THE BRITISH BIRD BOOK

200 PLATES IN COLOUR AND NUMEROUS PHOTOGRAPHS,

EDITED BY
F. B. KIRKMAN, B.A. OXON

Contributors

J. L. BONHOTE
WILLIAM FARREN
E. HARTERT
F. C. R. JOURDAIN
W. P. PYCRAFT
EDMUND SELOUS
MISS E. L. TURNER
A. L. THOMSON
AND THE EDITOR

Artists

MISS W. AUSTEN
G. E. COLLINS
H. GRÖNVOLD
G. E. LODGE
A. W. SEABY
AND OTHERS

A COMPLETE WORK ON THE BIRDS, NESTS AND EGGS OF GREAT BRITAIN

London and Edinburgh ~ T. C. & E. C. JACK
THE SHELDDUCK AND THE SURFACE-FEEDING DUCKS


PRELIMINARY CLASSIFIED NOTES


COMMON-SHELDDUCK [Tadorna tadorna (Linnaeus); Tadorna cornuta (S. G. Gmelin). Burrow-duck, bargander, bargoose, ladyfowl, anet; stock-anet (Scotland). French, tadorne; German, Brandgans; Italian, volpoca].

1. Description.—The adult sheldrake may always be distinguished by the crimson beak and white plumage variegated with black and chesnut. There is no marked seasonal change of coloration. Length 25 in. [635 mm.]. (Pl. 156.) The male is distinguished at once by the protuberance at the base of the beak. The head and neck are black with metallic green sheen, the rest of the plumage white relieved by a broad band of bright chesnut encircling the body at the base of the neck, and a broad black band down the middle of the breast. The scapulars and primaries are black and the tail is tipped with black, and the sides of the under tail-coverts are pale chesnut. The speculum has the outer half chesnut-red, the inner half steel-blue. The female lacks the protuberances at the base of the beak, and is slightly duller and smaller than the male. The juvenile plumage recalls that of the adult, but the head and neck are of dull grey-black, the chesnut band encircling the body, and the black band down the breast and abdomen are wanting, and the beak is flesh-coloured, while the legs and toes are of livid flesh colour. The young in down is white, with the crown,

There can be no doubt that the existing systematic arrangement of the Ducks is very unsatisfactory, but having regard to the fact that a thorough study of their structural characters has yet to be attempted, it has been thought inadvisable in this work to depart from the arrangement of the genera adopted by Howard Saunders.—Ed.

VOL. IV. 2 B
hind-neck, and back of a pale brown; before and behind the wings the dark colour of the back trends downwards, forming short transverse bars. [W. P. P.]

2. Distribution.—This is mainly an estuary-haunting species, but occasionally is found breeding at considerable distances from the sea. It nests in fair numbers in suitable localities in our east coast counties, but is scarce in the south-east, though some breed on the south coast from Hampshire westward. On the Welsh estuaries it is very numerous, and is also found on the north-west coasts of England and on the Isle of Man. It is abundant on the east coast of Scotland, but more local on the west side, and is found in the Hebrides and Orkneys, but is of very rare occurrence in the Shetlands. In Ireland it breeds in limited numbers on the low-lying parts of the coast, more especially on the west side. On the Continent its breeding range extends to the Lofodens in Norway, commonly in South Sweden and also in Öland, on the south-west coasts of Finland, according to Buturlin on the Murman coast in N. Russia, as well as from 51° in the Urals south to Transcaucasia and the Black and Caspian Seas. In the southern Baltic and on the coasts of Denmark, the Frisian Islands, N. Germany, and Holland it is common, and also breeds in small numbers locally in North France and at the mouth of the Guadalquivir in Spain. It is said to nest also on the Tunisian coast. In Asia it breeds from Transcaspia and the Kirghiz Steppes up to lat. 53° 27' in the Tomsk government, Dauria, and probably Manchuria. On migration it ranges to the Mediterranean and N. Africa (about lat. 23°), and in Asia to the Persian Gulf, North India, China, Burma, Formosa, and Japan. It has occurred casually in the Færoes and Iceland. [F. C. R. J.]

3. Migration.—A resident species, whose numbers are augmented in winter by immigrants from the Continent. In Yorkshire large flocks of migrants occur in autumn and in spring, some remaining throughout the winter: occasionally occurring inland (cf. Nelson, B. of Yorks., 1907, p. 432). Three hundred birds were seen at the Tees light-vessel on 13th Jan. 1882 (cf. Fourth B. A. Migration Report), while flocks of up to two hundred and one thousand birds have been recorded from Kentish and Welsh waters respectively (cf. Ticehurst, B. of Kent, 1909, p. 341; and Forrest, Fauna N. Wales, 1907, p. 275). The winter increase is also noticeable in Ireland, where the largest flocks are seen in spring (cf. Saunders, Ill. Man. B. B., 2nd ed., 1899, p. 419; and Ussher and Warren, B. of Ireland, 1900, p. 188). Sometimes strikes against the lighthouse lanterns (cf. Nelson, op. cit., p. 433). [A. L. T.]

4. Nest and Eggs.—Occasionally the nest has been found in quite open sites on unfrequented islands, but the normal position is at the end of a tunnel
Common shelduck's nest and eggs in a burrow opened to show same

Mallard's nest and eggs

Gadwall's nest and eggs (Holland)

Shoveler's nest and eggs
in the sand, sometimes a rabbit burrow, and at other times excavated by the bird. The distance from the mouth of the hole varies considerably, some nests being as much as 10 or 12 feet from the entrance, while others are only a few feet. (Pl. lxvi.) On the Frisian islands artificial holes are freely used to breed in, and it may be said to exist in a partially domesticated state. Other sites occasionally made use of are holes in stone embankments or in the face of a cliff, hollows beneath loose boulders, and in thick gorse bushes. The nest itself is a big bed of down, pale brownish or pearly grey in colour, and large white feathers, barred at the tip with chesnut or dark brown (Pl. U),\(^1\) mixed with dead grasses, moss, leaves, etc., and is formed by the female, though probably both sexes take part in excavation (O. Lee), but this is denied by Naumann. The smooth creamy white eggs are generally from 7 or 8 to 12 in number, but instances of 13 to 17 eggs in one nest are on record, and in Norway 20 and 28 have been found in one nest, obviously the produce of more than one female, as was undoubtedly also the nest with 32 eggs recorded by W. Gyngell (Naturalist, 1902, p. 161). Average size of 93 eggs, 2.57 x 1.84 in. [65.5 x 46.9 mm.]. (Pl. S.) The incubation period is given by Saunders as 28 to 30 days, but Oswin Lee estimates it as 24 to 26 days. It is apparently performed by the duck alone, but according to some writers she is relieved for a short time in the early morning and evening by her mate. This is probably an error of observation, as the drake calls her off and accompanies her on her return to the nest. Full clutches may be met with from about the first week of May onward, usually about the middle of the month, occasionally as early as the end of April, and in the north often not till early in June. Only one brood is reared in a season, though a second clutch may be laid if the first is taken. [F. C. R. J.]

5. Food.—Sandhoppers and other small Crustacea, molluscs, marine worms, and sea-weed. The young partake of the same food, and are assisted in its capture by the female. [W. F. P.]


1. Description.—The mallard may be distinguished at all ages by the coloration of the coverts and secondaries forming the speculum. This, in so

\(^{1}\) For illustrations of the typical feathers found in the nests of the British-breeding ducks, see an article by H. Noble in \textit{British Birds}, vol. ii. pp. 18 and 37, pls. 1 and 2.
far as the secondaries are concerned, is of a rich metallic steel-blue, bounded along its hinder margin by a black-bordered white band, the white area formed by the tips of the remiges. Anteriorly it is bounded by a similar band formed by the tips of the major coverts, but here the black traverses the tips of the feathers. The sexes differ widely in coloration, and the male undergoes a striking seasonal change of plumage. Length 23 in. [584 mm.]. (Pl. 157.) The characteristic mark of the male is furnished by the middle tail-feathers, which are conspicuously curled, and of a dark glossy green almost black in colour, as are the rump and under tail-coverts. The head and neck are of a rich metallic green. Round the neck is a ring of white. The interscapulars are brownish, the hue varying individually in intensity: the scapulars and breast and flank feathers are greyish white with fine grey vermiculations, while the fore-breast is of a rich dark chestnut. The beak is olive-green and the legs orange, while the iris is hazel. The "eclipse" dress—mid-June to mid-September—differs from that of the female in that the crown, back, and rump are of an almost uniform dusky tint, the scapulars lack the broad sub-marginal and marginal ochreous bands, the wing-coverts are of a uniform grey, and the abdomen and under tail-coverts are heavily spotted. In the duck the plumage is of a dark brown mottled with ochreous; on the crown this motting has a streaked effect, while on the outer webs of the hinder scapulars this hue forms a pair of broad, curved ochreous bands. The juvenile dress resembles that of the female: but the male may be distinguished by the dusky coloration of the neck, back, rump, and tail; the female by light brown cross-bars on the rump feathers, the sandy yellow streaks on the crown, and the paler lores. She is also smaller than the male. The young in down are of an olive-brown above, with a dark streak before and behind the eye, which contrasts with the golden yellow colour of the side of the head. There is a buff band along the hinder margin of the fore-arm, which partly covers a similar transverse band on the trunk; and there is a further short transverse band across the loins. The under parts are of a pale golden yellow. [w. p. p.]

2. Distribution.—This is by far the commonest and most generally distributed of our British breeding ducks, and breeds in suitable localities throughout the British Isles. Its breeding range extends to the Faeroes and Iceland, but the race inhabiting Greenland has been subspecifically separated. On the Continent it ranges up to Finmark in Norway and north of Uleåborg in Finland, while it is not found north of the Arctic Circle in North Russia. South of these limits it is generally distributed over the European continent south to the Mediterranean.
It also breeds in the Azores and Canaries, and in North-west Africa from Maroc to Algeria. In Asia it is found across the continent north to about lat. 65° and south to Transcaspia, the Persian mountain ranges, Kashmir, and the Lakes of Tibet; also in Japan and the Kuriles. In America it ranges from the Arctic coasts to the United States, chiefly on the western side of the continent. In winter its migration range extends in the Old World to its southern breeding limits, as well as to Madeira and Egypt in Africa and the Persian Gulf, India, Burma, and China in Asia, while in America it ranges south to Mexico, the West Indies, and Panama. [F. C. R. J.]

3. Migration.—A common resident species, which is even more abundant as a winter visitor and a bird of passage from North Europe. The immigration usually occurs between 12th September and 5th November, and the passage may last till 28th November: the spring passage season is from 25th March to 14th May (cf. Clarke, Studies in Bird-Migration, 1912, vol. i. p. 160). In Yorkshire flocks of apparent immigrants have been noted as early as the third week of August, although the majority do not arrive till October or November: after arrival the birds become distributed. Of the same region it is said that “if the weather is fine when migration is progressing, the route taken lies a considerable distance out at sea, but in storms with onshore gales the flocks are compelled to hug the coast, and so are brought under observation” (cf. Nelson, B. of Yorks., 1907, p. 436). And it has also been remarked that great numbers are driven into the creeks and flats of the Thames and Medway estuaries by easterly and north-easterly gales (cf. Ticehurst, B. of Kent, 1909, p. 346). In Ireland there is a great augmentation in numbers during December and January, and the new arrivals are said to be distinguishable “by being slighter in body, tired after migration, and more easily decoyed” (cf. Ussher and Warren, B. of Ireland, 1900, p. 191). Gregarious, often seen in huge flocks: sometimes strikes against the lighthouse lanterns. [A. L. T.]

4. Nest and Eggs.—Most nests are placed on the ground not far from water, and are generally somewhat hidden by the surrounding vegetation, but it has been known to breed at a considerable distance from water. Not infrequently it nests in pollarded willows or hollow trees: occasionally in ivy covered trees or walls, and in bean or straw stacks, and heaps of faggots. Instances are also on record of its breeding in old nests of both crow and rook, and on the Continent the eggs have been taken in the nests of the goshawk, buzzard, and kestrel. Many of these sites are at considerable heights above the ground. The materials used for the nests are chiefly dry grass with some admixture of moss and dead leaves,
and as a rule a plentiful supply of down, which is dark brown in bulk, with fair-sized light centres and whitish brown tips. The nest feathers are more pointed than those of the Pintail, and are marked with a double brown bar (the upper one being sometimes represented by two spots) and a fan-shaped extension down the shaft to the tip. (Pls. U and lxvi.) The nest is made by the duck alone, and contains as a rule from 8 or 9 to 14 eggs, exceptionally as many as 16. The colour varies considerably; it is usually greenish grey or yellowish grey, occasionally pale blue-green or greenish white. Average size of 270 eggs, 2·21 × 1·61 in. [56·3 × 40·9 mm.]. (Pl. T.) Incubation is performed by the duck alone, and lasts 25 to 26 days (W. Evans). Heinroth also gives 26 days, but O. A. J. Lee states that the average period is 25 days, but that some eggs hatch on the 22nd day. They are laid in the British Isles from February onward to June, but the most usual time is from the end of March to mid-April. In the Shetlands eggs may be found from mid-May to the end of June (Saxby). Exceptional cases have been recorded of autumn breeding, in September and even in October. Normally the mallard is single brooded, and eight to ten weeks elapse before the young can fly, so that the late hatches are probably those of birds which have lost their first sittings, though it is of course possible that some birds may attempt to breed twice. [F. C. R. J.]

5. Food.—Minute organisms obtained by passing water and ooze through the beak, aquatic insects and their larvae, worms, slugs, small frogs, small fish, leaves and seeds of aquatic plants, grain, and acorns. The young feed largely on insects, under the guidance of the female, and in the fledgling stage obtain much food by diving, wherein they differ from the adults. [W. F. P.]

GADWALL [Ánas strépera Linnaeus. Bastard (Kent). French, chipeau-bruyant; German, Mittel- or Schnatter-Ente; Italian, canapiglia].

1. Description.—The gadwall may always be distinguished by the coloration of the speculum, the inner half of which is white, the outer black. In front it is bounded by a wedge-shaped patch of black passing towards the tip of the outstretched wing into Indian-red. The sexes differ in coloration, and there is a conspicuous seasonal change of plumage in the male. (Pl. 158.) Length 20 in. [508 mm.]. The male has the base of the hind-neck, scapulars, and flanks marked by coarse vermiculations of black and white, and the minor coverts rich Indian-red. The crown is black, more or less markedly barred with brown, and the side of the head and neck are buffish white, mottled with brown. The fore-breast is white
with concentric bars of black, while the breast and abdomen are white. The rump and under tail-coverts are of a dark glossy green, almost black. In his “eclipse” dress—June, September—the back is dusky, transversely barred with white: the minor coverts are marked like the back: the rump is of a dusky brown, and the upper tail-coverts are barred with buff. The fore-breast is buff with large brown spots; while the mid-breast is white with short, oblong, incomplete dusky bars. The female resembles the female mallard, but may at once be distinguished by the speculum, which differs from that of the male only in its smaller size, and the absence of red on both speculum and minor coverts. The juvenile dress resembles that of the female, but males are darker on the back than females of the same age, and in this they recall the adult male in his “eclipse” dress. The young in down differs from the young mallard of the same stage in that the dark band before and behind the eye is narrower. [w. p. p.]

2. Distribution.—As a breeding species in the British Isles the gadwall is confined to East Anglia and one or two localities in Southern Scotland. It breeds now in some numbers in Norfolk, especially at Merton, and also locally in Suffolk. In Scotland it is known to have bred in 1909 and 1910 at a loch in the Forth area, as well as in Peebles in 1906. It has not yet been proved to nest in Ireland, but owing to its inconspicuous colouring is apt to be overlooked. Outside the British Isles a few pairs breed in North Iceland, and on the Continent it is not uncommon in Svearike and Gotarike in South Sweden; it breeds locally in Germany, Holland, and Denmark, and also in Moravia, Galizia, and Hungary; while in Russia, though recorded from Archangel, it is chiefly confined to the south (Poland and the governments of Moscow, Riazan, Kazan, and Perm). It also breeds in Bulgaria and the Dobrogea, probably in Thessaly, and nests not uncommonly in Southern Spain. Salvin and Tristram found nests at Zara in Algeria in 1857. In Asia its breeding range extends from Transcaspia, Turkestan, and the south of the Tobolsk and Tomsk governments to lat. 60° N. in East Siberia; and in North America it inhabits the temperate parts of the continent south to Texas. Its migration range in the Old World extends to North Africa and Abyssinia; in Asia to the Persian Gulf, India (except in the extreme south), Burma, China, Japan, etc., and in America to Mexico and Florida, while as a casual it has occurred on the Kuriles and Commander Isles, and in the Bermudas, Cuba, and Jamaica. [F. C. R. J.]

3. Migration.—A resident species and also a winter visitor from the Continent: mainly a very irregular and uncertain winter visitor, usually arriving some time between 23rd September and 29th October, but exceptionally as early as
THE SHELDUCK AND SURFACE-FEEDING DUCKS

26th August (cf. Clarke, Studies in Bird Migration, 1912, vol. i. p. 160). On the east coast of Great Britain it is decidedly scarce, and it is surprising that its autumn and winter visits to Kent have not become more frequent with the increase of the species in Norfolk (cf. Ticehurst, B. of Kent, 1909, p. 350). On the west of Scotland it is more often recorded, and it appears to be comparatively numerous in some places. But in Dumfriesshire it has only been recorded on two occasions (cf. Gladstone, B. of Dumfries., 1910, p. 268), while it is rare (chiefly recorded in December) in North Wales (cf. Forrest, Fauna N. Wales, 1907, p. 277). To Ireland it is a scarce winter visitor to all parts, very irregular as to locality but perhaps most frequent on the west (cf. Ussher and Warren, B. of Ireland, 1900, p. 192; and Saunders, Ill. Man. B. B., 2nd ed., 1899, p. 425). As a migrant it is usually recorded as being in small parties. [A. L. T.]

4. Nest and Eggs.—The nest is placed on the ground, generally in a dry place, but not far from water, and is partly concealed by clumps of rushes, grass, heather, etc., or in some cases under shelter of a bush. Dry grasses are the chief material used in forming the nest, and a plentiful supply of down is added, which is very dark with small lighter centres and distinct greyish white tips: the duck builds. (Pls. U and lxvi.) Noble describes the nest feathers as “small, light in colour, with irregular darker markings in the centre, but lighter towards the tips.” The eggs range from 8 to 13 in number, and are buffish white in colour, without any tinge of green. Average size of 100 eggs, 2.05 x 1.56 in. [52.2 x 39.6 mm.]. (Pl. T.) Incubation is performed by the duck alone, and lasts 26 days according to Heinroth. Nahlik’s estimate of 21 days is probably too low. The average time for full clutches seems to be about the second or third week of May, but fresh eggs may be obtained till the end of the month, and in Ireland early in June. Only one brood is reared during the season. [F. C. R. J.]

5. Food.—Aquatic insects and their larvae, small fresh-water Crustacea and water-snails, small frogs, worms, and occasionally moths and butterflies; seeds and leaves of aquatic plants, and, in India, rice. The young feed on insects and their larvae, and are accompanied in the search for food by the female. [W. P. P.]

SHOVELER [Spátula clypea (Linneaus)]. Spoonbill, broadbill, rattlewing; Britannia (Moray). French, souchet; German, Löffel-Ente; Italian, cucchiaroni.

1. Description.—The shoveler may at all ages, save in the downy stages, be distinguished by the great breadth of the beak and the length of the horny
lamellae along the edges of the jaws. The sexes differ conspicuously, and there is a marked seasonal change of plumage in the male. (Pl. 159.) Length 20 in. [508 mm.]. The male has the wing-coverts of a pale blue, the speculum green with a metallic sheen, a broad white band along its anterior border, and a narrow white line along its hinder edge. The head and neck are of a rich dark metallic green; the foremost scapulars, the hind-neck, and the fore-breast form a continuous white area. The hinder scapulars are blue with white outer webs, and these are succeeded, tailwards, by black feathers marked by broad white shaft-streaks. The interscapular area is dusky. The breast and abdomen are dark mahogany-red, and the under tail-coverts are black glossed with green. The beak is black, the legs orange colour, and the iris yellow. In the eclipse dress the head and neck are much as in the female, but the fore-breast is dusky with V-shaped loops of buff, while the hind-neck is dusky with a few transverse bars of buff, and similar bars occur also on the scapulars. The breast and abdomen are of a dull, pale, mahogany colour, and the latter is spotted with black. The wings are as in the supernuptial dress. The female has the wing-coverts grey-blue, the speculum as in the drake, but with a much narrower anterior bar of white. The upper parts are of a dusky hue with pale wood-brown striations on the crown, and broad marginal bands of the same hue on the scapulars, and interscapulars; on the dusky rump are wavy semicircular loops of wood-brown. The breast is of a dark wood-brown with obscure dusky mottlings. The juvenile dress resembles that of the male in eclipse, but differs in the absence of transverse bars of buff on the hind-neck. The downy young differs from the downy mallard in lacking the buff bar on the wing and the brownish buff colour of the neck. [W. F. P.]

2. Distribution.—There has been a considerable increase in the breeding range of this species in the British Isles of late years, and it has now colonised practically all the northern counties of England, all the east and south coast counties except Cornwall, and has also established itself at various localities in the midlands, chiefly in the east and north-west. In Scotland it is principally confined to the Forth, Tay, Tweed, and Solway areas, but has also been found breeding sporadically even in the extreme north of the mainland, as well as in the Orkneys, Tiree, and in the Outer Hebrides since 1903. In Wales it is still scarce, but has bred in Anglesey and once in Merioneth. In Ireland it is increasing its range, and now breeds in every province in small numbers. On the Continent it nests in many parts of Sweden, especially in the south, and possibly also in South Norway; on the Baltic islands, the coast of Finland, and Lake Ladoga and
the rivers flowing into the Arctic Ocean in North Russia. From here it ranges southward through Denmark, the Low Countries, Germany, the Baltic provinces, Austro-Hungary, Roumania, South Russia, Cyprus, and occasionally breeds in Spain. In North Africa it has been recorded as nesting in Algeria, Tunisia, and Egypt, while it is said also to breed in Nubia and Abyssinia. In Asia it breeds on the rivers Ob, Yenisei, Lena, and Kolyma to 68° on the west and 68½° on the east side, and south to N. Persia, Turkestan, and Kashgaria. In North America its breeding limits extend north to Alaska and south to Texas. The winter range of this species is very extensive, and reaches to Senegambia and Somaliland in Africa, and in Asia it visits the countries bordering the Indian Ocean, China, Japan, as well as the Philippines, Australia, and the Gilbert Isles. In America it ranges to Colombia, the West Indies, and Hawaii. As a casual it has occurred in the Bermudas and once near Cape Town. [F. C. R. J.]

3. Migration.—A very locally distributed breeding species, whose numbers are greatly augmented in winter by immigrants from the Continent: such immigrants have been recorded as early as 5th September (cf. Clarke, Studies in Bird-Migration, 1912, vol. i. p. 160). Our breeding birds are probably mainly resident, becoming more widely distributed in winter; but in Kent the breeding birds are described as "strictly summer visitors," arriving about mid-March, observed in pairs or parties till mid-April, and then at their nesting haunts till early August, after which they are found on the coast till mid-September; winter visitant examples are recorded from October or November onwards (cf. Ticehurst, B. of Kent, 1909, p. 352). A few nest in North Wales, but their numbers are increased in winter, when they are recorded most frequently from the coasts (cf. Forrest, Fauna of N. Wales, 1907, p. 278). In Yorkshire it is best known as an uncommon spring and autumn migrant, although it is also a nesting species, and is occasionally found in winter (cf. Nelson, B. of Yorks., 1907, p. 451). To Ireland, where it breeds in every province and is decidedly on the increase, there is also a considerable augmentation in numbers during the cold season. [A. L. T.]

4. Nest and Eggs.—The nest is often placed on the ground in a meadow, in heather on moorlands, or surrounded by rank vegetation, bracken, etc.; more rarely among dead reeds or in rushes. The distance from the water's edge is very variable, and is sometimes considerable. The nest hollow is filled with dead grasses and other vegetable matter mixed with down, and is the work of the female. The down is much like that of the wigeon, being dark brown with indistinct light centres, but the feathers are distinctive, the larger ones being deep brown, with a heavy blotch near the tip and a band below, while the small ones have a median
PINTAIL [Dátila acáta (Linnaeus).] Sea-pheasant. French, pilet; German, Speiss-Ente; Italian, codone.

1. Description.—The adult pintail is to be distinguished by the speculum, which is of a rich dark green, with purple and bronze reflections, and bounded in front by a band of cinnamon formed by the tips of the major coverts, and behind by a sub-marginal band of black and a very broad terminal fringe of white. The sexes differ conspicuously, and there are distinct seasonal changes of plumage. (Pl. 160.) Length 29 in. [736 mm.]. The male in his full dress has the head of a dark brown with lilac gloss on each side, the back of the neck black; the fore-neck white, which, in the form of a narrow band, is continued up the side of the neck to the head; while it extends downwards to include the whole of the under surface save the flanks, which are vermiculated with narrow lines of grey and white. The wing-coverts are of a brownish grey, while the long inner secondaries and elongated hinder secondaries are black edged with white. The lateral upper tail-coverts and the under tail-coverts are velvety black, the latter contrasting with a buff patch on either side of the abdomen behind the flank feathers; the central tail feathers are black, and much elongated. The beak, legs, and toes are slate-grey; the iris is brown. In eclipse the fully adult bird has the head and neck pale brown, finely striated with darker brown, but the crown is dusky, and round the middle of the neck is an ill-defined whitish band, with grey striations. The base of the hind-neck, intercapulars, scapulars, and rump are dusky with indistinct grey
and white vermiculations, and narrow conspicuous transverse wavy bars of white. The breast is dull white with dusky mottlings, but the abdomen and under tail-coverts are much striated. The flanks are dark brown with irregular loops of white. The wing remains unchanged, in so far as the smaller coverts and speculum are concerned. In immature birds the hind-neck, interscapulars and scapulars are of a dark slate, almost black, with strongly marked transverse bars of buff, but the vermiculations of the adult eclipse dress are wanting; while the small wing-coverts have narrow white edges, and the whole of the under surface is marked by heavy dusky striations. The female differs from the male in eclipse in having the back marked by broad V-shaped loops of buff instead of transverse bars, while the speculum is somewhat duller. The juvenile dress recalls that of the adult male in eclipse rather than of the female, the back being of a dark slate with transverse bars of buff: the speculum at this period is of a dirty brownish grey colour and with lustre of any kind, while the under parts from the fore-breast backward are heavily striated. The young in down differs from the mallard nestling in having the sides of the head brown, and only a narrow superciliary stripe, while the short buff colour bars of the wings and loins are wanting. [w. r. p.]

2. Distribution.—In the British Isles is only known with certainty to breed in Scotland, where it has established itself of late years. A fair-sized colony has been known to exist at Loch Leven, Kinross, since 1898, and probably for some years before: it is also well established in the Orkneys, and has bred in the Shetlands, Skye, S. Uist, and Selkirk. There is no recent proof of its nesting in Ireland. Outside the British Isles it has bred in the Fœroes, and is not uncommon in Iceland; while on the Continent it nests in Norway up to North Finmark and in Sweden to Torneà Lappmark; in Finland and Russia it is generally distributed from the Arctic Ocean and White Sea southward, except in the Baltic provinces, the Taurida, and the Astrakhan government. It also breeds in Holland, Denmark, North Germany, Austro-Hungary, and Roumania, while a few pairs nest apparently in the Camargue and certainly in South Spain. In Asia it ranges north to 72° on the Yenisei and is plentiful on the Kolyma (lat. 69½°), while to the southward it is known to breed in Transcaspia. In North America it has been met with from Alaska, Hudson’s Bay territory and Labrador to Dakota, Idaho, and Montana. Its winter migrations extend to Northern Africa and the Egyptian Sudan; Arabia, India, Ceylon, Burma, China, Formosa, and Japan in Asia; the Indo-Malay archipelago (Borneo, the Philippines, etc.), Laysan, Hawaii; while in America it reaches Costa Rica, Porto Rico, and Cuba. It has also occurred in Greenland. [F. C. B. J.]
3. Migration.—A scarce resident, breeding very locally: also a regular winter visitor and a bird of passage from Northern Europe, arriving some time between 17th September and 11th October, but exceptionally as early as 11th August (cf. Clarke, Studies in Bird-Migration, 1912, vol. i. p. 160). As a winter visitor to Great Britain it is chiefly found on the coasts, but even there it is nowhere abundant: the autumn immigrants rarely linger long in the north of Scotland. A good many birds, indeed, appear to pass right through our area, as an increase in numbers is noticeable in spring; even in the south this return passage lasts till mid-April (cf. Tieghurst, B. of Kent, 1909, p. 354). In Ireland it is commonest in February, but is very local, though the localities are widespread: the southern and western districts are the most favoured (cf. Ussher and Warren, B. of Ireland, 1900, p. 196; and Saunders, Ill. Man. B. B., 2nd ed., 1899, p. 429). A report on the results of marking large numbers of pintail in Denmark is awaited with interest. Usually recorded in small parties of from two or three birds to a score or more. [A. L. T.]

4. Nest and Eggs.—The nest is usually placed on the ground in a dry place, sometimes sheltered by the surrounding vegetation or under cover of a low bush. It is constructed by the duck, and dry grasses and other vegetable matter are used, together with a good supply of down, which is dull sooty-brown in colour, lighter than that of the longtailed-duck, and with whitish centres. (Pls. U and LXVII.) Some feathers show a brown bar with extension down the shaft to the tip; others have a median blotch and a bar with median extension, almost in the shape of a fleur-de-lys. The eggs are usually buffish or yellowish green, but some clutches are cream coloured without any green tinge. The clutch generally consists of 7 to 10 eggs, which are decidedly smaller than those of the mallard, but do not differ much in size from those of the shoveler and wigeon. Average size of 101 eggs, 2.16 x 1.52 in. [55 x 38.8 mm.]. (Pl. T.) Incubation is performed by the duck only, and lasts 22 to 23 days according to Heinroth. Hantzsch gives 3½ weeks, and Naumann says that it is less than four weeks. The breeding season is rather early, and full clutches may be found in the first few days of May in Scotland and Denmark, but in the north of Europe they may be found in early June, and Seebohm took eggs on the Yenisei in July. Only one brood is reared during the season. [F. C. R. J.]

5. Food.—Insects and their larvae, molluscs, small Crustacea, and water-plants, especially Equisetum. The young feed at first mainly on insects and their larvae. [W. P. P.]
TEAL [Néttion crécca crécca (Linnaeus); Néttion crécca (Linnaeus). Throstle-teal, jay-teal; crick (Norfolk). French, sarcelle d'hiver; German, Krick-Ente; Italian, alsavola].

1. Description.—The speculum in the teal suffices to distinguish it in both sexes and at all ages, the outer half being velvety black, the inner metallic green, while it is bounded in front by a rust-coloured or occasionally white bar, formed by the tips of the major coverts, and behind by a very narrow white line formed by the tips of the remiges. The sexes differ markedly in coloration, and there is a conspicuous seasonal change of plumage in the male. (Pl. 158.) Length 14·5 in. [368 mm.]. The male has the head and neck of a rich chesnut relieved by a broad band of dark metallic green extending from the eye backwards on to the neck, and bordered with a narrow edging of buff, which, as a narrow line, runs forward from above the eye downwards to the beak. The upper parts are finely pencilled with grey and white vermiculations, but the wing-coverts are brownish grey, and the hinder scapulars are greatly elongated and coloured, and form a conspicuous longitudinal band, velvet black along its external, and cream coloured along its internal border. The lateral upper tail-coverts and the under tail-coverts are of a velvety black. The fore-breast is white spotted with black, and the flanks are vermiculated like the back, while the breast and abdomen are white, the former with large round black spots. The beak is black, and the legs and toes dusky. In its eclipse dress—July to October—it differs from the female in having the abdomen heavily marked with oval, dusky spots, and the back dusky with narrow transverse bars of buff. The female differs from the female mallard chiefly in its much smaller size, and in having the base of the hind-neck ("upper-mantle") barred with broad bars of ochreous buff, in having the loop-like markings of the hinder scapulars and long inner secondaries of a rufous tinge, and the rump transversely barred with grey, while the breast is white save in August, when it becomes heavily spotted. The juvenile dress differs from that of the adult female in having the crown of the head and the back feathers of a uniform dusky hue and a duller speculum. The young in down differs from the young mallard in lacking the buff markings on the upper surface, and in having the sides of the head and breast pale brown instead of golden yellow. [W. P. F.]

2. Distribution.—On the whole a widely distributed species in the British Isles, nesting in most of the English counties, especially on the east coast and in the north of England. It is rather sparsely distributed in the southern and midland counties, but is commoner in Wales. In Scotland it is very general on
the mainland, and on all the island groups, having been first recorded as breeding in the Outer Hebrides in 1901. In Ireland also it breeds in all districts in limited numbers. Outside the British Isles it nests in Iceland, and on the Continent it is generally distributed in suitable localities from Lapland and the shores of the Arctic Ocean in North Russia to the shores of the Mediterranean, but it is comparatively scarce in the countries of Southern Europe, and it is doubtful whether it breeds in Italy; has only exceptionally been found nesting in Spain, and does not breed in Greece as far as is known. It nests in Sardinia, and is said to have bred in the Azores (Godman), while in Asia it ranges across the whole continent, east to Kamtschatka and north to about 70°. It breeds in the Kuriles and has occurred in Alaska, but is replaced by an allied race in North America, though it has strayed to Greenland and the eastern coasts. In winter its migrations extend to Madeira, the Canaries, and North Africa, south to Haussaland, the Blue Nile and Abyssinia; while in Asia it ranges to Socotra, the Persian Gulf, India, Ceylon, the Malay Peninsula, China, Formosa, Japan, and also to the Philippines. [F. C. R. J.]

3. Migration.—Found all the year round in our islands: the birds which nest with us probably include both resident and summer visitant individuals. The species is, however, most abundant as a winter visitor and a bird of passage from Northern Europe. The autumn immigration takes place between 6th September and 28th November, but the season of the passage movements is given as from 30th August to 29th November; the spring passage season is from 25th March to 11th May (cf. Clarke, Studies in Bird-Migration, 1912, pp. 136, 160). It is resident in Yorkshire, and the first immigrants appear in August, great flights following in September and October, after which the birds disperse; the return passage takes place in March and April (cf. Nelson, B. of Yorks., 1907, p. 455). In Kent the immigrants appear early in September, and are further increased in hard weather: the birds nesting in that county are summer visitors, arriving in March and moving south early in August (cf. Tiechurst, B. of Kent, 1909, p. 355). A few nest in North Wales, but in winter it becomes abundant (cf. Forrest, Fauna N. Wales, 1907, p. 281). The immigrant birds appear in Ireland late in October or early in November, afterwards dispersing (cf. Ussher and Warren, B. of Ireland, 1900, p. 198). Large numbers of teal have been marked on passage in Denmark, and the following is a summary of the results given in the First Report:—One hundred and two birds were caught in a decoy on the island of Fanö, off South-western Denmark, in October 1907; these were "ringed" and released, and twenty-one of them were
reported from various localities during that and the following winter. Two were killed in Holland (22nd October and 22nd November 1907), four in the south-western shires of England (Herefordshire, 5th January; Cornwall, 17th January; and Hampshire, 30th January and 30th December 1908), five in Ireland (Co. Limerick, 10th December 1907; Co. Kerry, 31st December 1907; Co. Fermanagh, 24th February 1908; Queen’s Co., 28th February 1908; and Co. Galway, 21st August 1908), eight in Western France (November and December 1907; and January, February, and September 1908), one in Southern Spain (Guadalquivir estuary, 2nd December 1907), and one in Northern Italy (river Po near Parma, 4th December 1908): further, one was recaptured at Fanö (5th November 1908), and a second on another of the North Frisian islands (Pellworm, 1st October 1908), while one was found not far from Stockholm (12th April 1912), giving an indication of the summer quarters of the birds concerned. Of the above cases, that of a teal marked on passage in Denmark in October 1907, and shot in Co. Galway on 21st August 1908, deserves special attention: the bird may possibly have summered in the British Isles for some reason—when shot it was in good condition, but alone. (Cf. Mortensen, Vidensk. Meddel. fra den naturhist. Forening i Köbenhavn, 1908, pp. 127-139). The teal is a gregarious migrant, and often met with in great numbers: sometimes strikes against the lighthouse lanterns. [A. L. T.]

4. Nest and Eggs.—The nest is frequently found among heather on moorlands, sometimes in a tuft of rushes, under a bush or in a wood. The hollow is scantily lined with dead leaves, grasses, etc., by the duck, and freely lined with down as incubation proceeds. (Pl. LXVII.) The down is dark blackish brown, with light centres, but lacks the white tips characteristic of the garganey. (Pl. U.) Nest feathers “light stone colour, with broad dark patches” on each side; “extending nearly to the tip of the feather” (Noble). The eggs are usually 8 to 15 or 16 in number, smaller than any other of our British-breeding ducks except the garganey, and are pale creamy white with a faint greenish tinge, which is characteristic. Average size of 100 eggs, 1·77 × 1·29 in. [45 × 32·8 mm.]. (Pl. T.) Incubation is performed by the duck alone, and ends on the 22nd day (W. Evans): Hantzsch gives 20 days from the last egg, but H. S. Gladstone estimates it at 28 days! Saunders states that the eggs are usually laid early in May, but nests may frequently be found with full clutches during the last fortnight of April in the south of England, and in Northern Europe often not till June. Only one brood is reared during the season normally. [F. C. R. J.]
Pintail's nest and eggs

Teal's nest and eggs

Garganey's nest and eggs

Wigeon's nest and eggs
5. Food.—The tender shoots and leaves of aquatic plants, insects and their larve, small Crustacea. The young feed largely on aquatic insects, and are aided in their search and guarded by both parents. [W. p. p.]

GARGANEY [Querquedula querquedula (Linnaeus); Querquedula circia (Linnaeus). Crick, summer-teal; summer-crick, cricket-teal (Norfolk). French, sarcelle d'été; German, Knäk-Ente; Italian, marzaiola].

1. Description.—The garganey may at all times be distinguished by the pale metallic green colour of the speculum, which is bounded before and behind by a broad white band. The sexes differ conspicuously, and the male displays a striking seasonal change of coloration. (Pl. 159.) Length 16 in. [406 mm.]. The male in "full" plumage has the lesser wing-coverts of a pale French grey, the head and neck dark cinnamon-red with hair-like striations of white, a broad white superciliary stripe, and a black chin. The long hinder scapulars are of a French grey colour, and these are succeeded by others which are black with broad white median shaft-streaks. The sides of the base of the neck are black with loops of buff, and the fore-breast is of a rufous buff barred with black. The flanks are coarsely vermiculated with dark grey on a white ground, and the abdomen is white obscurely freckled with grey, while the under tail-coverts are buffish white, obscurely spotted with black, thereby differing from all the other surface-feeding ducks, wherein these coverts are velvety black. In his eclipse dress the male retains the coloration of the supernuptial, or "breeding" dress, in so far as the wings are concerned; for the rest he resembles the female save that the fore-breast is white with sub-crescentic bars of dark brown. The female lacks the brilliancy of colour which characterises the male in regard to the speculum, and has the wing-coverts of a dark grey: the feathers of the upper parts are of a dusky hue margined with buffish white: there is a short white stripe behind the eye, another from the eye to the base of the beak, and there is a dull white patch in the region of the lores. The throat is white, the middle of the neck buffish white with sepia striations, and the flanks are sepia coloured margined with white. The young in down is of a dark chocolate colour, and has the sides of the head pale chesnut, with a chocolate patch behind the eye, and a sinuous line of the same hue along the face curving up behind the ear. Behind the wing is an S-shaped loop of dull white, and there is a buff spot on the thigh. The throat and breast are pale buff, the fore-breast rufous, and the abdomen buff with dusky mottlings. [W. p. p.]
2. Distribution.—This species only breeds with us in very small numbers, and is very local. The only counties in which it breeds at all regularly are Norfolk, where it is diminishing in numbers, and in smaller numbers in Suffolk and Kent. It formerly bred in Northumberland, and has nested within the last thirty years in Durham, Yorkshire, Essex, Hants, and Somerset. No instances of breeding are known from Scotland or Ireland. On the Continent it is said to breed in Iceland and at Jæderen in Norway, nests in Sweden up to about lat. 60°, and perhaps also in Jemtland, in Finland, and from the Archangel and Vologda governments and the Baltic provinces in Russia southward. In Denmark, Holland, and some parts of North Germany, as well as in Hungary, it is fairly common, and breeds in smaller numbers in France, North Italy, the Balkan states, Greece, Sicily, probably in Crete, Cyprus, and the southern governments of Russia. In Asia it breeds in Asia Minor, Transcaspia, and on the Ob north to the Arctic Circle, Turkestan, the Tomsk government, near Irkutsk, in Ussuria, Kamtschatka, and Mongolia. Its migration range extends to Abyssinia, Somaliland, the Egyptian Sudan, and British East Africa; in Asia to Arabia, Persia, India, Ceylon, the Malay Peninsula, China, and Japan; the Sunda Isles, Moluccas, Philippines, and Celebes. [F. C. R. J.]

3. Migration.—Apart from the small British breeding stock (see preceding paragraph), this species is an uncommon bird of passage to our islands, very rare or unknown in some parts. In Kent the breeding birds are summer visitors, sometimes arriving in March, but more usually in April; they seek the coast about the middle of July, and probably leave a month later (cf. Ticehurst, B. of Kent, 1909, p. 357). The southern and eastern parts of England are those in which the passage movements in early March and in autumn are most marked (cf. Saunders, Ill. Man. Brit. B., 2nd ed., 1899, p. 435). To Ireland the garganey is a very rare bird of passage, occurring chiefly in the south and west, and in March or April, although also in January and February (cf. Saunders, loc. cit.; and Ussher and Warren, B. of Ireland, 1900, p. 198). [A. L. T.]

4. Nest and Eggs.—The nest may be found in meadows, among heather or rank vegetation, and in marshes, and is a mere depression in the ground, lined with grasses and other vegetable matter, to which down is added, sometimes only while incubation is going on. (Pl. lxvii.) It is formed by the duck alone, and generally contains 6 or 7 to 10 eggs, occasionally as many as 13, which differ little in size from those of the teal, but are a warm creamy yellow in colour, and lack the greenish tinge. The down is also distinctive, being smaller than that of the teal, sooty brown in colour, with light centres and distinct light tips. (Pl. U.)
PRELIMINARY CLASSIFIED NOTES

The feathers have a dark median patch, which does not reach either to the tip or edges of the feather. Average size of 77 eggs, 1.77 x 1.28 in. [45 x 32.5 mm.]. (Pl. T.) Incubation is performed by the duck alone, and lasts, according to Heinroth, about 24 days; but only 22 days by Winel's estimate. Full clutches may be found in East Anglia during the last fortnight of April or early in May, sometimes in Central Europe as late as the end of June, possibly in the case of birds which have lost their first clutch. Only one brood is reared during the season. [F. C. R. J.]

5. Food.—Small fish, aquatic insects, small mollusces, and aquatic vegetation. The young feed largely on aquatic insects, small mollusces, and Crustacea, and are guided in their search for food by the female. [W. P. P.]

WIGEON [Maréca penelope (Linnaeus). Lady-wigeon; russiannett (Lancashire); winder, pandle (Kent); whew (Northumberland); whew-duck. French, canard siffleur; German, Pfeif-Ente, Bläss-Ente; Italian, fischione].

1. Description.—In the male wigeon the speculum is almost black, save for a broad band of metallic green which forms its anterior border. It is bounded in front by a black band formed by the tips of the major coverts, which else, with the rest of the wing-coverts, are white. The female may at once be distinguished from other species of the same sex by the fact that the speculum is of a dusky grey, bounded in front by a white bar. The sexes differ conspicuously, and there is a striking seasonal change of plumage in the male. (Pl. 160.) Length 18.5 in. [469 mm.]. The head and neck of the male are of a chestnut-red, save the crown which is cream coloured, while the eye is surrounded by a broad metallic green ring, and metallic green spots besprinkle the sides of the head and neck. The interscapulars, inner scapulars, rump, and flanks are marked by fine grey and white vermiculations. The outer web of the secondary overlapping the inner border of the speculum is white, the next three remiges of the series are velvet black with white edges, and the lateral upper tail-coverts and under tail-coverts are black. The fore-breast is of a greyish pink tinge, while the breast and abdomen are white. The beak is blue, tipped with black, the feet and legs are lead coloured, and the iris dark brown. In the eclipse dress the plumage differs from that of the female in that the crown is dusky, slightly spotted with brown, the sides of the face and neck mottled closely with grey and white, and the whole of the rest of the upper surface is dusky, transversely barred with buff; while the abdomen is
heavily spotted with grey on a buff ground, the under tail-coverts are dull white heavily spotted with dark grey. The coloration of the female resembles that of the female mallard, differing mainly therefrom in having the feathers at the base of the hind-neck marked by very broad transverse bars and loops of buff, and the sub-marginal and marginal bands of the long inner secondaries rufous instead of buff; and finally, the speculum is dusky grey, bounded in front by a white bar. The juvenile dress differs from the adult female in having the back feathers dusky, margined with a narrow edging of dull grey, interspersed with which are a few, sparsely distributed, indistinct transverse bars of buff. The downy nestling is distinguished by the absence of a basal streak, the almost uniform brown colour of the upper parts showing only a faint buff bar along the wing, and the rufous colour of the cheeks and throat. [W. P. F.]

2. Distribution.—The wigeon breeds in considerable numbers in the north of Scotland, especially Sutherland, and less commonly in Ross, Caithness, and Cromarty. Of late years it has extended its range southward, and has bred in Argyll, Perth, the Forth area (Kincardine), as well as Roxburgh, Selkirk, and Kirkcudbright. It has also nested on Coll, the Orkneys and Shetlands. In England apparently wild birds have bred at one locality in Cumberland, and nests have been found in Yorkshire. Apparently it has also nested once in Merioneth. These latter records may be due to the breeding of young birds hatched in captivity. Although suspected of having bred in Ireland, proof is still wanting. Outside the British Isles it has probably bred in the Faeroes, and nests commonly in Iceland: is abundant in Norway and Sweden as well as in Finland, while in Russia it ranges to Lapland, the White Sea, and the southern part of the tundra which borders on the Arctic Ocean. It has bred on Waigatz and extends in South-east Russia to Astrakhan and Transcaucasia, as well as to the Crimea, but is absent from the south-west. It also breeds in very small numbers in East Prussia, and possibly a few pairs may nest in other parts of North Germany, in Denmark, and in Holland. In Asia it ranges north to 71° on the Boganida and 69° on the Kolyma, south to Ussuria, the Altai, and near Tomsk. It is also found on the Aleutian Isles and in Alaska. In winter it migrates south to Madeira, North Africa, and south-east to the Egyptian Sudan and Abyssinia, while Asiatic birds reach Persia, India (except in the south), Burma, China, and Japan, to Borneo, the Sunda and Marshall Islands: in America to California on the west, and the Carolinas and Virginia on the east: casual in Greenland. [F. C. R. J.]

3. Migration.—A considerable number are resident in or summer visitors
to our islands, breeding in some parts of Scotland (see preceding paragraph), but
the species is much more abundant as a bird of passage and a winter visitor from
Northern Europe. As a winter visitor the wigeon may arrive as early as 5th August,
but more usually does so between 9th September and 16th November, while the period
of the autumn passage is given as from 30th August to 23rd November, but principally October: the spring passage is from 25th March to 11th May and 12th June (cf. Clarke, *Studies in Bird Migration*, 1912, vol. i. pp. 136, 160). On the Yorkshire coast it is generally young birds that are noted in August and September, both old and young arriving in October and November; but adult females are said to be very scarce in winter in the Tees and Humber estuaries (cf. Nelson, *B. of Yorks.*, 1907, p. 459). The young birds are also noted first, towards the end of September, in Kent (cf. Ticehurst, *B. of Kent*, 1909, p. 359). A few reach Ireland by the end of August, but the main influx takes place between 10th October and the middle or end of November, the numbers varying with the season: the period of the return movement is from mid-March to mid-April, sometimes lasting till May (cf. Ussher and Warren, *B. of Ireland*, 1900, p. 200). As a winter visitor the wigeon is gregarious, and is found on both coastal and inland waters. A passage movement has been described as follows: “Off the Cleveland coast, the wigeon is very frequently observed passing alongshore, to the north-west, on migration, and at times comes within range of the fowlers stationed on the ‘scars’ or sand-hills, who take toll of their numbers. In some seasons, when favourable winds from the east or north-east prevail at the time of the full moon, immense flights are seen; I have noticed them incessantly from early morn till noon, in flocks numbering several hundred birds; such was the case in the first week of November 1878, on 1st October 1887, the 13th and 14th October 1894, and the 29th and 30th October 1901” (Nelson, loc. cit.). Two records of marked birds throw valuable light on the movements of our Scottish native wigeon: out of a brood of five wigeon ducklings marked on 19th June 1909 on Loch Brora, Eastern Sutherland, one was caught in a duck decoy at Westpolder, Ulrum, Groningen, North-eastern Holland, on 3rd September 1909, and another was shot in England, on the river Trent, four miles above Gainsborough, early in January 1911 (cf. Thomson, *British Birds*, vol. v. p. 98). [A. L. T.]

4. Nest and Eggs.—The nest is usually placed on the ground, rarely
more than 20 yards from the water, amongst heather; sometimes in rushes, grass
or coarse herbage, and is composed of grasses, moss, etc., mixed with down, and
is the work of the duck. (Pl. LXVII.) The down is dark sooty brown with light
centres, but the nest feathers are quite distinctive, ‘being white, sometimes with grey centres, which spread to the top of the web’ (Noble.) The eggs are 6 or 7 to 10 in number, creamy white in colour. Average size of 100 eggs, 2·16 × 1·52 in. [54·9 × 38·7 mm.] (Pl. T.) Incubation is performed by the duck alone, and lasts 22 to 23 days (Heinroth); 24 to 25 days (Naumann). In Scotland the full clutch may be found occasionally as early as the first week of May, but more usually about the middle of the month, and sometimes even in early June. On the Shetlands Saxby records eggs as early as April 26, but in Northern Russia the eggs are often not laid till the end of June. Only one brood is reared in the season. [F. C. R. J.]

5. Food.—Grasswrack (Zostera) and other marine algae, fresh-water submerged weeds, fine turf, cockles and other Mollusca, and small Crustacea. The young feed mainly on small Crustacea, and accompany the female in their search for food. [W. P. P.]
THE SHELDUCK AND SURFACE-FEEDING DUCKS

[W. P. Pycraft]

Systems of classification are apt to be somewhat arbitrary, and rarely reflect the habits of the living animals they embrace. But there are exceptions to every rule, and the division of the Ducks into "surface-feeding" and "diving" species is one of these; for this division, though originally based almost entirely on habits, is confirmed by evidence obtained from diverse sources. One is tempted to regard the surface-feeding species as birds of the fresh waters, and of the diving species as marine types; but a little reflection will show that this is by no means true. It is thus, then, plain that the obvious structural features which distinguish these two groups are not to be attributed to their haunts, but rather to the method of securing their food. Those of the surface water will, it is true, dive under exceptional circumstances, as in the avoidance of enemies, or momentarily when in play; but they are not dependent on diving feats to secure their daily bread. Such food as is obtained lower than the surface of the water is procured by peculiar, semi-diving movements, wherein the fore part of the body is submerged, leaving the hinder portion sticking vertically out of the water, after the fashion of geese and swans. The diving Ducks, on the other hand, have to dive for a living, and hence it is that in them we find the legs relatively shorter, the thigh-bone especially, whereby the carriage of the body when on land becomes semi-erect and somewhat strained. On the water, however, the advantage of this change in the fashion of the limb becomes at once apparent, for it is now obvious, from the more backward position of the legs, increased powers both of diving and swimming are attained. This modification of the leg, however, is purely an adaptive character, and therefore of no value to the systematist. Happily, however, it is confirmed from an unexpected source, and one which excludes all
possibility of having been induced by adaptation. We refer to the lower, or syringeal, end of the windpipe. This, and in the males only, displays a curious, roughly spherical bony chamber, as a rule on one side of the syrinx only. But in each species this bulla has a character of its own, as distinctive as the plumage. Only in the sheldrake is a symmetrically disposed double-bulla present.

What purpose do these curious inflations of the syrinx serve? Apparently they are vocal organs, resonators. If this is so, one would have expected the males to display the more powerful voice, but the opposite is actually the case; only in one or two species do the males seem to utter any very peculiar sound, such as might be attributed to the bulla. It may be, of course, that closer observation will show that the males are more vociferous than was supposed, or that the peculiar notes characteristic of the males of the several species have a greater carrying power than we have hitherto imagined.

When we turn to the "diving Ducks," we find this syringeal bulla assuming still stranger forms. In the Eider-ducks alone does it bear any likeness to that of the surface-feeding species. The Scoters form a group apart, to be considered presently. In the rest this chamber has become enormously enlarged, and its transformation seems to have put a greater strain on the bone secretions concerned with its formation. At any rate, the walls of the chamber are pierced by large vacuities, across which are stretched exceedingly delicate membranes. Here again we must regard the modification as concerned with voice-production and not with the diving habits, since only the males are affected. In the goosander alone does the female show any tracheal modification. This takes the form of a fusiform enlargement of the windpipe itself, and in the male there are two such enlargements, which can be felt by drawing the fingers down the neck of the living bird. The male merganser resembles the female goosander in this respect, while the female merganser displays no such contrivance.

