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SEA TERNS



1. MOSTLY ROSEATE TERNS WITH SOME SANDWICH AND A FEW COMMON AND ARCTIC TERNS.

SEA TERNS
or Sea Swallows

Their habits, language, arrival and departure

by

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Illustrated with Photographs, Drawings and Diagrams by the Authors

London: Country Life Limited

" He hastened over the wave like to a tern hunting fish on the dread bosom of the unharvested sea, which dips its thick feathered wings in the water."

Odyssey, V. 51.

First published in 1934

PRINTED IN GREAT BRITAIN

PREFACE

A FEW words may, perhaps, be allowed in explanation of the purpose with which the following pages were written.

It has been our endeavour to produce a connected and exhaustive account of the life of the British Sea Terns, which, as Sea Swallows, are more or less familiar to most people. If excuse is necessary for sharing our observations with the public we may urge that, hitherto, our subject has not been treated comprehensively. And fullness of treatment and fidelity of recording the life and doings of one related group of birds we thought might appeal to the general reader and the student of bird-life alike, as they have done to ourselves.

In making this history many authorities have been consulted in the preparation of certain chapters; where this has been done is obvious and our obligations have been expressed.

But for the rest, almost without exception, the details recorded are the result of personal observation on our part covering many years. We have avoided, with care, using the records of others.

To ensure these observations being original and adequate we have been at pains to spend many consecutive hours, days and even weeks in hide and hut in various terneries closely watching and immediately recording, feeling that only by so doing could a complete picture be obtained of the life of the Terns. We claim this procedure has enabled us to present fresh facts in connection with migration; with arrival and departure; many original observations on the course and progress of love-making; the significance of the " tracks " of the Terns; an extensive " vocabulary " of their speech exceeding anything yet published of this kind, and other new details of ornithological interest.

These we have illustrated by original diagrams and drawings, and photographs of our own taking.

Not long ago someone incautiously remarked that British birds, as a subject of study, were " played out." We think our pages will show that this statement is very far from the truth, for

> " What is discovered only serves to show
> How little 's known to what is yet to know."

We must express our great obligation to Professor Oliver, F.R.S., for his courtesy in allowing us to use the outline of his map of Blakeney

Point as a foundation for the details of migration and nesting shown in the diagrams on pp. 47, 69; to Messrs. L. J. Turtle, H. T. Malcomson, J. Cunningham and J. A. S. Stendall; to Lord Ilchester and the Rev. F. L. Blathwayt; to S. H. Long, M.D., F.Z.S., M.B.O.U., Hon Sec. of the Norwich and Norfolk Naturalists' Society; to B. B. Riviere, M.R.C.S., F.Z.S., M.B.O.U., R. M. Garnett, M.B.O.U., and the "Watchers" on Blakeney Point, Scolt Head and at Ainsdale for valuable assistance in various ways.

Our thanks are also due to the Editor of *Scottish Country Life* for permission to reproduce illustrations and the gist of our article on "Petty Larceny in a Ternery."

Sway, July, 1934. G. M. and A. M.

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OF SEA TERNS AND MARSH TERNS

IN its origin the name " TERN " is obscure. It may be related to the Danish " terne " and " taerne," the Norse " terna," and the Swedish " tarna," all meaning a maid-servant. What the connection is between a maid-servant and a sea-bird is not readily discernible, but if it exists it may have some mystical significance, as has the Gaelic name for the Oyster-catcher—" Gille-bhride," which means the " Servant of Breed or St. Bride."

We have, in an Anglo-Saxon vocabulary of the eighth century, the bird name " stearn,"[1] and in Old-English it appears as " stern " and " stearne "; but it is not certain if the word was the name used for the birds we call " Tern " to-day. Whether the English " stern " has any affinity with the Scandinavian " terne " does not appear; nor, if so, why and when the initial " s " was dropped. But it does, or did, remain in use as a country name, and occurs in Gaelic as " stearnal " and " stearnan," and as " stern " and " starn " in Norfolk. Turner probably heard this word used to denote the Black Tern when he was at Cambridge University, and so in his *Avium præcipuarum historia* wrote: " *Nostrati lingua sterna appellata* " (" it is called in our language ' sterna ' "). From this statement of Turner's Linnæus adopted " sterna " as the generic name for the species.

Probably the first known ornithological use of the name " tern " is by Willughby, when he made that amusing essay into the etymology of the word in his *Ornithologia* (1678), where he says: " In Northern parts they call them Terns, whence Turner called them in Latine, Sternæ, because they frequent Lakes and great Pools of water, which, in the North of England, are called Tarns." But there is an early reference to the bird in the *Northumberland Household Book* dated 1512, where among birds for " My Lord's own Mees " are " Ternes after iiij a jd.," *i.e.* four a penny; and a still earlier one is its appearance as " Tearn " in an Anglo-Saxon vocabulary of the eleventh century.[2]

According to Selby, the word should only be applied to the Sandwich Tern, the rest being called " Sea Swallows," which he said was the custom in the Farne Islands. Willughby, however, had, in his great work,

[1] Wright, *A.-S. and O.E. Vocab.*, p. 7.

[2] *Ibid.*, p. 131.

previously used the name for more than one of the species, and it is to-day used for all.

There are a number of common names still in use, or dying out, which seem to be akin to the Scandinavian, and as most of these come from the Orkneys and the east coast of Scotland, it is more than likely their origin is in that language. " Picktarne " is one of these which was certainly in use as far back as 1684 ; " tarnie " is another, " darr " is probably a third, while others will appear later on.

Of these Terns, which are a widely spread race, there being about fifty species distributed over the globe, we are concerned only with those which are visitors to the British Isles either for breeding purposes or merely making a passing call. Of these there are fourteen species, including two of doubtful authenticity. They may, conveniently, be separated into two groups, according to the place they frequent for breeding and obtaining their food—" SEA TERNS " or " Sea Swallows," and " MARSH TERNS " or " Carr Swallows." The former, excluding the doubtful kinds, number eight species, and of the latter there are three. One species—the Gull-billed Tern—seems to belong to both groups.

Some of the Terns are common, and at the right time and in the right place one may always count on seeing them. These are " summer resident " birds, and number five species, and are all Sea Terns. They are the Sandwich, Common, Arctic, Roseate and Little Terns.

