are generally very wild on the open sea and difficult to approach with a sailing boat. Like all the true sea-ducks, however, they are easy to approach in a gunning punt, though the days on which such a flimsy craft can be used with safety on the open sea are not frequent. Under any circumstances the gunner should be accompanied by a large sailing boat which can be kept within hail. In North America enormous numbers of American Scoters, Eiders, and other sea-ducks are killed by shooters hiding in sink-boats, floating platforms filled with sunk barrels in which the shooter hides, and near which decoys are placed. In March and April enormous numbers of duck are wending their way north and come readily to the decoys. Both in winter and spring Common Scoters separate in flocks consisting of adult males and others containing none but females and young. Very often these parties of different sexes are found in the same place, and at other times adult males are only seen off certain coasts, whilst immatures and females occupy other places. This seems to be the case with all the sea-ducks.

In winter the cry of both adult male and female and immatures is a harsh grating call which is so common amongst other sea-ducks, but in spring the adult male utters a somewhat musical bell-like call which is very difficult to render in words. Naumann expresses it in the words "Skrück-lück" on two notes making a major third, but I do not think that this is a good definition of the sound. Faber, who studied these birds in Iceland at the breeding time, says the male at the nest utters a short, low, quickly-reiterated, and flute-like call, such as "tü-tü-tü-tü," whilst the female answers with a hoarse "re-re-re-re-re."

The Common Scoter feeds principally on conchylia, and to a lesser degree on sea and fresh-water worms, small fish, crabs, insects, and portions of water-plants. On the sea their principal food is the edible mussel, *Mytilus edulis*. Speaking of their food, Naumann (*Naturgeschichte Vögel Mitteleuropas*, x. 248) says:

"In the stomachs of birds killed here (Germany), particularly young birds, I found traces of all the food-stuffs above named, especially very many nodular roots of water-plants which look like sprouting wheat, which are the favourite food of all the other diving duck which visit us, and probably come from *Polygonum amphibium*. In places where they cannot find enough snails and mussels, coarse sand takes

the place of the shells of these, probably for the purpose of digestion, and it is so effectual that even mussel shells are so extraordinarily ground down that it is got rid of as though it were coarse sand.

"The edible mussel (*Mytilus edulis*) seems to be preferred by them to all other species, and they swallow specimens of these which are as long as 3.5 cm. Their gullets often seem stuffed full of these, and places at which they can find mussel banks of this species at the bottom of the sea are the favourite haunts of this duck. They bring them up from the bottom of the sea at a depth of some fathoms, and are continually diving under for them, and busy themselves with this so often and for so long, apparently at the same place, and until they are scared away or leave the spot, that one marvels at their insatiable appetite, but probably it is the search and choosing of suitable specimens of these which helps to account for this.

"Birds have been fed in captivity on soaked bread, and kept alive for some time."

An interesting piece of information from Gätke, *loc. cit.*, proves that they sometimes also enjoy vegetable food:

"A ship went aground and broke up one stormy winter night on the long southern point of the dunes near Heligoland, with a cargo of the smaller grey horse-beans, and the whole cargo was carried eastward by the current and scattered over the bottom of the sea. This undoubtedly quite new dish to the Common Scoter was so much appreciated by them that soon thousands of them had collected at the spot, and dallied for over a month at the place which offered them this obviously favourite food at a depth of some 10 fathoms in ample sufficiency. All the specimens which were obtained at that spot were literally clothed in fat, which, unlike their normal condition, was very white and well flavoured. These birds possess no trace of the fishy taste which clings particularly to adult males."

F. S. Mitchell notes that cockles (*Cardium edule*) and other sand mollusca are eaten, and T. E. Gunn has found remains of small bivalves. Mr. G. Bolam has found chiefly Sandhoppers (*Gammaridæ*), with an occasional shrimp, and quantities of sand.

In the breeding season they must subsist almost entirely on fresh-water mollusca (F. C. R. Jourdain).

The adult Common Scoters begin to migrate northwards about the end of March. In Denmark and North Holland they do not move much before the middle or end of April, whilst numbers often delay until May before they take their departure. The majority of the immatures also go northwards, but whether they go to the sea coasts near the breeding grounds or not I cannot ascertain, for no naturalist seems to have made observation of this point. I saw no flock of immatures in Iceland either on the coast or on the inland waters in summer, but under any circumstances these might easily have been overlooked, as the Common Scoter is only a somewhat scarce breeder in that island. As we have already pointed out, numbers of Scoters, both adult and immature, stay throughout the year on the winter resorts and do not migrate northwards. Common Scoters that have spent the winter on the N. Danish coasts generally leave at the end of March, but birds that have wintered in the south-west arrive at the end of April in North Denmark, and follow the earlier birds at once throughout late April and early May.

As a rule the breeding birds on the Sutherland and Caithness lochs do not arrive until the end of May, and this is also the case in N. Iceland. Naumann speaks of seeing them starting on their northern migration as late as June 13, but I think that although he saw large numbers of Scoters at the mouth of the Elbe at this date, it does not necessarily follow that these birds were migrating at all. They might only be performing a short

local movement. At this date Common Scoters would have nests in most of their northern homes.

I do not know of any account, nor have I seen the courtship of this duck. In the north of Scotland nests are rarely found before the beginning of June, and often not until the middle of the month. I found a nest at Myvatn, Iceland, with the eggs hard set, on July 3, 1889. In Lapland, it is said, the nest is occasionally found early in June, but generally in the middle of that month and onward on to July. On Spitsbergen, Koenig took a clutch of eggs on July 15, 1905. The nest is generally placed amongst heather or wet moorlands in Scotland; in Iceland, sometimes in islands, but generally in dwarf scrub. The one I found was in a thicket of dwarf willow, about 20 yards from the Myvatn lake; little rills of water ran all round the spot, which was itself quite dry. The nest, which contained nine eggs, was woven of dry willow leaves and the dry stalks of grass, with a few pieces of what I took to be withered shoots of *Azalea procumbens*. It was heavily lined with brown-grey down. The bird flew off her nest uttering a plaintive "mewing" note.

In North Russia the nest is often situated in marshes. Sometimes it is exposed to full view amongst grass tussocks, but more generally it is hidden by heather, angelica, dwarf birch or willow. It is nearly always placed within a few yards of a fresh-water lake, or on an island in a lake, and not close to the sea, but at such a distance as it is easy for the young to get to the sea in the autumn. They are very shy even at the nesting-places, the males keeping far out to the centre of the lakes, and the females very cunning in their movements. For this reason they do not nest near human habitations, as other northern breeding species often do.

We have some recent notes contributed to the *Field*, July 4, 1908, by Major H. Trevelyan, on the subject of the nesting of this species. It gives many interesting details of these birds at this period of the year, and all Naturalists must hope that the same fate will not overtake the birds that happened to the small colony of Irish breeding Red-necked Phalaropes, which was raided by unscrupulous collectors. Major Trevelyan says:

"In the week ending June 11, 1904, I first saw and identified a pair of Common Scoters on an Irish lough. Until July 1, the date of my leaving the locality, they were, when I saw them, always together, and my boatman told me he saw them from time to time till about August 18, but never apart. On May 24 I saw a pair of Common Scoters for the first time in 1905, and on June 5 a female alone for the first time. On June 13, when on an island, I found a female Scoter on a nest under a sallow bush (*Salix caprea*). She allowed me to look at her from a distance of about 9 feet, but on my man advancing she rose and flew off. There were eight eggs, partly incubated, and all somewhat dirty. The nest was 8 inches in diameter at the top, inside measurement, composed of dried grass, moss, and down. It was very well and neatly constructed. I took two eggs and a very small pinch of the down. On the 14th I again visited the nest. The duck was away, and the eggs carefully covered over with down, of which I took a good-sized pinch. I visited the nest from time to time, but never again put her off it, or even apparently disturbed her. She was last seen on the nest on the 28th, but on my visiting it on the 30th she was away, and the nest empty, save for a few fragments of eggshell.

"On July 1, having left six eggs, I found her on the lough with five young ones. When the boat was within a few yards of her she uttered curiously plaintive cries, which reminded me of the mewing of a cat. My boatman said they reminded him of 'the talk of a teal.' Neither the mother nor her brood seemed to me so wild as Tufted Ducks in similar circumstances. She did not simulate a wounded bird,

but rose, flew a few yards, and settled again. She did not dive; some, at any rate, of her young did. On July 3, when my boat was approaching the island where the nest had been, one of my companions exclaimed, as the female Scoter flew past, 'There is the Black Duck.' She was, my boatman said, again uttering plaintive cries (probably notes of warning to the young ones). She settled on the water by the side of the island. We saw no ducklings, but, suspecting they were in concealment either by or on the island, I took the boat to another and adjacent island, lay on its shore, and watched. After about ten minutes she rose and flew to the south shore of the lake, about 600 yards distant. I then, with my companions, retired further into the island and got under cover. After a short time she returned, settling on the water about the same place as before. She was evidently uneasy (the boat was still in view). After a few minutes she again rose and flew off, this time to the north shore, about a quarter of a mile distant. We remained, and after a few minutes saw five young ducks feeding, *i.e.* swimming and frequently diving along the shore of the island on which the nest had been. Soon the old bird returned, took charge of her young brood, swimming with them out into the lough. As soon as they were clear of the land I followed, and secured one of the young ones.

"It was on April 25 that I first saw in 1906 a pair of Common Scoters. They were in the same locality as in the two previous years; they were wild, and rose at about 150 yards distance. On May 18 I found on the same island as in 1905, but this time under a birch bush, a nest with three Scoter's eggs and one of the Tufted Duck. On May 22 I put a Scoter off the nest, which then contained six Scoter's and two Tufted Duck's eggs. The nest was partly lined with down. I visited the nest on June 16. The eggs were covered, but one egg, a Scoter's, hard set, was lying broken outside the nest. On June 21 I found the eggs covered with dried grass. On June 24 I visited the nest in a rainstorm, and unfortunately put the Scoter off. There was certainly at least one of the eggs chipped, with a young one visible through the aperture. On June 26 I visited the nest. The duck was away. There were six cold eggs; they were one Scoter's, broken, a dead duckling in it, which had apparently been ready to emerge; one Scoter's, dead duckling in it; one Scoter's, partly incubated; one Scoter's, rotten; one Tufted Duck's, dead duckling in it, which had apparently been ready to emerge; one Tufted Duck's, partly incubated. This left one egg, a Scoter's, unaccounted for, and I hoped the bird had hatched it out; but I saw her subsequently on the lough once or twice, and there was no young one with her.

"It was no doubt my ill-timed visit to the nest on June 24 that was the cause of the failure of the duck to hatch out some of the eggs. I could not see, owing to intervening grass, whether she was sitting or not, and while I was deliberating if I should advance or retire she rose. As to my visiting the nest at all, on such a day, it must be remembered that I found her sitting on May 22, and that on June 24 she had been sitting no less than 33 days, when it might fairly be expected the eggs, if fertile, would have hatched out. The long incubation is perhaps to be explained by inclement weather and disturbances during the Mayfly season.

"On June 4 I saw, about $1\frac{3}{4}$ miles from the island on which the Scoter had nested in 1905, two male Scoters, apparently in immature plumage. They were probably of the 1905 brood; they allowed me to approach to within 30 yards. On May 21, 1907, and on subsequent occasions, I saw a pair of Common Scoters about their old haunts, but found no evidence to show that they nested. They appeared to be restless and unsettled, and were seen at places some distance apart during the nesting season. In 1905 and 1906 the pair of Scoters on the lough were very local. On May 29 I saw one male and two female Scoters together, and there were at least that number of these ducks on the lough during the nesting season of 1907.

"On my arrival on the lough on May 4, 1908, I was told a pair of Scoters had been about their old haunts, but had left them, and were seen some 3 miles away on April 12 and 26. On May 5 I found them near where they had been seen on the above dates, and I saw them from time to time till May 27. On June 4 Mr. Robert Patterson, one of the editors of *The Irish Naturalist*, to whom I had given information as to their whereabouts, found a female Scoter sitting on eight eggs. On June 7 he very kindly took me to an island to see the nest, which is well concealed in a furze bush, with cover from view from above as well as from all sides; but, well concealed as the nest is, one of the eggs had disappeared. As, however, on June 11 there was no further deficiency, it may be hoped the bird will hatch out the remainder. On June 8 I saw a female Scoter about 2 miles from the nest. I had heard of a solitary female, and think that this year, as last, there are two females and one male on the lough. I have been

Walter L. Collo. Sc

Common Scoters at Sea.

so often on the portions of the lough frequented by the birds, that it is unlikely a second male would have escaped my notice.

"For obvious reasons I do not give the name of the lough which these Scoters have frequented for five consecutive summers."

The males seem to desert the females as soon as they begin to sit, and to form into small parties in the centre of the lakes. Early in August, or even in July, they leave for the coast, where they remain until migration commences. Little seems to be known of the food of the young in down, but it is probably similar to that of other Diving Ducks bred in fresh water.

In the entrails of this species occur *Strongylus uncinatus*, *Strongylus nodularis*, *Strongylus acutus*, *Distomum constrictum*, *Distomum oxyurum*, *Monostomum mutabile*, *Holostomum gracile*, *Holostomum anatis nigrae*, *Taenia microsoma*, *Taenia levis*, *Strongylus monodon*. (*Naturgesch. Vögel Mitteleuropas*, x. p. 249.)

As already stated, Common Scoter are very shy and difficult to approach in a sailing boat; but they may be killed by towing the double-handed punt to sea on fine days and "setting to" in the usual manner. They will sometimes sit to within shot of a small motor-boat, whose speed they seem unable to gauge correctly. Not being of any commercial value, but few Common Scoters are killed by net or gun on the British coasts; but in the Baltic, Heligoland, and on the coasts of France and Holland, large numbers are captured by means of large square nets stretched horizontally just under the water. These are set in quiet places where this and other species congregate. As the birds proceed in feeding they often come up under these nets, and are caught by the neck and drowned. The flesh of this species is rank and uneatable. Mr. Franklyn, who has shot ducks for many years both on the east and west coasts of North America, tells us that Scoters are amongst the easiest of sea-ducks to decoy, and that almost any dark object will bring the ducks within gunshot. He has used a string of black bladders with much success.

All those who have tried to keep this species in confinement have had to admit a failure to keep them in good health for any long period. I am indebted to Mr. A. F. Moody for the following note of two (an immature male and female which I saw at Scampston on May 1, 1912). His remarks with regard to the greed and jealousy of the species at feeding hours bear out the experience of other aviculturists. He says:

"This very common and rather unprepossessing Sea Duck is, I believe, not very popular in confinement; in fact, it appears to be a species that deteriorates very quickly in the middle-men's hands, that is, if kept from water, and we have experienced the greatest difficulty in procuring any but birds whose feathers had lost their bloom and whose bodies could scarcely be considered sound. Also I am informed, by a water-fowl breeder of great experience who has tried them, that the Scoter, although doing well up to a certain period, is naturally a very difficult subject to moult in captivity.

"Our own experience, apart from half a dozen more or less unsound and reduced examples which lived for a few weeks, days, or months, has been chiefly confined to a pair which some years ago moulted their primary feathers, and through an oversight in not pinioning them escaped, and with an immature pair which we have possessed for the past five months (since January 4th of the present year 1911). Regarding the habits of this latter pair, the male, although daily improving, is still hardly sufficiently advanced in the moult to be at home upon the water.[1] The female, however, like all other Scoters

[1] Such examples, owing to the cold water reaching their bodies, cannot remain long in the water; and we find are apparently best treated by a stimulating diet and allowing them to sit (in bad cases upon dry wheat straw beneath a temporary shed or shelter) in a sheltered situation by the side of a fairly deep pool. The male in question was not water-proof even by December, when it was fed on a diet of cod-liver oil (4 tablespoonful daily) with the meal.

that I have had acquaintance with, has become very tame. She is a most powerful and determined diver, and although she lacks to some extent the gracefulness of form or rapidity of movement possessed by the Smew, Longtail, &c., is a very clever and long-winded bird under water. She also, unlike the male, rarely, if ever, leaves the water; and with other species, although sociable enough to float or sleep in company with Golden Eye, Scaup, &c., is usually on her guard and of an aggressive turn of mind, which means that she defends herself or rushes open-mouthed at any bird that ventures too near. Regarding food, the Scoters we have had, in addition to the Sea Ducks' fare (see Eider-Ducks), partake freely of grain; whilst as to their note, the female we possess occasionally emits a peculiar squeaking sound, and the male a feeble and rather teal-like whistle. Referring to the behaviour of this species upon land, they walk with a very Eider-like gait and with greater ease and facility than several of the diving ducks."

SOFT PARTS OF SCOTERS (Drawn from Life).

1. Velvet Scoter. Immature Male. 7 months. 2. Velvet Scoter. Adult Male. 3. Velvet Scoter. Adult Female. 4. Common Scoter. Immature Male. 3 months. 5. Common Scoter. Immature Male. 9 months. 6, 7 and 8. Common Scoter. Immature Male. 21 months. 9 and 10. Common Scoter. Adult Male. 11, 12 and 13. Surf Scoter. Adult Female. 14. Surf Scoter. Immature Male. 10 months. 15, 16, 17 and 18. Surf Scoter. Adult Male. November.

THE VELVET-SCOTER

Oidemia fusca (Linnæus)

Anas fusca, Linn., Syst. Nat., ed. x., I, p. 123 (1758).
Anas nigra major, Briss., Orn., vi. p. 423 (1760).
Anas fusca, Linn., Syst. Nat., ed. xii. I, p. 196 (1766).
La double macreuse, Buff., Hist. Nat. Ois., ix. p. 242 (1783).
Anas fuliginosa, Bechst., Gemeinn. Naturg. Deutsch., 2nd ed., iii. p. 962 (1809).
Melanitta fusca (L.), Boie, Isis, 1822, p. 564.
Oidemia, Flem. (*Anas nigra et fusca*), Phil. of Zool., ii. p. 260 (1822).
Oidemia fusca (L.), Steph. in Shaw's Gen. Zool., xii. pt. ii. p. 216 (1824).
Platypus fuscus (L.), C. L. Brehm, Lehrb. Naturg. eur. Vög., ii. p. 822 (1824).
Anas carbo, Pall., Zoogr. Rosso-As., ii. p. 244 (1827).
Melanitta hornschuchii, C. L. Brehm, Vög. Deutschl., p. 904 (1831).
Melanitta megapus, C. L. Brehm, op. cit., p. 906 (1831).
Melanitta platyrhynchos, C. L. Brehm, op. cit., p. 907 (1831).
Fuligula fusca (L.), Degl., Orn. Eur., ii. p. 472 (1849).
Oedemia fusca (L.), C. L. Brehm, Vogelfang, p. 383 (1855). Yarrell, Dresser, Saunders, &c.
Oedemia megapus et O. platyrhynchos, C. L. Brehm, op. cit., p. 384 (1855).
Oidemia fusca fusca (L.), Authors' Hand-list of Brit. B., p. 145 (1912).

LOCAL NAMES.—Velvet-Scoter, Velvet duck, Great Black duck (*English*); Grande-Macreuse (*French*); Sammetente, Sammet-Trauerente (*German*); De groote Zeeëend, Zwarte noordsche duiker (*Dutch*); Flöielsand (*Danish*); Sjö-orre, Havorre (*Norwegian*); Svärta, Svärt, Svärtkar, Svartand, Doppand (*Swedish*); Ckoarra (*Lappish*); Pilkkasiipi (*Finnish*); Barsunasti Turpan, Patkakalasica (*Croatian*); Kachna temna (*Czechish*); Germano di Mare, Anitra vera, Orco marino (*Italian*); Kaczkauhla (*Polish*); Tjulpan, Turpan, Nyrok-sirok (*Russian*); Morell del mar (*Spanish*); Kuro-tori (*Japanese*).

Egg.—6 to 10 as a rule, but clutches of 11 have been recorded. Simonson says that clutches of 10 to 14 may be met with. Oval in shape, creamy-white with a warm "apricot" tinge when fresh, which fades after a time. Average size of 90 eggs, 70.8×47.9 mm. (2.78×1.88 inches). Max., 76.5×49.5 and 71.2×51.5; min., 64.3×46.9, and 68.3×44.8 mm. (F. C. R. Jourdain).

Rey gives the average weight as 6.977 grms., varying from 5.92 to 9.05 grms., while Goebel gives the average weight of 42 eggs as 6.89 grms.

Down.—Dull dark brown, usually with indistinct light centres, but apparently mixed with a small quantity of lighter down (F. C. R. Jourdain). For figures of the nest feathers see H. Noble, *Brit. Birds*, ii. (pl. ii. figs. 15, 16). Notes on the down are also to be found in *Zool.*, 1906, p. 374.

Young in Down.—Crown, nape, back of neck, and sides of the head, to a line taken from the base of the lower mandible, dark brown; a whitish spot below the eye; chin, top of neck, and sides of throat, white; upper back dark brown, with a slight olivaceous tinge. Small whitish patch of down on the wings; under parts dull greyish white, lightest in centre of the belly; upper breast crossed by a brown band; bill slate-brown, feet and legs lead-black.

The specimen in Mr. Grönvold's plate is taken from a Norwegian bird.

Immature Male.—The young male and female in first plumage are almost exactly similar, except that the young male is slightly larger and the feathers on the upper parts

are a little darker. The head and neck are a dull blackish-brown; there is a dull white patch in front of the eye, not so large as in the young female, and a small one over the ear. The upper parts are blackish-brown with lighter ends to the feathers; under parts light brown, edged with dull white; wings, brown; secondaries white, with the outer feathers margined with dark brown; long inner secondaries, dark brown; tail and primaries dark brown, the former much worn at the tips. The feet are at first greenish yellow over brown, and the bill lead-blue black.

By the beginning of November the different sexes are easily identified, as the bill of the male grows rapidly to nearly the size of the adult. The colouring, too, of the light parts of the bill is reddish yellow. In November the first black feathers appear on the head and upper chest, and the legs and feet become dull red, with the webs dusky black. By February the immature male has many black feathers on the scapulars, rump, undertail coverts, flanks, and upper breast, while the whole of head and neck is a very dark brownish black, the two patches having almost disappeared. In April a further number of black feathers come into the above-mentioned parts, and the moult then ceases. Throughout the succeeding months until late July the plumage of the young male fades. I have not succeeded in obtaining specimens in August of these 13-months males, but have no doubt that the course of plumage follows that of the Common Scoter, and that it has a first partial eclipse on the head and neck. At 18½ months the first full plumage is attained, but the head and neck of these birds are never so rich and glossy black as old males. At 21 months there are still a few black spots on the yellow of the bill. Young males may breed at 23 months, but I rather doubt if they do. I think that another year must elapse, when they are in full beauty, before they can be considered quite adult.

Adult Male.—Except for the white long and short secondaries and a small patch of white below the eye, the whole plumage is a deep glossy black, which in the open air takes on a bluish tinge. The throat and front neck have a brownish tinge. The bill is very strong and broad, and much swollen over the nostrils, forming a slight protuberance. This part and the margin of the bill is black. Except the nail, which in life is a bright bone yellow, the rest of the bill is rich orange-yellow. Two narrow black lines pass on each side of the nail upwards to the black above the nostrils. On the summit of the bill there is a naked space of rough grey-brown skin. Irides, reddish brown; legs and toes deep red; webs, dusky black. Adult males vary a good deal in size. Total length from 22 to 25 inches; wing, 10 to 11 inches; tail, 3.5 inches; tarsus, 1.9 inches.

The eclipse plumage of the Velvet-Scoter has never been obtained or described, but after repeated failures to obtain a specimen, I at last killed an old male on August 3, 1887, near the island of Flotta, Orkneys.

This bird has a very different appearance from a male in spring. A general moult is taking place over the whole plumage, and the feathers that are coming in are in every case those of the black winter dress. The change in appearance is due to the ends of his old feathers being worn and sun-bleached, and this is most noticeable on the cheeks, crown, chest, and scapulars, which all have grey or faded edges. The most interesting feature, however, is a patch of whitish brown eclipse feathers behind the eye and the bill, which had evidently come in in July, and give the bird a female appearance. In front of these feathers is a jet black patch, which has, however, only been renewed once in the plumage

change (July-November). The breast and lower parts are brown, and the tail and wings are being renewed. The bird was incapable of flight when I shot it. The legs and toes are yellow, only dark about the joints and webs as usual. (See Velvet-Scoter plate.)

Immature Female.—First plumage similar to the young male, only not so dark, nor is the bill so broad. In November the sexes are easily distinguished, and a change of plumage towards maturity takes place over the head and neck, upper breast, and scapulars. In April the change, so far as it goes, is more or less complete for the year, only the under parts, tail, wings, and portions of the upper parts remaining in an immature and faded state until the main moult in July and August. In November the female attains full plumage at 17 months. It is doubtful if these females breed at 22 months.

Adult Female.—These are of two distinct types: (1) grey, and (2) rich red-brown.

Grey Form.—Head and neck blackish-brown; a large grey-white patch in front of the eye and a small white one over the ear; upper parts blackish-brown with lighter margins; under parts light brown with greyish-white ends to the feathers; wings brown and secondaries white, with black-brown ends to outer feathers; bill bluish lead-black, without any knob; irides reddish dark brown; legs dull red.

Red-brown Form.—I am unable to state whether this form is a plumage of older birds or not, but on the breeding grounds both the grey and the red-brown forms are found in equal numbers. In the dark form the whole of the head, neck, upper and under parts are much darker and of a richer reddish-brown than the grey form. The white patches both before and behind the eye are *almost, and in some cases completely,* absent.[1] The whole of the under parts are a rich warm brown, only a few feathers in the centre of the breast being brown, with the upper parts of these feathers showing pure white. Over the whole of the brown under parts the feathers are edged with a very narrow line of whitish-grey. I have killed a good number of these old females, and am surprised to find that this plumage has not been described. Only the grey form is figured by Dresser, Naumann, Saunders, Gould, Lilford, and other writers of standard works.

Length, 21 inches; wing, 10 inches; tarsus, 1 inch.

Breeding Range.

[*Scotland.*—There is no reliable evidence that this species has ever bred in Scotland, although a few adults stay throughout the summer every year. For supposed occurrences of its breeding, see Dresser, *Birds of Europe*, vi. p. 658, and *Vert. Fauna of Moray Basin*, ii. p. 116.]

Continental Europe: Norway.—Scarce in lakes near the coast, but breeds in all the fjeld districts of Northern Norway and East Finmark (Westerlund, *Skandinaviska Fogl. Fortplantningshist.*, p. 175). I have seen old birds and young on the lakes of North Trondhjem in August. Professor Collett informs me that it breeds as far south as Christiania.

Sweden.—Breeds in the fjeld districts of Jemtland, and Lapland, and Tornea Lappmark; also sporadically in Blekinge and S. Skåne, and the E. coasts of Öland and Gotland (Westerlund, *t. c.*). Kolthoff doubts these latter cases.

[1] This is not invariably the case. There is a specimen of the dark red-brown type of female in the Christiania Museum, killed in Hallingdal, August 15, 1881, which has an unusually large white patch on the lobes and the smaller one on the ear coverings.—J. G. M.

Finland.—Chiefly in the north, but also to the coasts of the Baltic, south to Viborg, but not commonly; also L. Ladoga.

Russia.—S. A. Buturlin says it breeds in the north and central parts of European Russia, Lake Onega, the Pinsk marshes of W. Russia, Archangel, the Lower Petschora, rarely on Novaya Zemlya, on the Kama and Middle Volga (Simbirsk Govt.), in Esthonia, in the Perm Govt. east of the Urals to 52° N. and 62° E., and on the mountain lakes of Transcaucasia (Gokcha and Tabiszkhuri) [quoted in Dresser's *Eggs of B. of Europe*, p. 578]. It also breeds in the Kola Peninsula (Pleske and H. F. Witherby). Taczanowski says it breeds in Podolia, but confirmation of this is required. [No proof of its having bred in Germany, though Naumann states that it occasionally bred in Prussia, and hoped to meet with it in Mecklenburg.]

Asia.—S. A. Buturlin (quoted in *Eggs of B. of Europe*, p. 578) says it breeds in the Tjumen district, Tobolsk govt., and the lower Ob, but probably not further to the east. H. L. Popham found it, however, at the mouth of the Yenisei in lat. 69° (*Ibis*, 1897, p. 101). The assertions in older works that its range extends east to the Pacific are due to confusion with *O.* [*carbo*] *fusca stejnegeri*, which breeds in North-Eastern Asia.

In North America the Nearctic form of the Velvet-Scoter, *Oidemia velvetina* (Cass.), only is to be found. It differs but slightly from the European bird, but as these differences are constant, it enables the two forms to be separated. In the American bird the feathering of the upper mandible extends further forward on both sides of the bill, and as Mr. Dresser has pointed out, especially so on the centre of the basal protuberance. The white patch, too, bordering the eye, is larger and further back. The American bird has also a slightly larger bill.

Migration Range.

British Isles.—Fairly numerous visitor to the eastern coasts of England and Scotland, but local in its distribution. Not uncommon on the south coast of England. Along the western seaboard of Great Britain (including Wales) it is rare. In the Orkneys and Shetlands it is fairly common in winter. On the Outer Hebrides it is only a rare visitor, except to the Sound of Harris. A scarce visitor to Ireland, occurring chiefly on the north and east coasts. It is rare on the west coast, and has occurred a few times in the south.

Iceland (not recorded).

Færöes.—One (H. W. Feilden, *Zool.*, 1872, p. 3255).

On the Continent (besides occurring off the British coasts) this species is found in winter in the North Sea (near to Tromsö) and N. Atlantic, as well as the Baltic, in such numbers that it is needless to give references. It is common on the west coast of Jutland. For the southward limits, Iberian Peninsula, see Bolle, *J. f. O.*, 1855, p. 315. Santander (Irby, *Ibis*, 1883, p. 189). Valencia, recorded by Vidal (L. H. Irby, *Orn. Str. Gib.*, p. 230).

France.—Provence (Müller, *J. f. O.*, 1856, p. 232: Jaubert et B.-L., p. 524).

Sardinia.—Salvadori, *J. f. O.*, 1865, p. 326; Brooke, *Ibis*, 73, p. 345.

Italy.—Venetia commonly, also Tuscany and Calabria (Giglioli, 2° *Resoconto*, p. 487).

Balkan Peninsula.—[Greece, very rare (Krüper), but winters in Cyclades (Erhard)].

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VELVET-SCOTER
adult male and female

O. Reiser, however, considers the occurrence of both species of Scoter in Greece as doubtful (*Ornis Balcanica*, iii. p. 583). In the Dobrogea (Roumania), it is a regular passage migrant (R. v. Dombrowski), and also visits the Black Sea (von Nordmann) in small numbers.

Inland in Europe it visits the lakes of Switzerland (Fatio and Studer, *Ois. de la Suisse*, p. 1392) and N. Italy (Lugano, &c.) on passage to the Mediterranean; also recorded from Bohemia (Fritsch, *J. f. O.*, 1872, p. 372); and Hungary (Madarász, *Magyarors. Madarai*, p. 574); and Austria (von Pelzeln); Transylvania (Danford and Harvie Brown, *Ibis*, 1875, p. 428), as well as S. Germany, &c.

Africa.—Morocco (C. A. Payton, *Field*, February 23, 1878).

Algeria.—(Loche, *Cat. des M. et Ois. Algérie*, p. 143).

Egypt.—(Brehm., *J. f. O.*, 1854, p. 84; Shelley, *B. of Egypt*, p. 292; von Heuglin, *Orn. N. Ost. Afrikas*, p. 67). Possibly the records of Scoters seen on Cyprus, but of which no specimens have as yet been secured, may refer to this species.

Asia.—Caspian Sea (*J. f. O.*, 1910, p. 72. *Cf.* also Pallas and Radde, *Orn. Caucas.*, p. 459; Seebohm, *Ibis*, 1882, p. 229; 1883, p. 189).

N. Persia.—De Filippi (*cf.* Blanford, *East. Persia*, ii. p. 302).

Turkestan.—(Dresser). [Records from China and Japan probably refer to eastern race.]

America.—Greenland, one in 1878 (H. Winge, *Grönland's Fugle*, p. 92).

Habits.—The Velvet-Scoter is the largest of the three species of Scoter found in the British Isles, and is easily distinguished on the wing by the large amount of white on the secondaries. Late in October or early in November Velvet-Scoters leave the regions of their summer home, for the most part situated in North and North-Eastern Europe, above the Arctic circle, and wander south to all parts of Germany, and even farther south. The majority, however, winter off the coasts of North Germany, Norway, Denmark, and the British Isles. As a rule the southern migration in autumn is somewhat later than is the case with other species of diving ducks, and they are the last of the regular winter visitors to arrive in our northern islands. On the other hand, they are often the first of the true sea-ducks to leave us, and I have more than once noted their departure as early as the end of March. Naumann expresses an opinion as to the habitat of this species which seems to differ somewhat from that chosen by birds which visit us. He speaks of their being "not so much sea-birds as many other species of duck, although in winter the greater majority linger only on the sea, and also at other periods of the year stay near islands, isthmuses, and in quiet bays, or else quite near these; from whence they make their way readily to fresh water, for they usually take up their abode in summer on the great inland lakes at some distance from the sea, and resort to them as well as large ponds and rivers at both times of passage" (*Vögel Mitteleuropas*, x. p. 255).

In our islands the Velvet-Scoter is strictly a sea-duck, is only very rarely killed on fresh water, and then only on migration. As a rule these birds frequent the neighbourhood of mussel-banks at some distance off-shore, apparently caring little whether these situations are exposed or protected, for they come with the utmost regularity to the same places year after year. Most of the places known to me in Scotland and the islands where these birds spend the winter months, are more or less protected by outlying islands or headlands, but in some cases, such as St. Andrews Bay and the Tay estuary, their feeding grounds are usually exposed to north and easterly winds. They seem to

be capable, however, of standing as much buffeting by wind and weather as the hardy Eiders and Long-tailed Ducks, and will ride out great storms at sea without coming in for protection.

I have never seen the Velvet-Scoter on shore in winter, and am told by observers who live in the neighbourhood of the lakes and in Norway, where they breed, that the males seldom if ever go to land in the summer, and only females, when they have nests or are searching for nesting-places, do so. Those that I have seen in confinement walk more clumsily than any other duck, and seem to trip and stumble over their own feet as if this mode of progression was unusual. When standing on shore the body is held horizontally, but as soon as the bird begins to walk the breast is held in a very erect position, and progress is slow and heavily laboured. They often fall to the ground and rest if pressed to move forward.

The Velvet-Scoter has no superior in swimming and diving. Its powerful legs and feet enable it to pass rapidly beneath the water, and reach the bottom at depths of 40 feet, and even more. They seem to prefer to search for their food in deep places, probably because mussel-beds situated in such spots are far off-shore, and consequently safe. I do not think they use the wings under water, at any rate to the same extent as the Eider. There are occasions when Velvet-Scoters come up the narrow estuaries to mussel-beds situated amongst narrow and shallow channels, and I have on two or three occasions noticed larger numbers coming in from the deep sea and passing up to places that should scarcely be frequented by such a true sea-duck. These movements were always performed in perfectly still and frosty weather, and the flocks consisted almost entirely of adult females or young birds. Twice on the Eden estuary, when waiting near the exit of the channels at the sea-bar, I have seen over 200 of these birds follow in small flocks the in-shore movement of Golden-Eyes, Scaup, and Common Scoters, and could in no way account for their sudden partiality for land-locked waters. After shooting some specimens, I have followed them up with the tide and have found them feeding in little mud and mussel bays, with a few yards of the "banks" in water that was not over 6 feet in depth. These birds finding their retreat cut off from the sea displayed a greater foolishness or want of resource than any sea-ducks I have met, and I was able to "jam" them into corners from which they appear to be fearful to rise. I was thus able to look them over carefully, and select any specimen I wished. Adult female Velvet-Scoters are by far the rarest to obtain, in proof of which I may state that so far without exception all the specimens figured by Saunders, Gould, Dresser, &c., are all immature females. These adult females I found plentiful on the Eden during these excursions to the land-locked mussel-beds, and at no other time have I seen more than an occasional adult female amongst the flocks of males on the east coast of Scotland, or in the Orkneys.

In the case of the Velvet-Scoters we have another good instance of the curious distribution of the sexes on our coasts during the winter season. In the Orkneys and Shetlands quite 98 per cent. of these birds seem to be adult males. I have only once seen and killed a young male in the Orkneys, and females are scarce.

Writing on this point, Mr. H. W. Robinson (*Field*, Jan. 5, 1907) says:

"The greatest difference of all, however, is shown in the case of the Velvet-Scoter, where drakes outnumber ducks by twenty or even thirty to one; indeed in Orkney it is very difficult to get a female of

this species, for in most flocks there are only two or three to be seen. One day last month I came across eight flocks of Velvet-Scoters, numbering in all 107 birds, and of these five only were females. The first lot of three included one female; with the second lot of twenty-two were two females; the third lot of eighteen were all drakes; the fourth flock of thirty-one contained one female; the next three lots, of seven, ten, and eight respectively, were all drakes; and with the last lot of eight was one female, which I was lucky enough to bag. Is it possible that most of the females remain in their nesting haunts, and that only the drakes winter here in any numbers? It certainly looks rather like it, especially so as in the four species which are resident and nest in this country the females outnumber the males in winter."[1]

In the Tay estuary, where the species is numerous, about 50 per cent. are adult males, the rest being a few females and many immatures. In St. Andrews Bay adult males and females comprise perhaps 50 per cent. of the local birds, the rest being young birds. Whereas in Musselburgh Bay, Leith, and Aberlady 80 per cent. are immatures, and 25 per cent. adult males. I have no experience of the Velvet-Scoter on the east and south coasts of England; but from all accounts it would seem that more than 85 per cent. which are to be seen or killed are young birds of the year. Thus it would seem that the adult males affect a more northern habitat in winter, the adult females a central position, and the young birds the southern or warmer seas. This is, I think, an interesting point, for it shows that all these sea-ducks are not alike in their sex distribution in winter, for the Eiders, Golden-Eyes, and Long-tailed Ducks are distributed according to age in somewhat different areas not necessarily according to longitude, but probably according to the variations of particular food found in special localities. The different winter ranges in Britain of the last named are, however, fully dealt with in other parts of this work. I have never found the Velvet-Scoter a very wild bird, except in rough weather, when it is easy for them to take to wing, and this is probably accounted for by the fact that their bodies are very heavy, and they seem to experience considerable difficulty in taking to flight if there is little or no headwind. They are as a rule much tamer than either the Surf- or Common Scoter; and if a boat is carefully manœuvred so as not to press them at first, a shot is certain. They rise head to wind with the usual run-up, and cannot turn away from a boat until they have travelled some 30 to 50 yards. The flight is at first accompanied with much noise and flapping, and usually performed at a very low elevation. Unlike the other Scoters, they usually adopt a "string" formation, and seldom move about in large flocks. It is most common to see single birds or flocks of from three to fifteen, each bird following the leader at a yard or so apart, and only 2 or 3 feet above the water. In the morning and evening these flocks or single birds may often be seen coming up the tideway from the deep sea, where they have been resting, preening, or sleeping during the hours of high tide, and moving towards their regular feeding grounds. On settling they seem to sink into the water with a heavy splash and glide for some distance over the element before coming to rest. Though Velvet-Scoters may be fairly numerous in any one locality, I have never seen them in a large flock. Between the islands of Cava, Faira, Flotta, and Reisa Little in the Orkneys, the winter stock remain in parties of from six to twenty. On a shot being fired perhaps one hundred Velvet-Scoters may rise in the immediate neighbourhood, but these are all seen to be in separate little parties. Single birds are often seen, generally adult males, and I have never seen them consorting with any other species.

[1] [This is not the case. The females frequent more southern areas in Britain.—J. G. M.]

Whilst easy to approach at most seasons, the male Velvet-Scoter, as soon as it loses the use of its wings during the eclipse period, becomes, like the male Eider, exceptionally wild; and I always recollect that one of the most strenuous hunts I ever had after a bird was to capture the male in eclipse (figured in Velvet-Scoter plate), which is, I believe, the first example of a Velvet-Scoter in eclipse that has been obtained by a naturalist.

Quite a large percentage of both adult and immature Velvet-Scoters do not leave us in the summer, but stay about their winter haunts until they are joined by the winter migrants in November. I had noticed this to be the case in the Orkneys, and much desired to kill an old male in August to see if the species obtain any kind of eclipse dress as other ducks do, as the fact whether they did so or not was unknown to naturalists.

For two seasons I tried hard to obtain an old male in August, and once spent a week amongst the islands off Rousay and Kirkwall in pursuit of three males, which I found quite unapproachable. In late July my boatman, James Sutherland, wrote me that an old male had frequented the side of the island of Cava all the summer, and that he had passed it at close range only the week before. He stated that when last seen it appeared to be different in the plumage of the head than those observed in winter, so I went to Stromness on purpose to obtain the bird. I need not weary the reader with all the efforts and ruses we adopted to get within shot of the bird, so tame in July and so fearfully wild in August, once it had moulted its primaries. It is enough to say that on two occasions it seemed to comprehend the danger of our sailing-boat at a distance of half a mile, and at once commenced diving in "ruffled" water, and was rapidly lost to view. Then choosing a fine day I towed my double-handed gunning punt ten miles to the island, and found the bird more amenable to attack. Although I approached within 100 yards before creating alarm, the magnificent diving powers of the Velvet-Scoter were too much for our united efforts, and we had to acknowledge defeat for the day at least, which, though good, was not ideal for the chase, being a trifle too windy.