In the Scoters these syringeal bullae are wanting. In the common
The scoter the trachea and syrinx are conspicuous for the absence of modifications, but the bronchi are curiously inflated. The velvet and surf scoters show no syringeal peculiarities, but a curious swelling at the upper end of the trachea, and a second in the furcular region. And the precise function of these, as of the syringeal bullæ, remains to be demonstrated.

The surface-feeding Ducks, including the shelduck, display a further peculiarity in the presence of a conspicuous "speculum" on the wing—an oblong band, generally of metallic green, formed by the secondary remiges; and this is commonly bounded by a bar of white or black, or both, formed by the tips of the major coverts. Often a bar along the hinder edge of this speculum is formed by the tips of the secondaries themselves. But there is no need to enlarge upon this feature, since it will be necessary to constantly refer thereto in describing the plumage of the several species, for each has its own fashion in this particular. Let it suffice here to draw special attention to the gadwall, which in this particular differs from all the other surface-feeding species.

Of the remarkable change of plumage, which annually leaves the male, for a season, in a state of "eclipse," we have already spoken, and the subject will be referred to again in the course of the following pages.

Similarly, no more than bare mention will be made here of the unusually fleshy and horn-fringed tongues, and the curious armature of the jaws. These are adaptive characters, best dealt with in considering those species wherein they are most conspicuously developed.

Though monogamous the males display little or no care for their young, this duty being undertaken by the female. She is an assiduous mother, plucking the down from her own breast for the benefit of her incubating eggs, just as the rabbit denudes itself of under-fur for the sake of its newly born young.

Young ducks, it need hardly be remarked, are nidifugous. But
they are peculiar, in the first place, on account of their coloration, which betrays but little evidence of the earlier striped livery which must have been worn during bygone ages; and in the second, for the infinitely slow development of the wings, wherein they differ conspicuously from the nidifugous young of Gallinaceous birds. In the latter the remiges are developed within a few hours of birth, and long before the appearance of contour feathers. In the Ducks, on the other hand, the quill feathers do not make their appearance until after the rest of the body is fledged, and these differences seem to be intimately associated with the conditions of existence. In the one case a limited power of flight has been prematurely developed, owing to the necessity of finding escape from the numerous enemies which lurk in dry covert; in the other, escape is found by taking to the water, and on this account the development of the contour feathers of the trunk is more important than those of the wings, and this because they afford a better protection than down, being more resistant to water.

THE SHELDRAKE

[W. P. Pycraft]

The sheldrake, though not in its habits so much a water surface-feeding Duck as a shore bird, may properly be classed with the surface-feeders by virtue of the structural similarities above mentioned. It is one of the handsomest and most strikingly coloured of the Ducks. It is also one of the most interesting. In the first place, it represents one of the annectant links with the Geese. It also commands attention from the fact that the two sexes are practically alike and brilliantly coloured, while the offspring have a distinct livery, though differing less markedly perhaps from the adult than is the rule in such cases.

While the surface-feeding Ducks for the most part haunt inland
waters, the sheldrake generally avoids them, preferring the open sea, sandy beaches, and estuaries: occasionally, however, it will nest inland, as on lochs in Scotland. In parts of its range, as in Asia east of the Caspian, salt lakes are frequented. The main factor in determining these haunts is of course food. In their freshwater-haunts this seems to consist mainly of small molluscs and aquatic insects obtained from shallow water, and worms obtained from pastures. Small fish, Crustacea, and molluscs form their staple diet by the sea, and much of this food is sought for at low tide below high-water mark.

As with many of its relatives and the Gulls, the sheldrake procures marine-worms by rapidly beating the ground with its feet, which apparently sets up vibrations, which drive the coveted morsels to the surface. St. John, commenting on this fact, implies that dry sand is thus tapped, but from my own observations only pools of water are thus explored. But whatever the meal for the time being, it is never procured by diving or from deep water; at most the body is half-submerged by paddling with the feet, so that the hinder half projects vertically from the water, as in the case of its surface-feeding relatives and the Swans. Under the stress of great fear, however, diving seems to be resorted to, both by young when striving to evade capture and the adults when wounded or to avoid the stoop of the peregrine. The flight of the sheldrake is likened by some to that of the swan, by others to that of the goose, from which it is clear that in this particular it differs conspicuously from that of the more typical ducks. But neither on the wing nor at rest are the bright chesnut colours of this bird visible save at close range; commonly the coloration appears to be simply black and white, disposed in large and sharply defined patches, which, when a number of birds are seen in full career, suggest nothing so much as a flock of large butterflies.

While feeding, the sheldrake is somewhat noisy, and the female

---

particularly so, as in the case of the mallard. Every now and then she will utter what Mr. Abel Chapman calls "a long-drawn, reverberating bark," and occasionally this is accompanied by half a dozen distinct quacks. The note of the drake is quite different—a peculiar sibilant noise, half-squeak, half-whistle, usually quite low and gentle, but sometimes tuned so as to become sharp and ringing. But what is still more curious about this cry is the fact that at the time it is uttered the beak is closed, apparently tightly; sometimes indeed, Mr Chapman tells us, the bird seems to be feeding at the very moment. The wigeon-drake, on the other hand, opens his beak wide before commencing his "pipe" and closes it during the note.

At the pairing season, according to Seebohm, the male develops a special call, which takes the form of a clear, rapidly repeated whistle or trill; but whether, as is probable, this is accompanied by any peculiar display there seem to be no records to show. Inasmuch as both sexes are coloured alike, we should expect to find a similar display by both sexes.

The sheldrake, as everybody knows, differs from all the other Anatidae in that it breeds, with rare exceptions (see "Classified Notes"), in a burrow. As a rule rabbit-burrows are selected, and it would seem that occasionally the rightful owners are evicted to provide the desired nursery. At any rate, on one occasion Sir Ralph Payne-Gallwey saw a female haul a young rabbit out of a burrow by its ear.¹ On occasion badger and fox earths are used; as also are natural crevices on rocky coasts. But when ready-made nurseries are not to be had the birds will dig one for themselves, and the work of tunnelling is believed to fall entirely on the female. This must be no mean task, since the brood-chamber may be as much as 12 feet from the entrance of the burrow. One would have imagined that for tunnelling on this scale beak and feet more adapted for the purpose would have been necessary. But the sand-martin and the bee-eater are, if possible, even less suitably equipped.

¹ C. J. Patten, *Aquatic Birds of Great Britain and Ireland*, p. 86.
Plate 156
Sheldrake (right), shelduck and ducklings
By A. W. Seaby
unnecessary so as to the case of the mallard. Every now and then we will hear what Mr. Abel Chapman calls "a long-drawn, resonating, "bear," and occasionally this is accompanied by half a dozen distinct quacks. The note of the drake is quite different—a peculiar shrewd, uneasy, half-squeak, half-whistle, usually quite low and gentle, but sometimes raised so as to become sharp and ringing. But what is still more curious about this cry is the fact that at the time it is uttered, the bird is raised, apparently tightly, sometimes indeed. Mr. Chapman tells us, the bird seems to be feeding at the edge-water. The signature drake, on the other hand, opens his beak wide before commencing his "bear" and closes it during the note.

At the fishing-season according to tradition, the male develops a special call which takes at times of a clear, rapidly repeated recitative, so well, but whether not probable, this is accompanied by any joint, or guttural tokens. In each we have seen are coloured, and were should expect to find a similar display by both sexes.

The sheldrake, as everybody knows, differs from all the other Anatidae in that it breeds with rare exceptions (see: "Classified Notes") in a burrow. As a rule rabbit-burrows are selected, and it would seem that occasionally, the rightful owners are excited to provide the desired nursery. At any rate, on one occasion, S. R. Payson-Talley saw a female lead a young rabbit out of a burrow by its ear. On occasion fodder and hay are also used, as also are natural crevices on rocky coasts. But when ready-made nurseries are not to be had, the birds will dig one for themselves, and the work of tunnelling is devoted to half entirely on the female. The nest must be no more than about 3 feet from the entrance of the burrow. One would have assumed that for tunnelling an especially beak and foot more adapted for the purposes would have been necessary. But the sharp-edged and the bee-eater are, if possible, even less suitable instrument.
In the North Frisian Islands, according to Yarrell, the natives make artificial burrows and systematically rob the nests until the middle of June, when they allow the birds to begin to sit. In this way each burrow may yield as many as thirty eggs. In robbing the nest care seems to be taken always to leave four or five eggs in the nest, so that the suspicions of the bird are not aroused: for the sheldrake appears to be of a wary disposition, often taking the precaution to fly straight into the entrance of the burrow, so as to leave no tell-tale traces of the whereabouts of its nursery. Generally, however, more or fewer footprints at the entrance to the burrow will be found, though none extend beyond it. Incubation extends over a period of from 28 to 30 days, during which time the male watches near at hand. Some valuable notes, generously placed at my disposal by Mr. G. Cresswell, show that we stand much in need of careful observation on the feeding-habits of the sheldrake during the incubation period, for he remarks of the numerous birds now breeding on the warrens at Wolferton, Norfolk, that "so far as I can observe, the diet of this bird must be entirely different in the nesting season to what it is during the rest of the year. A few . . . do visit the salts and creeks occasionally, for a short time; but only for what may be called 'a wash and brush up,' and not for food. When the eggs are set I do not think the birds move from the vicinity of the heath." It may prove that they live on sand-lizards, beetles, and snails, varied with a little grass. As soon as the young are hatched they are taken down to the water by their parents, the male being as assiduous in their care as his mate. According to Naumann, when the young are hatched far from the water they are carried in the beak, but others seem to incline to the view that the nestlings mount on to the back of the parent and maintain their position by seizing hold of the feathers of the back. Commonly, if not always, they go on their own feet. Some interesting facts on this head are embodied in the notes furnished me by Mr. Cresswell, who, writing of the birds breeding on Wolferton heath, remarks that the old birds, in convoying
their young to the sea, have a choice of routes by fields and ditches, yet they commonly choose to pass through the village street of Wolferton, much to the delight of the inhabitants. Having reached the sea, two or three broods seem to combine to form "troops" of from thirty to forty, accompanied by their parents. If approached, the adults display considerable anxiety for the safety of their young, but if hard pressed, Mr. Abel Chapman tells us, they leave them to seek safety by squatting among the stones and tide-wrack on the shore. When older they seem well able to take care of themselves, resorting to diving if pursued, and dispersing themselves in all directions. Not until they are at least two years old are these youngsters sexually mature, by which time they have assumed the adult dress, though this lacks something of the brilliancy of older birds.

The Mallard

[By W. P. Pycraft]

Of all our native ducks the mallard has surely the highest claim to our regard, for it is one of the handsomest members of its tribe, and certainly the most valuable, since it is the parent stock from which our domesticated breeds have been derived, while in a wild state it yields us still a by no means inappreciable portion of our food-supply. Why the mallard alone among the Ducks has proved capable of domestication is a matter which seems beyond our powers of divination, yet the fact remains. But it is significant to note that when they are not molested, mallard display a very trustful disposition. Thus I have seen numbers feeding and disporting themselves in the midday sun, from the bridge which crosses the Tay at Perth, despite the fact that tramways were continually passing overhead, and people were always watching them from the parapet. But no

1 In litt.
one is allowed to shoot them. And similarly Mr. Ussher, in his delightful *Birds of Ireland*, remarks on this same theme: “When my cows go to drink where the ducks are standing, the latter merely move aside, and the presence of the cowherd at most causes them to fly out on the water; but should any one approach with an umbrella, or even with black clothes, they quit the lake.”

During the autumn months large numbers of immigrants reach our shores, and these seem for the most part to make the sea their headquarters, finding much if not most of their food there, but foraging inland at night. Our home-bred birds, on the other hand, seem to remain where they were bred, though resorting to the sea if ice has locked up their usual food-supply.

In its choice of habitat the mallard is not hard to please; for it will find congenial haunts alike on bare Highland lochs in Scotland and the richly stocked waters of a Norfolk Broad at the sea-level. Bogs, ditches, and the seashore besides are drawn upon as the need arises, while after rain the marshes form an irresistible attraction for the sake of worms and slugs, and in the autumn grain gathered from the stubble, and acorns from the hedges, afford a welcome change of diet. During most of the year it is omnivorous. No animal matter contained in the water is despised, nor is any green thing that grows there deemed unpalatable. Much of its food seems to be obtained by passing large quantities of mud and water through the beak, when the solid, edible portions are retained, the rest being rejected by the aid of the horny strainers which depend from the edges of the upper jaw. In the choice of food, doubtless the thick, fleshy tongue plays an important part. That the mallard is largely a night-feeder is due to force of circumstances rather than choice. Where they have an assured security from persecution they feed by day and sleep by night.

The flight is both rapid and powerful, the swish of the wings being plainly audible even at a distance of several yards. When alighting on the water the body is suddenly inclined upwards, the
THE SHELDOUCK AND SURFACE-FEEDING DUCKS

neck drawn backwards, and the feet thrust forwards so that on reaching the water they plough along its surface for some few feet before coming to rest. Occasionally, apparently when under the spell of pleasurable excitement, mallard will perform aerial evolutions like those of teal, turning and twisting, and plunging downwards, then rising in a great sweep and circling round, and finally descending, one after another, on to the water. But compared with their smaller relatives they are but indifferent performers.

The mallard rarely dives, save when in the “flapper” stage or in extreme danger. On occasion, Mr. J. G. Millais remarks,¹ an adult will pursue a fish under water. When greatly alarmed, as when being fired at from several points, I have seen them suddenly descend to the water and submerge the body till only the head and the highest point of the back are with difficulty discernible; and all the while the body is slowly thrust forward towards the cover of the reeds, by the paddling action of the feet. Usually, when feeding afloat, the forepart of the body is submerged, so that the hinder half points directly skywards, this position being maintained by action of the feet; and when in very shallow water they will execute a kind of dance on the mud, evidently for the purpose of stirring up worms and other organisms. Gulls and plovers practise a similar device.

The most interesting period in the life-history of the mallard, as with nearly all birds, is the reproductive period. And on this aspect some valuable information has been gleaned by Mr. J. G. Millais and Mr. Hugh Wormald. Mr. Millais’ observations show that at times the ardour of the male flags, and on such occasions the female makes advances. Sometimes even as many as three females will court the same male, swimming alongside and round and round him, uttering the while a curious guttural sound, and dipping their bills in quick succession from left to right. Commonly, he carries his head high, as if unaware of these blandishments. Then one or other lowers herself in the water till half submerged, when pairing almost invariably takes

¹ The Natural History of the British Surface-Feeding Ducks, p. 3.
Plate 157

Mallard: two drakes pursuing a duck

By A. W. Seaby
wasted energy and surface-feeding ducks

next draw a balance so that the foot thrust forwards so that on reaching the water they plough along its surface for some few feet before coming to rest. Descentally, apparently when under the spell of preparatory excitement, mallards will perform aerial evolutions like those of bees, diving and twisting and plunging downwards. Their coming to almost rest and kicking round, and finally descending, can after similar tricks be seen. But compared with their smaller relations, these are incredible performances.

When we come back to the "flapper" stage of the duck's life, as observed by Mr. C. Millais, our attention is directed to certain points. When slowly swimming, as when being pursued, the leading ducks, I have seen them suddenly descend to the bottom, the body 45 only the head and the highest part of the neck are visible, and all the while the body is submerged, so that the hinder half points directly backwards, this position being maintained by action of the feet; and when in very shallow water they will execute a kind of dance on the sand, evidently for the purpose of stirring up worms and other organisms. Gulls and divers practise a similar device.

The most interesting period in the life-history of the mallard, as nearly all birds, is the reproductive season. Mr. MILLAIS'S information has been corroborated by Dr. W. H. WOLFF and Mr. John Wetmore. Mr. MILLAIS says that sometimes the feathers of the male drake and female are both the female makes excursions from the nest even as late as autumn, the males will court the females and continue alongside and round him, gifting for miles a very neat, pleasant sound and dipping their bills in quick succession from left to right. Commonly, he carries his head high, as if aware of these blishments. Then one or other bears herself in the water 0.50 submerging, when pairing always invariably takes place.
place. The display of the male, however, is of a much more elaborate description, at its best exhibiting no less than five distinct postures. As many as four or five rival males often take part in such performances, and act in unison. In the opening movements all swim round the female with the head drawn down close to the body, and in an apparently unconcerned fashion. Then they will suddenly lower their heads till the tips of the beaks are under water, and with this the body is suddenly raised up into a standing posture, and maintained for a moment thus by the treading action of the feet, while the beak, with a jerk, is withdrawn from the water and up the breast, a jet of water being thrown forward as the beak leaves it. These curious movements are commonly accompanied by a low whistle. The normal swimming attitude is now momentarily assumed, but quickly the hinder part of the body is raised and the tail spread, while the neck is held somewhat stiffly and extended upwards. Almost immediately after follows the final phase, when the tail is lowered and the head and neck are stretched straight out along, and touching, the water. This exact sequence, however, is not always observed, but the final stretching out of the head and neck seems always to follow immediately after pairing.

Both Mr. Wormald and Mr. Millais are agreed that adult mallards will commence "displaying" in October, so soon as the new supernuptial dress is completed. And Mr. Wormald has even seen them displaying when in eclipse plumage! Immature drakes begin to display also in the autumn, but such performances lack the vigour of the spring displays.

While Mr. Millais seems to have been the first to draw attention to the display of the mallard duck, Mr. J. L. Bonhote is apparently the first to contend that the she actually chooses her mate. His observations, however, on this head, were made on captive specimens; though they may well be true in the case of wild birds, at any rate occasionally. Mr. H. Eliot Howard showed, long since, in the case of

\[1 \text{Avicultural Magazine, 1911, p. 300.}\]
the Warblers, that our conceptions of the part played by sexual selection must be modified. Mr. Bonhote's observations on the mallard, if borne out in the case of wild birds, will tend to show that the display serves primarily to express the desire for pairing.

Both sexes seem to take part in the choice of a nesting-site, which varies much. As soon as she begins to sit the female plucks down from her breast wherewith to cover her eggs during her brief absences, thereby keeping them warm and concealing them from prowling enemies. But Mr. Millais asserts that little or no down is used when the nests are made near water; he also remarks that when sitting she places leaves and sticks on her back to still further mask her most wonderfully protective coloration. She is a most devoted mother, save at dawn and dusk never leaving her eggs.

The male takes no part in the task of brooding the eggs, but he remains near the sitting hen, at any rate during the greater part of her onerous task. But by degrees his visits become less frequent, and finally he goes away with other males, and holds aloof from his mate till the autumn.

The young take to the water as soon as hatched, and here they display extraordinary skill and agility in catching flies and other insects. They are jealously guarded by the female, who is a somewhat stern parent. On occasion she will elect to nest in a pollard willow, or even amid the branches of oak and elm, using as a foundation for her nursery the deserted nest of a crow or hawk. When the young hatch out the mother secures their descent not by transporting them but by inducing them to jump from the nest to the ground, a feat which is invariably accomplished without injury, owing probably to the lightness of the body and the length and elasticity of the down. While in health, at any rate, every care is taken to assure their welfare. Gulls are vigorously buffeted, and the fond mother will even challenge and defeat the hawk. From the inclemency of the weather she protects them with her own body, protecting them from rain by spreading her wings over them, and from cold by drawing them under
her closed wings. Such as fall sick, however, she promptly dispatches, though what may be the motive for such summary proceedings is not clear.

**THE GADWALL**

[W. P. Pycraft]

The gadwall stands conspicuous among the surface-feeding ducks for the almost quaker-like sobriety of the coloration of the drake, and still more for the striking character of the speculum, which differs from that of all its congeners, consisting as it does of sharply contrasted patches of black and white, instead of some shade of metallic green or bronze. If coloration alone is a sufficient basis for classification, then those systematists who in time past set the gadwall apart in a genus by itself were justified. But conclusions based upon coloration are insufficient. The systematic position of the gadwall, and indeed of all the other Ducks, has to be determined by a study of far more deep-seated characters, and this study has yet to be undertaken. Meanwhile, no classification can be regarded as satisfactory. But this by the way.

In its habits the gadwall resembles the mallard, but shows a decided preference for quiet, reed-fringed lakes, and sluggish streams where there is plenty of cover; for it is one of the most wary and timid of the Ducks, and hence has become largely a nocturnal feeder. It is perhaps on account of its suspicious nature that it affects country near the coast rather than districts far inland, and for the reason that should its safety seem to be endangered, it can retreat to the open sea. Even in winter it will seek such a refuge, contriving to secure relief from the buffeting of the waves during stormy weather by sheltering in the lee of rocky promontories. While feeding, the female keeps up an incessant chattering: when on the wing the
male utters an occasional and curious croak, not unlike the cry of the raven. They float high on the water when swimming, and procure such food as they need from beneath the surface of the water by that curious half-dive so characteristic of the surface-feeding ducks.

Of its courting habits almost the only records are those of Mr. J. G. Millais, who tells us that the drake swims about all day uttering a most unducklike croak, and "showing off" in a modest way before his prospective mate. But in all his actions at this time he displays a somewhat phlegmatic and self-possessed disposition. At times several males will pay advances to the same female, but there is no squabbling, no animosity or jealousy displayed. At most they swim round and round her, merely raising the feathers of the neck and crown, which, it will be remarked, are somewhat soberly coloured: occasionally one will quickly jerk its beak, mallard fashion, and raise its tail after the fashion of the pintail; but there is no apparent enthusiasm.

Having regard to his behaviour during the period of courtship, one is not surprised to find he displays no interest in the welfare of his offspring, the female being left to brood the eggs and rear the young as best she may. She is apparently not the most discreet of mothers, for she will often elect to build her nest in a wood, and numbers of sitting birds, on this account, are snapped up by foxes.

While the duck is sitting, the drake is undergoing his annual "eclipse" moult, which, by the way, he often begins to assume very early, so that he is in full eclipse dress even before the end of May. Not until the young are fledged does the female start her autumn moult.

As touching the eclipse dress, nothing need here be said, for it has been sufficiently described in the introductory notes.
Plate 158

Teal (right) and gadwalls (left)

By A. W. Seaby
As the birds are about to discard their eggs, they are collected by the female. She then proceeds to build a nest, usually in a tree or in the ground, depending on the species. The nest is typically lined with feathers, grass, and other soft materials to provide insulation and comfort for the eggs. Once the nest is complete, the female begins the process of sitting on the eggs to incubate them. This is a crucial period for the development of the young birds, as the temperature and environment within the nest play a significant role in determining their future growth and survival.
Among the surface-feeding ducks the shoveler must always hold a conspicuous place, not only because of the beauty of the drake's plumage, but also on account of the remarkable form of the beak, which, as an ornithological object-lesson in evolution, is worthy of more attention than it has yet received. In all the Anatidae, as everybody knows, the tongue is thick and fleshy, and provided with a more or less extensive lateral armature of spines, while the inner edges of the beak are beset with horny outgrowths. In the Geese and Swans, and in the fish-eating Ducks, these take the form of serrations of considerable size, but in the surface-feeding Ducks they assume a more or less bristle-like character; and in the shoveler these bristles attain their maximum length, which is considerable, so that they form a sifting apparatus, recalling the baleen of whales. Among birds only the petrels of the genus Prion show a similar development of bristles, and herein we have a most excellent illustration of convergent evolution. So far so good. But why in the shoveler alone among its kind have these lamellae attained so great a length? The answer which would usually be given begs the question, since it would be to the effect that they must be of importance to the bird's well-being or they would not be there. That they are evidence of a high specialisation, enabling the bird to take advantage of a source of food-supply inaccessible to its neighbours, and thereby their possessor gains an advantage in the struggle for existence. This may indeed be true. But so far as the evidence goes, such an answer is lacking in cogency. And this because, so far as the records of the food and habits of this bird go, they do not show that the shoveler differs materially in his choice of food from the
various other species with which he commonly consorts. To justify the generally accepted view, the shoveler should feed mainly on minute Crustacea—water-fleas, cyclops, cypris, and the larger Gammarus, and so on. But though large quantities of these small Crustacea may indeed be eaten, no evidence of this fact has so far been brought to light. On the contrary, all who have ventured to describe the menu of the shoveler have enumerated items which are just as eagerly sought, and as successfully caught, by other species not so elaborately lamellated. One author, Seebohm, it is true, says that the shoveler sifts a larger quantity of mud in a given time than any other duck—and we may assume he earns more for his pains—but this is not enough. So far as the evidence goes, the shoveler would get on just as well with a much less perfectly developed sifting mechanism, and in just so far we seem to be justified in regarding these lamellae as affording another of the many instances of "hyperometrically" which have of late years been brought together. That is to say, these lamellæ have developed beyond what is needed to attain their end. Here, then, is a point well worth the while of the field ornithologist to take up. The sequel may prove that the generally accepted views on this theme are correct; but until the matter has been made the subject of special inquiry, the need for this very elaborate sifting apparatus must remain open to question.

Having regard to the peculiarities of the beak, it is certainly significant to find that the shoveler in its choice of haunts is a strictly fresh-water bird. It resorts to the sea only when driven by the severest weather; and it shows a marked preference for bog and reedy marsh-land affording open patches of water, or the backwaters of rivers where there is plenty of cover in the shape of reeds and similar water-plants. This choice is also determined by its small feet, which are ill-adapted to stemming the current of tidal water. Secure in these fastnesses, it seems to spend much of the day in sleep, rousing into activity with the twilight and feeding eagerly till dawn. Night, however, is not the only feeding time, for the shoveler is particularly
Plate 159

Shovelers (upper pair) and garganeys

By A. W. Seaby
under the water's surface, feeding on various other species with which he commonly coexists. As nearly the general accepted view, the shorter should feed upon minute Crustaceans, water-lice, cyclops, cypria, and the larger than these, and so on. But though large quantities of these small crustaceans were believed to exist, no evidence of this fact has as yet been accessible to us. On the contrary, all who have ventured to describe the nature of the shorter have enumerated items which are just as are others are, and as successfully caught, by other species as are their species intermingled. Our author, however, it is true, says that the shorter with a proper quantity of food in a given time than the other shorter species may easily be made more for his painless exertion, and we see, as far as the evidence goes, the shorter generally do as well with a much less perfectly developed sifting mechanism, and as just as far as seem to be justified in regarding these kinds of life as the product of "hyperplasia" which has not yet come to be brought together. That is to say, these kinds seem to have developed beyond what is needed to attain their end. Here, then, is a point well worth the while of the field ornithologist to take up. The sequel may prove that the generally accepted views on this theme are correct, but until the matter has been made the subject of special inquiry, the need for the very elaborate stiffness apparatus must remain open to question.

Having regard to the persistence of the idea that the shorter is a strictly fresh-water bird. It requires no farther proof than driven by the severest weather, and it shows a lack of experience for fog and ready depth and affording some measure of exertion on the backwaters of rivers where there is plenty of cover, in the shape of reeds and similar water-plants. This choice is also determined by its small feet which are adapted to stemming the current of tidel waters. Secure in these latitudes, it seems to spend much of the day in sleep, running in to activity with the twilight and feeding eagerly till dawn. Night, however, is not the only feeding time, for the shorter is particularly
fond of aquatic insects of all kinds, catching such as fly with wonderful dexterity. But it is no less skilful in the capture of aquatic insects such as are obliged to come frequently to the surface for air. Millais describes the zeal which is displayed in taking the latter, and the keenness of sight which is necessary for success. A bird which he kept under observation during one of these insect forays manifested the greatest excitement. The victim was detected long before it reached the surface, and was seized the moment the ascent was completed by a headlong rush along the water. Having effected a capture, it would return to its resting-place and watch for more, restlessly working its neck backwards and forwards as if preparing for its next sally. Occasionally it would grow furiously excited, turning its head swiftly now this way and now that, as if it saw beetles—if such they were—in every direction. At other times it will feed from the bottom of the stream after the manner of its tribe, by a semi-dive, the body being half-submerged till only the hinder half remains visible, the tail pointing directly skywards. On the wing it must be described as active and powerful, rising almost perpendicularly into the air like a teal; and with a rattling of the wings sufficiently loud to have earned the name of "rattle-wings." Like the teal it is fond of taking "headers" towards the water and sweeping upward again; but when fairly launched on the wing its flight recalls that of the wigeon.

Having regard to current theories on the significance of resplendent coloration among birds, it is something of a surprise to find that the courtship of the shoveler is a very tame affair; on neither side, indeed, is there any marked demonstrativeness. The drake, it seems, swims up to the female uttering a low, guttural croak—"konk, konk"—and elevating his head and neck, and jerking his bill upwards. She bows in recognition of the greeting, then both swim round in circles, one behind the other, meanwhile passing water rapidly through their beaks. At other times he indulges in aerial flights. Indeed, Mr. Millais remarks that during the courting season they spend more time in the air than any of the other ducks, beating up
and down over the marsh, the male chasing the female in evidently playful mood, and during such excursions they display amazing skill in turning and diving through space.

Polyandry seems occasionally to take place, and when this is so the additional male is generally immature. As a rule, among the ducks the care of the young is left entirely to the female, but the male shoveler will sometimes display some anxiety on their behalf if he deems them to be in danger, by flying round and round uttering a curious call, something between a croak and a quack. According to Lydekker,¹ at least one instance is known wherein the drake "to some extent" took part in the incubation of the eggs; but, as he remarks, if there has been no mistake in this matter, it is hardly likely to be a solitary example. It is to be hoped that some effort, then, will be made to confirm or contradict this statement, after careful observation.

THE PINTAIL

[W. P. Pycraft]

Among the many attributes of the pintail, beauty, both of form and coloration, occupies a conspicuous place, at any rate so far as the male is concerned, though this is not of such a transcending character as to overshadow the striking personalities of its congeners the mallard, shoveler, teal, wigeon, and garganey, which are all, each in its own way, beautiful. But in some ways the pintail is more interesting than any of these; and this because it seems to have preserved more links with the past in the matter of plumage changes than any of the others. We hold to this view on account of the plumage changes revealed by a study of the eclipse dress of the male

¹ The Sportsman's Book of British Birds, p. 320.
on the one hand, and of the juvenile dress on the other. Briefly, in
the latter the back is of a dusky hue, marked by short, rather broad,
transverse bars of buffish white, and the speculum, devoid of any
gloss whatsoever, presents an indescribable blending of brown and
grey. In immature birds, at the stage when the coloration has
already proclaimed the sex of the wearer, we find similar barrings,
associated with strongly marked striations all over the under surface
of the body. Later, these bars are retained only by the male in
eclipse, but they are then somewhat changed in character, being
wavy in outline, and associated with curiously obscure vermiculations
recalling those of the supernuptial dress. The female loses all traces
of this on attaining maturity, broad V-shaped loops of buff taking
the place of bars; whereby we may infer that the eclipse plumage
of the male answers to an older, more ancestral, livery than that of
the female, which has travelled from this stage along a line of its
own. But let it not be supposed that we know all that is to be dis-
covered of the eclipse plumages of this, or of any others of our
ducks. On the contrary, though much has been written on this
subject, we are as yet far from being able to recount the full sequence
of events in their correct time and place. It would not, indeed, be
easy to find a theme in ornithological literature which has been more
completely obscured by discussion, and if we are ever to possess
ourselves of the facts as to what does take place, the whole matter
must be taken in hand afresh.

In its choice of haunts, as in its choice of food, the pintail has
much in common with the wigeon, for while both are to be found
on large inland lakes, they seem to prefer rather such areas of fresh
water as are within easy reach of the sea, whither they can escape
for safety when alarmed, and where they find a safe harbourage when
the perils of foraging for food have been successfully braved. Large
estuaries perhaps furnish their ideal haunts in these islands, not
that they find here any greater plenty of food than elsewhere, but
because of the greater security which they afford, for the pintail is
a peculiarly wary and timorous bird, and wherever a large flock may be feeding, one or other is constantly on the lookout against surprise. Hence, like other and less suspicious members of this tribe, they feed at night rather than by day. When they have acquired a certain amount of confidence, however, they do feed by day, and at such times search with zeal for aquatic insects of all kinds, most of which are taken from the water, but some are caught when on the wing with great dexterity. Small Crustacea and small molluscs are also greedily devoured, but for the most part they seem to feed on water-plants. Such as grow in shallow water are uprooted and eaten as they float at the surface, and to secure these the body is half-submerged, so that the hinder half of the body projects vertically from the water. But they rarely or never dive. When swimming they float high in the water, and commonly with the tail much raised, though never so much so as in the long-tailed duck. By day they are remarkably silent birds, the male, at no time vociferous, when flying will occasionally utter a low whistle, and when frightened or wounded a sharp “cheeping” note like that of a wigeon. The female, especially at night, gives tongue to a low quack. During courtship both sexes become rather more loquacious, and then only does the male emit a curious double note identical with that of the teal under the stress of like emotions.

Of this courtship but little seems to be known, and most of what has been recorded has been observed by Mr. J. G. Millais, from whom we gather that the male in display presents actions recalling in some respects those of the mallard, and in others of the wigeon. Thus a number of males will often be making advances to the same female, and suddenly all will start up and raise the tail. At other times all will stand up in the water, and bringing the bill down on to the breast will then swiftly jerk it upwards, mallard fashion, at the same time uttering a low soft note. According to Naumann, the male often swims round his prospective mate uttering a deep clük, which, if the observer be fortunate enough to be sufficiently near,
Plate 160

Wigeon (lower). Pintails courting (upper four)

By A. W. Seaby
a peculiarly wary and suspicious bird, and wherever a large flock may be feeding, one or two will be constantly on the lookout against surprise. These, the older and less suspicious members of this pair, are seen at night rather than by day. When they have obtained a certain amount of confidence, however, they are fed by day and at such times search with greed for aquatic insects of all kinds, most of which are taken from the water, but some are caught while on the wing with great dexterity. Small Crustacea and small mollusks are also eagerly devoured, but for the most part their dependence is on aquatic plants such as grow in shallow water. The male builds the nest on a rock or in the reeds, but the female never stays near it. She is said to sit in the water, and commonly has the long

Wigeon (Anas americana) (above fig.)

The female, especially at night, gives tongue to a clear quack. During courtship both sexes become rather more sociable, and then only does the male emit a curious double note, identified with that of the sea unless the stress of life conditions.

Of this courtship but little seems to be known, and most of what has been recorded has been observed by Mr. J. S. Millan, from whom we gather that the male in display presents actions recalling those of the mallard, and in others of the wigeon. There is a number of males will often be making advances to the same female, and suddenly all will start up, and raise the tail at either state he will stand up in the water, and bringing the bill down on to the breast, then suddenly jerk it upward, mallard fashion, at the same time uttering a low soft note. According to Millan, the males when united would his prospective mate uttering a high shrill note, which is sometimes as terrific as to be audible over a
he will find is preceded by a sound like the drawing in of the breath followed by a low grating note. It seems plain, however, that only a general insight into this aspect of the life-history has been obtained, and we must await further observations before we are in possession of all the facts.

Save that the male seems to assist the female in the choice of a nesting-site, we have no records as to the share, if any, which he takes in the care of his offspring: and we must assume that, after the fashion of his kind, he leaves this entirely to the female.

**TEAL**

[W. P. Pycraft]

The teal is at once the smallest British duck, and, after the mallard, the most numerous breeding species in the British Islands. It is thus generally regarded as a resident species. But in the autumn, while hosts of teal arrive on our shores from Northern Europe others are leaving us. These last are our own home-bred birds, and it is a moot point whether any of these pass the winter in the land of their birth: possibly a few remain. If, however, as we surmise, all depart as their places become filled by immigrants, then the teal is a resident species only in the sense that it is always to be met with among us, at one time home-bred birds and at another strangers from afar representing the race.

These home-bred birds distribute themselves along our eastern and northern counties, a few pushing still farther inland; but all confine themselves to fresh waters. On the other hand, the autumn immigrants, for some time after their arrival at any rate, haunt the sea and estuaries, drawing gradually inland as newcomers arrive. Here they remain till the spring, unless driven back to the sea by prolonged frost. But this is a refuge which is sought only in dire
need: after frost the only other factor powerful enough to drive them from fresh water is persecution at the hands of sportsmen. When they are constantly harassed by day, such as live within reach of the sea repair thither daily at dawn, returning at night to their chosen haunts to feed. As with the species already considered, it would seem that these nocturnal meals are partaken of rather from necessity than choice: persecution at the hands of man driving them to seek the cover of the darkness as a means of security against surprise, which is the more easy when the attention is distracted by the search for meat. This, however, is by no means clearly established. It is quite possible that, at any rate during certain times of the year, they may feed by choice at night. For it must be remembered that much of the food of the surface-feeding ducks is of an intangible character, invisible to the birds themselves, consisting as it does of microscopic animal and vegetable organisms, many of which may be of the kind known as negatively heliotropic, that is to say, shunning the daylight—as a certain personage is said to avoid apple-dumplings—and therefore obtainable only during the hours of darkness. These highly nutritive but invisible bodies are obtained, as everybody knows, only by passing large quantities of water rapidly through the mouth by the process known among fen-men as "bibbling." The solid particles are lodged on the fleshy, sensitive tongue, and the water is strained off by the fringes along its sides and the lamellæ bordering the beak. And such "small deer" can be captured as well by night as by day. More observations are needed on this subject, and it may prove that persecution is only partly responsible for these nocturnal habits.

By day teal will rest for hours motionless, in pensive mood, or asleep with the head tucked away amid the scapulars; but if surprised they take flight with amazing suddenness, shooting straight up into the air without preliminary warning, as from a steel spring. They are no less remarkable for the skill and speed with which they change the direction of their flight, even when in full career, for they can turn and twist with the ease of a flock of dunlins, and often, when
apparently pursuing a course which is to end only at some far distant rendezvous, they will suddenly plunge downward and settle on the water.

Teal are said to be wonderfully good weather prophets. When, by severe and prolonged frosts they have been compelled to seek their living from the sea, they will, even when there is no sign of abatement in the rigour of the weather perceptible to human senses, betake themselves back again to their inland haunts, and then, standing on the ice, await the dissolution which they seem to have divined will overtake it within twenty-four hours of their vigil. They leave their inland haunts at such times with evident reluctance; hope with them dominates experience. As an instance in point we may cite the winter of 1891, which was one of exceptional severity, driving hordes of wild-fowl to seek sustenance with us. Vast flocks sought shelter in Ireland, and huge numbers found food long after other sources had closed to them on the decoy lake at Kerryville, Queen’s Co. But at last this too became an ice-sheet, and for days its surface, for about five or six acres, was as thick with teal as they could sit, it being estimated that between six or seven thousand birds here awaited the much-desired thaw.

Our home-bred birds are not hard to please in their choice of haunts, and they breed wherever a sufficient supply of food seems assured to them. Quiet, shallow lakes, whose shores are overgrown with rank herbage, are favoured areas; but marshes near the coast, as well as inland bogs, are readily adopted. Heather-covered wastes with rushy pools have a great fascination for them.

In the matter of their courtship teal display considerable vivacity. But it is significant to note that while there may be many females in the vicinity, only one perhaps will permit the advances of the opposite sex; and she commonly receives court from several drakes at once, which seems to show that the whole phenomena of courtship are dependent upon some subtle state of sexual “ripeness” so to speak, wherein the condition of the female plays a more important part than
is generally supposed. We are indebted for practically all that we know on the behaviour of teal during courtship to Mr. J. G. Millais. Several males will vie one with another in friendly rivalry for the possession of the particular female which has given signs of willingness to mate, should a suitable suitor present himself. The antics of these amorous males are somewhat extravagant. As if according to some traditional usage, they stand, momentarily, erect in the water, raising the tail, arching the neck, and drawing the beak rapidly up the breast, mallard fashion: every now and then one or other will give forth a low double whistle. During these movements the female will sometimes allow two drakes to approach her closely, all the others disposing themselves in a circle or semicircle near at hand. But should any male approach who has received no sign of favour, she promptly drives him off. After some days of this flirtation the female at last goes off with one or other of her suitors to some nesting-place near at hand, but once pairing has taken place a strict monogamy is observed.

The male teal seems to display more anxiety for the welfare of his mate and young than, say, the wigeon, and in this respect again he resembles the mallard. At any rate, when these birds have been discovered breeding, the male has often exhibited as much concern for the downy young as his mate, inviting the pursuit of the intruder by a feigned lameness. The young at the same time scatter, and evade detection by lying close to the ground. At times the female shows a quite remarkable courage in the defence of her brood. A case in point is furnished by the well-known story quoted by Yarrell, wherein a brood of downy nestlings, found by a boy on Lord Cavan's estate in Achill, was driven towards the farmhouse followed by the distracted mother. The boy drove them into the yard and into a shed, and still she followed and was shut in with them. How great an ordeal was this may be gathered from the fact that both dogs and people had to be encountered during the whole of the latter part of

the journey. But probably, in her anxiety for her young, she had eyes for nothing else.

Not even when courting is the male teal vociferous: when on the wing he will occasionally utter a low double whistle. The duck quacks like the mallard female, but lower, more hurriedly, and less defined, while the male occasionally gives forth a sibilant note or two, like that of the mallard drake. But young teal, when in packs in the autumn, are said to keep a constant low clucking chatter.

GARGANEY

[W. P. Pycraft]

In spite of the handsome livery of the male, the garganey has somehow failed to attract the attention which it deserves, for it is a species which affords profitable themes for discussion in more than one direction, even though, as in regard to details of its coloration, one can scarcely hope to find solutions for the queries that suggest themselves. What, for example, can be the meaning of the curious coloration of the under tail-coverts? In all the other surface-feeding ducks discussed in these pages, these feathers, in the male, in his "nuptial" dress are black, with a more or less metallic sheen. In the garganey alone they are coloured after the fashion affected by the females of the race, or of the males in eclipse. Again, why is it that though it enjoys a wide distribution, it is nowhere met with in such abundance as, for example, are mallard and wigeon. Perchance this numerical inferiority is due to its inability to stand cold, for its northern range falls far short of that of the mallard and wigeon. It is also the least edible, or rather the least esteemed for table, of all the surface-feeding species, and this apparently because it feeds more largely, as we shall show, on animal food than any of the others.
In its habits the garganey resembles both the teal and the shoveler, and, like the latter, it loves to gutter in boggy swamps and backwaters. But while the shoveler apparently consumes large quantities of water-fleas and other minute floating Crustacea, as well as other microscopic types of animal and vegetable organisms, the garganey seems to prey rather on insects and their larvae, worms, small frogs and their spawn, small fish, and molluses. True, the shoveler also eats these, but in smaller quantities. In other words, the garganey is less a vegetarian apparently than his congeners, but it is certain that the terminal shoots of water-plants are eaten. That this is so is shown rather by the taste of its flesh, which by common consent is rank, than by actual observation, for the records of its food given by various authors vary so much that we may take it for granted much of what has been stated on this head is pure guess-work. That an animal diet invariably imparts a disagreeable flavour to the flesh of ducks is shown by the fact that the wigeon of the north-west of Scotland, which perforce live largely on cockles, are uneatable, while birds killed elsewhere afford the best of all table birds. Similarly, the eider, which is almost entirely a "meat" eater, is anything but palatable, but kept in confinement and fed on barley and wheat, it quickly becomes transformed into one of the most delectable of ducks!

In its flight the garganey resembles the shoveler, but is far swifter, and peculiarly noiseless on the wing. It cannot, however, compare with the teal for agility in effecting sudden turns, or in rising from the water. When swimming it floats high, but it does not appear to dive, save after the fashion common to the surface-feeding ducks and swans, that is to say, by submerging the forepart of the body till the long axis of the body is at right angles with the water.

It courts like the shoveler. Mr. J. G. Millais, who has closely studied its habits at this time, tells us that the drake swims closely round his prospective mate, spreading his long scapulars and ruffling
the head feathers, thereby displaying his splendid plumage to the very best advantage. This display is varied by a kind of follow-my-leader game, the two coursing round and round, head and stern, and forcing large quantities of water through their beaks, which are buried to the level of the nostrils.

During this amorous period the drake utters a very peculiar cry—a strange crackling note which may be likened to the noise of a high-pitched rattle, or to a stick being swiftly drawn across iron railings. Hence in East Anglia, in addition to its name of "summer teal," it is also called the "cricket teal."

The care of the young, as usual, falls entirely on the female, and there are no records of instances affording exceptions to this rule, such as have been remarked in the case of other species.

In regard to the reproductive period, it is interesting to note that the young garganey takes longer to attain sexual maturity than is the case with teal, which not infrequently will breed at ten months old; with garganey this is rarely the case.

Finally, it is to be remarked, the garganey retains its eclipse dress longer than any other surface-feeding duck. According to Mr. J. G. Millais, the "breeding" dress is not complete till December, and may even be protracted till February. In this matter, however, it again affords an approximation to the shoveler, wherein also the eclipse dress is longer, though it is never so long retained as in the case of the garganey. Somehow one would rather have expected to find this prolonged existence of the eclipse dress in the gadwall, but in any case it affords another illustration of the contention that this dress answers to the "winter plumage" of the Limicoline birds.
That the wigeon and the mallard in their choice of habit display much in common is convincingly attested by the fact that the two are so commonly taken together in decoys. Nevertheless they display a marked preference for estuaries, where, if the conditions be favourable, they swarm during the winter months, the period of their sojourn with us, for the few pairs that remain to breed are a negligible quantity. And this fascination of the sea is felt also, as we have already remarked, by the mallard which come south to us for the winter. Nevertheless, considerable numbers work their way inland in the case of both species; though, for the most part, they do not travel beyond easy reach of the sea.

During its sojourn here the favourite and principal food of the wigeon is furnished by *Zostera marina*. To obtain this they await low water, when, by that peculiar half-diving movement peculiar to the Anatidae, they contrive to pull it up for the sake of its succulent roots. Brent geese feed largely on this weed, and from their larger size and longer necks they are able to obtain all they need in deeper water than the wigeon can forage in. As a consequence, at any rate when hungry, wigeon will play the jackal, and wait on the geese for the sake of the stranded leaves which they reject. Similarly, when fishing in fresh water, they will watch the coot reappearing with weeds after his dive, rushing up at the moment the diver comes to the surface to deprive him of his spoils! In the spring the wigeon is as fond of cropping the grass as a goose, and eats large quantities thereof. But later a change of diet is made, animal food in the shape of aquatic insects of all sorts, small Mollusca, and Crustacea being eagerly sought for. There are times, indeed, when at sea that the favourite *Zostera* is hard to come by, and then they will greedily eat cockles and other shell-fish, and such other animal food as comes in
their way; but after such a diet the flesh is poor. But as a tablefowl wigeon are disappointing, save when they have been feeding for a time in fresh water, when they are scarcely if at all inferior to mallard and teal.

That the wigeon for choice prefers salt water is shown by the fact that among the surface-feeding species they are the most numerous on our coasts. Sir Ralph Payne Gallwey remarks on this head that out of 1500 duck and geese he once killed off the west coast of Ireland, 1200 were wigeon; and again, out of a bag of 500 duck obtained in ten days in the winter of 1883, 400 were of this species. And by way of confirming this estimate, he points out that of 90,000 duck taken during a period of thirty-five years from the celebrated Ashly decoy in Lincolnshire, only 2000 were wigeon. These decoys in the past—and many are unhappily still at work—have wrought an appalling total of destruction, as may be gathered from records of the celebrated Steeple decoy in Canny Marsh, Essex. In the twelve years between 1714-1726, no less than 44,677 wigeon were taken, the "best" year being that of 1714, when 6296 wigeon were taken, 347 teal, 675 mallard, and 46 pintail! And here it is interesting to note that a couple of hundred years ago the great hauls were made in the early autumn, not during January, February, and March as now.

Some idea of the vast numbers which in times past, at any rate, used to resort to the Irish bays and estuaries during the winter months may be gathered from Sir Ralph Payne Gallwey's Fowler in Ireland, pp. 36-48, where he describes how they sit in dense companies, and when they take flight they move in dark sweeping clouds, with a roar of wings as they rise, or pitch, which may be heard a mile off.

So far as the evidence goes, it would seem to show that the wigeon, like its congeners, by choice feeds by day, but after a little persecution it speedily changes its habits, and feeds only during the hours of darkness.
Of its courting habits we have but few records, and these we owe for the most part to the enthusiasm of Mr. J. G. Millais. The display of the drake, he tells us, differs somewhat from that of other surface feeders. Five or six drakes will persistently swim round a female and persecute her with their attentions. Every male raises his crest and stretches out his neck close over the water, meanwhile erecting his beautiful elongated inner scapulars as if to display them to the best advantage; and at the same time the wrist is thrust downwards, causing the primaries to rise in the air. During all this time they keep up a babble of loud "whee-ous," for the wigeon is by far the noisiest of the ducks in his courtship. Only occasionally do the males fight, and in such encounters each tries to seize the other by the back of the neck, and to get his adversary underneath him, when he may be punished by a sound drubbing with the wings as well as severe bites on the head and neck. As a rule such contests are fought only by old males, but occasionally, at any rate, like the shoveler, immature birds enter the arena, and it is certain that such occasionally breed.

So soon as the female begins to sit, the male, Mr. Millais tells us, betakes himself off, to undergo, in seclusion, the moult which for a season deprives him of his fine feathers and leaves him in the more sombre garb of his ancestors. These weeks of humiliation he spends in mutual companionship with all the other males in the neighbourhood in like case. But, according to Naumann, the male attends the female while sitting till incubation is about half over, roosting by day near the nest, and accompanying her each evening to the feeding ground. But at last he leaves her to fend for herself, while he retires to moult.
THE DIVING DUCKS


PRELIMINARY CLASSIFIED NOTES


POCHARD [Nyróca ferina (Linnaeus); Fuligula ferina (Linnaeus). Red-headed-pochard, poker, red-head, dun-bird; snuffle-headed wigeon (Kent); frosty-back (Devon); sandyheaded-poker (Norfolk). French, milouin; German, Tafel-Ente; Italian, moriglione].

1. Description.—The pochard is easily recognised by the broad lobe of the hind-toe and the absence of white in the wings. The sexes differ conspicuously in coloration, and there is a seasonal change of coloration in the male. (Pl. 161.) Length 19 in. [482 mm.]. The male in full dress has the head and neck chesnut-red, the fore-part of the back and fore-breast black or very dusky chesnut; the scapulars, interscapulars, and the under parts white vermiculated with dark grey. The wing-coverts are dark brownish grey, the secondaries pale grey, the lower back and the upper and under tail-coverts are black. The iris is red, the beak black, with a grey patch in the middle of the upper mandible. The eclipse dress is not markedly different from the full plumage, the head and neck being browner, and the breast of a dark pencilled grey. The female has the head and neck of a dull chesnut-brown, darker on the crown and hind-neck, and shaded with white on the cheeks and above the eye. The back is of a dark brown frosted with grey. The wing-coverts are grey, with darker vermiculations, while the secondaries, as in the male, are pale grey. The under parts are of a dull brownish white, except the flanks, which are dark brown. Tail-coverts black, as in the male, but duller. Immature birds resemble the female, but are browner below. The young in down are of a dark brown, paler below. [W. P. P.]

2. Distribution.—The pochard is now well established as a breeding species
in the British Isles, and in England now nests in Northumberland, Durham, Yorkshire, Lincoln, Norfolk, probably in Notts and Suffolk, and locally in Essex and Kent. Along the south coast it is known to nest in Sussex, Hants, and Dorset. Breeding also takes place annually on the borders of Herts, Bedford, and Buckingham, and has been also recorded from Lancashire, Berkshire, and Staffordshire. It has probably nested in Anglesey, and in Scotland is now a widely distributed species, breeding in suitable localities from the Border counties (Berwick, Roxburgh, Wigton, etc.) northward, though not yet definitely recorded as nesting in North-west Highlands or Dee area. On some of the Inner Hebrides it breeds regularly, and is apparently extending its range to the Outer Hebrides and Orkneys, but not as yet to the Shetlands. In Ireland it is stated to have bred in several counties, and young were identified in 1907 in Co. Monaghan. Outside the British Isles it ranges to Östergötland in Sweden, Gotland, in Finland on Åland and up to lat. 63°, in Russia in the Baltic provinces and the Jaroslav, Kazan, and Perm governments; also locally in Germany, in Hungary, Denmark, and Holland, while in Southern Europe it is said to nest in the marshes of Northern Italy, and colonies certainly exist in Eastern Roumania and the Guadalquivir delta in S. Spain. It is also said to have bred in Algeria, and does so in Central Asia (Tomsk, Barnaul, Baikalia, probably also N. Dauria and Seistan in Persia). During the winter months it ranges south to the Mediterranean region and North Africa as well as Madeira and the Canaries, while in Asia it reaches the Persian Gulf, India, Burma, China, and Japan. Casual in the Færoes, Iceland, and Norway. [F. C. R. J.]

3. Migration.—Breeding in the British Isles in small numbers, but chiefly known as a winter visitor; very irregular in the numbers and localities of its occurrence, and usually visiting inland waters. The usual date of its arrival is between 3rd September and 14th November (cf. Clarke, Studies in Bird Migration, 1912, vol. i. p. 160). In Ireland it is chiefly found between November and March; in Yorkshire it visits both coastal and inland waters, but is not numerous; in North Wales it is noted as "variable" (cf. Ussher and Warren, B. of Ireland, 1900, p. 202; Nelson, B. of Yorks., 1907, p. 404; Forrest, Fauna of N. Wales, 1907, p. 284). Gregarious, sometimes occurring in flocks of many hundreds or even of thousands. [A. L. T.]