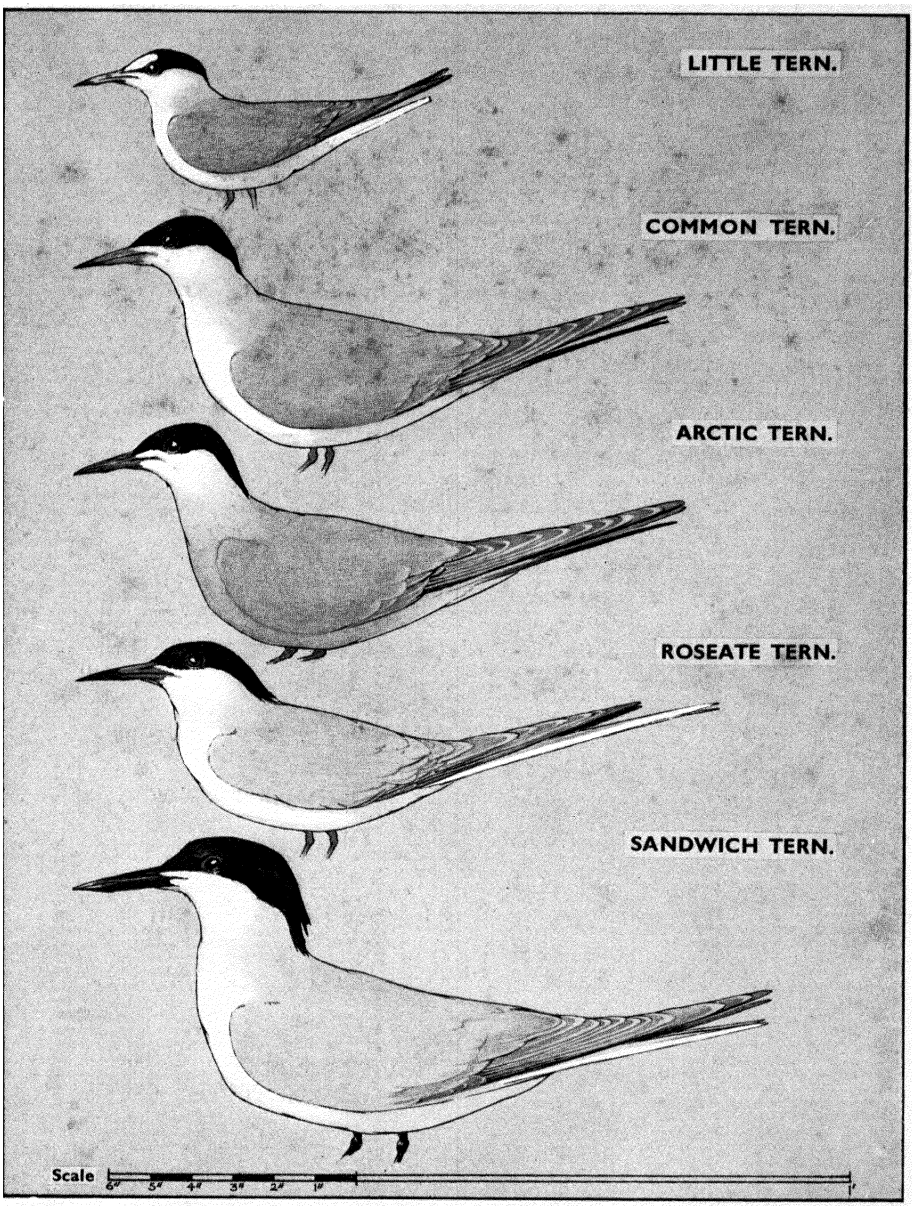
One of the Marsh group, the Black Tern, is a " passage migrant," *i.e.* it visits us every year in small or greater numbers, going to or coming from its continental breeding-places. At one time it nested abundantly here, but now is, for one reason or another, lost to us as a breeding species, though it still visits us in Spring and Autumn in some numbers.

The remaining species come very occasionally, and are " vagrant " Terns.

Of the " vagrant " Terns there are the White-winged Black and the Whiskered Terns, both of these being Marsh Terns ; the Gull-billed Tern, which is a link between the Marsh and Sea Terns ; and the Caspian, the Sooty and the Noddy Terns, which are true Sea Terns.

At one time one of these, the Gull-billed Tern, bred, or was thought to breed, in Great Britain : Montagu observing, in 1802, " Without doubt this (the Sandwich Tern) and the Gull-billed Tern both breed on the coast of Britain." It does not do so now, neither does the White-winged Black Tern, which, probably, nested also, though there is no record of it having done so.

Besides these, there are two dubious occurrences—one an example of a Lesser Sooty Tern, accepted as genuine by some authorities, rejected



2. COMPARATIVE DIAGRAMS OF THE FIVE "SUMMER RESIDENT" TERNS.

by others; and the other a Swift Tern which may have been an attempt at fraud or a practical joke, though there is just a possibility that it—or they, for more than one were reported—was a genuine visitant.

Mention, too, should be made of the Brown Tern which proved to be the young of the Common Tern; the Striated Tern which was the name given to the young of the Sandwich Tern under the delusion that it was a different species; the " Sterna nævia," also a young Sandwich Tern; and the " Sterna portlandica," which is now known to be an Arctic Tern in the plumage of its first summer.

When the study of birds was in its infancy there was much confusion and misapprehension about the Terns, resulting in the creation of species which did not exist, referred to in the last paragraph, an inability to recognise the distinctive characters of species common on our coasts, and, a little later, a bewildering redundancy of names.

At the outset Terns were, not unnaturally, confused with Gulls (Willughby speaks of " Terns, the least sort of Gull, having a forked tail "), for not only are they similar in appearance, but both Terns and Gulls frequent the seashore. This mistake, which is also made to-day, is a not unreasonable one, for they are, indeed, closely related, and they were not only included in the Order Lari but grouped in the genera Larus.

Thus Gesner (1516–1565), the " Father of Ornithology," and Aldrovandus (1522–1605) define three kinds of Tern under the names of Larus niger, Larus piscator and Larus cinereus, the latter name appearing to have been used for a true Gull as well.

The first is evidently the Black Tern and is thus described—" This small Gull hath a black Bill, Head, Neck, Breast, Belly and Back, ash-coloured Wings, reaching beyond the Tail. The Legs have a slight dash of red."

Baltner, an observer and artist of the same date, having made a picture of Larus niger, was able to describe it with considerable accuracy, adding some slight account of its behaviour.

A Mr. Johnson, a Yorkshire-man, furnished a description of a British specimen which he called a " Scare-crow," probably meaning a " scared " or " frightened " crow, for he says " it cannot abide the presence of men." It may, however, be " skirr," not " scare," a common name of the Sandwich Tern (see p. 7). Another explanation has been given, that it is " Carr-crow " from its being found on marshes, *i.e.* " carrs."

" Larus piscator " as described by Gesner, Baltner and Johnson seems almost certainly to be the Common Tern, though there is some discrepancy in the colour of the legs, this being due in all likelihood to their descriptions being made from dry specimens, the feet of which had changed

colour. Baltner adds to his description of the externals, " the guts are half a yard long," but we have not as yet checked his statement.

Willughby, from whose *Ornithologia* we have taken these details, did not appear to have seen the birds himself.

Turner, whose *Avium præcipuarum historia*, already mentioned, was published in 1544, writes of two birds only which can be ascribed to the Tern family : one a " Larus," which he calls " Stern " and is obviously the Black Tern, and the other " Fulica," which seems to be either the Common or the Arctic Tern. Gesner, who corresponded with Turner, possibly got the word " Sterna " in that way, though he does refer to a white and grey bird with a black head as the " Stirn of the Frisians."