On thinking the matter over carefully, I saw that our best chance of success was to attack the bird with a light sculling-boat, choosing a day when there was scarcely a breath of wind. After some trouble the boat was found, but we had to wait many days before a day of Italian softness was forthcoming. At last it did come in August, and with gentle breezes, helped by the up-flowing tide of the Bring, we reached the island of Cava at midday. A careful search revealed the Velvet-Scoter sitting quietly on the sea about half a mile away, so, leaving the sailing-boat concealed on the island, we took to our racing skiff, and at once commenced the attack. At 400 yards distance the bird recognised his enemies, and made for the open sea. James Sutherland and Tom Sinclair bent to their oars, and we made such good time that our quarry began diving. Each dive was above 100 yards long, the bird just "oiling" to the surface, showing the top of his head, and was down again in an instant. For a time it kept a straight line, but the speed my gallant oarsmen were getting from their work began to tell, and the Velvet-Scoter began the usual tricks of doubling under the boat. I was, however, ready for such manœuvres, and noted carefully the direction in which the head pointed at each dive. Two or three times the bird rose within 30 to 50 yards of the boat, but on each occasion his rise to the air was so skilful, and his disappearance so rapid, that not the best shot in the world could have fired a shot with

VELVET-SCOTER.

1. Immature male. Dec. Age, 5 months and 4 days.
2. Adult female. December.
3. Adult female. December.
4. Immature female. Nov. Age, 4½ months.
5. Adult male, full eclipse. Aug.
6. Adult male. Feb.
7. Immature male. April. Age, 21 months.
8. Immature male. Feb. Age, 8 months.

success. I did not mean to fire even a snap unless fairly sure of my aim, because it is sometimes possible to tire out even these skilled divers if conditions are propitious. At last, after one of those sudden "doubles" which we had successfully anticipated, we got the bird jammed in on the coast near the rocks of Cava, and he rose for a moment. As I had hoped, he hesitated and lifted his head, just for one instant, uncertain in which line to dive. That momentary error on his part cost him his life. The gun went off, and the red legs were kicking the air, and I had killed what to me was a specimen of great value.

Both the male and female Velvet-Scoter make a hoarse, guttural cry like the words "kra-kra-kra." The male probably had a distinct call during courtship, but no one, so far as I know, has ever seen the mating display of these birds.

The food of this species consists chiefly of conchylia and crustacea, which they gain from a considerable depth. I have found their stomachs filled with large numbers of the common mussel, which seems to be their principal food, mixed with quantities of sand and small pebbles. They are also very partial to the razor-shell in Orkney. I have also seen them bring to the surface quite large crabs, which they break up before swallowing. The Great Black-backed Gull often waits on in attendance of feeding Velvet-Scoters, and I have more than once seen these clever robbers swoop down and steal the crab, the duck merely gazing round in surprise when he finds his treasure gone.

MacGillivray states that in Scottish waters this duck feeds exclusively on bivalve mollusca of the genera *Mactra*, *Tellina*, *Solen*, *Mytilus*, *Cardium*, and others. The gizzards of specimens killed in Kirkcaldy Bay were filled exclusively with *Donax trunculus*.

Naumann gives some interesting notes on the food, especially in fresh water. He says (*Naturgesch. Vögel Mitteleuropas*, x. p. 256):

"With regard to its food, the Velvet-Scoter resembles the Common Scoter most closely. Conchylia are the chief food with them too, and much less frequently small crustacea, insects, worms, and small fish; and if on fresh water they also eat (and this is much more frequent) shoots of roots, buds and seeds of submerged plants, and with it they swallow a great deal of sand and small pebbles. In birds which have appeared on our lakes and ponds, especially in young birds coming to us in the late autumn, we noticed a great tendency to go to the banks after storms, where a great many water plants had been thrown up by the waves, and they carefully poked about in this, as a rule walking, and even if they were scared away, returned again to such places after a short time. The birds which were killed at that time had their stomachs full of a great deal of green stuff, pieces of roots, tubers, and seeds of different water plants, few remains of insects, but always a great many water snails. They procure these and other means of subsistence much more frequently, or as a rule by diving under to the bottom of the water; and they are to be seen ceaselessly vanishing and reappearing on the broad expanses of our lakes as well as on the sea, and yet again diving even when the bottom is several fathoms deep; and they have even been seen to dive at a depth of 14 metres and procure conchylia which lie at the bottom, or might at most be found a couple of feet higher sticking between sea-grass or sea-weed, and such have been found in the stomachs of birds which have been killed. On the Baltic, especially in the Bay of Kiel, the common cockle (*Cardium edule*) and the mussel (*Mytilus edulis*) are almost exclusively their chief food. Although they generally seek out the smaller specimens of these and fill the crop and gullet with them, specimens of the latter species are not infrequently found amongst them which have a length of 3.5 cm.

"Birds which have been caught can be fed and kept alive for a long while on these mussels. They swallow them right down, and the shells are passed in the excrement in such a broken state that they might be taken for slate-like sand."

Just before they depart to their summer homes the male Velvet-Scoters indulge in some part of their spring display, but I have never been near enough to a flock to see

what takes place. I have seen what I took to be a slight lift from the water, and this is probably accompanied by a throat swell and some note, so that we must presume, until we have more complete evidence, that the male Scoters are in no way distinct in their courtship attitudes from other diving ducks. It is, in fact, unlikely that the courtship differs much from that of the Eider, but information on this point is wanted. Velvet-Scoters leave the German, Danish, and British coasts late in March or early in April. Possibly 80 per cent. of the adult birds leave at this time, but a certain number both of adults and immatures remain throughout the year in their winter resorts. I have notes to the effect that I have seen Velvet-Scoters in every month of the year, but in the summer these nearly always consist of single individuals, or small numbers such as two or three. As previously stated, they are fairly tame until August, when the usual shyness, due to flight-incapacity, causes them to adopt means to guard their safety; and like the Eider they are not confiding again until fully capable of flight in mid-September.

Velvet-Scoters arrive on the lakes of Norway and Sweden about the end of April —in fact, as soon as the ice breaks up, and even earlier on the lake-swamps of Lithuania, which seems to be about the southern limit of nesting birds. The male and female are much devoted to one another and keep close together during the early part of the nesting season. It has often been noticed that if one of the pair is shot the other will fall to the water and dive or stay close to its fallen mate.

They seem to prefer inland lakes and small ponds on which to breed. Collett has found them breeding in large numbers in the hill lakes of Gudbrandsdal, Valders, Österdal, and north to Finmark, and I have myself seen females and young birds on the lakes of Valders and Trondhjem in September, the males having departed.

The nest is often found in a depression of the dry ground in the open, at other times sheltered by brushwood such as salix or juniper. C. E. Pearson found one nest in a clump of marram grass amongst sandhills. Others were placed deep down in cracks of the peat, overgrown by *Empetrum nigrum*, so that the sitting duck was carefully concealed. Seebohm found several nests in the Siberian tundra far from the water, whilst Knobloch says the Velvet-Scoter sometimes breeds in forests. The nest is usually a deep hollow lined with grass and leaves. The earliest clutches are to be met with in the Baltic, and are to be found from May 25 onwards, but in Lapland it is more usual to find eggs in June and generally in the second half of that month. H. F. Witherby took a clutch of eggs on July 22 in Russian Lapland, and Seebohm found eggs on the Petschora in July. Six to ten eggs are usually laid, and incubation is by the female alone. As to the period of incubation no data are available.

The males appear to desert the females about the time the young are hatching. E. F. von Homeyer says: "I have often seen flocks of 60 to 100, consisting of old males only, in the months of July and August, and these spent the day on the high sea and at dusk came to the shallower water on the coasts and in the bays of the island of Rügen."

According to Pleske, they nest in such numbers in the island of Rugoe in Esthland (Russian Baltic Provinces), that the inhabitants make ornaments for their rooms with the blown eggs. All the habits of this duck, the upbringing of the young, and the early departure of the males for the sea, seem to be similar to other true sea-ducks. Late in

Walter L. Colls, Sc.

Velvet Scoters coming in to feed.

September, when the young are able to fly, the female takes them to the nearest sea-coast, where she stays with them until the migration commences in late October.

The same birds and mammals frequenting the Arctic regions that prey on the foregoing species also attack the old and young Velvet-Scoters. Parasitic insects, such as *Docophorus icterodes* and *Trinotum luridum*, are found in the feathers of these birds, and in the entrails (according to Von Linstow) are found: *Distomum echinatum*, *Strongylus nodularis*, *Strongylus acutus*, *Spiroptera crassicauda*, *Trichosoma brevicolle*, *Echinorhynchus polymorphus*, *Distomum concavum*, *Distomum pyriforme*, *Distomum anatis fuscae*, *Monostomum attenuatum*, *Monostomum flavum*, *Monostomum alveatum*, *Holostomum erraticum*, *Holostomum gracile*, *Tænia microsoma*, *Tænia tenuirostris*, *Distomum echinatum*, as well as *Echinorynchus filicollis*. (*Naturgesch. Vögel Mitteleuropas*, x. p. 257.)

Velvet-Scoters, although usually easy to approach, are, according to my experience, the toughest of all sea-ducks to kill; they require the charge of shot to be placed well forward to kill them, and are such expert divers that unless killed outright by the first shot when on the wing, they are generally lost, especially so if there is any roughness on the water.

The American *O. deglandi*, closely allied to our Velvet-Scoter, and a species I have seen in large numbers on the coast of British Columbia, is said to come very readily to painted wooden decoys, and I have little doubt that Velvet-Scoters could be thus lured within shot when passing up channels. The flesh of this species has an oily and repulsive taste. I have eaten Eider with some relish when pressed for flesh food, but found a Velvet-Scoter impossible as an article of diet.

THE SURF-SCOTER

Oidemia perspicillata (Linnæus)

Anas perspicillata, Linn., Syst. Nat., ed. x. i. p. 125 (1758).
Anas nigra major freti hudsonis, Briss., Orn., vi. p. 425 (1760).
Anas perspicillata, Linn., Syst. Nat., ed. xii. i. p. 201 (1766).
La Macreuse à large bec, Buff., Hist. Nat. Ois., ix. p. 244 (1783).
Anas latirostris, Bodd., Tabl. des Pl. Enl., p. 58 (1783).
Melanitta perspicillata (L.), Boie, Isis, 1822, p. 564.
Platypus perspicillata (L.), C. L. Brehm, Lehrb. Naturg. eur. Vög., ii. p. 823 (1824).
Œdemia perspicillata (L.), Steph., in Shaw's Gen. Zool., xii. pt. ii. p. 219 (1824). Yarrell, Saunders, and Dresser.
Macroramphus, Less. (*Anas perspicillata*, Linn.), Man. d'Orn., ii. p. 414 (1828).
Pelionetta, Kaup (*Anas perspicillata*, Linn.), Natüral. Syst., p. 107 (1829).
Fuligula perspicillata (L.), Aud., Orn. Biogr., iv. p. 161, pl. 317 (1838).
Pelionetta perspicillata (L.), Bp., Compt. Rend., xliii. p. 651 (1856).
Pelionetta trowbridgii, Baird, B. of N. America, p. 806 (1858).
Œdemia perspicillata, var. *trowbridgii*, Coues, Key, p. 295 (1872).
Oidemia perspicillata (L.), Authors of Hand-list of Brit. Birds, p. 146 (1912).

LOCAL NAMES.—Surf-Scoter, Surf-duck (*English*); Skunk-head Coot (*New England and Long Island*); Surf-duck, Spectacled Coot, Surf-Coot, Hollow Coot (adults), Grey Coot (young birds) (*N. America*); Macreuse à large bec (*French*); Brillenente, Brillen-Tauchente (*German*); Brilleand (*Danish*); Hvitnackad Svärta, Glasögonand (*Swedish*); Valkoniska-merilintu (*Finnish*); Svēstún (*Russian*).

Egg.—The eggs are 5 to 7 in number as a rule; but Macfarlane records one instance in which 8 were found in one nest. One clutch of 7 taken off the Labrador coast averages 64.4 × 43.9 mm. (2.53 × 1.72 inches). Maximum, 66.5 × 43.5 and 64.1 × 45; minimum, 63 × 43.5. These eggs are rather pointed in shape, creamy in colour (Massey Coll.). Five eggs in the Brit. Mus. from Macfarlane and J. G. Bell are decidedly smaller, averaging 58.7 × 41.1 mm. (2.31 × 1.61 inches). Maximum, 60.6 × 40.7 and 56.6 × 42.6; minimum, 56.6 × 42.6; and 57.6 × 40.5 minimum (F. C. R. Jourdain). C. J. Maynard says they are greenish buff, 6 to 10 in number, and 2.25 × 1.60 to 2.30 × 1.65 inches in size. The specimen, figured and kindly lent by H. Massey, was taken by Mr. R. S. Duncan at Akfratok, Labrador, on June 11, 1903.

Young in Down.—I have been unable to obtain the young of this species for illustration, since no British or American public or private collection seems to contain a specimen.

Immature Male.—The young male in first plumage (October) is very similar to the young male Common Scoter. Crown and cheeks and back of the neck dark brown, with a distinct white patch in front of the eye similar to female. Nape, mantle, scapulars, back, and wings very dark brown with greyish edges to the feathers; flanks warm brown; under parts pale brown with grey edges, whitish in the centre of the breast; the tail is greyish-brown barred with dark brown. The young male Surf-Scoter can easily be identified from other species by the shape of the bill, which in November begins to turn orange round and below the nostrils and as far forward as the nail. In December the white appears round the square black patch on the broad part of the upper mandible, and black markings are retained

Printed by Albert Frisch-Berlin

SURF-SCOTER
adult male and female

above, below, and in front of the orange area all round the nostrils. These black markings continue until the bird is quite adult (twenty-six to twenty-eight months). All through the winter the black adult plumage pushes in and displaces the first plumage, until by May the bird has cast all signs of immaturity except the wings, tail, and small areas of feathers on the back and lower breast. As is the case with so many diving ducks, there is a great disparity in the plumage of early and late hatched young birds. One young bird killed on May 1 has the whole of the under parts, mantle, wings, tail, and white patch in front of the eye still unmoulted; whilst another, killed on the same day, has a new black tail and all the rest of the plumage black except the wings and a small area of immature feathers on the back and breast, the latter having faded to pure white. All these young birds seem to get the snow-white patch at the back of the head; but instead of the white patch on the crown, they have a black one. It is probable that the young males at twelve months get a few eclipse white and brown feathers between the eye and the bill whilst the main moult is proceeding towards the first full plumage, but I have seen no specimens killed at this date.

In the following November the young male Surf-Scoter attains his full dress, except that there is a brown edging to white patch on the crown, and the bill has a black band on the upper surface, down the nail and forward from the square black patch on the sides of the upper mandible. These signs of immaturity do not disappear until the following August, when the bird moults to his first adult plumage and gets the full-coloured bill, for a bird in my possession, killed only in May near Vancouver Island, has these immature features clearly defined. The male Surf-Scoter therefore attains full maturity at twenty-seven or twenty-eight months.

Adult Male.—The whole of the plumage is a deep glossy black, except a large pure white patch on the centre of the crown and another on the hind neck; the bill is of a peculiar shape. There is a large lump on each side of the base, where there is a square patch of black; above the black patch it is orange, passing to vermilion at the back; pure white below until it reaches a line below the nostrils; above the nostril to the front of the crown it is deep red, which extends forward and fades into the pale yellow of the nail. Behind the nail and the front and below the nostrils the colour is orange. Irides white; legs dull pinkish red and dark orange on the sides of the toes; a line of dusky black extends down the central toe, and the joints are black; webs dusky black. Length, 20 to 21 inches; wing, 9.6 inches; tarsus, 1.8 inch. I have not seen a specimen killed in July or August, but the Surf-Scoter probably follows the other members of the genus in having a few eclipse brown and whitish feathers in front of the eye whilst the principal moult is proceeding.

Immature Female.—The young female at first resembles the young male; but in November can easily be distinguished by the shape and colour of the bill and the advanced plumage of the respective sexes asserting itself. The moult follows the same course as the male, the young females being half changed by April, and retain their immature lower breasts, wings, tail, and portions of the back until the principal moult in August. In October the full plumage is gained, but it is not known yet if these females are sufficiently mature to breed in the following spring. Since the males are not adult until twenty-seven to twenty-eight months, it is probable that females are similar to female Eiders, and do not breed until thirty-four months.

Adult Female.—Crown blackish-brown; a small or fairly large triangular patch of

white on the hind neck (this varies much in individuals); a large dirty brownish-white patch below and in front of the eye, and smaller one over the ear, at the back of which there is generally a black spot; sides of the head and neck dark brown; chin greyish white spotted with brown; rest of the plumage dark brown, with the upper parts darker, and all feathers edged with pale greyish-brown; bill slightly swollen at the base on each side, blackish over the top and in front of the nostrils, but pale grey round the black quadrilateral patch on the sides. The nail is black with a narrow margin of bone colour; the legs are of very different colour on the inside and the outside; outside dull orange slightly suffused with olivaceous grey; inside dull rosy pink suffused with grey. Irides reddish-brown (Mr. Dresser gives the irides as *greyish*, but this is probably only correct for very old birds, and by no means usual). Size very slightly smaller than the male, and head not so large.

Breeding Range.

North America.—Breeds in northern N. America "from Newfoundland west to Alaska," according to some American writers [but the only evidence of breeding in Newfoundland appears to be Reek's statement that it is especially common there "during the breeding season" (probably non-breeding birds)]. In Labrador Audubon found it breeding and took a nest, and it is common in summer in N.E. Labrador. Macfarlane states that it is a common species on the Arctic coasts, and breeds abundantly both there and on the Barrens along the Anderson River near Fort Anderson. It must also breed in Hudson Bay district. In Alaska it must breed in great numbers from the fact that vast flocks of males are to be met with off the coast in summer (E. W. Nelson, p. 81). *Cf.* also Macoun, *Cat. Canadian Birds*, 2nd ed., p. 117; *Check List A. O. U.*, last ed.; Macfarlane, *Proc. U.S. Nat. Mus.*, xiv. p. 423. At Sitka it was found breeding by M. Bischoff, and also by Dall on the Yukon. Probably the main breeding grounds of this species lie on the "tundra" which borders the Arctic coast of Alaska south-west of Point Barrow, but I can find no record of nests being taken there by the MacIlhenny expedition.

In Greenland it is said to have been found breeding in Disko in June 1879 (female shot and young in down seen), but confirmation is required. *Cf.* Winge, *Grönland's Fugle*, p. 93.

Asia.—Apparently breeds in the Chukchi Peninsula. *Cf.* S. A. Buturlin, *J. f. O.*, 1908, p. 288; Palmén, *Voyage of the Vega*, &c.

Migration Range.—In N. America it winters normally on the east side from the Gulf of St. Lawrence to S. Carolina, and occurs casually in Florida. It is very common on the coast of Nova Scotia, where I have killed specimens and seen large numbers. On the west side its winter range extends from the Aleutian Isles to Lower California. It is very abundant on the British Columbian coast, and I saw a few non-breeding birds there in summer. Casually it has been recorded from Greenland several times, and also twice from Bermudas (Wedderburn and Hurdis in 1854), and Jamaica (Gosse). Recorded from Kansas (A. L. Bennett, *Auk*, 1888, p. 203).

Europe: British Isles.—Six specimens have been obtained in the Orkneys, nearly all in the vicinity of Stromness. One lived at Flotta with the Velvet-Scoters during the winter of 1886, but I failed to obtain it, and another frequented Stromness harbour in the winter

of 1905, and was not killed, as Mr. Robinson informs me. In other places in Scotland three have been obtained, only one of these being taken in Western Hebrides (recorded by Gray). It was killed in 1865 at Holm, near Stornoway, and is now in the museum at Stornoway Castle. There are eleven occurrences of the species in England (see Harting, Howard Saunders, Dresser, and *Hand-list of Brit. Birds*, p. 146). In Ireland it is also a rare and accidental visitor, and six specimens are recorded (Ussher and Warren, *Birds of Ireland*, p. 216) from co. Down, Dublin, Cork, and Mayo, three times. Of the two last specimens Mr. Warren gives the following interesting account:

"The fifth specimen obtained was an adult female I shot on December 19, 1896. It was one of a pair I observed in the Moyne Channel, near Killala, co. Mayo. I first took them to be Common Scoters, but as they flew past, remarking the white marks on the head of the male, I immediately recognised them to be Surf-Scoters. After they pitched on the water I set my punt up to them, and firing my big gun, killed the female and winged the male, which I followed, and fired several shots from my cripple stopper without effect, the bird escaping owing to his expertness in diving and ducking the flash. On January 16 following, when down Wigeon shooting, I met the wounded bird in the channel near where I had killed his companion, and although I fired my big gun at him, and three shots from my shoulder gun, he again escaped by ducking the flash. Having failed in securing such a prize by myself, I arranged with Mr. A. C. Kirkwood, of Bartragh, to come with me on the following Monday, the 18th, bringing his punt and gun, and assist in the capture. Going down the channel we saw nothing of the bird until the junction with the bay was reached, and there, on the side of the bank, we saw the bird resting close to the water, and Mr. Kirkwood, paddling up, easily came within range, and firing, knocked him over with a charge of No. 6 shot from his 4-bore, thus securing the sixth specimen of the Surf-Scoter captured in Ireland. The two last-named specimens are now in the Dublin Museum."

No specimen has as yet occurred in Wales.

On the Continent the following occurrences have been recorded: Norway, September 23, 1893 (Cf. *Orn. Jahrbuch*, 1895, p. 246). Sweden twice (Karesuando, 1833, and Kalmar, 1846). Finland (Kittila 1858, on Åland 1866, and Pojo 1867). (*Cf.* Westerlund, *Skandinaviska Foglarnes*, p. 177). (In *Ootheca Wolleyana*, ii. p. 579, one is recorded from Kyrö in 1858, evidently the same as that mentioned above as from Kittila). One specimen killed on Heligoland in the Gätke collection.

France.—Many obtained on various occasions along the north coast of France (Saunders, *Manual*, p. 470; Paris, *Cat. des Ois. de la France*, p. 50).

Færöes.—One occurrence in 1853, a pair also seen (cf. *Zool.*, 1872, p. 3255: H. C. Müller).

Belgium.—Said to have occurred.

Asia.—Obtained on several occasions in the Chukchi Peninsula (S. A. Buturlin, quoted by Dresser). Met with apparently breeding on shores of Bering Sea, and, according to Palmén, in extreme north-east of Siberia.

Habits.—In general appearance the Surf-Scoter somewhat resembles the Common Scoter at a distance, but can generally be distinguished by the patches of white on the crown and back of the neck. It is only at shorter range that the peculiar form and colouring of the bill becomes a point of identification. Although the bird may be more closely allied to the Common than the Velvet, it may be observed that where it comes as an accidental visitor, it nearly always associates with the Velvet-Scoter. In fact, James Sutherland, my old boatman in Orkney, with whom I had many adventures in search of a

Surf-Scoter, and who was in "at the death" at no less than three of the six Orkney specimens, told me that these and two others seen were always found associating with the Velvet-Scoters in the islands of the Bring.

It was an exciting moment when I first viewed this interesting duck from the carriage windows of the Intercolonial railway near Sydney, Cape Breton, Nova Scotia. Numerous flocks could be seen flying quite near the shore, so I jumped out of the train at the next station, returned to Sydney, hired a gun and drove 10 miles to a village 10 miles north-west of Sydney, and the first morning killed four fine specimens in a couple of hours. The species is very abundant in most seasons from New Brunswick and Nova Scotia to North Carolina, and I found the birds for the most part split up into small flocks of six to twenty, feeding and flying according to the movements of the tide. We must not dogmatize on the habits of any species if we only observe it in certain places, for the character of a bird may be regulated according to the circumstances where food, the ruling factor in the movements of all birds, is found locally, and where for many hours it is inaccessible. The actual habitat of this species is similar to the Velvet-Scoter, which affects mussel-banks on the edge of tideways, and not great open bays or coast-lines, like the Common Scoter. Both in the east and the west coast of North America, where I have subsequently observed them, Surf-Scoters seemed to be more restless birds than either of the two species found regularly in the British Isles, and this, in their true haunts, I attribute, not to a more restless disposition, but to the fact that, like all the other Scoters and the Eiders, they are of a very greedy nature, and require a large amount of food to supply their wants. The movements of the tide, both in the entrance of the St. Lawrence and on the British Columbian coasts, are very swift, and this necessitates constant changes of ground on the part of the birds, before, after, and at the feeding hours; wherefore the little flocks are constantly flying to and fro, coming easily to wooden decoys, and forming a ready prey to the numerous coast gunners in their tubs or "sink-boats." I noticed that with an "in-shore" wind this species approached the coast-line nearer than any other Scoters I had previously observed. Some of the small flocks even flew over a point of land in spite of the fact that in such places there is usually a hidden gunner in waiting for them.

The birds first observed were those that were "settled" for the winter, which would account for their being in small flocks, both during the period of the autumn and especially the spring migration. Surf-Scoters assemble in enormous flocks, and often join up with Common and Velvet-Scoters, as well as Eiders, Long-tails, and Harlequins. Mr. Dresser gives an interesting account of the abundance of this species in the Bay of Fundy, New Brunswick, during the spring migration. He says (*Birds of Europe*, pp. 672–3):

"When living in New Brunswick I had ample opportunities of observing the present species; for during the seasons of passage it was very numerous, though less so, as far as my experience goes, in the autumn than in the spring. In some seasons it occurs in great numbers. This was the case in 1862, when I spent a few days at Lepreaux Lighthouse, which is placed on a rocky point jutting out from the mainland into the Bay of Fundy. On my arrival there on April 25 myriads of ducks were flying past, among which Surf-Scoters were more numerous than any other species. They followed the line of the coast, at a short distance from the shore, and in passing the point generally steered close in, or flew over the end of the point itself. On the 26th I spent the day among the rocks; and I never recollect seeing water-fowl in such countless numbers as I did on that day, all wending their way north-

SURF-SCOTER.

1. Immature male. May. Age, 10 months.
2. Immature male. May. backward bird. Age, 9½ months.
3. Adult female. May.
4. Adult male. Nov.
5. Immature male. May. Nearly adult. Age, 22 months.
6. Immature male. May. Very advanced bird. Age, 10 months.

ward. Velvet, Common, and especially Surf-Scoters were the most numerous; but there were also many Eiders, Brent Geese, Long-tailed Ducks, with a few Harlequins, Great Northern Divers, and some others. The Surf-Scoters flew in large compact flocks, from eight to ten deep. I estimated the length of the flocks by watching them as they passed certain points, the distance between which was known to me; and I found that one compact flock was at least half a mile in length, a second reaching from one point to another distant nearly a mile and a quarter. I made several telling shots amongst them, knocking over eight at one discharge, and six and four at a double shot, though I was only using a light 15-bore gun. I found them, however, very hard to recover; for during the time the dog was retrieving them, one or two were sure to come to and paddle off, and the sea was too rough to go out in a boat to pick up the cripples. The males proved to be far more numerous than the females, of which sex I only killed three during the whole day."

The flight of the Surf-Scoter is rapid, and usually performed at a low elevation over the water, as is the case with the Velvet-Scoter. Its general habits seem to resemble that species very closely. On the British Columbian coasts I observed many specimens (principally males and probably non-breeding birds of 22 to 24 months) flying about singly on the same places as *O. deglandi.*

My friend, Mr. G. E. Francklyn, who has killed many of these birds both on the east and the west coast of North America, where he is now a professional wild fowler, has told me that these birds made a distinct whistling noise both when commencing flight and on alighting, though during the flight itself it is not noticeable. He compares this sound to that produced by the Golden-Eye, but not so loud. On approaching a flock which rose in front of my boat in fairly quiet weather, I distinctly heard this whistling sound as the birds rose during their "run-up," and there is no doubt that in a dead calm the noise is very noticeable.

Turner, in speaking of the Surf-Scoter (*Contributions to the Nat. Hist. of Alaska*, pp. 137–8), which he noticed in the Yukon district, bordering on the sea and to the northward, says:

"It is common among the Aleutian Islands. It frequents the larger coves and bays, where in favoured situations the bird is abundant in winter.

"It is rather shy, but when single or in pairs it may be approached to within long range. The favourite way to obtain this duck is to wait until it dives, then to go to where it will come up. It is then so confused that ample time is given to obtain a shot at shorter range. When wounded, this duck will dive and swim for two or three hundred yards. I have wounded them and waited for twenty minutes to have them reappear. They often sink to the bottom, as they die under water, and there is not sufficient air in their lungs to float them [?]. If not this, there is always some big fish that accompanies the hunter and takes the bird only after it has died under the water.

"Unless the bird is killed outright there is but little chance to obtain it.

"They have a peculiar habit of stretching up their necks as though they had some throat disease, like the 'gapes' in the young chickens. The flesh of this duck is very nice, and if well prepared is excellent food, being free from any strong odours. Its food is obtained from the bottom of the bays and coves, and consists almost entirely of shell-fish and worms that are found among the rocks.

"The Surf-Duck is the *Svēstún*, or Whistler, of the Russians."

Both on the east and on the west coasts of America numbers of Surf-Scoters remain throughout the summer, and these are not necessarily wounded birds, but are for the most part immature males and a few females, whilst a few adult males also do not go northward.

Mr. George Mackay gives us an interesting account of the food and habits of this species and other Scoters in his *Auk*, viii. p. 280. He says:

"These Scoters are the most numerous of all the water-birds which visit the New England coast, collecting in greater or less numbers wherever their favourite food can be procured: The black mussel (*Modiola modiolus*), small sea clams (*Spisula solidissima*), scallops (*Pecten concentricus*), and short razor shells (*Siliqua costata*) about an inch to an inch and a half long, which they obtain by diving. As an indication of how large a scallop these ducks can swallow, I may mention one taken from the throat of an adult male White-winged Scoter, which was about the size of a silver dollar; it cut the skin of the neck when the bird struck the beach after being shot. Mussels measuring 2½ inches by 1 inch have been taken from them; but usually they select sea clams and scallops varying in size from a five-cent nickel piece to a quarter of a dollar. They can feed in about forty feet of water, but prefer less than half of that depth. As these mussels are frequently difficult to detach, and the sea clam lives embedded endwise in sand at the bottom, with only half an inch above the sand, the birds are not always successful in obtaining them, it requiring considerable effort on their part to pull the mussels off or to drag out the clams. Eight or ten of these constitute a meal, but the number varies according to the size. I have heard of a mussel closing on a Scoter's tongue, which was nearly severed at the time the bird was shot (Muskeget Island, about 1854). The fishermen frequently discover beds of shell-fish (scallops) by noticing where these birds congregate to feed. . . . Where there are large ponds adjacent to the coast, separated from the ocean by a strip of beach country, all three of the Scoters will at times frequent them to feed, and will collect in and come in considerable numbers if the supply of food is abundant, in which case they are very unwilling to leave such ponds, and although much harassed by being shot at and driven out, continue to return until many are killed. An instance of this kind occurred November 1, 1890, when some 400 Scoters collected in the Hummuck Pond on Nantucket Island; they were composed entirely of the *young* of the Surf and White-winged Scoters, only one American (a female) being obtained out of about 50 birds shot in one day (November 3) by a friend and myself. . . .

"The old birds of the Surf-Scoter appear about the middle of September, with a very large movement about the 20th, according to the weather; the young birds making their appearance the last of September or first of October. I have known a considerable flight to occur on the last day of September, the wind all day being very fresh from the south-west, which deflected them in towards the land; such an early movement is, however, unusual. An easterly storm about the middle of August is likely to bring them along, the wind from this direction being particularly favourable for migration; if, on the other hand, the weather is mild and warm, it is not usual to see them so early. . . .

"I have noticed during the spring migration northward in April that frequently the larger flocks of the Surf-Scoter are led by an old drake. That the selection of such a leader is a wise precaution has frequently been brought to my notice, for on first perceiving such a flock coming towards me in the distance, they would be flying close to the water: as they neared the line of boats, although still a considerable distance away, the old drake would become suspicious and commence to rise higher and higher, the flock following him, until the line of boats is passed, when the flock again descends to the water. When over the boats shots are frequently fired up at them, but so well has the distance been calculated that it is seldom a bird is shot from the flock.

"While each species during spring migration prefers to keep separate from the others, I have at times noticed flocks which had a few strangers of the other kinds mixed with them, and have seen stray birds join flocks not of their own kind. They, however, soon appeared ill at ease, frequently leaving the flock before passing from view.

"All three varieties [species], when flying directly overhead at an elevation of about one hundred and thirty yards, can be called or whistled (by blowing through the fingers placed in the mouth) down to within ten or fifteen yards of the water, though *never* into it; but it requires one whose eyes and hands work in most perfect accord to catch them with a charge of shot during such a headlong, zigzag rush. I explain this action on their part by the supposition that at first they mistake the sound for the noise of a hawk's wings, and seek the water for safety. I have seen the same result produced by a rifle ball passing through or near a flock flying high in the air. Either of the Scoters, when at a considerable distance, can be attracted towards the decoys by shaking a jacket or hat at intervals, which, when their attention

has been secured, should be stopped; for if once their eyes have become fixed on the decoys, they will usually come to them if flying low down near to the water.

". . . I have rarely heard the Surf-Scoter make any sound, and then only a low guttural croak like the clucking of a hen; they are said to utter also a low whistle.

". . . In the spring mating begins before the northward migration, as I have taken eggs from females between April 15 and 25, which varied in size from a cherry-stone to a robin's[1] egg. During this period the duck, when flying, is always closely followed by the drake, and wherever she goes he follows. If she is shot he continues to return to the spot until also killed.

"I have often, on firing at a flock, shot out a female; the moment she commences to fall, she is followed by her mate. He remains with her or flies off a short distance, only to return again and again until killed, regardless of previous shots fired at him.

"I have never seen any such devotion on the part of the female; she always uses the utmost speed in flying away from the spot, and never returns to it.

"In regard to the abundance of each kind of Scoter it is difficult to judge, but I lean to the opinion that the Surf-Scoter is the most numerous; next the White-winged, and lastly the American. I think there is little difference as to the numbers now and formerly, but during the southern migration, unless it is thick and stormy weather, they pass further out from land than formerly, owing to their being shot at.

"When migrating they fly very much higher in calm than during windy weather, and if there is any difference in the elevation of their flights at such time I should say the Surf-Scoter flew the highest (with the exception of those White-winged Scoters which migrate *west* in May)."

N. S. Goss, writing in the *Auk* (vi. p. 123), states that their food consists chiefly of shell-fish (chiefly mussels), fish, &c. They rise from the water in the usual running and laborious Scoter fashion, and seem to be as much at home in rough as in calm water. When feeding I have noticed that they follow one another quickly under the sea with a somewhat clumsy splash, some of the flock reappearing just as others are going down.

Concerning the actual courtship, during which the males make a low whistle,[2] and the females a rough grating call, I have no complete information, but some "show" undoubtedly takes place before the main "spring" migration from the 10th to the 25th of April. Notes on their nesting habits are also very scarce. In Hudson Bay Surf-Scoters repair to small ponds and lakes at no great distance from the sea, and here the female makes her nest of dry grass or other plants generally in an open situation.

Audubon seems to have been the first to find and record the nest of this species in Labrador. He describes (*Birds of America*, vii. p. 49) the summer habitat and nesting places as follows:

"After we had anchored in the lovely harbour of Little Macatma, I had been anxiously searching for the nest of this species, but in vain; the millions that sped along the shores had no regard to my wishes. At length I found that a few pairs had remained in the neighbourhood; and one morning while in company of Captain Emery, searching for the nests of the Red-breasted Merganser over a vast oozy and treacherous fresh-water marsh, I suddenly started a female Surf-Duck from her treasure. We were then about five miles distant from our harbour, from which our party had come in two boats, and fully five and a half miles from the waters of the Gulf of St. Lawrence. The marsh was about three miles in length, and so unsafe that more than once we both feared, as we were crossing it, that we might never reach its margin. The nest was snugly placed amid the tall leaves of a bunch of grass and raised fully four inches above its roots. It was entirely composed of withered and rotted weeds, the former being circularly arranged over the latter, producing a well-rounded cavity six inches in diameter by two and a half in depth. The borders of this inner cup were lined with the down of the bird, in the same manner as the Eider-Duck's nest; and in it lay five eggs, the smallest number I have ever found in any duck's

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[1] *I.e.* the egg of the American "Robin," *Turdus migratorius*.

[2] E. W. Nelson mentions a "low clear whistle" which is used as a call note in the breeding season.

nest. They are two inches and two and a half eighths in length by one inch and five-eighths in their greatest breadth, more equally rounded at both ends than usual, the shell perfectly smooth, and of a uniform pale yellowish or cream colour. I took them on board, along with the female bird, which was shot as she rose from her nest. We saw no male bird near the spot, but in the course of the same day met with several males by themselves, about four miles distant from the marsh, as we were returning to the harbour. This induced me to believe that, like the Eider and other ducks that breed in Labrador, the males abandon the females as soon as incubation commences."

In Hudson Bay and N. Labrador, where Hantzsch found them breeding, they select banks, marshes, and small islands near fresh-water lakes at no great distance from the sea, and make the nest, as described by Audubon, of rotten vegetation overlaid with dry grass, in the months of June and July. Other descriptions of the nesting places and eggs are also to be found in the writings of Macfarlane, *Proc. U. S. Nat. Mus.*, xiv. No. 865, p. 423, and Macoun, *Cat. Canadian Birds*, 2nd ed. p. 118.

Very few authentic nests of this species seem to have been taken, though the birds are very plentiful in some districts, which seems to point to the fact that the main breeding grounds have not been visited by naturalists. E. W. Nelson also noticed immense flocks of males only on the coast in the breeding season and infers that the female alone incubates and rears the young (*Rep. upon Nat. Hist. Collections made in Alaska*, 1877–1881, p. 81). Eggs from the Anderson River and now in the British Museum were taken by Macfarlane on June 26; another clutch, said to have been taken on the Labrador coast on June 11 (Jourdain), whilst a clutch of eight, taken on the Mackenzie River (W. Raine, quoted by Macoun), was found on June 26, 1901.

The nest is said to be sometimes made of moss, twigs, and different plants woven together and very like that of the American Velvet-Scoter, whilst nests found by Macfarlane seem to have consisted of nothing but down and a few feathers.

Of the habits of this species during late summer we seem to know nothing at present, except that the southward migration often commences very early, flocks of these birds coming south to the St. Lawrence and eastern coasts often by the end of August. The flesh of this species is said to be far superior to that of the Common or Velvet-Scoter. I am not aware that any aviculturist has kept the species in confinement.

GENUS: *Mergus*

THE GOOSANDER

Mergus merganser, Linnæus

Mergus merganser, Linn., Syst. Nat., ed. x. i. p. 129 (1758).
Merganser, Briss., Orn. vi., p. 231, pl. xxii. (1760).
Merganser cinereus, Briss., tom. cit., p. 255, pl. xxv. (1760).
Mergus merganser, Linn., Syst. Nat., ed. xii. i. p. 208 (1766).
Mergus castor, Linn., tom. cit., p. 209 (1766).
Mergus gulo, Scop. Ann. I. Hist. Nat., p. 69 (1768).
Le Harle, Buff., Hist. Nat. Ois., viii. 267, pl. xxiii. (1781).
Mergus rubricapillus, Gmel., Syst. Nat., i. p. 545 (1788).
Merganser raii, Leach, Syst. Cat. M. & B. Brit. Mus., 36 (1816).
Mergus leucomelanus, Schrank, Faun. Boic., i. p. 238 (1798).
Merganser castor (L.), Bp. Comp. List, p. 59 (1838).
Mergus orientalis, Gould, P.Z.S., 1845, p. 1.

LOCAL NAMES.—Goosander, Greater Saw-bill, Goose Sawyer, Sawyer, Saw-Goose, Jacksaw, Dun-diver (female) (*English*);[1] Siolta bheag (*Gaelic*); Hwyadwydd Gyffredin (common Duck-Goose), Hwyaden Ddan-heddog (Toothed Duck) (*Welsh*); Le Harle, Grand Harle (*French*); Mergo maggiore, Pescareu gros (*Italian*); Groote Zaagbek, Roseeward, Duikergans, Zaageend (*Dutch*); Ronac oras (*Croatian*); Morcak velky (*Czech*); Stor Skallesluger, Gulskraep, Gut Skallshinger Skjörand, Stor Hargasse, Bögeskrakke (*Danish*); Topandt (*Færöese*); Unkoskelo, Isokoskelo, Rökkä, Voikoskelo (*Finnish*); Kussakoalsi (*Lappish*); Stor Fiskand, Fagergaas (*Norwegian*); Stor-skrake, Skrake, Halskrake, Halskraka (female) (*Swedish*); Tracz hohol (*Polish*); Ribic, Sarscica, Velika savscica (*Slovenish*); Trullo, Bech de serra gran (*Spanish*); Nagy buko (*Hungarian*); Krahal bolshoy (*Russian*).

Egg.—Pale creamy or yellowish-white, closely grained and smooth in texture; they vary in number from 7 to 12 as a rule (F. C. R. Jourdain). Thirteen are recorded by N. Gilroy and O. Reiser, and 15 by H. J. Pearson; whilst 36 have been found in one nest in Germany (*Zeit. f. Oologie*, 1900, p. 32). The late H. Hocke once found 19 eggs in one nest, and 25 to 30 or more eggs may be taken from one female if removed gradually (Hantzsch).

In Scotland full clutches may be found as early as the end of April and early in May. The usual date being from April 20 to May 5. In Iceland the first half of June, and in Finland June, is the period of egg-laying. Average size of 100 eggs, 68.46 × 47.18 mm.; max., 74.5 × 47.5 and 70 × 49; min., 63 × 45 and 68 × 41 (F. C. R. Jourdain). Rey gives the average weight as 7.878 grms.; while Goebel estimates the average of 41 eggs as 7.30 grms.