4. Nest and Eggs.—As a rule the pochard prefers to place its nest in wet and somewhat inaccessible places, sometimes choosing a clump of dead flags in shallow water or deep mud, and at other times on the margins of reed-beds or in tussocks of rushes and aquatic herbage. The nest is a rudely formed structure,
PRELIMINARY CLASSIFIED NOTES

chiefly composed of dead leaves of flag or reed, though occasionally other materials may be used, such as coarse grasses, etc. (Pl. lxviii.) It bears a curious likeness to that of the coot, and is apparently built by the duck. Some nests have little or no down even when the eggs are much incubated, but generally there is a fair supply when the duck has been sitting some time. Mr. H. Noble describes the down as large and exceedingly soft to the touch; it is rather dark brownish grey, and has the usual light centres but no light tips, and is not by itself sufficient for identification without the nest feathers, which are figured and described by Mr. H. Noble in British Birds, ii. p. 23, pl. i. They are 'large and brownish in colour, slightly streaked from the centre upwards, and often tipped for a quarter of an inch with grey' (Noble.) (See also Pl. U.) The eggs, however, are characteristic, being large and very broad in shape. The shell is smooth and waxy, and the colour varies from greenish grey to greenish drab, occasionally almost a dull leaden colour, but the greenish tinge, though somewhat fugitive, is rarely wanting. The clutch usually ranges from 6 or 7 to 11 in number, and 13 and 14 have been found in one nest. Not infrequently one or more eggs may be found in the water close to the nest, presumably knocked out by the duck accidentally. Average size of 100 eggs, 242 x 172 in. [61.4 x 43.7 mm.]. (Pl. S.) Incubation is performed by the female alone, and the period is given by Naumann as 23 days, and 24 by the Hon. G. Legge. If correct, this is rather shorter than what might be expected. The average date for full clutches in England is given by most writers as about the second week of May or the middle of that month. In some cases the eggs must be laid nearly a month earlier, for I have seen eggs which could not have been laid later than mid-April, and know of numerous cases in which full clutches have been found from 21st April to 2nd May. In Scotland fresh eggs may be found till well into June. Only a single brood is reared in the season. [F. C. R. J.]

5. Food.—Except during the winter months the bulk of the food of this species consists of vegetable matter, chiefly the young shoots, buds, leaves, and seeds of the aquatic plants which it obtains by diving. Among these may be mentioned Polygonum amphibium, which Naumann found in great plenty, and in autumn Potamogeton marinus and P. pectinatus. Other plants recorded are Myriophyllum, Ceratophyllum, and seeds of reed, rushes, and grasses. Jäckel records also Panicum crus-galli, Glyceria fluitans, Polygonum persicaria, P. hydropiper, and P. lapathifolium, as well as Bidens tripartita. Aquatic insects are also eaten occasionally, and no doubt also small frogs. During the winter small fish are taken as
well as thin-shelled Mollusca and Crustacea, and Newstead has recorded worms and grass. Sand and small pebbles are usually found in the gizzard. The young are tended by the duck, and though able to dive at an early age, pick up their food at first on the surface of the water. [F. C. R. J.]

6. Song Period.—The low, soft courting-notes are only uttered early in the spring, several weeks before breeding takes place. [F. C. R. J.]

**TUFTED-DUCK** [Nyróca fulígula (Linnaeus); Fulígula cristáta (Leach).
Curre, tuftie, black-wigeon, magpie-diver; goldeneye, arp (Norfolk); covey-don (Sussex); black-pocker (Yorks.). French, morillon; German, Reiher-Ente; Italian, moretta].

1. Description.—The tufted-duck is to be distinguished by the more or less conspicuous pendant occipital crest, the almost uniform black or brown coloration of the upper parts, and the broad white bar across the secondaries. The sexes differ in coloration, and the male undergoes a seasonal change of plumage. (Pl. 161.) Length 17 in. [431 mm.]. The male in full dress has the head and neck black with a purple gloss, the rest of the upper parts dull black with a green gloss on the secondaries, which are crossed by a broad white band. The belly and flanks are white, while the under tail-coverts are black. The beak is slate-grey tipped black, the legs and toes slate-blue, the iris yellow. The eclipse dress resembles that of the female, the crest being greatly reduced in size, while the flanks are clouded by black vermiculations. The female is readily distinguished; the wing, as in the case of the male, has a broad white, black-bordered band, while the rest of the upper parts are of an almost uniform dark brown hue, darker on the scapulars and wings, the breast is a dull, brownish white, and the flanks are dark brown, with traces of grey vermiculations. The short, wide beak, and the very dark hue of the upper parts distinguishes the female of the tufted-duck from the female of the rare ferruginous duck, which it otherwise resembles. Immature birds resemble the female, but have no crest, the breast mottled with dusky brown, and a patch of whitish brown on the lores. Young males are darker than the females of the same age. The young in down is of a uniform dark brown above, save for a faint trace of a whitish brown spot near the base of the tail, and an obscure band of pale brownish over the eye and the sides of the head. The under parts are white. [W. P. P.]

2. Distribution.—There is no evidence of the breeding of this species in
PLATE LXVIII

Pochard's nest and eggs

Tufted-duck's nest and eggs

Eider-duck's nest and eggs (Farnes)
England prior to 1849, when it was reported as nesting in Yorkshire, but since that
time it has spread with great rapidity over England. One of the earliest centres
of distribution was in Nottinghamshire, where it was breeding in 1854. At the
present time it breeds in most of the northern counties, also probably in all the
east and south coast counties west to Devon, as well as in Somerset and Surrey, in
Herts, Beds, and Bucks, and in the northern midlands from Salop and Stafford to
Derby and Nottingham. In several of the east midland counties, if not already
established, it will probably become so within a short period. In Wales it certainly
breeds in Anglesey, and probably also in Merioneth. In Scotland its distribution
has been traced in detail by Mr. J. A. Harvie-Brown up to 1896 (Annals Scot.
Nat. Hist., 1896, pt. i. pp. 3-22), from which it appears that the earliest dates of
breeding in Scotland date no farther back than 1875, when it was recorded from the
Tay and Forth areas, while in 1877 it was found nesting in Tweed, and the following
year in Sutherland. It may now be said to be almost general in Scotland, having
extended its range to the Inner and Outer Hebrides (1903) as well as the Orkneys,
but it is still absent as a breeding species from the West Ross coast. In Ireland there
is no real evidence of breeding before 1879, but here its spread has been equally rapid,
and it is now established in all four provinces, ranging west to Kerry (1896), Clare
(1895 ?), Galway (1906), Mayo (1905), and probably Donegal, while in some districts
of the west of Ireland it is extraordinarily plentiful. Outside the British Isles
it is said to have bred on the Faeroes in 1872; was first noticed on Iceland in 1895,
and now breeds in small numbers; while on the Continent it ranges to Finmark in
Norway and Småland N. to the Russian border in Sweden, while in Finland it is
commonest in the north and central parts, and in Russia ranges from Russian
Lapland to about 50° N. in the Kieff government and 48° on the Volga. From
the Baltic provinces it extends to North and Middle Germany, but is absent from
the south, while in Denmark it has only rarely been known to breed, and is scarce
also in Holland. In South-eastern Europe it has extended its range to the
Dobrogea and probably Bulgaria, while recently it has been found breeding in
Bosnia, Montenegro, and Herzegovina. In Asia its range extends west from
Transcaucasia east to Dauria and Ussuria, north to 68°-70° in West Siberia and
69° 4' in East Siberia. During the winter it migrates south to the Mediterranean
region; Madeira, North Africa from Marocco to Egypt, Nubia and Abyssinia (once
in Liberia); Asia to Arabia, the Persian Gulf, Northern India, Burma, South
China, Formosa, Japan, and the Kuriles; also the Philippine Isles, Great Sunda,
Marianne, and Pelew groups. [F. C. R. J.]
3. Migration.—A resident, and also a winter visitor and a bird of passage from the Continent. The winter visitors arrive between 15th September and 13th October, while the seasons of passage are from 29th October to 27th November and from 24th April to 10th May (cf. Clarke, *Studies in Bird Migration*, 1912, vol. i. pp. 136, 160). Ireland receives most of its winter birds in December, while April is the month of departure (cf. Ussher and Warren, *B. of Ireland*, 1900, p. 207). In North Wales the species is not a very common winter visitor, and in Kent it is only numerous in hard seasons (cf. Forrest, *Fauna of N. Wales*, 1907, p. 286; and Ticehurst, *B. of Kent*, 1909, p. 384). Gregarious as a migrant, and visits both coastal and inland waters. [A. L. T.]

4. Nest and Eggs.—The usual nesting-place is a hollow among rushes, coarse grass, occasionally heather, or under rhododendron and other bushes, generally on islands or the shores of lakes, and as a rule at no great distance from the water. The hollow is lined by the duck with a few grasses or dead leaves, which become mixed with the down, which is dull, dusty brown with indistinct light centres. (Pl. lxviii.) The small greyish white nest feathers are figured by Noble (*Brit. Birds*, ii. pl. 2, fig. 11), and see Pl. U. This duck is of a social disposition, and may be said to nest in colonies as a rule. The eggs vary in number from 8 or 9 to 12, but nests with from 14 to 16 eggs are not infrequently met with. Larger numbers such as 18, 21, and 28 are due to more than one duck laying in a nest. In colour they are a dirty olivaceous brown shading into greenish olivaceous or brownish yellow, while the shape is somewhat characteristic, many eggs being elongated, sometimes approaching those of the sand-grouse in shape. The shell is rather coarse and has little gloss. Average size of 150 eggs, 2.32×1.61 in. [59.0×40.9 mm.]. (Pl. S.) Incubation is performed by the duck alone, and the period seems to vary somewhat. Noble estimates it as 23 days (in incubator), Heinroth at 25 to 26 days, W. Evans 25 to 28 days, while a writer in the *Field* finds that his results for three years vary from 23 to 28 days. The breeding season is late, full clutches being rarely found before mid-May and often not till the end of the month or early in June, while the normal date for Scotland is about the first week of June. Only one brood is reared in the season. [F. C. R. J.]

5. Food.—Both animal and vegetable food is eaten by this duck. On inland waters it subsists to a great extent on the buds, seeds, roots, bulbs, and leaves of various aquatic plants obtained by diving. Jäckel mentions *Polygonum amphibium*, *persicaria*, and *lapathifolium*, *Rumex* and *Potamogeton*. Newstead found
the fruit of the hawthorn (Crataegus), grass, and vegetable fibre. Animal food is also largely eaten: small fishes, tadpoles and small frogs, fresh-water mollusces (Pisidium fontinale), and various insects both in the larval and adult stages, such as the larva of Phryganea and Ephemera (Jäckel), and Dyttiscus marginalis (Sachse). In the Baltic Naumann found in winter chiefly small specimens of Turbo litoreus. The young are tended by the duck, and though able to dive at a very early age, subsist at first entirely on minute organisms picked up on the surface, and water-plants brought up by the duck. [F. C. R. J.]

6. Song Period.—The courting-notes are only to be heard when the birds are pairing in March. [F. C. R. J.]

SCAUP [Nyroca marila (Linnaeus); Fuligula marila (Linnaeus). Blue-bill, sea-wigeon, mussel-teal; covie (Northumberland); frostyback-wigeon (Sussex)].

1. Description.—The scaup may readily be distinguished by the great breadth of the beak and the white bar across the wing. The sexes differ in coloration; the male undergoes a seasonal change of plumage. (Pl. 162.) Length 19 in. [482 mm.]. The male in full dress has the head, neck, fore-part of the back and breast black, glossed with green; the scapulars and interscapulars and flanks white, coarsely vermiculated with grey; while the breast and abdomen are white, the lower back and under tail-coverts are black. Iris yellow, legs and toes lead colour. The female may at once be distinguished by the broad blaze of white round the base of the beak: the head and neck and upper part of the body are dark brown, relieved on the scapulars and interscapulars with more or less conspicuous vermiculations of grey on an obscurely defined white ground: the flanks are vermiculated with grey and white, and the rest of the under parts are white. The male in "eclipse" resembles the female. Immature birds are also like the female, but the white band around the base of the beak is tinged with brown, and the grey vermiculations on the back are but feebly developed: similarly, the white breast feathers are obscured by a brown hue. The young in down are dark brown above. [W. P. F.]

2. Distribution.—In the British Isles this species has only been recorded as breeding on a few occasions in Scotland. In the Outer Hebrides nesting is said to have taken place "south of the Sound of Harris" in 1897, 1898, 1899 (two pairs), 1900 (three pairs), probably in 1901, and certainly in 1902 (J. A. Harvie-Brown, Annals Scot. Nat. Hist., 1902, p. 211); but the first thoroughly authenticated nest
was taken by Captain Sandeman and Mr. H. Noble in Sutherland in 1899. It was also recorded as breeding in one of the Uists in 1906 by Messrs N. B. Kinnear and P. H. Bahr (Annals Scot. Nat. Hist., 1907, pp. 82 and 213; Brit. Birds, ii. p. 209). The supposed Fifeshire record has been shown to be unreliable (Brit. Birds, ii. p. 132). Outside the British Isles a few are believed to breed on the Færøes, and on Iceland it is extraordinarily plentiful, especially near Lake Myvatn, but is only a casual in Greenland. In Scandinavia it breeds on the Norwegian high fjeld and in East Finmark, but also on the Swedish fjeld and on the coast near Stockholm, on Gotland, Öland, etc. In Russia it nests in North-west Finland, also in Novgorod and possibly the Petersburg governments, while recently it has been found breeding off the coast of the Russian Baltic provinces, and on Bornholm in 1879. It is also said to have bred exceptionally in N. Germany. In Asia it breeds commonly on the tundra of W. Siberia, but the East Siberian birds as well as the North American form have been separated. During the winter months it migrates southward to the Mediterranean region and North-East Africa (Lower Egypt and Abyssinia according to von Heuglin), the Black and Caspian Seas, Palestine, Arabia Petraea, the Persian Gulf, and India, while migrants to China, Formosa, the Philippines, and Japan no doubt come from E. Siberia, and American birds range south to Texas and Mexico. [F. C. R. J.]

3. Migration.—Although it has been recorded as breeding within our area, the scap is almost entirely a winter visitor and a bird of passage in the British Isles. Occasionally recorded as early as 1st August, the winter visitors ordinarily arrive between 13th September and 9th November; while the periods of passage are from 22nd September to 9th November and from 24th March to 12th June (cf. Clarke, Studies in Bird Migration, 1912, vol. i. pp. 136, 160). It is common in the north of Ireland, but scarce in the south except in severe seasons. In that country the scap is occasionally recorded in August and usually seen in September, while most of the birds are there by mid-October, their numbers being apparently not increased during subsequent hard weather: some often linger till late in April, and are occasionally met with up till August (cf. Ussher and Warren, B. of Ireland, 1900, pp. 207-8). It appears rather irregularly on the Yorkshire coast, but is sometimes very numerous in hard seasons; it arrives towards the end of October, and is sometimes seen as late as May (cf. Nelson, B. of Yorks., 1907, p. 488). On the coast of North Wales it is not uncommon (cf. Forrest, Fauna of N. Wales, 1907,

For full details as to breeding in Scotland, see P. H. Bahr's article in British Birds, ii. pp. 209-217.

4. Nest and Eggs.—As a rule the nest is placed in some depression within a few feet of the water, often on an island, and sheltered by vegetation. Riemschneider found exceptionally nests in lava-holes at arm's-depth, but as a rule they are quite in the open. In Iceland these birds may be said to breed in colonies, great numbers of nests being found within a short distance of one another. The nest hollow is lined by the duck with a few grasses and dry stalks, which become mixed with the down, which is sooty brown in colour, with light centres, but no light tips. The rather large white nest feathers, faintly tipped with brownish, and sometimes slightly speckled, especially towards the tip, are illustrated in Mr. Noble's paper, Brit. Birds, ii. p. 38, pl. 1. (See also Pl. U.) Professor Newton and Mr. H. Noble describe the down as lighter than that of the tufted-duck, but the reverse is the case in specimens collected by myself in Iceland and England. The eggs vary in number, as a rule, from 8 to 11 in number, but 19 and 22 have been exceptionally recorded in single nests, though probably in each case two ducks were laying together. They are rather elongated in shape, and are greenish grey stone colour, olive-grey or brownish grey; the shell smooth, but with little gloss and not stout. From the eggs of the pochard they are generally distinguishable by their darker and more muddy type of colour, and are not such a broad oval. Average size of 100 eggs, 2·43 x 1·71 in. [61·7 x 43·6 mm.]. (Pl. T.) Incubation is performed by the duck alone, and the period is estimated by Hantzsch as four weeks. In Iceland full clutches may be found at the end of May and early in June, but as many eggs are taken for food fresh eggs may occasionally be met with as late as the beginning of July. The few nests recorded from Scotland were found in the second week of June. Only a single brood is reared in the season. [F. C. R. J.]

5. Food.—During the winter months, when the scaup is usually to be met with at sea, the food consists chiefly of animal rather than vegetable food. A small amount of vegetable matter is, however, occasionally met with, chiefly Zostera marina. A. C. Chapman notes that the "sea grass" he found in gizzards was cut up into half inch lengths. The animal food consists mainly of mussels, Mytilus edulis, also large numbers of periwinkles, Littorina littorea and L. retusa. Thompson also records Lacuna quadrifasciata, Rissoa ulva, Cerithium reticulatum, and Nassa maculata; also the bivalve Nucula margaritacea, as well as seeds of Zostera marina and remains of Crustacea (e.g. Idoteae). Newstead records fragments of cockles
THE DIVING DUCKS

(Cardium edule), and this is confirmed by A. C. Chapman, who also includes small crabs and spawn of Mollusca in the diet. In Iceland during the breeding season H. H. Slater says that the food consists chiefly of fresh-water Mollusca (Limnaea peregra, pisidium, succinea) and a certain amount of vegetable matter, water-plants, etc. The young are tended by the female as a rule, sometimes also for a short time by the male, and gizzards of young examined by Hantzsch contained a plentiful supply of vegetable food, especially small leaves and buds, as well as the usual small pebbles. [F. C. R. J.]

6. Song Period. — Apparently the cooing or grunting notes are only used during courtship, and are not heard after their arrival at the breeding-grounds about the end of April. It must not be confused with the somewhat similar alarm-note. [F. C. R. J.]

GOLDENEYE [Clángula clángula (Linnaeus); Clángula glácion (Linnaeus). Pied curre (♀), morillon (♂ and juv.). Rattlewings, spectacle-duck, whistler, whewer, mussel-picker, diving duck; whiteside (Westmorland); wigeon (Northumberland); black and white poker (Norfolk). French, garrot; German, Schell-Ente; Italian, quatr'-occhi].

1. Description. — The goldeneye in full plumage may at once be distinguished by the large oval white patch at the base of the beak, which does not rise above the level of the eye, the green gloss of the black head, and the large area of white in the wing, which is crossed by a black bar. The sexes are dissimilar, and the male displays a marked seasonal change of plumage. (Pl. 163.) Length 18½ in. [470 mm.]. The male has the head and upper part of the neck black glossed with green. The back and tail-coverts are black. The scapulars are white, the outermost with a broad black margin along their inner webs, this margin not being produced beyond the white portion of the vane, as in Barrow’s goldeneye. The minor, median, and major coverts are white, but the median series are tipped with black forming a black bar. The secondaries are also white. The lower neck and under parts are white. Beak bluish black, legs and toes yellowish, webs black, iris yellow. The “eclipse” dress resembles that of the female, but more or less white at the base of the beak, and on the wing is always retained. The female has the head and upper part of the neck of a uniform umber-brown, the lower neck, fore-breast, back, and flanks are grey, with mottlings of darker grey. Black tips of the white wing-coverts divide the white area into three portions. The under
parts are white. Immature birds resemble the females, but are duller in appearance. The young in down are of a dark brown above, paler brown on the flanks and breast, and white on the throat and abdomen. [w. p. p.]

2. Distribution.—Up to the present this duck has not been proved to nest in the British Isles, though it is suspected of having occasionally done so in Northern Scotland, and Saxby believed that it bred in the Shetlands. There are also records of what may have been pricked birds breeding in Yorkshire (Birds of Yorkshire, ii. p. 471). Outside the British Isles it is met with in small numbers in Iceland, and on the Continent breeds from the coniferous tree limit in Scandinavia (lat. 70°) south to the high fjeld of the Dovre and File in Norway, and in Sweden to Dalecarlia and Wermland, occasionally even to Småland. In Finland and Russia its northern range extends to the coniferous tree limit, and it reaches southward as far as lat. 51° in the Urals and the Baltic provinces. In Germany it is very local, but has been recorded as nesting from Holstein and Mecklenburg east to Siberia and East Prussia, as well as in Bohemia and Switzerland. Dombrowski’s statement that it breeds in the south of the Dobrogea needs confirmation. In Asia its range extends across the continent to Kamtschatka and the island of Saghalien, but it is only found in the forest belt south of the tundra. In N. America it is replaced by a closely allied race. In winter its extreme range extends south to the Straits of Gibraltar and the North African coast (rarely to the Azores) and the Mediterranean; in Asia to Mesopotamia, North India, Burma, China, Formosa, and Japan; while the American race reaches Central America and the West Indies. Most birds, however, winter far to the north of these extreme limits. [F. C. R. J.]

3. Migration.—A winter visitor from Northern Europe, arriving exceptionally as early as 26th August, but more usually between 23rd September and 29th October; while as a bird of passage it is recorded between 14th September and 21st November and between 23rd March and 12th June (cf. Clarke, Studies in Bird Migration, 1912, vol. i. pp. 136, 160). Although sometimes recorded in Ireland in September, it is usually met with only from October onwards, and becomes more numerous after the middle of December; departure takes place late in March or early in April, but examples have been recorded as late as July (cf. Ussher and Warren, B. of Ireland, 1900, p. 209). In Dumfriesshire it is described as “scarce but regular,” in North Wales as “common,” and in Kent as “not numerous” (cf. Gladstone, B. of Dumfries., 1910, p. 287; Forrest, Fauna of N. Wales, 1907, p. 289; and Ticehurst, B. of Kent, 1909, p. 366). In Yorkshire it is noted that adults, especially adult drakes, are always rare (cf. Nelson, B. of Yorks., 1907, p. 470).
4. Nest and Eggs.—The normal nesting-site of this species differs widely from those of the other diving ducks, for it is usually found breeding in a hole of a tree in its natural condition. In Lapland and Finland boxes are put up by the peasants in order to induce it to breed, and are often occupied. Some of the holes used are formed by natural decay, others are old holes of the great black woodpecker, and the height from the ground varies considerably. No nesting material is introduced by the duck except a plentiful supply of the beautiful light pearly greyish white down with white feathers (Brit. Birds, ii., pl. 2, fig. 14). The feathers are on an average rather smaller than those of Barrow’s goldeneye, which they otherwise resemble (P. F. Bunyard). There is some reason to believe that at the northern limit of its range it occasionally breeds in holes among rocks, like the Icelandic Barrow’s goldeneye. Any Icelandic breeding specimens must necessarily nest in this way, as there are no trees of any size there. The eggs vary from 8 to 14 in number as a rule, but nests with 15 and 16 and even 19 have been recorded. When fresh they are a beautiful bright blue-green in colour, which, however, soon fades. The shell is stout and has little gloss, and the average size of 130 eggs is 2·33 × 1·67 in. [59·2 × 42·5 mm.]. Incubation is performed by the female alone, and eggs placed under a hen were hatched out in 20 days (F. E. Blaauw). Naumann gives the period as 22 days, but his remarks can hardly apply to this species, as he describes it as nesting in the open in clumps of sedge and rushes! In Germany full clutches have been found as early as the middle of April, but in Lapland usually from the end of May to the latter part of June and even later when the eggs have been taken. Only one brood is reared in the season. [F. C. R. J.]

5. Food.—During the winter months the food of this species consists to a great extent of molluscs and small crustaceans, as well as some vegetable matter. When on salt water, mussels and other marine Mollusca, small Crustacea, especially of the genera Palæmon and Crangon (shrimps, prawns, etc.), and sea grass, which is brought to the surface after diving and devoured at leisure, are the chief articles of diet. Other species of algae, as well as Zostera, are eaten at times. When visiting fresh water and during the breeding season, fresh-water molluscs are eaten, also fresh-water crustaceans such as Gammarus pulex (Jäckel), tadpoles and small frogs, small fish not exceeding two inches in length, and the larvae of various aquatic insects, especially Coleoptera, Phryganeæ, and also Libellulæ (Dragon-flies), as well
as the seeds, buds, and roots of various aquatic plants (Naumann). Newstead records from one specimen 150 beetles, mostly Helophorus aquaticus, one Dytiscus punctulatus, and Cordeaux found shells of Physa fontinalis and a mass of larvae of Neuroptera. Small pebbles and sand are as usual found in the gizzard for digestive purposes. The young are tended by the duck, and have been reared in confinement on ants’ “eggs” and duckweed, but little is known of their food in a wild state. [F. C. R. J.]

6. Song Period.—The harsh dissyllabic courting-note may be heard very early in the year, from February onward to April in the case of the American race. [F. C. R. J.]

LONGTAILED-DUCK [Harëldæ hyemālis (Linnaeus); Harëldæ glaciālis (Linnaeus). Ice-duck, sea-pheasant, Jacky (♂) and Jenny (♀); Forster (Northumberland); calloo (Orkneys and Shetlands); old squaw, old wife (N. America). French, canard de Miquelon; German, Eis-Ente; Italian, moretta codona].

1. Description.—The longtailed-duck is to be distinguished by the short wide beak and the broad, lobate, extension of the feathers of the forehead on to the culmen, occupying its whole breadth and terminating at the level of the nostrils. The sexes differ conspicuously, and there is a striking seasonal change of plumage. (Pl. 163.) Length 22-26 in. [588-660 mm.]. The male in winter has the head and neck white, save the forehead, which is sooty grey, and an oval patch below the eye of a dark brown hue shading into paler brown towards the neck. The interscapulars and lower back, the wings, and the fore-breast are of a dark brown, almost black. The scapulars are pale grey shading into white on the hinder and outer feathers, which are produced into long streamers. The breast and abdomen are also white. The central tail feathers are black, extremely long and attenuated; the feathers on either side have wide margins, and the white area increases in succeeding feathers to the outermost, which are wholly white. The beak is of a lead black with a band of rose-pink across its middle, while the legs and toes are lead blue: the iris is brown. In the summer dress, which is complete in May, the sides of the head are whitish, but the rest of the upper parts are of a blackish brown, the scapulars, which lose their elongate feathers, and interscapulars having chesnut margins. The female is of a dark brown, with the lores, the postocular region, and a ring round the neck greyish white. The fore-breast is
brown, the rest of the under parts white. Length 15·5 in. [393 mm.]. The juvenile dress resembles that of the female, but is of a paler brown, while the white areas are less white. Young males have chesnut margins to the scapulars, inner secondaries, and wing-coverts, and the white on the neck more conspicuous. The young in down are of a dark brown above, a white spot on the lores, above and below the eye. The white of the throat extends upwards towards the nape. The fore-breast and flanks are brown, the rest of the under parts white. [W. P. P.]

2. Distribution.—Although there is little doubt that a few birds breed from time to time on the Shetlands, and probably also on the Orkneys, the evidence is as yet not fully satisfactory. John Wolley and Saxby received eggs believed to be of this species from the Shetlands; and O. V. Aplin stated that he had reports of breeding in 1911 on the Orkneys, but gave somewhat scanty details (Zoologist, 1911, p. 432; 1912, p. 195). Outside the British Isles it has probably bred in the Faeroes and Jan Mayen; while in Iceland it is locally abundant, and also breeds on Spitsbergen and Bear Island. In Norway it is found north of Valders and the Dovrefjeld, and also in Swedish Lapland; in Russia from Lapland and Lake Onega throughout North-east Russia, from the Arctic Ocean south to the Perm government, as well as on Novaya Zemlya, Waigatz, and probably Kolguev. In Asia it ranges on the tundra of Siberia across the Continent to the Commander Isles, while in America it breeds on the Aleutian Isles and from Alaska to Hudson’s Bay, Labrador, and Greenland, as well as on the arctic shores and islands of that continent north to lat. 82°. Its winter range extends to Southern France and Venetia, while it has occurred in the Azores and Northern Italy casually. Eastward it winters in Austro-Hungary, rarely in Herzegovina and the Dobrogea; and in Asia ranges to the Caspian, Lake Baikal, China, and Japan. American birds winter from New England to the middle states, casually to Florida, Texas, and California. [F. C. R. J.]

3. Migration.—Winter visitor from Northern Europe to the coasts of the British Isles, but uncommon on the south and west of England (though exceptionally numerous there in the winter of 1887-8); irregular on the north and west of Ireland and rare on the south of Ireland (cf. Saunders, Ill. Man. B. B., 2nd. ed., 1899, p. 455). Arrival usually takes place between 26th September and 31st October, but 24th July is given as an exceptional date (cf. Clarke, Studies in Bird Migration, 1912, vol. i. p. 160). The bulk of the birds that visit us are immature: departure occurs in April, some birds lingering till May. The longtailed-duck is described as “an occasional winter visitor” to Dumfriesshire, as “rare” in North Wales, as “sometimes not uncommon” in Yorkshire, and as “rare even in hard seasons”
PRELIMINARY CLASSIFIED NOTES


4. Nest and Eggs.—As a rule the nest is found in the neighbourhood of lakes or rivers; in Iceland often in the islets in the rivers and lakes; while in Siberia it is frequently met with in the marshes, sheltered by dwarf willows. The nest hollow is lined by the duck with sooty brown down, not so dark as that of the scaup or scoter, showing dull white spots, and sometimes contains a few stalks and leaves, and the eggs usually vary from 5 or 6 to 9, and exceptionally 10 in number. The nest feathers are sometimes white, with brown edges, while others are brownish. They are elliptical or blunt oval in shape, rather glossy, and vary in colour from light greyish green or bluish green to buff or brownish. Average size of 100 eggs, 2·11 × 1·51 in. [53·6 × 38·6 mm.]. (Pl. T.) The first eggs are to be found about the end of May or early in June, and in Northern Russia and Asia Seebohm found clutches early in July, but incubation is general in Iceland about mid-June. Incubation is performed by the duck alone, and Hantsch estimates the period at about three and a half weeks. Only a single brood is reared during the season. [F. C. B. J.]

5. Food.—During the winter months this bird is almost entirely a marine species, and lives principally on marine Mollusca, often obtained by diving to considerable depths. The chief food consists of mussels, Mytilus edulis, and cockles, Cardium edule, but Tellina cornea and other species are also eaten, and, according to Naumann, specimens of shell-fish up to about one inch in length are swallowed whole. In the Shetlands Saxby found that they fed almost entirely on periwinkles. Small crustaceans are also eaten, and the fry of various fish, e.g. Pleuronectes, Gadus collaris, etc.; rarely worms and insects, but frequently the seeds, buds, and roots of various water-plants (Naumann). A. C. Chapman has known it to devour grain from a wrecked ship. During the breeding season in Iceland it feeds chiefly on the various fresh-water Mollusca which inhabit the lakes, as well as larvae of aquatic insects, and generally also some vegetable matter (H. H. Slater). Scandinavian specimens shot in July were also found to have been feeding almost entirely on aquatic insects (Dann). In specimens from Bear Island, Le Roi found remains of bivalves, also roots, moss, and especially algae. Swenander records Gammaridae, mussels, Pteropoda, Polynoidae, and larvae of Diptera; and Cordeaux has found small specimens of Buccinum, as well as Patella pellucida. Gray records Venus ovata, Lacuna vincta, young Mytilus edulis, and once the crustacean Idotea tricuspidata. The young are
tended by the duck alone, and dive with her in pursuit of food at a very early age, chiefly no doubt fresh-water Mollusca. [F. C. R. J.]

6. **Song Period.**—The loud musical breeding-call of the male, while swimming round and bowing to his mate, is chiefly heard from the earliest days of spring up to about the end of June, but it is also freely uttered during the winter months. [F. C. R. J.]

**COMMON-EIDER** [*Somateria mollissima* (Linnaeus).] St. Cuthbert’s duck, anet; dunter or dunter-duck (Shetlands); culver (Northumberland). French, *morillon*; German, *Eider-Ente*.

1. **Description.**—The eider-duck may always be distinguished by the remarkable forward extension of the feathers of the face along the sides of the beak, to end in a point just beneath the middle of the lower border of the nostrils. The sexes differ conspicuously, and there are striking seasonal changes of plumage in the male. (Pl. 162.) Length 22 in. [558 mm.]. The male in full dress has the head, neck, and upper parts white, relieved by a broad black bar extending across the forehead backwards to form a broad band above the eye, and forwards along the sides of the beak. On each side of the hinder region of the head and upper part of the neck is a broad patch of sea-green, and the lower back is black. The fore-breast has a cinnamon tinge, and the whole of the rest of the under parts is of a jet black. The long inner secondaries, which are falcated, are white like the wing-coverts. Iris brown, beak and legs olive-green. In the eclipse dress the white areas of the plumage are replaced by brown, though a few scattered white feathers always remain. The female is of a buff or rufous colour, closely striated on the head and neck with dark brown; the back feathers are dark brown margined with greyish, and the fore-breast and flanks are barred with dark brown, while the breast and abdomen are of a rufous buff. The major wing-coverts and secondaries are tipped with white, forming a double alar bar. The juvenile dress resembles that of the female, but the alar bars are feebly developed; the males are distinguishable by the fact that the sides of the head are nearly black. The downy young is of a dark brown above, paler brown below, and there is a more or less conspicuous stripe of pale brown above the eye. [W. P. P.]

2. **Distribution.**—As a breeding species in the British Isles, the eider is confined to the county of Northumberland in England, the coasts and islands of Scotland, and one locality in Co. Donegal in Ireland. In Northumberland there is a strong colony on the Farne Islands, and a few breed on the coast of Northumber-
land and occasionally on Holy Island, while Coquet Island has not been occupied since 1875. In Scotland its range is extensive; it is scarce in the Tweed area though numerous in the Forth and Tay areas, but north of Forfar is practically absent, except near the Ythan (Dee area). On the coasts of the Moray area and East Sutherland it again becomes common, and is plentiful in the Orkneys and Shetlands, as well as along the north coast. It is, however, absent from the West Ross coast, though its range is rapidly extending in W. Scotland, and it breeds freely at many localities in Argyll, extending south to Islay, Jura, Gigha, etc., and spreading into the Clyde area. Still farther to the south, breeding was first recorded from Kirkcudbright in 1908. It is present on most of the islands of the Inner Hebrides, scarce in Skye, but breeds in Harris and S. Uist. In Ireland it was first found nesting on an islet in Co. Donegal in 1912. Outside the British Isles it breeds in the Faeroes, and plentifully in Iceland; but Spitsbergen is inhabited by a local race, which is also found in Greenland, and probably in Franz Josef Land. On the Continent it is found along the coast and islands of North Russia from the Kara Sea westward, in the White Sea and along the Norwegian coast, sparingly in Denmark, but more commonly on the coasts of Sweden and Finland south to Helsingfors. Off the Schleswig-Holstein coast there are strong colonies on Sylt and Norderoog, and recently breeding has been recorded from Vlieland and Terschelling (Holland), while a pair or two nest on an island off the coast of Brittany (Bureau). Allied forms also breed in North America, and North-east Asia. European birds migrate in winter southward along the coast of Europe, and are occasionally recorded from the far interior of the Continent (the lakes of Switzerland, Lower Austria, Hungary, the Balkan Peninsula, etc.), and casually in the Adriatic and on the Azores. [F. C. R. J.]

3. Migration.—A resident on our coasts from Northumberland and Argyllshire northwards, its numbers being probably increased in winter by immigrants from more northern waters. But on the remainder of the British coast-line the eider-duck is only known as a scarce cold-weather vagrant. Even in Dumfriesshire it is an irregular and uncommon winter visitor, while in Ireland it rarely occurs (chiefly recorded in November), and there is only one record for North Wales: on the east it is uncommon on the Yorkshire coast (immature birds being most frequently obtained), and is very rare in Kent (cf. Gladstone, B. of Dumfries., 1910, p. 292; Ussher and Warren, B. of Ireland, 1900, p. 211; Forrest, Fauna of N. Wales, 1907, p. 291; Nelson, B. of Yorks., 1907, p. 475; and Ticehurst, B. of Kent, 1909, p. 369). Gregarious, and often seen in flocks of hundreds. [A. L. T.]
4. Nest and Eggs.—Where undisturbed the eider breeds in large colonies on islands, partly no doubt for protection against its natural enemies, and places its nest at a short distance from the water. In such colonies three or four nests may be seen within a radius of a yard or two. In the Faeroes it has been known to breed at a height of 1200 feet, and in the Shetlands nests have been found in the hills at a considerable distance from the sea. Many nests are quite open, being mere hollows in grassy spots or overgrown with dwarf willows (Salix lanata), bracken, and rank vegetation, but in Scotland the shelter of a boulder is often sought, and nests may be found in sheep-holes in stone walls. When selecting a nesting-place the duck is accompanied by her mate, but the hollow is made by the female alone. She lines the nest with dead grasses, bits of heather or seaweed, and later with down. (Pl. lxviii.) The down is as a rule plentiful, pale greyish brown with light centres, and the nest feathers are figured in Brit. Birds, ii., pl. 2, fig. 13. (Pl. U.) They are reddish brown, with two or sometimes three dark brown transverse bars. The eggs vary in number to an extraordinary extent. Thus on the Farnes, though many nests contain only 4 or 5, others may contain 9, 11, 12, 13, 18, or 19 eggs! which the watchers believe to be the produce of single ducks, though this seems incredible. On the Faeroes the number ranges up to 8-11. On the eider farms in Iceland one rarely sees more than three eggs in a nest, but great numbers are taken systematically for eating purposes. They are characteristic in appearance, large, and often an elongated oval in shape, smooth in texture, with some gloss, and ranging in colour from greenish grey to olive-green, yellowish olive, or bluish green. Some eggs have what appear to be grease stains on them even when freshly laid. Average size of 426 eggs by Göbel, 3·06 x 2·05 in. [77·9 x 52·2 mm.]. (Pl. S.) Incubation is performed by the duck alone, and lasts for 28 days according to most observers, though Mr. F. G. Paynter estimates it at 31 days. The breeding season at the Farnes begins about 12th May, and on the Shetlands fresh eggs may be taken from mid-May to mid-July. Only one brood is reared in the season. [F. C. R. J.]

5. Food.—The main food of this species consists of marine Mollusca and Crustacea. Among molluscs, large quantities of mussels (Mytilus edulis) are swallowed entire, in some cases up to 2½ inches in length. Periwinkles are also commonly eaten: Mr. H. W. Robinson has found as many as twenty in one gizzard, and also records limpets (Patella) and razor-shells (Ensis siliqua) up to the astonish-

ing length of 8 inches, sometimes with jagged broken edges.\(^1\) Naumann includes cockles (*Cardium*), *Venus, Nerita*, and even the whelk (*Buccinum undatum*). Mr. W. Evans gives a list of twelve species of molluscs, besides various crustaceans, sea-anemones, cuttle-fish, etc., found by the examination of forty-two birds shot in the Orkneys in 1885 (*Brit. Birds*, iii. p. 165). Crustacea are also very largely devoured, and sometimes three or four big crabs may be disgorged by shaking from a shot bird (A. Chapman). On one occasion a crab was found in the gizzard and a starfish in the crop (H. W. Robinson). Other occasional articles of diet are marine algae, small fish, and, according to Naumann and Hantzsch, also spawn and entrails thrown overboard by fishermen. One instance of a six-inch blenny (*Zoarces viviparus*) being disgorged is recorded by G. Bolam, while Newstead found in one female many remains of beetles (*Hydradephaga* and *Geodephaga*). The young are tended by the duck, and soon learn to pick up the small molluscs and crustaceans on which they feed at first. [F. C. R. J.]

**6. Song Period.**—The wailing notes of the male may frequently be heard in chorus from the first spring days till well into June at the great colonies in Iceland, but are less frequently uttered by those birds which breed with us, though occasionally heard in autumn. [F. C. R. J.]

**SCOTER** [*Oidemia nigra* (Linnaeus). Black-duck, black-scoter, douker; black-dyker (Lancs.); seahen (Northumberland). French, *maacreuse*; German, *Trauer-Ente*; Italian, *orchetto marino*].

**1. Description.**—The scoter is at once distinguished by its black coloration and the peculiar markings on the beak. The sexes differ in coloration. (Pl. 164.) Length 20 in. [508 mm.]. The beak of the male is marked by a swollen base and the yellow area surrounding the nostrils. The iris is brown, and the legs and toes are black. The female is of a sooty brown colour, save the cheeks, which are greyish white, and the throat, which is dirty white. There is only a slight swelling at the base of the beak. Young birds resemble the female, but have white under parts obscurely mottled with brown. The nestling is of a uniform dark brown above, the throat white, and the under parts greyish brown. [W. P. F.]

**2. Distribution.**—This species has a very restricted range in the British Isles. Its main breeding-grounds are the "flows" and moors of Caithness and

---

\(^1\) These shells are, of course, regurgitated as pellets, when the mollusc has been acted upon by the gastric juices and the soft parts assimilated.
Sutherland, but it also nests in Cromarty and locally in some parts of Ross and
Inverness. It is also recorded as breeding in Tiree in 1897, and is said to have
nested in the Shetlands in 1911. These localities are all in Scotland, but the late
Major H. Trevelyan found a pair nesting on a large lough in the west of Ireland
in 1905, and noticed the birds in the preceding year. They continued to breed
there subsequently, but apparently did not increase in numbers. Outside the
British Isles it nests in fair numbers in Iceland, and was recorded as breeding on
Spitsbergen in 1905 by Koenig, while on the Continent it is rare on the high fjeld
of Southern Norway, but from there and from Jemtland in Sweden northward
ranges to East Finmark. In Finland it is not found breeding south of 61\(^\circ\), and
in Russia it nests in Lapland, the Archangel government and the lower Petschora,
as well as on Waigatz and Novaya Zemlya. Eastward in Asia it has been recorded
as breeding east to the Taimyr Peninsula and also in the Tobolsk government.
In North-east Siberia as well as in North America it is replaced by an allied form,
which ranges west to the Lena. The ordinary winter range extends to the North
Sea and English Channel, but it occurs also as far south as the coasts of Spain and
Marocoo, the Azores and Rio d'Oro on the west, the Mediterranean, Black Sea,
Palestine coast and Caspian Sea, while the American race ranges to California and
casually to Florida. [F. C. R. J.]

3. Migration.—Resident, breeding in the areas of Scotland mentioned in
the preceding paragraph, while flocks of immature birds remain off our coasts
throughout the summer. More numerous as a winter visitor from Northern
Europe, arriving between 10th September and 9th October (exceptionally as early
as 5th August), and recorded as a bird of passage from 5th September to late
October and from 29th April to 7th June (cf. Clarke, Studies in Bird Migration,
1912, vol. i. pp. 136, 160). In Ireland it is chiefly known on the northern coasts
from October to April (cf. Ussher and Warren, B. of Ireland, 1900, p. 214). On the
Dumfriesshire coast it is a common winter visitor, and off North Wales it is
numerous even up till May, and some are seen during the summer (cf. Gladstone,
B. of Dumfries., 1910, p. 293; and Forrest, Fauna of N. Wales, 1907, p. 299). On
the Yorkshire coast a few are usually seen in summer, and it is common in winter
and very numerous in some seasons (cf. Nelson, B. of Yorks., 1907, p. 478). Large
flocks appear off the coast of Kent towards the end of September and pass down
the Channel; their numbers are increased, sometimes to a huge extent, if the
season farther north is a severe one: the return takes place in March and April
(cf. Ticehurst, B. of Kent, 1909, p. 371). Gregarious, and often in flocks of thou-
PRELIMINARY CLASSIFIED NOTES

sands; rarely occurs inland. A migration was observed in the early night hours of 24th, 25th, and 26th April 1879 over Skipton-in-Craven, Yorkshire (cf. Clarke, Zoologist, 1880, p. 355). [A. L. T.]

4. Nest and Eggs.—In the British Isles the most usually chosen site is a hollow in water-logged moorland among heather, sometimes on islets, but in a dry spot and frequently at a considerable distance from water. Sometimes it is sheltered by a low bush, but more usually well hidden among long heather and other moorland vegetation. The nest-hollow is scantily lined by the duck with a few bents, dead leaves, heather twigs, etc., and is plentifully supplied with down. The down is rather dark brownish, showing indistinct light centres, but no light tips. (Pl. U.) The nest feathers are figured by H. Noble (Brit. Birds, ii., pl. 2, fig. 15), and are variable, many being greyish or whitish tipped with brown, but in this case the appearance of the eggs alone is sufficient for identification. They are, as a rule, from 5 to 8 in number, rarely 10 or 11, and in appearance are large, rather pointed oval in shape, and pale buff to warm cream in colour. Average size of 70 eggs, 2·57 x 1·75 in. [65·4 x 44·6 mm.]. (Pl. S.) In Scotland the eggs are rarely found before the beginning of June, often not till nearly the middle of the month, and in Lapland from about mid-June onward into July. Incubation is performed by the duck only, and, according to Hantzsch, lasts for four weeks. Only one brood is reared in the season. [F. C. R. J.]

5. Food.—During the winter months the scoter is almost entirely marine in its habits, and feeds chiefly on marine Mollusca, especially the common mussel, *Mytilus edulis*. These are swallowed, according to Naumann, up to 1·38 in. in length. Cockles (*Cardium edule*) and other small molluscs are also eaten (F. S. Mitchell), and remains of small bivalves have also been noted by T. E. Gunn. Mr. G. Bolam has found chiefly sandhoppers, an occasional shrimp, and quantities of sand. Mr. A. C. Chapman records an instance in which these ducks were seen to feed on grain from a wrecked ship, and Gätke mentions a similar instance, while Naumann found in young birds many remains of a water-plant, probably *Polygonum amphibium*. The same writer also states that worms, small fish, and insects form part of their diet. During the breeding season, on fresh water, they no doubt subsist largely on fresh-water Mollusca. Sand for digestive purposes is usually found in the stomach. The young are tended by the duck only, and probably feed chiefly on small molluscs. [F. C. R. J.]
VELVET-SCOTER [Oidémia fúscá (Linnéus). French, grand macreuse; German, Sammet-Ente; Italian, orco marino].

1. Description.—The velvet-scoter may at once be distinguished by the white bar across the wings and the forward growth of the feathers of the lores, which project beyond the level of those of the forehead. The sexes differ in coloration. (Pl. 164.) Length 22 in. [558 mm.]. The male is wholly black save for a small white patch below and behind the eye, and a white bar across the wings formed by the tips of the major coverts and the secondaries. The beak is of a pale orange colour, but the base and edges are black, and a black line runs from the nostril forwards to the nail. The feet and toes are of a dull orange-red, the webs black. The iris is white. The female is of a dark brown colour, the feathers of the upper surface margined with grey. The under surface of the body is whitish on the breast. The white wing-bar is formed only by the secondaries. The beak and iris are brown; the feet are paler than in the male. The juvenile dress resembles that of the female. The downy young differs from that of the common-scoter in being paler underneath. [w. f. p.]

2. Distribution.—This bird is only a winter visitor to the British Isles, and the statement that it has bred in Scotland cannot be substantiated and is improbable, though non-breeding birds have been known to stay through the summer with us. On the Continent it breeds in the high fjeld of Southern Norway and thence northward to East Finmark; also in Sweden from Skåne and Blekinge northward to the Russian border, as well as on Öland and Gotland; in Finland from Viborg northward; and in Russia according to Buturlin in Esthland, the Pinsk marshes, Lake Onega, Lapland, the lower Petschora and Archangel government, Novaya Zemlya (rarely), and also in the Simbirsk government and the mountain lakes of Transcaucasia. Statements that it has bred in Podolia and Germany require confirmation. East of the Urals it nests in the Perm government; and in Siberia on the Ob and in the Tobolsk government. In East Siberia and in North America it is replaced by allied races. On migration it ranges to the North Sea, Mediterranean, Black and Caspian Seas, and has been recorded as far south as the east and west coasts of Spain, Marocco, Sardinia, the Adriatic, Lower Egypt, North Persia, and Turkestan, while it has occurred as a casual in the Færoes and Greenland. [F. C. R. J.]

3. Migration.—A winter visitor and bird of passage from Northern
Europe in much smaller numbers than the common-scoter: unlike the latter, it is not known to breed in our area, but immature birds are found in summer off the east coast of Great Britain. As a winter visitor it arrives between 16th September and 18th October, while the seasons of passage are from 17th September to 20th October, and from the end of April through May (cf. Clarke, Studies in Bird Migration, 1912, vol. i. pp. 136, 160). The velvet-scoter is less common on the west of Scotland than on the east, and it is uncommon on the Welsh and west English coasts (cf. Saunders, Ill. Man. B. B., 2nd ed., 1899, p. 467). It is rare in Ireland even on the east, and almost unknown on the west: January is the chief month (cf. Ussher and Warren, B. of Ireland, 1900, p. 214). In Yorkshire it is noted that adult drakes are very rare (cf. Nelson, B. of Yorks., 1907, p. 480). Gregarious; but it is more usual to find a small percentage of velvet-scoters in the huge flocks of the common species than to find separate flocks of any size. [A. L. T.]

4. Nest and Eggs.—Does not breed in the British Isles, though it is said, on unsatisfactory evidence, to have nested in the Highlands of Scotland (cf. E. T. Booth, Rough Notes). [F. C. R. J.]

5. Food.—This species is perhaps almost more of a sea-duck than even the common-scoter during the winter months, and lives almost exclusively on marine Mollusca obtained by diving, chiefly the common mussel, Mytilus edulis, and the cockle, Cardium edule, the former of which is, according to Naumann, swallowed up to 1·38 in. in length. Macgillivray states that he has also obtained from the stomachs of birds examined, shells of the genera Mactra, Tellina, and Solen, as well as Donax trunculus in addition to the usual cockles and mussels. T. E. Gunn found remains of vegetable fibre as well as fragments of shells, pebbles, bits of flint and silt. Naumann also states that on rare occasions small Crustacea, insects, worms, and small fish are eaten, and that on fresh-water lakes they will eat the roots, seeds, and buds of surface-growing water-weeds. The young are tended entirely by the female, and probably feed on small fresh-water Mollusca and possibly some vegetable food. [F. C. R. J.]
THE DIVING DUCKS

[F. C. R. Jourdain]

In the following chapter the term "Diving Ducks" must be understood as not including the group of "Sawbills," which of course, in the literal sense of the words, are also diving ducks, but is confined to the ducks of the genera Nyroca, Clangula, Harelda, Somateria, and Oidemia. Of these, the three species of the genus Nyroca and one of the genus Clangula are sufficiently numerous to be treated of below, namely, the pochard, N. ferina (L.), the tufted-duck, N. fuligula (L.), the scaup, N. marila (L.), and the goldeneye, C. clangula (L.), the others being relegated to the "Rare Bird" section. One member of the genus Harelda, the longtailed-duck, H. hyemalis (L.), is also included, and a single representative of the genus Somateria, the common-eider, S. mollissima (L.); while the genus Oidemia is represented by two species, the common-scoter, O. nigra (L.), and the velvet-scoter, O. fusca (L.).

All these ducks have certain points in common which distinguish them from the surface-feeders. Instead of habitually seeking their food either on the surface or in shallow water, after the ungainly fashion with which we are familiar in the case of the tame duck, the head and fore part of the body only being submerged, and the after part sticking perpendicularly out of the water, the diving ducks prefer to feed in deep water, with the body entirely submerged, and are capable of remaining under water for considerable periods.¹ Structurally they all have certain characteristics in common; for instance, in the diving ducks the hind-toe is always deeply lobed, while in the surface-feeders the lobe is either absent or extremely narrow. Their

¹ It must not be inferred from this that the surface-feeders are incapable of diving; for instance, the shoveler can and does remain completely submerged for considerable periods at a time.
build is also somewhat different; the head is usually heavier and set on a shorter neck, while the feet are placed noticeably farther back, the wings are shorter, and the toes much elongated. In consequence, we find that as a rule these ducks are very bad walkers, and most at home in the water; their large feet, set well back, give great power of propulsion on or under the water, while on the other hand their capacity for flight is not as a rule so great. For the same reasons the nesting-place is generally quite close to the water, and most of the members of this group spend a considerable part of the year at sea, where, except in rough weather, they are able to feed without the necessity of resorting to mud flats and shallows.

Of the three species of the genus Nyroca which are treated of in this article, two, the pochard and the tufted-duck, are now well established with us as breeding species; while the scaup is only known to have bred on a few occasions in Scotland. On the other hand there is no definite proof that the goldeneye, our only representative of the genus Clangula, has ever nested with us. Both species are, however, familiar to us as winter visitors.