Sir Thomas Browne, writing in 1662, says of Norfolk, " Here is . . . many sorts of Lari, seamews and cobs," and that the " Larus cinereus greater and smaller " (the Sandwich and the Common Terns ?) " are butt a coars meat commonly called sternes," and refers to the " Hirundo marina " or " sea-swallowe," " a neat white and forked tayle bird butt much longer than a swallowe," by which he may mean the Common Tern. It is curious that Browne does not mention the Black Tern, which in his day was so numerous in Norfolk that the " noise of the assembled multitude was deafening." Ray, in his " *Third Itinerary*," made in 1662, visited Wales. He refers to Caldey Island in Pembroke as follows : " In one part of the island the puits and gulls and sea swallows' nests lie so thick that a man can scarce walk but he must needs set his foot upon them." And of his visit to Priestholm, or Puffin Island, he says he found " Scrays, two sorts, which are a kind of gull." Leigh, in his *Natural History of Lancashire, etc.* (1700), writes of two Sea-gulls, the Great and the Less, evidently the Gannet and a Tern, seen in North Lancashire. " It is," he says, " a very diverting sight to see them mount, and hover in the Air, spying out their Prey, which discover'd they strike instantly into the Water, take it up in their Pounces, convey it to the Shore, and there feed upon it." He further says, " There are vast quantities of these in the Isle of Walney, particularly in Breeding-time, the whole Island is near covered with Eggs, or Young-ones, so that it is scarce passable without injuring them."

Pennant recognises in his *British Zoology* (1766) three kinds of Terns only: the Greater Tern, which he refers to Willughby's Sea Swallow and Brisson's Sterna major ; the Lesser Tern, this being the Lesser Sea Swallow of Montagu and Sterna minor of Brisson, and the Larus piscator of Gesner ; and the Black Tern, the " Scare-crow " of Willughby, the Black cloven-footed Gull of Ray, the Larus niger of Gesner and Sterna nigra of Brisson.

The knowledge of Terns was growing, and we find Latham in his *General Synopsis* (1781) not only able to describe the Common Tern

with commendable accuracy and detail, but knew enough to add notes on its habitat and habits; this being the first complete and reliable description hitherto written. This is his description, which from the measurements and weight seems to refer to the Sandwich Tern ; the account of the nest and eggs suggests the Black-headed Gull, while the remainder describes the Common Tern.

" The Sea Swallow or Hirundo marina. The weight of this bird was near five ounces. Its length from Bill to Tail sixteen inches : its breadth from Wings end to Wings end thirty two inches. It is a small bird, slender and long bodied : Hath a forked tail. . . . A Black crown, the black being terminated by a line drawn from the Nosthrils through the Eyes to the Neck, so that above the eyes the Head is black, under the Eyes white. The Cheeks, Chin, lower Belly, underside of the Wings are all white. The Breast hath something of cinereus mingled. The Rump is white : the Back and upper side of the Wings are of a dark ash colour. Each Wing has twenty nine quils ; the outermost ten whereof have their outer Webs running into sharp points, the rest their inner. The exteriour Web of the first or outmost feather is black, the shaft white, and of notable thickness : The tips of the following till the tenth and the inside all white and moreover half the interiour Web of the four or five foremost. The Tail is composed of twelve feathers, the outmost being half a foot long and better and having their exteriour Webs from cinereus inclining to black : The two middlemost scarce three inches long and white : the rest having their outer Webs cinereus, their inner white.

" Its Bill is long, almost streight, black at the tip, else red. Its mouth is red within : Its tongue sharp : Its legs red ; the back toe small : The fore-toes web'd together as far as the very Claws. The craw was large, out of which we took a Gudgeon : The Gizzard full of fish bones : The Guts twenty inches long : The blind guts very short.

" These Birds flock together, and build and breed on Islands uninhabited near the Sea-shores many together in the same quarter. In the Island of Caldey, adjacent to the Southern shore of Wales, they call them Spurres and that little Islet where they build Spurre Island. In other places in England they are called Scrayes, a name, I conceive, framed in imitation of their cry. In the Northern parts they call them Terns. . . .

" They lay three or four eggs, either upon the bare ground or in a Nest made of Reeds. Their eggs are like the great Gulls eggs, though much less : The Young are also spotted with black like theirs."

Even Latham at this time knew nothing of the Arctic, the Roseate and the Sandwich Terns as British birds (he wrote of the latter as the African Tern), and it was not until 1787, when " that diligent naturalist Mr. Boys " called his attention to it, that he realised the Sandwich Tern was a British bird and named it " Sterna Sandvicensis."

To Montagu the Arctic Tern was apparently unknown as he did not mention it in his *Dictionary of British Birds* (1802), neither did Linnæus in his *Systema Naturæ* (1735), but though Seebohm says [1] that the distinction between the Arctic Tern and the Common Tern was not discovered till 1819, it had been described as a separate species as far back as 1764, by Brunnich. Nevertheless, it remained for a long time and is even to-day, on occasion, confounded with the Common Tern.

Some time prior to 1802 Montagu had shot a Gull-billed Tern in Sussex, but failed to recognise its specific characters and classified it as a Sandwich Tern in his *Dictionary of British Birds* (1802), and it was not until 1813, when Latham's type specimen came into his hands, that he saw the difference.

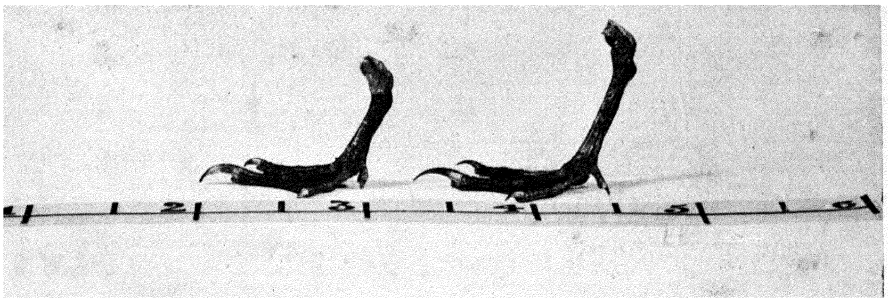
There was still another species which had, hitherto, escaped notice, this being the Roseate Tern, but in 1813 Dr. MacDougall, having shot a specimen, sent it to Montagu, who described it under the name of " Sterna Dougalli," thus completing the recognition of the British breeding Terns.

As for the visiting Terns, the Caspian was first recognised from a specimen shot at Yarmouth just before 1825 : the Whiskered Tern was discovered in 1836 at Lyme Regis : the White-winged Black Tern was described in 1841 from a bird shot on either the Shannon or the Liffey, accounts varying : the Sooty Tern from a specimen obtained at Tutbury in Staffordshire in 1852 : while those debatable birds, the Lesser Sooty Tern and the Noddy Tern, were, to give them the benefit of the doubt, discovered in 1875.