Down.—Light pearly grey, rather like that of the Sheld-Duck, but slightly smaller. The feathers of the latter are, however, unmistakable, as they are tipped with black or chestnut; whereas those of the Goosander are white (see figures *Brit. Birds*, ii. pl. ii. fig. 17; and Kirkman's *Brit. Bird Book*, vol. iv. pl. U).

Young in Down.—Closely resembles the young of the Red-breasted Merganser, but

[1] A closely allied form in North America is known as the American Merganser, American Sheldrake, Pond Sheldrake, Saw-bill, Breakhorn, Fisherman, and Torrent Duck.

slightly larger at birth; whilst all the markings are less rich. Crown, shoulders, and back deep brown, becoming almost black on the lower back and rump, and interspersed with grey; outer edge and lower half of the wing, sides, and on a spot above the thighs, white; under parts and throat white; cheeks reddish brown-buff extending almost to the front of lower neck; a blackish-brown line extends from the angle of the upper mandible to below the eye, leaving a whitish line from the bill to below the eye. Another dark line extends from the top of the bill to the eye, leaving the eye almost encircled with white. Irides red; bill dark brown with slate suffusion; nail bone yellow; legs and toes yellow, with back of the legs and webs inclined to slatey-brown. Length at one day old, 6¼ inches.

Immature Male.—I am indebted to my friend Colonel Stevenson Clarke, who has sent me nine specimens of young males and females (just able to fly) that were killed in September 1910 at Fasnakyle on the river Glass, Inverness-shire. The young males very closely resemble the young females; but even at this early age (two months) the superiority in size of the males is noticeable, while the bill is somewhat wider.

In first plumage the immature male closely resembles the adult female, but can always be distinguished by the shorter and less abundant crest, and by the fact that the white throat extends from the chin to the blue-grey and white feathers of the upper chest; whereas in the adult female the white passes into rich red-brown, 2¾ inches from the front of the chin. The front of the crown and cheeks of young males and females are slightly darker than the adult female, and there is generally a whitish-yellow line of feathers extending from the lower angle of the upper mandible to below the eye. This character is not found in adult females, nor is the vent interspersed with blue-grey feathers as it is in immatures.

In first plumage the young male has the crown and crest dark reddish-brown, cheeks and sides of the neck rich red-brown. Chin and throat, white becoming more blended at the sides on to the red-brown where it meets the upper chest, which is brownish grey edged with white; back of neck, mantle, scapulars, upper wings, back, rump, flanks, and under and upper tail-coverts, ash-blue with black feather-shafts. There is a tendency to brown in the blue-grey flanks and sides of the upper breast in immatures, and most of their feathers are edged with white. Primaries black; outer secondaries white, inclined to cream; and inner long secondaries bluish-grey, edged on their outer margin with black. The lesser secondaries are white, with their upper half black. Tail (eighteen feathers) blue-grey over brown, and in immatures usually broken at the tips. Under parts yellowish-white, with blue-grey feathers across the vent and on the under tail-coverts. Upper mandible dark reddish-brown, becoming yellow on the serrated lower edge. Lower mandible pale yellow; nail bone yellow, as in downy young; feet and legs yellow, darker towards the back of the legs; webs dusky grey.

There is little change in the young male until late October, when the bird is nearly full-grown in size. The bill becomes large and deep red like the adult male. The area of white at the base of the neck now passes up almost to the back of the neck, and a few black feathers appear at the back of the neck. Throughout the winter many whitish-yellow feathers vermiculated with brownish-grey come into the flanks, and these, as well as the black feathers, increase in numbers until March, when the tail is often renewed, though sometimes this part is not shed until May. A few black feathers also appear on the chin. After March the usual halt takes place until May, when the young male passes into what

may be called its first eclipse or semi-eclipse dress. The black feathers on the neck are moulted, and the whole of the bird (except the wings, which remain blue-grey on their upper parts) soon resembles the adult male in eclipse, but is slightly paler. The blue-grey dress is moulted later. In August the main moult takes place, and proceeds slowly through September, October, and early November, at which date all traces of eclipse and immaturity are lost, and the young male assumes its first full winter plumage. It is, therefore, adult at seventeen months.

Adult Male.—Head and neck black, glossed with bottle-green on the upper sides of the neck, and purple on the upper sides of the crown. Occipital feathers much elongated; lower neck and upper mantle white; back and scapulars glossy black with a purplish tinge; lower part of the back, rump, tail-coverts, and tail, ash-blue, the tail being slightly darker, with shafts blackish-brown. Primaries black, with an ashy tinge; secondaries white and cream, with a narrow black edging. Inner long secondaries black; rest of the wing-coverts white. Flanks and under parts salmon-buff, cream only on the upper breast and lower neck. Under tail-coverts cream, washed with grey, and finely vermiculated with black behind the thighs. Bill deep red-vermilion, with the ridge of the upper mandible and nail blackish. Irides deep red; legs and webs vermilion-red. Length, 25 to 26 inches; wing, 11 inches; tarsus, 1.9 inch.

In May the adult male goosander begins to assume its eclipse plumage. Specimens in this dress are extremely rare, but I have been able to examine three and figure two kindly lent to me by Mr. Schiöler. The general appearance of these two birds resembles the immature male, but the adult in eclipse can be readily distinguished by the wings, which are the same from May to September as in winter, and merely moult once, as is the case in all other ducks. The adult male in August has the crown reddish-brown, with a grey tinge; chin white, and the rest of the head and upper neck rich red-brown. There is a black mark in front of the eye, and a whitish line from this to the lower angle of the upper mandible. The lower neck is blue-grey, interspersed with creamy-white; mantle, flanks, scapulars, back and tail blue-grey; the flanks have a few white feathers on the outer sides, vermiculated with brownish-grey; the last inner secondaries only change from black to black; wings as in winter, and now changing as usual only once; under parts not so rosy as in winter. In early September the wings and tail are renewed, and the black feathers on the mantle come in. After this the whole plumage proceeds to moult slowly, the full winter dress not being assumed until early December.

Immature Female.—The first plumage closely resembles the immature male, but the bird is smaller, and the bill not so thick or long. (For other points, see "Immature Male.").

By the end of October the white throat-line is curtailed by the red-brown, and the long occipital feathers have grown to their full length. The young female, during the first winter, can always be distinguished from the adult by being whiter on the breast, having a darker bill, and less abundant crest. The feet are also much paler, and in the spring do not get the rich red-vermilion of the adult. Immature females present a worn and be-draggled appearance by June, the breast becoming nearly white. Another almost invariable character of the immature female is the worn ends of the tail feathers, but, like many other diving ducks, the tail is sometimes renewed in winter or spring in advanced birds.

In July and August the immature female moults the whole plumage, and gains the full adult dress in October, thus being adult at 15 to 15½ months.

Adult Female.—Crown, nape, sides of the head, and upper neck rich red-brown. There is a space of white extending from the chin for a short space down the front of the neck. The crown and nape are somewhat darker than the cheeks. The feathers of the crown and nape are much elongated, forming a crest. Lower hind-neck, mantle, scapulars, inner secondaries, wing-coverts, rump, and tail ashy slate-grey, most of the feathers having dark shafts. Central secondaries white, outer secondaries brown, lesser secondaries white with black upper parts; primaries blackish-brown; rest of the wing ash-grey; flanks light ash-grey, faintly edged with white. Under parts rich yellow cream (not white in life). Soft parts similar to the male, only not so highly coloured. Length, 24½ inches; wing, 10 inches; tarsus, 1.75 inch.

The range of the Goosander is very extensive, as it occurs throughout the Palæarctic regions, being replaced by very closely-allied forms in North America and Central Asia, the last-named race wintering in India.

Breeding Range.

British Isles: Scotland.—There do not seem to have been any reliable records of the breeding of this species in Scotland previous to 1871 (J. A. Harvie Brown), although it is likely that it has long been a resident here. Like other diving ducks it is extending its range rapidly, and will soon be found further to the south.

Breeds in Sutherland and West Ross (*V. F. of N.W. Highlands*, p. 251; cf. *V. F. of Sutherland and Caithness*, p. 195). Also in Moray area (*V. F. of Moray Basin*, ii. p. 117).

[S. P. Gordon records a nest on June 6, 1906, from Aberdeenshire; also in Elgin and Banff, as well as Inverness.[1] Probably these are due to confusion with R.-b. Merganser.]

[No recent records of breeding in Outer Hebrides, though Macgillivray states that he found it breeding by the larger lakes, and Dr. Dewar is said to have found it breeding in North Uist in 1858, and shot a female off the nest (Gray, *Birds of W. of Scotland*, p. 403). Confirmation is required of this.]

In Tay area it is now common and increasing (*V. F. of Tay Basin and Strathmore*, p. 249). First record in 1871 (*loc. cit.*); cf. *Ooth. Wolley.*, ii. p. 632.

In Argyll it breeds on the mainland south to Loch Awe (*V. F. of Argyll and Inner Hebrides*, p. 141). First record of breeding in Scotland from this district (cf. *Field*, July 29, 1871, and August 12, 1871; *V. F. of Tay*, p. 254).

I have seen old females with young in many parts of Perthshire and Argyllshire, especially on the Dochart, Orchy, and the Kinglass, in the latter county. I have also seen broods on the Glass and the Farrer, in Inverness-shire, and received young unable to fly from Fasnakyle in 1910. I have seen them at the nesting time in Strathnaver, Sutherland, about Syre, and shot old birds and young there in August. In Scotland, Goosanders frequent somewhat rocky rivers of medium size in the breeding season, and will soon, I think, be found in all Highland rivers of this character.

[1] S. P. Gordon may be right in this case, but in his *Birds of the Loch and Mountain* he has figures and articles of the Goosander which obviously refer to the Red-breasted Merganser.

Printed by Albert Frisch-Berlin

GOOSANDER
adult male and female

Continental Europe: Iceland.—Resident and pretty common (Slater, *Manual*, p. 75). Widely distributed, but nowhere common (Hantzsch).

Færöes.—Not known to breed; rare visitor.

Continent: Norway.—Up to the shores of the Arctic Ocean, but most commonly in southern and S.E. parts (Westerlund, p. 186).

Sweden.—From Skåne, Blekinge, and Gefle, north to Jemtland and Lapland; common on L. Venern (*t. c.* p. 186).

Russia: Finland.—Scarce in S., but common Enare (Westerlund); common near Uleaborg (Dresser); Kola Peninsula and Lapland, Novaya Zemlya, Kolguev, Waigatz, and on the mainland south to Upper and Mid Volga (scarce), and N. of Orenburg Government (S. A. Buturlin, H. Schalone, Pleske, Pearson, &c.); also Baltic Provinces (Buturlin).

Denmark.—Roskild Fjord, Moen, near Vordingbord on Sjölland, but always sparingly (R. Olsen).

Germany.—E. Prussia (Hartert, *Ibis*, 92, p. 519), West Prussia, Pomerania, Mark Brandenburg, Rügen, Mecklenburg, Silesia, and Schleswig-Holstein (Rey, Hartert, Naumann, &c.); also Bavaria (*Orn. Monatsber.*, 1910, p. 33).

Switzerland.—See H. Saunders, *Ibis*, 1891, p. 184; also E. H. Zoltikofer. (Breeds on Lakes Bienne, Neuchâtel, Morat, and Constance.)

Bosnia.—O. Reiser, *J. f. O.*, 1885, p. 55.

Roumania.—Breeds very rarely (R. R. von Dombrowski), but confirmation required of this.

Asia.—Breeds across the Continent east to Kamtschatka, the Kuriles (teste Snow, Stejneger), and the Commander Isles, but not on the Taimyr Peninsula, nor Tchucksi Land, nor on the Lower Kolyma (S. A. Buturlin). In the west it breeds in the Tomsk and Tobolsk Governments of Siberia south to about 52° N. lat., but in Central Asia it is replaced by *M. merganser comatus* (*M. orientalis*, Gould), which breeds in the high-lying lakes of Central Asia and Tibet, and also in the Himalayas at about 10,000 feet (E. C. Stuart Baker).

America.—In North America it is replaced by another sub-species, *M. merganser americanus* (Cassin.), which is distributed over the greater part of the Dominion of Canada, and ranges into Alaska and southward to Wisconsin and Pennsylvania. For details, see *A. O. U. Check List* (new ed.), Macoun's *Cat. of Canadian Birds*, 2nd ed., p. 73, &c.

I have shot birds of this American form of the Goosander, and must confess that I could find no difference between them and the European race. I think that this sub-species, as well as the American Golden-Eye and the Greater Scaup, have little claim to separation. An adult female and three young American Goosanders which I killed in Newfoundland in 1899 are absolutely identical with Scottish specimens.

Migration Range.

British Isles.—Scarce in Shetland, but a regular, though not common, visitor to the Orkneys. It is also scarce in the Western Islands of Scotland and the Outer Hebrides, and also in the west, except in a few estuaries, such as the Clyde. Except in the hardest winters, it is very common on all the large rivers and shallow lakes of the Highlands, and nowhere so abundant as on Loch Leven (Kinross) in early spring, where I have seen hundreds in March. In England it is more common in the northern counties than in the

south, although a few always spend the winter on the south coast. In hard winters they are even numerous on the coasts of Sussex and Devonshire, especially about the estuary of the Exe. A few always winter in the Channel Islands. In North Wales it is a "winter visitor, not uncommon on north and west coasts and on the Upper Dee, not recorded in Anglesey or Lleyn, and only twice in Montgomeryshire" (Forrest, *Fauna of N. Wales*, p. 296). In Ireland it is a "scarce winter visitor, met with irregularly and in very small numbers, but probably an annual visitant" (Ussher and Warren, *B. of Ireland*, p. 217). In Ireland the Goosander frequents ponds and streams in winter as it does the Scottish lakes and rivers unless frozen out.

Europe.—Migrates "across country," and not by the seacoast only, to the Mediterranean and Black Seas.

Spain.—Santander (Irby, *Ibis*, p. 83); Malaga (Arévalo); Valencia (Saunders, cf. *Ibis*, 71, p. 397).

Sardinia.—Rare (Brooke, *Ibis*, 1873, p. 345); accidental (Arrigoni, *Man.*, p. 769).

Italy.—Scarce visitor to N. Italy, chiefly from Veneto and the Po delta (Giglioli, *Avif. Ital.*, p. 493; *Ibis*, 98, p. 73). Not uncommon in Lago di Garda and in Lombardy (J. Whitaker).

Sicily.—Rare (Arrigoni, *Manuale*, p. 769).

Malta.—Once (C. A. Wright, *Ibis*).

Greece.—Rare (O. Reiser, *Ornis. Balcanica*, iii. p. 507); Ionian Isles (T. L. Powys, *Ibis*, 60, p. 354); Bosporus (Elwes and Buckley, *Ibis*, 70, p. 340); Herzegovina (Kadich, p. 98).

Russia.—On migration in Caucasus.

Astrakhan.—Common (Henke, *Ibis*, 82, p. 229).

Black Sea and Dobrudscha.—Regular passage migrant (Dombrowski).

Africa.—Tangier, twice (L. H. Irby, *Orn. Str. Gibraltar*, p. 231); Algeria, only in severe winters (Loche, *Exp. Sci. Alg. Ois.*, ii. 4, 400); one from Algeria in Milan Museum, and said to occur in Tunisia (J. Whitaker, *B. of Tunisia*, ii. p. 222); Egypt, once seen (M. J. Nicoll, *Ibis*, 1909, p. 368).

Asia.—[Impossible to distinguish winter records of Central and N. Asian races at present in S.E. Asia.] Palestine (not recorded by Tristram). Asia Minor, rare (*J. f. O.*, 1908, p. 621). Records from Euphrates (C. G. Darrford) probably belong to this race, but from the Mekran coast (Hume, *Str. Feath*, iv. p. 496; cf. also *Str. F.*, v. p. 291); Afghanistan (Stoliczka and Aitchison); Northern India south to Bombay (cf. Stuart Baker, *Indian Ducks*, p. 271); Burmah (F. Finn, *Indian Ducks*, p. 272).

China.—Tientsin, abundant (Swinhoe, *P. Z. S.*, 63, p. 323); Lower Yangtse very common (Styan, *Ibis*, 1891, p. 498).

Japan.—Temm. and Schl. (Seeb., *B. J. Emp.*); Saghalien (Dresser, *Eggs of B. of Europe*, p. 586).

All these records probably belong to *M. m. comatus.*

N. America.—The American Goosander, which I must regard as identical with the European race, moves north from Newfoundland and the Canadian Arctic and Alaska in October and winters in South Newfoundland, New Brunswick, Nova Scotia, and many of the interior states, going as far north as Florida, Louisiana, Texas, and Northern Mexico. On

the western side it winters from British Columbia to Southern California (see also American and Canadian authors). It also occurs in Bermuda.

Habits.—Goosanders are very hardy birds, and will support a very low degree of temperature provided there is sufficient spaces of water in which to swim and dive. I have seen small flocks and single birds diving amongst the great blocks of ice on the River Tay when all other ducks had been driven south. Even in Iceland large flocks spend the winter in narrow inlets of the sea, and do not leave the warm springs of the island even in the severest winters (Faber).

When migrating Goosanders generally fly at a great height in small parties in a wedge formation. They seem to prefer fresh-water rivers and lakes abounding in trout, having a special preference for running water. They are not averse to very rocky rivers, provided they have deep quiet pools at frequent intervals, but prefer medium-sized or large rivers of a somewhat broken character, and often choose their feeding grounds in open flats of the river from which a good view of all approaches is obtainable. On the whole the Goosander is rather a shy bird, much more so than the Red-breasted Merganser, and will take alarm at the presence of man at a considerable distance. This is especially the case when they are found frequenting large lakes or open estuaries, and here they are very difficult to approach, flying away whilst the boat or intruder is still far out of gun-shot range. On rivers they are equally shy, but the fact that they invariably fly immediately above the water and at no great height, causes them to pass close to the fisherman whether he is on the bank or in a boat. Whilst salmon-fishing in the Tay in early spring, I have often had Goosanders pass the boat within a few yards, but if any movement is made they will shoot suddenly up into the air and try and avoid the presence of man as far as the limits of the river will allow them. On the rivers they are often to be seen diving on the edge of very strong currents frequented by small trout and salmon par, and they can make good headway even in considerable rapids, though they never dive in such spots as a Harlequin would frequent. The larger Highland rivers seem to be their principal habitat in our islands in winter and spring, but I have sometimes seen large gatherings of Goosanders both on Loch Tay and Loch Leven in early spring. These were probably migrants, of which the majority would leave us later for more northern waters. I shall not readily forget one day in March when the late Sir Graham Montgomery asked me to destroy a Heronry on the Castle Island at Loch Leven. These birds had increased to an alarming extent on the lake and were killing such vast quantities of young trout that a raid had to be undertaken to reduce their numbers. There were about thirty nests in the small clump of firs at the north-east end of the island, so I spent the morning in hiding, killing some twenty-seven birds. In the afternoon the wind rose from the north-east and all the Goosanders on the lake—there must have been over 1000—began moving from the east to the west. They passed the corner of the island in small flocks of from six to fifteen, and so far as I could see they were all adults. Many of the flocks came within shot of the stones where I lay concealed, and in the course of an hour I killed six, which were all the specimens I required. I have never seen such numbers of Goosanders as on that day, and heard from Maunderson the boatman that they all left about ten days later.

The flight is usually performed very close to the water when travelling upstream. When taking long flights down-stream Goosanders often rise to a considerable height, far

out of gunshot, and at such times the birds are generally travelling to a considerable distance. Over large open lakes they often wheel about in small parties above the spaces of water where they intend to alight and fly at a great speed, like all the other members of this group, with necks held very stiff and straight and the crest depressed close into the neck. When rising they shoot out the neck parallel with the water and "run" flapping with considerable splashing and commotion along the surface of the water before they are able to get clear. In the spring they are nearly as restless as the Red-breasted Merganser, the males constantly indulging in "flapping" races along the surface of the water and making their show immediately afterwards. At a distance the males have a very brilliant black and white appearance and the wings are beaten so fast that a flock in movement has a glittering aspect. On alighting on the water they make a considerable disturbance and create quite a commotion on the still surface of a lake. For some minutes after resting they are much on the alert, and the slightest sign of danger will put them to wing again. Their eyesight seems to be quicker and more accurate than any of the Mergansers, and unless they are feeding they seldom come into the shallowest places under banks where they may be stalked.

I once had a most interesting stalk at Goosanders in Argyllshire, in September 1889. At that time I did not know whether the males assumed an eclipse plumage or not, never having seen a specimen. Walking from the lodge at Glenkinglass, where I had been deer-stalking for a week, I followed the river Kinglass for 10 miles or so, passing on the way two or three female Goosanders and their young. Having arrived at the junction of the river where it joins the Lochtulla I saw five ducks of some kind fishing close under the shore opposite the Home Sanctuary and about half a mile away. The telescope showed these to be Goosanders, and as they all appeared to be full-grown females, I was interested in seeing so many adults together at this season. As I walked along it dawned upon me that they must be old males in full eclipse, and this surmise proved to be correct, when on a closer inspection one of the birds raised itself up and I saw the large spaces of white on the wings.

I now made a very careful stalk, and seeing that the birds were fishing very close inshore towards me, I hid behind some bushes on the bank of the lake and awaited their coming. Most unfortunately I had left my rifle behind for the stalker to bring to the Forest Lodge later in the day, so I had no weapon of any kind, and so when the Goosanders came swimming by at a distance of 10 yards I was powerless to obtain a specimen. They came so close that I could watch their brilliant red eyes searching the shallow for trout, and observe their red crests and heads and black backs, and they did not become alarmed until I rose to my feet. This is the only occasion on which I have ever seen the males in eclipse, for they leave the females and hide themselves away in out-of-the-way pools and tarns as soon as they have left the females, and are at this season the shyest of birds. I offered rewards to Highland keepers, extending over a period of ten years, so that I might obtain a specimen in eclipse plumage, but numerous letters only produced females and young birds which were thought to be adult males. I have the greatest respect and affection for the Highlander, than whom there is no better man, but I cannot say that I ever met one who was a first-class naturalist, or one gifted with exceptional powers of observation. One man, who has a

great local reputation as a naturalist in Inverness-shire, and who actually lived in the very midst of breeding Goosanders, assured me, after repeated failures even to see a male in eclipse, that I was wrong, and that the bird never assumed any other plumage but that of the spring-winter one. It was not, in fact, until the autumn of 1910 that I obtained the loan of specimens in the eclipse dress from my friend Mr. Schiöler.

Various naturalists have told us that in its northern breeding places Goosanders will frequent swamps and quite small ponds, but these are generally situated in the vicinity of the larger fresh-water lakes. Generally the Goosander likes rivers and lakes whose banks are everywhere overgrown with forest or bushes, and at all times prefers clear water. In Newfoundland they seem to like the lakes quite as much as the rivers.

When standing or walking both males and females assume the horizontal position adopted by all diving ducks. They do not sit up like Cormorants, as figured in Dresser's *Birds of Europe* and many other standard works. The head and neck are held in a full S-shaped bend, the angle at the back of the neck being very sharp. This is very well shown in Mr. Thorburn's figures, which are drawn from life. The walk is very heavy and rolling, and the feet are placed on the ground deliberately, whilst the bill is pointed downwards, and each step taken as if the bird was afraid of tripping or falling. They seldom go more than a yard or two from the water's edge, but can run quite swiftly for a few yards if suddenly surprised. In winter it is a very rare event to see Goosanders ashore, but in spring they often leave the water, and will spend hours sleeping and preening on some small island or point of land. No birds are more industrious in their toilet than the Mergansers in spring, and most of their time, when not feeding, flying, or sleeping, is spent in polishing up their plumage and bathing.

Goosanders are fully as skilled in swimming and diving as the other members of this genus; in fact, I think they can both swim faster and cover greater distances under water than the Red-breasted Merganser. Individuals often remain over two minutes under the water, during which time they are darting here and there, or pursuing a forward course. I think they also probe much with the bill amongst the stones in very shallow water, so as to start small trout from their hiding; and are so quick and accurate in pursuit that they seldom miss their prey, even when swimming at high speed. I have watched Goosanders diving in holes in the ice when the Tay has been nearly frozen over, and in this case the birds always came up at the same spot where they went down, and did not pass under the ice to other holes that were open.

The usual method of fishing is for the bird to dive in water from 2 to 15 feet deep and proceed 40 or 50 yards upstream before it again comes to the surface. These long dives are, I think, more or less for the purpose of finding the fish—which in most rivers are gregarious and confined to certain pools. When once a spot is discovered where trout or par are numerous, the Goosander only takes short quick dives, appearing at frequent intervals, until hunger is satiated. The bird will then often remain for a long time in one spot, just keeping up sufficient movement with its feet to stem the current until food is digested.

Goosanders are birds with great appetites, and the amount of small fish they destroy in the Highland rivers and lochs is enormous; and it is a curious fact that so little notice is taken of their presence by piscatorial societies. They do not take fish of any size, seldom greater than a finger's length; but they devour such vast quantities that they will

soon depreciate a stock of salmon and trout. Naumann says they eat "all sorts of water beetles, the larvæ of these, and other water insects, occasionally worms and frogs are not despised"; and in a footnote Dr. E. Hartert says, "at the breeding places in summer they like change of diet, and also eat caterpillars, cockchafers, and burying-beetles" (*Vögel Mitteleuropas*, x. p. 296). Apparently they do not eat water-plants.

Naumann seems to think that a large flock of these birds will form a half-circle when swimming and all dive together and drive the fish into the shallows, where they are easily caught. This habit, clever as it is, and commonly employed by various species of Cormorant, must have confirmation in the case of the Goosander. I have always noticed that when fishing in a flock all the birds dive together with somewhat of a splash, and each pursues its prey *separately*, according to the movements of the fish. After the dive the flock reunites and swims together for a short distance before diving again.

The perceptive powers of the Goosander are very acute, and it may be classed as one of the shyest of ducks, especially when in large flocks. By nature timid and wary, it only becomes less shy during the actual breeding season, and even then the limitations of its surroundings, whilst it permits man to come near, curtails the immediate retreat of the bird. I have never seen Goosanders associating with any other species; and a single bird may often be seen frequenting the same pool or a river the whole winter. The cry is a harsh "Karr-karr," which is uttered more frequently by the female. They make use of it when rising to fly, pursuing one another, or when frightened. In the spring it is often heard when the love-making is in progress.

The courtship of the male Goosander is of a simple character so far as I have seen it, and that is not often, so there may be other movements in the display which I have not seen. I have observed much commotion and chasing and throwing-up on the part of the males in parties of Goosander in a wild state, but have never been sufficiently close to make any notes that could be accepted as accurate from wild birds. It was not until the spring of 1900 that I found an adult male, a young male, and a female on a pond belonging to Mr. H. Dennis at Faygate. The adult male in his full show frequently half raised himself from the water, with the head and neck well drawn back in an S formation, the angle at the back of the neck being very acute. The crest was not displayed in any way, nor was any sound made, except when he chased away the young male who attempted to "show" in a half-hearted manner, then he made a harsh "karr." The female often opened her mouth, as if in playful protest to the advances of the male, but the latter assumed none of the extravagant attitudes nor displayed the curious grimaces exhibited by the male Red-breasted Merganser. On dropping to the water again the male occasionally raised the feathers on the crown, and kept moving the head and neck quickly back and forwards as it swam in an excited manner round the female. With regard to the courtship and nesting habits of the Goosander, Naumann says (*Vögel Mitteleuropas*, x. p. 297):

"As the males already join company with the females during the latter part of their stay here [N. Germany] and appear to mate, many fights arise between the males for the females, and when they get to the breeding places these birds are generally already mated and immediately begin the business of breeding, whilst young males of the previous year first have to win their females by fighting there, and therefore are a couple of weeks later in going to nest, so that with the former this takes place at

the beginning of May, and with the latter at the end, whereas in the far north the time is postponed for more than half a month."

In the foregoing paragraph Naumann is evidently labouring under the delusion that young male Goosanders of the previous year pair and breed in the following spring. It is quite a mistake to think they will do so, nor do they assume more than a small portion of the adult plumage—only, in fact, a few feathers of black on the lower neck.

The Goosander is a very early breeder, and full clutches are often to be found in Scotland as early as the end of April. In Scotland the species generally nests in holes in the rocks or amongst bushes or peat-hags near running water, but sometimes the female goes a considerable distance from the loch or stream in order to find a suitable hiding-place for the nest. In a letter to me Mr. Heatley Noble says: "I have seen a nest in a hole in an old Mountain Ash which was used by Goosanders for many years; two others in rocks near a burn, one in a hole in a rock a long way from water, and two others in peat-hags near a little stream. Goosanders seem to prefer the nest near running water rather than by a loch."

In North-Eastern Germany it would appear that the Goosander usually nests in trees, of which Dr. E. Hartert in the *Neuer Naumann* (x. p. 296) gives the following account:

"As has been already remarked, the Goosander is a bird which breeds fairly frequently in the well-wooded country near inland lakes, and in the tracts of country near rivers in the north-eastern part of Germany, especially in Prussia, Pomerania, Mecklenburg, Schleswig-Holstein, and the Mark Brandenburg. From the latter place we have to thank H. Hocke especially for his interesting information about the breeding and manner of life of the species. The people—*i.e.* the fishermen, herdsmen, and woodmen—know the bird almost everywhere under the name of Baumgans or tree-goose, Baumente or tree-duck, but never as Sawyer (Säger).

"Wherever the Goosander can, it breeds in holes of trees. In Prussia, the Mark, and Mecklenburg it might almost be said that the nests are never found anywhere except in the hollows of trees. I once found a sitting under the roots of a pine thrown down by a storm in a hollow of the level ground about the length of one's arm, but with this exception invariably at a height of about 1 to 15 metres above the ground. Hocke's remarks agree with this too (*Deutsche Jägerzeitung*, 1889; *Gefiederte Welt*, 1899; *Zeitschr. f. Oologie*), Wustnei and Clodius (*Vögel Mecklenburgs*, p. 305), Szielasko and other fellow-workers of the *Zeitschrift für Oologie*, and others in addition. The Merganser, however, places its nest differently in places where there are no suitable hollows in the trees. In Iceland, for instance, where there are no trees, it always breeds on the level ground, almost in the same way as has been described in the case of the Red-breasted Merganser, but still generally less in the open and more hidden. In Scotland it prefers holes in the trees, but where there is a scarcity of trees it nests too between overgrown entangled roots, under overhanging banks, among large blocks of rock, &c., but never quite open from above, as is sometimes the case with the Red-breasted Merganser. If a Saw-bill's nest is found in the cavity of a tree, high up, one can be sure that it is the property of a Goosander, but nests standing on the ground may belong to this species just as well as to the Red-breasted Merganser.[1]

"It is often in very deep hollow tree-trunks that the Goosander breeds, and it is then often very difficult to get to the eggs without help, if one cannot cut through it from below, as may easily be done occasionally in the case of old rotten trunks. I have found full sittings in East Prussia at the end of April and the beginning of May, also later, but Hocke and others have got them much earlier in the Mark Brandenburg. In the *Zeitschrift für Oologie*, 1898, Nr. 6, pp. 21, 22, is to be found the following information: '*April* 1.—Owing to storm and rain I am obliged to seek shelter under a hollow oak on the Havel River. I am startled by a sudden noise, and notice that a Goosander flies out of the oak. My

[1] The nest itself might easily be confused, but the down and the eggs of the two species are quite distinct.—J. G. M.

subsequent search discloses seven eggs of this bird, which only seldom occurs here. On April 12 I happened to be on a tour on the Schwieloch Lake. A fisherman, steering his boat to the shore, goes up to an oak standing near and watches it carefully, and this strikes me as very strange. My question as to why he watched the tree so carefully is answered by his saying that it contains the nest of a "tree-duck," and that he would climb up to it. I thought it more advisable to get there first, and to search for the nest myself, and threw a long line over a branch of the tree, and had myself pulled up by my companion. The nest contains only twelve absolutely fresh eggs, which I let down, and which my companion packed in my case, a proceeding which the fisherman watched speechless with amazement' (W. R., *Osthavelland*). 'On March 29 a woodcutter, who was repairing a park-paling early one morning, told me that a Goosander had flown into a hollow oak and had not reappeared. As the season of the year still seemed to me very early, I had the tree climbed for the first time in the Easter holidays (April 10), and to my surprise there were found there thirteen eggs in an advanced stage of incubation, so there was not the smallest doubt that the sitting was already complete as early as March 29, though this had never occurred here before earlier than April 10. I now went to another old oak in which a *Merganser*-nest was found every year, but here too there were eleven eggs already much incubated, and of these it could with certainty be assumed that they had all been laid in March' (R., *Angermünde*).

"The Goosander breeds regularly in Silesia only in a few places, and is supposed to be nowhere very frequent (*J. f. O.*, 1891, p. 199).

"Wustnei and Clodius (*Vögel Mecklenburgs*, p. 305) say: 'The bird begins early with the breeding business. We generally found eggs at the middle and end of April, and fledged young as early as June 24 and July 3.'"

In Finland, Scandinavia, Lapland, and Iceland the Goosander breeds later, and full clutches are not laid till the middle of May. In Finland Palmen gives the date from the middle of May to the middle of June. In Scandinavia and Lapland it is said to prefer to nest in boxes hung out for the purpose by the peasants. These have one entrance, and it is said that by a systematic taking of the eggs the female may be induced to lay a very large number.

Naumann (*Vögel Mitteleuropas*, x. p. 297) writes as follows on the subject:

"This species goes preferably and more than other birds of the duck family into the boxes prepared for them to nest in, made of a piece of a hollowed-out branch of a tree hung up at some height on trees standing near the water, in order that they may breed there. These boxes are in general use amongst the Karels, who live on the Finland side of the upper Gulf of Bothnia, and in addition to the opening for the entrance and egress of the bird, these have also a larger aperture for getting out the eggs, which is usually closed with a trap-door, and is only opened when the nest is searched."

Whilst the usual nesting sites are hollows in trees or rocks, or holes in banks, or cavities in the peat, generally hidden by some vegetation, the female Goosander is said, but on somewhat dubious authority, to nest occasionally on the tops of willow stumps, and even in the deserted nests of birds of prey and crows. The nest rather resembles that of the Common Wild Duck, being composed of twigs, dried grass, and vegetation, leaves, &c., all woven together and lined with down during the time the bird is sitting.

The female Goosander usually lays from seven to twelve creamy-white eggs, considerably larger than those of the Red-breasted Merganser, but if first clutches are removed, leaving an egg or two in the nest, she will lay as many as thirty to forty eggs.

Incubation is performed by the female alone, and about the time of hatching she will sit very close, and if disturbed will leave with great reluctance. I disturbed a female Goosander off her nest in a hole in the lava in Iceland, and she went flapping around over the tundra with raised crest and repeated cries of "Karr-karr." She did not actually make

GOOSANDER.

1. Immature Female. August. Age, 1½ months.
2. Immature Female. September 1st. Age, 2 months.
3. Immature Female. September. Age, 2½ months.
4. Adult Female. February.
5. Immature Male. September. Age, 2½ months.
6. Adult Male; coming out of eclipse. November.
7. Immature Male. March. Age, 8 months.
8. Adult Male; full eclipse. October 1st.
9. Immature Male; semi-eclipse. May. Age, 10 months.

for the water, which was at some distance, for some time, but I saw her return to the nest as soon as I walked away from it.

Naumann thinks that it is very difficult for the young Goosanders to climb out of the deep cavities in which they are hatched, and states that if they have been hatched in a high tree far from the water, the mother carries them there one by one. E. Hartert commenting on this, practically agrees with the above-named naturalist, but admits that the young ducks often descend to the ground by jumping. He says that he has seen young ducks "carried in the beak in E. Prussia." In support of the idea that the female Goosander will transport her young to the water, he quotes Oswin Lee (*Among British Birds in their Nesting Haunts*), who states that he saw a female Goosander carry down nine young ones out of the nest, and that she "carried them partly in her beak, partly between the beak and the breast."

I think that young Goosanders, which are almost as active as mice, are capable of climbing out of any hole where the sides are rough, and then jump to the ground and accompany the mother to the water, just as young Golden-Eyes, Mallard, &c., do when hatched in similar situations. I have never seen any duck hold a duckling in the bill unless the latter was sick or injured, and then she generally killed it by throwing it on the ground or water, and rapping it on the head with her beak. I have seen female wild ducks do this several times. In the social system of ducks the motto is, "Cruel only to be kind."

Young Goosanders are extremely active, and can run over the surface of the water with greater activity than most young ducks, and they soon learn to dive with the mother, who is most assiduous in her care. The female Goosander will willingly sacrifice her life for her young, and often comes between a boat and her brood, as if to cover their retreat. When the young are threatened she rushes to and fro on the surface of the water, raising her crest, and uttering both a hissing as well as her harsh cry. She stays with her brood until they can fly, and always takes the lead in all their movements and education, finally leading them to the great lakes, and eventually on migration.

When rushing down the swift rivers of Newfoundland in my canoe, I have often wondered at the resource or natural instinct of the broods of Goosander and their mothers which remain perfectly still when suddenly confronted with danger. As the little boat flies down a rapid, swiftly passing silent pools in the rock eddies at the sides, I have often turned my head and noticed a female Goosander and her nearly full-grown young. On a lake or open stretch of the river, knowing that concealment was impossible, the mother would have dashed out in the open, and either hurried by flapping along the surface to the middle of the lake, or in the case of the river down-stream, and so endeavour to escape. When suddenly confronted within a few yards in the eddies of the rapids, she felt that such a method of escape was useless, and with swift intuition remained perfectly still, each member of the brood keeping the neck held stiffly, so that the whole party looked like the stiff twigs of an upturned tree. This sudden assimilation to surroundings, so wonderfully exhibited in the Common or Little Bittern amid the rushes, seems to be a natural instinct in all birds, and they often adopt it as a last resort.

Their judgment, too, as to whether they are noticed or not is always without error. The slightest hostile movement on the part of the man in the canoe is always recognised, and then a *sauve qui peut* follows. Something in the colour of that upturned tree catches

your eye, and you see that it is not a tree at all, but a bunch of long necks and snake-like heads. The exigencies of the pot are predominant, for Caribou may be still far distant, and Indians must have "meat" of some sort, so you pick up your gun, but never so quickly that the Goosanders have failed to detect the movement, and are already dashing down-stream past the boat.

The males leave the females as soon as they commence to sit, and keep in small parties together until the late autumn. Whilst passing up the Stickine River, Alaska, in August 1908, our steamer disturbed five old male Goosanders in eclipse plumage, and these kept flying in front of us the whole day, without permitting an approach nearer than 400 or 500 yards. Females and young often swam down-stream near the steamer, but the shy males gave us a very wide berth. If specimens are required, Goosanders are easily shot by marking the part of a river where the birds are in the habit of feeding, and by the sportsman taking up a position hidden in some "narrow" a quarter of a mile or so above. A man should then be sent a mile or two down-stream, and told to walk towards the concealed gunner. Goosanders are more easily driven up-stream than down-stream, and always keep lower in their flight under such circumstances. It is, however, very necessary that the shooter should possess a good water-dog or a canoe to recover the birds that are killed, as they always fall in the river and are rapidly carried away.

Even if a Goosander sees a gunner commanding a "neck" up-stream, it is seldom it will flinch, but will come straight on. On the other hand, I have often seen Goosanders flying down-stream in a party notice a single man or a boat, and make a sudden swing in the air and retreat up-stream again. They are far more cautious and wary than the Red-breasted Merganser, and are very difficult to stalk on estuaries or large lakes, owing to their watchfulness and keen eyesight. They are also far more difficult to kill, and to ensure death the charge has to be placed well forward in the head and neck. Goosanders are captured in continental waters by the means usually employed in trapping Golden-Eyes, &c., which has already been described. They are also captured at times by means of fish-hooks baited with living fish.

I have always found that young Mergansers, in spite of their fish diet, are quite eatable, and even palatable, before they go to the sea or become adult. After six months of age they seem to me to be quite uneatable. Except after the breeding season adults are always very fat, and this fat has a rancid and pungent flavour. The eggs are quite good eating. The down of this species is only second to that of the Eiders, and in northern lands it is collected, whilst adult birds are shot in the spring, and their skins, freed from the feathers, are much valued as articles of clothing.

It cannot be denied that Goosanders are most injurious to the breeding of fish in Highland rivers and streams, for the amount of young trout and salmon destroyed by them in a single season is enormous. Yet proprietors of Highland birds, beasts, and fish, whilst waging inveterate war on such harmless creatures as kestrels and owls, pay but little attention to the Goosanders decimating the young fish in the streams, and even hatcheries, as they do. Perhaps it is fortunate that they do not observe these birds too closely, for outdoor life in the northern rivers would be less interesting if it were robbed of the presence of this bird, one of its most beautiful creations.

The parasitic insects *Docophurus icterodes*, *D. bipunctatus*, *Lipeurus temporalis*, and others are found in the feathers of these birds, and the usual formidable list of worms in the intestines and œsophagus, such as *Strongylus papillosus*, and in the entrails *Tænia gracilis*, *Tænia tenuirostris*, *Tænia multistriata*, *Ascaris spiculigera*, *Ascaris mergi*, *Hystrichis coronatus*, *Hystrichis tubifex*, *Spiroptera crassicauda*, *Acanthophorus tenuis*, *Trichosoma brevicolle*, *Echinorhynchus hystrix*, *Echinorhynchus polymorphus*, *Distomum globulus*, *Monostomum attenuatum*, *Holostomum gracile*, *Ligula digramma*, *Ligula monogramma*, *Schistocephalus dimorphus*, *Botriocephalus distremus*, *Hemistomum pileatum*, and *Tropidocerca tenuis*.