THE POCHARD AND TUFTED-DUCK

Except in the case of a few species of birds which were used for food, the materials for estimating the status of any given species in the British Isles, prior to the last hundred years or so, are lamentably scanty. But now we have hosts of observers in every county ready to note the slightest extension of range on the part of any bird which is at all conspicuous, and in consequence we are now able to map out the gradual extension of the breeding range of the British-breeding ducks with some approach to accuracy. In the case of the pochard, the increased breeding area is remarkable, although it sinks into insignificance when compared with that of the tufted-duck. In 1865, when A. G. More wrote his excellent paper on the "Distribution of Birds in
THE DIVING DUCKS

Great Britain during the Nesting-Season,"¹ he was only able to record the breeding of the pochard from three districts—the Tring reservoirs on the borders of Herts and Bucks, Norfolk, and three localities in Yorkshire. At the present time it has extended its range to all the east coast counties of England, as well as along the south coast westward to Dorset. It also holds its own in Herts and Bucks, and has bred in Bedford and Berks as well as in Stafford and Lancashire. But in Scotland, where More had no records, it is now widely distributed, and breeds on many lochs from the Border counties northward, and is extending its range even to the outlying island groups. In Ireland it is also said to have bred in various localities, but more evidence is wanted here. The case of the tufted-duck is even more extraordinary. Up to about 1850 it was only known as a winter visitor, but in 1849 a brood was observed in the West Riding of Yorkshire, and in 1854 in Notts. Now it breeds regularly, not only in most of the English counties, but has nested in Anglesey, and probably also in Merioneth; in Scotland it is now very widely distributed, and in some places is extremely plentiful, and it ranges north to the Orkneys and west to the Outer Hebrides;² while in Ireland, where no case of breeding was known prior to 1877, it is now well established in every province, and is still spreading.

The pochard and tufted-duck differ from the other diving ducks in being much less marine in their habits, preferring, when possible, to seek their food in fresh water. Like the other ducks they are migratory, and large numbers visit us in winter from the Continent, while the birds which breed with us forsake their nesting haunts and betake themselves to the lakes and estuaries of our larger rivers, only visiting our coasts as a rule during severe weather. During the winter they tend to congregate in large or smaller flocks, feeding chiefly during the night, and also performing their migratory movements at this

Plate 161

Tufted-ducks (centre and left) and pochards (right)

By A. W. Seaby
Great-Britain during the Nesting Season," he was only able to record the breeding of the pochard from three districts—the Thames reservoirs on the boundary of Herts and Bucks, Norfolk, and three localities in Yorkshire. At the present time, it has extended its range to all the east coast counties of England, as well as along the south coast eastward to Dorset. It also holds its own in Herts and Bucks, and has bred in the Isle of Wight and Dorset as well as in Stafford and Lancashire. But in Scotland, where more and no records, it is now widely distributed, and breeds an great flocks from the Lothian counties northward, and is breeding in large flocks in the surviving seabird groups. In Ireland, it is generally known to have bred in various localities, but more attention is needed here. The view of the tufted duck is even more checkered; once almost extinct, was only known as a winter visitor, but in 1830 it was recorded in the West Riding of Yorkshire, and in 1868 in the Isle of Man. It is now found in nearly all parts of the English counties, but has been lost in Ireland, and probably also in the Channel Islands. In Scotland it is now very widely distributed, and in some places is extremely plentiful; and it ranges north to the Orkneys and west to the Outer Hebrides; while in Ireland, where no case of breeding was known prior to 1877, it is now well established in every county, and is still spreading.

The pochard and tufted duck differ from the other diving ducks in being much less marine in their habits, proceeding when possible, to seek their food in fresh water. Like the other ducks, they are sociable, and large numbers visit us in winter from the Continent, while the weeds which breed with us forake their nesting grounds and betake themselves to the lakes, and estuaries of our larger rivers, only visiting our shores for a visit during severe weather. During the winter they tend to congregate in large or smaller flocks, feeding chiefly through the night, and also performing their migratory movements at this time. The ducks, both the pochard and tufted, are seen in the Thames, not with a few, but thousands from the Continent, during the winter; and their movements through this county are a regular feature of the avifauna.
time, so that while hundreds may be seen floating idly on the water one evening, by the next morning every bird may have disappeared.

The pochard returns to its breeding-place in March, and associates at first with other species. In its courtship the pochard shows signs of a more phlegmatic disposition than the other ducks. The somewhat harsh and deep "charr, charr, charr," or, as written by some, "kurr, kurr, kurr," of the male may frequently be heard at this time as two or three of them swim in pursuit of a female, following her every turn. According to Naumann, fights between the rival males rarely or never take place. Professor Newton, who kept a pair for some years in confinement, remarks that the actions of the cock in spring were most entertaining. "He would extend himself at full length on the water, and utter the softest of sounds," but unfortunately his mate proved to be indifferent to his advances, and breeding never took place. Naumann says that the female exercises free choice among her admirers, and retires with the selected partner, leaving the disconsolate swains to seek other mates.

Mr. J. G. Millais has kindly furnished the following description of the courtship from his forthcoming monograph on the Diving Ducks. At the commencement of the courtship several males may be seen crowding round a female who shows a disposition to accept attentions. She in turn "circles round some male, dipping her bill in the water, stretching her neck low on the water, and occasionally uttering her coarse cry of 'kurr-kurr-kurr.' The males continuously keep up their curious groan, which is somewhat like a man affected with asthma and being told by the doctor to 'take a deep breath.' In addition to this call they also utter a soft low whistle, which the spectator must be close at hand to hear. The first attitude of the male consists in throwing the head and neck back until the back of the head touches a point between the shoulders. This is repeated constantly at the beginning

1 Or, as Dresser writes it, "a low verrr-verrr-a."
2 Evidently an allusion to the courting notes or song, which unfortunately is still undescribed.
of courtship. The more common display is to blow the neck out with air with the head raised horizontally, and utter the groan as the air is released. During this show a distinct 'kink' is to be observed in the lower part of the neck, while the centre is unusually swollen. The fullest display is usually performed as the male approaches the female. The male then lies very flat on the water and stretches the head and neck to the fullest extent, at the same time blowing out the neck and frequently turning the head on one side, so as to display its full beauty. During these moments of intense excitement the pupil of the eye of the male nearly disappears, and the eye itself seems to blaze a very rich lacquer red."

Once paired the sexes are inseparable, except for short periods under stress of severe weather, and haunt the spot where they decide to nest. As already described, the nest is generally built in the water, often among the dead stalks of flags or reeds of the previous summer, and bears a curious likeness to that of the coot, before the down is added. In some cases, even when the eggs are highly incubated, there is hardly any down. The duck does not seem to object to the company of other birds, and it is not uncommon to find a nest surrounded by a noisy colony of black-headed-gulls. During the period of incubation the male remains in the neighbourhood of the nest, but of course takes no share in the work. Naumann gives a lifelike description of the cautious way in which the duck approaches the nest during the laying period. First of all the pair come flying past, keeping a careful lookout, and settle with a splash on the open water some little distance away. Here both birds remain for some time motionless, with outstretched necks, on the alert for the slightest sign of danger, and then, if all remains quiet, the duck begins to swim cautiously towards the nest, keeping her head down, and taking advantage of any cover that may exist. In the case of a bird which hatched out young in confinement, she was observed to leave the nest about three times a week in order to wash and feed: at these times she was very ravenous,
but directly her appetite was satisfied and she had had a good wash, she returned to the nest as fast as she could swim.¹ The young only remain in the nest for about a day after hatching, and then take to the water, where they are quite at home, swimming and diving with wonderful facility, but not trusting themselves far from the shelter of the reeds and sedge, on the broken stems of which they can rest. Often the same places are resorted to for this purpose day after day, and can easily be distinguished by the accumulation of droppings beneath them. One peculiarity about the young is shared by the other diving ducks. This is the slow development of the wings as compared with those of the surface-feeders, so that it is not till after they are in other respects fully developed that they are able to fly. They then leave the breeding-grounds and make for the larger sheets of open water, forming small flocks, which tend to unite into larger bodies. The whole of the work of tending the young falls upon the female, the male taking no part whatever in the task, and when confined together in an enclosure, the duck will drive off the male as long as she is accompanied by the young.

Much of what has been written of the pochard is true also of the tufted-duck, but there are several important points of difference. The tufted-duck is a much quicker and cleaner diver, and slips into the water with much less of a commotion than the heavier pochard, which rises from the surface to gain impetus before it plunges downward. For quite half a minute² it remains at times below the surface, tearing up the aquatic vegetation and bringing it to the surface, and also keenly on the lookout for animal food (frogs, molluscs, and insect larvae). The usual time during which they remain under water when feeding is estimated by Mr. J. Whitaker at about fifteen seconds. Exactly at twilight they rise from the ponds where they have spent the day and fly to other feeding-grounds, travelling at a

¹ Cecil Smith, Zoologist, 1872, p. 3243.
² It has been stated that the tufted-duck can remain under water for a full minute, but probably this was merely an estimate and not an accurately observed habit.
THE DIVING DUCKS

great pace and a good height in the air. In the morning, according to Mr. Whitaker, they may be seen actively diving for weeds after their return from the feeding-grounds, and in the afternoon they rest and preen their feathers, becoming restless as flighting time approaches. Pairing takes place in March, when their harsh notes are often to be heard. Naumann writes this call as "karr, karrkarr," etc., or "körr, körr"; but Mr. Whitaker, who has had excellent opportunities for observing this species, states that on a few occasions when he was close to the birds, and unseen by them, he heard a pleasant series of courting-notes uttered by the male as he swam round the female. These he describes as low, but very clear, resembling the sounds "tuc, tuc, tuck, quit, quit, quitta, wheeo, whit, quit, quit, quie." At intervals the drake throws the head backwards so as almost to touch the dorsal feathers, and also raises the fore part of the body slowly in the water, at the same time stretching the head and neck upwards. Mr. S. E. Brock states that these gestures may be seen from the end of February till after the pairing season. The note uttered on leaving the water or alighting, which is that referred to by Naumann, is graphically expressed by Mr. Whitaker as "curragh, curragh." Although the male is often the first to show uneasiness at the approach of danger, he does not leave the water till the duck takes to wing, uttering the familiar "curragh" note.

It is somewhat curious that the breeding season of the tufted-duck should be so late. While the mallard has been known to lay in February and frequently nests in March, the tufted-duck does not begin to lay as a rule till mid-May, and often the clutches are incomplete at the beginning of June. According to all ornithological writers, the pochard is comparatively a late breeder, and the average time for full clutches is about the middle of May, but I have seen highly incubated clutches of pochards' eggs, which must have been sat on for

2 Mr. S. E. Brock describes it as "a soft, liquid, several-syllabled utterance, rarely penetrating to any distance," and commonly uttered in chorus by several drakes together (Scott. Nat., 1912, p. 266).
THE SCAUP

at least a fortnight, in the last days of April, and several full clutches before the end of that month. 1 Although the tufted-duck does not place its nest as a rule actually in the water like the pochard, it is generally within a few feet of it, as a rule among long grass or rushes or sheltered by bushes, in the midlands and south of England, but often in heather in the north. Mr. A. Chapman, however, states that he has met with instances in which the nest has been at considerable distances from water, but on these Northumbrian moorlands probably the duck would be able to lead the young to some channel in the peat with pools of water in places, by which they could be conveyed to the nearest loch. The young dive almost as soon as they are introduced to the water, and are carefully tended by the duck, who shows great reluctance to leave them, scuttering along the surface of the water as if unable to fly, and attempting to draw attention from the ducklings. Should this prove unsuccessful, she will return again and again to within a few yards. On larger sheets of water the duck shows a distinct tendency on the approach of danger to make for deep water with her young brood, which she gathers closely around her, instead of taking cover in the reedy margins, as is the habit of the surface-feeders. The drake, which was always in attendance while laying was going on, and to a less extent during the earlier stages of incubation, does not take any part in the care of the young, but associates chiefly with other males.

THE SCAUP

The scaup belongs to a different category from the two species already treated of. It has a more northerly breeding-range, and though suspected of having nested in Scotland, was not proved to do so till breeding was recorded from the Outer Hebrides from 1897 onward, and Captain Sandeman and Mr. H. Noble found a nest in Sutherland in 1899. For practical purposes we may consider it as a

1 Major Sparrow has also found recently hatched young on 16th May in Kent.
winter visitor, and as such almost entirely marine in its habits, haunting the estuaries of tidal rivers and low-lying, muddy coasts. In the breeding season, however, it resorts to the neighbourhood of inland lochs to nest, and in some parts of Iceland, especially the Myvatn district, is extraordinarily plentiful. Not only scores, but literally hundreds of nests are to be found within quite a limited area. The Rev. H. H. Slater and Mr. T. Carter counted no fewer than 305 nests on one small group of islands in Lake Myvatn on 13th July 1885, and then only stopped counting from sheer weariness. In other parts of the island it is also numerous, but is not found in such enormous numbers as at Myvatn. In March most of the scaups arrive from the North Sea, where they have spent the winter months, and gradually spread over the country, not reaching the northern coasts till the beginning of April, and working up the rivers to their breeding-grounds, so that many of them do not reach their nesting-haunts till the beginning of May. By this time they are already paired, but little has hitherto been recorded as to their courtship. Montagu noticed that captive birds kept apart from other ducks, and made a grunting noise accompanied with a singular toss of the head, the bill being opened at the same time. This habit was continued for a considerable time while swimming and sporting on the water in the spring months, and in itself is sufficient to identify the species. Saxby also describes it as half standing in the water, and thrusting its head forward with the bill widely open—sometimes, for a variation, bending the head down towards the breast with a rapid jerking motion (Birds of Shetland, p. 255).

Mr. J. G. Millais has kindly allowed me to extract the following description from his forthcoming monograph on the Diving Ducks:—

"The male scaup, anxious to pair, approaches the female with head and neck held up to their fullest extent, the bill being raised in the air to an angle of 50° to 60°. If the female responds to this, she also lifts the neck stiffly, at the same time uttering a crooning sort of note like

1 Faber compares it to the "murr" of the turtle-dove.
Plate 162

Scaups (left top) and eider-ducks

By A. W. Seaby
winter visitors and as such almost entirely marine in its habits, haunting the estuaries of tidal rivers and low-lying, muddy coasts. In the breeding season, however, it resorts to the neighbourhood of inland lakes in North and in some parts of Iceland, especially the Mývatn district, is extraordinarily prolific. Not only scores, but literally hundreds of young are to be found within quite a limited area. The Rev. H. H. Sutcliffe and Mr. J. Orr recorded no fewer than 900 nests in an area of a square mile in the lake Mývatn on 18th July 1889, and these were contained independently from three directions. In other parts of the lake, in the middle of the water, and in the shallow eastern shores, the young birds were almost as numerous as in the central islands. During the summer and early autumn, the birds are to be seen in their usual haunts till the beginning of May. By this time they are already paired but little has been recorded as to their courtship. Montagu noticed that captive males kept apart from other ducks, and made a grunting sound accompanied with a peculiar toss of the head, the bill being opened at the same time. This habit was continued for a considerable time while swimming and sporting on the water in the early months, and in itself is sufficient to identify the species, though it describes it as half standing in the water, and thrusting its head forward with the bill widely open—sometimes, for a variation, bending the head down towards the breast with a rapid jerking motion (Chase of Shelducks, p. 355).

Mr. J. G. Milne has kindly allowed me to extract the following description from his forthcoming monograph on the Diving Ducks:

The male, about to pair, approaches the female with head and neck held up to the utmost extent, the bill being raised in the air to 60° or 70°. If the female responds to this, she also lifts her head, as the same time uttering a crying sort of note. The

"Three answers to the "Mumpy of the Long-ears"
the words, 'tuc-tuc-turra-tuc.' If alarmed, or pretending to be so, she swims away quickly with powerful strokes, uttering her grating cry, 'scaar-scaarr.' When paired the female often comes up to the male and bows her head several times. The actual show of the male is a quick throw up of the head and neck, which is greatly swollen with air as it extends. At the summit of extension the bird utters a gentle cry like the words 'pa-whoo,' only uttered once. As he makes his show the female sometimes swims round him, lowering the head and dipping the bill to the surface of the water, and making a gentle call 'chup-chup,' or 'chup-chup cherr-err.' Quite as frequently the cry of the male is uttered after the head is raised and slightly lowered. He also utters a very low whistle. Except the harsh loud cry of the female, all these calls of pairing scaup are very low in tone, and the spectator must be within a few yards of the birds to hear them." The same writer also quotes a note from Mr. Gerald Legge, who observed a male suddenly draw back its head and neck with a quick jerk, something like the throw of the male pochard, except that the head was horizontal and not turned over till the throat was uppermost. Riemschneider noticed that the males, when in company with their mates, uttered occasionally a low "uhu, uhu."

The ordinary call-note of this species bears some resemblance to that of the tufted-duck, but is louder and harsher. It is also used as an alarm-note, and may be heard both while swimming and in flight. Naumann describes it as a loud, rough, deep "karr, karr, karr," etc.¹ Hantzsch remarks that when a family party is approached a snoring or rattling note is heard, which sounds something like "brr, brr," or "hrr, hrr." Should the danger become more imminent, one of the party flutters anxiously, uttering again a harsh "br räh," while from the young in varying tones may be heard higher pitched "krkr".²

¹ Seebohm distinguishes between the call-note (which he describes as a most discordant sound, and compares to a man with an exceptionally harsh, hoarse voice screaming out the word "scaup" at the top of his voice) and the grating alarm-note, like that of the tufted-duck, uttered during flight (Hist. of British Birds, iii. p. 580).
² Hantzsch, Beitrag zur Kenntnis der Vogelwelt Islands, p. 185.
The usual situation for the nest is only a few paces from the water, and the birds may be said to nest in colonies, so close are the nests to one another. At the beginning of the incubation period the males remain in the immediate neighbourhood of the nest, but later they assemble in flocks during the day, but accompany their mates when feeding at night. The young are mainly tended by the duck, but Messrs. Pearson saw in one or two cases the drakes assisting in the work, and Hantzsch also states that for a short time they associate with their families, but soon return to their bachelor existence. The young are fledged after a period of five or six weeks, and at the beginning of September leave their breeding-haunts, the drakes assembling in separate flocks. By the end of September they have all taken to the sea, and during the second half of October make their way southward to their winter quarters.

Enormous flocks may be met with during the winter months far out at sea, resting on the open water "head to windward" by day, and resorting to the mussel-beds and neighbourhood of the shore to feed at night. As a diver the powers of this duck exceed even those of the pochard and tufted-duck, and it can remain under water longer than they do, so that its natural impulse is to seek safety under water; and it is rather unwilling to take to flight unless very hard pressed, although strong and swift on the wing when once started.

**The Goldeneye**

The common goldeneye is another winter visitor to our shores like the scaup, but, unlike that bird, has not yet been satisfactorily proved to breed with us. There seems to be no reason why it should not do so, as on the Continent its breeding-range extends south to Germany, Switzerland, and Bohemia, and it is reported to have bred even in the Dobrogea. The few cases where it is said to have nested with us are insufficiently authenticated; but the late E. T. Booth, who
THE GOLDENEYE

was thoroughly acquainted with all our British ducks, states in the third volume of his Rough Notes that he repeatedly observed females in summer on remote Highland lochs, and on more than one occasion detected a bird flying from old and weather-beaten pine woods, where most probably her nest was concealed, although he never succeeded in verifying the fact. The only point which seems to tell against this theory is that no adult males were observed after the first week in April, with the exception of one pair which were seen for several days subsequent to 11th June 1869 on Loch Slyn in Ross-shire. Mr. A. H. Evans also saw a pair courting on Loch Maree on 30th May 1891. The goldeneye is less pelagic in its habits during the winter months than the scaup, and occurs not infrequently on inland waters as well as on the coast, but the great majority of the birds which visit us are immature.

In its courtship and breeding habits the goldeneye differs considerably from the other diving ducks, and fortunately these have been tolerably closely observed, not only in Europe, but also in the case of the race which inhabits America. As the American bird is merely a local form of the European goldeneye, it is probable that the performance is similar in both countries. Dr. C. W. Townsend describes it as follows: "One or more males swim restlessly back and forth and around the female. The feathers of the cheeks and crest of the male are so erected that the head looks large and round, the neck correspondingly small. As he swims along the head is thrust out in front, close to the water, occasionally dabbling at it. Suddenly he springs forward, elevating his breast, and at the same time he enters on the most typical and essential part of the performance. The neck is stretched straight up, and the bill, pointing to the zenith, is opened to emit a harsh, rasping double note, 'zee-at,' vibratory and searching in character. The head is then quickly snapped back until the occiput touches the rump, whence it is brought forward again with a jerk to the normal position. As the head is returned to its place the bird often springs forward, kicking the water in a spurt out behind, and
displaying, like a flash of flame, the orange coloured legs."¹ This is the most complete form of the ritual of courtship, which is curtailed and varied in some instances. The female is generally passive, but sometimes responds by protruding her head close to the water in front, and then bringing it up so that it also points to the zenith. Dr. Townsend proceeds to mention some of the ways in which this remarkable performance varies individually. Dr. Heinroth's observations on European birds agree well with this description, but some interesting points are added. For instance, the method of driving away intruders is most remarkable, and resembles the plan of attack adopted by the great crested-grebe. The attacker dives and swims rapidly under water in the direction of his opponent, making his onslaught from below, usually with immediate success. Dr. Heinroth also noted that ducks when quarrelling with one another also adopted this plan, which seems to differ from that of any other species of duck. The actions of courtship may be seen repeated in the autumn, though in the case of the young males it is incompletely carried out.

It is unnecessary here to describe the nesting habits of this species, as they have already been dealt with in the "Classified Notes." It is, however, still something of a problem how the young are brought down to the water after they are hatched, as the observations recorded differ. It has been stated that they are conveyed to the water in the parent's bill, but W. Brewster, writing of the American subspecies,² quotes the evidence of R. A. Gilbert, that the old duck appeared at the entrance of the hole and sat there for five minutes, during which time her head was turned incessantly in every direction within her field of view. She then withdrew herself into the hole for a minute, and on reappearing watched as before for five minutes longer. She then flew down to the water and swam round a stump which projected from the water, calling. At the third time she stopped directly under

¹ Cf. The Auk, 1910, p. 177. This should be compared with the descriptions already given of the courting attitudes of the pochard and scaup.
² The Auk, 1900, p. 207.
Plate 163
Golden-eyes (upper) and longtailed-ducks (right)
By A. W. Seaby
THE GIVING DUCKS

...explaining how a duck of flame, the orange colored bird... This is the usual consequence of the ritual of courtship, which is described and varied in some instances. The female is generally passive, but sometimes resists by protruding her head close to the water in front, and then turning it up so that it also points to the zenith. Dr. Townsend proceeds to mention some of the ways in which this remarkable performance varies individually. Dr. Howard's observations on European birds agree well with this description, but some interesting points are added. He remarks the method of driving away intruders is most effective, and resembles the plan of attack adopted by the great crested grebe. The attack is made and water splashed upon water in the direction of the approach, and water thrown from above usually with considerable effect. Dr. Howard also made good shots with the water glass to which he added this plan, which seems to have been neglected. The actions of courtship may be seen repeated in A. autumn, though in the case of the young males it is incompletely carried out.

It is unnecessary here to describe the nesting habits of this species, as they have already been dealt with in the "Classified Notes." It is, however, still something of a problem how the young are brought down to the water after they are hatched, as the observations recorded differ. It has been stated that they are conveyed to the water in the parent's bill, but W. Brewster, writing of the American subspecies, quotes the evidence of R. A. Gilbert, that he saw the duck-mother at the entrance of the hole and sat there for a minute, from which time her head was turned incessantly in every direction within her field of view. She then withdrew herself into the hole for a minute and in reappearing watched as before for five minutes longer. She then flew down to the water and swam round a stump which projected from the water, calling. At the third time she stopped directly under...
the hole and gave a single loud cluck or call, when the ducklings scrambled to the mouth of the hole and fell into the water one after another. One or two hesitated an instant on the edge, but most of them toppled out over the edge as soon as they appeared, using their tiny wings in the descent, the duck sitting meantime motionless on the water. As soon as the last duckling had descended, she led her brood to a flooded thicket in which they disappeared. Young European goldeneyes, hatched in confinement, were very active, and after three weeks the feathers began to show on the shoulders. At six weeks old they were completely feathered, but the flight feathers were only just sprouting, and after sixty days they were able to fly, and practically full grown.¹

Its courting-note apart, the goldeneye is a very silent bird, only uttering an occasional low croak. It is an expert diver. Cordeaux describes how the body is thrown forward to add momentum to the plunge. The period under water is estimated by him at forty-five to fifty seconds, but Caton Haigh gives the average time as twenty to thirty seconds. After diving they rise up very suddenly, almost at the point of descent, and when feeding only remain a few seconds on the surface before plunging in again with a splash, thus spending four-fifths of their time under water.² They are among the most wary of our water-fowl, and, like the pochard, are hardly ever taken in decoys; but though almost unapproachable at sea, throw off some of their wildness when visiting inland waters.

THE LONGTAILED-DUCK

No duck, except possibly the pintail, can rival the longtailed-duck in beauty of form and colouring. There is some evidence, though as yet not fully satisfactory, that it has bred in the Orkneys, and with more probability also in the Shetlands; but to the rest of the

British Isles it is only known as a winter visitor, chiefly to our eastern coasts, and often in considerable flocks. At this season it very rarely occurs inland, but, curiously enough, visits the lakes of Switzerland in hard winters. It is a lively, active, playful, rather quarrelsome and noisy bird. Though most figures represent it with depressed tail, it is usually carried in an oblique position, and when excited is raised almost perpendicularly. This is well shown in Mr. J. G. Millais' life-like sketch of a flock about to rise in *The Wildfowler in Scotland*, p. 157. The loud musical call of the male is very noticeable, and can be heard to a great distance. It is rather freely rendered by Scotch hearers as "coal an' can'le licht," and the Orcadian name "calloo" is another attempt to represent the sound. Naumann makes a more careful attempt to reproduce it by the words, "au auh lik a a a auh lik," or "ah a gleck, a ah gleck," while Hantzsch simply writes it as variations of the short a sound and the long drawn out au, sometimes a au a.¹ In the northern summer this musical call may be heard not only by day but also right through the night. The note of the female is a low "wed, wad" or "wack, wack." From the earliest days of spring until the young are hatched these notes may be heard continually, and in the autumn and winter months they are also often heard. Even before these ducks leave our southern coasts in March a good deal of courting goes on. Bolam describes the manoeuvres of a feeding flock at this season, when shifting their ground, as they are continually doing. "All the birds rise simultaneously, as though by signal, fly a short distance, and dash as suddenly into the water again, when, as a rule, every bird instantly dives. On reappearing on the surface they are generally somewhat scattered, but all draw together again before another dive is made, which, like the last, is taken by all the flock at the same moment. They go down with a violent plunge, often kicking the water high into the air above them."² Saxby notes that when diving for food they stay under water for about fifty-five

¹ Robert Gray's rendering is "our, o, u, ah."
seconds on an average when not alarmed. Towards the end of April they begin to resort to their breeding-places in the islets in the lakes and rivers of Iceland, breeding often in considerable numbers and at no great distance from one another. As the nesting habits of this species have been already described ("Classified Notes," p. 254), it is sufficient here to say that the young are fledged after a period of about five weeks. The males then attach themselves once more to these family parties, and the small flocks gradually work towards the sea, disappearing from Iceland in September or early in October as a rule, though a few appear to winter on the west side.

THE EIDER-DUCK

The next species on our list, the eider, is perhaps the most important from an economic point of view, for in some parts of Iceland and Norway it lives in almost a semi-domesticated state, and the eggs and down have a considerable value. Hantzsch quotes from a report by Consul Thomsen at Reykjavik, from which it appears that 5896 pounds of down were exported from Iceland in the year 1902 alone! From Greenland 984 pounds were exported in 1890, but only 653 pounds in 1896. In Norway, also, the trade assumes large proportions, and the breeding stations are jealously preserved; but in the British Isles little is done to protect our resident birds, except at the Farne Islands, where there is a colony of about a hundred and fifty pairs. They respond readily to protection, and it is not uncommon to find ducks which will allow themselves to be stroked repeatedly while incubating, without leaving their eggs. At some of the large colonies in Iceland the males are almost as tame as the females, and will remain within a few yards of the visitor without showing any sign of alarm. The eider is perhaps the most thoroughly pelagic of all our

1 Twenty nests have been found on one island in Lake Myvatn.
British diving ducks, for even during the breeding season it remains by the coast, unlike most ducks, which usually resort to fresh water for this purpose. During the early summer of 1912 I visited a large colony in Iceland on small islands in a river which must have been at least ten or eleven kilometres from the sea. Probably in this case the site was the attraction, for no doubt in past ages the Arctic foxes played havoc with the nests of the birds which bred on the mainland, and only those which bred on the islets in the lakes and rapid-flowing rivers had much chance of bringing off their broods.

Except where the birds are well protected, little is seen or heard of the courtship of the eider. The scattered pairs which may be found breeding on the west coast of Scotland seem to wish to avoid observation as much as possible. But in the neighbourhood of the big colonies in Northern Europe, the peculiar love-song of the males is a very striking feature. A chorus of moaning notes, "wow, wow, wow," rises from the fjord below us, where some thirty of the drakes are floating, and dies away again only to be renewed time after time. Dr. C. W. Townsend, writing of the North American race, says that where there were many eiders about the sound was almost constant. It is something like the syllables "aah-ou" or "ah-ee-ou," frequently repeated, and though low and pleading in tone, the volume of sound from a large flock may be heard for a considerable distance over the water. During courtship the drake frequently stands up in the water, sometimes flapping his wings, and displaying his black frontal shield. But the complete ritual of the courting attitudes is described by Dr. Townsend as follows: "The head is drawn rigidly down, the bill resting against the breast; the head is then raised up until the beak points vertically upwards, and at this time the bill may or may not be opened to emit the love-notes. Directly after this the head is occasionally jerked backwards a short distance still rigidly, and then returned to its normal position."¹ All this takes place as the drake swims near the duck, often facing her while she floats about indifferently,

¹ *The Auk*, 1910, p. 170.
and occasionally shows her appreciation by throwing up her head slightly.

When paired the drakes accompany their mates while choice is being made of the nesting-place, but after incubation has begun the males are said to withdraw themselves altogether.\footnote{G. Bolam, Birds of Northumberland and the Eastern Borders, p. 405.} This, however, does not tally with my own experience, for in the case of isolated nests in Scotland the male was generally to be seen on the water not far away, and the duck when flushed from the nest joined him at once. The same has been noted at the Farnes.\footnote{F. B. Kirkman, \textit{in litt.}} In the Iceland colonies it was usual to see the drakes standing close to their sitting mates, and in the course of a few hours one might see hundreds doing sentry duty within a few feet of the nest. The duck is well known to be a very close sitter, but Mr. W. H. St. Quintin, who has bred these birds in confinement, records the astonishing fact that all his ducks have sat steadily on their eggs throughout the whole of the incubation period, which at the lowest computation lasts for twenty-seven or twenty-eight days, without once coming off the nest to feed or wash. In the case of his first duck, Mr. St. Quintin was much concerned when she remained so long on the nest, and placed food and water within her reach, but they were never touched, and before the young were hatched she was quite grown over by a mass of chickweed.\footnote{Hantzsch thinks that in Iceland the ducks leave the nest when undisturbed only for a short time daily, swimming about but apparently taking very little food, and subsisting on the accumulated fat on their bodies.} The young remain in the nest for some hours after hatching till they are thoroughly dry, and then follow the duck to the water. I have seen an Icelandic girl pick up the youngsters as they tumbled among the rocks and throw them far out into the river, where the old duck was waiting for them. The river in question was partly glacier-fed, and foamed and raged past at a pace which bid fair to sweep the entire family away, but to my astonishment the ducklings seemed absolutely at home in their new element, and managed somehow to hold their
own in spite of the tremendous current. Presumably these families drift down stream to the sea, or at any rate to brackish water. The whole care of the young devolves on the duck, but it has often been noticed that when two or more families come to close quarters the young frequently get mixed up and attach themselves indifferently to the nearest duck, so that a fleet of twenty or more young may be seen in close attendance on a single duck. After a period of from six to seven weeks the young are fully fledged, but before this time they may often be seen packing together in flocks of as many as fifty or more, sometimes accompanied by an old bird or two, but quite capable of taking care of themselves, and paying little attention to her.

In the Færoes Müller states that he found eiders nesting on the top of Hestöe, which is an island from 1000 to 1200 feet high. It is difficult to understand how the young can manage such a formidable descent, and probably a large proportion of them lose their lives on the way, but there is no doubt that young ducks can fall from considerable heights without suffering any apparent injury. Eiders are voracious birds, and in addition to their natural diet will eagerly devour the carcasses of other birds when thrown into the water. In captivity the best food for newly hatched young has proved to be live earthworms. Besides the "cooing" or "moaning" note of the drakes in the breeding season, and occasionally also in autumn, one hears a low grunting note, written by Hantzsch as "krrr" or "korrr," from the duck when driven from the nest, while the drake occasionally utters a nasal "ha" or a loud "hauwa, hahauwa" at the nest, and a long-drawn "gag" while resting on the water. The breeding range of the eider, both in the British Isles and on the Continent, has been considerably extended of late, and is still increasing.
THE SCOTERS

The last diving ducks here treated of are the two species of scoter, readily distinguished in the field by the fact that the common-scooter is entirely black, while the velvet-scooter shows, both on the water and in flight, a conspicuous white wing-bar. The common-scooter breeds in some numbers in the north of Scotland, especially on the "flows" of Caithness and Sutherland, and has more recently been recorded as nesting at one locality in Ireland. But in the autumn and winter months enormous flocks may be seen at sea off our eastern coasts and in the English Channel. Sometimes for miles they may be seen scattered over the surface, only approaching our shores in order to feed on the mussel-beds, and just outside the breakers.

Much less appears to be known of the courtship of the Scoters than of the other diving ducks, probably because much of it takes place at sea before the birds return to their breeding-grounds on the moors. E. T. Booth states that in early morning the drakes in a sportive and amusing manner flap round and round the object of their admiration, afterwards washing and splashing in the water, sending the spray flying in all directions. Seebohm tells us that in early spring the drake calls to the duck with a double note which is not unmusical, but the usual note is a grating "kr, kr, kr," not unlike that of the tufted-duck. Faber writes the drake's note as "tü-tü, tü, tü," and the harsh response of the duck as "re-re-re-re-re."

In Iceland they reach the coast in April and arrive at their breeding-grounds about the beginning of May, but the breeding season is decidedly late, and it is rarely that full clutches are met with in North Scotland before the end of May or the beginning of June, while in Iceland the best time is about mid-June. The duck alone incubates, and the drake at the beginning of the period is generally to be seen on the water not far away, but as the moult comes on he retires to the

1 Wolley goes further, and says that the notes of a number heard together have a wonderfully sweet effect.
open water. The duck is very wary and is not a close sitter, but takes to the water when approached, uttering a warning "wak." For six or seven weeks after hatching the young remain under the charge of the mother, but when they are fledged the family parties unite into larger flocks, and, according to Faber, the males rejoin their families and make their way together towards the sea.

Mr. G. Bolam gives a vivid and life-like picture of Scoters feeding just outside where the heaviest surf is breaking, probably in order that they may capture the sandhoppers (*Gammaridea*) which swarm in such places. "A flock of Scoters feeding just beyond the breakers has often reminded me, by their actions, of the movement of starlings across a field. As the ebb of the tide gradually carries them seaward, those farthest out are continually rising on the wing and flying back over the heads of their companions to the white line of waves, right into which they boldly plunge. A sort of constant movement is thus kept up amongst the flock, and a person lying concealed near water-mark will have a number of the birds every now and again flying straight towards him."¹ So confident are they in their powers, that when the weather is not too rough they will frequently ride over the curling crest of an approaching wave instead of diving through it as other ducks do.

The velvet-scoter is not nearly so common a visitor to our coasts as the preceding species, and has a more eastern breeding range; but it is a bird of somewhat similar habits, except that it is generally found on our shores in small parties of a pair or two, instead of large flocks. It also remains rather farther out at sea, and apparently is even a better diver than the common-scoter, remaining longer below the surface.² A few words as to its nesting-habits may not be out of place, though it has not been known to breed in the British Isles. Messrs. H. J. and C. E. Pearson found several nests in deep cracks of the peat overgrown with *Empetrum nigrum*, so that the sitting bird was quite

¹ *Birds of Northumberland and the Eastern Borders*, p. 410.
² According to Howard Saunders, though, curiously enough, Lord Lilford expresses a precisely opposite opinion!
Plate 164
Common Scoters (right) and velvet-scoters (left)
By A. W. Seaby
THE DIVING DUCKS

soon follow. The duck is very wary and is not a close sitter, but takes
off the water when approached, uttering a warning "sob." For six or
seven weeks after hatching the young remain under the shelter of
the mother, but when they are fed, the family parties unite into
larger flocks and, according to Faber, the males rejoin their families
and help them on together towards the sea.

Mr. A. H. Harter gives a vivid and lifelike picture of Divers feeding
just outside where the breakers are breaking, probably in order that
they may escape the sandpipers (Calidris alba) which swarm in such
places. "A flock of Divers feeding just beyond the breakers has
even reminded me, by their actions, of the movement of sandpipers
amongst rocks. As the edge of the tide gradually comes these
smaller flocks are continually rising on the wing and flying over
the heads of their companions to the white line of waves, most
near which ( ambassadors! how (witty) specious seeming!) a large
kept up amongst the flock, wading while being concealed near water-
mark will have a number of the birds every now and again flying
straight towards him." So confident are they in their powers that
when the weather is not too rough they will frequently ride over the
curling crest of an approaching wave, instead of diving through it as
other ducks do.

The rook-echter is not nearly so common a visitor to our coasts
as the preceding species, and has a more southern breeding range; but
it is a bird of somewhat similar habits, except that it is generally
found in open spaces in small parties of a pair or two instead of large
flocks. Its nest is usually rather farther out at sea, and apparently is
even a little deeper than the common scoter, remaining longer below the
water.

A few words as to its nesting-habits may not be out of place,
though it has not been known to breed in the British Isles.

Mr. E. P. Pearson found several nests in deep cracks at the base
of rocks and nestled amongst the rocks, the depression being
lined with roots and seaweed.


"English Birds," by Charles Sisson, through various sources, their After Its
migration season.
hidden, also between the high grass tussocks on Henö Islands in Russian Lapland. One nest was found in the open, and this was partly sheltered by a patch of dwarf sallow, some ten inches high, and another, found by Mr. C. E. Pearson, was in a clump of marram grass on sandhills. The nest hollow is lined with a few grasses, dead leaves, etc., and most of the down is a dull brown, with small indistinct light centres, intermixed with a small quantity of light-coloured down. The feathers are figured by Mr. Noble in British Birds, ii., pl. 2, figs. 15, 16. The eggs are larger than those of the common-scoter, and have a beautiful rosy or apricot coloured flush when fresh, fading to a warm creamy white. Average size of 90 eggs, 2.78 × 1.88 in. [70.8 × 47.9 mm.]. They are usually from 5 or 6 to 8 or 9 in number, but clutches of 10 and 11 have been recorded. The breeding season is late, and full clutches are rarely found before the end of May, generally not till the latter half of June, and sometimes in July. As with the other ducks, the whole duty of incubation falls to the female, the drakes meantime assembling on the water in the neighbourhood. But the domestic history of this species has yet to be written.

One habit which has been observed in the case of most of the ducks, and which deserves a few words, is that of discharging evil-smelling excrement over the eggs and nest when suddenly flushed. In some species this is of a very offensive character, and it has been surmised that it might possibly be of use in deterring predatory animals from devouring the eggs. It is curious that while the unprotected eiders both in Northern Europe and on our British coasts usually do this, the semi-domesticated birds at the Iceland colonies may be turned off the nest by scores without its taking place once. Personally I am inclined to think that it is not an involuntary action, for on one occasion when an eider-duck was flushed from an isolated nest in Scotland without any discharge, the eggs proved on examination to be all chipped by the young birds. In the case of the protected colonies, the birds have found the precaution unnecessary, and in consequence the habit is in abeyance.
THE SAWBILL-DUCKS


PRELIMINARY CLASSIFIED NOTES


GOOSANDER [Mergus merganser Linnaeus. Sawbill, sawneb (generic), dun-diver, stock-annet, stock-gander. French, grand harle; German, grosser Säger; Italian, smergo maggiore].

I. Description.—The goosander may at once be distinguished from the merganser by its markedly superior size, the pronounced forward extension of the feathers of the forehead on to the base of the culmen, and of the feathers of the throat which extend forwards beyond the level of the nostril, while there is no black bar across the wing. The sexes differ in coloration, and there is a marked seasonal change of plumage. (Pl. 165.) Length 26 in. [660 mm.]. The male has the head and upper part of the neck black glossed with green, and the feathers of the nape slightly elongated. The interscapulars and inner scapulars are black, the outer white, and the lower back is ash-grey. The wing-coverts are mostly white, as are the secondaries, which are narrowly margined with black. The lower part of the neck and the whole of the under parts are white, the latter with a delicate tinge of salmon-pink, which disappears soon after death. The beak and iris are red, the legs and toes orange-red. In his eclipse dress the male is to be distinguished from the female by his darker back, and a more or less distinct black ring round the neck. The female has the head and neck of a bright chesnut-red, contrasting with a white throat. The upper parts are of a light slate-grey, save the outermost scapulars, which have the outermost web white. The major coverts are broadly tipped with white, and have a subterminal dusky spot on the inner web, and the inner secondaries are white. The under parts are white save the flanks, which are more or less barred and vermiculated with grey. The young in
down is of a uniform dark brown above, showing a faint trace of the usual light spot behind the wing. [W. F. P.]

2. Distribution.—It is only of late years that the goosander has established itself as a breeding species in Scotland, but it is increasing its range and now breeds in fair numbers in Sutherland, Ross, and Inverness, as well as in the other counties which form part of the Moray area (Elgin, Banff, W. Aberdeen). Harvie-Brown describes it as now common and increasing in the Tay area, and in the Argyll area it nests on the mainland as far south as Loch Awe. Hitherto it has not been found breeding on any of the islands (except on the Summer Isles, near the coast of W. Ross), but since the first brood was reported in Scotland in 1871 its spread has been so rapid that it is probable that it will soon be recorded from other areas in the south of the country. There are no records of breeding in Ireland. Outside the British Isles it has rarely been found in the Færoes, but breeds in Iceland, and on the Continent nests in Norway and also in Sweden from Skåne and Blekinge to Jemtland and Lapland, in Finland south to Åbo, and in Russia from the Murman coast, Kolguev, Waigatz, and Novaya Zemlya southward to the northern part of the Orenburg government, the middle and upper Volga valley, and the Baltic provinces. It breeds sparingly in Jylland and Northern Germany (Schleswig-Holstein, Mark Brandenburg, Pomerania, West and East Prussia, and Silesia), and has recently been found nesting in Bavaria, on the Swiss Lakes, as well as in Bosnia; and possibly also breeds in the Dobrogea. In Asia it ranges across the continent east to the Kuriles and Commander Isles, but is apparently replaced by an allied race in the highlands of Central Asia south to Tibet and the Himalaya range, and also in North America north of Wisconsin and Pennsylvania. During the winter months its migrations extend to the Spanish, Maroccan, and Algerian coasts (rare), while it has been once observed in Egypt; the northern shores and some of the islands in the Mediterranean, the Black and Caspian Seas, but it is not confined to the coasts, and works down the rivers of Southern Europe; while in Asia specimens have been obtained in Palestine, the Euphrates valley, the Persian Gulf, India south to Bombay, Burma, China, Corea, and Japan; and American birds range south to the Gulf of Mexico, Lower California, and Northern Mexico. [F. C. R. J.]

3. Migration.—A common breeding species in the north of Scotland (see preceding paragraph); otherwise a winter visitor to the British Isles, arriving exceptionally as early as 21st August, but usually between 25th September and

1 Macgillivray, however, believed that it bred in the Outer Hebrides, and a nest is said to have been found there in 1858, but this requires confirmation, which up till now has been lacking. Probably the records refer to the redbreasted-merganser.
31st October (cf. Clarke, *Studies in Bird Migration*, 1912, vol. i. p. 160). The east of Great Britain is the most favoured region in winter, but in Yorkshire its numbers are variable (adult males uncommon except in hard seasons), and in the extreme south it is only seen at long intervals (cf. Nelson, *B. of Yorks.*, 1907, p. 482; and Ticehurst, *B. of Kent*, 1909, p. 373). In the northern and western Scottish isles the goosander is rare at any season, but in Dumfriesshire it is well known in winter, and in North Wales it is then not uncommon (cf. Saunders, *Ill. Man. Brit. B.*, 2nd ed., 1899, p. 471; Gladstone, *B. of Dumfries*, 1910, p. 296; and Forrest, *Fauna of N. Wales*, 1907, p. 296). It is a scarce winter visitor to most parts of Ireland, but unknown in Western Connaught: it rarely appears before December and is commonest in January: in hard winters it is commoner than in others (cf. Ussher and Warren, *B. of Ireland*, 1900, p. 217). Occurs singly or in pairs or small flocks: visits both estuaries and inland waters. [A. L. T.]

4. Nest and Eggs.—Nesting-sites of this species vary considerably: some nests are placed in hollow trees, others in holes of the peaty banks or among boulders by river-sides, occasionally in a natural hollow on a steep, wooded hillside, and when other sites fail, in a hollow cavity on open ground, sometimes under shelter of scrub. More exceptionally it has been recorded as nesting in a deserted peasant’s hut, in holes of buildings, nest-boxes, and, it is said, in the deserted nests of raptorial birds. The female sometimes collects a little withered grass before adding down, unless the nest is in a tree, when the eggs are laid on the chips of rotten wood. (Pl. LXIX.) The eggs are pale creamy or yellowish in colour, and are very close grained and smooth in texture, ranging as a rule from 7 to 12 in number, occasionally 13 or 15, but if they are regularly removed as many as 25 or 30 may be laid.1 The down, as in the case of other hole-breeding ducks, is very light in colour, a light pearly grey, not unlike that of the shelduck, but not quite so large. The feathers, however, are unmistakable, as they lack the chesnut or black tip which is found in those of the shelduck (Pl. U. Cf. *Brit. Birds*, ii., pl. 2, fig. 17), and have a creamy or yellowish tinge. Average size of 100 eggs, 2·69 × 1·85 in. [68·4 × 47·1 mm.]. (Pl. S.) Incubation is performed by the duck alone, and is estimated at 28 days (Tiedemann, Hantzsch). The breeding season in Scotland falls early, and full clutches of fresh eggs may be obtained in the last two weeks of April. In Northern Europe the time is naturally later, and in Iceland they are usually laid during the first half of June, and may be found early in June in Lapland. Only one brood is reared in the season. [F. C. R. J.]

1 So-called clutches of from 19 to 36 eggs are probably produced by more than one duck.
Site of goosander's nest (marked black behind the jutting rocks at the top)

Merganser on its nest in a deep hole in a peat bank
5. Food. — The goosander is mainly a fresh-water species, except occasionally in hard weather, and feeds almost entirely on fish, like the other sawbills. It feeds greedily, and will gorge itself when it gets the chance. The species of fish captured depends on locality: trout are largely eaten in the north. Newstead found three young salmon and remains of other small fish in one bird; in winter T. E. Gunn found roach up to 8 1/2 inches long; and E. T. Booth records small rudd and roach. Thompson took a young pike (*Esox lucius*) 8 1/2 in. long, and remains of two others, from one bird; another contained an eel 11 1/2 in. long and remains of a second, as well as a full-grown *Trochus cinerarius* and some small stones. G. Bolam has taken an eel 18 inches long from the gullet of a female, but finds the usual food to be samlets and young trout, which are easily swallowed up to 6 inches in length. Macgillivray records taking sixteen trout from one bird, and Cordeaux took two trout, 7 and 5 inches long, from another. During the breeding season the diet is, however, slightly varied: Hantzsch frequently found remains of water-plants, and Hartert states that cockchafers, dung-beetles, and caterpillars are eaten at this season; while Naumann found traces of vegetable matter (but always mixed with animal food, such as the wings and legs of beetles), various insects (water-beetles and larvae of aquatic insects), worms, and frogs. The young are tended by the duck alone. [F. C. R. J.]

6. Song Period.—The soft, low croak which accompanies the courtship display may be heard not only in the early spring (up to April), but also in late autumn (S. E. Brock). [F. C. R. J.]

**REDBREASTED-MERGANSER** (*Mergus serrator* Linnaeus. Sawbill (generic); spikebilled-wigeon (Devon); yarrell (Northumberland); harl (Orkneys); hareld-duck (Shetlands); scaleduck, shellduck, spearwigeon (Ireland). French, *harle huppé*; German, *müllerer Säger*; Italian, *smergo minore*).

1. Description.—The redbreasted-merganser is readily distinguished at all seasons from the goosander by its smaller size, the slight extension of the feathers of the forehead on to the base of the culmen, the slight forward extension of the feathers of the throat, which do not extend beyond the hinder margin of the nostril, the absence of white in the scapulars, and the single enlargement down the middle of the windpipe, which can be felt with the fingers: there are two in the male goosander, one in the female, while the female merganser has none. The sexes differ conspicuously, and there is a marked seasonal change
of plumage. (Pl. 165.) Length 24 in. [609 mm.]. The male in full dress has the head and upper part of the neck black glossed with green, and a double median crest. The middle of the neck is white, while the base of the fore-neck is buff with heavy dusky striations, and the base of the hind-neck black, while a patch of white feathers, margined with black, covers the wrist-joint in the closed wing; the back is black. The wing-coverts are white, relieved by two black bars. The flanks are vermiculated with black and white, while the breast and abdomen are white tinged with salmon-pink. Beak, iris, legs, and toes crimson. The eclipse dress is like that of the male in first plumage. The female differs from the female goosander in having the head and neck of a dull brownish red and the throat rufous, in the absence of white in the scapulars, and the uniform brownish grey of the flanks. The male in immature dress differs from the adult female in having a shorter crest, and the flanks slate-grey. The young in down are of a dark chocolate-brown above, with a chesnut tinge on the head and side of the neck, a white ring round the eye, and a white spot before and behind the wing and on each side of the base of the tail. [W. P. F.]

2. Distribution.—This duck is widely distributed in the breeding season along the coasts and rivers of Scotland, south to the Tay area on the east side, and to Dumbarton, Bute, that part of Argyllshire which lies within the Clyde area, and probably Ayrshire on the west. It is common on the Orkneys and also breeds in the Shetlands, while on the west side it inhabits the Inner and Outer Hebrides. It does not breed in England, but in Ireland attains the southern limit of its breeding range, nesting on the coasts and by the larger lochs, chiefly in Ulster, Connaught, and Munster, from the coast of Co. Down on the east through Meath, Westmeath, and N. Tipperary to Kerry on the west. Outside the British Isles it nests sparingly on the Faeroes and commonly in Iceland, while on the Continent it is found in Southern Norway chiefly in the interior, and in the north near the coast; in Sweden and Finland generally: in Russia from Lapland south to the Baltic provinces on the west and lat. 50° on the Volga, but not in the Moscow, Tula, and Orenburg governments, though found in that of Ufa, and it is said also in the Caucasus. In Germany it occurs in the northern provinces from Holstein and Mecklenburg to East Prussia, and also in Denmark. In America its range extends from Greenland, Davis Strait, and Labrador on the east to Alaska, the Aleutian Isles, and the Kuriles on the west, and south to about lat. 45°. Its winter range includes the coasts (and to some extent the rivers) of Europe to the Mediterranean and its islands, as well as the North African coast, the Azores, and
Madeira; while in Asia it reaches Palestine, the Sinai Peninsula, the Persian Gulf, Baluchistan, North India, China, Formosa, and Japan. In America it migrates south to the Gulf coast, Lower California, Cuba, and the Bermudas. Casual on Hawaii. [F. C. E. J.]

3. Migration.—A winter visitor and a bird of passage, but also a common resident in many parts of Scotland and Ireland. As a winter visitor it usually arrives between 15th September and 20th October, while the periods of passage are from 3rd September to 31st October, but chiefly in September and early October, and from 16th March to 14th May, but chiefly in early May (cf. Clarke, Studies in Bird Migration, 1912, vol. i. pp. 136, 161). As a winter visitor it is not very common in Yorkshire, but well known on the north of Kent and numerous in severe weather, while North Wales is visited in small numbers (cf. Nelson, B. of Yorks., 1907, p. 484; Ticehurst, B. of Kent, 1909, p. 374; and Forrest, Fauna of N. Wales, 1907, p. 297). A common winter bird in the Irish estuaries, and sometimes seen in hundreds in severe weather (cf. Ussher and Warren, B. of Ireland, 1900, p. 218). As already implied, the merganser is gregarious in winter, and occurs chiefly in river estuaries. [A. L. T.]

4. Nest and Eggs.—The nesting-sites vary considerably: as a rule the nest is placed on the ground, sheltered by rank vegetation, heather, brushwood, etc., sometimes in a thick bramble clump or cairn of loose stones, occasionally in a rabbit-hole or a hollow in the face of a cliff or old wall, and generally well hidden and sheltered to some extent from above. Exceptionally a nest is found quite exposed, and in Iceland it breeds far in among loose rocks, while in Lapland the deserted huts of the peasants are sometimes occupied. The duck makes a scanty nest of bents or dead bracken and a few leaves or twigs, lining it as incubation proceeds with grey or drab coloured down with light centres and tips. (Pl. lxxix.) For feathers see Pl. U and H. Noble in Brit. Birds, ii., pl. 2, fig. 18. They are white, and decidedly smaller than those of the goosander. The approach to the nest is by a well-trodden pad where the grass looks dead and faded, and is often a clue to the nesting-site. The eggs as a rule range from about 7 to 12 in number, but 14 to 16 have been found in one nest, and in some cases were almost certainly laid by one female. In colour they differ widely from those of the goosander, and are drab or olive-grey as a rule, but occasionally light greyish stone colour, and average in size (100 eggs) 2:52 × 1:78 in. [64:2 × 45:4 mm.]. (Pl. S.) Incubation is performed by the duck alone, and Hantzsch estimates the period at four weeks. Full clutches may be found in Scotland in the last week of May and
early in June, but usually in the latter month; and Ussher states that in Ireland it is quite the exception to find the nest in May. Latitude seems to make little difference to this species, for in Germany the usual time is about the second week of June, and clutches may be found in Iceland about the same date. In Russian Lapland, however, eggs were taken by the Pearsons late in June and early in July. Only one brood is reared during the season, though a second clutch is laid if the first is taken. [F. C. R. J.]