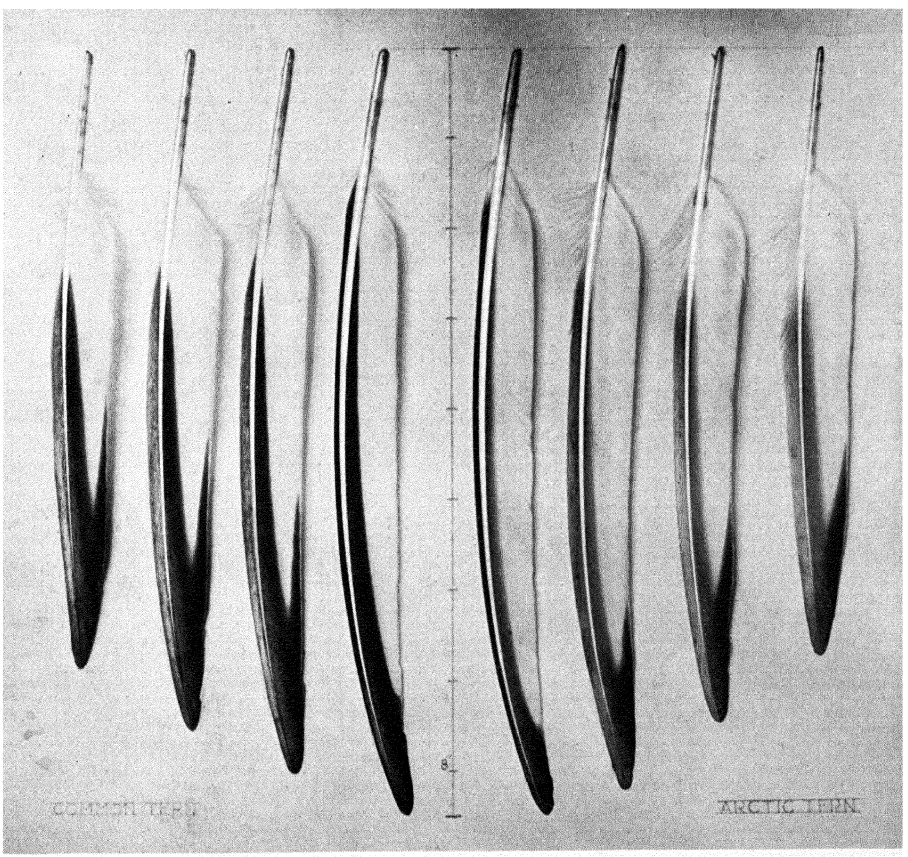
It is not necessary to carry the progress of the description of these birds any further than to say that from this time onward a succession of more or less able writers dealt with the Terns in their comprehensive works on British birds. Selby in 1833, Macgillivray in 1837, Thompson in 1849, Sharpe and Dresser 1871–1896, Yarrell in 1871, most of these being useful compilations with little original observation, it not being apparent that some of the authors had ever seen a Tern in the field. Then came the era of sectional ornithologies, the County histories, some of which, being written by men who personally knew the birds, are extremely good. The growth of detail dealt with in these works necessitated that landmark in ornithological literature, the *Handbook of British Birds*, by H. Saunders (1889), which, unrivalled in its condensed accounts of the birds, has only now been superseded by the *Practical Handbook of British Birds* by H. F. Witherby, which is almost the last word in presentation of the necessary and important.

Formerly the Order in which Terns were placed was called Gaviæ

[1] *Hist. of British Birds*, III. 1885.



3. COMPARISON OF FEET AND TARSI OF ARCTIC (LEFT) AND COMMON TERN (RIGHT).



4. FLIGHT FEATHERS FROM WINGS OF COMMON AND ARCTIC TERNS, SHOWING WIDTH OF PRIMARY BAND.

(family Laridæ) or Charadriiformes. Their recognition as a sub-family of the Order Sterninæ which once was accepted is no longer considered necessary. The genera to which they are now assigned are (*a*) Chlidonias, to which genus belong the Black, the White-winged Black and the Whiskered Terns; (*b*) Gelochelidon, the Gull-billed Tern; (*c*) Hydroprogne, the Caspian Tern, and (*d*) Sterna, to which are assigned the Sandwich, the Common, the Arctic, the Roseate, the Little and the Sooty Terns [and also two doubtful ones, the Lesser Sooty and the Swift Tern]. To the genus Anous belongs the Noddy Tern.

It may be said that there is much confusion both as to the scientific names of the Terns and the dates when these were bestowed, no two authorities seeming to agree. Many species were discovered several times over and named more or less, usually less, appropriately. In many cases the " discoverer " annexed the descriptive portion of the name bestowed by a previous discoverer, adding his own specific title.

The largest of our breeding Terns, the SANDWICH TERN (*Sterna sandvicensis sandvicensis Lath.*), (Pl. 2), was named, as we have said, by Latham in 1787, " Sterna Sandvicensis," owing to its being found " in vast flocks making a screaming noise " at Sandwich in Kent. The first specimen was shot by Dr. Boys in 1784. He communicated the information of the new species to Latham, who, in 1790, altered his original appellation, in honour of Boys, to S. Boysii. Gmelin, who had already in 1788 named it S. Africana, changed it, in 1789, to S. Cantiaca—the Kentish Tern—a name adopted by both Yarrell and Saunders.

As previously noted, Selby said it was called in the Farne Islands in his day " the Tern," all others being called " Sea Swallows." In Ireland, Sandwich Terns are called " Large Skirrs " (see p. 3), and also " Surf Terns from their partiality for settling on sunken rocks where the surf runs high." Other names are Sparling, Kek and Kek Swallow, Kip and Screecher Kip, Screecher, Skrike, Pearl Gull, Cat Swallow, Great Sea Swallow and Big Sea Swallow. It is Hirondelle de mer caugek and Sterna caugek in France, Golondrina de mer pogada in Spain, beccapesci in Italy, Brand-Meerschwalbe, Brand-Seeschwalbe and Kentische Meerschwalbe in Germany, groote Zeezwalou in Holland, and in Denmark, Kentisk Terne.

The origin of some of these names and of those of other species is obvious: of many it is obscure. " Kek," " Kip," " Screecher " and " Skrike " have reference to its cry; " Pearl Gull " to its colour; " Great " and " Big " to its size compared with other species; " Cat " is not obvious except as a " cry " name, nor is " sparling "—Scottish for " smelt "—unless it is so named because the bird eats small fish.

The length of the Sandwich Tern is 418·0 mm. (5 measured); its wing from carpal joint to the tip of the longest feather is 300·0 (10 measured); its wings outstretched (wing span), 809·5 (2 measured); its bill 53·3 (8 measured), and its weight 255·158 g. (2 weighed).