RED-BREASTED MERGANSER

Mergus serrator, Linnæus

Mergus serrator, Linn., Syst. Nat., Ed. x., i. p. 129 (1758).
Merganser cristatus, Briss. Orn., vi. p. 237, pl. xxiii. (1760).
Mergus albellus, Scop. Ann. I. Hist. Nat., No. 89 (1769).
Mergus serratus, Gm., Syst. Nat., i. p. 546 (1788).
Mergus niger, Gm., *et supra* (1788).
Mergus leucomelas, Gm., *et supra* (1788).
Merganser cristatus, Leach, Syst. Cat. Mam. and B., Brit. Mus., p. 36 (1816).
Merganser serrata, Steph., in Shaw's Gen. Zool., xii. p. 165 (1817).
Merganser serrator (L.), Bp. Compt., List, p. 59 (1838).

Local Names.—Red-breasted Merganser, Saw-bill, Sawyer, Shelduck, Spear-wigeon (*English*); Sheldrake, Salt-water Sheldrake, Pied Sheldrake, Fishing-duck, Hairy-crown, Shelduck, Whistler, Garbill (*N. America*); Y Trochydd Brongoch (Red-breasted Plunger), Trochydd Danheddog (Toothed Diver), Hwyaden Ddanheddog Fronrudd (Red-breasted Toothed Duck) (*Welsh*); Siolta, Sioltain (Sand-eel Diver) (*Gaelic*); Topandt (*Faroese*); Pikkukoskelo, Tukkakoskelo, Karikoskelo, Jouhikoskelo Ajava (*Finnish*); Litla Topönd, Hrafnsönd (*Icelandic*); Vuokta-Koalsi (*Lappish*); Mindre Fiskand, Siland, Siden Fiskand, Strömand (*Norwegian*); Pracka, Smaskrake, Pracknisse, Stenskrake (male), Stenskräcka (female), Skräcka, Ard, Vipand, Bergand, Fiskand (*Swedish*); Ronac brokavac (*Croatian*); Morcak prostredni (*Czechish*); Toppet Skallesluger, Topskraekke, Bögeskräkke, Fiskand (*Danish*); Mittelste zaagbek, Pinduiker (*Dutch*); Harle huppé (*French*); der Mittlere Säger (*German*); Merganso (*Portuguese*); Mergo cristado, Serreta (*Spanish*); Smergo minore, Imperga, Segheta, Resegott (*Italian*); Tracro dlugodziob (*Polish*); Krahal alinnonosoy (*Russian*); Orvösbuko (*Hungarian*).

Egg.—Creamy-buff with a greenish-grey tinge, and sometimes of a dull stone-drab colour. They usually vary in number from 7 to 10, but clutches of 11, 12, 14 (J. A. Harvie Brown, *V. Fauna of Skye and N. W. Highlands*, p. 253), 15 (H. J. Pearson, *Three Summers in Russian Lapland*, p. 49), and 16 (C. Collier, *Ibis*, 104), have been recorded.

Average size of 109 eggs, 64.2×45.4 mm.; max., 68×46.5 and 64×47.5; min., 60.5 ×45.5 and 63×43.5 (F. C. R. Jourdain). Rey gives the average weight as 5.96 grammes, and Goebel estimates the average weight of 81 Russian specimens at 5.59 grammes.

In Scotland full clutches are usually found in last week of May and first ten days of June, usually in June.

Incubation period given by Hantzsch as four weeks.

Down.—The down of this species is light grey with a bluish tinge, the centres being almost white and the tips greyish-white. See also *Zoologist*, 1906, p. 374; 1907, pp. 108–9; *Brit. Birds*, ii. p. 40 (feathers figured on pl. ii. fig. 18, and in the *Brit. Bird Book*, vol. iv.).

Young in Down.—Crown and upper parts brown, becoming blackish-brown behind the wing and on the lower back and rump. Upper wing and end of the wing brown, outer edges white; a large white spot joins the thighs to the white under parts, and there is a white spot on each side of the rump. Cheeks and sides of the neck pale red-brown; under the eye, white; from the tip of the mandible to the eye and from the lower angle of the bill, a blackish-brown line extends to the sides of cheeks. There is a white buff line from round

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RED-BREASTED MERGANSER
adult male and female

the eye to the centre of the upper mandible. Chin white; bill slatey red-brown; nail bright bone-yellow; legs and feet yellowish and inclined to dusky slate in the webs and at the joints.

Length at two days old, 6 inches.

The young in down of the Red-breasted Merganser closely resembles the young Goosander, but is smaller and slightly richer in colour. The bill is not so stout.

Immature Male.—In first plumage the young plumage resembles the adult female, but the crest is less, the bill much shorter, and the plumage of the upper parts more slatey and not nearly so brown, and the cheeks more red with less white. The ends of the tail are also worn. By the end of October young males are easily recognised by their superior size and bill. It is not until December that much change takes place. The red-brown crest is then abundant, and black feathers begin to appear on the sides of the crown and cheeks, chin, mantle, and scapulars. The tail and rump also begin to moult to blue-grey, and many vermiculated feathers mixed with slatey-brown ones come in on the thighs and flanks. By the end of March some white feathers appear on the scapulars and the first white broadly black-edged feathers come in on the sides of the breast overlapping the wings. These prominent feathers are, however, never complete as in the case of the adult males, but are always divided in colour, the lower halves being red and vermiculated with black from the broad black edge to the white above. The nape is now very dark brown edged with worn blue-grey, and not a clear rich red-brown as in the female. The long inner secondaries, similar to adult males, now also appear.

From this date the plumage undergoes no further advance toward spring plumage, except that the tail is completely renewed. The young male during May and June moults all signs of the brilliant spring plumage, and passes into an eclipse similar to the adult male. It can, however, always be identified by the *immature* wing, which is brown and slate on all its upper parts, instead of being black with a large white area in the centre, as in the adult male. During August, September, and October the general moult towards complete winter plumage is in progress, and the young male does not come into full dress until the end of November. It may then be considered adult at seventeen months. I have seen a few young males with traces of the eclipse remaining as late as the middle of December, but this is, I think, unusual.

Adult Male.—Head and upper neck black, glossed with purple and bottle green. The occipital feathers are much elongated and form a double crest which is held apart in life; lower part of the neck white, with a very narrow line of black feathers joining the back of the head to the black mantle; back and inner scapulars glossy black, with a purplish tinge; lower back white, vermiculated with blackish-brown and having a few brownish-grey feathers in the upper back. Tail brown, suffused with ash-grey; outer scapulars white; lower neck and upper chest red, marbled and edged with black; along the sides of the chest are a double row of broad feathers, white in the middle and broadly edged with black. These overlap the wing and are a striking feature in life. Flanks and thighs white, boldly vermiculated with black; primaries, dark brown; secondaries, white edged with black on the inner half; outer secondaries and lesser secondaries white and broadly marked on the upper part with black; upper part of the wing white and surrounded by dark brown; under parts creamy-white and in life tinged with reddish-buff.

Bill and legs, red vermilion; irides, deep red; length, 25 to 26 inches; wing, 11 inches; tarsus, 1.9 inch.

There is no species of duck which commences to assume its eclipse plumage so early in the year as the Red-breasted Merganser. In 1883 I killed four adult males on Loch Fyne on March 22, and three of these were already in full moult on the neck, the white collar having almost disappeared. After the month of March the moult in the full eclipse proceeds very slowly, for a specimen I killed on July 6, 1889, on Loch Stennes, Orkneys, still retains about a half of its spring plumage, with numerous black feathers in the head and neck and the greater part of the mantle, scapulars, and flanks still unmoulted. It is not, in fact, until August that the adult male may be said to be in full eclipse.

I possess a perfect specimen which I killed in Balranald Bay, N. Uist, on August 20, 1898. I saw the bird some two or three hundred yards away fishing and thought it was an adult female, but on its rising to flap its wings I was then certain that it was an adult male in full eclipse. Having no shot-gun, but only my old Mannlicher rifle in hand, for I was waiting for seals at the time, I did not think there was much chance of being able to kill the bird, as it was diving and swimming fast, but seeing that it was the only chance I took a long shot at 200 yards and was lucky enough to hit the bird with the bullet in the centre of the body, and without in any way injuring the specimen. The description of the bird is as follows:

Head, neck, and upper breast almost exactly similar to adult female, but with only a very short area of white on the chin; mantle and scapulars blackish-brown, edged with grey; wings which have just been renewed as in winter; rump and lower back a mixture, brownish ash-grey feathers like the female, and white vermiculated with black (as in spring); flanks and sides of the chest brownish-grey like the female.[1] There are a few slate and brown vermiculated feathers at the sides of the vent. Under parts white, and soft parts as in spring, only not so bright.

Early in September the moult of those parts which will change again commences, and it is not completed until the end of November, when the male has again assumed full winter dress.

Immature Female.—In first plumage the young female is similar to the adult female, except for the less abundant crest and small area of black round the eye. Tail feathers are worn and wing markings less distinct. The scapular and mantle feathers, too, which remain unchanged until March, are like nearly all immature female ducks pale and worn on their outer edges and generally grey or sandy and unlike the clean rich feathers of adults.

By April it is difficult to distinguish between immature and adult females, except that the young never possess the large area of black round the eye nor the black feathers at the sides of the chin, and only the throat. The wings are as usual the main character in distinguishing age. I do not think these young birds breed nor are they adult until the following November.

Adult Female.—Head and neck reddish-brown and darker on the crown, in some cases being almost black on the front of the crown. Chin and throat white and marked

[1] There are only one or two vermiculated feathers on the flanks, and these are mottled with slate and quite different from the black vermiculated feathers of the spring plumage.

with black, especially about the angle of the lower mandible, this feature varying in individuals. There is also a broad patch of black feathers round the eyes. Occipital feathers elongated and forming a double crest, the lower section being the longest; lower neck and upper chest pale reddish-brown, with lighter edges; mantle, scapulars, back, rump, and tail warm brown, with lighter edges, and with the back more ash coloured; flanks brownish-grey, some of the long feathers being mixed with white; primaries and inner long secondaries blackish-brown; middle secondaries white and black at the base; larger coverts white, tipped with black; smaller wing-crests brownish-grey; under parts white; soft parts as in the male, only duller. Length, 19 to 20 inches; wing, 8.5 inches; tarsus, 1.8 inch.

The Red-breasted Merganser has a very extensive range, being found throughout Europe, Asia, and N. America.

Breeding Range.

British Isles: Scotland.—It breeds in small numbers round the whole coast-line north of Forfarshire and Argyllshire, and in numbers on lochs and fresh-water streams in suitable places, being most numerous in Ross, Inverness, Caithness, and Sutherland. It is also a common breeding species in summer in the Inner and Outer Hebrides, and in the Orkneys. In the Shetlands a few breed.

It is probable that it has now extended its southward range even into Ayrshire (cf. *A. S. N. H.*, 1896, p. 255). There is some evidence that it has bred as far south as Bute, in the Firth of Clyde (J. Paterson, *A. S. N. H.*, 1896, p. 255). More recently, Mr. J. Paterson states that it is now common in Dumbarton, Bute, and that part of Argyll which lies in the Clyde area.

Ireland.—Common resident, except in S. and S.E., breeding on larger lakes and also on marine inlets (Ussher, *B. of Ireland*, p. 218; and *List of Irish Birds*, p. 36). Southern limit runs from Kerry on W., through Tipperary, Westmeath, Meath, to Co. Down on E. side.

Europe: Faroes.—Breeds sparingly (H. W. Feilden, *Zool.*, 72, p. 3256).

Iceland.—Breeds commonly (B. Hantzsch, *B. z. K. Vogelwets Islands*, p. 169, &c.). Common and resident (Slater, *Manual*, p. 76). I saw several old birds with young at Myvatn and Fiskevätn, and it also breeds in the south of the island.

Norway.—In South Norway, chiefly on higher ground in the interior; but in North Norway right down to the coast (Westerlund, *Scandinavisk. Fortpl. hist.*, p. 187).

Sweden and Finland.—Generally distributed (Westerlund, *loc. cit.*).

Russia.—From Lapland south to lat. 50° on the Volga (not on Kolguev), in the Ufa Government, and it is said in the mountains of the Caucasus; but not in the Moscow, Tula, or Orenburg governments (S. A. Buturlin quoted by H. E. Dresser, *Eggs of B. of Europe*).

The *Baltic Provinces* (Russow), and common in Livonia (Loudon).

In *Germany* breeds in the northern provinces, from Holstein in the west, Mecklenburg, Rügen, Pommern, West and East Prussia.

Also commonly in *Denmark* in suitable localities (Winge and Olsen).

America: Greenland.—Breeds locally along the W. coast; also at one or two localities

on the E. coast (H. Winge, *Grönlands Fugle*, p. 113), Davis Straits (W.), and Labrador coast (H. Winge). *Cf.* also *J. f. O.*, 1908, p. 233. It also breeds on the N.E. coast of Greenland (Manniche, p. 106). Breeds across the whole of the wooded region from Newfoundland and Labrador to the Aleutian Isles; breeds in British Columbia, but not very commonly (Macoun, *Cat. Canadian Birds*, 2nd ed., p. 75). Breeds in Alaska (Dall, Nelson, &c.); also in Alberta (Dippie) and Manitoba (Raine). Breeds on Kuriles (Seebohm and Stejneger). Southern breeding limit in N. America about lat. 45°. Breeding in N.W. Canada (Keewatin, &c.); *cf.* Macfarlane in *P.U.S.N. Mus.*; Aleutian Isles (E. W. Nelson, p. 66; Dall, p. 7). I have seen it in summer throughout Arctic Canada from Newfoundland to Alaska.

Asia.—Across Siberia to the Pacific: R. Yenisei (Seebohm, June 10), &c., scarce (Popham, *Ibis*, pp. 97, 101, &c.).

Migration Range.

In the autumn and winter the majority of the Scottish Red-breasted Mergansers do not leave the north, but move in large numbers to the nearest salt-water estuaries, having a distinct preference for brackish waters. In the Orkneys, Shetlands,[1] and the Outer and Inner Hebrides they stay all the year round, keeping to the coast-line and moving into fresh and brackish waters at certain hours of the day. On the western side of Scotland they frequent sheltered bays and sea lochs from Sutherland to Bute, and are abundant locally; whilst on the eastern coasts of Scotland they are principally found in the estuaries of the Little Ferry (Sutherland), the Dornoch Firth, the brackish coast lakes of Aberdeen, and the Tay and Eden estuaries. South of this they seem to be scarce. At intervals all along the east and south coasts of England they are occasional autumn and winter visitors, generally females and young birds; whilst to the Channel Isles they are regular winter visitors.

On the west coast of England it is a regular winter visitor, especially to Wales and Cumberland.

In Ireland it frequents all the large estuaries and lakes, sometimes in considerable numbers.

A few spend the winter in Iceland, especially in the south; but most birds leave for the south in October or November.

In continental Europe it ranges through the coasts, and to some extent also the rivers, of Europe south to the Mediterranean Region.

Spain.—Santander (Irby, *Ibis*, 1883); Valencia (Saunders, *Ibis*, 71, p. 397); Gibraltar (Irby, *Orn. Str. Gib.*, p. 231).

Sardinia.—Common (Brooke, *Ibis*, 73, p. 345).

Corsica.—A few records (Jourdain, *Ibis*, 1912, p. 82).

Italy.—On passage and winters; common Venetia and N. provinces; rarer S. (Arrigoni, *Manuale*, p. 769). Sicily: frequent (J. Whitaker, *B. of Tunisia*, ii. p. 223); irregular in appearance (Arrigoni, p. 769).

Malta.—Irregular (C. A. Wright, *Ibis*, 64, p. 156).

Herzegovina (Kadich, p. 98).

[1] Abundant in the Shetlands in winter, but I have seen few there in summer.

RED-BREASTED MERGANSER.

1. Immature Female. November. Age, 4½ months.
2. Adult Female. December.
3. Adult Female. December. Very old bird.
4. Immature Male. March 22nd. Age 8 months and 22 days.
5. Adult Male; passing into eclipse. July 6th.
6. Adult Male; full eclipse. September.
7. Adult Male. December.
8. Adult Male. March.

Corfu and Ionian Isles, Epirus, Albania (Lilford and Drummond Hay, *Ibis*, 1860, p. 354, &c.).

Greece (O. Reiser, *Ornis Balcanica*, iii. p. 506).

Turkey (Elwes and Buckley, *Ibis*, 1870, p. 341).

Dobrudscha.—On passage (Dombrowski).

Russia.—Black Sea (von Nordman, &c.). Astrakhan, rare (Henke, *Ibis*, 82, p. 230).

Caspian Sea.—Fairly common.

Africa: Morocco (Irby, *Orn. Str. Geb.*, p. 231).

Madeira (Schmitz, *Orn. Jahrb.*, 108, p. 44).

Azores (O. Grant and Hartert, *Nov. Zool.*, xii. p. 110).

Algeria (Buvry, *J. f. O.*, 1857, p. 130; Loche, *Cat. M. & O.*, p. 146; Koenig, *J. f. O.*, 1893, p. 104).

Tunisia.—Not uncommon (Whitaker, *B. of Tunisia*, ii. 233; Koenig, *J. f. O.*, 1888, p. 296). Not recorded with certainty for Egypt; one in Leiden Museum said to have been obtained there by Clot Bey.

N. America.—Winters in south Greenland and the Commander Isles. On the east coast it is found from Maine to Florida, and it also visits Bermuda. On the western side its winter habitat ranges from Alaska to Lower California, and it has been taken in Cuba and Hawaii (*A. O. U. Check List*).

Asia.—Winters in Persia, Japan, S. China, and Northern India; but only occurs in India as the "most rare of stragglers" (Stuart Baker, *Indian Ducks*, p. 282).

Asia Minor.—Scarce (*J. f. O.*, 1908, p. 621).

Palestine.—Very common (Tristram, *Ibis*, 68, p. 328; *Fauna and Fl. Palestine*, &c.).

Sinai Peninsula.—C. W. Wyatt (*Ibis*, 1870, p. 17).

Jask, Persian Gulf (Sharpe, *Ibis*, 1891, p. 116).

Persian Baluchistan (*cf.* Stuart Baker, *Indian Ducks*, p. 282).

India.—About three records (Kurachi, Quetta, and Calcutta), E. C. St. Baker, *tom. cit.*

China.—Abundant; Foochow and Swatow (La Touche, *Ibis*, 92, p. 493); Tokien (*J. f. O.*, 1910, p. 480); throughout China (Swinhoe, *P.Z.S.*, 1871, p. 416).

Formosa (Grant and La Touche, *Ibis*, 1907, p. 261).

Japan (Seebohm, *B. Jap. Empire*, p. 258, &c.).

Habits.—Wherever the traveller goes in the northern regions of the world in summer he will find this common bird, and in winter it is to be found on all the coasts and the large brackish or fresh waters adjoining them.

To temperate climates the Red-breasted Merganser may be considered for the most part as a migratory species; whilst its visits to southern latitudes are more often dictated by conditions of weather. As long as frost and ice will permit, however, it remains in northern latitudes actually on or close to its summer home; and even if forced to undergo a temporary migration, it returns to its favourite haunts at the earliest opportunity. The majority wander southwards at the advent of the first cold period, and vast numbers move from the barrens and tundras of Arctic Canada, Europe, and Asia, to the fringe of the cold, and remain there until the following spring. About the middle of October they gather in large flocks and commence their southern movement gradually, the female and the young going first. Like many other species the immatures work farther to the south than

adults, old males being rare on the English and German coasts in winter. In our northern islands, such as the Orkneys, the Shetlands, and the Hebrides, the old birds for the most part do not migrate at all, but stay all the winter there; and I have only on rare occasions seen immatures in winter or spring about these islands. The same applies to the east and west coast of Scotland, where as a rule only adults are found on the sea and brackish waters in winter. In England the majority are immatures at this season. Whilst in Ireland both adults and large mixed flocks are found throughout the late autumn and winter.

It is unusual to see very large flocks of these birds in our islands, though I have observed parties of fifty to a hundred birds in October on Loch Stenness. These were the united families of all the locally bred young birds, which had come together and were about to leave for the south; and I have more than once observed the gradual "packing" of immatures led by one or more adult females prior to migration.

Enormous flights of Mergansers move south in early November in Canada, and sometimes flocks numbering several hundreds are seen on the coasts of Norway. It is interesting to note that large flocks also assemble in Ireland, concerning which the late Major H. Trevelyan contributed two interesting notes to the *Field* (September 3, 1910, and October 21, 1911). He says:

"On a large inland lake in Ireland I saw on August 22 a pack of about fifty young Red-breasted Mergansers; they were unable to fly, but were wild, not allowing me to get within 100 yards of them; they flapped off at a great pace, and appeared to break up into parties. The day was a quiet one, but not sufficiently so to enable me to ascertain whether there was more than one adult bird with them. Returning, however, over the same water within the hour, I saw two small parties of young birds, neither of which was accompanied by an old bird. About a mile more or less from where these fifty flappers were I saw another pack of them, in number about a hundred. They also were wild, and gave me little opportunity for observation. My man, who has been with me on the lough for the last seventeen seasons, has frequently told me of this packing in August, and that one adult female takes charge, but that it is not till September that it becomes general, *i.e.* till some time in that month single broods may be seen. He believes he has seen 200 young ones in a pack with one adult female as leader. Another local man tells me that in September some years ago, when Mergansers nested far more numerously on the lough than they do at the present time, he believes he has seen as many as 500 to 1000 young ones in a pack, and, as far as he could make out, there was never more than one old bird with them. He saw a good deal of them, as someone interested in fishing employed him with others to drive as many as possible of a pack towards a net stretched across an opening between the mainland and an island, when they would be successful in catching some and shooting others; but the majority, of course, escaped. . . . I saw on August 15, 1911, on the same lake in Fermanagh, a small flock of young Mergansers, about twenty-two in number. The day was very hot and still, and as at one time they were not more than 100 yards from me, there was no difficulty in ascertaining that there was only one old bird with them. When scuttling off they maintained, as is their habit, a more upright position on the water than do the young of the Tufted Duck under similar circumstances. About forty minutes later and two miles away, I saw another pack of not less than forty in number. Again there was with them only one old bird. I watched them from my boat with my Zeiss binoculars for perhaps a quarter of an hour, at distances varying from 200 to 400 yards. The one old duck was evidently in charge, for the young ones conformed to her movements. I saw no more packs up to my departure from the lake on September 1. My boatman has written me that up to September 26 he had seen packs of about one hundred, sixty, fifty, and twenty-five, and he was able to ascertain that with the two smaller flocks there was only one old bird with each. Writing on October 2, he had seen on the previous day a pack of about 300; but as they were able to fly and apparently equal in size, he was unable to say whether they were young or old birds; and on October 11 he wrote that the few Mergansers he had seen were then able to fly well, and that in his opinion the majority of them had left the lake."

On the whole the Red-breasted Merganser may be described as a summer visitor to the Arctic and colder regions, only staying in a few places where open water is found all the winter, indigenous to Newfoundland, Scotland, and the Southern and Central Norwegian and Swedish coasts, &c., and in winter a migrant to England, Central and Southern Europe, Asia, and the east and west coasts of America south of the St. Lawrence and South Alaska. Whilst on migration mergansers fly very high in the air in the usual wedge-shaped formation and are generally led by an old female.

The Red-breasted Merganser usually lives upon the sea for the greater part of the year, but even in winter it seems to have an affection for fresh and brackish waters, and if there are large lakes near at hand they spend many hours of the day and night there.

On the sea they seem to prefer to keep near the shore about a point of land, inlets, bays, islands, or tideways, and have an especial affection for tidal estuaries, up which they regularly pass at certain hours of the tide to feed in the shallow channels left at low water. A very favourite haunt of the Red-breasted Merganser in Scotland is the estuary of the Little Ferry in Sutherland. Here I have watched large numbers of these birds coming in from the sea at half-ebb to fish, rest, and wash in the brackish waters of this sheltered and quiet bay. Whether the weather was rough or still they always kept in little parties of three to ten, and after passing the narrow neck at the mouth flew from a few hundred yards to half a mile before settling in the main stream. Then as the tide ebbed they commenced to feed and explored the edges of the numerous sandbanks and mussel banks in search of sand-eels and other small fish, returning again to the sea when the channels became too deep.

A certain number of Red-breasted Mergansers, generally single birds, wander far into the heart of Scotland and Ireland in the winter and frequent the lakes and remain there unless frost drives them out; and even on the coast in mid-winter very severe conditions will cause packing and a temporary migration. In the severe winter of 1878–1879 Sir R. Payne-Gallwey saw several hundreds swimming together in Queenstown Harbour (co. Cork), but I have never seen large flocks in winter in Scotland even in the hardest weather, the packing only being noticeable in autumn. They are not afraid of the high seas, for I have seen them resting in very rough places at times, but it is unusual to find them anywhere in the vicinity of breakers or very far from land. In summer they frequent quiet fresh-water lakes, streams with well-wooded banks, slow-moving rivers amongst the Arctic barrens and the sheltered coast-line. In fact, at this season they seem to choose almost any place where food is abundant and man seldom comes.

In flight, carriage of the body, gait, and movement, the Red-breasted Merganser closely resembles the Goosander, and at a distance the females may easily be confused. The female Red-breasted Merganser is, however, much smaller, and as birds of this species are generally seen in parties, the appearance of the males at once gives a clue to what the birds are. On the water Red-breasted Mergansers are very active and restless in pursuit of their prey, and when fishing seem to sink their bodies lower in the water than Goosanders. After diving altogether with a quick "duck" under the surface, they turn hither and thither with surprising rapidity, often chasing the fish into the shallows and snapping them as they turn to retreat. In the quickness of movements in the water they are only

equalled by the Smew. In very shallow water they often all work together and create such a commotion that the whole surface boils and the fish must become much confused and so fall an easy prey. On coming to the surface they adopt an easy swinging movement with the head and neck moving at each stroke of the feet, and stay only a few seconds on the surface before diving again. I have watched both Goosanders and Red-breasted Mergansers "cornering" small trout and par in water so shallow that they did not need to dive at all but kept darting here and there with only their necks and heads under water.

When fishing this species does not keep nearly such a sharp look-out as the Goosander, and it is often possible by careful stalking to get within a few yards of a feeding party by judicious advances. I have more than once got within ten yards of a flock of these birds and watched their movements in the water from behind some sheltering bush, and though they are sharp enough to detect any movement they are not nearly so suspicious as their larger cousins, who will often suddenly swim out from a shallow for no apparent reason, and remain intently on the *qui vive* for several minutes before returning to the business of fishing. All Mergansers swallow the fish as they capture them. They are adept at exploring the nooks and crannies amongst the rocks, and the hiding-places of fish under large and small stones, continually poking with their bills amid holes and dark places. If a fish is started they drive it before them, turning rapidly with all its movements, and as they hunt in companies, pass it backwards and forwards to one another until it is captured. If droves of small fry are encountered, they will hunt them into the shallows and devour them, until their enormous appetites are satisfied. They often adopt the half-circle in so doing, after the manner of certain species of Cormorant, but each follows its own prey.

If fish are not very plentiful, Red-breasted Mergansers dive together, and each takes a line of its own, so that the flock may rise to the surface widely separated. If this is the case they at once swim together again before proceeding to fresh operations. Fish are captured by oblique or horizontal movements on the part of the Mergansers, and they do not go to the bottom or stay for any time in one place as so many of the true diving ducks do.

Various kinds of fish are the principal food of the Red-breasted Merganser. In summer they take enormous numbers of small trout and salmon, an inch or two in length, and in fresh waters they also eat roach, dace, &c. An adult male killed on a backwater on the Tay was full of small pike, so that some degree of virtue, from the fisherman's point of view, may be attributed to this otherwise destructive bird. In fact, I think they will catch and eat almost any kind of small fish on fresh and salt waters. In the Orkneys I found they were very partial to sand-eels and small coal-fish. In the winter I have never seen them devour anything but fish, but in summer they undoubtedly eat crabs, cock-chafers, dragon-fly larvæ, caterpillars, earthworms, &c. They do not, however, eat any vegetable matter. I have heard sportsmen say that often their appetites are so voracious that some of their food must be disgorged before they were able to fly. On alighting at a new feeding ground the Red-breasted Merganser often dips his head and neck under water to look about for food before diving. Their flight is very swift, the wings being beaten with unusual rapidity. The neck and head is held in a straight horizontal line with the crest depressed. It is usually performed higher in the air than with the Goosander,

and the birds get under weigh and alight less clumsily than that species. Nevertheless they make a great fluttering and splashing as they rise from the surface of a still lake, and the species may be recognised at a great distance by their noisy and frequent excursions on the surface. In the spring especially the parties seem to be fond of continuous "splashing" races of short duration, so much so that it seems to be almost a part and expression of the sexual excitement. When flying a whistling sound is produced by the wings. The usual cry of both species is a harsh "Ker-r-r" or "Gor-r-r," uttered by both male and female, but more usually the latter as she rises or in moments of excitement.

I have heard the female also make use of another note resembling the quack of the Wild Duck, but not so loud, when calling her young.

Dresser (*Birds of Europe*, p. 697) says, with regard to Red-breasted Merganser, that "when pursued or threatened with any danger, it usually seeks safety by diving in preference to trusting to its power of flight." This is not my experience, for I have always found that this bird takes to wing immediately danger threatens, and does not dive. Even females with very small young fly round and round, frequently alighting, and uttering hoarse cries in their efforts to lead away the disturber.

As the spring advances Red-breasted Mergansers assemble in fairly large flocks prior to migrating to the breeding grounds. It is not uncommon to see packs of fifty or sixty adult birds together in the estuaries, but these flocks are never so large as those formed of immatures in the autumn. I have seen flocks of fifty or more at the mouth of the Liffey (co. Dublin), on Loch Fyne (Argyll), and in Sutherland and Orkney, and those in March were in a state of constant commotion owing to the ardent passions of the males, who had already commenced their courtship in early March. Even when they have arrived at the breeding grounds at the end of March or early in April, it is common to see two or three males accompanying and "showing" off before one female, at which date the eclipse dress has fully commenced, some of the necks of the males having already moulted the white collar. It is generally not until the end of April, when the males have half-changed the head and neck, that we see pairs of Red-breasted Mergansers going about together, and even at this late date a *tertium quid* may be observed in attendance. This is probably due to the fact that the fighting of the males is not of a very serious character. They rush at each other with open bill, and occasionally bite and hold, but their ardour in chasing the female is so great that they soon leave a rival, and so he remains to obtain his share in the lists of love. All four species of Merganser, although so closely allied, have a somewhat different courtship, that of the Red-breasted Merganser being by far the most remarkable. I have observed it many times, both in a wild state and in birds in confinement. The "bobs" and grimaces which the male makes before the female are very strange and even comic. The courtship is as follows: 1. The first advance of the male is to swim rapidly towards the female with the chin and head raised to an angle of 75°, the crest being depressed close to the neck. This gives a very snake-like appearance to the bird. 2. On reaching the female the head and neck are suddenly thrown out straight in front and then turned downward with a sudden bow. 3. A quick rise in the water and a dip. 4. On coming back to the normal position the double crest is fully spread, the head turned sideways, and the bill opened to its widest extent, showing the inside of a red mouth.

During the bow movement the male makes a low but quite distinct scraping sound, which can only be heard at a distance of a few paces. The view of several males all grimacing before one female at the same moment is a very curious one, and represents one of the most remarkable displays of courtship exhibited by any birds.

During the season of love flocks or parties of Red-breasted Mergansers are in a constant state of turmoil. Owing to the worrying she receives, each female seeks to escape by flight, when the males begin to pursue her, and so the little parties of love-makers keep fluttering and splashing from one place to another for hours together, so that we wonder if the female at any rate gets any amusement out of this state of affairs, except from the commotion she is creating.

At this season of the year Mergansers go ashore a good deal and spend hours in polishing up their feathers. They are very busy birds at all times, but in spring, when not fishing, flying, or love-making, they sit on the sandy points or on islands and attend to their toilet or sleep a little.

The nesting places are occasionally to be found in banks, heather, cliff ledges, rabbit-holes, or old cairns or ruins near the sea itself, but more often somewhere near fresh-water streams or lakes, in dense vegetation, hidden crevices, or in the rocks and peat. Often they are situated in deep holes and only rarely in the open. I put a female off her nest out of a deep hole in a lava bed in Iceland, which I think is the usual site in Iceland. It may almost be said to have been in association with other ducks, for only a few yards away were the nests of Scaup and Long-tailed Ducks.

Both in Iceland and Northern Europe the Red-breasted Merganser has been found to make use of the deserted huts of peasants, having entered through broken windows (H. J. Pearson). Mr. Heatley Noble informs me that he has generally found the nest in Scotland "in thick heather out of sight, but occasionally in the open. I have known as many as fifteen eggs in one nest." It is also often found in the grass under bushes. The nest is roughly and loosely woven together or merely heaped in a mass of dry grass, sedge, twigs, and foliage of different plants or shrubs.

The site of the nest is never very far away from the water and generally only a few paces. The female sits very close and is not easily put off her nest. Blasius states that the nest is sometimes placed in high trees, sometimes far from the water in the old nests of birds of prey and crows, also in boxes fastened to trees and made from a piece of hollow tree branch and provided with an entrance hole. In Scotland in late May (and farther north in June) the female lays from seven to twelve eggs and occasionally as many as fifteen or sixteen, which she sits on for four weeks. All the nesting habits seem to be very similar to other diving ducks, the males deserting the females as soon as they commence to sit.

The female Merganser is the very best of mothers, but they do not all behave with the astonishing bravery exhibited by some individuals of this species—sometimes a mother will fly a long distance from her small brood and keep nervously croaking and flying in small circles, hardly coming within gunshot of a boat. At other times I have pursued a family party on lake or river in my canoe, and have seen the mother bird brushing against the bow of the boat almost within touching distance of a paddle in her efforts to save her young.

As the young grow up and are still unable to fly they will "run" over the surface of the water at great speed when alarmed—so fast, in fact, that it is impossible to overtake them either in a boat or canoe.

I have not noticed any particular flocking on the part of the males once they have left the females and assumed the full eclipse dress. I have seen parties of adult males in July in Orkney, but much more often single birds, which are always very shy.

The adult males do not seem to join the females again until October, and then only attach themselves to flocks of adults that are resident.

Occasionally an old male may be seen with the packs that are about to migrate, but this is unusual, and they would doubtless leave them at the time of departure. The flocking of young birds and females prior to migration has already been described.

Mergansers are very rarely assailed by large birds of prey, owing to the fact that they always fly over the water where Peregrines and Iceland Falcons will only "stoop" for practice. Predatory Crows and Skuas, however, take their eggs and kill and eat the young. The same parasitic insects that affect the Goosander are also found on this species.

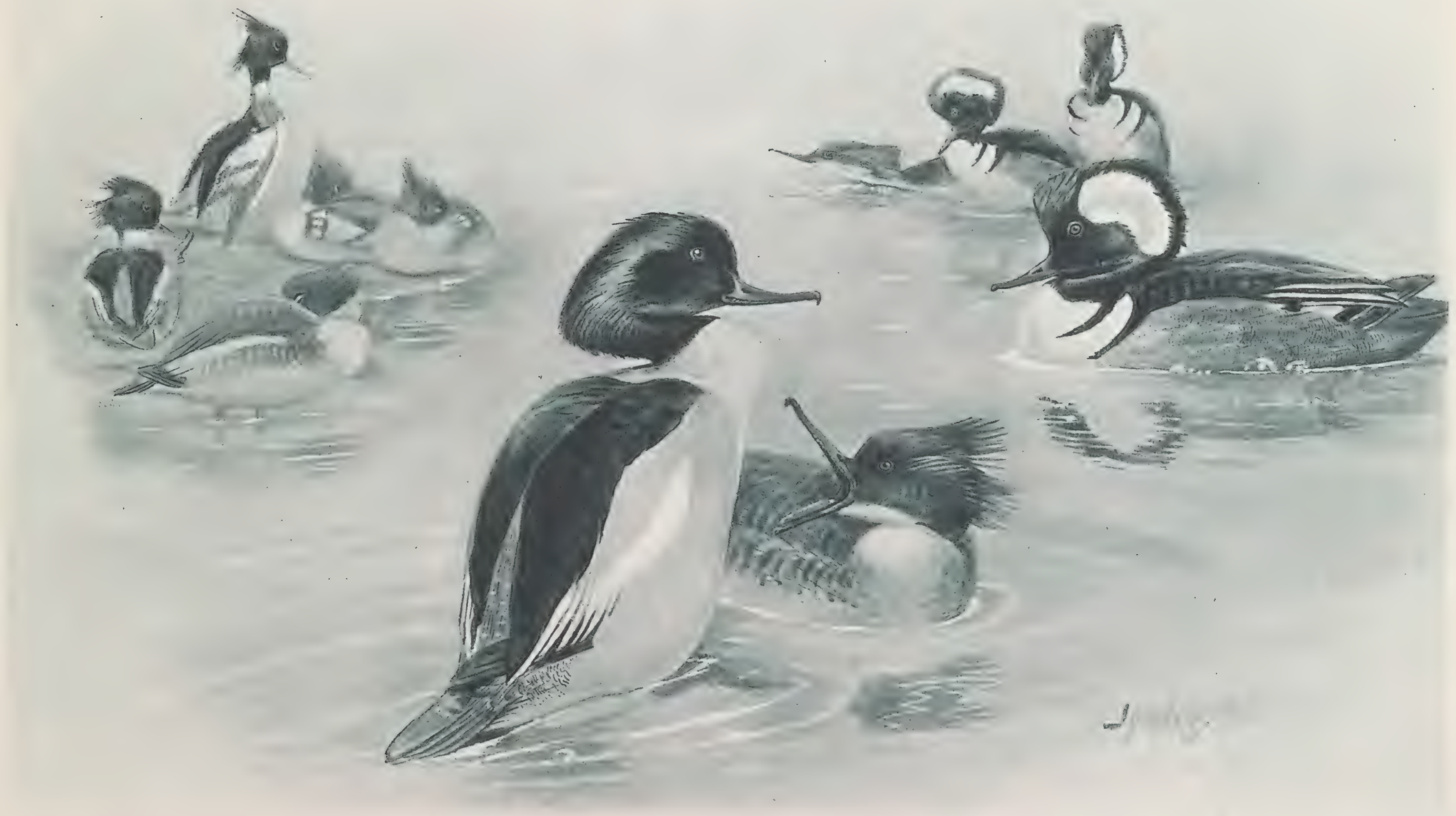
There is no doubt that, both on account of its habits and its numbers, the Red-breasted Merganser is one of the most destructive birds to fresh-water fish there is. The quantities of small trout and salmon consumed by them must be enormous. Yet it is somewhat of a fortunate circumstance that, in spite of the fact that they are seldom killed, they do not seem to increase in numbers in any one locality—in the case of our islands at least—and this may be accounted for by the fact that they do not frequent either rivers or lakes unless they are so full of trout and salmon that the waters can stand a certain amount of depredation. Moreover, it seems to be an accepted law amongst many species of birds that certain areas can only supply a certain quantity of food, and the old birds themselves regulate the numbers that are allowed within its confines. Twenty swans are seen on a lake before the spring fights settle who is to remain there, and one pair or perhaps two are left to partake of the food, &c., that is only sufficient for perhaps two families. A pair of Golden Eagles drive off their young year after year, as they know there is not sufficient hunting grounds for another pair in the same valley and its adjacent corries. So, too, nearly all the young Mergansers leave in autumn, only a very small percentage returning in spring to supply the losses, whilst the rest move about in packs until they are adult and eventually find fresh lakes and rivers which are not overcrowded. Thus the summer habitats of this and other species are frequented by the same number of birds year after year, and if the neighbouring waters are also well stocked with fish the range is extended without any very serious depletion of the fish-supply in any one locality.

On the open coasts Red-breasted Mergansers are very shy and wary, and in consequence difficult to stalk and shoot, nor do they often come within gun-shot of a sailing boat or punt. I have found that this species and the Goosander recognise the danger of a punt quicker than any of the true sea-ducks except the Golden-Eye, and they will seldom sit on the water and await its approach. They may, however, be surprised occasionally in shallow bays and killed as they fly past the boat to the open sea. Mergansers are, however, easy to shoot on tidal rivers and estuaries where there are narrow channels at low water, owing to their habits of flying directly up and down-stream at no great height above the water. On rivers they are easily "driven" to a concealed gun. They are tough birds to

kill, and the gunner should possess a good water-dog to retrieve them. I have killed numbers of these birds by standing on the Bridge of Waithe (Orkney), which spans the tidal stream that joins Loch Stenness to the sea. In the morning and evening the Mergansers fly from the sea to the brackish lake and back again, and in spite of their fishy flavour they seemed to be much relished by the natives, or I should not have shot them. All the young of the Mergansers are quite good eating, in spite of their fish diet, before they go to sea, but after October they are unfit for the ordinary palate. The Orcadian fishermen, possessing an extraordinary taste in such things, seemed to relish them. At any rate, a present of Mergansers was always accepted with pleasure, whilst a shag (which, quite eatable if properly cooked) was always rejected with scorn.