5. Food.—Although in the main a fish-eater and very destructive to trout and salmon fry, this species has rather a wider range of diet than the goosander. It has, however, an insatiable appetite. Oswin Lee mentions having taken eleven good-sized salmon parr from one bird in July. On migration it appears to be especially fond of small eels: Selby found two gorged with a quantity of them about 2 or 3 inches long, and Bolam also notes the same thing. Other fish which have been recorded are small plaice (A. C. Chapman); roach (Leuciscus rutilus) and gudgeon (Gobio fluviatilis) are noted by Newstead; Thompson mentions the three-spined stickleback (Gasterosteus aculeatus) and otoliths of some member of the cod family (Gadidae), twenty-four sand-eels (Ammodytes lancea) were taken from one bird (R. Ball), and young hake and pipe-fish are recorded by R. Warren, and sprats and whiting by T. E. Gunn. Besides fish it occasionally feeds on shrimps (A. C. Chapman) and Crustacea (Poole); H. W. Robinson has also found crabs about the size of a shilling in a drake killed in November; while in the breeding season it will devour, according to Naumann, water-beetles, larvae of insects, worms, more rarely frogs and some vegetable matter; and Hartert gives its summer diet as including crabs, cockchafers, worms, caterpillars, larvae of dragon-flies, but no vegetable matter. The young are carefully tended by the duck, and at first pick up insects from the surface as well as the mixed diet given above. [F. C. R. J.]

6. Song Period.—The rough, purring double note of courtship was noted by Dr. Townsend in April. [F. C. R. J.]

S M E W [Mergus albellus Linnaeus. Nun, white-nun, smee; redheaded-smew (immature); white-wigeon, weasel-wigeon, magpie-diver (Ireland). French, petit harle huppé; German, kleiner Säger; Italian, pesciagóla].

1. Description.—With a serrated beak like that of the goosander and merganser, but so short as to be less in length than the tarsus, the smew is easily
recognised. The sexes differ in plumage; there is a marked seasonal change of coloration. (Pl. 166.) Length 17½ in. [444 mm.]. The male may be described as white, with large black patch in front of and embracing the eye, a patch of black on the nape, two crescentic lines of black across the fore-back, and a black back. The outermost scapulars are bordered with black; the median wing-coverts and the major coverts are black, the latter tipped with white; the secondaries are also black tipped with white: thus is formed a double white wing-bar. The rump and tail-coverts are grey with hoary margins, and the tail quills are grey, and the flanks have grey vermiculations. The "eclipse" dress is like that of the female, but the dark bands on each side of the fore-breast are retained. The female has the head and upper part of the neck chesnut, save for a black patch in front of the eye, and a white throat. The upper parts are grey. The wings are coloured as in the male, and the under parts are white. Young birds resemble the female, but lack the black patch on the face, and have the white on the wings washed with brown. The young in down are dark brown, with a white spot below the eye, another on the posterior edge of the wing and on the hinder end of the body; the under parts are white. [W. P. P.]

2. Distribution.—The breeding range of this species, which is only a winter visitor to the British Isles, extends from Sweden across North Russia and Siberia to Kamtschatka. In Sweden it is found in wooded districts on the borders of Swedish and Russian Lapland, but has also been recorded exceptionally from Sandhamnn, near Stockholm. In Lapland and Northern Finland it is not uncommon up to the tree limit in the Kola Peninsula, on the Muonio river, in Enontekis, Enare, etc.; while in Russia it breeds on Lake Onega, the Dwina, rarely on the Oka, the Petschora valley, and the Perm government. Buturlin also states that it breeds in the Ufa government and on the Volga. Dombrowski has recorded nests from the Dobrogea, but this requires confirmation. Its winter range extends to the Swiss lakes, and in a south-westerly direction along the coast of West Europe to the Western Mediterranean, and it has once been recorded from Egypt; as well as to the Caspian and Black Seas, and thence to the Eastern Mediterranean. In Asia it has been recorded from Persia, Afghanistan, N. India, China, and Japan, but not from Southern India or Burma. The only American record is probably erroneous. [F. C. B. J.]

3. Migration. — Unlike its congeners, the smew is entirely a winter visitor to our area, coming to us from that part of Northern Europe which lies east of Finnish Lapland. Although the smew has been exceptionally recorded as early as

VOL. IV. 2 P


5. Food.—Although to a great extent a fish-eater, this species consumes a larger proportion of other kinds of food than the other sawbills. Naumann records among other species eaten young trout, gudgeon, eels, lampreys, and at sea sandeels and *Atherina hepetus*. H. A. Macpherson found eighteen minnows in the gullet of one bird and a small eel in another, and Newstead records ten small flukes (*Platessa flesus*) and a samlet in one bird, while another had five small flukes. Boulton found roach 3 to 5 inches long. Other food eaten includes small Crustacea, e.g. *Crangon vulgaris*, small frogs, and water-insects (Naumann); aquatic insects and vegetable matter (Macpherson), sandhoppers (Newstead), and molluscs (Stuart Baker). The young are tended by the duck alone. [F. C. R. J.]:

The following species is described in the supplementary chapter on "Rare Birds":—

Hooded merganser, *Mergus coccullátus* (Linnaeus).
The sawbills form an easily recognisable group of diving ducks, in which the edges of both upper and lower mandible are furnished with rows of toothed lamellae, giving them the appearance of a saw blade in which the points are directed backwards. The bills of all the species of this genus (Mergus) taper rapidly from the base, and are very slender by comparison with those of other ducks. In common with the other diving ducks, they possess deeply lobed hind-toes, and have the feet set far back, thus necessitating a very upright carriage when walking. Three species are treated of in the present article—the goosander, Mergus merganser L., the redbreasted-merganser, Mergus serrator L., and the smew, Mergus albellus L. All three species haunt fresh-water streams and lakes in the breeding season, though the redbreasted-merganser is also found nesting along the coast; while during the winter months the goosander and smew are chiefly to be met with on fresh water, and the merganser haunts the coast, although occasionally penetrating for some distance up the rivers. All the sawbills are excellent swimmers and divers as well as strong on the wing. They are, moreover, exceedingly wary birds, and feed by day; but owing to the destruction caused by them among the trout and salmon fry are far from welcome visitors to our fishing streams. Their flesh is practically useless as food, and in consequence they are but little shot at except by fish-preservers; but few birds have a better idea of how to take care of themselves, and in the case of the goosander, and to a smaller extent of the merganser, the increase in breeding range of late years has been remarkable.
THE GOOSANDER

Although the goosander had been suspected of breeding in Scotland for some years (quite apart from the probably mistaken records from the Outer Hebrides), the first definite proof was obtained in 1871. In that year a brood of young was observed on Loch Awe in July, and a nest with eight eggs taken from a hollow tree by Loch Erich, Perthshire, in May, which was subsequently identified by careful comparison of the eggs and down. Full particulars of the discovery will be found in Mr. J. A. Harvie-Brown's Fauna of the Tay Basin and Strathmore, pp. 251-254. At the present time the goosander is by no means uncommon in some parts of Scotland as a breeding species.

Till quite recently hardly anything had been recorded with regard to the courtship of this species, but some very interesting observations have been published by Mr. S. E. Brock in the Scottish Naturalist for 1912, p. 116. The first indications are noticed in November, soon after the birds have arrived at their winter quarters on Linlithgow Loch. Later on the performance takes place more frequently and is more fully developed. Mr. Brock divides the display into three heads. In the first "when swimming rapidly in company with one or more females, the male with great suddenness and rapidity stretches his head and neck perpendicularly upwards to their fullest extent, the bill gaping": and thence with equal abruptness assumes his ordinary demeanour. The second performance bears considerable resemblance to that of the mallard, the bird raising the fore part of the body in the water, and simultaneously curving the neck so that the bill is directed towards the breast. (See the figure of the mallard in this position in British Birds, iv. p. 3.) The third action consists of a spasmodic movement of the feet while swimming, by which a jet of water is thrown upwards, and the bird is propelled
Plate 165
Upper: Goosanders
Lower: Mergansers

By A. W. Seaby
THE GOOSANDER

Although the goosander had been suspected of breeding in Scotland for some years quite apart from the probably mistaken records from the inner Hebrides, the first definite proof was obtained in 1871. In that year a brood of young was observed on Loch Awe in July, and a nest with eight eggs taken from a hollow tree by Loch Fyne, Renfrewshire, in May, which was subsequently identified by careful measurement at the eggs and down. Full particulars of the discovery were given in Mr. J. A. Hinde's paper of the same name in {Scottish Naturalist} x, 221-224. At the present time the goosander is by no means rare in the western parts of Scotland as a breeding species.

This quite recently hardly anything had been recorded with regard to the courtship of this species, but some very interesting observations have been published by Mr. S. K. Brock in the {Scottish Naturalist} for 1912, p. 116. The first indications are noticed in November, soon after the birds have arrived at their winter quarters on Loch Lomond. Titled on the performance, takes place more frequently and is more fully developed. Mr. Brock divides the display into three heads. In the first, when extending rapidly in antiquity with one or more females, the male with great agility stretches his neck and body perpendicularly upwards to twice its own extent, the bill gaping, and thence with equal abruptness returns to ordinary demeanour. The second performance bears considerable resemblance to that of the mallard, the bird raising the far part of the body in the water, and simultaneously curving the neck so that the bill is directed towards the breast. Then the figure of the goose. In this position in {British Birds} IV, p. 15). The third consists of a spasmodic movement of the feet while swimming, his whole mass of water is thrown upwards, and the bird is propelled
forward a foot or two with a sudden jerk. The three actions do not take place in any fixed order, and are not always to be noted on any one occasion. The feathers of the head are also somewhat elevated so as to form a crest, and slight bowings and head tossings may also be observed. A comparison with the records of the courtship-display of other species of ducks shows that there is a very strong family likeness between most of them in nearly every case where the observations are at all full, the only gaps in the series being in those cases, such as that of the smew, where material is almost entirely wanting.

Mr. Brock notes that while the display was going on, a soft, low, croaking note was continuously uttered. Directly one drake began to display, other drakes began to hurry to the spot, and those at some distance would often rise on the wing in order to take part, till a little band was collected together, the individuals swimming to and fro in close company. The display was not altogether confined to the males, for ducks were seen occasionally, but not often, to go through the second and third movements, but not the first, which appears to be peculiar to the male in this species. There was not much active rivalry between the different males: now and then one would make a lunge with his bill at a neighbour, and even pursue him for a short distance over the water, and the females sometimes repelled the advances of a male in the same way.¹

By March and April these birds had all paired off and departed for their breeding-grounds; but E. T. Booth observed males and females, adults and immatures, still in flocks at the end of April, although by that time they had already paired. These flocks, however, broke up early in May.

The goosander is an excellent diver, disappearing beneath the surface without apparent effort, and remaining under water for periods of varying length. Mr. T. A. Coward states that the period of immersion varies from ten seconds to a minute and a half, and that the

¹ *Scottish Naturalist*, 1912, p. 116.
longest dive was timed at one hundred and ten seconds. Mr. G. H. Caton Haig, who has watched these birds on the estuaries of the Welsh coast, is of opinion that the wings are not used in diving either by this species or the redbreasted-merganser, but that they dive with closed wings, as the grebes and the cormorants do. Although this is apparently the case, as a rule, it is quite probable that the wings are occasionally used, for Maegillivray states that mergansers "shoot along under the water with partially outspread wings," and Saxby states that the same species "invariably uses its wings as well as its feet" when diving. There is also good evidence that the cormorant when hard pressed will use its wings, so that probably these birds make use of the additional means of propulsion when necessary, but not otherwise. When flushed from the water the goosander does not rise at once, but patters along the surface for some way like the coot and waterhen. When once on the wing, however, it moves at a good pace. When fishing in a river it shows a tendency to keep in the middle of the stream, as far from the bank as possible, and when no open sheet of water is at hand, will fly a considerable distance to the coast and ride out the night at sea, returning to its feeding-grounds at the first streak of dawn and flying high in the air. When wounded or alarmed it possesses the power of sinking its body in the water so that nothing is visible but the dark snake-like head and neck; and in broken water is by no means easy to distinguish. As a walker it is not nearly so awkward and clumsy as the diving ducks, which can only waddle with difficulty on land, but owing to the position of the feet has to adopt a very upright carriage, and can scuttle along at a very fair pace when necessary. When resting close to the water's edge it will, however, shuffle along on its breast into the water without adopting the upright position at all.

The nesting-sites of this species have been already described: in some districts the hollows in the stumps of old and decayed trees, especially alders, are generally used, but in other parts, where there is not much old timber, holes and crevices in the ground of some kind
are frequently adopted. When the nest is at a considerable depth in the hollow trunk of a tree, the removal of the newly hatched young is attended with some difficulty. Mr. Oswin Lee states that after watching one nest for two mornings, which was at the bottom of a vertical hole, six feet deep, he saw the old bird appear at the opening with the nine young in succession. Sometimes the young bird was held in the bill, at other times it was held between the breast and the bill, and once a young bird was allowed to fall from the mouth of the hole to the heather beneath, but was apparently none the worse for the fall. When the last of the young had been safely brought down, the duck led them down the burn. The process of bringing the young out in this case lasted considerably more than an hour.

In the care of the young the drake appears to take no part: in fact all the evidence tends to prove that as soon as the clutch is complete and the duck has begun to sit, he deserts the locality altogether.

Mr. E. T. Booth, who watched the development of a brood of young for some weeks before securing them for his museum, noticed that the duck generally keeps her youngsters in shallow water till they are about four or five weeks old, in order to avoid the attacks of pike. He also observed that in fine, bright weather, the young would turn over on their backs in the water in order to sun themselves, and might be seen with one foot flapping in the air and slowly paddling round with the other. This is the more remarkable, as the young of the ordinary wild duck are almost invariably drowned if by any accident they are upset and assume this position. On the other hand, young mergansers seem to be able to withstand almost any amount of buffeting in rough water.

The young gradually work their way down stream, and the brood watched by Booth moved down the river for nearly ten miles during the seven weeks that they were under observation. The appetite of

---

1 The article and illustrations of goosanders' nests in Mr. S. P. Gordon's Birds of the Loch and Mountain obviously refer to those of the redbreasted-merganser.
these birds is almost insatiable. Mr. F. Finn tested a captive bird of the Central Asiatic race, and found that it actually devoured no fewer than forty fish, about 2 inches long, at a meal! In another case fourteen fish were taken from the crop of one male, and Sir R. Payne-Gallwey states that he took a trout of 7 inches in length, and found the partially digested remains of two other fish of similar size in the same bird. Needless to say, they are not welcomed on salmon and trout streams in consequence. When wounded or alarmed they will often throw up recently swallowed fish, and Booth relates that after a shot at a number of these birds on Heigham Sounds, scores of small rudd and roach were found on the surface where the flock had been resting.\footnote{Rough Notes, vol. iii.} After a fish has been captured it is always brought to the surface to be swallowed; then the bird usually drinks and stretches its neck several times.

The ordinary note of this species is a harsh guttural quack, which is generally written “\textit{karr}.” Booth heard a low plaintive whistle from a duck with young, but was unable to find out from which the sound came. This is probably the “half-hiss, half-whistle” which Stuart Baker heard from the female, who also makes a hissing noise when surprised on the nest.

**THE REDBREASTED-MERGANSER**

The redbreasted-merganser is far more marine in its habits than the goosander. Even in the breeding season many ducks may be found nesting on islets in the sea-lochs and firths of Scotland, and during the winter months it is generally to be met with round the coast, and even when feeding in the estuaries, almost always returns to the sea to spend the night. Like the goosander it feeds by day, and even before dawn may be dimly discerned rapidly winging its way up the course of the river to its feeding-grounds. Although at times
it shows remarkable boldness, it is on the whole an extraordinarily wary bird, which is the more surprising as it is little shot at, on account of the unpalatable nature of its flesh. Except for a siesta in the middle of the day, when small parties may be observed sunning themselves not far from the water's edge, and during the incubation period, it is rarely seen on land, and seems to spend almost its whole life on the water. It can, however, progress on land with considerable speed, but, like the goosander, raises its body to a half upright attitude owing to the backward position of the feet.

Very little has been written with regard to the courtship of this species in Europe, presumably because it is to a great extent carried on at sea, beyond the breakers, and is in consequence difficult to watch. Naumann, who derived his information from Faber, refers briefly to the remarkable attitudes of the drake, who stretches his long neck vertically upwards, and then lays it flat on the surface of the water, uttering a hollow note. But it is to Dr. C. W. Townsend that we are indebted for a really full and complete account of the courtship of this species. From this we gather that the most complete display takes place when several drakes are showing off before a single duck. The drake begins by stretching up his long neck, thus causing the white neck-ring to appear broader. The bill is then widely opened, and the whole bird stiffly dips as though on a pivot, the breast and lower neck being immersed and the tail and stern swinging upward, while the neck and head pass from a vertical position to an angle of forty-five degrees with the water. When this action is performed at sea, the courting-note is inaudible on account of the surf, but in still water a loud, rough, purring-note may be heard, which Dr. Townsend writes as "da-ah," though he admits that it is probably not susceptible of expression by syllables.

The love-note and bow may be given twice in rapid succession, at times once only, or once definitely, preceded by a similar but slighter one, and the frequency of its repetition after an interval is

---

no doubt dependent on the attitude of the duck and the ardour of her suitors. She may remain altogether passive, or may respond by similar but not so pronounced actions, emitting a single note, somewhat louder than that of the male, and of a different type, which appears to be the same harsh, rasping croak which she utters at other times. At such moments she seems to be much excited, and induces a corresponding ardour among the surrounding drakes. Sometimes she will dart out her neck and make a dash at the ring of male birds.

When the drake "bobs," the wings are apparently arched slightly upwards, so that the white secondaries are very prominent, and the tail is elevated at an angle of forty-five degrees, and sometimes, but not always, is widely spread. One drake kept his tail spread during the intervals as well as while in action. Sometimes one male will rush at another with powerful leg strokes, making the water foam about his elevated breast. Occasionally the wings are slightly raised, or both wings and feet are used for propulsion, accompanied by much splashing. A female when pursued will sometimes dive, and is at once followed by the male. No splashing backwards of water by means of the feet as noted by Dr. Townsend in the case of the goldeneye, and by Mr. Brock in that of the goosander, was observed. Dr. Townsend is of opinion that the attitude in which the neck is stretched flat on the surface of the water, with the bill partly immersed, is not a courting action, but, like the search for food with all the head immersed except the crest, is used at all seasons. The momentarily erect position in the water with flapping wings is also common to all seasons, but probably also forms a part of the display, especially when the drake rises with wings closed, as he does at times.

On the whole the merganser is a very silent bird: the croaking or quacking note of the duck when disturbed is generally uttered in flight, and is described by Macpherson as a sharp "quark," while Naumann writes it as "körrr," or "gerrr." Besides the breeding-note referred to above, the male hardly ever utters a note.
The breeding habits of this species have already been treated of in the "Classified Notes," but it should be observed that it is much later in its breeding season than the goosander, and there seems to be no really satisfactory evidence that it ever builds in hollow trees, though it has been stated to breed in old crows' nests in Holstein. Probably the supposed instances of breeding in trees are due to confusion with the goosander, for the females of the two species are by no means easy to distinguish unless the distinguishing marks are looked for. Another curious point is the great dissimilarity between the downs of two such closely allied species, while the eggs also differ widely in appearance. Both birds will often return to the same spot year after year for breeding purposes when undisturbed. The late H. A. Macpherson refers to a cairn which was reported to have been occupied for fifty years. When incubation has been in progress for some time, the duck sits very closely, and can often be captured by hand on the nest.

The drake does not appear to desert his mate so completely as the goosander after incubation has begun, but may frequently be observed not far from the nest. He does not appear to take any part in the care of the young, which are exceedingly hardy. Sir R. Payne-Gallwey says that when the young are about ten days old, the duck pilots them down stream to salt water. On reaching broken water, if all is quiet, she will land and walk with her ducklings past the waves, taking to the water again below the rapids, but if alarmed old and young will come headlong down, the young often turning head-over-heels on the way. On one occasion he saw a whole brood come tumbling over a perpendicular fall, at least twelve feet high. One of the young was caught in an eddy and unable to escape, but when released nearly an hour afterwards, the old merganser was discovered sitting on a stone not a dozen yards away. It was evident that she

1 The chin and throat of the female goosander is white, while the corresponding parts of the duck merganser are reddish. The head of the duck goosander is also lighter and the back ashy grey. The merganser is also a decidedly smaller bird.

2 Letters to Young Shooters, Third Series, p. 186.
had missed the errant youngster and had been an interested spectator of its rescue. When once on open water the young broods tend to get mixed together, so that it is not uncommon to see one duck in charge of a small fleet of youngsters some thirty or forty in number. In August and September, on Lough Erne, the late Major Trevelyان found that packs of from fifty to three hundred young birds might be met with, generally accompanied by a single adult bird, and in October a pack estimated at over five hundred strong was seen, but by November they had all left the lake and taken to the sea. During the winter the old males keep apart from the females and immature birds. In conclusion, it may be said that it is as expert a diver as the goosander, raising its body and plunging gracefully in head first. It may be seen at times in shallow water feeding with stern uppermost, like the surface-feeders, but more usually swims with head submerged till its prey is sighted, when it dives without taking breath. The habit of bringing all food to the surface to be swallowed leads occasionally to piracy on the part of the greatbacked-gull.

THE SMEW

The smew is comparatively a rare winter visitor to our country, and our information as to its breeding-habits is exceedingly scanty. The story of how John Wolley gradually ascertained the main facts of its nesting habits has been so frequently repeated that it need only be referred to here. Full particulars of the discovery are to be found in the Ootheca Wolleyana and the fourth edition of Yarrell. The natural breeding-site of this species is like that of the goldeneye, in a hollow of some tree near the water’s edge, but it is often tempted to nest in the boxes put up by the Finns for this purpose. Here the eggs, usually from 5 or 6 to 9 in number, exceptionally even 10, are laid

1 See H. A. Macpherson in A Fauna of the N. W. Highlands and Skye, p. 253.
Plate 166

Smew, the drake being the nearer

By A. W. Seaby
THE BAWBLES: DUCKS

had seen the weird youngeter and had been an interested spectator of its escape. When once on open water the young broods tend to get together, so that it is not unusual to see one flock in charge of a small host of young ones some thirty or forty in number. As August and September on Lough Bray, the late Major Travelynn found two groups of from fifty to one hundred young birds might be seen such parties accompanied by a single adult bird, and in October a larger party consisted of the parents and young ones, but by November the great mass of parents and young had disappeared. The gulls in November were spread over the valley, but by December they had all congregated in the swampy grounds near the Harbour. In December and January the gulls were seen feeding in the fields, with great consternation. The turf was frequently cut and the gulls were with their young ones with head down, eyes closed and the gull was in the air, but all was quiet once more. The habit of bringing all food to the surface and swallowing it occasioned to percy in the part of the great blacked-gull.

THE GULL

The gull is comparatively a rare summer visitor to our country, and our information as to its breeding habits is exceedingly scanty. The story of how John Wesley probably overlooked the main facts of its nesting habits has been so frequently repeated that it need only be referred to here. Full particulars of the discovery are to be found in the Naturalist's Magazine and the fourth edition of Linnæus. The natural breeding site of this species is the dunes of the goldeneye, in a hollow of some size near the water's edge, but it is often tempted to nest in the hollows put up by the Plank for this purpose. Here the eggs, usually from 8 or 10 to 15 in number, exceptionally even 10, are laid.
about the end of May or early in June in Finland. They closely resemble those of the wigeon in appearance, being similar in colour and size, but the surface of the egg is smoother and more glossy, and the shell stouter and heavier. Average size 107 eggs, 2.06 \times 1.47 in. [52.4 \times 37.4 \text{ mm.}] The down used in the nest is a light grey, somewhat dingy looking, and the small feathers are white. Moss and wood chips may be found also in the nesting-hole. The smew is one of the shyest and wariest of ducks, keeping generally to the middle of the lake or river on which it is seen. As a diver it is said by Hume to excel even the grebes and cormorants, and Stuart Baker states that it makes use of its wings when diving. It swims with great rapidity and can outpace an ordinary boat. When alarmed it has the power of sinking its body in the water till only the head and neck are visible. The only note which has been recorded is described by Naumann as a guttural note, not unlike those of the other sawbills, and Bonhote heard "a kind of guttural squeak" from a male bird in confinement. Nothing appears to have been noted as to its courting display. I have seen small parties on the lagoons of the lower Danube as late as the beginning of May, and it has been stated that a few pairs breed there every year. The drakes in full plumage are very conspicuous, but will not allow a close approach, and readily take to flight.
THE SPOONBILL


PRELIMINARY CLASSIFIED NOTES


SPOONBILL [Platalea leucorodia Linnaeus. Shoveler or shovelard, popeler (obsolete); banjo-bill (Norfolk). French, spatule blanche; German, weisser Löffler, Löffelreiher; Italian, spatola].

1. Description.—The spoonbill may at all times be distinguished by its white plumage and the broad spoon-shaped beak. The sexes are alike, and there is no marked seasonal change of plumage. [Nest Plate LXX.] Length 36 in. [194 mm.]. The male during the breeding season has a conspicuous, pendant, occipital crest, tinged with buff, the fore-neck is similarly tinged. In the female the crest is much smaller, and it is absent in both in winter. The beak is black, barred with yellow, the region of the throat is bare and of an orange colour, the iris is red, and the feet and toes are black. The juvenile dress is white like that of the parents, but the crest is absent and the beak much narrower. The downy young are white. [W. P. P.]

2. Distribution.—As a breeding species the spoonbill has long been extinct in Great Britain, though it still visits our east coasts regularly at the periods of passage, but is known to have nested formerly in East Anglia, Sussex, Middlesex, and Pembrokeshire. On the Continent two colonies exist in Holland, and some also nest in Andalucia, while it also breeds in Hungary, Slavonia (in enormous numbers), Dalmatia, Roumania, and South Russia to the Southern Urals and Transcaucasia. In Africa it may possibly breed locally in Morocco and Algeria, and in Asia is found from Northern Syria and Asia Minor eastward through Central Asia to India. In Eastern Asia as well as in Tropical Africa and Australia it is replaced by allied races. To its European breeding-places it is a summer migrant,
wintering in Africa and occurring casually on the Atlantic Islands and north to Scandinavia and North Russia. [F. C. R. J.]

3. Migration.—Formerly breeding in parts of the British Isles, the spoonbill is now only a “passage-migrant in Norfolk and Kent, vagrant elsewhere”: a few annually visit the former of these two favoured counties between April and June, and between August and October, and occasionally in July, while in 1908 it was recorded as early as 31st March and as late as 21st November: in Kent it may also be of annual occurrence, and is observed mainly in spring and near the coast (cf. Hartert, Jourdain, Ticehurst, and Witherby, Hand-List of British Birds, 1912, p. 121; Witherby and Ticehurst, British Birds, vol. i. p. 450; Gurney, Zoologist, 1909; and Ticehurst, B. of Kent, 1909, p. 326). Apart from Norfolk, Kent, and the immediately adjacent districts, the spoonbill is most frequently met with along the south coast of England, and especially in Cornwall; it is of not infrequent occurrence as a vagrant in Pembrook and Cardigan, but otherwise rare on the west of England and Wales (cf. Saunders, Ill. Man. Brit. B., 2nd ed., 1899, p. 393). In Yorkshire it is only a rare casual (cf. Nelson, B. of Yorks., 1907, p. 406). In Scotland it is of very rare occurrence, but it has been recorded even from the Shetland Islands and the Inner Hebrides, and more recently from the Outer Hebrides (cf. Saunders, loc. cit.; and Harvie-Brown, Annals Scot. Nat. Hist., 1902, p. 204). In Ireland it is also very rare, and most of the records come from the southern maritime counties, especially from Co. Cork; autumn and winter is the usual season, and the maximum number of records is for November (cf. Ushber and Warren, B. of Ireland, 1900, p. 172). British records usually refer to solitary individuals or to very small parties; companies of up to six in number have been observed in Kent (cf. Ticehurst, loc. cit.). For comparison of dates we may mention that in Holland the spoonbill is still a breeding summer visitor, arriving in April and leaving in September or early October (cf. Saunders, loc. cit.). [A. L. T.]

4. Nest and Eggs.—From what has been recorded of the extinct British race, the usual breeding-place was in lofty trees, and generally together with herons. At the present time almost all European spoonbills nest among reeds growing in water, or low bushes, but in India trees are still resorted to at times for breeding purposes. Possibly it was the protection afforded to the heronries which enabled the spoonbills to survive for a time. When placed in a tree the nest is carelessly built of sticks and twigs, but in marshes it is almost entirely composed of dead reeds, which are piled up till they reach a foot or two above the surface of the water. (Pl. lxx.) Probably both sexes share in the construction of the nest. The
eggs are usually 4 in number, sometimes only 3, and occasionally 5. Instances in which 6 eggs have been found in a nest may be due to two birds laying together. They are white when fresh, rather variable in shape, but frequently a pointed oval, and show hardly any gloss. Generally they are sparingly spotted and blotched with red-brown, and in some cases bold blotches of dark brown may be found, but as a rule they are poorly marked, and the spots show a tendency to form a cap or zone at the big end. Incubation lasts for about three weeks, but the share of the sexes is not known, though both birds are frequently together on the nest, one sitting and the other standing close by. The breeding season in Southern Spain begins towards the latter part of April, and full clutches may be obtained by the end of April or the first week in May. In Holland eggs are to be found early in May. Only one brood is reared during the season. [F. C. R. J.]

5. Food.—Naumann states that the principal food of this species consists of small fish, spawn, larve of aquatic insects, worms, molluscs, and it is said snakes and frogs. Vegetable matter is also undoubtedly eaten. In the stomachs of specimens obtained on the English coasts have been found specimens of the three-spined stickleback, Gasterosteus leiurus (Zoologist, 1866, p. 348), shrimps (Sheppard and Whitear) mixed with sand and silt, and sandhoppers. Of vegetable products the fruit of a Sparganium and a single carpel of a Potamogeton (probably P. pectinatus) have been recognised (Harting). [F. C. R. J.]
PLATE LXX

Photo by R. B. Lodge

Adult spoonbill on nest

Photo by Riley Fortune

Young spoonbills on nest
THE SPOONBILL

[F. C. R. Jourdain]

Two centuries and a half ago the spoonbill still lingered in one or two places as a breeding species in Great Britain, but its conspicuous plumage, and the ease with which it could be shot at the nest, caused its extermination not long afterwards. It is a curious fact that, as far as we know, all the old British colonies consisted of tree-nesting birds, but at the present time all the European breeding birds nest in marshes, on the ground or in low bushes, and the only colonies of tree-nesting birds are to be found in the Indian Peninsula and Ceylon. The former headquarters of this species in our islands seem to have been in East Anglia. Professor Newton has shown, by reference to the Calendar of Patent Rolls of Edward I., that in 1300 colonies existed in the woods of Whinburgh, Cantley, and Wormgay in Norfolk.\(^1\) Merrett also speaks of it as a British bird on Turner's authority, and Sir Thomas Browne, who died in 1682, mentions "the Platea or Shovelard" as having formerly built "in the Hernery at Claxton and Rudham [Reedham]; now at Trimley in Suffolk." Possibly the young bird taken from the nest which Willughby describes came from this very colony.\(^2\) Other records of former nesting have been brought to light by Mr. J. E. Harting from Sussex: a MS. survey of some manors belonging to the Duke of Norfolk in that county, at East Dene, near Goodwood, made in 1570, containing the statement that "in the woods called the Weestwood and the Haselette, Shovelers and Herons have lately breed [sic], and some Shovelers breed there this yeere."\(^3\) The same writer has also adduced evidence that, in the time of Henry VIII., they built in the heronry which then existed in the

\(^2\) Willughby also visited one of the Dutch breeding-places in company with John Ray.
\(^3\) Zoologist, 1877, p. 425.
Bishop of London’s park at Fulham. Lastly, George Owen, in his *Description of Pembrokeshire*, states that in his time (1603), “Heron-shewes, Shovelers, and Woodquestes” bred on high trees in the county.

It is a curious fact that the spoonbills which visit us from the still flourishing colonies in Holland show a distinct tendency to return to the neighbourhood of their old breeding-places. The Norfolk broads, especially in the vicinity of Yarmouth, are annually resorted to, and there seems a possibility that, with due protection, this species might even re-establish itself with us, as the bittern is attempting to do. Fortunately, however, it is possible for us to make the acquaintance of these beautiful birds without the necessity of making an extended journey. Holland must have been a great stronghold of this species in former days. Many of these ancient haunts are now reclaimed and deserted by their bird inhabitants; even the Horster Meer, which was visited by Selater and Forbes in 1877, and by Seebohm and Elwes in 1880, is now unoccupied, but two flourishing colonies still survive, and there seems no reason why they should not long continue to do so. It is interesting to note that one of the earliest descriptions of one of these Dutch colonies comes from the pen of one of our own countrymen, John Ray, who visited the Netherlands in company with Willughby and two other friends, and published a description of his visit in 1673. He tells us that in a grove at Sevenhuys, about four leagues from Leyden, great numbers of shags (? cormorants), spoonbills, night herons, and common herons nested in the trees, each species having its own quarter, and that the young were shaken out of the nest by means of a hook fastened to a long pole, and taken for food. A hundred years later, the Dutch naturalist Cornelius Nozeman found another breeding-place in the recesses of the treacherous morass of Isselmeyr, in the Wolle-voppen polder. These birds were breeding on the lower branches of wide-topped, pollarded alders, while a few nested on the bare ground on the accumulations of nests of previous years. Other colonies also existed.

---

1 *Zoologist*, 1880, p. 81.  
2 *I.e.* Herons, spoonbills, and woodpigeons.
at this period on the Maas, and here and there in the reclaimed Haarlem Meer. In 1867 Sclater found spoonbills still haunting Nieuwerkerk, and about the same time we hear of a colony on Texel; but in 1877 the Haarlem birds had settled down at Horster Meer, and the breeding-places near the Maas were quite abandoned. Here they remained till some time between 1881 and 1883, when they migrated to the Naarder Meer, a few miles distant. Attempts to drain this Meer between the years 1883 and 1886 fortunately proved unsuccessful, owing to the porosity of the soil, and though for a time the meer was entirely deserted by the spoonbills, they began to return in 1887, and have never been absent in the breeding season since that date. The second colony, which is not nearly so well known, lies in a secluded spot among the dunes of Noord-Holland, not far from the Helder, and probably contains the descendants of the deserted Texel colony. This lagoon is strictly preserved, and probably most of the English occurrences are due to wanderers from this site. It is difficult to form any reliable estimate of the numbers of breeding birds. In 1898 Dr. Sclater estimated the number of breeding pairs at the colony near the Helder at three hundred pairs, while that on the Naarder Meer is much smaller, and probably does not much exceed thirty pairs in number.

Favier says that they occur at Tangier on migration in March, April, and May, but the first bird observed by Irby near Gibraltar was noted on 9th April, and they reach their breeding quarters in Holland during the same month. In all probability spoonbills pair for life, but of their courtship nothing seems to be recorded. Year after year they return to the same spots to breed, making use of the remains of the old nests of the previous year as a foundation for the new ones. At this time the Naarder Meer is covered with dense beds of dead reeds, 5 or 6 feet high, standing in water varying from 2 or 3 to 5 or 6 feet deep, while the green spikes of the fresh growth of reeds project a foot or so above the water-level. No material is used except the dead reed stems with a few leaves attached, which are brittle
and can be broken off without difficulty, and are generally brought from some distance. By preference the spoonbill always nests in the thickest part of one of these reed-beds and not on the outskirts, so that it is necessary to push the punt for some distance through a forest of dead stems, amidst the croaking of innumerable great reed-warblers, before there is a sudden rush and rattle of many wings, and immediately the snowy forms of fifteen or twenty birds appear on the wing above the reed tops, while glimpses of white through the reed stems show that one or two anxious parents are still on their nests. When fairly on the wing, the spoonbill carries its long neck outstretched, and not retracted like the herons. The black legs also are extended behind the tail in almost a straight line, or gently deflected. But when about to alight the bird looks anxiously downwards, the legs are dropped, and as it reaches the ground are extended in a most awkward-looking “straddling” attitude with outstretched toes, which is anything but graceful. Not a sound is heard as the flock uneasily hovers about, and after a time is lost to view. Indeed there are few more silent birds than the spoonbill. Like the stork it makes a “clappering” noise with its mandibles, and Mr. Beetham thinks that this is used to express endearment, and noticed that it was responded to by the erection of the crest feathers of the companion bird. The young may be heard to utter a weak “cheep” in the nest, but many writers assert that the adult has no true note. This is, however, not the case. Mr. R. B. Lodge states that on one occasion only he heard a low sort of croaking noise uttered in flight. Herr Szikla also describes a sound uttered during the breeding season as “huh, huh, huh, hurum huk huk huk huk hur hur hur hum hum.” Whether this represents a song or not is uncertain, but while visiting the Naarder Meer colony some ten years ago I noticed that an occasional low grunting note, which might be written “ur” or “urd,” was uttered by one or two of the birds which were flying about, and seemed to

1 Expressed by von Homeyer as “pierrr, pierrr.”
2 R. B. Lodge, Pictures of Bird Life, p. 238.
denote anxiety on their part. The spoonbill is generally described as a particularly wary and shy bird, but this is merely due to the fact that they are so persistently shot at, like the great white-heron. Where protected they are not especially shy, though always rather nervous and easily alarmed. In this respect Mr. B. Beetham found that individuals differed widely, some being far more timid and suspicious than others. The general characteristics of the spoonbill form a great contrast to those of the herons, and impress one very favourably. It is true that Mr. Beetham once witnessed a furious contest between one bird which had settled by accident on another's nest and the two rightful owners. In a moment all three were flapping about wildly in the confined space, one bent on escape and the other two on punishment. The struggle lasted till all were so draggled and exhausted that they lay half in and half out of the water, incapable for the time of flight. This was, however, the only quarrel which he witnessed, and he describes the spoonbill as the most gentle and docile of birds. There is none of the wild clamour, the weird squawks and groans that one hears in every heron colony; none of the vicious attacks and cold-blooded murders that are so often witnessed there; instead all is quiet and peaceful, and the only excitement is the arrival of a parent laden with food.

Owing to the difficulty of making continuous observations in the localities where they live, much of the life-history of this species is still imperfectly known. The first broods of young which I saw showed great discrepancies in size and development, and led to the inference that the eggs were laid at intervals and incubated as soon as laid. Since then, however, I have seen other nests in which development was much more uniform, and feel less confident on the point. Mr. Farren also notes that recently hatched young seen by him in Spain were all about the same size. The usual number of eggs is from 3 to 4, but out of thirteen nests examined in one colony in Spain, one contained 5 eggs, six held 4, and the rest 2 or 3 apiece.\footnote{Mr. Farren also observed three clutches of 5 eggs at the same colony in 1911.}
Mr. R. B. Lodge also notes that on the Naarder Meer, when several nests had been robbed early in the season, the second layings were unusually large, one such nest containing 6 and another 7 eggs! The young are hatched about the third week of May in Holland, and differ widely in appearance from their parents, the bill being smaller, thicker, and only slightly spatulate. In those I have seen the bill was a yellowish flesh colour,¹ and the unwieldy, swollen-looking legs were a bluish tint. The wings, which showed the black primaries in the quill, were generally held drooping, and the bird often rested, like a young stork, on the heel (tibio-tarsal) joint, the tarsus projecting upward and the feet drooping. When first hatched they are quite incapable of standing, and can only progress by crawling, not attempting to walk till they have been hatched for ten days or so. During incubation, and also after the young are hatched, both parents may frequently be seen together at the nest. Owing to the difficulty of distinguishing the sexes, it is impossible at present to be certain as to how the duties of incubation and providing for the young are divided, but during the day small parties of five or six birds leave the colony from time to time and resort to the mud-flats and seashore to obtain food. The actions when feeding will be described later, but on returning to the nest with full crop the new arrival at first seems indifferent to the solicitations of its mate, who paddles in front of him, first on one foot and then on the other, moving her bill, up and down, occasionally prodding him in the throat with her bill, and even flapping her wings with widely gaping bill and uplifted crest.² At last, with a flapping and gaping like that of his mate, he prepares to deliver what he has brought. "After one or two sideway shakes of the head, he stooped down and with a few vigorous gulps opened his bill." Meantime the food had been regurgitated into the upper part of the throat and the trough at the base of the lower mandible, so that the young could pick it out without thrusting their heads into their parent's distended gullet, as in the case of

¹ See, however, the widely differing accounts of the colours of the soft parts in the young bird quoted in the Neuer Naumann, vol. vii. p. 6.
² B. Beetham, The Home Life of the Spoonbill, etc., p. 12.
the cormorants. When nearly full grown, young spoonbills, on being approached, will scramble out of the nest, plunge into the water, and disappear among the reeds.\(^1\)

In Roumania a breeding-place some miles from the main stream of the Danube, visited by Messrs. E. Mackenzie Murray and F. R. Ratcliff in 1911, was also placed in thick reed-beds growing in deep water, and contained perhaps about a hundred nests. In South Spain one meets with isolated nests on the tamarisk bushes, which in normal seasons are surrounded by water, and are covered with thousands of nests of little egret and buff-backed heron. These nests are built of twigs and branches of tamarisk, and look bulky by comparison with those of the smaller herons, but are in reality as a rule very flimsy structures. Most of the nests here are built among the reed-beds, but in 1906, an exceptionally dry year, we met with about eighteen pairs on a barren flat island, which only rose a few inches above the surface of the laguna. Here were packed closely together thirteen nests, all touching or almost touching one another, and forming practically one continuous row of nests on a common foundation of dead reeds and mud. In striking contrast to other colonies, these nests were quite exposed and had not the slightest cover near them, and the white plumage of the incubating birds was visible a mile away.\(^2\)

Evidently the nesting-site of this colony varies from year to year, for in 1911 Mr. W. Farren found most of the spoonbills nesting on partly submerged tamarisks in company with various species of herons. The nests were built of sticks with some aquatic vegetation for lining, and in some cases rested almost on the water, and at other times were 3 feet or more above it. Some of the egrets' nests were so close to those of the spoonbills that they almost touched, and one spoonbill was unmercifully bullied by an egret when returning to its nest, but made no attempt to retaliate. Probably the largest European colony is that in the great morass of the Obedska Bara, where Herr

\(^1\) R. B. Lodge, *Pictures of Bird Life*, p. 234.
\(^2\) Chapman also states that in 1909 they nested on or among the low samphire scrub at the Caño de la Junqueria, and in 1910 none bred.
Schenk estimates the breeding stock at about one thousand pairs.\(^1\) Here many of the nests are built on the submerged branches of willows, and vary much in appearance, some being huge structures four feet above the water-level, while others are only just clear of it. Hume describes some of the Indian colonies as varying in size, some being quite small and others enormous, but almost always close to where some allied species, notably the shell-ibis, was breeding. At most of these Indian stations the nests are built in big trees, and are substantial platforms of sticks, two or three feet in diameter, and from three inches to nearly a foot in depth.

The young are said to leave the nest after a stay of about three weeks, which seems rather a low estimate; and when they are fledged, both old and young are apt to wander far afield. At such times they are to be met with on estuaries and mud-flats, usually in small parties, for they are pre-eminently sociable birds, and always prefer to travel and feed in company. When feeding they generally advance in a line, with the bill immersed, working from side to side with their bills and swinging their bodies with a corresponding motion which Lord Lilford compares to the rhythmic swing of mowers in a hayfield. Meantime the broad spoon-shaped mandibles sift the soft mud as a duck does.

The Dutch birds leave for the south during September, and recross the Straits of Gibraltar in October, only an occasional straggler remaining till November, and winter in Tropical Africa.

THE GLOSSY-IBIS

[ORDER: Ciconiiformes. SUBORDER: Ciconiæ. FAMILY: Ibisidæ. SUBFAMILY: Ibitinæ]

PRELIMINARY CLASSIFIED NOTES

[F. C. R. JOURDAIN. W. P. PYCRAFT. A. L. THOMSON]

GLOSSY-IBIS [Egithæus fæcinêllus (Linnaeus); Plégadis fæcinêllus (Linnaeus). Black curlew (Norfolk). French, ibis fæcînelle; German, brauner Sîchler; Italian, mîgnattâcio].

1. Description.—The glossy-ibis may at all times be distinguished by the long decurved beak, long hind-toe, and more or less extensive metallic gloss of the plumage. There is a seasonal change of coloration. (Pl. 167.) Length 22 in. [558 mm.]. The male in his breeding dress is of a dark reddish chesnut, burnished on the crown with dark metallic green, on the scapulars and inter-scapulars and wing-coverts with green and purple. The beak is of dark brownish olive, and the iris is brown. The legs and feet are greenish grey. The female is slightly smaller, duller, and has a shorter beak. In the winter dress the reddish brown is more or less completely replaced by earthy brown, but the metallic areas remain unchanged. The juvenile dress resembles that of the adult winter dress, but the metallic areas are of an oil-green colour, and the head and throat are more or less striated with white. The downy nestling is blackish grey, with a white band on the crown. [W. P. P.]

2. Distribution.—The breeding range of this species in Europe is chiefly confined to the basins of the Mediterranean and Black Seas, where it is very local.¹ It breeds in the marismas of the Guadalquivir in S. Spain, but not in large numbers, and formerly nested in the Camargue, though there seems to be no recent record of its breeding there. It has not been proved to breed in Italy, though probably a

¹ None were noted there in 1911 by Mr. W. Farren.
few nest in Sicily and the Balearic Isles. In the swamps of the lower Danube, however, it becomes more numerous, and there are very large colonies in Slavonia, a few in Hungary, and breeding-places exist in Servia, Bosnia, Bulgaria, and the Dobrogea in Roumania, as well as in South Russia east to the Caucasus. In North Africa it is not common, but has been recorded as nesting in Morocco and Algeria. In Asia it is found in the marshes of Asia Minor and N. Syria, N. Persia, Turkestan, India, and Ceylon. It occurs in many parts of the Malay Archipelago, and has been found breeding once at least in Australia, and is also found in the south-eastern part of the United States. In America its southward limit of migration is not yet clearly known, but in Africa it extends to the Cape of Good Hope and Madagascar. To Northern Europe (Iceland, the Faeroes, Scandinavia, and Finland) it is only a rare casual visitor. [F. C. R. J.]

3. Migration. — A wanderer from Southern Europe, occurring almost annually in some part or other of the British Isles in autumn or early winter (August to November), very rarely in spring. The southern and eastern coastal districts of England are the most frequently visited, and the species is very rare inland as well as on the east coast of Great Britain north of Yorkshire, and on the west coast north of the Bristol Channel (cf. Hartert, Jourdain, Ticehurst, and Witherby, Hand-List of British Birds, 1912, p. 122). But there are a number of records from the eastern seaboard of Scotland, and even from the Orkney and Shetland Islands, while one was recorded from South Uist, Outer Hebrides, in November 1910: several occurred in Anglesey in 1806, but none have been noted since in North Wales (cf. Saunders, Ill. Man. Brit. B., 2nd ed., 1899, p. 391; H. Newton, Field, 10, xii., 1910, p. 1094; and Forrest, Fauna of N. Wales, 1907, p. 260). There are about thirty-six Irish records, chiefly for October and November, and for the eastern and southern districts (cf. Ussher, List of Irish Birds, 1908, p. 32; Ussher and Warren, B. of Ireland, 1900, p. 171; and Saunders, loc. cit.). British records frequently refer to small flocks, although in the main, perhaps, to solitary examples; as many as twenty were observed together in Orkney from 24th September to 1st October 1907, and of the ten that were shot those examined were all immature birds (cf. H. W. Robinson, Annals Scot. Nat. Hist., 1908, p. 50). Considering that even the summer quarters of the glossy-ibis are no nearer than Andalusia, Slavonia, and the lower Danube, it is very remarkable that it should visit our islands so often as it does, and also reach at times Scandinavia, the Faeroes, and Iceland. Whether this phenomenon is in any way connected with a former wider distribution is too purely a theoretical point to be discussed here.
But it may be mentioned that some dispute the very slight evidence in favour of a supposed former more frequent occurrence on parts of our coasts. [A. L. T.]


5. Food.—In a wild state it lives on worms, small crustaceans and molluscs, aquatic insects, and frogs. Naumann says that their main food consists of larvae of aquatic insects and worms, as well as insects, beetles, dragon-flies, sedge-flies, small molluscs, small frogs and tadpoles, fishes and their spawn. One specimen contained many caddis-flies and a water-beetle (Hydrophilus). H. O. Forbes includes in the dietary of this species small reptiles and scraps of vegetable matter. In confinement it is practically omnivorous. [F. C. R. J.]
The glossy-ibis resembles our common-starling in the fact that when viewed from some distance it appears to be clad in sober black, but at close quarters reveals unsuspected variety and beauty of colouring. In general appearance it shows a striking resemblance to the curlew, so that the name of "black curloo" or "curlew," by which it is known to the marshmen of East Anglia, is so descriptive that no one who knows both birds by sight could fail to recognise this species at once on first hearing the name. As far as we know, it was never more than an occasional visitor to us, though no doubt it occurred more frequently before the colonies in the Rhone delta were broken up.

My first acquaintance with this bird dates back to 1906, when on a visit to the marismas of the Gaudalquivir. The previous season had been one of exceptional drought, and vast expanses which in a normal spring are covered with a foot or two of water were then nothing but miles of sun-cracked mud. Even this year there was less water than usual, but still there was enough to encourage the water-birds to breed. In the preceding year most of them had abandoned the idea altogether, and the teeming bird colonies, or "pajareras," were lifeless and deserted, but this year the continual flights of little-egrets, buff-backed-herons, and other species showed that nesting was in progress at no great distance. Huge rolling hills of loose sand, ever drifting with the wind and encroaching on the mud-flats, shut in the view on the left: in front of us were some acres of tamarisk scrub in the distance, and to the right, beyond the shallow water which covered the mud-flats of the previous season, one could distinguish in the distance the course of the great river, with here and there a boat or river steamer slowly moving along. As we approached the bushes we could
Plate 167

Glossy-ibis

By Winifred Austen
THE GLOSSY IBIS

[By C. L. R. Journals]

The glossy ibis reminds one common-sense in the fact that some species even more distance. It appears to be clad in sober black, but it is more exactly a species. It shows a striking resemblance to the egret in size of black slender "or " variety, by which it is known to the naturalist of Kent Anglesey. It is described that no one ever knows. Such being the case, it would fail to recognize the species at first hearing the name, as far as we know, it was never more about an occasional visitor to us. It is of no doubt it occurred more frequently before the colonies were broken up.

My first acquaintance dates back to 1868, when on a visit to the marshes of the Guadalquivir. The previous season had been one of exceptional drought, and vast expanses which in a normal spring are covered with a foot or two of water were then nothing but solid masses of sun-cracked mud. Even this year there was less water than usual, but still there was enough to encourage the water-birds to breed. In the preceding year most of those had abandoned the idea altogether, and the teeming bird colonies, as "carrancas," were deserted and deserted. But this year the continual flights of birds, white, buff-banded herons, and other species showed that breeding was in progress at an early date. Huge rolling hills of loose sand, once draining into the river and encroaching on the mud-flats, shut in the view on the left as far as we were some acres of tamarisk scrub, in the distance, and in the right beyond the shallow water which contained the gravel. Some of the marshes, one could distinguish in the distance the outline of the great gulls, white here and there, a large number slowly moving along. As we approached the marshes we could
see a cloud of white resting on them. Streams of birds were now passing overhead, and soon we could see that the tamarisks were crowded with a dense mass of white birds in constant turmoil and movement. A regular babel of weird cries, quacks, and groans in different tones came from the birds on their nests, though in flight they are all silent. In a wet season these tamarisks stand in the water, but this year the ground was practically dry round the chosen site for the colony, and as few of the nests were more than ten feet from the ground, it seemed absurdly easy to examine the nests. A few minutes served to show how mistaken we were. In many places the bushes were matted together with long trailing brambles, and grew close together. By crawling on hands and knees one could get into the thick of the colony, where the ground was strewn with broken eggs which had fallen from the nests above, but on attempting to climb the bushes we soon found that they were unable to bear our weight and gradually collapsed, bringing down a shower of eggs with them. At last, after many failures, we managed to find a place where the matted brambles held the tamarisks up sufficiently to enable us to reach the top, but not without serious damage to our clothes and skins as well. Here a wonderful sight met our view. Above us in the clear sky floated silently thousands of birds, a few purple-herons, a pair of spoonbills, thousands of little-egrets and buffbacked-herons, many night-herons and a few squacco-herons. But conspicuous among them was a small flock of glossy-ibises, their blackish plumage contrasting strongly with the snowy whiteness of the egrets and buffbacked-herons. Nests were visible by hundreds on every side. Within arm's-reach were half a dozen, while every bush was crowded to the utmost limit of its capacity by others. The wide, flat nests of the purple-heron, with their large blue-green eggs, were easily distinguished. Then the spoonbill's flimsy nest with its white eggs, flecked with red-brown, was marked down. The small eggs of the squacco, too, could be separated without difficulty by their size, and those of the glossy-ibis by their deep blue, quite different from the pale greenish blue tints of the other herons. The eggs of
the little-egret, buff'backed and night-herons, however, required careful authentication, so that it was necessary for one observer to mark the parent bird down on to the nest from the sandhills above, while a confederate lay concealed under the bushes below and climbed to the nest under direction. All these birds made use of practically the same materials for building, for as a matter of fact the only available twigs were those of dead tamarisks close at hand. There were, however, certain differences noticeable in the way in which the twigs were arranged, and the night-herons showed a partiality for larger sticks, arranging them so that they radiated from the middle of the nest. Amongst the deafening chorus of cries which broke out as the birds began to settle down on their nests, it was impossible to distinguish the notes of the various species. The glossy-ibis is, as a rule, a very silent bird, but, as stated by Naumann, it utters at times a harsh, heron-like note, which he writes as "rrha" or "rraa." The late Lord Lilford kept a number of them in confinement, and noticed that the only sound he heard from them was a "decidedly corvine, prolonged guttural croak."