It has a black bill with greyish-yellow tip. The inside of its mouth is yellow; its iris, brown; its legs and feet are black, its soles yellow; its forehead, crown and nape, jet-black, the feathers of the latter being prolonged into a sort of crest which is erected during excitement. Mantle, scapulars and back are a medium aluminium-grey. Rump, upper tail coverts and tail are white. Wing coverts and secondaries, medium aluminium-grey, the latter with inner webs very broadly edged with white. First primary, small and like secondaries. Second primary, outer web and half inner almost black, changing to dark ash-grey at the tip, rest of inner web and quill, white. Other primaries, like the secondaries. All underparts are white, the feathers of the breast next the body often being tinged with salmon pink.

The wings extend beyond the tips of tail an average of 53·0 (5 measured). The tail is forked, the depth being about 75·0. The fork, as with all Terns, is only visible when the bird spreads its tail to turn in the air or to alight; when closed the tail is pointed.

The sexes are indistinguishable.

The name given to the COMMON TERN (*Sterna hirundo hirundo Linn.*) (Pl. 2) is properly applicable only to England: elsewhere it is *not* the common Tern. Called Sterna hirundo, the Swallow Tern, by Linnæus in 1758; " the species he described under this name is evidently the Arctic Tern."[1] Other examples of the misapplication of names to descriptions of the Common Tern are:—Cloven-footed gull (Albin), which was the Black Tern and, curiously enough, Sandwich Tern (Latham), and S. Boysii (Ind. Orni.), the latter name also relating to the Sandwich Tern. It was renamed S. fluviatilis, the River Tern, by Naumann in 1847, which name was used by Yarrell and by Saunders. Altogether it has been given sixteen scientific names.

The common names of this Tern are numerous. " Sea Swallow " is the general one from its swallow-like form, not only in English but appears in Welsh as Gwennol y Mor and Morwennol gyffredin; in French as Hirondelle de Mer and in German as Seeschwalbe and Fluss-Seeschwalbe. Rondine de Mare the Italians call it, and it is Golondrina de Mar in Spain. It is also called Pierre-Garin in France; Kleinere Mewe, Kleine Fischmewe, Fischmewe, grauer Fischer, Fischerlin, Rohrmewe, Rohrschwalbe, Swartzkopf, Spirer, Speurer, Schmürring and Tänner in Germany; het Vischdiefje in Holland; Fisktärna in Sweden; Makrel-

[1] *Handbook of British Birds*, Harting, p. 74.

terne in Norway and Haette Terne in Denmark. In addition to those names before mentioned as possibly derived from the Scandinavian are such as Picktar, Pickitar, Picket-aa, Pictarnie, Picktarney, Picket tarney, Piccatarrie, Speikintares (" pick " evidently refers to their habit of " picking " small fish from the sea). Pick-mire also contains this meaning, and also Ticket. Tarney, Tarry, Tarret, Tarrack, Tarrock, Terrick and Taring all seem to have their origin in Tern. Names seemingly founded on the cries of the bird are: Ysgrechan—the screamer; Ysgraell —rattle; Skrike, Scrage, Scray, Scraye, Scobby-scray (" cob " being a gull), Skirre and Skirr, Sporre, Spirre, Spurre, Spurling and Sparling, Pirre, Perl, Great purl, Dip purl (a reference to their custom of dropping into the water). Also onomatopœic are Kirrmew (" mew " being Irish and Cornish for Tern), Kirmsu, Kip and Clett (Kirre appears in the Danish name for Black Tern—" Sort Kirre "); Mew, Mew gull, Big mow (mew), and Zethar, which is Cornish for Seamew. Large Tern, Great Tern, Greater Tern and White daw are descriptive. Rixy, meaning quarrelsome, refers to its disposition, as also does Gull-teaser. This last name, according to Montagu,[1] was given " because it pursues and persecutes the lesser gulls till they disgorge their recent prey, which is caught and swallowed by it ere it reaches the water." This is either a mistake for the Skua or the Tern's habits have changed, for it never acts in this way now (see p. 165). It is more likely that the name refers to their habit of mobbing gulls which trespass on the ternery. On the other hand, Selby states that the Surinam Tern " pursues lesser ones in order to make them disgorge what they have swallowed, which it seizes on as its lawful prey." The names " Williefisher " and " Kingfisher " suggest its skill in catching its food. It is called in the Isle of Man, " Gibbyn Gant," meaning the Gannet of the sand-launce—" gannet " from its resemblance to that great diving bird and " launce " in reference to one of the items of its menu. More poetically it is " Spithag " and " Spyrryd," meaning " Spirit," from its angel-like grace and whiteness. Miret, Rittoch, Rittock and Rippock we cannot account for. Mackerel Tern it is called in Devonshire as well as in Norway because it attends on the fishermen. And in this connection in the West of Ireland its arrival in numbers is thought to denote plenitude of salmon during the season.

The first reference we know to the use of Terns as an article of food is in the *Northumberland Household Book* (1512) (see p. 1). The early writers, Gesner and others, mention the bird as being eaten. Baltner said of both Larus piscator and L. niger, " Their flesh is good to eat." It is mentioned as an edible bird in a " Breviate " of directions for the ordering of a nobleman's house in the sixteenth century; and in the Naworth

[1] *Dict. of British Birds*, 1866, p. 341.

accounts the " Sea Swallow " is entered as " eatable."[1] Sir Thomas Browne was not enthusiastic ; he said it is " butt a coars meat " ; Latham, in 1781, said, somewhat guardedly, the Common Tern was " thought good eating." Montagu quotes Dr. Boys as saying, " It (the Brown Tern) is esteemed a good relish when split and boiled and the eggs excellent when boiled hard and eaten cold." Leigh, in 1700, said, " Their Taste is very strong and ungrateful and therefore not much regarded." Shakespeare, too, may have been acquainted with the dainty, for he makes Caliban addressing Trinculo say :

> " Sometimes I'll get thee
> Young scamels from the Rock." *Tempest*, Act ii, Sc. 2.