I remember an incident in connection with Merganser-shooting which was not without its humorous side. I had been shivering on a bitterly cold February day on the Bridge of Waithe, waiting for some Whooper Swans that had passed up from the sea, and which I fondly hoped would return in the evening and give me a shot. Nothing came, however, until dusk, when I observed a party of Red-breasted Mergansers flying from the lake towards the bridge. At the same moment I heard the rumble of wheels on the high road on which I stood, coming from Kirkwall, and glancing in that direction observed a "machine" containing a merry party of Orcadians engaged in song. Both ducks and wagonette continued to advance to the bridge until I began to hesitate whether I should fire or not, as the horse was so close to me. Now the Orcadian Bucephalus is not as a rule a highly mettled animal, a course of plodding on dreary roads in howling tempests subduing his proud spirit. So I thought I would chance a mishap and rapped in a sharp right and left at the Mergansers just as the travellers came behind me. I confess it was reprehensible, for the effect of the shots was worse than I could have imagined. I happened to kill both birds stone dead, the first as it came towards me, and this, hitting the horse on the head nearly knocked it to the ground and then terrified it out of its wits. Away went the machine at full speed, with the voices of the song-birds now uttering cries of woe, and away I rushed, hoping to head the frightened steed. It appeared that my Merganser had bumped the head of the only steed in Orkney that could be warmed into a gallop, but he was too fast for me, and luckily avoiding a crash on the bridge it skilfully grazed a telegraph pole and fled into the wilderness, where, encountering a mound, it stopped slowly and overturned the whole party into a pool of black peat. It appears that the party consisted of the Sheriff's Court going to try cases in Stromness, of which I fully expected mine to be the first, but when the dirt was washed from the face of the first sufferer and he proved to be my old friend Sheriff Melliss, we all began to laugh, and after giving me a good rating, like a good sportsman he came back to the stream and soon forgot all about the accident in watching my old dog Jet retrieve the second Merganser from the sea, in which it had drifted afar.

So, other lands other ways. In Putney these men would have brought an action against me for personal injury and shooting on the public road. In Orkney they offered me a lift to Stromness, after I had nearly killed them. We sang all the way, and had dinner together, and afterwards they took home the ducks as souvenirs.



Walter L. Colls, Sc.

Red-breasted Mergansers and female Goosander resting.

Red-breasted Mergansers courting
Goosander in display.

Hooded Mergansers courting.

HOODED MERGANSER

Mergus cucullatus, Linnæus

Mergus cucullatus, Linn., Syst. Nat., ed. x. i. p. 129 (1758).
Lophodytes cucullatus, Salvadori, Cat. B. Brit. Mus., xxvii. p. 468 (1895).

LOCAL NAMES.—Hooded Merganser, American Hooded Merganser (*English*); Hairy-head, Water-pheasant, Hooded Shelldrake, Cotton-head, Pond-shell Duck, Spikebill (*N. America*).

Egg.—The eggs are 5 to 12 in number. Texture of shell smooth with a good deal of gloss; shell very thick and hard; colour white or creamy white; the shape is extraordinarily round, in fact almost spherical. Average size of eggs, 54.49 × 44.3 mm. (2.14 × 1.74 inches). Max. 57.5 × 45.2 and 55.5 × 45.5; min. 51 × 42 and 53.5 × 41.5 (F. C. R. Jourdain).

Down.—Dull buffy grey, very soft in texture; small feathers amongst it are white, with a large greyish-brown central patch, extending right across the feathers. (Dresser, *Eggs of B. of Europe*, p. 588).

Young in Down.—Upper parts brown, darker in centre of back and rump; crown brown, passing into buff on sides of head and cheeks; small white spots on each side of the back and rump; wings brown, with white edges where secondaries will appear; upper breast and lower neck grey; lower breast and under parts of vent white.

Immature Male.—From the few specimens of immatures in public and private collections which I have seen it seems certain that the plumage changes of the immature Hooded Merganser are in every way identical with the three other members of the genus.

The first plumage of the young male resembles the female, having a brown crest. By the following March the young male has assumed a small amount of adult plumage, noticeably round the eye, throat, and upper sides of the breasts. A few new scapulars also come in, whilst the tail has been renewed.

A young male killed in March has the head and neck light brown, more or less sprinkled with new black feathers; crest brownish-white, with broad brown edge; upper parts dark brown with lighter edges; wings, rump, and upper tail-coverts dark brown, with a few of the upper wing coverts white; upper breast dusky grey; lower breast and abdomen white.

In May and June these traces of winter feathers are lost and a semi-eclipse is assumed, very similar to the adult male. The wings, however, are not changed until August and September, when the principal moult is in full course. In November the young male, at seventeen months, gets its first adult plumage.

Adult Male.—Head and neck black with green and purple suffusions; crest large and semi-circular with a broad edge of black and a large fan-shaped patch of white in the middle. Upper parts black, changing to brown on the mantle and lower back; lower neck and breast white, with two black crescentic bars on each side of the breast; under parts white, and often yellow if the bird goes to the sea or brackish water; tail brownish-black; flanks reddish-brown, vermiculated with dark bars; thighs and sides of under tail-coverts sandy-brown, vermiculated with dark grey-brown bars; primaries brown; secondaries brown, and

with white central feathers and black upper parts; lesser wing-coverts black, with white lower halves; long feathers of the secondaries white, with broad black margins; upper part of wings brownish-grey; irides golden-yellow; bill bluish-black; feet and legs deep red. Length, 16 to 17 inches; wing, 7.50 inches; tarsus, 1.20 inch.

Immature Female.—Similar to adult female with all the colours more subdued, and very small crest of pale brown; worn tail. The young female gets her adult plumage at 17 months.

Adult Female.—Smaller than the male. Chin white; head and neck ash-brown; crest less abundant than the male, and reddish-brown; dark ash-brown above and white below; flanks grey-brown; wings browner without so much black as the male; long secondaries shorter, and brown with less white; feet and legs as in the male, only not so rich in colour; bill black, with yellowish edge. Length, 16 inches.

Breeding Range.

North America.—Widely distributed over the dominion of Canada; probably most abundant in N. Manitoba and near mouth of Saskatchewan. Common summer resident in the Rockies; young seen at Waterton Lake (lat. 49°) in 1895 and in 1897 at Crow-nest Pass, 30 miles farther north. Also breeds at Great Slave Lake, Central Keewatin, and Central Ungava, and Newfoundland. It nests in British Columbia where it is common; in Ontario, and north to Hudson's Bay. (For details see Macoun, *Cat. Canadian Birds*, 2nd ed. pp. 76–7). Eggs from New Brunswick (River St. Croix) in B. M. Coll. (*Cat. Eggs B. M.*, vol. ii. p. 196).

United States.—Oregon and Washington territories, and south to Ohio, Indiana, Kentucky, and S. Carolina (H. E. Dresser). Also south to Oregon, New Mexico, Louisiana, and Florida (last ed., *A. O. U. Check List*).

Florida.—W. E. D. Scott, *Auk*, ix. (1892), p. 211; N. Dakota, E. Coues, *Expl. of 49th Parallel*, p. 654; S.E. Dakota (*Auk*, 1885, p. 288); Oregon (J. C. Merrill, *Auk*, 1888, p. 141). It does not breed in Alaska.

Migration Range.

British Isles.—Four well-authenticated occurrences; male, Menai Straits, N. Wales, 1830–31. T. C. Eyton, *Hist. of Rarer Brit. Birds*, p. 75. A pair in Cork Harbour, December 1878. Sir R. Payne-Gallwey, *Fowler in Ireland*, p. 121. One (female) on north coast of Kerry in January 1881. Sir R. Payne-Gallwey (*ibid.*).

I possess a fine adult male which was enclosed in a case of local birds shot by a farmer named Moloney in Tralee Harbour in the winter of 1880. I was unable to obtain any other information from the farmer's wife (Moloney himself having died) beyond the fact that all the birds were shot locally by her husband. I think the specimen was probably quite genuine (see *Birds of Ireland*, p. 222).

Others are said to have been killed at Dingle Bay, Kerry, about 1840 (specimen not forthcoming); in co. Meath, *teste* Watters (ditto); and near Sligo 1880–81 (ditto). Also said to have been obtained in winter 1837–38 in Norfolk. (See *Birds of Norfolk*, iii. p. 228.) List of thirteen supposed occurrences in Dresser. Supplement to *Birds of Europe*, ix. p. 296, quoting J. J. Dalgleish, *Auk*, 1880, p. 217.

HOODED MERGANSER.

The Rev. F. C. R. Jourdain informs me that one was shot near Cheltenham early in March 1909, and was bought by Sir V. Crewe, in whose collection it now rests.

Continental Europe.—There seem to be no records of this species, except for a reference by Temminck (*Man. d'Ornith.*, iv. p. 557). France, no details. Eversmann states that two young were obtained in the autumn of 1852, on the south-west slopes of the Ural (Dresser, *Eggs of Birds of Europe*, p. 588).

North America.—Winter range in N. America extends from Southern British Columbia to Lower California and Mexico. (See *A. O. U. Check List*, last ed.)

On the eastern side from Massachusetts, New York, Illinois, Indiana, Minnesota, and Kansas, southwards to the Gulf States and Cuba.

Casual occurrences also recorded from Alaska and Bermuda.

Habits.—Unlike the Goosander and Red-breasted Merganser, which delight in rushing streams and sea estuaries and bays, the Hooded Merganser loves the quiet lakes and pools of forest country. I have found it in British Columbia and Ontario in much the same habitat as the Buffle-headed Duck. They are often found on the same lakes as the Dusky and Wood Ducks, although not actually consorting with those species. They seem to be altogether a more delicate form of Merganser than the other species, and avoid rough winds and exposed situations of all kinds, spending the day in exploring the depths of some quiet pool for fish and water-insects. No one can mistake this very beautiful bird for any other duck, for even at a great distance the small size and peculiar form of the crest of the male make it easy of identification. The crest is not usually held in the expanded position generally figured in books. I noticed that it was almost invariably held depressed or folded backwards as in the distant figure of my drawing. It is only elevated and expanded in moments of fear or excitement. The female is also capable of spreading her crest, but not nearly to such an extent as the male.

It did not strike me that Hooded Mergansers were as shy as other members of the genus. When seeing a stranger they merely swam away very fast to the other side of the lake, and kept under the lee of the banks, evidently in the hope that the disturber would pass away. The speed at which they swam was quite as swift as other Mergansers, and they kept moving the head and neck backwards and forwards as if prepared to dive at any moment. All their movements, both on the water and in flight, were similar to Smews and Red-breasted Mergansers. The flight was very swift, and they turned and twisted to the course of even a small stream with great ease and rapidity. Their food consists principally of fish: those that I killed were full of small char; but they also eat quantities of molluscs and water-insects, and various American authorities state that they eat aquatic plants, seeds, and grain, a diet not accepted by other Mergansers. But for this latter reason certain western epicures insist that the Hooded Merganser is an excellent table bird; but it seems a great pity that this beautiful bird should be killed for the table when many far commoner and more palatable species are available. Gourmets says that "the birds should first be parboiled through two or three waters; that they should then be well baked, stewed, fricassed or broiled, and flavoured with rashers of bacon, and onions, potatoes," &c. This simply means that the carcase is robbed of its original quality, and reduced to meat. An owl, a wolf, a carp, a Cormorant, or even an old boot might be made edible with such treatment. If a bird is unfit for food without such manipulation, it seems a pity to kill it.

An American writer in the *Waterfowl Family*, p. 199, says:

"We have them on our New England coast in spare numbers by late September, though in the south more commonly. Throughout the interior they are well known on the marshes of most of our lakes and rivers. The Hooded Merganser frequents the brackish bays of our southern States; here creeks and ponds, on the marshy islands are the spots he loves. We see him in a small, select flock, or with his little brown wife, keeping mostly by themselves; in places where protection is afforded, quickly showing their appreciation of it, and becoming gentle."

In March the majority of the Hooded Mergansers that have wintered in the south move northward, though a few stay and breed in their winter range as far south as Florida.

The courtship, according to my friend Mr. Francklyn, consists of a sudden rise of the body with depressed crest. On coming to the water again the crest is fully expanded. The males also stretch their necks forward with fully expanded crest. The nest is usually placed in a hollow tree, often 20 feet above the ground, and near to some lake, but occasionally at some distance from the water. Full clutches of eggs are laid from the middle of May to the end of that month, and sometimes as late as the middle of June (see Macoun, *Cat. Canadian Birds*, 2nd ed. pp. 76–7; *P.Z.S.*, 1867, p. 167). Spreadborough states that the nesting hole is often at a considerable distance, and not always close to the water, while Macoun (p. 77) records a nest 30 feet from the ground.

The female Hooded Merganser flies through the woods and alights on the edge of the hole where her nest is situated with speed and grace. An interesting instance is related by Mr. Boardman of a case where a female Wood Duck and a female Hooded Merganser contested for the possession of a nesting site in a hollow tree. Later the nest was found to contain eighteen fresh eggs, about a third belonging to the Merganser.

The nest is said to be made of grass, leaves, and moss. The nesting habits and autumnal migrations seem to be similar to that of the other Mergansers. I have only shot three of those beautiful birds, and it struck me that they were far easier to kill and to outwit than other Mergansers. To a great extent their narrow feeding grounds would account for this, but I am told by sportsmen who know them well on the larger lakes that they are by no means shy, and come freely over concealed gunners.

The migration flocks in British Columbia, and throughout the Canadian barrens, gather together early in September, and they are almost the first ducks to move before the coming frost.

Smew

Mergus albellus, Linnæus

Mergus albellus, Linn., Syst. Nat., ed. x. i. p. 129 (1758).
Mergus cristatus minor, Briss., Orn., vi. p. 243 (1760).
Merganser stellatus, Briss., tom. cit., i. p. 252 (1760).
Mergus minutus, Linn., tom. cit., ed. xii. p. 209, No. 6 (1766).
Mergus albulus, Scop., Ann. I. Hist. Nat., p. 71, No. 91 (1769).
Mergus pannonicus, Scop., tom. cit., p. 72, No. 92 (1769).
Merganser albellus (L.), Bodd., Table de Pl. Enl., p. 27 (1783).
La Piette ou le petit Harle huppé, Buffon, Ois., ix. p. 164 (1784).
Le Harle étoilé, Buffon, tom. cit., p. 166 (1784).
Mergus albellus (L.), Selby, Cat. Gen. Subgen. of Birds, p. 47 (1840).

LOCAL NAMES.—Smew, Smee, White Wigeon, Weasel Head, Weasel Wigeon, Vare, Nun (female) (*English*); Petit Harle huppé, Piette (*French*); Der Kleine Säger (*German*); Pesciajola, Smergo, Pescareu Annia pescadura (*Italian*); Strallera branca (*Sard*); Serra (*Maltese*); Nonnetje, Scheft (*Dutch*); Nonne-Hvidskække (*Danish*); Hvid Fiskand (*Norwegian*); Salskraken, Salknipan (*Swedish*); Uinilo, Uivelo, Ungilo (*Finnish*); Krahal-Lutok, Paganka (*Russian*); Belic (*Slovenish*); Kis buko (*Hungarian*); Ronac bijeli (*Croatian*); Morcak bily (*Czechish*); Tracz Dniestrowka (*Polish*); *Bech de serra petit* (*Spanish*).

Egg.—Usually 6 to 9 in number, but 10 have been recorded (*Zeit. f. Ool.*, 1897, pp. 3, 22). They are creamy in colour and smooth in texture (notes on the texture and distinction between these eggs and those of Wigeons are to be found in *Ooth. Wolleyana*, ii. p. 622).

Average size of 107 eggs, 52.42 × 37.46 mm., max. 58 × 40.5 (Goebel): min. 47.7 × 34. They are smaller *on the average* than Wigeons': decidedly shorter as a rule, and not quite so broad; but the measurements of the species overlap (F. C. R. Jourdain). Average weight of 49 eggs 3.79 grms., varying from 3.42 to 4.04 grms., according to Goebel. Wigeons' eggs are lighter, averaging (68 eggs) 3.14 grms. and ranging from 2.76 to 3.48 grms., according to the same writer.

Full clutches may be taken in N. Europe from the last week of May to the middle of June.

Down.—The down is small and greyish-white, freely intermixed with fine white feathers. Fragments of rotten wood and moss may also be found mixed with the down at the bottom of the nest hole or nesting box.

Young in Down.—Dresser's description (*Birds of Europe*, vi. p. 700) is as follows: "Upper parts, including the sides of the head below the eye, but only the back of the neck, dark blackish-brown, darkest on the crown and the lower part of the back; at the base of the wing-joint a white spot, and another close to it, but rather lower down the back, and on each side of the rump another white spot; below the eye a very small white spot; under parts white; breast and flanks pale greyish or sooty-brown. One young bird, which can only be two or three days old, has the bill so slightly serrated that the serrations can only be seen when very closely looked into; but another, which is a few days older, has the serrations very distinct."

The specimen described accurately by Dresser has been kindly sent to me for examination by the Curator of the Birds, Manchester University Museum. It was collected by Sabanaeff, being taken on July 18, 1872, at Kimschensk, N. Russia. The whole appearance is very like that of the young Golden-Eye in down, but the bill is narrower and longer and has a very bright bone-yellow nail. The tail too is very large, like all the juvenile *Mergi*.

Immature Male.—The young male in first plumage very closely resembles the adult female and young female, and until December it is very difficult to tell the sexes apart except by dissection. At the end of five months, however, the young male begins to turn much darker. The nape is now often changed to new black feathers and the upper wing has a larger area of white; the lores too show many dark feathers. The tail is often complete by December. So the advent of the male plumage continues to advance on the upper parts until April when the usual halt takes place, until an eclipse plumage, closely resembling that of the adult male, is assumed. The wings, which are always the key to identification, are not the same as the adult male, and always have more or less brown or blackish edges on the upper coverts instead of being the pure white of the adult male.

The immature male passes through the same stages as the other Mergansers and assumes its first complete plumage in late November—that is, at seventeen months.

Adult Male.—Lores and a large patch round the eye and nuchal patch jet black; the rest of the head, neck, and under parts pure white; generally a faint line of black feathers extends from the back of the eye to the back of the head. Crown feathers elongated, forming a white crest which in moments of excitement is split in the middle of the crown, forming a double crest. Centre of the back and two narrow lines, one across and the other touching the scapulars on the sides of the upper breast, black; scapulars white, the outer feathers tipped with black; lower back black, turning to greyish-brown on the rump; tail greyish-brown; a little grey across the vent; flanks white and finely vermiculated with black; primaries blackish-brown; long inner secondaries grey with white edges, their one white feather edged with black and central secondaries black with white; median wing coverts white; lesser wing coverts black; bill bluish-slate; nail inclined to bone-colour; irides white; legs and feet lead-blue with darker webs. Length, 16½ inches; wing, 7.6 inches; tarsus, 1.3 inch.

The adult male assumes its eclipse plumage in June. As Naumann points out, it closely resembles that of the adult female, though I fancy that the bird from which his description was taken was not yet in full eclipse, as it differs somewhat from those I have seen.

In July the adult male has gained a very rich red-brown crest, somewhat fuller than the female, and it can always be distinguished from the female by the rich colouring of the wing, the white irides, and the black patch round the front of the eyes; also by its larger size, black edges to outer white scapulars, and a few vermiculated feathers above the thighs on the flanks. In other respects the whole of the rest of the plumage is like the adult female, except the mantle, which is nearly black. Wings as in winter. The autumn moult proceeds in the usual manner, and the adult male regains its winter plumage by the end of November. Sometimes a few eclipse plumage feathers remain in the plumage until the new year, but this is unusual.[1]

[1] For a description of the eclipse plumage, see also Naumann and J. L. Bonhote, *Avicultural Mag.*, new series, vol. iii. (1904–1905), p. 120.

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SMEW
adult male and female

The windpipe of the male is cylindrical in shape and widens gradually from the top downwards. At the point of division into the two bronchial tubes there is the usual large drum of bone, divided on the inner side in two halves by a wall, the left one being by far the larger.

Immature Female.—The immature female in first plumage can always be distinguished from the adult by the more dull-brown plumage, the worn tail ends, and the dirty or black-edge white feathers of the median coverts.

The adult plumage comes in slowly throughout the winter, and the new tail is gained. By March and April the faded and dirty-looking wing is the main point of identification. The whole bird is more "ragged" throughout the summer, and the change to maturity does not take place until the main moult in August. The young female then moults completely, and gradually assumes adult plumage at seventeen months.

Adult Female.—Crown, nape, and back of the neck reddish-brown,[1] the feathers on the back of crown and nape much elongated to form a crest. Feathers round and more especially in front of the eye, blackish-brown or black; chin and throat white; lower neck greyish-brown, forming a collar; back and upper parts generally slatey-brown and much darker on the rump, in some cases almost black, with feathers of the mantle and scapulars tipped with grey; wings like those of the male, but not so bright or grey on the long secondaries; there is also no large white feather on the secondaries. Area of white on the median coverts dirty white; under parts white; flanks greyish-brown, and edged with light grey. Legs and bill as in the male, only duller. Irides reddish-brown. Length, 14½ inches; wing, 7¼ inches; tarsus, 1.3 inch.

Breeding Range.

Continental Europe.—John Wolley was the first to receive authentic eggs of the Smew and to establish the fact that the species bred in the holes of trees in Swedish Lapland. A full account of this appears in the *Ibis* (1859, pp. 69–76), which Mr. Dresser (*B. of Europe*, vi. pp. 704–8) quotes *in extenso*.

Sweden.—A nest with nine eggs found at Sandhamn, near Stockholm, in June 1885 (O. Ekbohrn, *Jägarf. Tidskrift;* C. A. Westerlund, *Skandinav. Foglarnes Fortplantnigshistoria*, p. 188). On the borders of Swedish and Russian Lapland and N. Finland it breeds in wooded districts in the Kola Peninsula commonly, and at Enontekis, Enare, Sodankylä, &c., as well as on the Muonio River, near Maonioniska, and also nested at Tjomalis, near Quichjoch, in 1867 (C. A. Westerlund, *loc. cit.*).

Russia.—S. A. Buturlin (Dresser's *Eggs of B. of Europe*, p. 588) says it breeds on L. Onega, the R. Dwina to Archangel; rarely on the R. Oka, in the Voronesh Government; the wooded parts of Petschora basin and Perm Government; probably in the Governments of Twer, Novgorod, and Pskov; in the Ufa Government and on the Middle and Lower Volga, but *not* in the Baltic Provinces, St. Petersburg or Moscow Governments, or in Don or Dneiper basins.

[*Roumania.*—R. R. v. Dombrowski in the *Zeit. f. Ool.*, 1904, p. 145, makes the aston-

[1] Dresser (*Birds of Europe*, vi. p. 700), in describing an old female from Moscow, says "on the fore part of the crown a few whitish feathers, &c." This must be quite abnormal, and I have never seen such a specimen. The bird he describes is probably a very old female slightly assuming male plumage—a not very rare circumstance in diving ducks.

ishing assertion that this species breeds at one or two of the lakes in the Dobrudscha, and asserts that he has obtained several nests there. Confirmation seems to be needed, though the breeding on the Volga is almost as extraordinary. Smews certainly remain very late in the spring on the lagoons on the Lower Danube.]

Asia.—S. A. Buturlin (*loc. cit.*) says near Tjumen, and possibly in the Tomsk Government south to 52° N., farther east to Kamtschatka, but *not* the Commander Isles. It avoids the tundras. *Cf.* Severtzow, *Ibis*, 1883, p. 77; also *Ibis*, 1909, p. 284.

MIGRATION RANGE.

British Isles.—Chiefly to the east coasts of Great Britain, and occasionally to large sheets of inland waters. Also regularly to the south coasts of England, principally west of Sussex. Not uncommon on the Inner Hebrides, but rare on the Outer Hebrides, Orkneys, and Shetlands.[1] It is also rare in N. Wales (Forrest), and in Ireland (Saunders, Ussher, and Warren, &c.). Ussher, in his latest list (1908), describes it as a rare and casual winter visitor, chiefly to Leinster and Ulster, and found more frequently on fresh water.

Nearly all the large sheets of fresh water of Central England and Scotland are visited occasionally by the Smew. In Scotland I have seen it several times on Loch Leven, and to Loch Lomond it is almost a regular visitor in late autumn, as it is to Wigtownshire, Solway, and the large lakes of Kirkcudbright. I have also seen Smews in the estuaries of the Tay, Eden, and Forth, and twice off Musselburgh, East Lothian. North of this it seems to be rare, only occurring occasionally on the coast lakes and river mouths of Aberdeenshire (Sim). It is almost a regular visitor to the Tyne estuary and the Wash, but becomes rare again until we find it almost regular in its appearance on the coasts of Devon and Dorset. Poole Harbour used to be a favourite place for Smews in the old days, and a few still come there every winter. I received two from the mouth of the Arun (Sussex) in January 1910.

Europe.—It is absent from the Færöes and Iceland, but migrates across the Baltic, and in a S.W. direction along the Atlantic coast, as well as across Europe to the Swiss lakes and the Mediterranean. Others migrate to the Ægean Sea, and the Black and Caspian Seas (Saunders, p. 476). Recorded from Gibraltar Bay (Irby, *Orn. Str. Gibraltar*, p. 232); Sardinia (Brooke, *Ibis*, 73, p. 345); Algeria (Loche); Tunisia (Whitaker, *B. of Tunisia*, ii. p. 224); N. and Central Italy, sometimes abundant (*ibid.*); Greece (Reiser, *Ornis Balcanica*, p. 506); Malta (*Ibis*, 1864, p. 291); Palestine coast once (Tristram, *Ibis*, 68, p. 328).

Asia.—Asia Minor (*J. f. O.*, 1908, p. 621); Talysch, Caspian Sea (*J. f. O.*, 1910, p. 72); Tehran, Persia (Blanford, *Zool. E. Persia*, ii. p. 303); Afghanistan (*Ibis*, 1882, p. 125); Turkestan (*Ibis*, 1876, p. 421); N. India, Kashmir, Quetta, Thall, Kohat, and Indus (*Ibis*, 1909, p. 284); Punjab, N.W.P., Sind, Oude, &c. (*cf.* Hume and Oates, *Faun. of India*, *Aves* iv. p. 468), but *not* in S. India or Burma; N. China, Yangtze R. (*P.Z.S.*, 1871, p. 416); Mr. Carey tells me it is a very common bird at the mouth of the Yangtze in winter; Fokien (*J. f. O.*, 1910, p. 480); Japan (Seebohm, *B. Jap. Emp.*, p. 259).

[*America.*—A female now in the British Museum, purchased from the Hudson Bay

[1] I do not know on what authority the authors of the *Hand-List of Brit. Birds* (p. 147) state that it is "not uncommon" in the Orkneys. I never saw a specimen there in ten years of winter shooting. Mr. R. Heddle (*Fauna of the Orkney Islands*, p. 186) says "that the Smew is at times common in Hoy Sound," but I think that this is a mistake.—J. G. M.

Walter L. Collo. Sc.

Smews courting.

Company, and a female said to have been obtained by Audubon in Louisiana in 1817, are the only two records from America. Both of these are, however, not above suspicion.]

Habits.—In general habits the Smew appears to resemble the Red-breasted Merganser, except that it seems to have a greater preference for large sheets of fresh water and brackish estuaries. It is seldom found in the sea itself unless on migration, by constant disturbance or the effects of ice.

Smews as a rule come to us very late in the season, often not until the middle of December, probably delaying their southward journey on the brackish waters of the northern coasts until actually forced to leave by severe conditions. They generally arrive in small parties of three to eight and make their winter home in some estuary from which they can retreat at any time to the open seas or bays. They are very shy and restless birds, and though occasionally seen are not often shot, unless they come into enclosed lakes or rivers where their retreat may be cut off. I have never yet killed a Smew, though I have seen a good many at different times, as I have always found them on large lakes or open estuaries, where they would not permit the approach of a sailing-boat. I have "set-to" them in a punt twice, usually a sure method of approaching diving ducks, but even with the utmost care, I have found them gifted with wonderful sight and quickness to take alarm.

In Northern Europe they are said to consort chiefly with Golden-Eyes, which is another way of saying that they have intelligence of a high order. Throughout Germany they frequent small rivers and stay there until the ice breaks up, diving in any open places to obtain their food.

Naumann (*Naturgesch. Vögel Mitteleuropas*, x. p. 277) says:

"The Smew does not seem to like the open sea, and it is seen almost always near land, in summer in deep, narrow gulfs running far inland, in estuaries, or in land lakes near and on other pieces of open water, less often on salt than on fresh. With us in the winter it most often keeps to the rivers and streams both in flat and hilly country, wooded or quite open country, and from there it visits other open places of the lakes, ponds, brooks, or even quite small springs. Should the cold become more severe, and should therefore fewer places remain free from ice, then they go the round from one to the other and betake themselves as soon as they are disturbed to the next place and continue thus doing this daily for weeks, and repeat this series of changes, though not at regular intervals, until the cold weather either forces them farther south-west or the approach of milder weather opens again larger places for them on the rivers and permits them to remain there. They can endure the most severe cold quite comfortably, and it is only the breaking up of the ice on the rivers which they hate, particularly if the so-called ground-ice is driving hard; in that case they take refuge on the open places of quiet water in the neighbourhood of the former and fly from one to another. In time of need they do not despise an occasional stay on the smallest springs and brooks, and in our neighbourhood often appear at such times quite close to the villages."

The male Smew may easily be recognised on the wing by its black and white plumage and its swift Merganser flight. The only bird with which it can be confused is the male Golden-Eye; but the shape and colouring of the head of the two species are so distinct that they can easily be distinguished even at a great distance. The head and neck of the two are also held quite differently.

Naumann thus remarks on the association of the two species (*tom. cit.*, p. 277):

"This behaviour is shown by smaller or larger companies even more than by isolated birds; but as they [*i.e.* Smews] willingly join with diving duck, particularly with the Golden-Eyes, and although the latter are not quite so shy, yet the former often choose the latter as leaders, with the result that it is rather

easier to get near them in such company. The natural attraction of the Smews to the Golden-Eyes (*F. clangula*) remains very remarkable, and is so general in our part of the world that one seldom sees the one without the other, and even small flocks of eight or twelve Smews are seldom seen without one or more Golden-Eyes in their midst, and keeping as close together with them as though they all belonged to one species. Other observers, too, have remarked this marvellous fellowship of two species belonging to two quite different genera in other countries also, and in districts where both were equally numerous, and they have found it just as striking."

In standing or walking the body is held horizontally, and the neck is very much bent, so as to form a distinct letter S.

They roll a good deal in movement, but their general attitudes do not differ from the other Mergansers. The crown and crest feathers are, however, held in quite a distinct manner peculiar to this bird. The front of the crown rises abruptly, and the sides of the crest are puffed out so as to form a rounded and not a flat tuft above the nupal patch. (I have endeavoured to show this in my sketches of Smews at rest, which are drawn from life.) When excited or in courtship the crest breaks into two parts, that immediately in front of the crown and consisting of only a few feathers standing out quite clear from the greater part, which is raised behind. The swimming attitudes are the same as the Red-breasted Merganser, and they only " sink " the body in the water when alarmed. When on feed they swim lower, and the tail trails, or is sometimes a little lower than the line of the water.

They dive with swiftness, and apparently more vertically than the other Mergansers—this may be due to their feeding on slower-moving fish—but they do not seem to range over the same extent of ground as the larger species. I have, however, seen a Smew making long horizontal dives like a Red-breasted Merganser, and in this instance it was probably hunting for food or in pursuit of trout. Certainly the few Smews I have seen on feed did not change their ground much, but came up again near to the spot they had dived, and it may be true, as some authors have asserted, that this is their general habit. I do not think that any of the Mergansers use their wings under water as the Eiders do. They all seem capable of swimming distances under water without coming to the surface to breathe. If the flock has separated, it soon swims together again before again diving.

The flight is very rapid, and the neck held very stiff and straight. When going at full speed they swing from side to side, and often shoot down suddenly close to water. On alighting on the water they often dive at once, as a precautionary measure, and on rising to the surface stop, preen, and bathe. Like the other Mergansers, they are constantly preening their feathers, whether on land or on the water. In winter they seldom come ashore, but in summer they often emerge from the water and lie for hours asleep amongst the stones or on some sand-spit or island. Hennicke observed a flock of Smews in Finland, in September 1900, resting on tree-trunks in the middle of the rapids of the Ulea River.

Smews very seldom make any cry, and in the winter only a harsh croaking note.

Naumann states that their food consists chiefly of small fish, such as *Atherina hepsetus*, small crab-like creatures, such as *Crangon vulgaris*, small frogs and water insects, also *Alburnus lucidus*, gudgeon, roach, trout fry, elvers, &c.

They also eat small trout, roach, or any small fish of a suitable size. Sim, the

Aberdeen naturalist, says that in the stomachs of four specimens sent to him for preservation were insects, mollusca, sticklebacks, and bits of quartz (*Vert. Fauna of Dee*, p. 154). On the sea sand-eels are a favourite food.

Naumann gives a pleasant picture of the methods of Smews feeding in a river full of ice (*tom. cit.*, p. 278).

"To watch a flock of Smews at their fishing unseen affords a pleasant amusement. At one moment all are swimming together, and then in a flash all have vanished from the surface, the water is stirred by their paddling in it, and finally one after another appears on the top again, but scattered, and where there is room, often thirty to fifty paces from the original place; they assemble again, dive yet again, and to the surprise of the observer they appear this time perhaps quite close to him on the surface. It is very wonderful how they can obtain their means of food only by diving often from such a small opening in the ice of only a few square feet; and they conduct their fish chase then under an ice roof, but they always come up again to the open places to breathe and rest for a few moments; and this is a proof that their sight under water must reach to a considerable distance. In places where the open water does not contain enough fish, or they have themselves caught or scared away the fish, they scour the bottom for insects or frogs taking their winter sleep in the mud, or for fish which have taken refuge and hidden there. . . . It is a special feature in the behaviour of the Smews (as it is too with other species of the genus), that if they want to fish they generally all dive under at the same time with the intent to pursue the surprised fish in all directions, so that one can catch what has escaped another or merely been scared away. But we have never noticed that in diving under they keep to any particular formation, and, as has been said, arrange themselves in a semi-circle to which they adhered after diving, so as to drive the fish into a narrow place and thus make sure of catching them. Their collective diving, however, drives the fish from one part of the water to another, and if the birds follow them even there, and the fish in terror try to hide themselves in any crevice, then the Smews often change from one place where there is plenty of fish to another, not infrequently an hour's distance away, so that they give the fish time to calm down again. We have been able to see from the waves made on the surface of the water, especially on standing pools, how they darted after the escaping fish in every direction, and their paths not infrequently crossed in doing so."

From Central Europe Smews often move northwards as early as the end of February; but on some of the lakes of Southern Europe they do not move until the end of April, and it is probable that the flocks begin to show their courtship before they leave.

The male now at the Zoological Gardens has been in good health for two years, and now "shows" constantly in spring before any female Goosander or Red-breasted Merganser in the absence of a female of his own species. The courtship is as follows: (1) The male swims slowly round the female, sometimes with the long scapulars slightly raised or expanded. The head and neck is often moved slowly forward in a pushing manner, and when about to make the act of display the neck is drawn back as far as possible between the scapulars. All this time the crest is raised and spread in a very peculiar fashion. It is separated into two parts, the front consisting of only a few feathers of the front of the crown. These stand quite clear away from the latter part of the crest, which is expanded above the nupal patch of black. Often a single white feather stands out alone connecting the two sections of the crest. The nupal patch lies flat, and the back of the head is not distended in any way.

(2) The next act of show is to push forward the neck somewhat slowly and then back as far as possible, the crest on the crown being raised as already indicated, and the chin pointed upwards, whilst there is a slight rise of the forepart of the body as it is lifted from the water. During this sedate movement the mating cry of the male is uttered. The throat

is slightly swelled, and the note is a prolonged croak or grunt like the word "err-err-err-umph," the last sound being an exhalation to clear the lungs, and seeming to be an effort on the part of the bird. During this movement the bird is stationary, with the tail either lying under or on the surface of the water.

(3) On the completion of the movement there is a quick forward dip of the head and bill, followed by a sudden rise of the forepart of the body out of the water, something like a "mallard and teal" show, but not nearly so upright. In fact, it is almost a forward movement. At the same time the feet are paddled vigorously to maintain equilibrium. The call is often made as the bird throws itself up and forwards.

(4) At the end of this movement the bird often drops to the water with neck outstretched and parallel to the water, and when in full show often makes a little rush forward.

I give Lord William Percy's observations on the same bird, as they are taken independently and from another observer's point of view:

"First attitude. Simply the raising of the head and body in the water and the erection of the forepart of the crest. Also a general raising of feathers on head, neck, and scapulars. The bird is now swimming.

"Second attitude. Stops dead; throws the head back, but does not raise the body at all. On the contrary, it is sunk, the water running over the tail. Crest still raised forward.

"Third attitude. The throw forward and a little rush through the water. As the head comes forward the bird paddles hard without raising the body from the water, but in a forward and not in an upright position. It is as he throws forward one hears the call.

"Fourth attitude. The head is not brought right down, so that the bill touches the water. At the end of the previous movement the head and neck are stretched out in front, the bill pointing straight.

"There is nothing very showy about the courtship of the Smew, but it is extraordinarily pretty and attractive. It looks so very chaste and nun-like. I wish I could see him 'show' before his own lady instead of that extremely discourteous old Merganser duck."

The nest of the Smew is placed in holes in trees, and also frequently in nesting-boxes put up by the Lapps for ducks to breed in. The first authentic nest of the Smew was taken on June 8, 1857, and sent to J. Wolley (see *Ootheca Wolleyana*, ii. pp. 619–27). In his account it is stated that the Smew is not found in the breeding season beyond the limit of tree-growth.

The natural attraction which this species seems to possess for the Golden-Eye may sometimes be witnessed even in the breeding season. But of this we have no proof except the one remarkable hybrid (an adult male) killed some years ago in Brunswick and figured in Naumann's *Vögel Mitteleuropas*, vol. x. pl. ix.

Of the nesting habits and upbringing of the young and autumnal migrations we have no account, but they are doubtless much the same as those of the other Mergansers. The same parasitic insects affect the other species of Mergansers as the Smew, and the same predatory birds and animals attack them in their nesting haunts.

These small-fish hunters come to us in such small numbers and frequent such wide areas of water that they are not so serious an enemy to fish as the Goosanders and Red-breasted Mergansers are. I am indebted to Mr. A. F. Moody for some notes on Smews that have been kept in confinement at Scampston. He writes:

"Possibly to anyone prepared to feed them entirely upon fresh-water fish or whitebait, &c., the Smew might prove an easy subject to keep, but when living upon an artificial diet, such as that we possessed, proved decidedly short-lived and unsatisfactory in captivity, for, in spite of every care and

apparently natural surroundings, our greatest success remained with a female that lived a year (having in the meantime completely moulted out) and an adult pair which succumbed to the moult at the end of six months. However, as they are most interesting and charming birds to keep for the benefit of anyone wishing to try them, I give some particulars below. After being fed on to artificial food in a pool aviary, our Smews were pinioned and kept with the other waterfowl. They were fed three times per day, and two-thirds of their diet consisted of fish, haddock, herring, or whiting, the remaining meals between times being pieces of liver or rabbit's flesh. They are greedy feeders, and readily learn to come swimming up, their eyes beneath the surface searching for food. Curiously enough, however, like many other birds, although we made it a rule to keep them as much as possible to fish, they soon preferred the animal food, and at the end of a few weeks developed a taste for the prepared barley meal, and were only prevented from filling themselves upon that fare by feeding them before the other species. Another curious feature in the history of these birds was that they became so wedded to artificial food that they never troubled to catch the numerous small live roach, dace, &c., that were for the greater part of the summer within their reach. From what I observed of the Smews' habits generally it may be described as an exceedingly quick and energetic species. Upon land it walks, runs, and even perches with ease and confidence, while in the water its diving powers appear to exceed those of any other duck. In the air also I should imagine it to be equally clever, as I noticed full-winged examples living in a pool aviary spring lightly and noiselessly from the water without any of the bustle and commotion that one is accustomed to associate with the rising of the true ducks. Concerning the moulting of this species I may state that the female referred to as living a year, which by the by was a bird received almost direct from the catchers the previous autumn, and during the whole time we possessed it and until shortly before its death it appeared in excellent health and condition, and completed its moult by simultaneously shedding its larger wing feathers on July 30; and that the particular adult male also referred to died on June 1 after having begun to change into the eclipse plumage by assuming a small brown patch behind each eye. As to their voice, I fail to recollect sufficiently to describe the subdued call of the male, but the female certainly occasionally emits a weak quacking sound."

ON THE VARIOUS METHODS OF SHOOTING DUCKS

Ducks of various kinds, both surface-feeding and diving, are of such different dispositions, and often so dissimilar in their habitats, that it may be of use to those who desire to make a collection of these birds that there should be a chapter devoted exclusively to their pursuit and the different ways by which they may be killed.

It is not too much to say that, taken as a whole, ducks and geese are by far the finest birds of the chase which we or other countries possess, because most of the species are either gifted with high intelligence or live in such places that their pursuit is often difficult and sometimes dangerous. No sportsman, in the true sense of the word, cares to kill a bird stupid by nature or easy to hit, or if he does he is either a lazy or an indifferent gunner. On the other hand, there are thousands of good sportsmen in these islands who seem to take much pleasure in the frequent failure and the occasional success that is the lot of the wild-fowler. Such sport not only draws out the true spirit of the hunter, but leads him into sights, scenes, and experiences that can only be enjoyed by the genuine *man*, for it is the triumph over obstacles that is the very essence of any form of work or play.