Wherever found, this species has always one characteristic, namely, its sociable disposition. Whether feeding or nesting or on migration, it is nearly always in company. While the egrets and herons may be flushed from their solitary stands among the marshes, the ibises are always in small or large parties. In Spain, where they are not common, one meets with half a dozen or so walking sedately about, very much as the curlew does, and probing the soft mud with their long decurved bills. In Slavonia, where the colonies are of enormous extent, Mr. Eagle Clarke met with no fewer than two hundred feeding together. It is also naturally a wary bird, and in a mixed colony is generally one of the first, if not actually the first species to take the alarm. In flight the legs are not carried so straight behind as with the herons, but droop slightly: the neck is also kept extended in flight, so that the downward curve of the bill and the angle at which the legs are held form a gentle curve. Sometimes they fly in wedge-shaped
formation like geese and cranes, but small flocks may be met with in a "bunched" formation, flying with more rapid wing-beats than the slower herons.

Probably the largest breeding European colony is that in the Obedska Bara in Slavonia, which is protected by the Hungarian Government. Mr. W. Eagle Clarke and his friends paid a visit to this colony in 1883, and with considerable difficulty managed to force their way through the belts of willows and beds of reeds till at last they reached the main colony, which was roughly estimated at about thirty thousand birds of all species. The noise of the beating of wings, accompanied by harsh alarm-notes, was deafening as the main body rose on the wing in alarm, but after a time they began to get more accustomed to the presence of visitors, and gradually returned to their nests or perched on the adjacent willows. In all directions sallow trees were growing in the water, but the nests of the glossy-ibis were in every instance either on the surface of the water or close to it. A little higher up were the nests of the night-herons, squacco, and little-egrets, though some of the latter were also low down and close to the water, while the pygmy-cormorants and common-herons nested by preference in the top branches. One bush, which may be taken as typical rather than exceptional, contained one nest of common-heron, two of pygmy-cormorant, three of night-heron, two of little-egret, one of squacco, and three of glossy-ibis! In this colony the materials used by the glossy-ibises were sticks and a few reeds, as was also the case with the little-egrets, while the night- and squacco-herons used sticks exclusively. Herr J. Schenk published the results of a rough census of this colony in Aquila, vol. xv. (1908) pp. 245-258, and estimated the number of breeding pairs of this species alone at about two thousand.

Still farther eastward there are large colonies in the great delta of the Danube—an interminable and only half-explored waste of reed-beds and willow-swamps. Here, amongst a dense growth of reeds

---

with a few sallows among them, or in the half-submerged willow trees, the nests of the pygmy-cormorant and glossy-ibis may be found in close proximity. In India the more usual site seems to be in a good-sized tree, but here the same tendency to breed in company with other species is shown, various species of ibis, egret, and cormorants nesting in the same colonies.¹

Throughout Europe the glossy-ibis is a summer visitor only, crossing the Straits of Gibraltar late in April, and passing through Greece on its way north to the Danube valley between the end of March and the middle of May, migrating in large and small flocks. In Spain it is generally regarded as a later breeder than the other species of herons; but in the Obedska Bara Eagle Clarke found fresh eggs of most species which were breeding there at about the same time in May. The eggs, as a rule, vary from 3 to 4 in number; but Baldamus states that 5 are sometimes found, and the Hungarian National Museum contains clutches of 6. Their colour is very remarkable, an intensely deep blue, quite devoid of markings. In this character they resemble the eggs of the herons, which are always some shade of greenish blue; but, on the other hand, the eggs of the other species of ibis approach the spoonbill type of egg, and are for the most part white with reddish brown markings. The average size of 105 eggs is 2.03 × 1.44 in. [51.8 × 36.7 mm.]. Owing to the difficulty of making observations, little is known of the domestic habits of this species. Heinroth gives the incubation period as 21 to 22 days. The newly hatched young are pretty little creatures, covered with blackish grey down, which is longest on the head, and showing a curious white band on the crown, while the bill in life has a black tip and base and is ivory-white between. Alléon describes them as holding the neck retracted, while the head was continually raised and depressed, each movement being accompanied by a little note. Colonel Legge found that the young, while still unable to fly, on his approach stood up and began to climb actively among the

¹ For details see Doig, Stray Feathers, 1879, p. 377; Legge, Birds of Ceylon; and Hume and Oates, Nests and Eggs of Indian Birds, iii. p. 231.
branches: "when seized they clung tightly with their feet, and were with difficulty removed."

Lord Lilford kept many of these birds in confinement, and found them hardy and practically omnivorous. They generally (but not invariably) chose a high perch when roosting at night. A peculiar attitude was frequently assumed in fine, bright weather in order to get the full benefit of the sun, the bird extending one wing to its full length in an upward direction, and allowing the other to hang limply by its side.¹

After the breeding season is over small parties of ibises are occasionally met with in the British Islands, and it also occurs at times, though much more rarely, in spring. Most European birds leave in September and October, and make their way across the Mediterranean to Africa.

¹ This attitude is figured in Lilford's Coloured Figures, vol. vii. pl. 17.
THE HERON


PRELIMINARY CLASSIFIED NOTES


COMMON-HERON [Ardea cinerea Linnaeus. Grey-heron, hern, Jack-herne or yarn, heronshaw or hernshaw, crane; haigrie (Shetlands); longnix (Cheshire). French, héron huppé or cendré; German, Fischreiher; Italian, airone cenerino].

1. Description.—The large size, grey plumage, powder-down-patches, the long dagger-like beak, and the large hind-toe, which is on the same level as the front toes, distinguish the heron, at all ages, from all other British birds. The sexes are alike in plumage, and there is no seasonal change of coloration. (Pl. 168.) Length 36 in. [914 mm.]. The uniformity of the delicate French-grey of the plumage is relieved by the pure white of the fore-part of the head, cheeks, and fore-part of the neck, which is marked by sharply defined lines of bluish black on a white ground, while a black band runs from the base of the beak backwards over the eye, widening as it goes, to terminate in a long pendant, black crest. A patch of black feathers covers the wrist-joint when the wing is folded, and the feathers of the outer scapulars are produced into long narrow streamers. Similarly the feathers of the base of the neck hang down far below the contour of the body. The under parts are white relieved by a broad band of black on each side. The beak and iris are yellow; the lores and the bare skin round the eye yellowish green; the legs and toes chocolate-brown. The female differs from the male only in her shorter crest and slightly duller hues. The juvenile plumage differs from that of the adults in its almost uniform ash colour, and in lacking the crest on the head, the long pendant feathers at the base of the neck, and the elongated scapulars. The black patch over the wrist of the adult is represented in the young by a similar patch.
PRELIMINARY CLASSIFIED NOTES

of dark slate colour streaked with white. The young till fledged is but sparsely covered with long, yellow, filamentous threads. [W. P. F.]

2. Distribution.—In the British Isles the heron is very widely but somewhat unevenly distributed, and although the largest colonies are mostly in England, it is probably most general in parts of Scotland and Ireland. About two hundred English heronries are catalogued by Mr. F. Bonnet, and some forty in Wales, while in Scotland two hundred and thirty sites are mentioned in the Annals Scot. Nat. Hist. (1908, p. 218), but about forty-five of these are now deserted. Nearly fifty are mentioned by Mr. Bonnet from Ireland, but this list is very incomplete. There are several breeding-places in the Orkneys, and Saxby states that it has bred in the Shetlands. In the Outer Hebrides it was first recorded as nesting in 1902. On the Continent its northern limit extends to Trondhjem's Fjord in Norway, sparingly to Dalecarlia and Jemtland in Sweden, and in Russia from the southern shores of the Gulf of Finland to about lat. 60° N. in the Perm government. Southward of these limits its range extends over the greater part of Europe to the Mediterranean, but it has not yet been found breeding in South Spain, Sardinia, Sicily, or Southern Italy, though a few nest in Corsica and Northern Italy. Possibly a few breed on the Azores and Tenerife, and apparently some also nest in North Africa, while there is evidence that it is also resident in Southern Africa and Madagascar, and breeding has been recorded from the Transvaal, Orange River and Cape Colonies. In Asia it ranges north to the central districts of Tobolsk and Tomsk and the Upper Lena, while southward it breeds in Palestine, the Persian Gulf, India, and Ceylon, but apparently East Asiatic birds differ to some extent. Although chiefly a resident, it occurs casually in the Færöes, Iceland, and even Greenland. [F. C. R. J.]

3. Migration.—A resident and a winter visitor. Our own native herons are probably sedentary, being found in the heronries from February till August, and sometimes visiting them in winter (cf. Saunders, Ill. Man. Brit. B., 2nd ed., 1899, p. 368). During the winter the birds are naturally less locally distributed, and at that season their numbers are increased to some extent by immigrants from the Continent. These winter visitant birds have been exceptionally recorded as early as 8th July, but they usually arrive between 2nd September and 29th November (cf. Clarke, Studies in Bird Migration, 1912, vol. i. p. 159). The influx chiefly affects the east of Great Britain, and on the Yorkshire coast the birds may annually be seen arriving from the east, flying high over the sea; but in Kent the species is described simply as “resident” (cf. Nelson, B. of Yorks., 1907, p. 389; and Ticehurst, B. of Kent, 1909, p. 304). The Dumfriesshire stock of herons is
"scarcely influenced" by immigration, and the same is probably true of the west of Great Britain as a whole (cf. Gladstone, B. of Dumfries., 1910, p. 227). Thompson has a reference to an autumn crossing from Scotland to Ireland, but apart from this there is no evidence of movement within the Irish area, although herons frequently fly out to the outlying islands (cf. Ussher and Warren, B. of Ireland, 1900, p. 158). Out of fifty-five young herons marked in May 1910 in Zeeland, East Denmark, the following have been recorded:—

<table>
<thead>
<tr>
<th>Year</th>
<th>Date</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1910</td>
<td>26th June</td>
<td>Holstein.</td>
</tr>
<tr>
<td></td>
<td>2nd July</td>
<td>Mecklenburg.</td>
</tr>
<tr>
<td></td>
<td>5th July</td>
<td>East Denmark.</td>
</tr>
<tr>
<td></td>
<td>23rd July</td>
<td>Near the mouth of the Elbe.</td>
</tr>
<tr>
<td></td>
<td>28th July</td>
<td>West Denmark.</td>
</tr>
<tr>
<td></td>
<td>5th August</td>
<td>Andalusia.</td>
</tr>
<tr>
<td></td>
<td>6th September</td>
<td>Near Hamburg.</td>
</tr>
<tr>
<td></td>
<td>10th September</td>
<td>Near Hamburg.</td>
</tr>
<tr>
<td></td>
<td>5th October</td>
<td>Holstein.</td>
</tr>
<tr>
<td></td>
<td>17th October</td>
<td>Near Salisbury, England</td>
</tr>
<tr>
<td>1911</td>
<td>4th January</td>
<td>North-eastern France.</td>
</tr>
<tr>
<td></td>
<td>9th February</td>
<td>East Denmark.</td>
</tr>
<tr>
<td></td>
<td>(? February</td>
<td>North-western France.</td>
</tr>
</tbody>
</table>

(Cf. Mortensen, Dansk. Ornith. Forenings Tidsskrift, 1911, pp. 115-119). "Migrants bearing the labels of the Loo Hawking Club, Holland, have been shot from time to time near Perpignan," Pyrénées-Orientales, France (Saunders, op. cit., p. 367). Such few records of British marked herons as exist only go to show that they are more or less sedentary (cf. Witherby, British Birds, vol. iii. p. 219; and vol. v. pp. 186, 314). The heron is often solitary at the time of migration and in winter, although so markedly gregarious in the breeding season. [A. L. T.]

4. Nest and Eggs.—The nesting-sites of this species vary according to circumstances. In most parts of the British Isles the nests are built in colonies in trees, often in those of considerable size. No particular preference for any one species of tree is shown, oaks, elms, sycamores, pines, larches, etc., all being made use of. The height from the ground may vary from seven or eight to eighty feet or more, but the nest is nearly always on or near the top of the tree. In Ireland

1 Similar letters in this column indicate birds from the same nest.
the nest may be found on the ground or on low bushes on islets in the loughs, and even in England it has occasionally been found in reed-beds or even on shingle, and exceptionally on the ground at the foot of a tree in a wood! In Scotland it breeds in places on the face of brush-grown cliffs. In Holland and Central France many birds breed in thick reed-beds. Nests have also been recorded from bare hillsides, and on ruined and ivy-grown buildings. As a rule the nest is flat, but substantially built of sticks and branches, lined with finer twigs, but in reed-beds is generally composed of stems of dead reed. Dead grass and roots may also be found in the lining, while one nest has been recorded which was made almost entirely of wire! (Pl. LXXI.) The share of the parents in building seems not to have been definitely recorded, but apparently both sexes take part in the work. The eggs are generally 4 or 5 in number, sometimes only 3, and occasionally 6 or 7. In colour they are a uniform light blue-green, generally rather larger and broader than those of the purple-heron, and devoid of gloss. (Pl. R.) Average size of 142 eggs, 2.36 \times 1.69 \text{ in.} \ [60.2 \times 42.9 \text{ mm.}.] The duties of incubation are shared by both sexes, and the period is usually estimated at 26 days, though Schmidt gives the period as 25 to 28 days, and eggs hatched under a hen took 25 to 26 days. Mr. B. Beetham, however, noticed that the last egg in a clutch was hatched out 23 days after it was laid. The breeding season in the south of England begins, as a rule, in mid-February, sometimes even in January, though in the north often a month later, but fresh eggs may be obtained much later in the season. There is much division of opinion as to whether two broods are reared in the year, and though in some districts it is unusual, there is reason to believe that it is not uncommon in others. In the valley of the Danube the breeding season is postponed till the arrival of the spring floods, and fresh eggs may be obtained in May and even in June. [F. C. R. J.]

5. Food.—Fish caught alive, and especially fresh-water fish, form the heron’s principal food, but small reptiles and amphibians, small mammals (especially water-voles, Microtus amphibius), whose fur is frequently to be found in the pellets thrown up by this bird; also shrews (Newstead). Newstead records remains of Dytiscus marginalis and Geotrupes stercorarius, as well as water-boatmen (Notonecta glauca). Young birds, large insects, and mussels are also eaten (see p. 337). The young are almost entirely fed on fish by both parents. [E. H.]
BITTERN [Botaurus stellarius stellarius (Linnaeus). Butterbump, mire-drum, bog-drum. French, grand butor; German, grosse Rohrdomel; Italian, tarabuso].

1. Description.—The bittern may be distinguished from all other British birds by the absence of contour feathers along the back of the neck, excepting only the American-bittern and little-bittern, from which it differs by the barring on the remiges. The sexes are alike, and there is no seasonal change of plumage. (Pl. 169.) Length 28 in. [711 mm.]. The general coloration is of a golden buff, variously barred and blotched with black. The crown and nape are uniformly black. The feathers of the fore-part of the neck are much elongated, and form a large, erectile frill. The throat is white; down the middle line of the neck runs a band of dark brown, which is bounded on either side by a similar band continuous above with a black moustachial stripe, and these bands are contrasted with a pale buff ground-colour. The marginal region of this frill is marked with fine transverse bars of black. The iris is yellow, the bare area around the eye, and the beak are of an ochreous green, while the legs and feet are grass green. The juvenile plumage does not differ from that of the adult, and the coloration of the quills is almost uniform. The young in down is of a rusty yellow colour. [w. p. p.]

2. Distribution.—Formerly the bittern bred in many parts of England, Wales, Southern Scotland, and Ireland, but it gradually became extinct as a breeding species. The latest recorded instances of nesting were at Wilstone reservoir, Herts, in 1849, and in Norfolk (Upton Broad) in 1868; but a young bird with down adhering to its plumage was obtained in Norfolk in 1886, and breeding probably also took place in Hants about 1886-1889. In 1911 a pair again succeeded in rearing young in Norfolk. On the Continent it visits South Sweden in small numbers, and has nested in Southern Finland, while in Russia it ranges north to the south of the Archangel government, but only to lat. 57° in the Urals. Southward it is found in suitable localities over the rest of the Continent to the Mediterranean, except Denmark, and is not uncommon in Friesland. It also breeds in Sicily, Sardinia, and North-western Africa, while in Asia it is found across the Continent east to Japan, south to Turkestan, Asia Minor, and perhaps Persia and Palestine, and north to 64° on the Yenisei, 65° on the Lena, and 67° on the Yana. It is replaced by closely allied forms in South Africa and North America. Northern birds are migratory, wintering in the Mediterranean region and from the Persian Gulf to India. The American race has occurred as a casual in Greenland, Iceland, and the British Isles. [F. G. R. J.]
3. Migration.—Formerly a well-known resident, but the recent breeding record from Norfolk is the first for several decades, and the species is now chiefly a cold-weather visitor in small numbers to the British Isles. It is an uncommon winter visitor to Yorkshire, sometimes numerous in severe weather, and also recorded from the coast in autumn (cf. Nelson, *B. of Yorks.*, 1907, p. 399). It is of variable occurrence in Kent, but one or two are recorded nearly every winter; while in North Wales it is not infrequent, especially in January and February (cf. Ticehurst, *B. of Kent*, 1909, p. 316; and Forrest, *Fauna of N. Wales*, 1907, p. 259). It has been recorded even from the outlying islands of Scotland, but is altogether rarer in that country (cf. Saunders, *Ill. Man. Brit. B.*, 2nd ed., 1899, p. 383). It probably visits Ireland annually, but is only irregularly recorded: the occurrences extend from August to March, but are notably for the months of December and January, and for the counties of Cork, Waterford, and Down (cf. Ussher and Warren, *B. of Ireland*, 1900, pp. 167-8). Not always solitary: four together, and even "flocks," have been recorded in this country (cf. Nelson, *op. cit.*, p. 402; and Saunders, *op. cit.*, p. 384). Has been recorded from the light-stations (cf. Nelson, *loc. cit.*). [A. L. T.]

4. Nest and Eggs.—As a rule this species breeds in dense beds of dead reeds or bulrushes, but exceptionally it has been known to nest in a small clump of reeds standing in open water. The nest itself is an artless structure of dead reed-stems,\(^1\) rather flat and small for the size of the bird, only projecting a few inches above the surface of the water. In some cases it is visible when the bird is not sitting as much as twenty or thirty paces away. Mr. Wade is of opinion that the sites are used throughout the year as resting and preening-places till they become padded down, and finally are adopted as foundations for the nest proper. The share of the parents in building has not been ascertained. The eggs are a uniform olive-brown, sometimes with a greenish tinge, without gloss, and vary considerably in shape. (Pl. R.) Average size of 65 eggs, 2.09 x 1.51 in. [53 x 38.5 mm.]. The number varies from 3 to 6,\(^2\) and they are laid at intervals of some days, while there are considerable differences in the development of the young and the incubation of the eggs, which point to incubation commencing with the laying of the first egg. The incubation period is said to last for about 25 days (Saunders), but Naumann gives 21 to 23 days, and states that incubation is performed by the female alone. The breeding season is somewhat irregular: in Holland, according to Mr. Wade, the average date is about 12th May, but eggs may be found from early April to

---

1 A Norfolk nest is said to have been built of large and small rushes.
2 Nine are recorded as having been found on one occasion in a single nest.
the first week in June. Probably only a single brood is reared in the season. [F. C. R. J.]

5. Food.—Water-voles and other small mammals, birds, frogs, and newts, fish, water-beetles, Crustacea. The young are fed mainly on fish, and by both parents. [W. P. P.]

LITTLE-BITTERN [Ixobrychus minutus (Linnaeus); Ardëta minûta (Linn.).
French, blongier nain; German, kleine Rohrdommel, Zwergrohrdommel; Italian, tarabusino].

1. Description.—The little-bittern may readily be distinguished from the common and American bitterns by its greatly inferior size, and by the fact that the middle toe and claw do not exceed the tarsus in length. The sexes differ conspicuously, but there is no seasonal change of coloration. (Pl. LXXI.) Length 11 in. [279 mm.]. The male has the crown and the whole of the back, scapulars, tail, and remiges black; the rest of the plumage is of a pale ochreous buff, save a patch of dark brown buff-bordered feathers, which covers the wrist-joint in the closed wing, and the abdomen and under tail-coverts, which are white. The throat and the lower portion of the neck-ruff shows faint indication of white longitudinal lines. The back of the neck is down-clad, as in the typical bitterns. The beak is purplish yellow, the iris orange-yellow, the feet greenish yellow. The female has the crown dark brown, the back and wing-coverts greyish brown, each feather margined with dull ochreous buff. The outermost wing-coverts have a rufous tinge. The neck-ruff is longitudinally striped with dark brown, buff, and white. The remiges are dark brown. The breast is white suffused with buff, and striated with dark brown, while the abdomen is white. The juvenile plumage resembles that of the female, but is duller. The downy young are of an ochreous buff above, greyish white below. [W. P. P.]

2. Distribution.—Although there is little doubt that this species formerly bred occasionally if not regularly with us, it has ceased to do so now. On the Continent it nests as far north as France, the Low Countries, N. Germany, and from Livonia to lat. 56° in the Perm government in Russia, while southward it is found in suitable localities not only to the Mediterranean and some of its islands, but also in North-western Africa (Algeria, Tunisia) and in Egypt. In Asia its breeding range extends from Palestine, Asia Minor, Transcaspia, and lat. 56° in W. Siberia, through Mesopotamia east to Sind, the North-West Provinces of India, and Kashmir. Its winter quarters lie chiefly in Africa, though a few winter in Southern Asia,
Plate LXXI

Heron on nest with young

Nest and eggs of little-bittern

Little-bittern ready to strike
and it has been recorded as far south as Pondoland in the eastern Cape Colony, as well as casually in Madeira and the Azores, Scandinavia, the Faeroes, and Iceland. [F. C. R. J.]

3. Migration.—Probably bred formerly in England, but now known as a rare irregular visitor, occurring chiefly in the spring and summer months. The southern and eastern counties of England are the most frequently visited, and the species is described as a very rare occasional visitor to North Wales, and as a rare casual, chiefly in summer, in Yorkshire: in Scotland it has reached the northern isles, but is, generally speaking, very rare (cf. Saunders, Ill. Man. Brit. B., 2nd ed., 1899, p. 381; Forrest, Fauna of N. Wales, 1907, p. 258; and Nelson, B. of Yorks., 1907, p. 396). It is a rare and irregular visitor to Ireland from March to November, chiefly to the southern and eastern coastal districts: out of about thirty birds obtained in all, only one was in Connaught, but a recent record (9th September 1908) refers to the isle of Owey, off Donegal (cf. Ussher and Warren, B. of Ireland, 1900, p. 165; Ussher, List of Irish Birds, 1908, p. 31; and Barrington, Irish Naturalist, 1908, p. 59). [A. L. T.]

4. Nest and Eggs.—The usual site is among thick reeds, but occasionally a nest may be found on a stump or among the branches of a pollarded tree. It is not unlike that of a waterhen, but much more roughly built of twigs, sedges, reed-stems, etc., lined with flat leaves of water-plants, dead flags, sedges, rushes, etc., generally close to the water-level except when in stumps or bushes, and then only a few feet above it. (Pl. LXXI.) The share of the sexes in building is not known. The eggs are rather elongated in shape, dead white when first laid, and generally varying in number from 4 or 5 to 7, though occasionally much larger numbers have been found in one nest. (Pl. R.) Average size of 102 eggs, 1·37 x 1·02 in. [34·8 x 25·9 mm.]. Incubation is stated by Naumann to last for 16 to 17 days, though Hocke was of opinion that the period was slightly shorter. Definite information is still lacking as to whether the male assists the female in incubation, but a male shot in Norfolk showed incubation patches, so that probably both sexes take part in the work. In Middle Europe most eggs are found from early June onward, exceptionally during the last fortnight of May, while second layings (or perhaps third) may be found till late in July. In South Spain eggs may be found even in the first week of May, but generally two or three weeks later. Only one brood is normally reared in the season. [F. C. R. J.]

5. Food.—Chiefly small fish (young tench (Tinca vulgaris), perch, and also Carassius vulgaris and Cobitis fossilis), though no doubt frogs, the smaller reptiles,
molluscs, worms, aquatic insects and their larvae (especially water-beetles, dragonfly and caddis-fly larvae) are also eaten. A bird kept in captivity in Tenerife subsisted largely on mice and lizards which entered its cage, and Hocke states that they will kill and eat young reed-warblers from the nest. The food for the young is disgorged by the parents on to the side of the nest, and consists chiefly of small fish. A male shot in Montenegro by Lodge contained small fish an inch long and aquatic insects. [F. C. R. J.]

The following species is described in the supplementary chapter on "Rare Birds":—

[Family Phoenicopteridæ]
Flamingo, Phoenicopterus róseus Pallas. [F. C. R. J.]

[Family Ardeidæ]
The following species and subspecies are described in the supplementary chapter on "Rare Birds":—

Purple-heron, Ardea purpúrea Linnaeus.
Great white-heron, Egrétta álba (Linnaeus) [Árdea álba Linnaeus].
Little-egret, Egrétta garzétta (Linnaeus) [Árdea garzétta Linnaeus].
Buffbacked-heron, Ardélota ibis (Linnaeus) [Árdea bubálcus Audouin].
Squacco-heron, Ardélota ralloídes (Scopoli) [Árdea ralloídes Scopoli].
Night-heron, Nyctícorax nyctícorax (Linnaeus) [Nyctícorax gríseus (Linnaeus)].
American-bittern, Botáurús stelláris lentiginósus (Montagu).
[American green-heron, Butórídes viréscent (Linnaeus).]
White-stork, Cicóñia cicóñia (Linnaeus) [Cicóñia álba Bechstein].
Black-stork, Cicóñia nígra (Linnaeus). [F. C. R. J.]
THE HERON

[E. Hartert]

The heron is found on all suitable waters—i.e. clear ponds, lakes, large and small rivers, if not flowing too fast, and occasionally on the seashore. During the breeding season it visits chiefly such waters as are not too far from nesting-places. For the latter trees or bushes of all sorts are chosen, though in some places the nests are built on cliffs, and in treeless steppes even among reeds and on the flat ground.

The food is taken entirely from the water or from the ground. An extraordinary exception to this rule is given in the Field of 7th December 1912, where it is stated that a heron, though with great difficulty and after many unsuccessful attempts, was observed to capture in flight a bat which had been disturbed from its roosting-place. The food consists chiefly of fishes of all kinds, unless too wide or too large to swallow, and small ones of 10 to 20 centimetres are nearly always chosen. Cases are, however, known in which birds have attempted to swallow larger fish, with the result that the heron was choked to death; such cases are, of course, very rare. In one case a heron was found choked to death by a large rat, and, in another noted by Mr. W. Farren, by a roach weighing three-quarters of a pound. The fish are swallowed alive, head first, and in this manner even sticklebacks go down without difficulty. Eels seem to be favourites, as they are, indeed, with many fish-eating birds. Besides fish, reptiles, and tadpoles, small mammals (voles, mice, rats, shrews, moles), large insects (such as beetles and Notonecta glauca), and young birds, principally ducklings, are also taken, but fish are always the principal and favoured food. There is, according to several authors, some doubt whether mussels are eaten by herons or not; but J. A. Naumann (senior) has actually found them in the crop, and I have,
on the Rhine, often found mussels \( (Anodonta, Unio) \) eaten out, which I attributed to herons, whose traces were seen around the empty shells, though I had no absolute proof of the eating by these birds.

The heron's bill is very powerful, and has been known to pierce a strong holly-stick. When wounded, the beak is used cunningly and is a very dangerous weapon, especially as it is often aimed at the eyes of dogs and men. A couple of herons have been found dead, one having pierced the thigh of the other right through. The aggressor was evidently not able to withdraw its beak, so that both died together.

Between the breeding seasons herons sleep in trees or on cliffs, and in the early morning, before it is quite daylight, fly towards their feeding-ground singly or in company. They are always more or less gregarious. Not only do they generally nest in colonies, but also between the breeding seasons one more often sees them in twos or threes or more together; sometimes, on good feeding-grounds, even a dozen or more not far from each other. Single herons are also seen in winter, but not very often. They alight as a rule on dry ground and walk into the water, though occasionally, but rarely, they alight in the low water at once. They stand still for a short while, quite motionless, with the neck straight up, but the beak horizontal, apparently to make sure that there is no danger near, and then begin to walk slowly and noiselessly through the water with curved neck, now and then, by a sudden straightening of the neck, thrusting down the bill into the water, and seldom without obtaining a fish or other prey. The popular notion that they use feathers or other things as bait is too ridiculous to be believed. As a rule the heron does not stand motionless like a fisherman, waiting for fish to come near, but "walks them up." On the other hand, it often stands for hours motionless, in the same spot, on the look out for some unwary fish. A casual observer will usually see a heron standing quiet and erect, but then the bird has in most cases seen or heard him, and is standing at attention ready to fly off at the slightest warning. When reposing, the long neck is doubled up and rests between the shoulders, but as
Plate 168
Herons
By A. W. Seaby
The heron's bill is very powerful, and has been known to pierce a strong holly-stick. When wounded, the beak is used cunningly and is a very dangerous weapon, especially as it is often aimed at the eyes of dogs and men. A heron or herons have been known dead, one having pierced the thigh of a cow with right through. The heron was entirely unable to withdraw its beak, so that both died together.

During the breeding season, herons sleep in trees or on cliffs, and in the early morning, before it is quite daylight, fly towards their feeding-ground singly or in company. They are always more or lessgregarious. Not only do they generally nest in colonies, but also between the breeding seasons are more often seen there in tens or twenties or more together; sometimes on good feeding-grounds, some a dozen or more not far from each other. Single herons are also seen in winter, but not very often. They alight as a rule on dry ground and walk into the water, though occasionally, but rarely, they alight in the low water at once. They stand still for a short while, quite motionless, with the neck straightened, but the beak, horizontal, apparently to make sure that there is no danger near, and then begins to walk slowly and noiselessly through the water with a smooth motion, and then, by a sudden straightening of the neck, resembles those in tall into the water, and suddenly with a quiver, takes a fish or other prey. The popular notion that they are fearless of other things, as bees is, is ridiculous to be believed. As a rule the heron does not stand and watch like a sentinel, waiting for fish to come near, but "walks them in." On the other hand, it often stands for hours motionless on the same spot, as the look out for some unlucky fish. A special observer will usually see a heron standing quiet and motionless, but then see that he is very keen or heard something, and is standing at some point and is on to it at the slightest movement. Unless repeatedly the heron is disturbed up and remains between the shrubs, but as
soon as a possible enemy approaches it is stretched out, and the bird becomes a picture of alertness, though standing motionless. The heron walks deliberately, with long strides. On taking wing it rises somewhat laboriously, though quick enough, and once in the air progresses fairly fast, with long flaps of its wide and rounded wings. During flight the neck is bent in the form of an S, and the head rests between the shoulders, the legs stretched out behind, as is the case with all water-birds. The heron flies high and straight.

In Great Britain and Ireland the heron is a resident all the year round, but in the colder portions of the Continent it is strictly migratory. In England it returns to the nesting-places by the end of January or in February, but in Northern Germany, for example, not before March or even April. Most of the migrants seem to winter in the Mediterranean countries and in South-east Europe. The species nests mostly in colonies, often of many hundreds of pairs, but single nests are not uncommonly found.

In the breeding season herons may be seen flying about in huge circles over the nest trees, one of a pair pursuing the other with wild shrieks, the pursued falling down away from the other when nearly reached, and both now and then tilting their bodies as if they would overbalance themselves.¹ The usual note is a discordant shriek, somewhat like an unsuccessful trumpet-blast, but reminding one rather of a goose’s cry when heard from afar. Near the nest, seldom elsewhere, one hears also a low “ka.”

The nest is a large, flat structure of sticks, with a shallow depression lined with grass, fur, or other soft material, and, as it is used for many years, often of great dimensions. Both parents take part in incubation and in feeding the young. Moult takes place after the breeding season, and there is only one moult each year.

Very often heronries are also occupied by other birds, especially the cormorants, nests of both species being found on the same trees. Rooks also nest frequently in the heronries; there is generally much

fighting when they enter, and at the beginning of the nesting season, but usually both parties appear to become gradually accustomed to the *status quo*, and all ends in peace. Mr. Jourdain, however, informs me (in *litt.* ) that this is not always the case: a large heronry on the river Alde, in Suffolk, was completely destroyed by rooks, which devoured every egg soon after it was laid, and this happened many years in succession. On the Continent the brown-kite is fond of nesting in heronries, shamelessly feeding its young with the young herons.

In olden times the heron was the bird almost exclusively, or at least preferably, hunted with falcons, and in those times it was protected, and its killing otherwise than with a falcon was a crime. When pursued by a hawk the heron spirals upward, trying to go above it, and, if unsuccessful, it was said on occasions to transfix its persecutor with its long beak. In our countries, at least, the adult heron has not any serious enemies except man, who resents its preying on fish; but eggs and young are not uncommonly taken by rooks, crows, brown-kites, and other birds. The flesh is good to eat, and the breast of a young but full-grown bird is excellent.

**THE BITTERN**

[W. P. Pycraft]

Unfortunately, chiefly owing to drainage, the reclamation of land, and the general advance of "civilisation," the bittern has been reduced to the verge of extinction as a British bird. It is unfortunate, because it was one of the most interesting of all the inhabitants of our fens and reed-grown wastes. In days gone by it was by no means despised as a bird for the table; while it contributed not a little towards enlivening the interest of the fen-dwellers in their surroundings, by reason of its extraordinary vocal powers. Now that it is
practically banished from among us, we have discovered that it possessed yet other attributes of an even more fascinating character; and these mainly concern its coloration, of which anon.

That the bittern and the heron are close allies there can be no question, but in their habits, in some structural features, and in coloration, they present very striking differences. In their choice of haunts they rather resemble the coot and the grebe than the heron, inasmuch as, like the former, they seek concealment amid the reeds; but even in the heyday of their prosperity among us they were never so frequently seen as their neighbours. At no time, apparently, were bitterns to be seen standing like sentinels “knee”-deep in water on the look-out for prey, by the side of some stream or pool, as herons are to-day—though the food, as with the heron, consisted almost entirely of water-voles, frogs, and small fish. Instead, these excessively timorous birds preferred to do their hunting stealthily, concealed amidst a maze of well-nigh impenetrable reeds.

What we may call the “hall-mark” of the Heron-tribe is the presence of certain patches of down-like feathers on the breast, the region of the groin, and the upper surface of the thigh, remarkable for the fact that they are in a constant state of disintegration into an excessively fine powder of an almost soapy texture. In the heron these patches have been regarded as luminous areas, the light of which was utilised by the bird as a lure for fishes in the twilight. But those who subscribed to this view were evidently under the impression that this mysterious powder-down was confined to the breast. They invented the theory to fit the facts, as they imagined them to be. The breast-patches being there, in short, an attempt was made to explain their presence. But the existence of precisely similar patches of this supposedly luminous down on parts of the body where luminosity would be quite unavailable, speedily disposes of the whole story. But if further condemnatory evidence were required, it would be furnished by the fact that the heron does not feed by night, and by the life-history of the bittern.
Another remarkable feature about the bittern, or rather the species of the genus *Botaurus* and *Ardetta*, is found in the feathering of the neck, the whole of the back of which is clothed simply by loose, downy feathers, and this unprotected region is generally covered by conspicuously long, loose, erectile feathers which clothe the sides of the neck. These, usually, are drawn downwards and backwards, to meet in the mid-dorsal line, and so shield this down-covered area. But on occasion these elongated feathers can be drawn outwards, so as to form a pair of great lateral shields, whose purpose must be discussed later. Finally, the bittern has a pectinated claw on the middle toe, as have so many other birds, and enormous feet. As to the purpose of the pectinated claw we are absolutely ignorant, though not a few wild guesses have been made; the huge feet, it is clear, are of considerable service in grasping reed-stems—several at a time—and also when wading in shallow water where the bottom is formed of the loose debris of aquatic vegetation, whereon walking would be impossible but for the spread of the long, lithe toes. The bittern, by the way, is a relatively much shorter legged bird than the heron, wherefrom it is clear much shallower water must be fished, and this fits well with what we know of its haunts and feeding-grounds—the recesses of vast reed-beds rather than the margins of the open water which they surround.

There are two other peculiarities of the bittern which must be considered here. The first of these concerns the quite extraordinary booming sounds produced, night and day, between January and June. From time immemorial these have been what we may term the most conspicuous features of this most inconspicuous of birds; for even in the days of its plenty it was known to hosts of the fen-dwellers, and to most of those who affected a knowledge of natural history, only by that strange cry which reverberated over the tops of the graceful swaying reeds during the early months of the year. The bird itself was never seen save by a few, and none knew how these strange sounds were produced. Even to-day we cannot say whether they are
Plate 169

Bitterns

By A. W. Seaby
Another remarkable feature about the Bittern, or rather the species of the genus *Botaurus* and *Ixobrychus*, is found in the feathering of the neck. The whole of the back of which is clothed simply by loose, downy feathers, and this uppermost region is generally covered by conspicuously long, loose, scythe-like feathers which clothe the sides of the neck. These usually are drawn downwards and backwards, or meet in the mid-line line, and so shield the down-covered area. But on occasion these elongated feathers can be drawn outwards, so as to form a pair of great lateral agencies, whose purpose must be discussed later. Finally, the Bittern has a perforated claw on the middle toe, as have so many other birds, and serves the same purpose as to the purpose of the perforated claw we are absolutely ignorant, though not a few wild guesses have been made; the huge beak, if there are any, of considerable service in grasping and tearing; several species Special, when wading in shallow water, the bottom is formed of the loose debris of aquatic vegetation, otherwise walking would be impossible but for the spread of the long, thistle toes. The Bittern, by the way, is a relatively much shorter legged bird than the heron, wherefrom it is clear, much shallower water must be fished, and this fits well with what we know of its habits and feeding grounds—the necessity of vast reed-beds rather than the margins of the open water which they surround.

There are two other peculiarities of the Bittern which must be considered here. The first of these concerns the quite extraordinary booming sounds produced, night and day, between January and June. From time immemorial these have been what we may term the most conspicuous features of this most inconspicuous of birds. For even in the days of its plenty it was known to hosts of the fen-dwellers, and to most of those who affected a knowledge of natural history, only that strange cry which reverberated over the tops of the reed-beds during the early months of the year. The second...
made by the male alone, or as answering calls by both sexes. In earlier days it was believed that they were produced by thrusting the beak under water and then expelling air through the mouth, or, according to another version, by thrusting the beak into a reed—a strange achievement having regard to the bore of the reed and the thickness of the beak. But even then there were dissentents, for Montagu insisted that the "boom" was usually uttered while the bird was high in the air! To-day we know that all these interpretations were wrong, for this strangely resonant cry, which can be heard a mile off, is made by the bird when the beak is closed and pointed skywards. The sounds, which are generally compared to the bellowing of a bull, are preceded by certain throbblings in the throat, apparently inspirations of air, which is then suddenly expelled while the beak is apparently closed. So far as we know to the contrary, they are made by the male only, but it is possible that the female also booms. Possible, because even in the male the syrinx displays no modification, which can be regarded as explaining the volume of sound emitted. But in this respect the bittern does not differ from the ostrich and the cassowary, in both of which the males emit resonant drumming or booming sounds, though lacking even a syrinx.

The bittern has at least one other note, syllabled kũw, no doubt an alarm-note. It was heard from a bird, flushed, "apparently near the nest," while it circled in the air. Its note was answered by the boom of its mate hidden in the reed-beds.\(^1\) The note of the young will be referred to below.

As touching the coloration. There can be no question but that this is pre-eminently of the "protective resemblance" or "concealing" (procryptic) type. Yet it is significant to notice that it differs in some striking particulars from the nearly related American-bittern (\textit{Botaurus lentiginosus}). Not only is "the common" bittern (\textit{B. stellaris}) a more brightly hued bird, but the remiges are conspicuously barred, while in the American bird—which is also reckoned a British species—these

\(^1\) \textit{British Birds [magazine]}, i. 332.

\textit{VOL. IV.}
feathers are of one uniform, dull hue. From this we may gather that the protective value of the coloration is not dependent on the precise tint or pattern of the plumage, but on its general resemblance to the surroundings, and one other factor—the assumption of a peculiar pose at just those critical moments when alone the coloration is of vital importance. Then the part played by pose and pigment is startling. Briefly, the bird, if alarmed, tilts up the body, and thrusts the neck and head straight upwards, so that the tip of the beak points skywards, and having assumed this attitude it remains as motionless as the reeds surrounding it on all sides. Long lines of dark chesnut-brown running down the front of the neck simulate the shadows between the reeds, the lighter background and thick dark lines simulate dead reed-stems. As a consequence, it is only by the merest chance that the presence of the bird is detected, and even then it is by no means easy, and after a close approach, to elicit any sign of life. At times the body is held in a crouching position, and the head drawn close down at the shoulders. Then woe betide the man or beast who comes too near, for with a lightning speed the long neck and dagger-like beak are shot upwards, and with terrible effect.

No observations seem to have been made, or at any rate recorded, as to the part played by the peculiar erectile frill which, as we have remarked, runs down each side of the neck and over the back of the head. It is present in both sexes and in young birds, and, strictly speaking, should be regarded as an ornament, a secondary sexual character, originally a seasonal adornment of the male, but now permanent, and assumed with the juvenile plumage. It is quite possible that it may be used, on occasion, as a terrifying agent, adding ferocity to the bird's appearance, when endeavouring to repel enemies other than man.

That this frill may be used during the "courting" period, as in the case of the great crested-grebe, wherein both sexes are in like manner similarly adorned, is quite possible. But we unfortunately
know nothing further of this important period in their life-history than that during this time, and then only, the males emit the strange booming sounds which have attracted the attention of poet and peasant alike.

But we need not despair. Even now this lamentable gap in our knowledge may be filled, and by observations, too, on birds breeding in Great Britain. And this because during last year, after the lapse of more than a generation, the bittern bred with us once again, and succeeded too in rearing young! This remarkable event has been vividly recounted by Miss E. L. Turner, who had the good fortune to assist in the exploration for, and discovery of, a nest of young on one of the Norfolk "broads" during the summer of 1911. She tells the story of this wonderful event tersely and vividly, but we can do no more here than simply summarise her account thereof. Nothing of the period of incubation came under observation, for when the nest was discovered the birds were already fledged, though the adults had been booming from January till June (1911). The young were not found till 7th July, and then only after a most laborious search. The nest had been placed amid a great reed-bed, and could only be approached by wading up to the knees in water. Only one young bird was actually found, but since the nest presented the appearance of having been trampled down, and since the surface was covered with disintegrated feather-sheaths—and we suspect also powder-down—to the depth of nearly an inch, it was assumed that more than one youngster had been reared there. But be that as it may, the nestling which was found was discovered in the pose characteristic of his race when fearful of detection—with the dagger-like beak "thrust straight upwards, the bright eyes half closed, the feathers of the head and neck smoothed downwards, their alternate light and dark bars blending with the reeds; while even the . . . bulky body, owing to its broken up colouring, seemed absolutely to 'melt' into its surroundings: the big green legs and feet being partially submerged . . . might easily have

been mistaken for reed-stalks." 1 No sooner, however, did he realise that his disguise was pierced, than he at once assumed the offensive and stood "at bay." The wings were now drooped, and the body lowered into a crouching position, while the feathers were set on end to give an appearance of ferocity which was by no means wanting, for every now and then he would suddenly strike upwards with his pointed beak with terrible suddenness: the whole force of the suddenly upspringing body being behind the stroke. The blow delivered, he crouched again for another spring. And in this heaving up and down, Miss Turner remarks, he recalled the behaviour of the young cuckoo under like circumstances.

The bittern's use of its bill for offensive purposes was noted by Yarrell. "It will," he writes, "strike at dog and man; and some care is necessary, when about to handle one, to avoid a blow from the point of its sharp beak. If a dog advances upon one that is not entirely disabled, the bird throws itself on its back, like a hawk, and fights with its claws as well as with its bill; and, owing to the length to which the drawn in neck can suddenly be extended, approach is often attended with danger to the incautious."

When the young bird found by Miss Turner was actually handled and afterwards released, he gave vent to curious "bubbling" sounds, such as may readily be produced by blowing through a straw into a glass of water, and these seem to be peculiar to the nestling period of life.

Miss Turner's observations seem to show that the work of providing for the young is shared by both parents. As she saw no food carried by the parents she infers that the young are fed on regurgitated food. If so, the fish is presumably carried in the gullet and passed to the young without pre-digestion, for a nestling taken in Holland by Mr. E. W. Wade, when handled, "threw up a fish a quarter of its own size, with the head only half digested." 2

1 British Birds (magazine), vol. v, p. 95.
2 Ibid., vol. i, p. 334. Mr. Kirkman, however, informs me that young gannets are frequently fed on fish of which the heads have been half-digested in the stomach of the parents, as is evident from the fact that the fish were seen to be disgorged by the young head first.
The bird found by Miss Turner, we may assume, was the youngest in the nest; and this because there is good evidence to show that incubation begins as soon as the first egg is laid, inasmuch as there is always a considerable disparity in size between the occupants of the nest, as is the case with young barn-owls (Strix flammea), for example.

There is much, as we have already remarked, to be done before we can claim to have anything like a complete life-history of this wonderful bird. And among other things there are certain statements by older writers which need confirmation, or, what is more likely, refutation. Such, for example, is the statement made by the Rev. Mr. Stonehouse, and quoted by Yarrell, that the bittern changes its haunts at night, and rising by spirals attains a vast height. Montagu, while rightly scouting the belief, prevalent in his day, that the bittern's boom was made by thrusting the beak into a reed or into water, went almost as wide of the truth when he insisted that this strange, weird cry was uttered while the bird was high in the air. Most other authors agree that the flight of this bird is heron-like, and that it is often accompanied by a hoarse croak not unlike that of the greatcrested-grebe. But the heron also cries when on the wing.

Under adequate protection a few pairs, at least, of this most valuable bird may be induced annually to breed among us, and in this case we shall almost certainly find a historian who will be able to give us a new history of this most interesting of our native birds: a few days with a note-book and a camera will accomplish more than a century of egg-collecting and shooting.

**LITTLE-BITTERN**

[R. B. Lodge and F. C. R. Jourdain]

Although this bird has been obtained on many occasions in the British Isles, and observed under circumstances which leave little doubt that it has occasionally bred with us, absolute proof of the
fact has always been wanting. Most of the occurrences on record in England come from the southern counties and East Anglia, but it has been known to stray even to the Orkneys and Shetlands, and it has visited Ireland on some thirty occasions. In Mr. H. Stevenson's article on this species in the *Birds of Norfolk*, which was published in 1870, it is stated that out of fourteen specimens procured in the Broad district, the exact dates of which are given, nine are known to have been killed in the summer months (May to July), four in winter, and one in autumn, so that it may reasonably be inferred that some of these were breeding at the time.2

The little-bittern is a summer visitor to Europe, crossing the Straits of Gibraltar early in May, and making its way across the Mediterranean by way of Malta and Sicily, and also to Greece, where it occasionally arrives in the latter part of March, or more commonly in early April. It appears to migrate by night, either singly or in small flocks, and Kleinschmidt and Hennicke state that the characteristic notes may often be heard from these parties when in flight overhead. Naumann states that in the migration season he has seen single birds rise high in the air at nightfall from a marsh and disappear in the distance. On first reaching the shores of Southern Europe after the passage of the Mediterranean, these birds may be met with in the most unlikely places, but soon pass on and gradually disperse to their breeding-grounds on the Continent. In flight the attitude of this species is not unlike that of a miniature purple-heron. The neck is retracted in the same S-like position which is adopted by the true herons, in this respect differing from the bittern, which may be seen flying with extended neck, as do also the storks.3 The wing strokes are, however, more rapid than those of the herons, and, as remarked by Naumann, if it were not for the fact that the wings are much broader and more rounded, the flight might be compared to

---

1 Vol. ii. pp. 154-159.
3 The figure in Yarrell, ed. 4, vol. iv. p. 200, is quite erroneous, and gives an entirely false impression of this species.
that of the pigeons. The localities favoured by this species for breeding purposes are marshes or lagoons with thick beds of reed and sedge, preferably when interspersed with pools of open water and an occasional willow-tree. As may easily be imagined, anything like close observation of its habits under these conditions is in most cases impossible, especially as it is nocturnal in its habits, and spends most of the day in sleep. One of the writers of this article visited a breeding-place of this species in an extensive reed-bed in Hungary. The water was about four feet deep, and in many places the surface was covered with an accumulation of vegetable débris, through which the thick stems of the reeds, which in such places grow to an enormous height, had forced their way. The exertion required in order to make a passage through this thickly growing obstruction, in tolerably deep water and under a powerful sun, was naturally excessive. The noise also necessarily made in such a progress, the breaking of the reeds and the splashing of water, together with frequent stumbles and consequent plunges in the effort to recover oneself, made it practically impossible to surprise any bird unaware on its nest. Hence it invariably happened that the bird slipped silently off the nest and crept away before the nest itself came within the field of vision, which was restricted to a few feet. [R. B. L.]

Occasionally, however, they may be met with under more favourable auspices. Thus in Holland, while punting close to a belt of reeds, a little-bittern got up and flew right across our bows. We landed at once and found it tolerable walking, only here and there taking us up to our knees. Presently a second bird got up ahead of us, and almost at once we came upon the nest—a mere hollow in a heap of dead sedge, with five fresh eggs. Two birds got up not far away, and we found a second nest partly sheltered by a sallow, but this time the nest was empty [R. C. R. J.]. Though not exactly sociable in its breeding-habits, it is not uncommon to find several pairs breeding together in quite a restricted district. Thus in some parts of Spain they are extremely common locally. Mr. H. Noble describes
how upwards of twenty nests, in course of building, or containing from one to six eggs, were seen on a single morning in beds of high reeds. It must not be supposed that all nests are placed in the water: on the contrary, it will also breed on boughs of recently pollarded willows, and in such cases the nests look not unlike those of wood-pigeons, except that there are generally a few rushes in them. The late Herr Hocke states that on some of the larger ponds of North Germany it might be said formerly to have bred in colonies, and mentions one pond of about fifty acres on which in the sixties some forty pairs were breeding.

Some of the nesting-sites which have been recorded are, however, still more remarkable. Thus Gloger records one in an old magpie's nest: others are said to have been found in hedges and thick bushes, while Chernel mentions one found built on to a blackheaded-gull's nest in a gullery. Extraordinarily large clutches have also been met with exceptionally: thus nests with 10 and 12 eggs are on record. They are laid on consecutive days, and Hocke's observations tend to show that the period of incubation is shorter even than the 16 or 17 days which Naumann assigned to it. The presence of these birds on any particular piece of water may generally be detected by the very peculiar and characteristic note of the male, which is uttered during the day when the weather is dull, as well as at nightfall, and bears some resemblance to that of the common-bittern. Naumann writes it as "pumm" or "pumb," Hocke as "prump," Lilford as a deep guttural cough, "ough," and H. M. Wallis as "waugh-h-h." After listening to it for some time in Friesland, it seemed to resemble the noise made by the impact of a heavy mallet on a pile more closely than anything else. One hears the thud and can almost see the mallet being raised for the next stroke, till three strokes have been given; then the workman pauses for a while, and again the sound travels over the water. Wallis compares the sound when heard at a distance to the

---

1 See Ibis, 1902, p. 81.
2 J. H. Gurney (Zoologist, 1895, p. 98) compares it to the sound made by a paviour ramming stones, or the distant barking of a dog.
coughing note of a gas-engine, and it has been described as a bark, but this seems to give quite a wrong impression of the note. Hocke states that he has heard it from 18th May to 13th July, or even 20th. Naumann states that when the hen is disturbed from the nest she makes a quacking noise, which he writes as “gäth, gäth” or “get, get,” and this has been copied into many books. Hocke, who found over a hundred nests at different times, states that he never heard anything but varied intonations of the same note, and neither of the writers of this paper has heard any sound from birds which they have flushed. After the young are hatched they remain in the nest for some days and are brooded by the old bird. Both parents share in the work of providing food, which is brought to the nest and ejected there for the young to feed themselves. The newly hatched young are quaint little objects, covered with fine ochreous coloured down, which is longest on the head. When only ten or twelve days old they have a very good idea of self-defence, and will strike with incredible speed at the eyes of an unwary opponent. One young bird which Hocke had taken from the nest struck at the nostril of a puppy which approached it, and when another larger dog came up, attracted by the howls of the victim, it too was struck with considerable force on the nose in the same way. After delivering its blow, the bittern instantly assumed an attitude of serene contemplation!