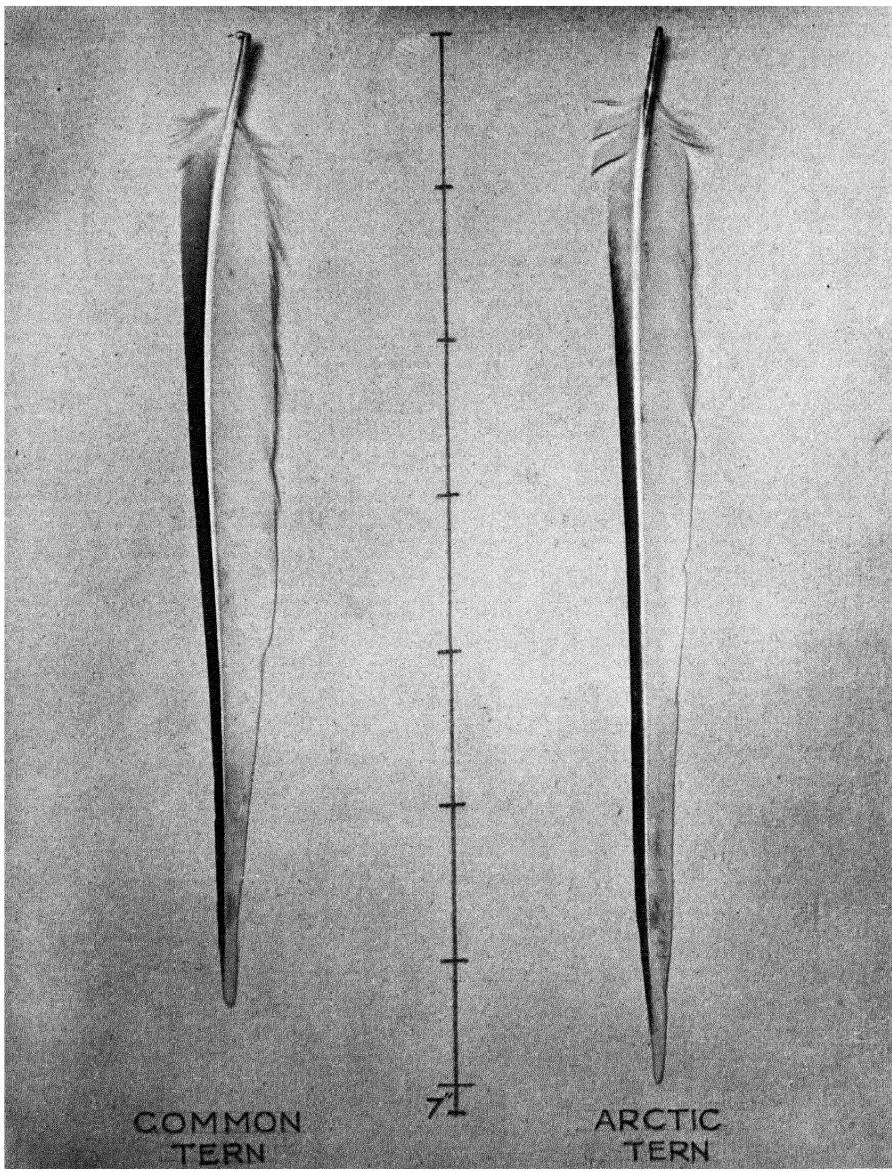
This obscure word " scamels " has been taken to be a misprint for " sea-mells,"[2] *i.e.* sea-mews, this being the common name for Terns in Cornwall and Ireland.

We have never heard of the flesh of Terns being eaten to-day, but during the war the eggs were eaten wholesale : we have seen a ternery swept absolutely bare by men collecting eggs for this purpose. We have visited a " farm " of Sandwich Terns in Holland where the eggs were taken daily and, along with those of Black-headed Gulls, sent to market in Amsterdam. The Terns continued to lay, day after day, until a certain date, when they were allowed to sit and hatch out their last eggs. This restraint was not observed on Romney Marsh, where, referring to the congregation of Sandwich Terns depositing their eggs close together, Plomley, quoted in *Birds of Kent*,[3] said, " These spots are called Screechers' Platts and were, forty to fifty years ago (*i.e. circa* 1800), often the cause of much contention amongst the poor, each family claiming a right to a certain Platt. Their eggs, with Common Terns', were sent to London as plovers' eggs." And regarding Common Terns, " men, women and children spent all their spare time hunting eggs for food and had dogs specially trained for this purpose."[4]

The length of the Common Tern is 378·13 mm. (4 measured) ; the wing is 265·29 (10 measured) ; the wing span is 792·75 (3 measured) ; its bill is 33·3 (9 measured) ; its tarsus, 20·0 (3 measured), and its weight, 100·97 g. (4 weighed).

Its bill is scarlet-red with vandyke brown tip : the colour on the tip may be almost absent or occupy anything up to half the bill. Inside the mouth is scarlet-red, too. The iris is brown. The legs and feet are vermilion. The forehead, crown and nape are jet-black ; a slight crest being sometimes observable. The mantle, scapulars and back are aluminium-grey, darker than in the Sandwich Tern. The rump and upper tail

[1] *Early Annals of Ornithol.*, Gurney.
[2] *Ornithology of Shakespeare*, Harting, p. 269.
[3] *Birds of Kent*, Ticehurst, 1909.
[4] *Ornitho. Rambles in Sussex*, Knox, p. 244.



5. OUTER TAIL FEATHERS OF COMMON AND ARCTIC TERN, SHOWING THE DIFFERENCE IN THE OUTER WEBS.

coverts are white and the tail white, except the outer webs of the outer feathers, which are medium aluminium-grey. The wing coverts and secondaries are aluminium-grey edged with white. The first primary is short and grey. The outer web of the second, the long primary, is very dark grey, almost black, changing to grey at the tip: half (about) of the inner web is medium grey, the rest white. The next four primaries have their outer webs ash-grey and their inner webs about half medium grey, the remainder white. The other primaries are ash-grey with white inner webs. The quills are white. All underparts are white or nearly so except the body, which is pale grey with a reddish tinge.

Of six birds measured, three had the tips of the wings reaching to the tail tips and three had the wings an average of 13·71 mm. longer than the tail. The tail is forked, the depth being rather more than that of the Sandwich Tern and is about 90·0.

The sexes are alike.

There is a close similarity between this species and the Arctic Tern. The differing characters by which each species may be recognised will be found at the end of the description of the Arctic Tern (see p. 12).

The distinction between the two species was not, according to Seebohm, perceived till 1819. Selby says that the Arctic Tern was first described and confirmed as a distinct species by Temminck in 1820. The honour is also claimed for Nitzsch, while Yarrell states that it was Naumann in 1847 who was the earliest ornithologist to detect the specific differences between the Arctic and Common Tern. Brunnich, however, seems to have named it in 1764.

The ARCTIC TERN (*Sterna macrura, Naum.*) (Pl. 2) is, in Scotland, the commonest Tern: this fact, as well as the unfortunate name of "Common" bestowed on the previous species, and their close resemblance, has caused much confusion in regard to the distribution of both kinds.

It is not clear why Brunnich, in 1764, called this species the Heavenly Tern—Sterna paradisæa (in this connection see the Manx name "Spyrryd" (p. 9)—and "Beatica," used as a synonym for "Tearn" in an Anglo-Saxon vocabulary of the eleventh century),[1] nor why Naumann named it the "Long-tailed Tern"—S. macrura—as he did in 1819, since the species known as "Roseate" has a much longer tail. Sterna arctica, as Temminck called it in 1820, is a much more appropriate name, but the name given by Brunnich, being the oldest, stood, and was used in the *Practical Handbook of British Birds* until on second thoughts a reversion was made to *S. macrura*.[2]

[1] Wright, *A.-S. and O.E. Vocab.*, p. 131. [2] *Practical Handbook of British Birds*, II. 902.