The naturalist-sportsman can have no better object than to make a collection of the various ducks and geese that frequent our islands, and to achieve this is not easy, and will take him at least eighteen to twenty years, when all his winters must be spent in the haunts of wild fowl at home, and the summers in the Arctic or sub-Arctic regions, where the climate is usually as good and often better than our own. Unless he is a rich man, it is also necessary that he should be able to prepare his own specimens, for there are many occasions when it is not possible to send birds to local taxidermists. To gain such a collection is full of absorbing interest, as it will occupy much time spent in the open air, as well as pleasant evenings at home, when specimens can be labelled and notes taken of any point of interest not as yet recorded by any previous observers. The writer of these volumes has spent thirty years in pursuit of duck, and he is fully conscious that there are still some gaps which it ought to be the object of the sportsman-naturalist to fill up. Interesting trips to North-Western Alaska, Kamschatka, the Lena Delta, and Northern Labrador could still be made with success, and fresh information gained as to the courtship and nesting habits of various species that are not very well known at present, whilst there is still a vast field for exploration amongst the ducks of Africa, Malay States, and South America. There is not, in fact, any genera of birds that will afford so great an amount of sport combined with scientific study, and the man who is prepared to undertake long journeys into the wild places of the earth in pursuit of ducks and geese has before him a task of absorbing interest only equalled by the chase of the great mammals.

In the British Islands there are various methods of shooting ducks. The surface-feeders may be killed by walking up or driving marshes or small lakes, flighting at

morning or evening, sailing to them by means of small boats, or hand-paddling to them with the single or double gunning-punt. They may also be stalked from the shore, lured within shot by decoys, or "moved" up or down the rivers they frequent. The Diving-Ducks may also be stalked both on the sea or lakes, or moved from enclosed waters, or up or down rivers, whilst certain species that frequent sheltered bays or estuaries can be approached and shot with the punt-gun. Occasionally they are also killed at flight. Most of the true sea-ducks are, however, unapproachable by these methods owing to the rough nature of their habitat. The best method of killing sea-ducks is by means of a light and easily-turned sailing-boat, but one that is also capable of standing up to the roughest seas.

There are also various "dodges" for luring or getting within shot of ducks, such as the artificial rock, cow or horse for stalking, and the stationary "sink-boat," furnished with living decoys so much in use in North America, where methods of killing all kinds of wild fowl are studied more seriously than in Europe. I have employed all these methods in the pursuit of ducks, and locally each and all are successful, for if they cannot be approached, lured, or waited-for in one way, there is always some other device that requires skill and patience, and these may be employed with success if the hunter is gifted with sufficient pertinacity. It is enough to say that if the gunner is a fair shot, he can in time encompass any bird that flies, though there may be long periods of failure which perhaps only add zest to the sport, and teach him the art of the chase.

The easiest as well as the commonest form of duck-shooting is that of walking-up ducks in bogs and marshes in the autumn, and even this sport is not as well understood as it should be, for many a sportsman who would take infinite trouble to stalk a duck in the winter is apt to throw aside precaution, and to regulate the brain-power of the wild duck or teal to the level of the partridge or pheasant amid the turnips. As a matter of fact, the gunner who walks a marsh with intelligence will kill twice the number of ducks that a man does who constantly stops, calls to his dog, or insists on being accompanied by a party of keepers and friends. It may be taken as a truism in marsh or bog-shooting, that the smaller the number of persons the larger the bag. Duck and teal that can fly are fully alive to what is going on around them once the first man is seen or heard, and if we could look ahead in all those little pools and rushes, we should notice that all live duck are standing with stiffened necks, or crouching ready to spring once the first shot has been fired, even on a very large area of marsh. At the time when the bog of Murthly was one of the finest wild-fowl resorts in Britain, I have often been out by myself a couple of days after there had been a party of five or six guns shooting, and killed far more than they did, simply by reason of the fact that although there were fewer duck, there was less disturbance.

There are few marshes that can stand more than two guns walking in line. Each shooter should possess a first-class dog, that is well under control, and quick to bring in fallen game, or held by a keeper and "dropped" to find game as the shooter passes on. The great importance of not stopping to talk and reload can always be noticed by any shooter of good observation, for immediately a gunner ceases to advance, ducks begin to rise at all distances, simply because, already alarmed by the shot they

do not know what is happening, and fear to be surprised, or perhaps surrounded. Even partridges will rise freely if you stop to reload. Wherefore there is something more frightening to birds in the man who halts than he who keeps steadily on.

By thus advancing slowly and steadily duck and teal will generally sit to within shot unless the weather is unusually bad, and a good bag made up if the place is properly looked after. Numbers of "flappers," which include both young ducks and old males in eclipse, will be encountered in August, and these should be released again, whilst the constant distraction of water-hens is apt to upset even the best dog. Yet the sport is on the whole a very good one, and far more enjoyable than shooting partridges in September. The British Islands possess many delightful bogs where good sport can be obtained. I have even had good fun in public places, such as the Tay mud flats at Inchture, where I have killed as many as forty duck in a day, and in the Orkney Islands. Sport of this kind is usually cheap, though it may not always be accessible or easy to find. For two summers I rented for one month a farm in the Hebrides for £40 a month, and killed over 200 duck each year, though quite half the time was spent in hunting seals and small mammals, &c. I should call that very cheap and excellent shooting compared to the indifferent sport to be obtained from the average partridge and pheasant estates.

On the other hand there are many who do not relish ploughing through high reeds and falling into bog and slime on a hot day, with the off-chance of a worse catastrophe in the shape of treacherous holes where the shooter may be immersed altogether. Only experience, however, can teach the shooter how to know the colour and the look of such traps, and when found it is well to test them or have a man behind ready to pull you out. Personally I have had more than one narrow escape, and have seen a friend almost drowned before my eyes. The Procurator-Fiscal of a certain island in the North does not love me because I asked him to shoot in a somewhat dangerous bog one day. He did not take the line I told him to follow, and soon fell in up to his neck, and was rescued with difficulty. A little later his favourite dog, a really fine animal, got into a hole, and though he was not drowned he died the same evening from the quantity of mud he had swallowed.

By the end of September, when the migratory duck are beginning to arrive in some numbers, there is a noticeable wildness on the part of the game, and if rarer specimens are to be killed it is often more successful to drive bogs, pools, or small lakes. This can also be done without the troublesome adjuncts of a crowd of beaters, for if the shooter knows his ground and has studied the lines of flight used by the birds he can nearly always "move" the duck to concealed gun or guns by means of one or at most two drivers. This is an interesting form of sport which, without resulting in large bags, often supplies specimens in various changes of immature and adult plumage which the naturalist may wish to obtain.

At this time, too, "flighting" may be commenced—one of the best of all sports. The selection of the right spot where the gunners should stand is a matter of personal observation. From one hour to ten minutes before darkness sets in all surface-feeding duck "flight" from the open waters or bays where they have spent the day at rest, and move to their feeding grounds for the night. Conversely they "flight" back to their secure homes at dawn, and though the morning flight is often the best in winter and early spring, the evening passage is usually the best in autumn days.

Adult Male; in eclipse. SMEW. Immature Male. Age 7 months.

GOOSANDER.

Immature Male. May. Age 9 months. Adult Male; in eclipse. October.

This generally commences with the flighting of Mallard to the corn-fields in late August or early September, and is coincidental with the ripening of the corn-fields. It is a sport that requires some patience and much observation to locate the correct spot, for the corn-fields of the North are often very large, and the points where the duck come in varied. Duck may stream into a field at one point where you stood the night before, but close examination of the field itself for feathers and droppings, as well as walking through the field after dark to put up the duck, are good methods of obtaining knowledge of their alighting places. The shooting, too, at this season is by no means easy, for if the weather is fine, as it generally is, the duck come in high and very late, only giving the gunner a few minutes in which to secure his game. In September 1912 I had three days as the guest of Lord Dalrymple at Lochinch, in Wigtonshire, and though duck were numerous I could not select the right spot until the last evening, when they came in well but very high, and I took down eleven rocketers in about ten minutes. After a big pheasant shoot in Cheshire last November, one of the guns came to me and said: "Do you think we could shoot a duck; I am tired of pheasants," and on our host kindly giving us permission to go where we liked, I hurried to a small swamp about half a mile upwind from a large mere where I had seen many duck during the day. We got there just in time, so placing my friend in what I thought was the best place, and going to another close by, we had not long to wait before the duck began to flight. In a few minutes my companion killed eleven duck and I got three; and the next evening I killed twelve and my friend two. A very pleasant instance of improvised sport. Later in the season Wigeon, Teal, Shovellers, Gadwall, and other ducks may be killed at flight, but these are all more difficult to shoot than Mallard, whilst the places they frequent in numbers are not very numerous. As Wigeon leave the sea or estuaries to feed in more sheltered bays, they may sometimes be intercepted with great success, particularly if the weather is rough or snow threatening. The best evening I have had at Wigeon was one day on the coast near Fort George, when a sudden snowstorm came on upwind and rendered all the landscape dark behind me. The Wigeon mistaking this for the usual darkness commenced to flight in from the sea fully half an hour before their usual time, and appearing clearly against the bright sky, gave me an unusual evening's sport.

But from December to March the best flighting is usually to be had in the early morning, for the reason that if duck do by any chance delay their return to the day resorts, they come late. Wherefore every error on their part is of advantage to the shooter, whilst the difficulties of picking up are simplified. Nearly all the best shoots at flight that I know of have been obtained in the morning. I have had as many as twenty duck myself, but no remarkable bags, because I have seldom shot on preserved inland waters.

The best morning flight I know of was obtained at Mr. Meynell's estate in Lincolnshire, on October 14, 1912, when the whole country was more or less flooded owing to continuous rains. The shooter was Lord William Percy, who is one of the best shots in these islands, and a man who thoroughly understands how to make use of his opportunities. He explained that he was standing on the edge of a dense reed bed, into which had the duck fallen they would have been extremely difficult to find, and so, with sportsmanlike observation and accuracy, he killed all his duck as they came towards him, so that they might fall on an open pool of water and so be easily recovered.

"I left the house at 4.15 A.M. and got to the place at 5 A.M.," he writes. "It was pitch dark and raining hard, and a good wind blowing—an almost perfect day for the job. Nothing came in till a few minutes before six, though for some twenty minutes before that there was some light in the sky, and if the ducks had come in early it would have been a very bad light. As it was it was not so bad. I fired the first shot (at a Shoveller) at 6 A.M., and shot till eight o'clock, before which time the flight was quite over, though I did kill a few ducks (eight I think) after that. As I told you, in my opinion the bag, which I gave you before, did not represent much more than half what could have been killed, with enough cartridges and lots of dogs to pick up. I only failed to pick up six ducks, but that was by dint of picking the shots very carefully during the whole flight, so that they should fall on the open water. The duck killed were: 75 Teal, 17 Shovellers, 6 Wigeon, 24 Mallard, 1 Pochard—total, 123."

Mr. Meynell kindly asked me to take part in the first flight on his estate in October, but by the time these lines are in print I expect to be hunting ducks and larger beasts in the forests and swamps of East Africa, so that the pleasure of seeing this remarkable duck resort may be delayed for some time.

Unusual conditions of weather, such as sudden storms, rendering the resting grounds of duck untenable, often create "day-flights," of which the shooter, if he knows his local birds and their movements, may take advantage. I have several times seen big day movements on the part of Wigeon, but have never been so fortunate as to intercept them. George Jennings, the old Dornoch punt-gunner, who lived for many years near the strip of land that divides the Dornoch Firth from Edderton Bay, had a remarkable day flight once on this neck of land. The Wigeon, disturbed by a storm, began moving across the neck at daybreak and continued to do so all day. Most of these birds were within shot of any ordinary shoulder gun, and Jennings, who could only command one small place, estimated that between twenty and thirty thousand Wigeon passed the Tarlogie Ferry point. He killed over 100 birds, and then had to stop for lack of cartridges.

The best day's shooting I ever had at Mallard was owing to one of these sudden day movements of duck. It was at Loch Leven on December 13, 1885, when a gale sprang up and forced all the duck that were resting on the north-east shores to pass the island and seek shelter. I was ensconced in a reed-bed on the Reed Bower island and had two decoys anchored in the water, and the way the duck came to me that day was something the wild-fowler dreams of but seldom experiences. Altogether I bagged 108 Mallard and Teal, and lost a good few besides owing to my dog being unable to continue its retrieving. On one lot of fifteen Teal that came in I shot eleven with the two barrels. Such a shot can seldom be obtained with the ordinary 12-bore, but the birds bunched together twice as I released the triggers, and the effect was to cut two large holes in the flock.

It is very seldom that the shooter has an opportunity of killing more than five or six duck with a 12-bore gun, even if a shot can be placed in the "brown" as they sit on the water. Let the reader try it and see. The result may be four duck killed and perhaps two or three winged. Also with the punt-gun when all seems favourable, and you think 100 birds are dead, the bag totals up about twenty. The reason of this is the small lateral killing area of the charge and the rarity of duck being strung out closely away from the gun.

The most remarkable shot with only ordinary 12-bore shoulder guns I know of occurred at Lochinch a few years ago. Lord Dalrymple had noticed the Wigeon collecting in a good pack on Cults Loch on the estate where they usually pass the day at rest. He

made a good stalk with two other guns at them, being aided by a green bank which screened the advance until they were within 25 yards. Then rising together the six barrels were discharged in different parts of the flock as the birds spread their wings and rose off the land. The result was that forty-four Wigeon lay dead. I doubt if such a number of duck have ever been killed before with six 12-bore cartridges. It meant that the six shots were all placed at different parts of the flock, exactly at the right moment and amongst the greatest number of birds.

Lord Dalrymple writes:

"The guns were Mr. J. A. Wallace, Mr. G. M'D. Stewart, and myself. I do not think that the whole flock contained more than 200 Wigeon. The day was fine, with a touch of frost in the air and a gentle breeze from the north or north-west. On January 16, 1911, at the same loch Gerald Legge and I killed twenty-four in the same manner, giving an average of six per barrel against $7\frac{1}{3}$ per shot in the other case. In the second instance there were not more than fifty or sixty Wigeon in the flock. The only cartridges used were ordinary 12-bore, loaded in my case with $5\frac{1}{2}$ shot, and I think Gerald Legge had the same charge. We were out after Woodcock, and noticed the duck whilst on our way to lunch. In the case of the big shot we never even crawled at all, and only crouched a little as we walked up to the firing point side by side. The Wigeon were on a steep bank of the loch covered with coarse grass, on which they were feeding. They only take to this form of food about the end of January every year, and seem keen on it only in frosty weather, but under such circumstances they are very fidgety, often returning suddenly to the water as if in alarm. In the second case the Wigeon had returned two or three times to the water before we approached, and if we had crawled another yard or two before rising to fire we should have met the birds on the brow of the hill, about 30 yards from the water and 15 feet above it."

Moonlight shooting is another form of sport which I must confess that I do not fancy very much, although large numbers of Mallard and Wigeon are killed by coast gunners. The birds are very difficult to see, and fly very high on fine nights when, in fact, it is only possible to observe them. Geese may be successfully stalked and shot by this method, but I must confess that I have been singularly unsuccessful on the few occasions that I have watched the clouds at night for duck, and can only admire the enthusiasm of those that enjoy this sport. Punt-shooting at night, too, is both difficult and somewhat dangerous. It is not pleasant to find you have been pointing your gun at a brother sportsman, or he at you; and this frequently occurs to those who hunt at night. The day always is long enough in which to shoot ducks.

Stalking both surface-feeding and diving ducks off the shores of a lake, river, or the sea is another delightful form of sport, and one that gives the naturalist many happy days and specimens for his collection. The methods of stalking the surface-feeders are such that may be employed in any form of approach to wild birds and animals, and call for no further comment; but to successfully shoot Golden-Eyes, Long-tails, Eiders, and the Mergansers a special knowledge of each and every species is desirable.

On the east coasts of England and Scotland the three last-named seldom approach the main coasts, so that they may be stalked from the shore, and I have only killed Eiders and Long-tails by this method on the coast of Sutherland; but in the northern and western isles the case is different, and they may often be approached to within gunshot by taking advantage of rock-cover, for here they dive and feed close in to the land in many places.

Where birds of other species, such as large Gulls, Herons, and Waders are numerous, it

is often a matter of difficulty to stalk diving ducks, because they are always alive to the movements of other creatures, and seem to recognise at once any sign of danger communicated by other birds. A Heron rising and squawking, a flock of frightened curlews or oyster-catchers, or the attentions of a great black-backed gull will put a whole coast-line on the move, so that it is often impossible to make a successful stalk unless the whole flock of ducks dive underneath simultaneously. The only way is either to wait until the conditions are more favourable, or take advantage of the whole flock being under water, and to run boldly to the point of firing. I have generally found that if you can get within 150 yards of a flock of Eiders, Long-tails, or Golden-Eyes, and mark correctly the spot within sight of the shore where you expect them to rise to the surface, you have time to accomplish the run. Golden-Eyes, Pochard, and Mergansers nearly always rise into the air at once when they see you, thus offering a much better target than one that is on the water, but Eiders and Long-tails have a way of sinking the body, turning away from the shooter and swimming off, thus offering a bad shot for hitting. This is especially the case if they have been little disturbed.

Another method of obtaining sea-ducks is by lying on flats of land or mussel-banks at dead low water when the birds come in from the sea to ascend the estuaries to feed. This is very uncertain sport, and apt to be a little dangerous unless the gunner knows his ground and tidal movements thoroughly well, or has a punt hidden somewhere close at hand, for the tide has a nasty way of creeping suddenly round these banks and isolating the gunner. When waiting on sand and mussel-banks, it is useful to have a large oil-skin to lie on, and two guns—one full-choke 12-bore, and the other a powerful 8-bore—so that shots at varying distances may be accepted.

Often days may go by without the gunner doing much at this form of sport, and then one day occurs when, apparently for little reason, there is a big movement on the part of the sea-ducks, and a good bag of Scaup, Scoters, Golden-Eye, and Divers of various kinds may be killed. I remember one day on the Eden estuary, when the ducks moved in a wonderful way after a heavy north-easter, and I shot away all my cartridges in a very short time, getting 22 Scaup, 6 Golden-Eye, 6 Velvet-Scoters, 10 Common Scoters, 3 Wigeon, 5 Divers, and 2 Brent Geese. The birds continued to stream up the estuary for hours afterwards.

It is hardly necessary to say more than a word or two on the pleasures and difficulties of shooting ducks both with the shoulder and the big-gun in the single and double-handed punt, as this form of sport has been fully dealt with in other works. It is quite an art in itself, and involves years of work on the sea and estuaries to understand all its charm, its difficulty, and its dangers. It is enough to say, however, that there is no method by which a large series of surface-feeding ducks may be obtained to compare with it, whilst the punt-gunner must be young and capable of withstanding considerable cold and discomfort to be successful. Given high animal spirits, a sound constitution, and a plentiful stock of patience, the punt-shooter will enjoy some great moments, as good as any that life can offer, and if he loves stalking just for the sake of its intellectual charm as well as the pleasure of studying birds in the very heart of their homes, he will not be disappointed.

By means of marsh- and lake-shooting early in the season and punting in the winter, the naturalist can in a few seasons kill nearly all the surface-feeding ducks he requires,

because he will get so many that he is able to pick and choose his specimens, and complete his series of their life-history. On the other hand, the opportunities of shooting true sea-ducks by these methods are few and far between, because if he attempts to invade them in the shelterless seas in which they live, he is apt to get into trouble. I have killed Long-tails, Scoters, and even Eiders out on the sea with the punt-gun, but I always felt that I was doing something rather foolish, and was glad to get ashore again. The sea-ducks (except Long-tails in spring) are absurdly callous to the presence of the flat-bottomed boat, and I have several times drifted right through a flock of Scoters and young Long-tails. One flock of Eiders which I found in the Moray Firth, where they were a great rarity, were so unsuspicious that I threw empty cartridge cases at the only male I wished to shoot, so as to force him to rise that I might kill him with the 12-bore.

If the naturalist is anxious to obtain a series of sea-ducks in the British Isles, the best way is to go to the Northern and Western Isles of Scotland and hire a small sea-going sailing-boat of broad beam and capable of withstanding rough weather. In the Orkneys and Shetlands are the finest types of men and the best sailors in Great Britain, and it is not difficult to pick a couple of these hardy semi-Scandinavians who will accompany him as much for their own personal pleasure as any monetary gain. These men enter into the sport of sea-shooting in a way that is as refreshing as it is unusual, and you have only to treat them well to make them your life-long friends and correspondents. I will only narrate one instance, to show what splendid fellows they are.

In 1880 I went to the Orkneys for the first time and employed a shoemaker in Stromness, named James Sutherland, for a fortnight, to come out on the sea and show me the best places for ducks and wild birds. The weather was very rough, and we only went to sea once or twice in that time, although he accompanied me every day in tramping or waiting in places on the coast. When I left I had the greatest difficulty in getting him to accept the sum of £3 which I offered him. After an hour's argument he put the money in his pocket, said "Good-bye," and I thought I had seen the last of him for that year at least. At four the next morning the mail-boat left, and just as we were pushing off from the landing-stage, a weird figure with few clothes on appeared on the wharf and flung a parcel into the boat addressed to me. As he vanished he called out, "A canna tak' it. A canna sleep. A've din naething for it."

Dear old Jimmy Sutherland and his assistant Tom Sinclair managed my boat for ten years after that, and at the end of each season I always had the same difficulty to make him take any money, as he always said it was such a pleasure to go shooting. Jimmy was a splendid viking of 6 feet 4 inches, and could handle a boat in a calm or a rough sea in a way I have never seen equalled. When not engaged in shooting, fishing, or bootmaking, he was, as he himself remarked, "much addicted to moral philosophy." The shooting of sea-ducks is a much more difficult business than it would seem to be. If the sea was always calm and the birds plentiful, and they would sit to within 80 yards, all would be easy, but in the northern isles it blows nine days out of ten. Ducks are not always numerous, and generally live on the edge of rough tideways which cause the boat to leap about in disorderly fashion just as the shot has to be taken. Sea-duck shooting is essentially snap-shooting, and the man who is successful at it must be accustomed to adapt his body to the rolling movement of the boat, to shoot straight and quickly with either 8 or 12-bore. He must be

smart to pick up the fallen, and to fire another shot at once at any duck that still shows signs of life, or it is generally lost. All these things only come with practice and experience, but when once learnt they are finer training for the game-shot than any other form of gun-shooting, as they make a man both quick and sure of his aim, owing to the fact that the pattern of his shot is invariably telegraphed back to the eye and brain as it hits the water.

One of the essentials in sea-duck shooting is that the hunter should spy his game before it takes any notice of the approaching boat. If the birds are down-wind, and the wind itself is not too strong, they may be sailed to at once, but if the birds are on either flank or upwind, a series of tacks so as to get to windward are necessary, and these movements must be conducted at such a distance from the birds as not to alarm them.

It requires no little skill on the part of the man at the tiller to approach sea-ducks down-wind when the wind is strong, for the boat in its outward rush is apt to travel too fast and to make loud noises as it descends into the trough of the sea. This alarms duck very much, and if it occurs more than once will put them to wing whilst still far out of shot. A clever steersman will keep his craft at varying angles across the waves so that he does not "race," and approaches whilst giving the bird the idea that he intends to sail by. When sailing to duck no gib-sheet must be used, and the lug-sail should have one or two reefs taken in, so that if at the last moment the duck rise and attempt to pass to the right of the boat the steersman may "gibe" and allow the shooter to dodge under the sail and get his shot.

I have always found the best guns for sea-shooting are a double full-choke 12-bore, carrying No. 4 shot, and a single or double 8-bore, throwing No. 1 shot. With these two weapons the shooter is prepared for anything that flies within 80 or 90 yards of his boat. He should hold the 8-bore in hand and be prepared for a long shot in case the duck rise at 100 yards; but if they sit until within a range of 60 or 50 yards, the 8-bore may be dropped and the 12-bore taken up, as the duck are bound to fly upwind towards the boat for some 20 yards or so before turning away.

It is often very difficult to keep your eye on any particular bird in a flock of sea-duck, as well as to attend to the shooting, and I found it a good plan to get my second boatman, Tom Sinclair, who had wonderful eyesight, to "mark" the specimen wanted and to attend to nothing else. As the duck rose in a small flock and approached the boat he would call out the number of the bird as it flew past, and in this way mistakes did not often occur.

When sea-ducks are shot for specimens they should be laid on the seats of the boat and allowed to drip for some time, as there is always a lot of slime, blood, and digested food in the crop that it is well to get rid of. When the bird is fairly dry, blood on the head and neck can be skimmed off with a penknife, and all the wounds dressed with cotton-wool, and the mouth and nostrils plugged with the same. The bird should then be wrapped in soft paper and packed in a waterproof box kept ready for the purpose. A taxidermist has very little trouble in making good skins of birds that have been properly attended to after being killed, whereas it is difficult to make fine specimens of those that have been left for some hours knocking about in a boat with the sea-spray, blood, and water on them.

If only a few duck are being killed for specimens, the shooter may like to preserve his

own specimens, but if not they should be despatched as soon as possible to the taxidermist. In warm weather it is a good plan to take out the body, as decomposition proceeds very slowly when this is done. Careful notes of sex, date, locality, and age of the bird should be taken at once and entered in a book; whilst the stomach should be examined and the food if possible identified.

My experience has been that the Shetland boatmen are not nearly so brave or so observant as the Orcadians, whilst the Hebridean crofters are both lazy and avaricious; yet there are very good hunting grounds for sea-ducks to be found in the Sound of Yell in the former islands, and on the west coasts of both North and South Uist and the Sound of Harris, if the hunter can get over the difficulties of securing reliable boats and boatmen.

ON THE REARING OF DUCKS FOR SHOOTING AND THE KEEPING OF ORNAMENTAL WATERFOWL IN CONFINEMENT

Of recent years there has been a distinct move on the part of British sportsmen to raise a stock of wild ducks (principally Mallard) for shooting purposes as a pleasant variety to the ubiquitous Pheasant and Partridge; and whilst these birds may be reared and brought to the gun in one season without the adjuncts of lakes and rivers, it seems to be somewhat pressing the point of artificiality a little too far to do so. Nevertheless, there are few places where lakes, burns, or rivers are to be found where ducks cannot be reared with success, and where in due time they may be induced to fly and furnish quite as good, if not better, sport than Pheasants, as well as providing the necessary variety. In proper surroundings the flock of duck, even if artificially reared, do not look out of place; whilst the expense and difficulty of rearing them is not more than that of the Pheasants, and in ordinary seasons the death-rate of young birds is smaller.[1] To explain modern methods of rearing ducks, I do not think I can do better than recapitulate certain articles I have written on the subject, and combine these remarks with the experience of others who have had a wide experience in management of these birds, taking in the first instance the experiments conducted at Netherby, Cumberland, by Sir Richard Graham.

After a preliminary effort in 1890, when 120 Mallard reared under hens were turned out on a pond and found to furnish indifferent sport, Sir Richard, in 1894, tried the experiment of rearing wild ducks under hens on the ground where they would eventually be shot, namely, at the Carwinley Burn. These ducks, to the number of 600, were fed higher up the burn, and flushed in small numbers on the day of the big shoot. They flew well, and the gun at the burn mouth killed 91 at his stand. Then, since the birds knew no country beyond the burn mouth, they circled round and came over the other guns, eventually settling again at the feeding places, and so affording several drives. The result of the day's shooting was 400 duck, and the experiment was voted a success, as 625 were killed in the season. More duck were brought up in 1895, and 799 were killed in three days' shooting and 1093 in the season, the places of shooting being the Solway Moss, Red Bank (the burn mouth), and the upper part of Carwinley Burn, which is surrounded by a wood. Here the birds were fed into a pen and let out in small parties, which took their flight down the water. The birds in the pen acted as natural decoys, to which the duck that had already been flushed and shot at returned, and were again re-flushed. In 1896 the same methods were pursued, and 2317 duck were killed; 1898 may be said to mark the third stage in the proceedings, when Sir Richard tried for the first time the experiment of letting hand-reared wild ducks sit and hatch their own eggs and bring up their own young. Three areas—(1) on the edge of Solway Moss at the Gap Burn; (2) the Carwinley Burn; (3) at the mouth of Carwinley Burn—were wired in against foxes to the area of 200 acres, and in each were

[1] About 90 per cent. of duck eggs are reared at Tring. This is a somewhat higher average than usual; 80 per cent. is considered quite good.

placed cut-winged wild ducks to the number of 400 to 500, there being two drakes to every ten ducks. Each enclosure was divided into four portions, and again into four more. In each pen a careful record of the sitting ducks was kept, and when at twenty-four days the eggs began to chip, the duck was taken off the nest and put in a coop with her own young ones, carried to the rearing field, and eventually to the ponds and streams. This experiment was only to try the wild duck as a mother, and it proved but a partial success, because the mothers themselves were hand-reared, therefore more or less useless. In addition, a number of duck were reared under hens. In 1899 these methods were further extended, and the enormous number of 5532 were killed in the season, separate days at the three principal shooting-places totalling 407, 756, 849, 261, 543, 736, 315, 303, 80, 357, 341, 116, and 180 birds.

In 1890, 4329 duck were killed; and in 1901, 4233 were bagged, in addition to 831 rock-pigeons. The latter bred more or less naturally on the rocky banks of the Carwinley Burn, and were trapped in small numbers at the same time that the duck were being driven, so that the shooters had the unique experience of a mixed duck and pigeon drive.

The year 1902 may be described as the great one, the six best days being as follows:

Date.	Beat.	Number of Duck Killed.
October 14	Red Bank and river	1141
" 15	Gap	1195
" 16	Carwinley Burn	1250
November 25	Gap	464
" 26	Carwinley Burn	801
" 27	Red Bank and river	1319
		6170

Sir Richard was now satisfied that a large stock of duck could be raised and shot by artificial methods, but he had found that the wild duck as a mother was no better than the foster-mother hen; accordingly, he looked for other means of rearing ducks that were less artificial and more in accordance with Nature.

To most of us who love birds and wish to preserve them, it is obvious that first of all we must have (1) an area of ground or water suitable for their requirements; (2) perfect peace and freedom from disturbance; (3) abundance of food; and (4) immunity from the attacks of man and vermin. If we have these essentials (and they are to be found everywhere), we can in time get almost any birds to stay and breed with us provided we start with a nucleus. A simple instance of this is the abundance of Gulls, Wood-Pigeons and Tufted Ducks in the London parks to-day. More uncongenial or unattractive places it would be difficult to find a few years ago, and yet within these areas are now little enclosures, fenced off, where man cannot invade, and here these species (except the Gulls) first bred, or had sanctuary, and found an abundance of food, which the Nature-loving public greatly supplements. When I was a boy it was impossible to see anything in the London parks but very dirty London sparrows; but spring to-day in London is almost as pleasant as the country, with its beautiful gardens and its flocks of Ducks, Wood-Pigeons and Gulls, making life joyous with their happy calls.

Having selected the place you wish to make a bird sanctuary, the only difficulty is to

get your first ducks to breed, and even that is not very hard when intelligence, backed by certain artificial aids, is brought to bear upon the subject. Now let us see how Sir Richard initiated, and has since developed, this idea at Netherby. One day he read in a book that no fewer than 16,800 wild fowl had been taken on a single acre of water in England, situated in a favourable position (the Harwich decoy). If that could be done in one place, it might be done in another, and it was obvious that even comparative success would result in a very handsome profit. First of all it was necessary to make a decoy pond, place on it a nucleus of duck and feed heavily, so that the home-bred birds should know where food could always be obtained. This point is one of extreme importance, because owing to severe frosts the duck leave and repair to the sea-coast, where they mix with their wild brethren. On a thaw taking place the home-bred birds return at once, or gradually, but always bring some of the true wild ones with them. The latter come and go, but they have discovered a place of rest which is also a good feeding ground, and so they in turn bring back fresh adherents until the decoy pond is too small to hold all the duck that come to it. This is what is called "obtaining a lead," and once having established it, all that is necessary to further expansion is increased water area. In this manner it is obvious that an enormous number of duck may be attracted for the small cost of the wages of two men, a moderate grain bill and the making of a few ponds at a cheap rate, provided the land employed is suitable; that is to say, it must be more or less flat and surrounded with woods as wind shelter, for all ducks hate a draught, and there must be an abundant supply of water at hand and easy to conduct.

Sir Richard began work in 1904 by constructing a small decoy pond to catch ducks in a wood by the Solway Moss, through which flows a small stream known as the Gap Burn. Here he made the mistake of digging out a deep pond, raising high banks and puddling the whole with clay. The success of this pond led Sir Richard to abandon the old artificial methods as well as to continue to shoot large bags of duck. Now he can give his friends a good day's shooting or an evening flight which may realise 50 to 100 genuine wild duck, and catch for market over 1000 Mallard every season; and he has proved that the whole system is capable of great extension, for the reasons already given and another. Up to the present time all the ponds which have been constructed at Netherby have been made for the attraction of the various surface-feeding ducks, and not for shooting. When it is considered that there is a sufficiency of ducks of all species, Sir Richard intends to make other lakes a mile away from the decoy ponds, where shooting can take place regularly. Such shooting as is now done is only occasional and experimental.

It is a truism that we only touch the very fringe of the great mass of duck that nightly passes over our heads during the early spring and autumn migrations. Unless a man is a very close observer of Nature, he has no conception of the tens of thousands of Duck, Plover, Snipe, and Woodcock there are which pass over our sleeping land at certain seasons only looking for a place of rest. There are many small sheets of water, marsh, and coppice which draw some of them down, and they may rest there a few hours, but few indeed are quite agreeable enough to hold them, and so they pass on at once. The great thing is to make these places suitable with a little care, and thus sanctuaries are formed. Marshes and ponds could be formed in the very centre of England, Ireland, and Scotland with every

prospect of success in what the uninitiated would call very unfavourable situations, for duck and snipe will come year after year to the same place if the feed is there. As an example of this I may state that I have killed ten couple of snipe and four ducks before breakfast in the Postle Marsh close to Maryhill Barracks, a noisome bog actually in the town of Glasgow itself. Mr. Rimington-Wilson shot seventeen and a half couple of snipe in the same spot a few years before when the bog was larger.

Now let us observe how the new ponds are made at Netherby. First, the site is chosen in the wood to one side, and below the Gap Burn, where the land is more or less flat. A few knolls or holes are no detriment, as on filling with water these form little islands or open spaces, which are advantageous. A section of parallelogram shape, one hundred and fifty yards long and about one hundred yards wide, is marked out, and the trees are felled (the sale of this timber, Scotch fir, pays for the making of the pond). Nothing is done to the main area, but banks about four feet high are raised round the pond, the bases and interior of these being filled with puddled clay and covered with sods. At the top left-hand corner an inlet is constructed some four feet above the stream-level, and about ten feet below, on the brook itself, a sluice-gate that can be lowered or opened at will. This controls the water-supply, so that the pond can be raised or made shallow as required. Before filling it has been found to be a good plan to plant rushes round the base and sides of the surrounding banks, as these plants not only prevent side-washing, but afford a secure retreat and shelter for young ducks in bad weather. It is also of importance that the pond should run out on one side to a level, as this gives the ducks landing-places, and is in summer a certain harbour of insects as the water retreats.[1]

Bell, the duck-keeper, who is an unusually intelligent man, noticed that any old stumps of trees left sticking out of the water were usually crowded with duck preening themselves at certain hours, and so now flat boards are erected just above the water-level to which the birds can resort. Having filled the pond with water to a depth of three feet, it was at first found difficult to plant it with rushes; but this obstacle was overcome by the keeper in a simple manner. He waited until a hard frost came, and then, digging up some hundreds of the plants with the roots, laid them on the ice in an erect position, after first cutting the roots square at the bottom. As soon as the thaw came, the plants sank straight to the bottom in an upright position and took root in all the shallows. Thus the pond had all the appearance of an old and naturally planted lake during the first summer, there being equal areas of rush, marsh, and open water. If we read the text-books on pond-making, we find diverse opinions on the merits of the common rush as covert suitable for ducks; but Sir Richard Graham believes that there is no covert to excel it, as the old birds use the tufts on all windy days as a shelter, and the young get right in under them in bad weather, finding quantities of insects there in the coldest days of spring. It has been found to be a good plan to allow the water of the pond to overflow its banks occasionally, as it prevents moles and rats, the chief enemies of ponds, from extending their ramifications, while the water only percolates away and rejoins the side streams.

No doubt much may be done with ponds to render them additionally attractive to wild duck of various kinds by planting and encouraging natural feed. At present this is

[1] There is an excellent description in Simpson's *Game and Game Coverts* on the making of artificial ponds, and for a perfect water-supply to a pond, see *Field*, Sept. 26, 1903, p. 547.

only in its infancy at Netherby; but as time goes on various natural water-plants which duck love, such as duck-weed (almost their favourite food), wild celery, wild rice, foxtail grass, and wapata, will be used. Water-cress is also good. The duck like it, and also it holds much insect-life in summer. When using wild rice it must be remembered that the seed must be imported and sown wet, otherwise it will not grow; but under any circumstances its success as a British plant is very doubtful. The best covert on the banks are those shrubs which grow quickly and form immediate wind-breaks, such as broom and willows, the latter being most important. A few rhododendrons are also good, but take time to grow.

Sir Richard Graham, having found that Mallard could be attracted in large numbers, soon turned his attention to the preservation of other surface-feeding ducks, and formulated the theory, a strikingly original one, that in the case of those species, such as Pintail and Gadwall, which are difficult to breed and retain, a race of home-staying birds might be created by raising hybrids between them and Mallard, and again recrossing with Gadwall and Pintail, until at the third or fourth generation he had created a race of pure, or nearly pure, Gadwall or Pintail that would not be disposed to wander too far. This idea he has worked successfully, so that now there are at Netherby small flocks of what are to all appearances pure species, and which it is hoped in future will become numerous. The first thing to do was to get a race of home-dwelling wild duck of good strain as mothers, and by close observation and selection this was obtained. One curious fact was noted by Sir Richard, namely, that the wild ducks are bad and wandering mothers in the first year, and that it is not advisable to utilise them as such until the second or, better still, the third season. Then their first eggs are taken from them, and early in May, when they sit again, the eggs of Pintail, Gadwalls, or other surface-feeding duck are placed under them, with complete success. The progeny keep with the foster-mother till the autumn, and then often return themselves in spring to breed. In addition to this Sir Richard has found it an excellent plan to raise wild surface-feeding ducks by the following method: In November a large number of Mallard, Wigeon, Gadwall, Pintail, Teal, &c., are caught in the traps. These have their primaries cut, and are placed in a big wired-in enclosure and fed through the winter. At the end of February they are caught up, and the "stobs," or old quills, are pulled out by hand. The new primaries at once commence to grow, and the duck fly in twenty-six days. The object of the plan is this. By the end of March the duck are pairing, or have paired, and, it being too late in the season for them to go North and seek breeding-grounds, they are disinclined to travel, and so look for nesting-places in the immediate vicinity. This has been found to work well, and numbers of these winter-penned birds are settling down to nest in "roughs" about the Solway Moss and woods.

Before leaving this subject of the pairing of ducks I would like to point out to future experimenters the great importance of fostering the "love matches" of ducks, an interesting phase in the character of these birds which I have fully explained in my work on the "Surface-feeding Ducks," and which may sound like some romantic dream, but is, nevertheless, literally true. A drake will only successfully breed with a duck with whom he has fallen in love, and any forcing together by man is generally attended by failure. I noticed this long ago when keeping ducks in confinement, and Bell, the keeper, who has

a vast experience on this point, tells me that when he has accidentally paired a duck with another husband and placed the ill-assorted pair two hundred yards away in a pen, he has been struck with the restlessness and repeated cries of the duck to her old love, who in turn has been mated with another wife. Often has he seen a pair of duck, especially Teal, apparently settle to affairs matrimonial, and then the drake will become wild and restless, running up and down and calling repeatedly to some charmer in the far distance. I have seen a duck and drake sit patiently for hours together, separated by some wire fence, and such natural inclinations ought always to be encouraged. It seems scarcely necessary to point a moral for the human species.

Mr. W. Coape Oates, who has successfully bred large numbers of duck, commenting on the third stage of the Netherby experiments, attributes the main cause of the failure to the fact that Nature was only allowed to have her own way to a certain extent.

"Wild Ducks," he says (*Country Life*, February 25, 1911), "if uncrossed with a tame strain, pair in the great majority of cases, and each pair like to wander off and nest in some special place selected by themselves; and it would appear that the plan of wiring in a certain number of ducks and drakes in a given area thwarted this natural instinct; and the fact that they were enclosed within a given area—no matter how spacious—prevented them from wandering far in search of food. I think, too, that two drakes to every ten ducks was hardly sufficient, and it would be interesting to know the percentage of ducklings hatched to eggs laid, and also the proportion of birds reared to those hatched. Many years ago I tried the wild duck as a mother on the rearing-field, and found her a complete failure. When placed under a coop, I found her terribly jealous and excitable, and so anxious that her young were often put off their food by the constant warning quacks of the old bird. I noticed also that in confinement they got terribly dirty, even if repeatedly washed, and that there were many more cases of purulent ophthalmia in a brood reared by a wild duck on the rearing-field than was the case if a hen was used as foster-mother. I may say that it is not my experience that hand-reared wild ducks are bad mothers—rather the reverse, and the mere fact of their being hand-reared makes them less likely to desert their nests while laying or sitting, as, being used to the proximity of man, they are naturally not shy.