One of the most curious points about this interesting bird is the power which it possesses of assuming attitudes which in its natural surroundings are wonderfully protective. Lodge was once fortunate enough to witness an instance of this in Montenegro. Seeing a marsh-harrier sitting on a pile of dead reeds on the far side of a reed-grown lake, he approached in order to see if there was a nest. After the harrier had flown off, on reaching the spot he was surprised to see a curious object on the water, which appeared to be a bird of some sort. Gradually drawing nearer, it was recognised as a living little-bittern. It was lying flat on the water in a shapeless lump, as if dead; in fact it was so unbird-like in appearance that it was difficult to realise that
it was a bird at all. Wading slowly and cautiously up to it, he grasped it by the neck, without its making the slightest effort to elude capture. On taking it back to the boat, it sat contentedly on his knee, without making any attempt to struggle or escape. Towards evening it became more lively, and occasionally pecked his fingers. In all probability this attitude was assumed in order to escape the notice of the marsh-harrier, and retained owing to the approach of the boat and its occupants.¹

Another protective attitude which is even more frequently assumed is that in which the beak is pointed perpendicularly upward and the body stretched out to its fullest extent. Mr. H. M. Wallis, while working some reed-beds in one of the Italian lakes, caught sight of one of these birds sitting side-on, and walked towards it, when it instantly disappeared. It had turned its buff breast to the observer and assumed the attitude of perpendicular rigidity, with the result that it seemed to melt into the background. When Mr. Wallis walked round it in a circle it revolved slowly in the same direction, always keeping its breast towards him, and, like the bird referred to above, allowed itself to be caught by the neck without attempting to escape, scratching and pecking a little after a while, but soon resigning itself to the inevitable.

Advantageous though this attitude is under ordinary circumstances, it is sometimes assumed from habit, when nothing is to be gained thereby. Mr. H. F. Witherby describes how a wounded bird perched on a reed, gripping it firmly with one foot above another, and when approached pointed its bill upwards and stretched out its body, till it looked extremely attenuated. In this case, however, it was quite in the open, and not in the broken light of a reed-bed, so that it could not well have been more conspicuous. Here it remained rigid and motionless, although Mr. Witherby went within a few yards of it.

¹ For further studies on the protective attitudes of this species see A. F. Griffith, Zoologist, 1894, p. 454, pl. 3. Probably the bird figured on the left in the plate would have assumed the attitude witnessed by Mr. Lodge if it had not been in such a confined space.
As is natural in the case of a bird which spends a great part of its life in reed-beds, the little-bittern has extraordinary powers of grasping in its long green toes and claws, and when alarmed can make its way up the big reed-stems with remarkable speed. The loosely jointed legs also enable it to make good its foothold in almost any position, and with the tarsi at different angles, so that it shows a curious indifference to the position of its feet, sometimes grasping a reed with the feet crossed, or standing with the toes of one foot pointing in quite a different quarter to the toes of the other. It can also revolve without the necessity of altering its foothold when adopting the upright protective attitude. So strong is the prehensile power of the toes, that one bird, when taken in the hand, curled its hind-toes up so that the point of each not only touched the base, but actually curled half way up upon itself.\footnote{Zoologist, 1894, p. 455.}

The usual time of its departure for winter quarters in Africa is during the last weeks of September in middle Europe, and it is only occasionally that a few stragglers delay their start till the first half of October.
CORMORANTS


PRELIMINARY CLASSIFIED NOTES


CORMORANT [Phalacrocorax carbo (Linnaeus). Great or black-cormorant; coalgoose, mochrum elder (Kent); Isle of Wight parson (Hants); palmer, scarf or scart (Scotland); loering (old), brongie (young) (Shetlands). French, grand cormoran; German, Kormoran (usually) or Kormoran-Scharbe; Italian, cormorano].

1. Description.—The cormorant agrees with the shag and the gannet in having all the toes enclosed in a common web, but it may at all times be distinguished from the shag, with which alone it can be confused, by its larger size, its blue-black metallic gloss, and the presence of fourteen tail feathers. The sexes are alike, and there is a slight seasonal change of coloration. (Pl. 170.) Length about 36 in. [914 mm.]. The general coloration is of a metallic steel-blue, almost black, save on the wing-coverts and scapulars, which are of a bronze-brown hue “laced” with black. The nuptial dress is distinguished by the development of a nuchal crest, and numerous long, white filoplumes on the sides of the head and neck, imparting a hoary appearance. A still more striking development of filoplumes takes place over the thigh, where they form a large, oval, white patch. Beak and legs black, gular pouch yellow, iris green. The juvenile dress differs from that of the adult in that the general coloration is of an ash-brown hue with a metallic green gloss on the back. The wings are coloured as in the adult, save that the major coverts have brown tips. The under parts are of an ash-brown; frequently, however, the centre of the breast and abdomen are more or less conspicuously white. The iris is brown. The young in down are of a dark sooty-brown colour. [W. P. P.]

2. Distribution.—In the British Isles the cormorant is chiefly confined to
PLATE LXXII

Shag's nest and eggs

Photo by Riley Fortune

Shag's nest and young

Photo by Riley Fortune

Cormorants at their nests—Lesser black-backed gulls in the foreground (Farne)
the precipitous coasts of Great Britain, although there is one colony on an isolated crag in the Disinwy valley, Merionethshire, four or five miles inland. It outnumbers the shag along the east coast from Flamborough northward, and in Wales (with the exception of Pembrokeshire), but on the rest of our coast-line and in the Hebrides, Orkneys, and Shetlands it is less abundant than the shag. In Ireland it is general along the coast except in the north and west, and breeds in several inland localities. Outside the British Isles it is found in the Færøes, Iceland, and Southern Greenland, while on the Continent it breeds locally along the coasts and in some districts also inland. Northward it ranges to the Stavanger Fjord and the shores of the White Sea, but is rare in the Baltic, and only found on its southern coasts and in South Sweden: large colonies formerly existed in Holland, though now decreased in numbers, and locally it is found in North-west France, Germany, Hungary, the Danube valley (where enormous colonies exist near the mouth), Italy and the adjacent islands, the Balkan Peninsula, the Black Sea, Asia Minor, and Northern Africa. In Asia it ranges across the continent to Kamtschatka and Japan, but the races which inhabit India, Burma, etc., and Australia are probably subspecifically distinct, as also are S. African birds. In North America, however, it is found on the eastern side from Hudson’s Bay to Carolina and Georgia, but is absent from the Pacific side. [F. C. R. J.]

3. Migration.—Resident, breeding on many parts of the British coasts, and, especially in Ireland, in some cases in inland localities (see preceding paragraph). Non-breeding birds may be seen in summer on many waters, marine and inland, in the neighbourhood of which the species does not nest. In winter the cormorant is widely distributed in British seas, and is of fairly frequent occurrence on inland waters. There is evidence of a partial southward movement in early winter. The majority “retire southward” from Yorkshire in winter, although the number remaining at that season is apparently on the increase: on the north of Kent, where the species is not found in summer, the number of winter visitant birds appears to be greater than formerly (cf. Nelson, B. of Yorks., 1907, pp. 375, 378; and Ticehurst, B. of Kent, 1909, p. 300). On the North Wales coast the cormorant is resident, and on the Dumfriesshire coast “a very common non-breeding resident” (cf. Forrest, Fauna of N. Wales, 1907, p. 249; and Gladstone, B. of Dumfries., 1910, p. 221). Birds marked in the nest on the Saltee Islands (off Co. Wexford) and the Scilly Isles respectively have been recorded from the coast of Finisterre, Western France, in November and December of their second winter (cf. Witherby, British Birds, vol. v. pp. 186, 314). A gregarious species at all seasons. [A. L. T.]
4. Nest and Eggs.—Although formerly the cormorant is known to have
nested on trees in Norfolk, at the present time the only breeding-places in Great
Britain are on ledges of cliffs or on rocky islets. It is naturally a gregarious
breeder. In Ireland there are several colonies in which the nests are built in
trees. On the Continent it is found in Holland nesting among the reeds on the
meers of Friesland, and in the Dobrogea there is a colony of some seventeen
hundred nests high up in partly submerged willows. The materials used, and the
manner of building, vary according to situation. In trees the nests are mainly built
of sticks or heather stems, lined with grasses, green rushes, straw, etc., while on islets
at sea the chief material used is seaweed. Both sexes share in nest construction,
according to Naumann. (Pl. lxxii.) The eggs, in number usually four, occasionally
five or only three, and rarely six, are generally elongated in shape; they have
a blue undershell, but the greater part of it is covered by a thick chalky deposit,
which has a tendency to leave patches of the blue undershell exposed. When
much incubated the soft chalky surface is frequently much stained by the nest
material. (Pl. V.) Average size of 84 eggs, 2·52 × 1·55 in. [64 × 39·4 mm.].
Incubation is shared by both sexes, and lasts four weeks almost exactly, as
observed in a wild state by Hantzsch, Lee (26 to 28 days), and Schmidt, and also in
confinement. The breeding season in the British Isles begins in the latter part
of April, and fresh eggs may be obtained in May; but in the Shetlands, Saxby says,
it does not begin to breed till the middle of May. There seems little doubt that
occasionally, at any rate, second broods are reared, and that the fresh eggs which
may be found in June are due to this. In Southern Europe the breeding season is
sometimes earlier, and near the coast eggs may be taken in March, while in the
Dobrogea I met with fresh clutches at the beginning of April. [F. C. R. J.]

5. Food.—Fish, up to the biggest kind which they can swallow. The food
of the young consist also of fish, as far as at present known (see also Shag). They are caught by diving only. The young are fed by both parents, in the
manner described, p. 361. [E. H.]

SHAG [Phalacrocorax gráculus (Linnaeus). Green-cormorant, crested-cormorant;
shoalster (Devon); scarf or scar (Scotland). French, cormoran huppé;
German, Kráhen-Scharbe; Italian, marangone col ciuffo].

1. Description.—The shag may readily be distinguished from the cormorant,
which it closely resembles, by its conspicuously smaller size and twelve tail feathers.
The sexes are alike, and there is a slight seasonal change of plumage. (Pl. 171.) Length 26 in. [660 mm.]. The almost black plumage is glossed with a metallic oil-green. In the spring a recurved frontal crest is developed, but this is lost as soon as incubation begins. There is no white thigh-patch, nor do filoplumes appear in the neck as in the cormorant. The gular pouch is black, spotted with yellow, and the inside of the mouth and gape are orange-yellow; the iris emerald-green; and the tarsus and toes are black. The juvenile plumage resembles that of the cormorant at the same stage, but the wing-coverts are greyish brown with oil-green reflections, and the breast is never white. The young in down are of a dark sooty brown. [W. P. P.]

2. Distribution.—The shag breeds locally on the rocky coasts of Great Britain, but is absent from the south coast of England east of the Isle of Wight, and also from the east of England, with the exception of a few pairs in Berwick and Northumberland. On the east coast of Scotland it is not common, but on the west side, as well as in the south-west of England, it outnumbers the cormorant. This is also the case in Ireland in the north-west. Outside the British Isles and their outlying groups, it is also found in the Faeroes and Iceland; while on the Continent it breeds on the coast of Norway to within the Arctic Circle, and along the Murman coast of Russian Lapland. It is absent from the Baltic and the flat eastern shores of the North Sea, but reappears in the Channel Isles and the Atlantic coasts of France, Spain, Portugal, and Morocco; but from the Straits of Gibraltar eastward is replaced by the Mediterranean race. It is a resident species throughout its range. [F. C. R. J.]

3. Migration.—Resident on many parts of the British coasts (see preceding paragraph), and rather more generally distributed in winter, although rarely occurring inland at any season. No longer breeding in Yorkshire, it is still known as a bird of passage, while to Kent it is an irregular winter wanderer: a very scarce visitor to Dumfriesshire, but resident in North Wales (cf. Nelson, B. of Yorks., 1907, p. 379; Ticchurst, B. of Kent, 1909, p. 301; Gladstone, B. of Dumfries., 1910, p. 223; and Forrest, Fauna of N. Wales, 1907, p. 251). A few breed on the east of Ireland, but their numbers are increased in winter: on the west it is almost abundant, and in winter flocks of great size—sometimes of thousands—are formed (cf. Ussher and Warren, B. of Ireland, 1900, p. 154). [A. L. T.]

4. Nest and Eggs.—Although it will at times breed on a cliff ledge like the cormorant or among boulders close to the shore, the shag shows a decided preference for sea-caves where available, and has never been known to breed at any distance from the sea or in trees. The materials of the nest are chiefly heather
stalks, seaweed, and a lining of grass. (Pl. LXXII.) The decaying seaweed is often very offensive, and many of the breeding colonies are infested with lice. Naumann states that nesting material is provided by both sexes, but Tomison asserts that one bird builds while the other provides material, and Blagg notices that nests with incubated eggs, and even young, had received recent additions of fresh green weeds. The eggs are similar in appearance to those of the cormorant, and have the same imperfect surface deposit of white chalky matter almost concealing the blue under-shell, but are smaller in size. They vary, as a rule, from 3 to 5 in number, but clutches of 6 are occasionally met with, and 8 eggs were found in one nest in Norway (Collett). (Pl. V.) Average size of 38 eggs, 2·51 × 1·51 in. [63·8 × 38·3 mm.]. Naumann states that both sexes share in incubation, and that the period lasts from 24 to 27 days. The breeding season begins as a rule in April, but eggs have been found in the Orkneys exceptionally as early as 24th February, and also in March in the Shetlands. There is no doubt that a second brood is reared, as many birds are to be found with fresh eggs at the end of June, and young have been seen in the nests in the Orkneys as late as mid-September. [F. C. R. J.]  

5. Food.—Same as the cormorant. Graba (quoted in Naumann, Vögel Mitteleuropas) mentions as part of the shag’s diet three species of fish which live on the sea bottom, viz. Cottus scorpio, Clupea sprattus, and young of Pleuronectes hippoclossus. In the stomach of a nestling dissected by Mr. W. P. Pycraft were found small Crustacea, a periwinkle, remains of small fish, as well as otoliths and vertebrae. [E. H.]
Plate 170
Cormorants in breeding plumage
By A. W. Seaby
CORMORANTS

... an eagle, observed a flock of geese. (F. 139.) The detaining snow and is often very

ice, and many of the breeding colonies are infected with bet. Neumann states

that the nesting material is provided by both sexes, but Tegetmeyer asserts that one bird

builds, while the other provides material, and Blagge notices that males with un

incubated eggs, and even young, had received recent additions of fresh grass walks.

The eggs are similar in appearance to those of the common gull, and have the same

imperfect outside aspect, except of white chalky matter almost covering the blue under

shell, but are smaller in size. They vary, as a rule, from 3 to 8 in number, but

patches of 8 are occasionally met with, and 9 eggs were found in one nest in Norway

(Thalass.). [R. y.] Average size of 66 eggs, 2.51 x 1.51 in. [82 x 1.51 red. et al.]

Nestmounds made that both sexes share in nest-stones, and that the period lasts

from 23 to 37 days. The breeding season begins in April, but eggs have been

found in the Orkneys exceptionally as early as 24th January, and also in

Russia in the Netherlands. There is no doubt that a second incubation occurs, so

many nests are to be found with fresh eggs at the end of June, and jays have been seen

in the nests in the Orkneys as late as mid-September. [R. y. y.]

... g. Tooth.—Same as the common. A Recent specimen in Nau von, Vogel

Müller gives the same as part of their; the three species of fish so many

have on the sea bottom, and. Cottus vulgaris, Gobius auritus, and young of Pteronopis

Hippoglossus. In the stomach of a nestling dissected by Mr. W. F. Eyre, we

found small Crustacea, a possible, remains of small fish, as well as echinoids and

vagaries. [R. y. y.]
The common or black-cormorant is a resident species in the British Isles, and may be called abundantly distributed on their coasts and some of the larger inland waters. There being comparatively few rivers, hardly any of which can be called large, and the shores of many of the inland lakes being too thickly inhabited, we find the cormorant with us chiefly around the coasts, for it is a shy and wary bird, which is, as a rule, not fond of the neighbourhood of men. On the continent of Europe and elsewhere, however, these birds are chiefly frequenters of inland waters, such as lakes and large rivers.

The food consists exclusively of fish, small as well as the largest which can be swallowed. All sorts of fish are eaten, and no choice is made, except that a fondness for eels is apparent, and mentioned by most writers.\footnote{Radde saw a cormorant in captivity (in the Zoological Gardens at Vienna) catching and swallowing swallows flying across the ground; and in the Faeroes the natives accuse cormorants of attacking and eating live lambs. The former is doubtless a perversity due to captivity, and the latter requires confirmation. C. S. John (Natural History and Sport in Moray, p. 171) states that the species has been known to swallow and bring to land a moorhen.}

The cormorant dives for its prey. When swimming it makes a short jump, with closed wings, as if surmounting some obstacle, the tail being used like a lever in springing up, and goes down under water, often almost perpendicularly (\textit{Scotsman}, 3rd Feb. 1912). It then swims along under water rapidly, using its feet alone, and never the wings, though it lifts them a little when turning round, or when nearing the end of a tank in captivity, so as to break the impetus of its movement. Fish are taken from crevices or swimming. Writers who said that cormorants usually used their wings in swimming under water must undoubtedly have been mistaken, unless they had
before them partly disabled birds; though in cases of emergency, or when exceptional efforts are required, the wings may occasionally be used. When not under water the cormorant swims like other water-birds, but frequently submerges its body, so that little more than the head is seen from a distance. The fish, when caught, is regularly brought up to the surface and swallowed entire, but very small ones are also, according to some writers, swallowed under water. The voracity of the species is enormous, and one observer states in the *Field* that one hundred and eighty small fish were eaten within an hour and a half.\(^1\) Even in the roughest sea cormorants can fish successfully.

When resting, cormorants frequently shake their wings or stand for long periods with them spread out as do falcons, eagles, and vultures. The bill is frequently opened, and this is perhaps due to the nostrils being almost entirely closed, so that breathing becomes only possible through the mouth. The flight of cormorants is fairly fast, and they fly with outstretched necks and feet. F. Davies saw a cormorant ascending in a regular spiral "until it became a mere speck and finally disappeared from view" (*Field*, 1901). This habit is probably unusual, though often observed in certain hawks, especially when nesting or pairing. The same wheeling round and upwards, until nearly out of sight, is also described in the *Zoologist*, 1875, p. 4327.

Cormorants in winter often collect together in great numbers, and doubtless those nesting on inland waters in northern latitudes must resort to the sea-shores, when the lakes or rivers are frozen over in cold weather, but they do not emigrate. According to Radde and other observers, when massed together\(^2\) they fish systematically in co-operation, proceeding in a long line, and thus searching the shallow waters for a couple of miles or more (Radde, *Ornis Caucasia*, p. 468).

\(^1\) Radde found that a cormorant in captivity ate in the morning twenty-six and in the afternoon seventeen fish, of an average length of 20 cm., and he reckons that an adult bird requires four pounds of fish within twenty-four hours.

\(^2\) Radde saw from six to eight thousand massed together on the Caspian Sea, and many thousands can be seen in company in Egypt in winter.
Though the observations are doubtlessly correct, it is doubtful whether an actual co-operative hunt takes place; perhaps an unusual number of birds, in such cases, had been attracted by shoals of fish in shallow places, where the cormorants could dive to the ground. On the other hand, it has been asserted by several good observers that pelicans act in a similar way.

Nidification commences early in April, and the nests are placed close together on trees, rocks, bushes, or reeds, according to the opportunities offered by the locality. (See "Classified Notes.") They consist of sticks, reeds, grass, seaweed, and other material, and are generally saturated with the birds' excrement; they vary in size, old nests being used year after year, and becoming very bulky in time. As a rule cormorants nest in colonies, sometimes small, sometimes of hundreds and even thousands of pairs; but I have found in East Prussia, on a tree on a little island in the Mauersee, a single nest, several miles from a colony. The stench in a cormorant's rookery is very strong, and much worse than in any heronry; in fact, on some of the oceanic islands, where other species of cormorants breed in enormous numbers, it is so overpowering that it makes even sailors, accustomed to smells and hardships, sick in an instant. The cormorant itself has a strong odour at all times of the year, different from that of all other strong-smelling birds, such as Petrels for example. A drawer of cormorant-skins in a museum, when opened, lets the odour all over a large room.

Both parents brood, and incubation lasts four weeks. When the young are hatched—naked, slate-coloured, blind, helpless, and very ugly little creatures—the extraordinary feeding commences, for cormorants are fed in a very peculiar and, what may appear to us, repulsive way. The parent birds—both parents seem to feed—opens its beak wide, and the baby puts its head and neck deep into the throat of its parent, extracting partly digested fish from the crop. This proceeding looks grotesque, and it appears as if the old bird were swallowing its children. The young keep up an unpleasant
screech all the time, while the old birds are very silent as a rule, but when nesting, and especially when their nests are threatened, utter a hoarse croaking note. After a few days the slaty black nestlings get their sight and become covered with dull black, velvety soft down, upon which follows the first plumage in due course. Only when too large for the mode of feeding described above do the young feed on fish disgorged by their parents in front of them.

Cormorants can easily be trained to catch fish. This is commonly seen in Foochow and other places in China, and in this country the late Captain F. H. Salvin possessed trained cormorants, which have been seen by many persons. In the London Hippodrome fishing cormorants have been exhibited for some time. In China a ring is placed round the bird’s neck, hindering it from swallowing its prey, which the master takes from the somewhat unwilling bird. A good many fish are thus caught during an afternoon, and this is considered to be great sport.

**SHAG**

**[E. Hartert]**

The shag differs from the common-cormorant in being entirely a marine bird, fishing exclusively in the sea, and nesting only on ledges on rocks, or in clefts and caves on the shore. Even in flying it never crosses the land, but follows the coast-line, so as never to be out of sight of the sea.

Otherwise the habits of the shag are almost the same as those of the common-cormorant. The general cry is described as a hoarse “gau, gau,” the call “crew-a-oop” (Zoologist, 1866, p. 252). “The flight is generally low; I have never seen it take such elevated flights as the cormorant; it is powerful and very rapid, making quick headway against the strongest gales; it is performed by rapid beats and occa-
Plate 171
Shags or green-cormorants
By A. W. Seaby
CORMORANTS

Although all the young
birds are very silent as a rule,
but upon meeting, and especially when their nests are threatened,
will give a hoarse croaking note. After a few days they start
nestlings get their sight and become covered with dull black
feathers and down, upon which follow the first plumage in due course.
Only when too large for the mode of feeding described above do the young
feed on fish destroyed by their parents in front of them.

Cormorants can easily be trained to catch fish. This is commonly
seen in Foochow and other places in China, and in this country
the late Captain P. B. Salisbury possessed trained cormorants, which
have been seen by many persons. In the London Museum fishing
cormorants have been exhibited for some years. In China a ring is
placed round the bird's neck, rendering it from swimming or prey
which the master takes from the water before morning, and so good
many fish are thus caught. The master does not think it to be great sport.

SHAG

[ALBATROSS]

The shag differs from the common cormorant in being entirely a
marine bird, fishing exclusively by the sea, and nesting only in ledges
on rocks, or in crevices and caves on the shore. Even when feeding it never
crosses the land, but follows the coast line as near as may be to be out of
sight of the sea.

Otherwise the habits of the shag are almost the same as those of
the common cormorant. The general cry is described as a hoarse
"quack, quack," the call "grow-aup" (Zoology, 1826, p. 252). "The flight
is generally low; I have never seen it take such elevated flights as the
cormorant. It is powerful and very rapid, making quick, broad
strokes the strongest gales; it is performed by rapid beats and
scau."
sional sailings of the wing." . . . "The impetus of its flight is very great." . . . "It never fishes, as some have said, from the air, by suddenly darting into the water" (Blake Knox, Zoologist, 1866).

Its voracity is as great as that of the cormorant, but it is apparently not true that it gets gorged to such an extent that it can be caught by hand. "A fish from two or three inches in width can be swallowed by them, and an eel of two feet long is worked down by degrees entire; six full-sixed herrings are managed at a time, the throat being capable of great distension."

The following is the sex display of the shag as described by Mr. E. Selous:¹—

"The way in which the male (green) cormorant makes love to the female is as follows: Either at once from where he stands, or after first waddling a step or two, he makes an impressive hop or jump towards her, and stretching his long neck straight up, or even a little backwards, he at the same time throws back his head so that it is in one line with it, and opens his beak rather widely. In a second or so he closes it, and then he opens and shuts it again several times in succession, rather more quickly. Then he sinks forward with his breast on the rock, so that he lies all along it, and fanning out his small stiff tail, bends it over his back whilst at the same time stretching his head and neck backwards towards it, till with his beak he sometimes seizes and apparently plays with the feathers. In this attitude he may remain for some seconds more or less, having all the while a languishing or ecstatic expression, after which he brings his head forward again, and then repeats the performance some three or four or perhaps half a dozen times. This would seem to be the full courting display, the complete figure so to speak, but it is not always fully gone through. It may be acted part at a time. The first part, commencing with the hop—the simple aveu as it may be called—is not always followed by the ecstasy in the recumbent posture, and the last is still more often indulged in without this preliminary, whilst the bird is sitting thus upon

¹ Bird Watching, p. 166.
the rock. Again, a bird whilst standing, but not quite erect, will dart his head forward and upward, and make with his bill as though snapping at insects in the air. Then, after a second or two, he will throw his head back till it touches or almost touches the centre of his back, and whilst at the same time opening and shutting his beak, communicate a quick vibratory movement to the throat. It looks as though he were executing a trill or doing the *tremolo* so loved of Italian singers, of which, however, there is no vocal evidence."

The female will sometimes cosset with her bill the throat or neck-feathers of her recumbent adorer, a favour which he acknowledges by "sundry little pleased movings of his head."

Green-cormorants begin in December to don their breeding-plumage, when the crest on the head first makes its appearance (J. Tomison, *Annals Scot. Nat. Hist.*, 1904, pp. 18, 19). If the weather is mild they begin nest-building as early as February, and complete their nests in six to eight days. Often the nests are built so near the water that the first heavy sea washes them away. One bird only builds, while the other acts as carrier.

The female begins laying in April, sometimes even earlier. Mr. Tomison saw fifty-four nests on a space of rock not more than thirty yards square, some of them within a foot of one another.

The clutch consists of 2 to 5 eggs, 3 being the most common number. "When the young are small, one of the parents acts as food provider, but when they are a fortnight old it takes the united efforts of both parents to convey sufficient food to their hungry offspring. . . . The old bird comes in from the sea and alights at the side of the nest. Immediately there is a rush made by the young to see who will get to work first. The fortunate one shoves its head entirely out of sight down the old one's throat, and by its movements seems to be enjoying itself. I don't suppose they know what it means to get enough; but apparently the parent decides that question, for I have often seen it shake off the one at work and give No. 2 a chance, and then No. 3. . . . I have seen five eggs and five young birds hatched, but I
never saw more than three come to maturity” (*loc. cit.*). During rough weather many nests are washed away. On 2nd June 1902 a storm washed away fully two hundred nests on Sule Skerry, Orkney Islands. “The old birds stuck by their nests as long as a vestige remained, trying all in their power to protect young and eggs by spreading out their wings as a covering, but all in vain” (*Annals Scot. Nat. Hist.*, 1904, p. 20).
THE GANNET


PRELIMINARY CLASSIFIED NOTES


GANNET [Sula bassana (Linnaeus). Solan goose, Johnny Gant; Channel goose (Devon). French, fou de Bassan; German, Bass-tölpel; Italian, no popular name].

1. Description.—The gannet is always to be distinguished from the Cormorants by its pointed beak, that of the latter having a conspicuous hook at the tip. The sexes are alike, and there is a slight seasonal change of plumage. (Pl. 172.) Length 33 in. [838 mm.]. The whole plumage is white save the wing quills, which are dark brown, not black as stated by Howard Saunders and others, and a buff tinge on the head and neck which is assumed in the spring. The iris is creamy white or grey. The eye-rim, of smooth leather-like skin, is slate-blue. The beak pale lead-blue, with deeper slate-coloured lines. The feet and toes dark slate-coloured, relieved by narrow lines of bluish green proceeding along the ridge of each toe and up the tarsus, towards the top of which they meet. Webs slate-coloured, so also the inside of the mouth. The juvenile dress is of a blackish slate spotted with white, but the spots speedily disappear. The young in down is white. The first feather plumage is blackish brown thickly spotted white. The bird is immature till the third or fourth year, during which period the blackish brown gives way gradually to the white of the adult.¹

2. Distribution.—This species breeds in large colonies on precipitous islands off the coasts of Scotland, Wales, and Ireland. The only English breeding-place (Lundy Island) is now deserted, and there is only a single Welsh colony on Grasholm, Pembrokeshire. In Scotland the Base Rock in the Firth of Forth, Ailsa Craig in the

¹ Some of the details in this description are from observations of the living bird by F. B. Kirkman.
² In captivity the adult plumage was acquired in 2½ years (J. H. Gurney).
Firth of Clyde, Boreray in the St. Kilda group, Stack (or East Sulisgeir), forty miles west of Stromness, and Sulisgeir (or North Barray), thirty-five miles north of the Butt of Lewis, are the only known breeding-places; while in Ireland there are colonies on the Bull Rock (Co. Cork) and the Little Skellig, the latter being occupied by some fifteen or twenty thousand birds. Outside the British Isles there is a breeding-station on Myganaes in the Færoes, and several off the coast of Iceland (the Westmanneyjar, Grimsey, and off Reykanes), but none on the Continent, though there are stations in North America on the Magdalen Isles, the Gulf of St. Lawrence, etc. During the winter months it is found in the Atlantic south to Morocco, the Azores, Madeira, and Canaries, and possibly also Senegambia on the east side, while on the west it ranges south to the Gulf of Mexico, but rarely visits the Baltic and Mediterranean.

[F. C. R. J.]

3. Migration.—Found all the year round in British waters, though less widely distributed in summer (see preceding paragraph): some birds, however, leave our area in winter and wander as far south as the Canaries, but, on the other hand, birds from the Icelandic and Færoe stations doubtless visit British seas at that season. The winter movements of this species are probably not migrations in the ordinary sense, and are apparently directly connected with the food-supply, viz. the herring. The gannet is a regular winter visitor to the English Channel, arriving from the North Sea in October and November, and it is an occasional visitor to North Wales during the herring season (cf. Ticehurst, B. of Kent, 1909, p. 302; and Forrest, Fauna of N. Wales, 1907, p. 253). In Ireland the gannet has two breeding-stations in the extreme south-west, and on the north coast birds from the Scottish stations may be seen fishing in summer: birds seen off other parts of the coasts at that season are probably non-breeding individuals. In winter it is less commonly observed on the Irish coasts, but regular seasonal movements are to be noticed both in spring and in autumn. Of these the spring movements are the most marked: they sometimes begin as early as January, are in full swing in February, March, and April, and often last to some extent into May and June. "During these months the gannets pass northward, often continuously for a month or two together, both up the coasts of Leinster and of West Connaught," probably to the west of Scotland stations, or farther on. "From Carnsore Point, however, to the Fastnet we find the general direction of the gannet's flight during spring is south-westwards towards their Irish breeding-haunts, though it is evident that many do not stop there, but continue to move on northwards past Slyne Head and the Black Rock, as before stated. The return movement is observed in autumn, though not so regularly" (cf.
Ussher and Warren, _B. of Ireland_, 1900, pp. 155-6). Not very gregarious out of the breeding season, being most often seen singly or in twos or threes. "During the winter months dead gannets are often washed up on all parts of the coast [of North Wales], and these are usually adults. On the other hand, the birds carried inland by gales from time to time are generally immature" (Forrest, _loc. cit._) [A. L. T.]

4. **Nest and Eggs.**—The nests are built in close proximity to one another on ledges of precipices bordering on the sea, and the colonies are generally large and sometimes of enormous extent. In some places the usual material is seaweed, but in others grasses, rushes, etc., while all kinds of articles, such as paper, rags, straw from wine bottles, bits of cork, old clothes, and even the remains of a parasol have been found in the nests. (Pl. LXXIII.) Both sexes take part in the work of providing material (E. T. Booth). The egg is white and somewhat similar in appearance to that of the cormorant, but larger and showing less of the blue undershell: the chalky deposit on the surface readily absorbs stains from the nest materials, so that many eggs are covered with dark brown nest-stains. (Pl. V.) Average size of 55 eggs, 3.06×1.96 in. [77.8×49.9 mm.]. Only a single egg is laid, which is incubated by the male and female in turn (see p. 376), and the incubation period is extraordinarily long. Faber erroneously gives it as 30 days; but Hantzsch more correctly states that it lasts six or seven weeks, and says that eggs can be easily blown after 2 to 3 weeks' incubation. W. Evans found that one egg hatched under a hen on the 39th day, while a second had a live chick in it on the 42nd day. E. T. Booth gives the period as noted in confinement as 43 days, and the Rev. Neil Mackenzie as 42 (Annals Scot. Nat. Hist., 1905, p. 144). The first eggs may be laid as early as the end of March, but many birds do not lay till the first half of May. Only a single chick is reared in the season, but a second egg, a third (Mackenzie), or more (J. M. Campbell) are laid if the first is taken. [F. C. R. J.]

5. **Food.**—Fish, such as herring, pilchard, and sprat, that swim near the surface; also cuttle-fish, according to Naumann. The young are fed by both parents, at first on semi-digested fish, later on fish disgorged whole (see pp. 378-9). [F. N. K.]
Gannets, nests and young, the latter in three phases—(1) White down, (2) Down with feathers sprouting, (3) Feathered blackish with white spots.

Young gannet, first phase, with down beginning to sprout. Mouth opened to show what remains of the tongue, the small flat top part of the projection in the lower mandible.
The genus *Sula* is nearly cosmopolitan in its range, but is chiefly found in tropical or sub-tropical regions. Our gannet is its sole representative on the northern waters and coasts of the Atlantic.¹

The gannet's habitat is the open sea and the rock ledges where it breeds; it is seldom found inland, and only when storm-driven.

More or less gregarious at all times, it is especially so in the breeding season, when colonies of several thousands are formed, the birds being then found nesting close to one another on the ledges of the precipitous sides of high sea-washed islands. The most famous in British waters is the Bass Rock (Firth of Forth), which gives to the species its scientific name (*bassana*), and its popular name both in German (*Bass-tölpel*) and in French (*fou de Bassari*). Well known also are Ailsa Craig and St. Kilda on the west of Scotland. The Lundy Island colony, the only one in England, used to be famous, but it has now ceased to exist, owing to the stupid and brutal persecution to which the birds were subjected.

Gannets arrive for the most part at their breeding-places in the first quarter of the year, some earlier, others later. Records kept at St. Kilda and the Bass Rock show that the first arrivals may appear as early as the second week in January if the weather is favourable, but it is not till February or March that the birds are present in large numbers.² Recorded movements of gannets northward along the Irish coasts show further that the period of arrival may extend into May and June, but it is not clear for what breeding-station these late

---

¹ See "Classified Notes" for full details.
² Records kept by J. M. Campbell, head-keeper at the Bass Rock Light Station, are—First arrivals in 1908 in third week of January; in 1909 in second week (*in litt.*). At St. Kilda a few have been recorded as early as 13th January (Neil Mackenzie in the *Annals Scot. Nat. Hist.*, 1908, p. 144). See also "Classified Notes."
birds are bound. The period of departure is nearly as protracted; it extends from September into December, from which it appears that the breeding-places are left unoccupied only during a relatively small portion of the year, a few weeks at most.

Gannets have been seen arriving on the Bass Rock in pairs, and this is stated to be the general rule, the exceptions being provided by birds which have lost their mates or are selecting them for the first time. The fact is interesting, because it is unusual: in the case of most species of birds the males arrive first. It points also to the conclusion that the birds pair for life.

The proceedings of the birds which arrive at the breeding-quarters unmated have yet to be closely studied. There is so far no evidence that their sex displays differ in any respect from those of the birds which arrive paired. The displays of paired birds may be observed repeatedly any day throughout the breeding season, and are of considerable interest, because they are performed by both sexes. As they have not hitherto been recorded, I propose to give a full description, basing the same upon a very large number of notes written down at the time of observation, during a stay of several days, in June and August, upon the Bass Rock (1909). The notes were supplemented by a number of photographs.

In its most complete form the gannet display is much as follows: the two birds stand usually face to face, with wings spread and waving, and with the tail bent down; thus standing, they wag their heads violently from side to side; if they are close enough, their beaks collide with a noise of castanets; if still closer, the beaks no longer clack, but are, so to speak, whetted one by the other, with something of the movements of a knife playing on the steel. The performance is accompanied by a vociferous strident “wrrah! wrrah!” which rings along

---

1 See “Classified Notes,” under Migration.
2 From Sula Skerry the period of departure has been given as September to December (J. Tomison in the Annals Scot. Nat. Hist., 1904, p. 97). For the Bass Rock as late as December (J. M. Campbell, in litt.).
3 J. M. Campbell, in litt.
the ledges. If, as may often occur, several birds are displaying at the same time, the result is a scene of uproarious excitement. The ceremony above described may be varied by elaborate bows, the neck being arched and the head passed quickly down one flank almost as far as the back of the foot, the wings being spread and waved, and the tail being both raised and bent, not as an effect of the forward and downward movement of the body, but quite independently. A quick, seemingly self-satisfied waggle of the tail sometimes concludes this part of the performance, after which the birds may either resume the bill-wagging, clacking, or whetting, or if their ardour has abated, be content to cosset one another's plumage with the tip of the bill.

I have timed a display—beak-play, with intervals of bowing and cossetting—to last one and a half minutes, and this as late as 18th August. Any of the three actions may be performed separately. They all express the same emotion, love or affection, and occur one or the other or all nearly every time one of a pair returns to visit or relieve its sitting mate. No birds, indeed, judging from appearances, are more affectionate than gannets, but their affection has in it a queer element of brutality, which is not, however, peculiar to them: it has, in fact, already been noted in the case of the guillemot (vol. iii. p. 18). Frequently a gannet, on alighting, will seize its sitting mate by the skin of the head and pull the head about viciously this way and that, before starting the usual demonstration of affection—beak-wagging, etc.—in which the mate heartily joins in spite of the treatment suffered. Sometimes it is the sitting bird that inflicts the injury. Owing to the similarity of the sexes, and the fact that both incubate, it is difficult to be sure whether or not this behaviour is confined to the male. On most occasions it appears to arise merely from exuberance of spirits, on others it is part of a deliberate effort by one of the pair to push the other off the nest in order to take its place upon the egg. That there may not be necessarily any sex element in the action is shown by the fact that often the nestling is the victim.

The gannet's display will of course vary in details from individual
to individual, and in the case of the same individual or pair according to the greater or less strength of the passing emotion. I have seen a pair, on the arrival of one of them, content merely to whet their bills once. Others will continue to sit side by side and wag their heads somewhat perfunctorily at intervals, just when the spirit moves them. The wings, again, are sometimes only half spread, and the tail action less vigorous. With respect to the tail, I may add that I have no record of the independent up and down movement during the beak-play—wagging, clacking, whetting; it appears to be associated only with the bowing movement, the tail being held stiffly deflected during the beak-play. But verification is needed.

As is the case with other species, gannets frequently display when alone, and they accompany the same with the strident "wrahls!" On one occasion (12th August) I saw a bird after such a display rush to a crevice and pick up, or pretend to pick up, some rubbish, decayed sea-weed and the like, which might have served for nest material; it then desisted, and stood looking about it for a while, suddenly to be once more galvanised into a transport of bowing and beak-wagging, after which another interval of repose and another outburst. The bird was quite alone and near no nest.

The sole mark of affection I saw shown by the parents for the young took the form of cosseting or preening with the beak, if we except the pinching and pulling of the head. Only on one occasion (15th August) did I see a young gannet perform the head-wagging movement. It was still in the down stage and was begging for food. The wagging may have been merely a form of begging in the air, the beak of the young bird not coming into touch with the beak or throat of the parent in the usual way, to be described below.

The only occasions on which I noted one of a pair displaying, when its mate, though present, did not, was when the latter was engaged in quitting the nest or the ledge. I use the word "engaged," because the gannet's usual manner of quitting is itself a display of a unique and curious kind. It is of frequent occurrence, but as it has not
to my knowledge been described in any ornithological work, I venture to call particular attention to it. In its most complete form the action, in the case of a sitting bird vacating the nest, is as follows: the bird, instead of responding to the noisy salutations of its mate, rises silently, with a solemn stiffness of demeanour, and stretches the neck and beak right up and slightly backward. Scanning the heavens with fixed preoccupied eyes, it turns slowly and cautiously round, as if treading on thin ice, and then, leaving the nest to its mate, marches, still gazing aloft, wings more or less erect, tail stiffly deflected, to the edge of the ledge, whence it dives into the air, uttering an almost indescribable note, a kind of long-drawn wailing “yee-orrrr.” This note, I found, varied greatly in pitch. It was never used except to terminate the strange ritual here described, which was the regular formal method of quitting the ledge, whether after changing places on the nest or not. Like the sex display, it was subject to variation in detail, and sometimes the bird dispensed altogether with the posturing, being content to utter the note. Occasionally it omitted both, especially when alarmed.

I can offer no satisfactory explanation of this peculiarity in the gannet’s behaviour. It has four salient features—the erection of the wings, the depression of the tail, the stiffly erect neck, and the final wailing note. The erection of the wings may arise through some process of mental association with the act of flight itself; it can hardly be a preparation for flight, for there is no necessity for raising the wings when, as sometimes happens, the bird is several feet away from the edge. The same applies to the deflected tail, which may be kept deflected when the bird is on the wing, in order to break the velocity of the descent through the air. But how the rigid upright neck and a special note should come to be associated with so simple an act as taking flight, is very difficult to understand.

1 In British Birds [mag.], iv. 163 (1910), Mr. Bentley Beetham has described, as part of an article on the “Position Assumed by Birds in Flight,” the movements of the birds’ wings previous to “letting off,” but not the ceremonious preliminaries.

2 The description of the quitting posture here given is based both on written and photographic evidence.
The arrival on the ledge, though not so noteworthy as the departure, is yet worth attention on account of the impetuosity with which it is frequently performed, if for no other reason. A bird will approach the ledges with a rushing flight, as if about to hurl itself against the rock, and occasionally will, in fact, alight with considerable violence, or so clumsily as to lose its footing and fall several yards down the face of the cliff before recovering its wings. The inrushing flight is usually accompanied by the wild triumphant "urrah! urrah!" and followed by the display of affection already described.

The affection that the gannet shows for its mate is not extended to its neighbours. Throughout the breeding season, any approach by one bird towards the nest of another is resented in the most unmistakable manner, and the mere proximity of one nest to another is itself a sufficient occasion for frequent demonstrations of hostility. There is in a gannet colony—and the same applies, with few exceptions, to other nesting associations of birds—none of that "peace and harmony" of which, according to one writer at least,\(^1\) the "most charming descriptions" might be written.

A gannet expresses anger by puffing out the feathers of the head, which then has almost a square appearance, and by opening its beak in a menacing manner, uttering at the same time its strident urrah! and sometimes also erecting its wings. It is stated by P. von Wöldicke, a friend of Naumann, that the circle of blue skin round the eye becomes lighter when the bird is angered.\(^2\) When at close quarters the gannet makes vicious passes at its opponent with its beak, not to peck or strike but to grasp; but as both combatants seem more anxious to avoid being seized than to seize, they usually draw back their beaks, at the moment of contact, with a lightning speed not surpassed by that of the forward lunge. The beaks once interlocked, there follows a strenuous tug-of-war. Both birds may lie flat

---

1 Prince Kropotkin, *Mutual Aid*, 1910, p. 35.
Plate 172

Gannets

By Winifred Austen
The arrival on the ledge, though not so noteworthy as the departure, is yet worth attention, on account of the ingenuity with which it is frequently performed, or for no other reason. A bird will approach the ledge with a rushing flight, as if about to hurl itself against the rock, and occasionally will, in fact, alight with considerable violence, or so suddenly as to lose its footing and fall several yards down the face of the cliff before recovering its wings. The rushing flight is usually accompanied by the wild triumphant "crak, knock," and followed by the display of affection already described.

The affection that the gannet shows for its mate is not extended to its neighbours. Throughout the breeding season, the approach by one bird towards the nest of another is resented with great much-taking manner, and the mere proximity of one nest to another is itself a sufficient occasion for frequent demonstrations of hostility. There is in a gannet colony—and the same applied with few exceptions to other nesting associations of birds—none of that "peace and harmony" of which, according to an early writer at least, the "most charming descriptions" might be written.

A gannet expresses anger by putting out the feathers of the head, which then has almost a square appearance, and by opening its beak in a menacing manner, uttering at the same time an audible "cack," and sometimes also erecting its wings. It is stated by P. von Völlmer, a friend of Naumann, that the circle of blue skin round the eye becomes lighter when the bird is angered. When at close quarters the gannet makes vicious passes at its opponent with its beak, not to peck or strike but to grasp; but as both combatants are in many cases anxious to avoid being seized than to seize, they usually draw back their heads at the moment of contact, with a lightning speed not surpassed by that of the forward wings. The beaks once interlocked, there follows a deliberate tug-of-war. Both birds tug till
upon the rock, with their wings outspread and pressed down so as to get a good purchase, an attitude which renders them peculiarly vulnerable to the pecks of third parties only too ready to profit by the opportunity. The contest may be protracted, and sometimes ends by both birds falling off the ledge into the sea, where they continue in a semi-submerged state to struggle till one has had enough and manages to escape.

It is more than probable that a gannet returns to the same nest-site each year, and builds upon what is left of the old nest, if anything, but direct evidence is lacking. As material is constantly being added to the nest throughout the season—18th August is the latest date I have recorded—the structure is sometimes of considerable size. It is built without art, and becomes gradually a flat, almost solid, mass of seaweed, straw, food refuse, and other materials. The material is obtained chiefly from the top of the island, the ledges, and the surface of the sea. It is the latter that provides many of the curious articles found in gannets' nests, such as golf-balls, toys, and candle-ends. E. T. Booth saw one of his captive gannets pluck feathers from its own back and place them on the nest, a waste of labour, as it happened, for the bird chanced to flap its wings shortly after and the feathers were blown away. The gannet has another source of supply in the nests of its neighbours, which, in their absence, it robs in the most shameless, one might almost say conscientious manner, and in doing so it suffers none of that interference from bystanders without which, according to an authority already quoted, "no nesting associations of birds could exist."

Both sexes take part in the building of the nest, but the share of each is doubtful. On the only occasion when I could be certain of the sex of the birds, owing to the evidence supplied by the act of pairing, it was the male who brought the material and the female who put it in place. It is worth adding that immature birds may

---

1 See also "Classified Notes."
2 Rough Notes, vol. iii.
3 Prince Kropotkin, op. cit., p. 58.
occasionally be seen with nest material in their beaks, but I have no proof that the nest-building instinct is ever developed in them beyond this stage.

The one dirty yellow-stained egg is incubated by each of the pair in turn for about six weeks. Sometimes the sitting bird declines to leave the eggs. On one occasion I saw one of a pair alight, proceed to the sitting bird, and try to push it bodily off the nest, at the same time seizing and wringing its head. The victim made no effort to resist, but simply sat fast. After a while the newcomer desisted, began to cosset the injured head, and presently the incident closed with the usual lively interchange of marks of affection, one standing, the other still seated.

The gannet's method of incubation merits special attention. It was first noted by Conrad Gesner in his *Historie Animalium* (1555). He states that he learned from an "erudite Scotchman" that the solan-geese "lay their eggs on rocks and cover them with one foot during the process of incubation." The statement, subject to the alteration of one foot to both feet, has been verified by E. T. Booth from observations of birds in captivity, and by Mr. J. M. Campbell, the head-keeper of the Bass Rock light-station. The bird places over the egg the web of one foot and then the web of the other, and lowers the body. The egg is not always wholly covered. The discoloration of the egg—originally chalky white—is held to be due to this habit, the underside of the webs being wet and dirty. The same method of incubation has been observed in the case of *Sula capensis* (S. Africa) and *Sula serrator* (Australia).

The earliest date of hatching recorded is 10th May, by E. T. Booth, but June is the most usual month. The latest record I have is 12th August. The young gannet is born naked, blind, and of a slaty hue, a most unprepossessing little creature; but in a few days it begins

---

1 See "Classified Notes."
2 *The Scotsman*, 28th June 1910; and in litt.
3 Victorian Naturalist, 1908-9, p. 18.
4 Rough Notes, vol. iii.
5 *Ibis*, 1904, p. 84 (W. L. Sclater).
to develop a magnificent covering of thick white woolly down (Pl. LXXIII), and in this imperial garb it grows to be as big and much fatter than its parents. Its subsequent changes of plumage are described in the "Classified Notes," and illustrated on Pl. LXXIII.

Young gannets, like the nestlings of other species breeding on cliff ledges, are singularly lethargic; they move little except under compulsion, and are thereby no doubt saved from the ever-present danger of falling from the cliff. Some do fall, especially when alarmed; their attention being then so much occupied with the danger in front that they do not perceive the danger behind soon enough to avoid slipping over the edge and rolling down the rocks to the sea.

Young gannets remain on their ledges for about three months or more after birth. The earliest born are fledged about the middle of August. The usual month for departure is September, but the latest born are not ready to go till November. During the last days of its stay, each bird exercises its wings by vigorous flapping. It is possibly stimulated to depart by hunger, for, as is the case with other species, the parents slacken in their efforts to find food for it, or desert altogether. The stimulus is occasionally of a more direct nature, and is provided by the parent bird in the shape of the head-pinching and wringing above mentioned. One young bird was seen by Mr. J. M. Campbell to quit the Bass Rock only after its head and neck had been made almost raw. The fledgling's first flight is somewhat unsteady, but suffices to take it some hundreds of yards, or even out of sight, before it drops with a splash into the sea; it is said to remain afloat for several days, entirely abandoned by its parents, and living on its own stored up fat. Mr. J. M. Campbell, on the other hand, tells me that young gannets soon find their wings, unless injured in the first descent, but this part of the life-history of the species has yet to be closely observed. When the bird finally rises from the water, there comes to it what must prove one of the most exciting moments of its life, the attempt to capture its first fish. This is no doubt, as in the
case of the young osprey,¹ an instinctive act awakened by the sight of fish beneath the surface, but certain proof can only be result of observations which exclude all possibility of imitation.

The gannet's method of fishing is to sweep in wide circles over the sea, and, when its prey is marked, to fall like a big white packet down through the air, the wings half closed, till close to the surface, when it closes its wings and drops in with a splash, to emerge shortly with its fish already lodged inside. It reposes a few seconds, and then, with laboured flapping, takes wing once more. The height from which the descent is made may vary from a score of feet to two or three hundred, possibly more, varying probably with the depth of the fish.

If a gannet has a young one to feed, it flies with the fish it has swallowed to the ledge, and there alights with every appearance of having no important business to do. The young bird, however, quite understands the situation. It proceeds to cosset or peck diligently its parent's bill, whereupon the old bird, after certain convulsive manifestations which seem to indicate that it is bringing the fish part way up the gullet, opens its beak wide. Into the cavity thus presented to it the young bird plunges its head. There is a struggling and a tugging, and the head is withdrawn. I have never seen anything pass from one beak to the other, the fish being seized and swallowed inside the gullet of the parent. I have not seen the fish disgorged onto the ledge before the young.

This account does not refer to the first few days of the nestling's life, when it is fed not with fish, but, according to some, on semi-digested fish pulp, but actual evidence on the point is scanty. The act of feeding at this stage has been noted by E. T. Booth, who had good opportunities of seeing it performed by birds in captivity. "The nestling," he writes, "was calling faintly, and lifting up its head open-mouthed, when the old bird dropped forward, and opening the beak

¹ See Home Life of the Osprey, p. 53, by C. G. Abbot, who quotes the American Zoological Society's Bulletin, No. 11, 1908, p. 120 (Baynes), and Scribner's Magazine, xli., 1907, p. 704 (Beebe).
to an enormous extent with the head drawn sideways, apparently scooped the young one into its mouth.” In another passage he describes the nestling as being completely concealed when fed.\(^1\)

Both parents share in the task of feeding their offspring. On one occasion I saw a young bird fed twice by one parent and once by the other within five minutes. Fish are readily disgorged both by old and young when alarmed. I noted that the fish disgorged by one young bird was a gurnard. It was ejected head first, and was therefore, swallowed tail first. As the formidable spikes of this fish lie backwards, they would have caught in the gullet of the bird had not the head of the fish been softened by previous partial digestion in the stomach of the parent and the spikes pressed flat into the flesh. The fact that the young swallowed the gurnard tail first showed that the parent took it from the sea head first. That it always does so is rendered unlikely by the fact that gannets have at various times been picked up dead with gurnards firmly wedged in their throats.\(^2\) Let us add that the gannet’s method of swallowing its food whole enables it to dispense with a tongue. What remains of this organ is a mere survival. The same applies to its nostrils, which have been reduced to a pinhole.