Owing to the difficulty of distinguishing this Tern from the Common Tern, the same common names are applied indiscriminately to each species. The Welsh, however, call the Arctic Tern " Morwennol y Gogledd "—Sea Swallow of the North, and " Ysgraell Gogledd "—northern rattle. In Germany it is known as Küsten-seeschwalbe ; in Denmark, Nordisk Haetteterne ; Makrel terne in Norway, and Rodnabbad Tarna in Sweden ; Hirondelle de mer Arctique and Sterne Arctique in France, and Rondine de mare coda lunga in Italy. In Devon it is called the Pearl Gull and in Ireland the Skrike. Another name said to be used in Galway, and " signifying a cross and peevish disposition," is " Jourongs." (The Devonshire word " Jourings " means quarrelling.) They are said to be " so named from their habit of biting themselves when wounded and thrown on the bottom of a boat." It is also widely known as the " Artic " Tern (*sic*).

The length of the Arctic Tern is 373·1 mm. (3 measured); the wing length is 269·3 (9 measured); the wing span, 774·70; its bill, 34·0 (6 measured); its tarsus, 16·0 (4 measured), and its weight, 85·0 g.

It has a blood-red bill, at times changing to dark brown at the tip. Inside the mouth is red. The iris is brown. The legs and feet, coral-red. The forehead, crown and nape are jet-black. The mantle, scapulars and back are darkish aluminium-grey distinctly darker than that of the Common Tern. The rump, upper tail coverts and central tail feathers are white ; the outer tail feathers have the outer web dark grey. The wing coverts and secondaries are medium aluminium-grey, the latter edged with white. The first primary is small and like the secondaries in colour : the second has the outer web black, changing to grey at the tip, a narrow portion of the inner web next the quill darkish grey, and the rest white. The next four primaries have their outer webs ash-grey, a portion of the inner web next the quill rather darker grey and the rest white. The quills are white. The other primaries are aluminium-grey with the inner edge white. The throat, under wings and under tail coverts are white ; the rest of the underparts being pale grey, a little darker than in the Common Tern and without any reddish tinge.

Of five birds measured, three had wings the same length as the tail, and in two the wings averaged 14·31 mm. beyond the tail. The tail is forked, the depth being about the same as the Common Tern.

The sexes are alike.

The differences between this species and the Common Tern (Pls. 3, 4, 5, 6) are slight but important : none can, with certainty, be detected when the birds are flying in a crowd of others in the air. On the ground the one test is the colour of the bill, which is quite different and unmistakable, that of the Common Tern being scarlet with a dark tip and that of the Arctic Tern blood-red without a tip. When in the hand there are several

distinctive features. The tarsus is much shorter, 16·0 mm. against 20·0; the " primary band," *i.e.* the grey band which is found next the quill on the inner web of the second–fifth primaries, is narrower: the whole width of the second, primary feather seems narrower than that of the Common Tern, being 16·0 mm. against 18·25 (4 measured $4\frac{1}{2}''$ from tip); the outer tail feathers a little longer, sometimes as much as 12·0–13·0 mm., and the grey on the outer web is not carried so near the quill as in the Common Tern. It does not appear to have been recorded that the other tail feathers have their terminations more pointed than those of the Common Tern, and this same feature is noticeable also in all the primaries beyond the first five. Both the upper and underparts are rather darker grey, the latter being free from any pinkish tinge.

The ROSEATE TERN (*Sterna dougallii dougallii Mont.*) (Pl. 2), the least numerous of the family, was named by Montagu in 1813—Sterna Dougalli—after Dr. MacDougall, who was the first to recognise it as a different species. Why he left out the " Mac " is unexplained, but in 1842 Macgillivray patriotically endeavoured to repair this omission by calling it (too late) MacDougall's Tern—S. Macdougalli—after Graves, in 1821, had named it, descriptively, S. rosea, the Rosy Tern. It was also called S. paradisea in 1840 by Keys, although this name had been given to the Arctic Tern more than 70 years before, and Schlegel in 1863 erroneously termed it S. Douglasi.

Of common names this Tern seems to possess hardly any, being doubtless grouped with the two preceding species. The French call it the Sterne de Dougall; in Germany it is the Paradies-Meer Schwalbe and Dougall's Seeschwalbe, and in Italy it is called Rondine di mare del MacDougall. In Carrickfergus it is said to be named Purre-(or Pirre) maw, and in Lancashire the Rose-breasted sparling. The keepers on Llandwyn Island and others refer to it as the " Rosette Tern," and it is not uncommonly called " Rozeet," these being, possibly, mispronunciations of its proper name.

Its length is 392·84 mm. (2 measured); its wing length is 228·27 (15 measured); its bill is 39·0 (9 measured); its tarsus is 21·3 (3 measured).

The Roseate Tern has a black bill which is often dark red next the head. Inside the mouth is red. The iris is dark brown. The legs and feet are coral-red. The forehead, crown and nape are jet-black. The mantle, scapulars and back are a medium aluminium-grey. The rump and upper tail coverts are pale grey. The tail has long outer tail feathers called the " streamers "; these are white, the rest of the tail being pale grey. The wing coverts and secondaries are medium aluminium-grey, the latter having the webs broadly edged with white. The first primary

is small and ash-grey : the second primary has the outer web nearly black, changing at the tip to dark grey : one-third to one-half of the inner web is very dark grey, the rest of the inner web being white. The next three primaries have ash-grey on the outer webs, one-third to one-half the inner webs dark grey, the rest being white. This white in these four primaries is carried round the tip on to the outer web. The quills are white. The rest of the primaries are medium aluminium-grey broadly edged inside with white. The underparts are white more or less tinged with rose-colour, hence the name of the bird. The strength of this colour varies in life ; with some birds it is fairly strong, others seem to be almost or entirely without it ; this being possibly a question of age. It is evanescent, vanishing from dead specimens.