"The plan I have pursued during several breeding seasons, which has been very successful, is as follows. The ducks and drakes, approximately, in equal numbers, are allowed absolute liberty, and are permitted to select their own mates; the birds are fed close to small areas which have previously been prepared for nesting purposes. Plenty of cover is supplied, artificial nests are hollowed out in suitable places, such as old willow trees, stacks of firewood, thick hedge bottoms, &c., and it is found that the birds, having been used to look for food at regular times in certain places, get into the habit of nesting in their near neighbourhood. Their nests are easily found, and each duck is allowed to lay three lots of eggs. The proceeds of the first two are placed under hens, and the duck is driven from her nest just as she commences to sit. These early lots are reared under hens, while the ducks are permitted to sit on their third lot of eggs, to hatch them out and rear the young birds under natural conditions; consequently each bird gets some practice at bringing up a family, and the maternal instincts are allowed full play. Almost invariably the old ducks take their clutches up the shallow dikes, and some distance away from their usual haunts; here they are free from the attentions of pike, and if the stream is running, a steady supply of food may be expected to come down. Sometimes drakes behave in a very unnatural manner, pulling the sitting ducks off their nests, and even interfering with the eggs; consequently it is often wise to catch them up altogether, when the ducks have begun to sit. Drakes vary, however, in disposition, and I have seen one defend his mate and ducklings against a number of others, warding them off until free passage had been allowed to her and her brood.

"The construction of a decoy-pond in 1904 by Sir Richard Graham and the further extension of the work were the most important steps hitherto taken. A decoy-pond, where food is regularly supplied and rest and shelter are always to be had, will draw numbers of strange ducks; but these strangers will not stay to breed there in large numbers, as they prefer solitude at this time, and it was a stroke of genius to extend their breeding area by the construction of numerous other ponds in the vicinity; these were small

pieces of water near the woods, and consequently secluded and well sheltered, a point rightly regarded as of the greatest importance. It is interesting to observe that the number of these ponds will be increased and a fresh series planned out for shooting purposes only. This is as it should be, as the site of a piece of water selected for suitability for sport might not necessarily be satisfactory for nesting purposes.

"The system of controlling the water-supply is admirable, and all lovers of wild ducks realise the necessity for supplying frequent rise and fall in the water which these birds frequent. It is noticeable that most wild ducks are invariably to be seen either when a piece of water is rising, owing to a flush in the stream which feeds it, or later when the level falls and portions of land lately submerged become bare again. The reason for this is obvious; when a rise occurs fresh food is sent down, and when the flood subsides it leaves behind numerous worms which have been drowned. It will be observed that the ponds are, for the most part, shallow—a very necessary provision. Ducks love a depth of water which enables them to reach their food without being completely submerged, and they always select shallow bays and inlets in preference to deeper water, always provided that the former are kept quiet. Wild ducks are surface-feeders, of course, but they love 'standing on their heads' in water which is shallow, and where a gradually receding freshet supplies them with their favourite food. The planting of rushes and other covert in and around the ponds is very necessary. I have found that they do very well if planted in the early spring just at the edge of the shallow water; as time goes on they spread and form excellent shelter. In addition to the 'flag,' as we call it here, we have bulrushes and very tall reeds. These latter grow to a height often of eight to ten feet, and ducks of all kinds prefer them to anything in a gale of wind or on a very cold day. They are not so easy to establish as the 'flag,' and appear to be more delicate, and I have noticed that considerable portions of a bed will die in a very severe winter. The experiment of planting made by Bell, the duck-keeper, is interesting and most original, and one would have expected the roots of the plants to be frosted and die if subjected to such treatment. The stunted willow locally called 'sally' makes excellent covert, and its leaves harbour countless insects which provide good food later on. Water-cress, I notice, is recommended, and Wigeon in particular show great partiality for it. One wishes that duck-weed was to be had all the year round, as there is nothing which ducks like better, and if only there is a dike connected with the pond or lake, a plentiful supply will be washed down with each rise of water; but the quantity will be larger if the stream is not too rapid, as under such conditions the weed thrives better."

Commenting on the disease of purulent ophthalmia, so common in the young of all young ducks, Mr. Coape Oates attributes its cause to:

"(1) Improper food, or, rather, insufficiency of animal food; (2) careless brooding and draughts; and (3) infection. To guard against it the young ducklings should be given a plentiful supply of worms in addition to their other food. Too many birds should not be crowded under one hen, and the foster-mothers should be carefully selected, while the coops and utensils must be carefully disinfected before use. One hopes that Sir Richard Graham may see his way to make a more extensive trial in breeding pure-bred Gadwall, one of the most beautiful of birds. The account of the hybrids is very interesting, and most people will feel some surprise and disappointment that the Teal has not been successfully crossed with the Garganey. The former is naturally the hardier bird, and as one travels farther East and into warmer climes the Garganey seems to outnumber the Common Teal. The system of crossing the varieties of wild ducks most nearly allied to the common bird with the latter, and recrossing back to the species which it was desired to establish, were extraordinarily successful, and appear to have given to the young birds just that desire to breed at home which was most wanted."

Before alluding to the commencement and gradual increase of the more interesting species of surface-feeding ducks now established at Netherby, it is necessary to point out that apart from the difficulty of getting the first birds to breed and return, it was found that the Mallard were a considerable hindrance to such smaller duck as Wigeon, Pintail, Teal, Shovellers, &c., owing to their greedy habits. When food was placed on the peninsulas and islands of the various ponds, it was found that the Mallard got most of it, and actually drove aside the weaker species, thus discouraging them from resorting to those waters in

any numbers. This difficulty has been obviated to some extent by the creation of numerous little lakes of highly different character, for it is noticeable that Teal, Pintail, and Shovellers resort to a "boggier" pond than Mallard, Wigeon preferring a somewhat open sheet of water.

The following species are now naturalised at Netherby in the lakes by the Gap Burn, and the history of their commencement and upgrowth will be of interest to others wishing to experiment with them:

PINTAIL.—Some pure birds were obtained from Halls of Sudbury, and twelve hybrid Mallard and Pintail were purchased in 1900. These hybrids, selecting the best coloured males, were recrossed with pure Pintails, and again recrossed, until what are to all appearances pure-bred Pintails have resulted. They have been found to be somewhat shy breeders, but a certain number now return regularly in autumn and spring. They are about fifty pairs at the present day, and none are killed.

TEAL.—Sir E. Grey and others interested in ducks have always found this species difficult to breed. After some failures, Sir Richard Graham started his stock by setting the eggs of wild birds. Even this was not very successful, so he purchased forty or fifty pairs every season, cut their wings, and allowed them freedom in the spring when their primaries had grown again. This was highly successful, as the birds do not migrate, but stay about the Moss and woods and breed freely. In 1898 there were at the most two hundred Teal on the Solway Moss Ponds, but in 1908 Sir Richard was able to capture in the traps eleven hundred, which would represent less than half the stock on the estate. They are now increasing rapidly. Teal wander both North and South; a Ringed Drake, marked at Old Hall Marsh, Tolleshunt D'Arcy, Essex, on February 14, 1910, was taken at Netherby the same year, and another of the same lot was captured on August 21, 1910, on an island off the coast of Schleswig.

GADWALL.—In 1902 two pairs were bought from Halls. It was, however, three years before they commenced to breed. The eggs were at first placed under hens, and it was found that they were most difficult to rear, many going blind, a disease common to wild ducks reared under hens, and not found when the ducks rear their own young (the reason probably being the absence of oily secretions). Sir Richard accordingly stopped this method, and again tried the hybridising system by crossing Gadwall drakes with Common Wild Ducks. This was most successful, and the hybrids were found easy to rear. These crosses were again crossed and recrossed with Gadwall drakes. The process was slow, but in 1910 the birds, which are almost quite pure Gadwalls, bred freely of themselves, and are now established. I saw about thirty on one lake, and the stock is said to be forty.

WIGEON.—The Netherby stock commenced with three, presented by Mr. H. St. Quintin in 1903 (Mr. St. Quintin's birds originally came from Sir Ralph Payne-Gallwey, who was, I believe, the first to breed this species in confinement). Sir Richard Graham also purchased one pair of Wigeon from Halls, and all bred at once, the progeny being reared under hens. Now they nest freely in the rough grounds, and the stock numbers over a thousand. About four hundred are trapped and killed annually.

AMERICAN WIGEON.—This beautiful species, obtained from Jamrach (who imported the birds for the Duke of Bedford), has just been started, and has bred with Pintail and

Common Wild Duck. Sir Richard considers that there will be no difficulty in getting up a good stock in time, as they are as amenable as our Wigeon. A pair of American Wigeon were given to Sir Richard by Mr. H. St. Quintin, who bred them at Scampston; the duck was lost, but the male, now at Netherby, is by the American Wigeon drake out of a Mallard-Wigeon duck.

Shoveller.—A few Shovellers have been bred in the same manner as other species, being started by eggs obtained from Loch Spynie. In 1910 they bred successfully, and more return to Netherby each spring.

Garganey.—This species is not yet established, but examples come every spring, and are captured.

Mandarins and Carolinas are both to be seen in freedom at Netherby. At first they bred far up in the fir trees in the old owls' nests, but now have boxes for their accommodation placed in the woods. The Mandarin is a good mother, but the Carolina a bad one, so the eggs of the latter are generally lifted and placed under a foster-mother call duck, which makes the best of parents. At present the stock is not large, as it is at Woburn, but no doubt in time will increase in number.

Sir Richard has bred some very remarkable hybrids, some in which Wigeon, Mallard, Gadwall, and Pintail all have a share, and has proved what was previously unknown to naturalists, that nearly all the true surface-feeders are fertile *inter se*, and on to the fourth, fifth, and sixth generation. So far he has not been successful in crossing Teal with any other pure species, though I think it is likely he may be successful by mating a male Teal with a female Pintail, since the two species are so closely allied. It might be achieved with a female Garganey, but that species is far more nearly allied to the Shoveller, with which it would probably cross. I agree with Sir Richard that the so-called bimaculated duck, of which Suchetet gives eight or nine examples, is probably not a cross between Mallard and Teal, but a produce of a male Teal crossed with a hybrid Mallard and Pintail, the commonest cross known among surface-feeding ducks.

At Netherby, in 1903, a Teal drake crossed with a Pintail-Mallard duck. Three eggs were laid, two of these hatched, and one, which proved to be a duck, was successfully reared. This interesting hybrid lived for three or four years at Netherby, but, being full winged, it departed, and has not returned. Some of the first hybrids are very beautiful birds, such as the Mallard and Wigeon and Wigeon and Pintail. It is interesting to note in some cases the predominating influence of the sire; for instance, the Mallard commands the Pintail and Gadwall hybrids, the Common Wigeon dominates the Gadwall, and the American Wigeon the Common Wigeon. The Common Teal probably commands the Green-winged Teal. Another interesting point in the breeding of ducks is that the drake of any species is most likely to be fertile just as he is "going off," wherefore a duck that is paired with him, and has laid a large number of unfertile eggs, often lays a fertile egg or two at the end of her sitting.

Several pairs of Baikal Teal have also been liberated at Netherby, and these for a time disappeared. A pair of these beautiful ducks, however, came to Netherby in the spring of 1912, and succeeded in rearing a fine brood. They probably came from Mr. Maurice Portal at Hexham, in Northumberland, as he also had several full-winged pairs.

Mr. Hugh Wormald, Mr. Meade Waldo, and the Duke of Bedford have all bred large

numbers of Carolinas and Mandarins, and a very beautiful sight it is at Woburn to see the full-winged flocks of these gorgeous ducks flying about from lake to lake.

The traps used for catching wild duck at Netherby are of the simplest design and construction. They are, in fact, nothing but the old rat-traps enlarged, which allow the birds to enter, but from which they cannot retreat. The trap is made of ordinary rabbit wire, supported in the centre and at the sides by strong stakes. When no catching is being done, the whole front is raised and food is placed leading up to and within the cage. On the night when it is desired to trap ducks, the front is fixed down, and the only means of ingress is the wire-netting "pipe," about 6 feet long. Food is scattered outside and along the pipe itself, and more placed inside where the duck can see it. Having devoured all the grain, chopped swedes, and whatever is used for bait, the birds follow the supply up the pipe, and, once inside, never move backwards to find the exit, but try only to get out at the sides of the pen. Curiously enough, numbers of Black-headed Gulls, Crows, and Rooks are caught in the enclosure, but Water-hens invariably find the way out.

Both for the collecting and the shooting of ducks there is no doubt that the success of the Netherby system depends largely on traps.

"Without a considerable supply of these traps," says Maximilian (*Field*, July 1, 1911), arranged in different parts of the grounds, the ducks must either be kept so tame that they do not afford proper sport, or else they are so wild that they cannot be brought under control on shooting days. Each area which they frequent should be fitted with a proportionate number of these traps, and the spots on which they are erected should be chosen with discrimination and care. They should be placed at the water's edge, and their interior area should consist of, roughly, one-third water and two-thirds land. The bank on which they are situated should thus have a gentle slope, and they should have a frontage on an open sheet of water of a moderate extent. If the main sheet of water is extensive the traps should for preference be located in sheltered bays and alcoves; whilst if the water is reed-grown and shallow, the traps should abut on a favoured place, and the water immediately in front of it should be clear from reeds. If it is not naturally open, the reeds may be cleared by cutting with a scythe, or the water may be permanently freed by cutting away their roots.

"From the very commencement of the season the traps can be applied to important uses. First and foremost, the water inside and surrounding them should be regularly supplied with maize or other suitable food, so that the wild ducks in the neighbourhood will be attracted thither, and will accustom themselves to regard the traps as safe feeding places. There will be evidence in due course that the food is being taken, and the traps should from time to time be set to ascertain what birds frequent the water. All Coots so caught should be killed, their presence being undesirable as consuming food that ducks appreciate. Tufted Ducks are amongst the most esteemed for the table. It is essential that the feeding in the shallow water, especially in the neighbourhood of the traps, should be regularly carried on from the time that the young ducks first commence to fly. A single day's neglect will result in their moving elsewhere, and the process of education will have to be started afresh. The usual condition of the trap is with the whole 21 feet of frontage uplifted, so that the ducks can walk in and out free from interference of any sort. It is not until the trap is actually required to capture the birds frequenting it that the front is pegged to the ground. Birds soon find the sole remaining opening, via the tunnel, but have not the reasoning faculty that would enable them to come out by the same route as that by which they entered. This trap is therefore superior to those of other designs where it is necessary for someone to hide in ambush and let down a hinged door. It does its best work in the quiet of night-time, and catches the wild birds which take the food thrown down by the keeper, as well as the tamer hand-reared ones.

"On the general question of the morality of catching all the birds that visit the water, it may be laid down as an axiom that every man may justly catch as many birds as possible. In so doing he is not stealing the birds of a neighbouring preserver, for the simple reason that everyone who rears ducks enters keenly into the competition of spreading plentiful food for their delectation. The surplus birds

that every preserver catches consist largely of the migrants from countries beyond the seas, which are forced to leave their breeding haunts when snow and frost seal up the means of existence. Wild-fowlers on the coast complain of the ever-diminishing supplies. This may be true of some of the wilder species, but it is absolutely certain that Mallard were never so plentiful as at the present time. The difference is that preservers know better than to allow them to go foraging for food, and so fall a prey to the punt-gunner. Ducks do wander, and will ever continue to make their nightly excursions to the stubbles, and to every pond into which food is thrown, and which constitute safe feeding grounds where harm seldom befalls them.

"This year practically all the purveyors of wild ducks' eggs received such plentiful orders that they ran short of supplies, and prices rose considerably. Those who desire to establish ducks on any available piece of water hitherto running more or less to waste would do well to erect a series of traps on the Netherby plan, and utilise them to begin with as pens for first introducing the young ducklings to the home water. Ducklings hatched by hens or incubators are incapable of entering the water till they are several weeks old, a fact which is in curious contrast to the readiness with which real wild ducks can swim from the moment they are out of the shell. The probable explanation is that those reared in the wild state derive a supply of water-resisting oil from contact with the mother-bird, whereas those artificially reared must wait some weeks for the development of the necessary oil gland to render their own feathers water-resisting. When the keeper decides that the time has come for taking the young ducks to the water, no better situation for the hen-coops can be conceived than one of the catching traps. These have naturally to be placed in different parts of the ground, so that the various families of young duck will be encouraged to inhabit different areas of water, so utilising the natural food supply to the greatest advantage. If the amount of water inside the trap is insufficient for the purpose, a somewhat larger area can be temporarily inclosed outside, and communication therewith can be made by raising the front of the trap. For at least three days the young birds should be kept in this partial confinement, so as to accustom them to their new surroundings and acquire the habit, when afterwards released, of turning to the trap for food. At the end of three days the temporary inclosure may be removed, and the young ducks will then make their way amongst the reeds and waterways in the near neighbourhood, where they will eagerly seek flies, small aquatic insects, and other natural provender.

"The pen and water surrounding it will continue to act as the chief feeding place, and the young ducks will acquire the habit of walking unconcernedly in and out of it. Whilst the coops remain in the traps and the young ducks necessarily spend much time in their vicinity, the protection of the solid roofing and sides is an asset of some importance. Once the hens are removed the ducks will adopt a more natural mode of existence on the water, resting for the most part on the small islands which wise forethought will have provided. Ducks are, of course, much cheaper than Pheasants to feed, for the reason that they obtain a good half of their food from natural sources. If each trap is made the head-quarters of fifty young ducks, and the traps are scattered at intervals of about 100 to 150 yards apart, a piece of water will be plentifully stocked with birds evenly distributed over the desired area. From time to time the fronts of the traps will be pegged down to catch the various participants of the fare provided, and these will be dealt with according to their varying merits. If wild ducks, accompanied by young ones from neighbouring waters, are found to have joined the more domesticated population, it may be a question whether the wings of the old ones should not be cut to prevent them flying away. A certain proportion of the home-reared ducks should be similarly treated, so that by remaining on the water they will tend to decoy their fellows to return if accidentally disturbed and driven away.

"Should it happen that rarer ducks of kinds which it is desired to encourage to breed in greater numbers are found in the traps, these can be made permanent residents by cutting their wings, or, more strictly speaking, the feathers of one wing. After treatment they may be released to wander where they like on the available water; though, for preference, they should be transferred to a special inclosure containing about equal parts of rough land and reed-sheltered water, extending, say, to a total area of from 2 to 4 acres, according to circumstances. The advantage of these inclosures is that they may be strictly reserved for particular kinds of ducks which are under the care of the keeper. A wire netting about 4 feet high will efficiently inclose ducks with cut wings; but the fence must be of ampler strength and proportions if it is to be made fox-proof. Should it happen that Teal, Wigeon, or any of the scarcer ducks are imported with a view to their becoming fairly established, it is desirable that a considerable

area of ponds should be inclosed for their accommodation. When in the course of time they settle down to nest, the eggs can be progressively withdrawn to a total representing the first two clutches, while still leaving the mother bird herself to rear the third and final brood. The cost and labour attendant on importing stock from without are wasted if no measures are taken to catch up from time to time the captive birds for the purpose of cutting their wings after moulting time, and so ensuring their continued residence under the conditions to which they have become resigned. The full benefits of imported stock of Teal and other ducks are of a cumulative nature, and become more and more apparent in successive years; but it is impossible to achieve this continuation of results unless the birds which have become accustomed to breeding in a state of semi-captivity are constantly rearing young families to whom the pond and its surroundings afford the attractions of home. The second and third generations emphasise the success of the Netherby system; for they enjoy full liberty to go and nest where they like, and yet they regularly bring back to the ponds and waters which are their home the families which they have reared some unknown distance away.

"Duck-preservation is at the present time running on somewhat unsatisfactory lines, in so far that too much attention is being devoted to the Mallard, whilst the more delicate Teal is thought to be beyond the skill of ordinary gamekeepers. The Netherby trap, and the experience which is gained in using it, gradually develop unexpected possibilities of management which it is difficult to express in print. The last and final scene where the traps serve their ultimate purpose is the catching up of ducks for shooting days. No greater act of mismanagement can be perpetrated than to disturb the waters which have been so carefully inclosed and developed as a sanctuary. If any shooting takes place during daytime, when the ducks are peacefully sleeping on the water or on the islands and banks connected with it, they rise in one great cloud and take their departure to some neighbouring resort. A better plan, but one which involves obvious inconveniences, is to rise at an early hour and post the guns in favoured spots near the water, with a view to shooting the ducks as they come home in small parties from their night wanderings. The salute which meets them on arrival causes the survivors to take refuge in neighbouring reed-beds and other aquatic covert, where they can be visited later. In these conditions a moderate bag may be made, and it certainly compares favourably with the insignificant results which follow the disturbance of the whole company of ducks during the daytime.

"There is really only one method by which ducks can be made to give the best shooting. It is to release them from suitably selected patches of covert, so that they may fly over the guns when making a hasty departure from home. By this means their sanctuary will remain undisturbed, and the survivors will placidly settle down to a resumption of the quiet life which they have hitherto enjoyed. A notable advantage of the trap method management is that specimens which it is desired to use as breeding stock will not be accidentally shot. Suitably managed pools will necessarily contain a certain number of call-ducks, especially the half-bred varieties that make such excellent foster-mothers for hatching eggs of less domesticated species. The traps, the inclosures, and the sundry other items of management that will suggest themselves as the work proceeds will remedy these deficiencies and will incidentally provide landowners having a taste for natural history with one of the most interesting hobbies it is possible to conceive. Keepers again will be found particularly keen in their desire to master the details of duck management, for they know that it is not only the most fashionable department of their profession, but that ducks do not give a tithe of the trouble nor are they any more than a tenth of the expense of Pheasants. They are practically free from disease, and with the help of migrant additions to their number will afford sport up to the commencement of the breeding season."

Those who are fortunate enough to possess a small estate or even a few acres containing a stream or small pond, may derive a great deal of pleasure from the keeping of both British and foreign waterfowl of various kinds in confinement. If the owner is a wildfowler he is constantly reminded of happy days on the coast by the merry cries of the Teal, the Wigeon, and the Mallard if they are on some piece of water near the house, and very little trouble or attention is necessary to maintain surface-feeding ducks in perfect health and beauty.

Where there are no foxes ordinary rabbit-netting 3 feet high is all that is necessary

wherewith to surround the enclosure, but if foxes abound, as they do in most counties, wire-netting, 8 feet high, and turned outwards at the top, will not be found too high. Wire of any kind is always unsightly near a house, but it can often be taken back into woods and shrubberies where it will not be seen, whilst the birds will both look better and enjoy a greater range of grass if this can be done. It is very necessary that ducks, even diving ones, should have a good space of turf-rushes and rough places in which to rest, retreat, feed, and nest, and it is as important to their health as the water itself. All surface-feeders and many diving ducks eat quantities of young grass, and after rain like to explore the grass for slugs, worms, &c. It is also a good plan to throw lawn-mowings on the pond, as this fine grass is readily devoured.

If the owner is anxious to breed ducks proper nesting places must be provided in the shape of reeds, bushes, willows, young spruces, rhododendrons, small bamboos, and common ling, whilst in the water natural food in the shape of duck-weed, water-cress, and other pond weeds, and calthas should be planted and wired off until they are established. When a good stock of these are once established they will provide continuous food for ducks as well as harbouring an abundance of insect and mollusc life which is their chief subsistence in summer. On all his ponds Mr. Wormald, who is very successful in breeding ducks, throws chopped grass twice a week and finds the birds eat it with avidity. In the winter chopped mangolds, turnips, grass, and potatoes are beneficial. For diving ducks there should be a supply of small fish in the pond if possible, and all the Mergansers should be kept apart, as they are such greedy and successful foragers that they will rapidly clear any small lake of fish. Animal food, consisting of fish, mussels, rabbit, and bullock's liver, should be given daily and chopped into small pieces. Mr. H. St. Quintin feeds his diving ducks on barley-meal, crissel (residue of meat extract), chopped fish, and salt. Even the true sea-ducks take to barley-meal in time and seem to thrive upon it. Mr. Moody, the keeper of the ducks at Scampston, gives the following receipt for preparing the food:

"To about three pints of home-grown barley-meal (the coarsest husks sifted out) placed in the bottom of a large bowl, in the centre of which form a hollow and add one pint of Spratt's patent poultry meal (biscuit meal) and half this quantity of crissel, then, having previously sprinkled the whole with a table-spoonful of salt, pour boiling water in the middle sufficient to thoroughly soak and scald the Spratt's meal and crissel. Knead thoroughly with the hands, mixing and working in such of the barley-meal as remains dry, or adding more dry meal if necessary, until the whole is in a damp, crumbly ball, but not sticky or too dry. A little practice will soon determine the quantity of water required, and the proper consistency of the stuff appears to be when it will hold together in a thoroughly moistened but crumbly mass, so that pieces may be broken off almost without soiling the fingers."

Eiders, Long-tailed Ducks, Scoters, &c., all dive for and eat this food and become fat.

If the duck-fancier desires to breed different species, he should pay attention to the fact that peace of mind is very essential, and that both the surface-feeders and the diving species cannot bear to be disturbed when looking for their nesting sites. Sheld-Ducks and geese should be excluded and put in pens by themselves, as they, especially in summer, are noisy and quarrelsome in the mating season. Many of the ducks are bad mothers, and it is a good plan to take the first setting of eggs and hatch them in an incubator. For Sheld-Ducks holes must be provided, and for Golden-Eyes, Mandarins, and Carolinas artificial nesting boxes set up on poles, 4 to 6 feet above the ground, and connected with the earth or water

by a small ladder, are necessary. The top of the box or small dog-kennel should be roofed with turf and a certain amount of dry grass or soft wood placed inside the box itself to encourage the birds to house-keeping. If an incubator is used to hatch the eggs the temperature should not be allowed to rise above 102° Fahr., and attention should be paid to sprinkling and turning the eggs twice daily. But the best foster-mother is undoubtedly the hand-reared wild duck that is tame and will allow herself to be handled, whilst the "silky" bantam is not far behind.

Mr. Wormald, in his excellent little book, *Notes on the Management of Ornamental Waterfowl in Confinement* (pp. 11–13), gives explicit advice on the rearing and feeding of young ducks as follows:

"But whatever means may be used to hatch the eggs, it is important to know the period of incubation of the various varieties; this is a subject which we have never seen dealt with in any work, so we can only give the periods for the various species which we have had under our own observation. The period in many cases may differ by a day or more, according to the temperature of the weather and the means which are employed to hatch the eggs; a hen gives out a higher temperature than a duck, so that eggs set under a hen will probably hatch out a day before eggs of the same species set under a duck.

"The period of incubation in the case of the Sheld-Duck is 30 days; Mallard, Pintail, Wigeon, Gadwall, Carolina, and Mandarin, 28 days; Tufted-Duck, Pochard, and White-Eyed Pochard vary from 24 to 28 days; Teal and Garganey Teal, 21 or 22 days; Shoveller, 24 days.

"Once the eggs are hatched, we have found that the incubator foster-mother is the best method of raising the ducklings, though they may be quite successfully reared by a tame wild duck or a careful bantam. The hot chamber of the foster-mother should be kept at about 85° Fahr. for the first week or so, and artificial heat may be entirely dispensed with after three weeks, provided the weather is not too cold. It is important that the floor of the warm chamber should be kept quite clean; pieces of sacking can be cut to the size of the floor and removed as soon as dirty; care must also be taken that the young ducklings do not come into contact with the paraffin of the lamp.

"Newly-hatched ducklings have many enemies, and when reared under a bantam or duck should be enclosed in a covered run for the first few days until quite strong; they should always be shut up at night in a rat-proof coop or shed until they are three-quarters grown, though even at that age they are not always safe from the attacks of rats.

"At first the ducklings should not be allowed any depth of water, a flat zinc tray six inches square by ¾-inch deep will, we think, be found the most serviceable. The food to begin with should consist of hard-boiled egg chopped fine and mixed with a little fine wild duck meal and bread crumbs; in addition to this, duckweed, dried flies, and ants' eggs should be floated on the surface of the water. It sometimes happens that young ducklings in a foster-mother refuse to eat anything; they may often be induced to pick if the food is sprinkled about the level of their bills on blades of grass, or even on the backs of their companions; any moving object such as a spider suspended above them by his web, or a fly crawling up the side of the foster-mother, may induce them to take their first meal, and once started they soon learn to pick up their food. Duckweed especially is a great help to the young birds, as it will be found to be full of animalculæ, small water-beetles, larvæ of gnats, &c., all of which form natural food. Fresh water should be given at least three times a day, as dirty water is injurious to the ducklings.

"When about three days old, the ducklings may be given chopped earthworms and thoroughly cleansed maggots, and, by degrees, wild duck meal (Spratt's), and barley-meal may take the place of the hard-boiled egg and bread-crumbs.

"When three or four weeks old the ducklings may be allowed on to the water; a natural pond with gently shelving banks is best, if free from rats, pike, and eels, provided it is small enough to allow the ducks to be easily driven into their rat-proof coop at night.

"At the age of seven weeks ducklings will begin to eat small grain, but will still prefer duckweed to anything else. When they commence to assume their winter plumage, a little extra nourishment is good, especially in the case of Sheld-Ducks, which, by the way, should never be allowed access to deep water until at least three months old, and even then they must not be allowed to stay in the water too long for a start. In the case of newly-hatched Carolinas and Mandarins, the enclosure must be covered over with small-mesh wire netting on the top, for these birds can climb with extraordinary agility; we have seen them run up the back and sides of a hen-coop almost like mice."

Mr. St. Quintin also gives some practical advice on the treatment of newly-caught duck which are shy and difficult to feed. He says (*ibid.*, pp. 15, 16):

"The duck should be placed, after the flight feathers of the wing have been shortened, in a small temporary pen (a 4-feet square packing-case will do), with peat moss, or chopped straw on the floor, and small-meshed wire netting across the top. In this way air and sufficient light are admitted, while the bird cannot look over the sides, and seeing no apparent way out, generally quickly settles down. The pen, with the bird, must be stood in a quiet place, and where there is no chance of dogs or cats disturbing the captive. Scoters, Scaup, Long-tailed Ducks and Golden-Eyes will generally, if they are kept quiet in this way, at once take small sprats, and, presently, bits of rough fish cut up, ox liver, and even rabbit's flesh if placed in their water-pan. No water except that which also contains the food must at this stage be within reach. Scoters and Scaup will soon take meal made very moist, offered in the same way in a shallow pan. Barley meal mixed with scalded Spratt's poultry meal and crissel will do very well. I have found Golden-Eyes less easy to train off fish, while Long-tailed Ducks may be months before they will take meal readily, though in the end it seems to suit them well (always in addition to plenty of animal food). When that stage is reached it is best to throw the pellets of meal to the expectant birds first, as if the allowance of flesh and meat is given them at the beginning of the feed they may refuse the meal afterwards.

"I may here recommend that any specially delicate ducks, or indeed other birds, should be fed at regular meals, and that the food should not be always before them—that is, of course, after the first stage, when they are thoroughly tamed and feeding freely.

"But to revert to the new comer, which at the end of a week or ten days, more or less, should know its food-pan, and should be taking what seems to be sufficient food to keep it in good flesh.

"No more time should be expended in this stage (in the small pen) than can be avoided, for the reason that the bird, which we will suppose is a diving duck and perhaps a marine one, is all this time off the water, and its plumage is dry, and it will be found that it is no longer waterproof. When the bird gets an opportunity of washing it is soon soaked through, and if exposed to a cold wind is very liable to contract cramp, and even a fatal attack of pneumonia. Therefore, the sooner the bird is placed upon water the better, as it will then have recourse to the oil gland, and will dress its feathers till their water-resisting condition is restored. In addition to this a diving duck's feet, if kept dry too long, are liable to crack, and lameness follows, especially in frosty weather. . . .

"I have found a small deep pond, say five yards across, with sloping banks, so that the bird is not tempted to be always trying to escape, while at the same time there is shelter from wind, is convenient. Of course, it must be wired round. Also one can sometimes run a half-circle of wire netting out into the water where the bird is, presently to be enlarged, so as to keep him within reach till he is tame, at any rate enough to take food thrown from the hand. This will be made much easier if there is a thoroughly tame duck or two, not necessarily of the same species, confined with the new bird, as they quickly inspire him with confidence. Also it is a good plan to feed any duck outside the wire half-circle close up to it, and in sight of the newcomer, for the same purpose. The beginning and the end of successful reclaiming of newly-caught birds is to keep up the 'wild' condition and flesh, and to tame them by inspiring them with confidence in their feeder as above suggested, without anything approaching starvation, or even stinting them in their full supply of food. It must be remembered that marine ducks, like the waders of our shores, are sensitive to the cold weather which we get inland. Any of the above-named species, and also Eiders, are much more liable to suffer from prolonged frost than fresh-water species even from south

Europe, South America, or Australia. Probably the great body of water in the ocean is slower to part with the warmth acquired during the summer than are the shallow rivers and ponds. But whatever the explanation, the certain fact remains, and must be remembered."

The duck that I should like to see introduced to English waters is the King-Eider, and I feel sure that could young birds be obtained from Greenland they would be as easy to acclimatise as the Eider with which Mr. St. Quintin has been so successful. It is more than likely that the King-Eider would do as well, if not better, than the Eider, for the recent travels of Mr. Manniche have found that the King-Eider spends much of its time in summer on *fresh water* and is not so essentially a sea-loving species as the Eider.

ADDENDA

THE EIDER-DUCK

Lord William Percy kindly sends me the following notes on three young Eiders reared by him in the summer of 1913:

"10 *days old.*—Down lighter on the breast than on the back, but very dark all over; light stripe over the eye and along the side of the jaw very conspicuous. Legs and feet black with a dull olive stripe running down the outer and inner sides of each toe. Bill dull slate; nail pinkish. Irides dark brown.

"31 *days old.*—Feathers now coming in rapidly. Down not so dark as at 10 days, and stripes on the head less distinct—in fact, hardly visible. Legs and feet bluish-slate; toes and stripes along sides of toes light bluish-slate. Eye and bill same as before. Nail pale bone colour.

"The first full feathers are visible on the 33rd day on flanks and head. On 37th day a large patch on the flanks and the whole of the lower breast and belly are feathered. The young are full feathered on the 40th day, but traces of down remain on head and back. Primaries still undeveloped.

"During the early stages of life the habits of young Eiders reminded more of geese than ducks. On the approach of a man they work their heads about, and their continuous and musical chatter is rather goose-like. It struck me as remarkable that during the first few days of life they were very poor swimmers, and ran rather than swam on the surface of the water with their bodies held very upright. They spent most of the day in water of their own depth, and a short swim made them very wet. Perhaps this was due to the fact that they were on fresh water. There was, however, a remarkable change in their powers of swimming after a fortnight, when they were then as much at home in water as any diving duck.

"One of the three spent as much time in catching flies as any surface-feeding duck, whilst the other two never seemed to take any notice of flies; their attentions being entirely confined to the bottom of a small stream. They all have one trick which they constantly employ to obtain food. They rest on a small pool of water and tread water violently for a few seconds, and then search about in the vortex of small stones and sand. They make a great commotion with their large feet. Now at the 48th day one of the young males is showing a considerable number of *white* feathers on the back."

INDEX

Arctic-breeding Ducks:
Variation in nesting materials and down of, i. 125
Audubon, on the nest of the Surf-Scoter, ii. 83
Author:
Account of destruction of a Heronry at Loch Leven, ii. 91
Account of flight of ducks before a White-tailed Eagle, i. 105
Account of Mallard shooting on Loch Leven, ii. 130
Account of a stalk at Goosanders in Argyllshire, ii. 92
Account of sea-duck shooting outside Leith harbour, ii. 57, 58
Anecdote connected with Merganser shooting in Orkney, ii. 112
On descent of Golden-Eye young from nest, i. 94, 95
On Golden-Eye at Perthbridge, i. 90
On Golden-Eye escaping Peregrine on Loch Leven, i. 91
On method of Skua in attacking Long-tailed Duck, i. 126
On Satin-Bower bird courtship at the Zoo, i. 93
Possesses Hooded Merganser, adult male, shot in Ireland, ii. 114
Possesses King-Eider male, old and young, ii. 37
Possesses Long-tail female with plumage tending to that of male, i. 116
Possesses Red-breasted Merganser male in full eclipse, ii. 102
Possesses Velvet-Scoter in eclipse plumage, ii. 72

Baer's Pochard. *See under* Pochard
Baker, Stuart:
On Baer's Pochard, immature male, i. 42
On the habitat of the Ferruginous Duck, i. 35
On distribution of Red-crested Pochard, i. 7
On shooting Red-crested Pochard, i. 12
Baldamus, Dr., on Red-crested Pochard nest, i. 12
Barrow's Golden-Eye. *See under* Golden-Eye
Bedford, Duchess of, on habitat of the Pochard, i. 21
Blaauw, F. E.:
Note on Ferruginous Duck in confinement, i. 41
Paper on the breeding and development of the Eider-Duck, ii. 30
Blasius, R.:
On breeding haunts of the Tufted Duck in Germany, i. 52
On methods employed in collection, sale, &c., of eider down, ii. 28
Brehm, classification of the various European Eiders by, ii. 1
Brewster, W., note on descent of Golden-Eye young from elevated nest, i. 95
Brooks, Allan:
Notes on the Buffel-headed Duck, i. 110, 111
On breeding of Barrow's Golden-Eye in the Cariboo district, British Columbia, i. 102
On colour and markings of Barrow's Golden-Eye, i. 100
Brünnich, M. Thrane, description of the Swedish Eider, ii. 6
Buffel-headed Duck, *Clangula albeola* (Linnæus), i. 106 *et seqq.*
Breeding, i. 108, 109, 110
Breeding range, i. 108, 111
Call, i. 109, 110
Colour of feet and legs, i. 107 *and note* 1
Courtship, i. 109, 110, 111
Diet, i. 110
Distribution, i. 108, 109
Diving, i. 109
Eggs, i. 106, 110
Feeding, i. 109
Flesh, i. 109
Flight, i. 109
Habitat, i. 109
Habits, i. 108–110
Local names, i. 106
Measurements, i. 107
Migration range, i. 108
Nest, i. 106, 108, 110
In treeless districts, i. 110
Nesting habits, i. 110
Plumage:
Adult female, i. 107, 109
Adult male, i. 107
Eclipse, i. 107, 110
Immature female, i. 107
Immature male, i. 106
Young, i. 106
Quickness in diving and taking to flight, i. 109
Shooting, i. 109

Collection of ducks and geese, on, ii. 126, 132
Best way to obtain a series of sea ducks, ii. 133
Common Scoter. *See under* Scoter

Dalrymple, Lord, note on remarkable shot at Wigeon with 12-bore gun, ii. 130, 131
Deichmann, Dr., on Barrow's Golden-Eye in West Greenland, i. 103, 104
Diving ducks, i. 1 *et seqq.*
Albinos, i. 80
Birth date, approximate, i. 3

Diving ducks (*continued*)—
Call of, i. 1
Characteristics of, i. 1
Dislike to draught, i. 21
Contrasted with surface-feeders, i. 1, 2
Diet, i. 1
Diving, i. 1
Of young, i. 2
Eggs, i. 2
Feeding, i. 1, 23
Flesh, oily and rancid, i. 2
Genera of, too many divisions in, i. 3, 4 *note* 1
Maturity, age of, considerable variation in, i. 2
Dixon, O. Murray, note on Common Scoters at Loughborough, ii. 54
Dresser:
Account of the abundance of Surf-Scoters in Bay of Fundy, ii. 80
On the Golden-Eye nest in Scandinavian countries, ii. 94
Dunbar, Captain Brander, account of Pochard on Loch Spynie, i. 25, 26

EASTERN WHITE-EYE. *See* Pochard, Baer's
Eider-Duck, *Somateria mollissima* (Linnæus), ii. 5 *et seqq.*
Albinos, ii. 29
American form, ii. 2–3
Birth date approximates to June 1, ii. 22
Breeding, ii. 5, 20, 21
Breeding range, ii. 12, 13, 14
Call, ii. 19, 20, 32 *and note*
Characteristics, ii. 16, 25
Colour of soft parts, ii. 2 *note* 2
Commercial uses of down and skins, ii. 27 *et seqq.*
Courtship, i. 75; ii. 19, 20
Variation in different localities, ii. 20
Courtship of immatures, ii. 11, 20
Detection of, at sea, ii. 25
Diet, ii. 14, 15, 18
In confinement, ii. 30, 31, 32
Disposition, ii. 16, 19, 27
Distinctive characters of the local races, ii. 2–4
Distribution, ii. 14
Distribution of the local races, ii. 2–4
Diving, ii. 16, 17, 19, 24
Down, ii. 27
Commercial uses and value of, ii. 21, 27, 28 *and note*
Farms for Eider-Ducks, ii. 28
Methods of collection and cleaning, ii. 27, 28, 29
Down in nest, ii. 6, 21, 22
Easily scared from breeding grounds by shooting, ii. 24
Eclipse, shyness in, ii. 23
Eggs, ii. 5, 21, 22, 24
Sought after for food in the far north, ii. 27
Enemies of, ii. 26
Farms for Eider-Ducks, ii. 28
Feeding, ii. 15, 18, 19
Feeding grounds, ii. 14, 15, 19