The gannet’s favourite element is the air, and it loves nothing better than sailing through it with its long wings—six feet or more from tip to tip—almost motionless. But it is an efficient swimmer, as might be inferred from its webbed feet, with respect to which it is worth noting that the web connects all four toes, a character which is common to all the species in the order *Steganopodes* (Cormorants and Darters, Frigate-birds, Pelicans, and Tropic-birds), and originates the name (Gr. *steganos*, covered, *pous*, foot), but it does not appear to be known whether it swims under water. It floats with great buoyancy owing to the highly developed system of air-cells lying between its skin and body and communicating with its lungs. It is

---

\(^1\) Rough Notes, vol. iii.
\(^2\) Gray, *Birds of the West of Scotland*, p. 462.
stated that these also serve to lessen the shock of the bird’s impact against the water when it descends to fish.  

On land, excepting always cliff-ledges or rocks, from which it can easily take flight, the gannet is rarely seen. If surprised on the grassy slopes of the island’s top, where it sometimes alights for nesting material, its habit is to make for the nearest cliff-edge with ungainly hops or jumps and with the aid of its wings.  

Of the gannet’s utterances, the most important is the loud “urrah!” figured by some writers as “grog,” by another as “carra-crac!” It has sounded to me on occasions like “urroo, or wrow, or ooorah,” differences no doubt due to distance and position. Heard with the ear a few inches from the bird’s wide-open mouth, it resolves itself simply into a strident “arrrr!” This note is used to accompany the inrushing flight to the ledges and the display, also to express anger. The almost indescribable note used only on “letting off” from the ledges has already been noted. The species is said to have an alarm-note, syllabled “bir!” I have listened for it without success. When flying in the open, the species seems to be quite silent. The note of the downy young, when heard close to, sounded to me like a high-pitched “uk!” It has been compared to the yapping of a puppy. The changes in the note of the species from birth to maturity have not yet been studied.  

On quitting the breeding station, the gannet colony disperses over the seas, and may then be seen fishing off our coast either singly, in twos and threes, or in flocks small and large. The species is said by Naumann to roost floating on the sea, when away from the breeding-ledges or suitable rocks, but he does not appear to write this from personal observation.  

A few notes in conclusion on the habits of the immature birds. Maturity is not reached till the third or fourth year, but many imma-

---

1 See Montagu’s Dictionary of Birds; Proc. Zool. Soc., 1831, p. 90 (Sir R. Owen); and Macgillivray’s History of Birds; also Mr. J. H. Gurney’s forthcoming book on the Gannet.
2 J. M. Campbell, in litt.
3 Ibis, 1866 (R. O. Cunningham).
4 Vögel Mitteleuropas, xi. 39-40.
ture individuals may be seen at the breeding station, though much rarer at some than at others, and are easily recognisable by the addition of dark brown in their plumage, which colour diminishes each year, being reduced to the brown of the primaries. They sit and move about among the breeding birds, who occasionally wring their heads for them as a reminder to keep at a respectful distance. They may often, as already noted, be seen picking up and carrying nesting material, and once I saw one cosseting a downy nestling. These beginnings of the nesting and parental instinct are well worth closer study. I have no record of immature birds performing either the sex or the quitting display. Mr. J. M. Campbell tells me, however, that he has seen immature birds displaying to adults, but no pairing resulted.
PETRELS AND SHEARWATERS


PRELIMINARY CLASSIFIED NOTES

[F. C. R. JOURDAIN. W. P. PYCRRAFT. A. L. THOMSON]

STORM-PETREL [Hydrobates pelagicus (Linnaeus); Procellaria pelagica Linnaeus. Mother Carey's chicken; martensil (Ireland); spencie, swallow (Shetlands); kitty-varrey (Isle of Man). French,thalassidrome tempête; German,kleine Sturmschwalbe; Italian, uccello delle tempeste].

1. Description.—The storm-petrel may readily be distinguished from any of its congeners on the British list by its small size and sharply truncated tail. The sexes are alike, and there is no seasonal change of plumage. (Pl. 173.) Length 6½ in. [165 mm.]. The general coloration is of a sooty black, but the major coverts of the wing have obscure white margins; the outer tail feathers have white base, and the upper tail-coverts are white, the longest and hindmost tipped with black; the white patch thus formed is continued downwards on each side of the base of the tail for a short distance. The beak and legs are black, and the iris is dark hazel-brown. The juvenile plumage differs from that of the adult only in that the major coverts of the wing are narrowly edged with white, and the scapulars and hindmost outer tail-coverts have obscurely defined white fringes. The downy young is of a sooty ash colour, and the down is of great length. [w. p. p.]

2. Distribution.—In Great Britain this species is known to breed on some of the islets off the coast of South Wales, especially Skokham and Skomer, possibly also on an islet off Lundy and on the Scillies. Off the Scottish coast there are many breeding-places, chiefly on the west side, and also in the Orkneys and Shetlands. A pair bred on the Bass Rock in 1904. In Ireland it nests on the islets off the north and west coasts, in some places in large numbers. Outside the British Isles it breeds in the Færoes, and on the Channel Isles, the Brittany coast, and in the
Photo by P. Webster

Young of stormy-petrel just hatched

Photo by C. H. Wells

Leach's forktailed-petrel. Nest hole opened to show egg
Western Mediterranean on islets off the coasts of Sardinia, Corsica, Elba, Malta, S. France, and the Hormigas off the east coast of Spain, as well as off the northwest coast of Africa. On migration it visits the Norwegian coast, Iceland, Greenland, and the eastern coasts of N. America; while southward it ranges to the Azores, Canaries, Madeira, and is said to have reached the Cape of Good Hope and the Straits of Bab-el-Mandeb. [F. C. R. J.]

3. Migration. — The storm-petrel is found at its breeding-stations (see preceding paragraph) from May till early autumn. Like the other members of its order it is pelagic except in the nesting season, and therefore comparatively seldom recorded, although widely distributed in British waters. But it is often noted at the light-stations in autumn, and may be driven inland by gales (cf. Saunders, Ill. Man. British Birds, 2nd ed., 1899, p. 727). On the Yorkshire coast it is occasionally seen in August or September, but not usually before October (cf. Nelson, B. of Yorks., 1907, p. 749). It is a fairly frequent visitor to Kent, only occasionally seen during rough weather in North Wales, and of rare and irregular occurrence in Dumfriesshire (cf. Ticehurst, B. of Kent, 1909, p. 546; Forrest, Fauna of N. Wales, 1907, p. 412; and Gladstone, B. of Dumfries, 1910, p. 466). Resident to some extent in Ireland, but very rarely met with from January to March (cf. Ussher and Warren, B. of Ireland, 1900, p. 383). "Unusual numbers occurred between October 27th and November 4th, 1883, on the east side of England; and in 1886, according to Mr. Harvie-Brown, 'a regular stream of migration of petrels seems to have taken place with the "great rush" of other species on the 5th and 6th of October, as they were reported from several stations in Scotland.'" (cf. Saunders, loc. cit.). [A. L. T.]

4. Nest and Eggs.—The nesting-site is sometimes under stones or heaps of boulders, occasionally in crevices of loose walls or deserted buildings. It is also frequently found in holes in the ground, sometimes excavated by the bird, and at other times in old rabbit-holes. (Pl. LXXV.) A musky smell pervades the hole, and there is often, though not always, a pad of dry grasses underneath the single egg, which is often elongated or elliptical in shape, white, with a dull chalky surface and a more or less distinct wreath of reddish brown specks round the big end. (Pl. V.) Average size of 53 eggs, 1.1 x .84 in. [27.9 x 21.4 mm.]. Both sexes share in incubation (R. Godfrey), which, according to Mr. W. Evans, probably lasts about 35 or 36 days. One chick hatched in an incubator early on the 36th day. The breeding season is late: in some localities nesting begins in the last week of May, but in the north of Scotland few birds lay before the end of June or the
beginning of July, and fresh eggs may be found even in mid-August in the Shetlands. On the Blaskets Seebohm found a few eggs still unhatched on 17th September. Only a single young bird is reared in the season. [F. C. R. J.]

5. Food.—Dr. Coppinger [Cruise, H.M.S. Alert] found in gizzards of specimens taken on St. Paul’s rocks, minute shells and otoliths of fishes. They also eat sorrel when ashore. The young are fed by both parents on regurgitated oil. [w. f. p.]

**LEACH’S FORKTAILED-PETREL** [**Oceanodroma leucorhoa** (Vieillot). Mother Carey’s chicken, swallow (gen.). French, *thalassidrome cul-blanc*; German, *gabelschwanzige Sturmschwalbe*; Italian, *uccello delle tempeste a coda forcuta*].

1. Description.—This species is readily distinguished by its long, deeply forked tail, white upper tail-coverts, and the drab-brown colour of the median and major coverts. The sexes are alike, and there is no seasonal change of coloration. (Pl. 173.) Length 8 in. [203 mm.]. The general coloration is of a sooty brown, with more or less distinct tinge of dark slate-grey on the back. The median and major coverts are of a drab-brown; the latter and the inner secondaries have, further, more or less conspicuously white margins. The upper tail-coverts are white; the remiges and rectrices black. The juvenile dress differs from that of the adult only in having the white margins along the major coverts somewhat more strongly marked. The young in down are of a sooty brown. [w. f. p.]

2. Distribution.—The only recorded localities where this species has been found breeding in Scotland are the St. Kilda group, where it breeds on Boreray, Soay, and sparingly on the other isles, the Flannan Isles, and North Rona; while in Ireland it is known to breed on Tearaght and Inishnabro (Co. Kerry), and off the Mayo coast. Outside the British Isles it breeds on the Westmanneyjar (Iceland), and in North America from Labrador to the Bay of Fundy. On migration it has occurred on the coasts of Western Europe from Norway to Spain, and in the Mediterranean as far east as Sicily, and once in the Baltic (Kurland). In the Atlantic it wanders to the Canaries, Madeira, and the Gold Coast, while on the American side it ranges south to Virginia. It is also found breeding on the islands of the North Pacific (Kuriles, Commander Isles, and probably the Aleutian Isles and the Alaska and California coasts), visiting Japan in winter. [F. C. R. J.]

3. Migration.—A summer visitor to its breeding-stations (see preceding paragraph), but generally distributed in British seas in autumn and winter, when
it not infrequently occurs on most parts of our coasts; inland records generally follow northerly and westerly gales (cf. Saunders, Ill. Man. British Birds, 2nd ed., 1899, p. 729). On both seaboards of Great Britain this petrel occurs as an occasional autumn and winter visitor: September 17th is the earliest Yorkshire date, and October and November are the chief months in Dumfriesshire, and November in Kent (cf. Nelson, B. of Yorks., 1907, p. 750; Gladstone, B. of Dumfries, 1910, p. 468; and Ticehurst, B. of Kent, 1909, p. 547). Off Cornwall it is as common in some winters as the storm-petrel (cf. Saunders, loc. cit.). A few breed in Ireland, but it is chiefly known in that country as an accidental visitor in early winter, and has not been recorded at all in February or March (cf. Ussher and Warren, B. of Ireland, 1900, p. 387). Unusual numbers were noted both in Scotland and in Ireland in the autumn of 1891 (cf. Saunders, loc. cit.). [A. L. T.]

4. Nest and Eggs.—In nestling habits it resembles the storm-petrel, breeding sometimes in holes among boulders and rocks, and at other times in burrows about 20 inches long in the turf, ending in an enlarged cavity, and constructed probably by the birds themselves, though sometimes they make use of puffin-holes. (Pl. lxxv.) The nest consists of a handful of dry grass, on which the single egg is deposited. In appearance it resembles that of the storm-petrel, and has the same dull chalky surface, but is decidedly larger, and nearly all eggs show more or less the wreath of reddish markings at the big end. (Pl. V.) Average size of 30 eggs, 1·3 × 0·95 in. [33 × 24·1 mm.]. Incubation is shared by both sexes (Hantzsch),¹ and the same observer states that it lasts about five weeks, which, judging from what we know of the storm-petrel, is probably correct. The breeding season begins in the last days of May or early in June, but fresh eggs may be obtained also in July. Only one young bird is reared in the season. [F. C. R. J.]

5. Food.—Fish-fry, small Crustacea, and cuttle-fish, and sorrel obtained from the breeding-ground. The young are fed by both parents on regurgitated oil. [W. P. P.]

GREAT-SHEARWATER [Puffinus gravis (O’Reilly). Hagdown (Ireland); hackbolt (Devon). French, puffin grand; German, grosse Sturm-Taucher; Italian, no popular name].

1. Description.—The great-shearwater is the largest of our native petrels, and may at once be distinguished not only on account of its size but also by the dark brown colour of the crown and nape, and the brown mottling on the middle

¹ Four birds secured on the eggs in S. Kilda proved to be males (J. Wiglesworth), but others taken under similar circumstances on N. Rona were all females.
of the abdomen. The sexes are alike, and there is no seasonal change of coloration. Length 17 in. [431 mm.]. The upper parts are of a light brown, and each feather has a marginal fringe of ashy brown. The remiges and rectrices are black, and the hinder upper tail-coverts are white. The lower part of the side of the head is white, as are the fore-neck and under parts, save the under tail-coverts, which are sooty brown. The beak is yellowish green; the iris dark brown; the feet light greenish grey, while the webs of the toes are flesh-coloured. The juvenile dress is like that of the adult. The young in down are unknown. [W. P. P.]

2. Distribution.—The only known breeding-place of this species is Inaccessible Island, in the Tristan d’Acunha group, but in all probability other sites will be discovered when the islands of the Southern Hemisphere are more thoroughly explored. Its breeding season is during our winter months, and on migration during our summer it visits the North Atlantic, ranging north to the Norwegian coast, the Færoes, Iceland, Greenland, and the Labrador coast. [F. C. R. J.]

3. Migration.—A fairly regular visitor to the seas round the British Isles, but seldom coming near land, and therefore rather irregularly recorded. The season when it most frequently occurs is from August to November, and the species is to be regarded as a native of the Southern Hemisphere (known to nest in the Tristan d’Acunha group, and supposed to do so on other southern islands), “wintering” in our summer. In some seasons it is found in considerable numbers from August onwards off Cornwall and the Scilly Isles, and it is said to remain in the seas round the latter (never coming among the islands) “during autumn and winter” (cf. Saunders, Ill. Man. British Birds, 2nd ed., 1899, p. 737; and Clark and Rodd, Zoologist, 1906, p. 346). It has once been recorded in Kent, on 29th October 1890, and several times in Norfolk and Suffolk, once as late as 10th November (cf. Gurney, Zoologist, 1891, p. 274; and Saunders, loc. cit.). Many have been seen off Flamborough Head in September, but apart from this locality it is an infrequent autumn and winter visitor to Yorkshire; but it has been recorded from 18th July to December, and once on 10th January (cf. Nelson, B. of Yorks., 1907, pp. 752-5). One was found dead in Skye on 13th July 1885, and the species has been noticed off Tiree, St. Kilda, and several of the other western and northern Scottish isles, while many frequent the fishing-banks near Rockall (cf. Saunders, loc. cit.). From forty to sixty pairs were seen on the water between the Butt of Lewis and North Rona on 27th June 1894, and over fifty pairs between Barra Head and St. Kilda on 24th June 1895, while specimens were killed in the same region in the fourth week of July 1899 (cf. Newton, Annals Scot. Nat. Hist., 1900, pp. 142-7). One was
Fulmar's egg on ledge

Young Fulmar

Manx shearwater at entrance of its burrow

Manx shearwater and young
shot from a small flock in Loch Broom, Wester Ross, on 31st October 1897, and
a few were observed off the Flannans on 21st September 1904 (cf. J. T. Henderson
To Ireland the great-shearwater is an uncertain visitor, chiefly to the west and in
autumn (cf. Ussher and Warren, B. of Ireland, 1900, p. 389). It was found to be
“surprisingly numerous” off the south of Ireland in September 1900, eight to ten
being seen daily; and on 9th September 1901 four were shot from a flock of from
two to three hundred birds met with between Cape Clear and Mizen Head, while
on the 13th large numbers were seen off Valentia and between the Blaskets and
the Skelligs (cf. Ussher, Irish Naturalist, 1901, pp. 42-3, and 1905, p. 43). In 1906
many were observed off Kerry in August, and off Cork on 1st November, and
several off Kerry on the 6th; off the same coast in 1907 many were seen in August,
a few in September, and several in November; and in 1908 two in August and
many in November (cf. G. P. Farran, Irish Naturalist, 1907, pp. 163, 184, and
1909, p. 80). As our knowledge on this subject is still very incomplete, the data
do not admit of ready summarisation, and have of necessity been given somewhat
fully: the frequency of November records and the existence of still later ones
is worthy of remark. It will be seen from the above that the species is gregarious
and sometimes met with in large flocks; note also the records in which the birds
were recorded as paired. [A. L. T.]


5. Food.—Pilchards and other fish, crabs and other Crustacea, and sea-
weed. Nothing is yet known of the young. [W. P. P.]

MANX-SHEARWATER [Puffinus puffinus puffinus (Brünnich);
Puffinus anglorum (Temminck). Puffin, Manx-puffin, mackarel cock; cackle
(Lundy); lyre bird (Orkneys); lyrie (Shetlands); skidden, crew (Scillies);
perkins (Eigg). French, péritel manks; German, nordischer Taucher-
Sturmvogel; Italian, berta minore (P. p. yelkouan)].

1. Description.—The Manx-shearwater is easily identified by its slender
hooked beak, long body, black upper and white under parts; it recalls the little
dusky shearwater, but differs sharply therefrom in its vastly superior size. The
sexes are alike, and there is no seasonal change of coloration. (Pl. 174.) Length,
14¾ in. [368 mm.]. The upper parts are black, save the lower part of the side of
head, which is white like all the under parts, but the sides of the base of the neck
are mottled with dark grey, almost forming a pectoral band, and there is a patch of black feathers in the femoral region. The beak is of a dark horn colour; the iris dark brown; the legs and toes have the outer surface black, the inner light light pink, while the webs are bluish. The juvenile dress is like that of the adult. The downy young is sooty brown. [w. p. p.]

2. Distribution.—The only known breeding-places of this species are on the western coast of Great Britain, the Orkney and Shetland groups, and the Irish coasts. In the Scillies there is a very large colony on Annet, and it is believed to have bred on Lundy Island, while another large breeding-station exists at Skomer in Pembrokeshire, and smaller colonies are found on Skokham, Bardsey Island, the Carnarvon coast, etc. It bred formerly on the Calf of Man, and there are many nesting-haunts on the islands off the west coast of Scotland, amongst others on Eigg, Rum, Canna, Skye, the Treshnish Isles, Flannan Isles, and the St. Kilda group; while there are breeding-stations in the Orkneys, at Hoy, Stroma, etc., and in the Shetlands on Foula, Unst, and probably Fetlar. In Ireland the largest breeding-places are on the Skelligs and Puffin Island (Co. Kerry) and Rathlin Island, but other colonies exist on the Saltees, Blaskets, Aranmore (Co. Donegal), off the Mayo coast, and on that of Co. Wicklow and Dublin, etc. Outside the British Isles its distribution is local: it breeds in the Færoes in some numbers, and on the Vestmann Islands in Iceland, and is said to occur on the Norwegian coast, but has not been proved to breed there. It is said also to breed in the Azores (Godman) and Madeira (Schmitz), and perhaps also in the Canaries. On migration it has occurred in Greenland (once), and south in the Atlantic to the Brazilian coast (once), Bermuda (once), and more regularly to the New England coasts. [r. c. r. j.]

3. Migration.—Widely distributed in British waters throughout the year (cf. Saunders, Ill. Man. British Birds, 2nd ed., 1899, p. 741). The existing data regarding its seasonal movements is altogether insufficient to affoord any conclusions: the habits of the species render it a very difficult one to observe. It is “present in the Firth of Forth every year from May to October, at first only a few, but in hundreds during August and September,” while odd birds are occasionally seen at other times, e.g. February (cf. W. Evans, in Witherby and Ticehurst, British Birds, vol. ii. p. 421). In Yorkshire it is a bird of passage, sometimes occurring in considerable numbers in autumn, and occasionally even inland; but to Kent it only comes as an occasional storm-driven visitor (cf. Nelson, B. of Yorks., 1907, p. 769; and Ticehurst, B. of Kent, 1909, p. 551). It is uncommon in Dumfries-
PRELIMINARY CLASSIFIED NOTES

"when the mackerel are in these birds are much in evidence," it is said, and hundreds have been observed in July (cf. Gladstone, *B. of Dumfries*, 1910, p. 471; and Forrest, *Fauna of N. Wales*, 1907, pp. 414-16). In Ireland it is resident, but decreases considerably in winter: assemblages of from a hundred and fifty to two hundred birds were seen off the Skullmartin Lightship (near the coast of Co. Down) on the early morning of 18th July 1904 (cf. Ussher and Warren, *B. of Ireland*, 1900, p. 392; and R. L. Patterson, *Irish Naturalist*, 1904, p. 171). Gregarious, as already implied: sometimes recorded from the light-stations (cf. Nelson, *loc. cit.*). [A. L. T.]

4. Nest and Eggs.—This shearwater breeds in burrows, sometimes in the face of perpendicular cliffs where there are grassy ledges and strips of turf, at other times on sloping banks, in some cases up to two thousand feet, or on practically flat ground. Many of these burrows are undoubtedly excavated by the birds themselves, as they are in positions where no rabbit could possibly gain access, but others are adapted to the purpose, or enlarged. They run to a depth of a foot or two or more, and a slight nest of dry grasses is constructed. (Pl. LXXIV.) Oswin Lee states that both sexes share in the work of making the burrow. Only a single egg is laid, which is white, without gloss, and smooth in texture. (Pl. V.) Average size of 51 eggs, 2.39 x 1.67 in. [60.9 x 42.5 mm.]. Both sexes take part in incubation, and males have frequently been taken on the egg by Faber and others. The period is estimated by Hantzsch at a month, the young being fed by its parents for six or seven weeks longer. The breeding season begins early in May, but fresh eggs may be met with up to mid-June, especially where the birds have been disturbed. Only one young bird is reared in the season. [F. C. R. J.]

5. Food.—Surface fish, small cuttle-fish, and other free-swimming Mollusca, surface-swimming Crustacea, and offal. The young are fed on regurgitated green oil, and by both parents. [W. F. P.]

FULMAR [*Fulmarus glacialis* (Linnaeus). Mollymawk, mollymew; mallimoke (Shetlands). French, *pétrel fulmar*; German, *Eis-Sturmvogel*; Italian, no popular name].

1. Description.—The fulmar, while presenting a general resemblance to a gull, may at once be distinguished by the tubular nasal passage and the compound character of the beak-sheath—which is of the typical petrel type. The sexes are alike, and there is no seasonal change of coloration. (Pl. 174.) Length 17 in.
[431 mm.]. The back, wings, and tail are of a dark silvery grey, the rest of the plumage being white. The iris is dark brown, the bill bluish yellow, mottled and streaked with darker patches. Legs and toes pale flesh-coloured. The juvenile dress is like that of the adult. The young in down is of a dull greyish white. [W. P. V.]

2. Distribution.—The wonderful increase in the number of breeding-stations and range of this species in the British Isles has been the subject of recent papers by Dr. Harvie-Brown in the *Scottish Naturalist*, 1912, pp. 97 and 121. Cf. also *Zoologist*, 1912, pp. 381 and 401. From these it appears that the oldest British station is that at St. Kilda, which is known to have flourished for two hundred and fifty years. In the Shetlands they were first recorded at Foula in 1878, spreading to Papa Stour in 1891, and gradually colonising the west and finally the east coast cliffs of the group. At N. Rona one was seen in 1886, and in 1887 they were fairly numerous here, and also at Sulisgeir, but of course in nothing like the numbers seen in 1910. At the Flannans they were seen in 1881, and certainly bred in 1902. One was seen at Stack and Skerry in 1889, and from 1900 onwards it has been found breeding on the Orkneys, first occupying the west coast, but since 1911 on east coast stacks also. The Clomore cliffs on the mainland have probably been used since 1897, and Dunnet Head since 1900. At Barra Head it appeared in 1899, and certainly bred in 1902, in which year they also occupied a site on Handa, and probably about this time colonised Fair Island. Lastly the Shiants (1910) and Berriedale Head, Caithness (1911). In Ireland it was first found breeding in 1911 on the North Mayo coast, and in the same year also in Co. Donegal (*Irish Naturalist*, 1911, p. 149; 1912, p. 180). Outside the British Isles it is plentiful at the Faroes (1838-9) and at many stations round the coasts of Iceland and in the Spitsbergen archipelago, as well as on Jan Mayen, and the north island of Novaya Zemlya. There is no reliable evidence of breeding on the Norwegian coast, but it nests in Greenland and on the west side of Davis Strait and Baffin’s Bay, and in the North Pacific is replaced by allied forms. In winter it ranges south to lat. 43° in Europe, and Massachusetts and Maine in N. America (Saunders). [F. C. R. J.]

3. Migration.—A summer visitor for breeding purposes to the northern isles and mainland of Scotland (see preceding paragraph). Otherwise the species is seldom seen near land, but may be found generally distributed in British seas, especially during the autumn and winter months. On the south and west coasts of England the fulmar is seldom recorded except in the colder months, and then chiefly after stormy weather: it is by no means infrequent on the fishing-grounds.
the Yorkshire coast it is a casual autumn and winter visitor, but, on the other hand,
it rarely comes south to the Channel (cf. Nelson, B. of Yorks., 1907, p. 764; and
Ticehurst, B. of Kent, 1909, p. 553). It is occasionally seen in Dumfriesshire after
storms, and is a rare occasional visitor to North Wales, chiefly Merioneth (cf.
Gladstone, B. of Dumfries., 1910, p. 471; and Forrest, Fauna of N. Wales, 1907,
p. 416). It is "frequently met with at all seasons on the Atlantic," but it rarely
comes to the Irish coasts; its occurrences are chiefly between September and
November, but also in January, March, May, and June (cf. Ussher, List of Irish
Birds, 1906, p. 54; and Ussher and Warren, B. of Ireland, 1900, p. 396). [A. L. T.]

4. Nest and Eggs.—Although in many cases the fulmar makes no nest
whatever, but deposits its egg on a depression in the turf or soil or detritus of broken
rocks, yet occasionally a little dry grass or withered tufts of sea-pink form an apology
for a lining, and on rocky ledges small flat pieces of stone are frequently arranged
round the egg. Many nesting-sites are in inaccessible cliffs, usually but not in-
variably over the sea, but in crowded colonies the eggs may be found on the tops
of stacks and on gently sloping turf. (Pl. lxxiv.) Only one egg is laid, white,
rather coarse and rough in texture, and it is said occasionally showing traces of red
spots. (Pl. V.) Average size of 80 eggs, 2.88 x 1.95 in. [73.2 x 49.7 mm.]. Both
parents take part in incubation, the male it is said chiefly by night, and the period
is unusually long. Faber estimates it as 35 to 40 days, Hantzsch at six weeks, while
the inhabitants of Grimsey give seven weeks! In St. Kilda the first eggs are laid
in the second week of May, the young birds emerging from 21st June onwards; in
Iceland they are generally laid during May, but fresh eggs may be met with even in
June. Only one young bird is reared in the season. [F. C. R. J.]

5. Food.—Fish, Mollusca, including cuttle-fish, offal obtained from ships,
and sorrel when ashore. The young are fed on oil. [W. P. F.]

The following species and subspecies are described in the supplementary chapter
on "Rare Birds":—

Madeiran fork-tailed petrel, Oceanódra om castro (Harcourt).
Wilson’s-petrel, Oceanóites oceanicus (Kuhl).
Frigate-petrel, Pelagódra marina (Latham).
Mediterranean-shearwater, Puffinus kuhlii (Boie).
Sooty-shearwater, Puffinus griseus (Gmelin).
Levantine-shearwater, Puffinus puffinus yelkouan (Acerbi).

VOL. IV.

3 D
Little dusky-shearwater, *Puffinus obscurus* [*Puffinus assimilis*, Gould].
Schlegel’s-petrel, *Pterodroma neglecta* (Schlegel).
Capped-petrel, *Pterodroma hasitata* (Kuhl) [*Estrilata hasitata* (Kuhl)].
Collared-petrel, *Pterodroma brevipes* (Peale) [*Estrilotis brevipes* (Peale)].
[Cape-pigeon, *Daption capense* (Linnaeus).]

[F. C. R. J.]
THE PETRELS

[W. P. PYCRAFT]

To those who are interested in the study of birds in relation to their environment, the Petrels must always appeal strongly. By the earlier ornithologists, who paid no heed to environmental conditions, these birds were commonly associated with the Gulls. And with some reason, if one does not look below the surface of things, for some of the Petrels have an undeniably gull-like look about them, and this is especially true, perhaps, of the Fulmars. But the likeness is a superficial one only, and the further we compare the two types the more obvious this becomes. The beak-sheath is the most telling of the external differences, for in the Petrels—which group, it must be remembered, also includes the Albatrosses—it is composed of numerous separate pieces, of which one on each side commonly forms the roof of the nostrils, sometimes the two apertures open together in a common case-like or tube-like cavity, hence the name "Tubinares" or "tube-nosed." The whole skeleton, the convolutions of the intestines, the pterylosis, all differ markedly from Charadriiform plan, and indicate affinities with the Divers and Penguins, and, more remotely, the Ciconiform type. But besides the evidence of the laboratory, we have yet other sources of information. The most helpful of these concern the characters of the eggs and young. Of the first, it may suffice to remark that not more than one is laid during the year, and that this lacks any of the characteristics of the gulls' eggs, being indeed white, or at most faintly freckled with dull red. As touching the young, a moment's glance will show how absolutely unlike are the young Gull and the young Petrel. Young Gulls are nidifugous, and have the down-feathers short and indistinctly striped or mottled. Young Petrels, on the other hand, are nidicolous, and are covered with exceptionally long down, which is either white,
PETRELS AND SHEARWATERS

grey, or brown in colour, but always "self-coloured." In these two last particulars the Petrels resemble the Penguins.

The Gulls have, as it were, demonstrated their plover-like affinities in sending more or fewer species inland to follow the plough, and play the scavenger up and down rivers and other inland waters often remote from the sea. With the Petrels this is never the case. All are strictly marine species, never leaving the extreme edge of the coast, never straying out of sight or sound of the sea. And thus it has come about that some species have become so highly specialised that, like their remote relatives the Grebes and Divers, they have acquired the art of obtaining their food from the depths of the sea instead of its surface; as witness the little diving-petrel, Pelecanoides. This bird, however, affords a parallel in another direction. It has come to bear so close a likeness to the little-auk that the inexpert might readily mistake the one for the other, and the little-auk, of course, is a specialised member of the Limicolæ.

Such, then, are some of the features that the Petrels present for those who are fond of speculating on the relation between the bodily form and habits. Other features of no less interest will become apparent as we proceed.

STORM-PETRELS

The "Storm-Petrels," which form the Family Procellariidæ, are distinguished from the remaining members of the order by a number of well-marked characters, the most conspicuous of which are the great length and slenderness of the legs, and the character of the aperture of the external nares, which open into a common chamber. All are conspicuously long-winged and relatively small species, and dusky in coloration, though some have a large white rump-patch.

On the British list five species are recorded, but of these only
Plate 173
Upper: Storm-petrel
Lower: Leach's forktailed-petrel

By A. W. Seaby
PELICANS AND DOLPHINS

and very rare in colour but always "self-coloured." In fact the
hens particularly the Pelicans resemble the Penguins

The Gulls have, as it were, demonstrated their plow-like abilities in leading larger fish like species inland to follow the plough and
ply the rivers up and down rivers and other inland water often
runin two hundred miles. While the Pelicans this is nothing in west.

That already makes a species before leaving the extreme edge of the
point where it overflows out of sight around the sea. And thus if the
bird also has some species that is rather an highly specialized (that
the bird can resemble the Doves and Doves that have acquired
interest in shadowing their food from the shadows of the sea instead of
incorporating, so witness the blue divers of Europe.

This bird however, affords a pedagogically another direction. It has come
to love to shadow, to mimic the shadow that the human might
understand, to make for the human incomparable.

Thus, then, are some of the reasons that the Pelicans present for
those who are fond of speculating on the relation between the
human form and habits. Other features of no less interest will,
together appear as we proceed.

STORM-FATHERS

The "Storm-petrels," which form the Pelecanian family, are
distinguished from the remaining members of the order by a number
of subciliated characters, most conspicuous of which are the
formal beaks and strength of the legs, and the character of the
foot of the several stages, which open into a chamber chamber.

All are usually very long-legged and relatively small birds, and
rather in addiction thence some have a large white crescent.

In the former, but the species are recorded but of these, for
three demand notice here. These are the typical “Storm-Petrel” or Mother Carey’s chicken and Leach’s forktailed-petrel. Both breed with us, and closely resemble one another in their habits, and live under practically identical environmental conditions. So far as the records go, what may be said of one is true for each. Of the rare vagrant Wilson’s-petrel we have but the scantiest information, for it breeds only in the far south of the Southern Hemisphere. It is described in the “Rare Bird” section, but there are features in its life-history which demand notice here.

All Petrels are strictly oceanic birds, coming to land only in the breeding season. This resort is one only of extremest need—the propagation of the species. For these birds appear never to walk while ashore, but to fly straight to their nesting-burrows and out again to sea. Even the presence of sorrel, which has been found in the gizzard of Leach’s-petrel, need not contradict this rooted conviction on the part of ornithologists, for this may well have been plucked from the mouth of the burrow, or the bird may occasionally alight beside the plant to gather the coveted morsels, which seem to be much sought after, since portions of this plant are also commonly found in the gizzard of the fulmar.

The petrels of this Family stand in somewhat sharp contrast with the rest of the order by reason of the long, almost swift-like wings and the length of the legs. These are, perhaps, their most conspicuous features. The great length of the wings is accounted for by the swallow-like and long-sustained powers of flight. But the length of the leg is puzzling, since all observers who have seen these birds on land seem to agree that these birds are incapable of walking, or even standing upright, as they are commonly depicted in bird-books. It may well be that some error has crept in here; that the observations have been made on birds exhausted by storms, or birds brought suddenly out of their burrows and dazed by the glare of daylight. If correct, then the relatively long shanks must play a more important part in enabling these birds to skim the surface of the water than has so far
been supposed, and they must be regarded as holding a unique position among birds in this respect. It is certainly significant in this connection to note that Yarrell says of the storm-petrel that it "picks its food from the surface of the water, planting its webbed feet on the surface, and supporting the body by fluttering its wings." That is to say, it picks up food from the water much as other birds do from land. Yet one would hardly suppose that this precise fashion of feeding would have been of such vital importance as to render such long legs a necessity. One would suppose that since they spend much time afloat with closed wings, they would have been able to procure an abundance of food while thus at rest. During the summer months, and in fine weather, according to Yarrell, this bird may be seen hawking insects, swallow fashion, sometimes dipping suddenly seawards but never alighting. And in like manner Wilson's-petrel was seen at Kerguelen Island by the Rev. A. E. Eaton, then naturalist to the "Transit of Venus" Expedition in 1874, flying not only over the sea like swallows, but turning inland and coursing low over the ground, following the course of the valleys. But he surmised that they were turning inland from the bay as a short cut to other inlets from the sea. The late Dr. E. A. Wilson, during the Antarctic Expedition 1901-4,¹ met with specimens "on more than one occasion" on the great ice-plain of the Great Barrier some sixty miles from open water, "but always on the wing, and apparently never tired." Its flight, he remarks, recalled that of the "familiar martin, for it flits here and there exactly as though in search of insects on the wing. Occasionally it sails with outstretched wings." But excursions inland, such as Wilson's-petrel occasionally makes, seem never to be indulged in by any other petrel, which may be regarded as birds which never voluntarily leave the sea.

The stomachs of these small petrels usually contain small stones, otoliths, minute shells, and oil. Ussher and Warren (Birds of

¹ National Antarctic Expedition, 1901-1904, vol. ii., 1907, p. 78. It might be as well to state that this strange title refers to the British Antarctic "Discovery" Expedition under the late Captain Scott, R.N.
In the case of Leach's forktailed-petrel, mention "a number of round, semi-transparent objects," besides oily matter. These semi-transparent objects were almost certainly the lenses of the eyes of cuttle-fish. I have taken them in large numbers from the stomach of the porpoise. The oily matter was probably also derived from the same source.

The practice of vomiting oil, and of ejecting it to a considerable distance, is well known in the case of the storm-petrel, but it appears to be common to all the Petrels, which seem, indeed, to be saturated therewith. The natives of St. Kilda, and of the Blasket Islands off the coast of Kerry, formerly depended on the storm and Leach's forktailed-petrels for their light for the winter.

Of the "courting" habits of the storm-petrels we have no records. But the two species which breed with us lay the eggs either in deserted burrows or in crevices and crannies in cliffs, or under boulders, partly, apparently, for the sake of evading the light when incubating, wherein they differ conspicuously from, say, the fulmar. Leach's-petrel seems to prolong the annual shore-life as long as possible, since, in St. Kilda, it is one of the earliest to take up its breeding quarters in spring, and one of the last to leave in the autumn. Both sexes incubate, and this is true of both species breeding with us. When on the nest the sitting bird most tenaciously guards its egg, commonly permitting itself to be taken in the hand rather than try and escape. Rude disturbances of this kind, however, are greatly resented, and an attempt is always made to discourage inquisitive ornithologists by a squirt of evil-smelling oil and semi-digested food.

By common consent these two small petrels, like many of their larger relatives, during the breeding season are crepuscular in habits, spending the day in incubation or brooding young, and emerging at night to feed. In support of this view, let me cite one or two modern writers whose claim to speak with authority none will care to question. Thus, then, Messrs. Ussher and Warren tell us (Birds of Ireland, p. 384) that the stormy-petrel thus behaves, and they quote Mr. R.
M. Barrington's statement in support of this, that during these hours of seclusion they keep up a constant "churr," quite audible over one hundred yards. Mr. W. Eagle-Clarke¹ affords us yet further light on the life-history of these birds. Writing of the storm-petrel in the Flannan Islands, he says that "they fly noisily about the islands during the night-time," and goes on to remark that they "are entirely absent during the day-time, leaving even small chicks to take care of themselves, and do not return till darkness sets in, when they tend their young and depart again early in the morning, probably to spend the day far out at sea in search of food. We opened out a number of their nesting-holes at all hours of the day, but the old birds were always absent, except in one instance, where the young had only recently emerged from the egg." Thus it is implied in this account that the burrows are occupied by day only while the birds are incubating. And this interpretation Mr. Eagle Clarke confirms in response to a letter I addressed to him on the subject while these pages were in the press. So soon as the young are hatched these birds spend the day far out at sea resting, and perhaps at intervals feeding. At dusk all come landwards, the females to brood, the males to disport themselves and feed anew. Perchance they too take a spell in the nursery, releasing the female.

According to Seebohm, Leach's-petrel in St. Kilda breeds in small subterranean colonies, a number of nesting cubicles opening out into a common tunnel. Similarly, it should be noted that the late Dr. E. A. Wilson (op. cit.) found more than one pair of Wilson's-petrel breeding in the same burrow. Moreover, the exceptional severity of the climate in the Antarctic area of its breeding range entails a high death-rate among the young, and during unusually cold summers none may be reared at all. In one case he took from a burrow an adult male and female, then two eggs, one clean and newly laid, the other old and rotten, and under all another dead and flattened adult. As the work of digging out the burrow was going on, a fourth bird was hovering

about as if anxious to gain admission. The floor of the particular burrow, it may be remarked, was formed by "hard, black ice." No wonder, then, that a plentiful supply of Adelie penguins' feathers had been necessary to form the foundation of the nest. But in the South Orkneys, where these birds were found breeding by the Scottish Antarctic "Scotia" Expedition, the conditions being less severe, no attempt at nest-building was made, though "both eggs and dead young birds of previous seasons were numerous in the tenanted holes containing fresh eggs."¹

The downy young, in the case of all these species, are fed by both parents, apparently on regurgitated oil, and they remain long in the nest. According to Ussher, a nestling of the storm-petrel, marked in July, was not fledged till mid-October. Since, he remarks, some adults may be commonly seen on the wing during the day, the task of brooding probably falls mainly on the females. This may be so, but evidently careful revision of existing records as to the habits of these birds during the breeding season is badly needed.

That these birds return year after year to the same burrow seems to be shown by the case of the storm-petrel which had lost its foot, and was thus readily distinguishable. This bird returned annually to the same nursery.

**THE SHEARWATERS**

Of the three species of Shearwaters which at one season or another may confidently be looked for in our waters, one only breeds with us, and this, the Manx-shearwater, has been by no means closely studied. Indeed, until much more careful observation of its habits has been made, we shall have to wait for a really satisfactory interpretation of some of the most salient characteristics of these interesting birds.

¹ *Ibis*, 1906, p. 167.
They take their name "shearwater" apparently from their peculiar "shearing" method of flight when feeding, during which they alternately rise and descend with the waves with outstretched wings, the descent taking an oblique direction, which is admirably described by the word "shearing." The earlier ornithologists, however, seem not to have observed this peculiarity, and the only species known to them was the Manx or "Manks" shearwater, which Montagu, for example, called the puffin. In his day this bird bred in large colonies in the Isle of Man, where their young were taken during August in great numbers and salted down for food. And the same toll was levied on their numbers in the Orkneys.

The Shearwaters differ conspicuously from the smaller Petrels, such as the storm and forktailed-petrels on the one hand, and the fulmar on the other, both in the shape of the beak and in the form of the body. These are features which have too long been set aside by the field ornithologist as "structural" characters, and therefore not coming within their purview. This is unfortunate, and the time is now come when the field ornithologist and those of us who are supposed to be more directly concerned with structural characters should join forces, for it is certain that not till then shall we be able to divine the exact relation which undoubtedly obtains between structure and habit.

Take this very instance of the shape of the beak. In how far has this been determined by the nature of the food? So far as the evidence goes, these birds display a striking similarity in their choice of food, and nowhere is this more apparent than in the fondness they show for sorrel, which they prefer even to sea-weed. Vegetable matter, however, forms but a small portion of their daily rations, and it is, of course, only procurable during their sojourn on their breeding-grounds, for the rest of the year is spent far out at sea. The ocean is their main source of food, and this seems to be made up of small surface-swimming organisms, especially Crustacea. But among the larger species like the fulmar and the Shearwaters, cuttle-fish seem
to be eagerly sought for. The fulmar apparently always seizes these as they float at the surface: and for the most part apparently so also do the Shearwaters. But that they also dive for food, and that this source of food is of vital importance, is shown by the elongated body and short, backwardly placed legs of these birds, features invariably present in birds which have to seek any large proportion of their food under water. Yet the diving habits of the Shearwaters are rarely referred to, and one must suppose are not commonly realised. Howard Saunders,\(^1\) however, in regard to Manx-shearwater, remarks that “it dives freely, remaining under water for about twenty seconds.” The precise fashion of its diving, however, seems to have been observed only by Ussher,\(^2\) who tells us that it will dash into and under water without closing its wings, and seems to fly or row itself beneath the surface for a few yards, but soon emerging. It will also dive with outspread wings while swimming or at rest on the surface. But it never dives auk-fashion. Sprats and other small fish and cuttle-fish seem to be the object of these submarine excursions.

Like the more typical petrels, the Shearwaters are experts at taking their prey from the surface of the water without alighting thereon, hovering over the desired morsels with vibrating wings, and pattering on the water with the feet.

So far as their general mode of life is concerned they present no marked points of difference. But the latter seems, if possible, to lead an even more strenuous life. It is never seen on land save during the breeding season, a custom common to the petrels, and seems never to deign to follow passing steamers for the sake of scraps as all other petrels will. At most it will approach for purposes of inspection, and, curiosity once satisfied, it continues its journey without more ado. Whalers and fishing vessels, however, furnish an irresistible attraction, for it will persistently and eagerly attend upon these, knowing from experience how much is to be gained thereby. It displays a most voracious appetite, and in its hawk-
ing excursions round such vessels is often taken on a baited hook.

Nothing seems to be known of the "courtship" of the Shearwaters, and little enough is known of the breeding habits of any save of the Manx-shearwater. But even in the case of this species our knowledge is very far from complete. Underground nurseries are invariably chosen: rock-crevices and deserted burrows are seized upon whenever they can be found, and failing these the birds will excavate for themselves. Both sexes take part in this work, and they share the duties of incubation and the care of the young. Only one is reared during the season, and this seems to be fed on regurgitated food, principally oil. And herein, it seems to me, we might profitably make a distinction between "regurgitated" and "disgorged" food, using the former term for food which has been completely changed by digestion, and the latter for such as has simply been "pouched" for the convenience of carriage. Thus the Petrels and Pigeons afford instances of young which are fed upon "regurgitated" food, while the young of herons and cormorants, for example, are fed upon "disgorged" food. Often the head of a fish "disgorged" by a cormorant has been more or less digested, as it were accidentally, but the greater part thereof is taken by the young in its actual raw state.

Like the young of the storm-petrel and its congeners, nestling shearwaters remain long in the nest, and are similarly clad in nestling down of excessive length and "woolliness." Similarly, like the adults they eject oil when molested. As with the smaller petrels, so with the shearwater, the young are eagerly sought by the natives for the sake of the abundant oil they yield, and for their flesh, which they apparently find palatable in spite of the curiously pungent smell which emanates from petrels of all sizes and ages. The hunters discover their quarry either by means of dogs or by listening for the sounds made by the brooding birds, for they are very garrulous in their burrows. According to Messrs. Ussher and Warren their notes sound like "ah-roo, kuk, kuk, ah-oo." Some of these notes are uttered in a deep voice and some in
Plate 174

Upper: Fulmars
Lower: Manx-shearwaters

By A. W. Seaby
the sound of wind and water in often taken over by exaggerated assertions. The element of the "goodness" of the characters and the beauty of the surroundings is known of the breeding habits of the young. But even in the case of this species, our knowledge is not very precise. The existing records are contradictory, and the scientific workers are divided in their opinions. The subject is of interest, and the future work on this problem will be important. 

The young of the sand-piper and its congeners spend the winter in the interior of the country, and the young of the sea-gull are found in the summer. The young of the sea-gull are entirely different in their habits; they are of the species of the parrot, and are, in fact, carnivorous birds. The young of the sand-piper is usually of the same species, and is called the "sand-piper." The young of the sea-gull is usually of the species known as "sea-gull."
a higher and more plaintive key, suggesting the differences between males and females.

Whether incubating or brooding young, the parents do not seem to issue from their fastnesses till dusk or later. And the fact that during the summer more or fewer Manx-shearwaters may be seen abroad at all hours of the day suggests that they are non-breeding birds.

While in favoured localities the Manx-shearwater still breeds among us in large numbers, from some of its strongholds it has been ousted. In the Isle of Man, according to Yarrell, it was exterminated by rats, while its namesake the puffin succeeded in effecting its complete eviction from Pabbay, one of the Hebrides. From which we may gather that in the struggle for existence the Manx-shearwater makes but a poor fighter.

**FULMAR-PETREL**

This remarkably interesting bird, one of the most gull-like of the Petrels, is but seldom seen save by those "who go down to the sea in ships," or who have to make a pilgrimage to St. Kilda, when, for a few weeks, they are constrained to rest on land while performing their allotted task of propagating their species. At all other times of the year it is a strictly oceanic bird living far from land, but contriving to obtain an abundance of food in the shape of cuttle-fish and surface-floating organisms, supplemented by offal cast from ships, and the blubber and oil obtained by attendance on whaling vessels. In their eagerness to secure this they approach so near to those engaged in flensing operations that they may be knocked down with an oar, or even taken by the hand. When following a ship they display all the skill of gulls, and according to some authorities are even more deft at turning movements, and more buoyant and graceful in flight; but in
scudding the pinions are held very straight, a fact which enables the fulmar to be distinguished from the gull with ease. Large pieces of food which may be thrown out to them are torn in pieces as the bird sits paddling in the water, smaller pieces are swallowed at once, sometimes in mid-air. But they seem to dive but rarely, and even then the plunge is but momentary. If all accounts are true, however, they go deep enough to reach the bait of “long-liners.” Curiously enough, during this short sojourn on land, when breeding, these birds display a strange liking for the sorrel which grows on the ledges where they are breeding. But save during this short space of time no other vegetable food is eaten.

Of the behaviour of these birds during the “courtship” period there are few records, and by far the most lengthy are those of Mr. Selous, who studied the fulmar in the Shetlands. After the birds have mated, it would seem they indulge in strange and often grotesque antics. One of the most curious is a habit of facing one another open-mouthed, and with outstretched necks, meanwhile moving the head from side to side and up and down as they utter a series of hoarse coughs or grunts, though at times they perform in silence. This display of the open mouth seems designed to make the most of the delicate mauvy-blue which lines its cavity, yet it is surely more than doubtful whether either bird exactly realises that its own mouth is coloured like that of its neighbour; though nevertheless the exhibition of it may serve as an excitant. It is certainly significant that this parade of the open mouth is only seen in such species as have this cavity brilliantly coloured, as, for example, in the black-guillemot, the razorbill, and the shag.

Since the young petrel in its fledgling plumage scarcely differs from the adult, it is not surprising to find that the mouth cavity is in like manner coloured, but it differs in hue, being paler and pinker.

Both sexes seem to share in the duties of incubation of the single egg and in feeding the chick, which for some considerable time remains in a lethargic state. Only once in a while, remarks Mr.
FULMAR-PETREL

Selous, will it rise a little on its feet and shuffle a few steps, but even then doing no more than turn round. This passiveness is due at first to sheer inability to move, and later to an inherent disinclination. These conditions we must attribute to natural selection having weeded out all those individuals which were of a restless disposition, for on the narrow ledges which form their nurseries a move so much as six inches would in most cases mean instant death by being dashed to pieces against the foot of the cliff.

During a portion of each day the youngster is brooded by the female, or she sits beside it, remarks Mr. Selous, "nibbling with her bill amidst its long, soft, white fluff, the chick sitting still the while, with its beak held open, but not at all as though it were thinking of food." At night one or other of the parents, apparently the female, sleeps beside it, the youngster turning the head back and burying the beak between the wing and the body, as is the custom with roosting birds.

The young one is fed by placing its beak within that of the parent, receiving, apparently, a mouthful of oil. Solid food does not seem to be given during the downy nestling stage. Both adult and young possess the power of ejecting this oil, which has a peculiar and most pungent smell, at any adversary by whom they may be threatened, and their aim is good. As the noisome fluid leaves the mouth the jaws are opened to their fullest possible extent. Similarly they possess the power of ejecting the excrement with considerable force and to a surprising distance, so that it is carried clear of the nest, a most important sanitary measure.

At times, at any rate, the female seems, according to Mr. Selous, to resent the approach of her mate while she is brooding her young, squirting oil at him, and uttering an angry "ak, ak, ak, ak;" sometimes preceded by a more or less curious "rherrrrrrrr." The fulmar presents a light and a dark phase of plumage; in the

---

1 The Bird-Watcher in the Shetlands, pp. 89-90.
2 Ibid., pp. 92, 201.
latter the under parts are greyish. This dark form, curiously, is the more northern type, and is the dominant type in Greenland and the more northern parts of Iceland. It is said, however, to be spreading southwards, even to the Scottish islands. But the dark birds are said to be slightly smaller and to suffer from persecution from their lighter relatives, at any rate when they are the more numerous.

The natives of St. Kilda depend very largely on the fulmar for their means of support. The adults are caught with a noose for the sake both of the oil they yield and their flesh and feathers. And a heavy toll is levied on the young for a like purpose. The oil is obtained from the adult by placing the bird head-downwards between the knees, then the beak is opened and a tablespoonful or more of clear amber-coloured oil runs out, to be received into a bag formed of the dried gullet of a gannet. The adults are esteemed as food on account of the thick layer of subcutaneous fat, of which the St. Kildans are inordinately fond.
1. Black-scoter.
2. Shelduck.
3. Eider.
4. Tufted-duck.
5. Pochard.
8. Redbreasted merganser.
1. Teal
2. Garganey
3. Pintail
4. Shoveler
5. Mute-swan
6. Wigeon
7. Longtailed-duck
8. Gadwall
9. Scaup
10. Mallard
PLATE U
NEST FEATHERS AND DOWN OF DUCKS

[The feather and down patterns should be used in conjunction with the descriptions in the Classified Notes by which they are in some cases slightly modified]

1. Shelduck
2. Wild-duck or mallard
3. Gadwall
4. Shoveler
5. Pintail
6. Teal
7. Garganey
8. Wigeon
9. Pochard
10. Tufted-duck
11. Scap
12. Eider-duck
13. Scoter
14. Goosander
15. Redbreasted-merganser
<table>
<thead>
<tr>
<th>Egg Plate V</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Shag</td>
</tr>
<tr>
<td>2. Cormorant</td>
</tr>
<tr>
<td>3. Gannet</td>
</tr>
<tr>
<td>4. Fulmar</td>
</tr>
<tr>
<td>5. Manx-shearwater</td>
</tr>
<tr>
<td>6. Storm petrel</td>
</tr>
<tr>
<td>7. Leach's forktailed-petrel</td>
</tr>
</tbody>
</table>

By H. Grønvold
THIS BOOK IS DUE ON THE LAST DATE STAMPED BELOW

AN INITIAL FINE OF 25 CENTS
WILL BE ASSESSED FOR FAILURE TO RETURN
THIS BOOK ON THE DATE DUE. THE PENALTY
WILL INCREASE TO 50 CENTS ON THE FOURTH
DAY AND TO $1.00 ON THE SEVENTH DAY
OVERDUE.

BIOLOGY LIBRARY

APR 27 1934