Eider-Duck (*continued*)—
Female partially assuming male plumage, example of, ii. 29
Flesh unfit for table, ii. 25, 75
Flight, i. 1; ii. 16
Capacity for, in young, ii. 24
Tenacity in keeping above water, ii. 16
Flocking, ii. 24
Habitat, ii. 13, 14, 15
Habits, ii. 14 *et seqq.*, 19, 31
Gregarious, i. 76; ii. 14
Migration rare and uncertain, ii. 14
Watchfulness on shore, ii. 15
Hybrids, ii. 29
Immatures, flocking of, ii. 20, 24
Points of distinction between juveniles of the two sexes, ii. 11, 31
In confinement, ii. 30, 31, 32, 152
Incubation, ii. 6, 22, 30
Families combined under care of one female after, ii. 24
Neglect of food by nesting bird, ii. 31
Local names, ii. 5, 13
Local races, distribution of, ii. 2–4
Maturity, age of, i. 2; ii. 6, 9, 10, 12, 20 *note*, 30
Measurements, ii. 4, 9, 12
Migration, ii. 14, 24, 25
Nest, ii. 21, 27
Plundered for eggs in far north, ii. 27 *and note*
Nesting habits, ii. 22, 29, 31
Nesting places, ii. 13, 14, 21, 28
Ovary in immatures, ii. 12
Pairing, ii. 20
Pairing of immatures, ii. 6, 10, 11, 12, 20 *and note*
Parasites, ii. 26, 27
Plumage, ii. 6–12
Female:
Adult, ii. 12
In down, ii. 11, 152
Juvenile, ii. 11
Stages in plumage of immatures, ii. 6, 11, 12
Male:
Adult, winter, ii. 9, 32
Eclipse, ii. 9, 10, 32
In down, ii. 7
Juvenile, ii. 7, 10, 32
Stages in plumage of immatures, ii. 7–9, 10
Plumages, interesting series of, ii. 25
Protection accorded to in breeding season for sake of the down, ii. 21, 24, 27
Robbed of food by gulls, ii. 18
Shooting, ii. 16, 23, 25, 26, 131, 132
Best day for, ii. 26
Wounded birds, ii. 16, 17
Skins as quilts and shirts, ii. 29
Swimming, ii. 16, 17
Use of wings in, i. 1; ii. 16, 17, 31

Eider-Duck (*continued*)—
Tameness of nesting birds, ii. 21, 22, 31
Degrees in, ii. 22
Varieties of, ii. 29
Walking, ii. 16, 31
Winter range, ii. 14
Wounded birds, ii. 16, 17
Voluntary drowning by, ii. 17–18
Young, education and care of, ii. 24
Young in down, ii. 19
Young in nest, ii. 23
Eider, King-, *Somateria spectabilis* (Linnæus), ii. 33 *et seqq.*
Account of, at Point Barrow, ii. 41
Bill, excrescence on, ii. 41, 44
Breeding habits, ii. 43
Breeding range, ii. 36, 37, 41
Capture, native methods of, ii. 43, 44
Courtship note, ii. 41
Cry, ii. 40, 41
Diet, ii. 40, 41
Distinguished from the Common Eider, ii. 34, 36, 40
Distribution, ii. 36
Down, ii. 33
Down in nest, ii. 40, 43
Eggs, ii. 33, 43
Enemies of, ii. 43
Feeding, ii. 40
Flesh, ii. 44
Flight, ii. 39
Habitat, ii. 39
Habits, ii. 39 *et seqq.*
Hybrids, ii. 29
In confinement, ii. 44, 151
Incubation, ii. 43
Local names, ii. 33 *and note*
Maturity, age of, ii. 35
Measurements, ii. 35, 36
Migration, ii. 41–43
Migration range, ii. 37, 38
Nesting habits, ii. 43
Nesting materials, ii. 33, 43
Nesting place, ii. 33, 39, 40, 41
Numbers killed by Esquimaux, ii. 42, 43
Parasites, ii. 43
Plumage:
Adult female, ii. 35, 40
Adult male, ii. 35, 40
Eclipse, ii. 35
Immature female, ii. 35
Immature male, ii. 34, 35
Quarrelsome during nesting season, ii. 39, 40, 41
Shooting at Point Barrow, ii. 42, 43
Skins made into quilts, ii. 44
Weight, ii. 35, 36
Young in down, ii. 33
Eider, Steller's, *Somateria stelleri* (Pallas), ii. 45 *et seqq.*
Account of, at Point Barrow, ii. 50
Breeding range, ii. 48, 49
Courtship, ii. 51
Diet, ii. 50, 51
Distribution, ii. 48
Diving, ii. 50, 51
Down in nest, ii. 45
Eggs, ii. 45, 51
Feeding grounds, ii. 50
Habits, ii. 50
Local names, ii. 45 *and note* 1
Maturity, age of, ii. 47
Measurements, ii. 47, 48
Migration range, ii. 49
Nest, ii. 51
Nesting habits, ii. 51
Plumage:
Adult female, ii. 48
Adult male, ii. 47
Eclipse, ii. 47
Immature female, ii. 47
Immature male, ii. 45–47
Dark form, ii. 46
Light form, ii. 46
Young in down, ii. 45
Enemies of diving ducks, i. 25, 49, 61, 79, 84, 92, 104, 105, 126, 127, 128; ii. 26, 43, 75, 111, 124

FEATHERS, change in colour of, i. 2
Ferruginous Duck, *Nyroca nyroca* (Güldenstädt), i. 30 *et seqq.*
Breeding, i. 38, 39
In confinement, i. 41
Breeding range, i. 33
Breeding season, i. 32, 41
Courtship, i. 38, 39
Cry, i. 38
Diet, i. 36, 37
Of young, in confinement, i. 41
Distinction of the sexes, i. 31, 32, 41
Distribution, i. 33
Diving, i. 37
Eggs, i. 30, 39, 40, 41
Enemies of, i. 40
Feeding, i. 37
Flesh inedible, i. 36
Depends on diet of bird, i. 36
Flight, i. 36, 40
Habitat, i. 34, 35, 36
Habits, i. 34–37
Disinclination to leave water, i. 36
Rise in detached parties, i. 35–36, 40
Tame, i. 35, 36, 37
Unsociable, i. 37
Hybrids, i. 28, 41, 63, 80
In confinement, i. 40, 41
Incubation period, i. 40, 41

Ferruginous Duck (*continued*)—
Local names, i. 30
Measurements, i. 31, 32
Migration, i. 40
Migration range, i. 34
Moulting, i. 32
Nest, i. 39, 40
Nesting habits, i. 32, 39, 40
Parasites, i. 40
Plumage:
Adult female, i. 32
Adult male, i. 31
Eclipse, i. 31
Immature female, i. 31, 41
Nestling in down, i. 30
Young male, i. 31, 41
Shooting, i. 35, 36, 40
Swimming, i. 37
Walking, i. 37
Windpipe of male, i. 33
Young: life of the brood, i. 40
Food supply and a law among birds, ii. 111
Francklyn, G. E., on the whistling noise of the Velvet-Scoter, ii. 81

Gätke, account of Common Scoter feeding on horse-beans, ii. 60
Golden-Eye, *Clangula clangula* (Linnæus), i. 81 *et seqq.*
American form, i. 81, 86, 94; ii. 89
Breeding birds become very tame, i. 93, 94
Breeding range, i. 84, 86
Call, i. 92
Capture, Continental methods of, i. 97
Comparative rarity of old males, except on some Scottish estuaries, i. 87
Control over wings on coming to surface of water, i. 92
Courtship, i. 92, 93
Female show in, i. 93
Remarkable attitude adopted by male after pairing, i. 93
Descent of young from nest at high elevation, i. 94, 95
Destructive of fish, i. 97
Diet, i. 91, 96
Distinguishing features: easy to recognise, i. 90
Diving, i. 1, 89, 90, 91
Down in nest, i. 81, 96
Eggs, i. 81, 94
Enemies of, i. 84
Eyesight of, i. 92
Sharp eyed, i. 89, 90
Favourite resorts of, i. 88
Feeding, i. 91
Flesh, i. 96
Flight, i. 89, 91
Noise of wings in, i. 89, 90, 91
Habitat, i. 88, 89, 90

Golden-Eye (*continued*)—
Habits, i. 86 *et seqq.*, 96
Quick to take alarm, i. 27, 89, 90, 92, 97
Rarely seen on land, i. 90
Shy, i. 89
Suspicious, i. 27, 88
Unsociable, i. 89
Hardy in severest winter, i. 88
Hybrids, i. 97
In confinement, i. 90, 91
Incubation, i. 81, 94, 96
Intelligence of, in appreciating protection, i. 92
Local distribution of ducks of different ages, i. 87; ii. 71
Local names, i. 81, 94
Measurements, i. 83, 84, 99
Migration, i. 87, 89, 92
Migration range, i. 86
Nest, i. 94
Nesting places, i. 93, 94
Norway, nests plundered for eggs in, i, 94
Parasites, i. 96
Plumage:
Adult female, i. 84
Adult male, i. 83, 90
Winter plumage, i. 83
Immature female, i. 83
Young in down, i. 81
Young male, i. 82
Eclipse, i. 82, 83
Winter plumage, i. 83
Preening the breast feathers, i. 90
Scent, i. 92
Shooting, i. 89, 96; ii. 132
American method, i. 97
Winged or wounded birds, i. 96, 97
Swimming, i. 90
Weight, i. 83
Young life, i. 96
Golden-Eye, Barrow's, *Clangula islandica* (Gmelin), i. 98 *et seqq.*
Bill, colour and marking of, i. 99, 100
Breeding range, i. 101, 102
Courtship, i. 104
Distinguished from Common Golden-Eye, i. 99, 100, 101, 103
Distribution, i. 101, 102
Diving, i. 103
Down in nest, i. 125
Eggs, i. 98, 102, 104
Enemies of, i. 104, 105
Feeding, i. 103
Flight, i. 103
Habits, i. 102–104
Incubation, i. 98
Local names, i. 98
Measurements, i. 99
Migration range, i. 102

Golden-Eye, Barrow's (*continued*)—
Nest, i. 102, 104, 125
Nesting habits, i. 103, 104
Plumage:
Adult female, i. 99
Adult male, i. 100, 101
Eclipse, i. 101
Immature female, i. 99
Immature male, i. 100
Young, i. 98
Shooting: shy birds, i. 104
Species first described by Pennant, i. 98
Young, i. 98
Comparison with Common Golden-Eye, i. 99
Goosander, *Mergus merganser*, Linnæus, ii. 85 *et seqq.*
Acute perceptive powers, ii. 94
American form, ii. 85 *note*, 89, 90
Asian form, ii. 89
Assimilation to surroundings in positions of danger, ii. 97
Breeding, ii. 96
Breeding range, ii. 88
Capture, Continental methods of, ii, 98
Courtship, ii. 92, 94
Cry, ii. 94
Descent of young from nest, ii. 97
Devotion of the mother bird, ii. 97
Diet, ii. 93, 94
Distribution, ii. 88
Diving, ii. 91, 93
Down, ii. 85, 98
Eggs, ii. 85, 96, 98
Feeding, ii. 93
Fish, enormous numbers destroyed by, ii. 93, 98
Fishing for food, ii. 93, 94
Flesh, ii. 98
Flight, ii. 91, 92
Habitat, ii. 88, 91, 93
Habits, ii. 91, 92, 93, 94
Shyness of males in eclipse, ii. 98
Wariness, ii. 92, 94, 97, 98
Incubation, ii. 96, 98
Local names, ii. 85 *and note*
Maturity, age of, ii. 87, 88, 95
Measurements, ii. 87, 88
Migration, ii. 91
Migration range, ii. 89
Nest, ii. 95, 96
Nest in boxes hung by peasants, ii. 96
Nesting habits, ii. 94, 95, 98
Parasites, ii. 99
Plumage:
Adult female, ii. 88
Adult male, ii. 87
Eclipse plumage, ii. 87, 92
Immature female, ii. 87
Immature male, ii. 86
Position in standing or walking, ii. 93
Goosander (*continued*)—
Shooting, ii. 91, 98
Difficult to stalk, ii. 98
Skins as articles of clothing, ii. 98
Swimming, ii. 93
Young in down, ii. 85
Young life, ii. 97
Graham, Sir Richard, experiments in rearing wild ducks for shooting, at Netherby, ii. 136 *et seqq.*
Gray, R., on the habits of the Tufted Duck, i. 55
Gunning punt, the best shelter for observation of wild-fowl, i. 121, 123; ii. 26

Hand-List of British Birds, *cited*, i. 4 *note* 1
Hantzsch *quoted* on courtship of the Harlequin Duck, i. 138
Harlequin Duck, *Clangula histrionica* (Linnæus), i. 132 *et seqq.*
Account of, in Alaska, i. 138
Breeding, i. 139, 140
Breeding range, i. 134, 135
Call, i. 138
Colours of young mature bird, i. 133
Courtship, i. 138, 139
Devotion of paired birds, i. 139
Diet, i. 138
Diving, i. 138
Down, i. 132, 139, 140
Eggs, i. 132, 139, 140
Feeding, i. 138
Feeding of young, i. 140
Flesh, i. 141
Flight, i. 137
Habitat, i. 137, 138
Habits, i. 137, 138
Identification not easy, i. 137
In confinement, i. 141
Incubation, i. 140
Local names, i. 132
Maturity, age of, i. 133
Measurements, i. 134
Migration, i. 137, 141
Migration range, i. 135–137
Nest, i. 135, 139, 140
Nesting season, i. 140
Pairing, i. 139
Plumage:
Adult female, i. 134
Adult male, i. 133, 137
Eclipse, i. 110, 134, 141
Immature female, i. 134
Immature male, i. 133
Young, i. 132, 140
Shyness of male in eclipse, i. 141
Swimming, movements in, i. 137
Young in down, i. 132, 140
Hartert, E., *cited*, ii. 1
On the nest of the Goosander, ii. 95
Highlander, the, as a naturalist, ii. 92, 93

Hooded Merganser, *Mergus cucullatus* (Linnæus). *See* Merganser, Hooded
Hume, on the Red-crested Pochard diving for food, i. 10

IRELAND:
Distribution of Golden-Eye in, i. 88
Spread of the Tufted Duck in, i. 51–52

JENNINGS, George, shooting of Wigeon on "day-flight" at Tarlogie Ferry, ii. 130

KING-EIDER. *See under* Eider

LASCELLES, Hon. Edward, note on the Golden-Eye in Yorkshire, i. 84
Legge, Gerald:
Cited, i. 10, 15, 50, 75
Note on female Pochard going on to nest, i. 25
On courtship of the Ferruginous Duck, i. 38
On courtship of the Tufted Duck, i. 58
On courtship show of the female Golden-Eye, i. 93
Leven, Loch, ducks on, i. 50, 54, 59, 60, 61; ii. 91
Lloyd, on the habits of the Eider-Duck, ii. 15
London parks, ducks and other birds in, *cited*, ii. 137
Long-tailed Duck, *Clangula hyemalis* (Linnæus), i. 112 *et seqq.*
Account of, at Point Barrow, Alaska, i. 127
Bill, peculiar junction with the skull, i. 115
Breeding, i. 124, 125, 127
Breeding range, i. 116–117
Call, i. 121, 126
Capture in nets and by decoy lines, i. 129
Colour, i. 115
Assimilation of, to surroundings, i. 115
Control over wings on coming to surface of water, i. 92
Courtship, i. 123–124
Date of arrival at breeding grounds, i. 124, 126
Devotion of male and female in nesting time, i. 125
Diet, i. 118, 119, 122, 130
Diving, i. 120–123, 130
Depth of dive, i. 122, 123
Regular succession in, i. 121
Down, i. 112
Down in nest, i. 125
Eggs, i. 112, 125
Enemies of, i. 126, 127, 128
Excitement of male in the breeding season, i. 89, 124, 126
Feeding, i. 122, 123, 130
Difficult to drive from their regular feeding grounds, i. 120, 122
Of young, i. 126
Females with a tendency to male plumage, i. 116
Flesh unpalatable, i. 127, 129
Flight, i. 120, 121
Dislike to flying over land, i. 120
Habit of swinging in, i. 120
Rapid descent to water, i. 121
"Towering," i. 121
Long-tailed Duck (*continued*)—
Habitat, i. 119
Habits, i. 119 *et seqq.*, 128
Confiding and easily approached, i. 120, 121
Devoted to the sea in winter, i. 119
In alarm, i. 120
In repose, i. 120
Local, of young Long-tailed Ducks, i. 129
Identification easy, i. 120
Immatures, "bunching" habit of, i. 129
In confinement, i. 130–131
Incubation, i. 125, 128
Local distribution of birds of different ages, i. 127; ii. 71
Local names, i. 112
Love fights of the male, i. 124
Maturity, age of, i. 113, 115, 123
Measurements, i. 115
Migration, i. 119, 123, 124, 127
Migration range, i. 117–119
Nest, i. 125, 127
Nesting, i. 124, 125
Parasites, i. 128
Plumage of adult female:
Summer, i. 116
Winter, i. 115–116
Plumage of adult male:
Dark form, i. 114
Light form, i. 114
Semi-eclipse plumage, i. 114–115
Summer, i. 114, 115
Variation in colour of the flanks, i. 114
Winter, i. 114, 115
Plumage of immature female, i. 115
Plumage of immature male, i. 113
Plumage of young, i. 112
Shooting, i. 120, 128, 129; ii. 131, 132
Immatures, i. 129
Winged and wounded birds, i. 128, 129
Swimming, i. 73
Tameness, i. 128, 129
In the Iceland rivers, i. 122
"Towering," habit of, i. 121
Types of, light and dark, i. 114
Winter feeding grounds, i. 122
Young life, i. 126, 127
Love amongst the birds, i. 93; ii. 140

M'ILHENNY, on arrival of King-Eider at Point Barrow, ii. 41
Mackay, George, on the food and habits of the Scoters, ii. 82
Mallard drake, colour changes in feathers of, i. 3
Malloch, Mr., account of destruction of eggs by Hooded Crow, i. 61
Manniche, Mr.:
On enemies of young ducks in East Greenland, i. 127
On habits and voice of the King-Eider, ii. 39
Maximilian, on traps for ducks, ii. 145 *et seqq.*

Merganser, Hooded, *Mergus cucullatus*, Linnæus, ii. 113 *et seqq.*
Breeding range, ii. 114
Courtship, ii. 116
Crest, ii. 115
Diet, ii. 115
Distribution, ii. 114, 115
Down, ii. 113
Eggs, ii. 113, 114, 116
Flesh, ii. 115
Flight, ii. 115, 116
Habitat, ii. 115, 116
Habits, ii. 115, 116
Local names, ii. 113
Maturity, age of, ii. 113
Measurements, ii. 114
Migration, ii. 116
Migration range, ii. 114
Nest, ii. 116
Plumage:
Adult female, ii. 114
Adult male, ii. 113
Immature female, ii. 114
Immature male, ii. 113
Shooting, ii. 116
Young in down, ii. 113
Merganser, Red-breasted, *Mergus serrator*, Linnæus, ii. 100 *et seqq.*
Active and restless on the water, ii. 107, 108
Behaviour of the mother bird, ii. 110
Brackish waters, preference for, ii. 104, 107
Breeding range, ii. 103
British Islands, large flocks unusual in, ii. 106
Comparison with Goosander, ii. 107, 108
Courtship, ii. 109, 110
Cry, ii. 109
Destructive of fresh-water fish, ii. 111
Diet, ii. 108
Distribution, ii. 103–105
Down, i. 125; ii. 100
Eclipse plumage, ii. 102
Eggs, ii. 100, 110
Enemies: very rarely assailed by large birds of prey, ii. 111
Favourite haunt of, in Scotland, a, ii. 107
Feeding, ii. 108
Fighting of males not of a serious character, ii. 109
Fishing for food, ii. 107, 108
Flesh, relished by Orcadian fishermen, ii. 112
Flight, ii. 108, 109
Flight on migration, ii. 107
Flocking, ii. 109, 111
Packing of immatures, ii. 106, 107
Habitat, ii. 107
Habits, ii. 105, 106, 110
Immatures, ii. 101
Wing of, ii. 101, 102
Merganser, Red-breasted (*continued*)—
Incubation, ii. 110
Incubation period, ii. 100
Ireland, large flocks observed in, ii. 106
Local increase in numbers regulated by food supply, ii. 111
Local names, ii. 100
Maturity, age of, ii. 101, 102
Measurements, ii. 102, 103
Migration, ii. 105, 106, 107, 111
Migration range, ii. 104, 105
Nest, i. 125; ii. 95, 110
Nesting habits, ii. 110
Packing of immatures prior to migration, ii. 106
Packing only noticeable in autumn, ii. 107
Parasites, ii. 111
Plumage:
Adult female, ii. 102
Adult male, ii. 101
Eclipse, ii. 102
Immature female, ii. 102
Immature male, ii. 101
Young in down, ii. 100
Resemblance to Goosander, ii. 107, 108
Severe weather conditions cause temporary migration, ii. 105, 107
Shooting, ii. 111, 131, 132
Voracious appetites, ii. 108
Wings as main character in distinguishing age, ii. 102
Young in down, ii. 100
Young life, ii. 111
Millais, Geoffrey, on the Ferruginous Duck in Kashmir, *cited*, i. 35
Moody, A. F., notes on live ducks possessed by Mr. St. Quintin at Scampston:
Common Scoter, ii. 63
Eider-Duck, ii. 31
Long-tailed Ducks, i. 130
Receipt for preparing food for diving ducks, ii. 148
Red-crested Pochard, i. 13
Smews, ii. 124, 125
Myvatn Lake, ducks on, i. 76, 126, 139
Black flies at, i. 79 *and note*, 105

NAUMANN, *quoted*, on:
Common Scoter, ii. 54, 59
Eider-Duck, ii. 18
Ferruginous Duck, i. 32, 35, 37, 39
Golden-Eye, i. 88, 92; ii. 121
Goosander, ii. 94
Pochard:
Common, i. 24
Red-crested, i. 9, 11, 12
Scaup, i. 71, 80
Smew, ii. 121, 123
Tufted Duck, i. 48, 56
Velvet-Scoter, ii. 69, 73

Netherby, experiments in rearing wild ducks at, ii. 136 *et seqq.* *See heading* Rearing of ducks
Species naturalised at Netherby, ii. 143
Noble, Heatley:
Note on Common Scoter breeding in Scotland, ii. 55 *note*
Note on the absence of down in some nests of the Common Pochard, i. 25
On breeding of the Tufted Duck, i. 60
On the nest of the Goosander, ii. 95
On Scaup, first nest found in Britain, i. 76
Nomenclature, present confusion in, i. 4 *note* 1; ii. 1

Oates, W. Coape, comments on the experiments at Netherby, ii. 141
On disease purulent ophthalmia, ii. 142

Pairing of ducks, experiments in, ii. 140 *et seqq.*
Payne-Gallwey, Sir Ralph, on Pochard in Ireland, i. 21
Pearson, H. J. and C. E.:
On nests of the Long-tail found in Iceland, i. 125
On the nesting places of the Harlequin Duck in the Myvatn district, i. 139
Pennant, description of Barrow's Golden-Eye by, i. 98
Percy, Lord William:
Account of adult male Harlequin in possession of, i. 136 *and note* 2
Account of shooting ducks on Mr. Meynell's estate, ii. 129, 130
Notes on three young Eiders reared by, ii. 152
On courtship attitudes of the Smew, ii. 124
On the down of the young Tufted Duck, i. 46
Plumage: sympathetic changes in colour of developed feathers, i. 2
Pochard, Baer's, *Nyroca baeri* (Radde), i. 42–44
Breeding habits, i. 43
Breeding range, i. 43
Courtship, i. 44
Egg, i. 42, 43
Habits, i. 44
Local name, i. 42
Measurements, i. 43
Migration range, i. 43, 44
Plumage:
Adult female, i. 43
Adult male, i. 42
Immature male, i. 42
Variations in the female bird, i. 43
Young in down, i. 42
Pochard, Common, *Nyroca ferina* (Linnæus), i. 14 *et seqq.*
American fastidiousness in cooking, i. 28
American form, i. 14, 16, 27–28
Breeding, i. 17
Breeding range, i. 17–20
Call, i. 23, 24
Of young, i. 25
Capture, i. 26, 28
Chesapeake Bay shooting ground for American Pochard, i. 27
Pochard, Common (*continued*)—
Courtship, i. 23, 24, 75
Diet, i. 23, 28
Distribution, i. 17–21, 27–28
Diving, i. 22
Young as divers, i. 25
Down in nest, i. 25
Eggs, i. 14, 15, 24
Enemies of, i. 25
Feeding, i. 22, 23
Flesh, delicacy of, i. 27, 28
Flight, i. 22, 27
Forms of, i. 14
Habitat, i. 21
Habits, i. 21 *et seqq.*
Join with domesticated ducks, i. 22
Hybrids, i. 13, 28, 29, 63
In confinement, i. 23, 28
Incubation, i. 15, 24, 25
Large flocks in Scotland and Ireland, i. 20, 21
Local names, i. 14
Male in eclipse most difficult to find, i. 25
Maturity, age of, i. 2, 15, 17
Measurements, i. 16, 17
Migration, i. 20, 26
Moulting, i. 16
Nest, i. 24
Nesting habits, i. 24, 25
Noise of birds rising, i. 27
Parasites, i. 28
Plumage:
Adult female, i. 17
Change during nesting season, i. 17
Adult male, i. 15
Eclipse, i. 16, 26
Immature female, i. 17
Immature male, i. 15
Young in down, i. 15
Preponderance of males, i. 22, 23
Shooting, i. 26, 27; ii. 132
On the Chesapeake shores, i. 27
Tameness on small ponds, i. 22
Weight, i. 16, 17
Whistle, i. 24
Windpipe of the male, i. 17
Pochard, Red-crested, *Nyroca rufina* (Pallas), i. 4 *et seqq.*
Breeding, i. 12, 13
Breeding range, i. 6
Call, i. 11
Courtship, i. 11
Diet, i. 11
Distinguished from Common Pochard, i. 19
Diving, i. 10
Down in nest, i. 13
Eggs, i. 5, 12, 13
Feeding, i. 10, 11, 13
Flesh, i. 12

Pochard, Red-crested (*continued*)—
Flight, i. 10
Fresh-water duck, a, i. 9
Habitat, i. 9, 10
Habits, 1, 8 *et seqq.*
Cautious, i. 11
Gregarious, i. 8, 9, 11
Hybrids, i. 13, 41, 80
In confinement, i. 10, 13
Incubation, i. 13
Introduction into England, date of, i. 13
Local names, i. 4 *and note* 2
Maturity, age of, i. 56
Measurements, i. 56
Nest, i. 12, 13
Nesting habits, i. 12, 13
Parasites, i. 13
Plumage:
Adult female, i. 6
Adult male, i. 5
Young male, i. 5
Young in down, i. 5, 13
Sexes, distinction of:
In eclipse, i. 6
Young birds, i. 13
Shooting, i. 12, 62
Weight, i. 5, 6
Windpipe, i. 6
Winter range, i. 7
Pochard, White-eyed. *See* Ferruginous Duck
Pycraft, P. W., investigation on structure of feathers, i. 2

Rearing of ducks for shooting, ii. 31, 136 *et seqq.*
Death-rate of young birds, ii. 136 *and note*
Decoy pond, ii. 138, 139 *and note*, 142
Diet, i. 36, 62; ii. 31, 64
Pairing of ducks, ii. 140, 143, 144
Requirements, ii. 137
Traps, ii. 145
Young should not be allowed to go alone into deep water, i. 62
Report of the International Polar Expedition: account of Ducks at Point Barrow, Alaska, i. 127, 128; ii. 41, 50
Riemschneider:
Account of the nest of Barrow's Golden-Eye, i. 104
Account of Long-tailed Ducks in the breeding season, i. 126
Description of movements and breeding habits of the Harlequin Duck, i. 139
On the habits of the Scaup, i. 77
Robinson, H. E., on scarcity of the female Velvet-Scoter, ii. 70, 71
Robinson, H. W.: Eider-drake incident, ii. 18

St. Quintin, notes on live ducks in possession of, at Scampston:
Common Scoter, ii. 63
Eider-Ducks, ii. 31
Golden-Eye, i. 83 *note.*
St. Quintin (*continued*)—
Long-tailed Ducks, i. 130
On the treatment of newly-caught duck, ii. 150
Red-crested Pochard, i. 13
Smews, ii. 124, 125
Sanford, Leonard, on the decoying of the Long-tailed Duck, i. 129
Scaup Duck, *Nyroca marila* (Linnæus), i. 64 *et seqq.*
Albinos, i. 80
American form, i. 69, 70; ii. 89
Asian form, i. 68, 70
Breeding range, i. 67, 70, 75, 76
Capture in loose nets, i. 80
Commercial value small, i. 79
Courtship, i. 74, 75, 77
Cry, i. 74, 75
Diet, i. 74
Diving, i. 72
Down in nest, i. 76, 77, 78
Eggs, i. 64, 67, 76, 77, 78
Feeding, i. 72, 79
Flesh, i. 79, 80
Flight, i. 73
Habitat, i. 70, 71
Habits, i. 70 *et seqq.*
Gregarious, i. 74, 76
Hardy, i. 70, 71, 73
Unsuspicious, i. 74, 79
Unwary, i. 72, 73
Hybrids, i. 68, 80
In confinement, i. 66, 75, 80
Incubation, i. 64, 78
Local distribution according to age, i. 79, 80
Local names, i. 64, 70
Maturity, age of, i. 65, 67
Measurements, i. 66
Migration, i. 71, 73, 74, 78, 79
Migration range, i. 69
Moulting, i. 65, 66, 67
Nest, i. 76, 77, 78
Nesting habits, i. 76, 77, 78
Scared bird, i. 78
Nesting materials, i. 78, 125
Out-of-season birds, i. 74
Parasites, i. 79
Plumage:
Adult female, i. 66
Breeding dress, i. 66
Adult male, i. 65, 66
Eclipse dress, i. 66
Immature female, i. 67
Immature male, i. 65
Young in down, i. 64
Female, i. 65
Saltwater duck, a, i. 70, 71, 88
Shooting, i. 71, 72, 79
Winged birds, i. 62, 73

Scaup Duck (*continued*)—
Swimming powers, i. 73
Weight, i. 66, 67
Windpipe of male, i. 66
Young life, i. 77, 78
Schioler, E. Lehn:
Collection of ducks of, *cited*, i. 101
Note on breeding range of Barrow's Golden-Eye, i. 101
On colour changes in feathers, i. 3
On the diving skill of a wounded and crippled female Eider, ii. 17
On the nesting habits and incubation of the Eider, ii. 21, 22
On the plumages of the Eider-Duck, ii. 7
Scoter, comparative abundance of the three species, ii. 83
Scoter, Black, nesting materials of, i. 125
Scoter, Common, *Oidemia nigra* (Linnæus), ii. 52 *et seqq.*
American Scoters, ii. 59
Bill, knob on the, ii. 52, 53, 54
Breeding range, ii. 55, 56
Breeding season, ii. 60
Call, ii. 59, 61, 64
Capture, Continental methods, ii. 63
Courtship, ii. 61
Diet, ii. 59, 60, 64
Sometimes enjoy vegetable food, ii. 60
Distribution, ii. 55
Diving, ii. 58, 64
Down in nest, ii. 52, 61
Eggs, ii. 52, 55 *note*, 61, 62
Feeding, ii. 57, 58, 63
Flesh, rank and uneatable, ii. 63
Flight, ii. 58, 59
In foggy weather, ii. 59
Whistling noise in, ii. 58
Flocking of, ii. 57
Habitat, ii. 57
Habits, ii. 57 *et seqq.*
A certain number do not migrate in the spring, ii. 57, 60
Early departure from breeding grounds, ii. 57
Flocking, ii. 57
Separation of sexes and ages, ii. 59
Shyest members of the genus, ii, 59, 61
In confinement, ii. 58, 60, 63
Incubation, ii. 52, 62
Local names, ii. 52
Maturity, age of, ii. 53
Measurements, ii. 53, 54, 55
Migration, ii. 57, 60
Migration range, ii. 56
Nest, ii. 61
Nesting habits, ii. 61–63
Parasites, ii. 63
Plumage:
Adult female, ii. 54, 55
Scoter, Common (*continued*)—
Plumage (*continued*)—
Adult male, ii. 54
Eclipse, ii. 54
Immature female, ii. 54
Immature male, ii. 52, 53, 54
Young in down, ii. 52
Shooting, ii. 57, 58, 59, 63
American methods, ii. 59
Swimming, ii. 58
Weight, ii. 53
Windpipe, ii. 54
Young in down, ii. 52, 63
Scoter, Surf-, *Oidemia perspicillata* (Linnæus), ii. 76 *et seqq.*
Abundance of, in New Brunswick and Nova Scotia, ii. 80
Associates with Velvet-Scoter, ii. 79–80
Bill, peculiar shape and colouring of, ii. 77, 79
Breeding range, ii. 78
Call, ii. 81, 83 *and note* 2
Courtship, ii. 83
Decoying of, ii. 82
Devotion of the male, ii. 83
Distinguished from the Common Scoter, ii. 79
Distribution, ii. 81
Eggs, ii. 76, 83, 84
Feeding, ii. 83
Feeding grounds, ii. 82
Flesh, ii. 81, 84
Flight, ii. 81
During migration, ii. 83
Whistling noise in, ii. 81
Flocking, ii. 80, 81
Food, ii. 81, 82, 83
Habitat, ii. 80
Habits, ii. 79, 81, 84
Gregarious, ii. 80
Regulated by food, ii. 80
Resemble those of the Velvet-Scoter, ii. 81
Incubation, ii. 84
Irides, ii. 78
Local names, ii. 76, 81
Maturity, age of, ii. 77
Measurements, ii. 77
Migration, ii. 80, 82, 83, 84
Numbers do not migrate, ii. 81
Migration range, ii. 78
Nest, ii. 83, 84
Plumage:
Adult female, ii. 77, 78
Adult male, ii. 77
Immature female, ii. 77
Immature male, ii. 76
Disparity in the plumage of early and late hatched birds, ii. 77
Shooting, ii. 80, 81, 82
Wounded birds, ii. 81
Young in down, ii. 76

Scoter, Velvet-, *Oidemia fusca* (Linnæus), ii. 65 *et seqq.*
American form, ii. 68
Bill, form, and colour, ii. 66
Breeding, ii. 74
Breeding range, ii. 67
Call, ii. 73
Courtship, ii. 73, 74
Diet, ii. 73
Distinguishing points, ii. 69
Distribution of the sexes during winter season, ii. 70, 71
Diving powers, ii. 70, 72
Depth of dive, ii. 73
Down in nest, ii. 65
Early departure of, from British Isles, ii. 69
Eggs, ii. 65, 74
Enemies of, ii. 75
Feeding grounds, ii. 69, 70
Flesh inedible, ii. 75
Flight, ii. 71
Difficulty of taking to wing except in rough weather, i. 1; ii. 71
"String" formation in, ii. 71
Great Black-backed Gull steals food of, ii. 73
Habitat, ii. 69, 70
Habits, ii. 69 *et seqq.*, 74
Early departure of males, ii. 74
Separation into small parties, ii. 71
Shyness during eclipse, ii. 74
Walking, ii. 70
Wild, during eclipse period, ii. 72, 74
In confinement, ii. 70, 73
Incubation, ii. 74
Local distribution of sexes, ii. 70, 71
Local names, ii. 65
Maturity, age of, ii. 66, 67
Measurements, ii. 66, 67
Migration, ii. 69, 74, 75
Large number remain at winter haunts during summer, ii. 72, 74
Migration range, ii. 68
Nearctic form, ii. 68
Nest, ii. 74
Nesting habits, ii. 74
Out-of-season birds, ii. 57, 74
Parasites, ii. 75
Plumage:
Adult female, ii. 67
Grey form, ii. 67
Red-brown form, ii. 67
Adult male, ii. 66
Eclipse, ii. 66, 72
Immatures, ii. 65–66, 67
Young in down, ii. 65
Rarity of adult female, ii. 70
Sex distribution in winter, ii. 70, 71
Shooting, ii. 71
Difficult to kill, ii. 75
Scoter, Velvet- (*continued*)—
Swimming powers, i. 73; ii. 70
Young life, ii. 74, 75
Scoter, Velvet-, *Oidemia velvetina* (Cass), ii. 68
Scoter, White-winged, *Oidemia deglandi*, ii. 57, 75, 81
Scotland:
Eider-Duck in the Western Islands, ii. 13
Golden-Eye in, i. 84, 85, 87
Red-breasted Merganser in, ii. 104
Scaup in, i. 67, 68, 69
Tufted Duck in, i. 50, 51
Seebohm, description of nesting places of Golden-Eye in Siberia, i. 94
Shooting:
Boatmen for: comparison of local types, ii. 135
Character of the sport, ii. 126, 128, 132
Good and cheap: a typical instance, ii. 128
Difficulties and dangers of, ii. 128, 132
Guns, ii. 130, 134
Methods of, ii. 126 *et seqq.*
Driving bogs, pools, or small lakes, ii. 128
Flighting, ii. 128 *et seqq.*
Lying in wait on flats and banks, ii. 132
Moonlight shooting, ii. 131
Punt shooting, ii. 132, 133
Stalking off shore, ii. 131, 132
Walking up, in bogs or marshes, ii. 127
North American methods of killing wild fowl, ii. 127
Sea ducks, ii. 131, 132, 133, 134
Treatment of ducks shot for specimens, ii. 134
Smew, *Mergus albellus*, Linnæus, ii. 117 *et seqq.*
Attraction for the Golden-Eye, ii. 121, 122, 124
Breeding range, ii. 119
Call, ii. 122, 123, 124, 125
Seldom make any cry—only a harsh croaking note, ii. 122
Contrasted with the Golden-Eye, ii. 121
Courtship, ii. 122, 123, 124
Crest, ii. 123
Diet, ii 122, 123
Distribution, ii. 119
Diving, ii. 122, 123, 125
Down in nest, ii. 117
Eggs, ii. 117, 119
Comparison with those of Wigeon, ii. 117
Enemies of, ii. 124
Feeding, ii. 122, 123, 125
Fishing by, ii. 123, 124
Flight, ii. 122
Habitat, ii. 121
Habits, ii. 121–124
Hybrids, i. 97; ii. 124
In confinement, ii. 124, 125
Intelligence of, ii. 121
Local names, ii. 117
Maturity, age of, ii. 118, 119
Measurements, ii. 118, 119

Smew (*continued*)—
Migration, ii. 121, 123, 124
Migration range, ii. 120
Moult, ii. 125
Nest, ii. 119, 124
Nesting habits, ii. 124
Parasites, ii. 124
Peculiarity of the crown and the crest feathers, ii. 122
Plumage:
Adult female, ii. 119 *and note*
Adult male, ii. 118
Eclipse, ii. 118
Immature female, ii. 119
Immature male, ii. 118
Young in down, ii. 117
Position in standing or walking, ii. 122
Preening, ii. 122
Quick to take alarm, ii. 121
Seldom found in the sea, ii. 121
Shooting, ii. 121
Sight of, under water, ii. 123
Swimming attitude, ii. 122
Windpipe, ii. 119
Young in down, ii. 117
Somateria, distinctive characters and distribution of the various local races, ii. 2–4
Measurements, ii. 4
Steller's Eider. *See under* Eider
Surf-Scoter. *See under* Scoter
Sutherland, James (Jimmy Sutherland), ii. 133

Trevelyan, Major H.:
Notes on nesting of Common Scoter on an Irish lough, ii. 61–63
On flocks of Red-breasted Merganser in Ireland, ii. 106
Tristram, Canon, on the nesting of the Red-crested Pochard, i. 12
Tufted Duck, *Nyroca fuligula* (Linnæus), i. 45 *et seqq.*
Appearance on water and in flight, i. 55
Breeding, i. 59, 60
Breeding range, i. 48–53
Courtship, i. 55, 58
Cry, i. 57, 58
Diet, i. 57, 62
Difficult to approach on large sheets of water, i. 56
Disappearance of males during nesting season, i. 60
Distribution, i. 48–53
Diving, i. 57, 61
Down in nest, i. 60
Eggs, i. 45, 59, 60
Enemies of, i. 61
Feeding, i. 57
Flight, i. 55, 56
Flocking of the males, i. 60
Fresh-water duck, a, i. 55

Tufted Duck (*continued*)—
Habitat, i. 54, 56
Habits, i. 48, 54–57
In alarm, i. 55
Of males during nesting season and in eclipse, i. 60
Winter habits, i. 55, 56
Hybrids, i. 41, 63
In confinement, i. 57, 62
Incubation period, i. 60
Local names, i. 45
Maturity, age of, i. 48
Measurements, i. 47, 48
Migration, i. 56
Migration range, i. 53, 54
Moulting, i. 47, 48, 60
Nest, i. 59, 60
Nesting habits, i. 59, 60
Parasites, i. 61
Plumage:
Adult female, i. 47
Adult male, i. 46
Eclipse, i. 47
Immature female, i. 48
Immature male, i. 46, 48
Comparison with Ferruginous Duck, i. 31
Distinction from adult, i. 46
Young in down, i. 46, 61
Quick to take alarm, i. 55, 56
Recognise degrees of danger, i. 56, 57
Shooting, i. 62
Wariness, i. 56, 57
Weight, i. 47, 48
Young, i. 60, 61
Colour of, i. 61
Diving by, i. 61
Turner, L. M.:
Account of Harlequin Duck in Alaska, i. 138
Note on the Surf-Scoter, ii. 81

Vancouver Island, a paradise for sea ducks, i. 109
Velvet-Scoter. *See under* Scoter
Von Linstow, on parasites in Scaup, i. 79

Warren, account of the Surf-Scoter captured in Ireland, ii. 79
Whittaker, J., on diving of the young Tufted, i. 61
Wildfowl, habits of, best observed from the gunning punt, i. 121, 123; ii. 26
Wood, Mr., on Common Pochard and Mallard hybrids, i. 29
Wormald, Hugh, *Notes on the Management of Ornamental Water Fowl*, cited and quoted, i. 62, 63; ii. 149
Note on show of Tufted Duck, i. 58.
On management of Tufted Ducks in confinement, i. 62
On rearing and feeding of young ducks, i. 62, 63; ii. 149

Zoological Society's Gardens, i. 62, 75; ii. 32, 53, 123

Printed by Ballantyne, Hanson & Co.
Edinburgh & London

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