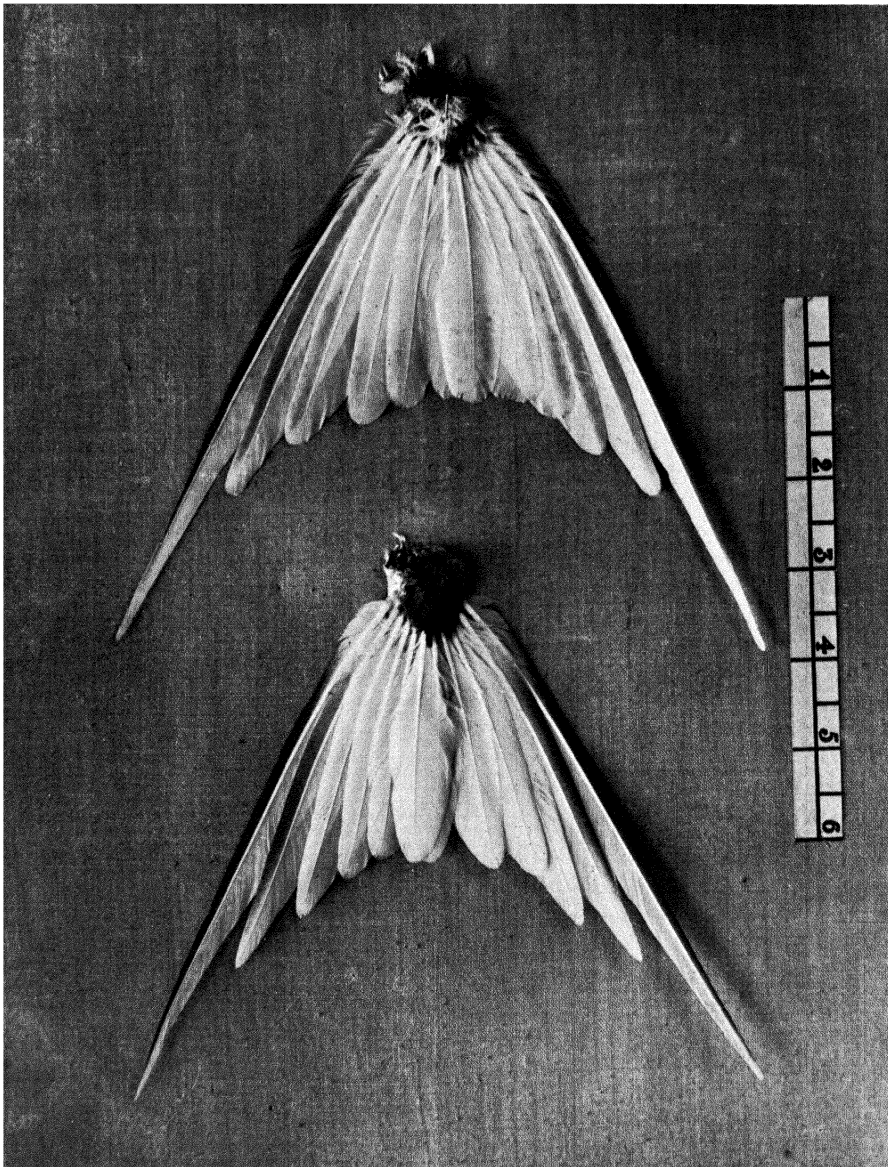
The tail, owing to the " streamers," extends a long way beyond the wing tips, averaging 39·70 mm. (10 measured). The depth of fork is 108·2 (5 measured).

The sexes are indistinguishable.

It may be of interest to append the description of the first-known Roseate Tern furnished by its discoverer to Montagu. " This tern is of light and very elegant figure, differing from the Sterna hirundo in size, length, colour and curvature of the bill ; in the comparative shortness of the wing in proportion to the tail ; in the purity of the whiteness of the tail, and the peculiar conformation and extraordinary length of the lateral feathers. It also differs from that bird in the hazel colour and size of the legs and feet."

Although the resemblances between Common and Arctic Terns are commonly described it is not usual for attention to be directed to the fact that Roseate and Sandwich Terns share similarities denied to the other species. These likenesses are not only structural, they occur also in their habits.

Both species have bills which are almost black. Both have mantles and backs of the same medium aluminium-grey, paler than either the Common or Arctic Terns. Both have the outer web of the second primary a dark grey, and the white inner margin extending round the tip and a little way up the outer web. The Roseate's outer tail feathers are white, those of the Sandwich Tern usually so. The full clutch of eggs in each case seems to be two. The young of both species have the same peculiar spinous appearance, and both tend early to leave the nesting area for the seashore. The adults have the same habit of sitting in groups on the beach, where, from a distance, either species might be mistaken for the other. Both species show a similar lack of aggressiveness against intruders but quarrel freely between themselves. Both share a marked restlessness and erratic behaviour as to nesting and, finally, their breeding limits are almost the same.



6. TAILS OF COMMON AND ARCTIC TERNS, SHOWING DIFFERENCE IN SHAPE OF ENDS OF INNER FEATHERS.

Smaller, much, than the other four, is the LITTLE TERN (*Sterna albifrons albifrons Pall.*) (Pl. 2). First named by Pallas in 1764, the White-browed Tern (*Sterna albifrons*), owing to its white face, Linnæus, in 1766, preferred it as the Minute Tern (*S. minuta*), a name which was adopted both by Yarrell and by Saunders.

The common names are those generally used for the genera. Sea Swallow with the qualifying " little " is common, as Morwennol fach —little sea swallow ; Morwennol Leraf—lesser sea swallow in Wales ; and Petite hirondelle de mer—little swallow of the sea in France, where also it is called " dwarf "—Sterna naine. Dwarf also appears in the German Zwerg-Meerschwalbe and Zwerg-Seeschwalbe ; in the Dutch Dwerg Zeezwaluw and the Danish Dvaergterne. Sma tarna in Swedish is Small Tern. It is Fraticello in Italian. From the bird's cry we have Reek and Ric, Chit-perl, Small purl, Sparling, Skirr, Scurril, Skerrick, Skrike, Clett and Little Kip. Little mow (mew), Knat, and Sea-mouse refer to its size ; and Fairy-bird to its grace and beauty, though Sea-mouse may possibly refer to the young bird. Little darr echoes the Scandinavian " tarna " ; while Dip-ears, Little pickie and Shrimp catcher indicate its fishing habits. Hooded tern is a reference to its black cap. What is the explanation of " Richel bird " we are unable to say.

The length of the Little Tern is 224·33 mm. (3 measured) ; its wing length is 171·57 (7 measured) ; its bill is 29·25 (4 measured) ; its tarsus, 16·5 (4 measured). One bird weighed 62·25 g.

Its bill is rich yellow with a black tip. Inside the mouth is yellow. The iris is brown. Its legs and feet are orange-yellow. The forehead is white : the crown, nape and lores, jet-black. The mantle, scapulars and back are aluminium-grey. The rump, upper tail coverts and tail are white. The wing coverts and secondaries are aluminium-grey edged with white. The first primary is small and grey. The second primary has its outer web black with a wide dark-grey " primary band " inside the shaft, the rest of the web being white. The other primaries are ash-grey with white inner margins. The shafts are grey. The underparts are white.

Pennant describes it [1] as having " the breast and underside of the body cloathed with feathers so closely set together and of such an exquisite rich a gloss, and so fine a white that no satin could be compared to it."

Curiously enough Seebohm [2] says, " The Little Tern is very similar to the Arctic Tern " !

It is interesting to observe early attempts at colour description, which is always a difficulty. Selby [3] says of the Little Tern, " The young of the year are, above of a pale wood-brown transversely barred with broccoli-brown and that their eggs are a pale wood-brown or oil-green." The

[1] *The British Zoology*, 1766. [2] *Hist. of British Birds*, III. 291.
[3] *Illustrations of Brit. Ornithology*, 1833.

eggs of the Arctic Tern are also " deep-oil-green." His profession peeps out (he was a medical man) when he describes the legs of young Common Terns as " pale gall-stone yellow " and the legs and feet of the Arctic Tern as " a deep arterial blood red."

Of five birds measured one had wings the same length as the tail: in the others they averaged 13·25 mm. longer than the tail. The depth of the fork is 35·5 (4 measured).

The sexes are alike.

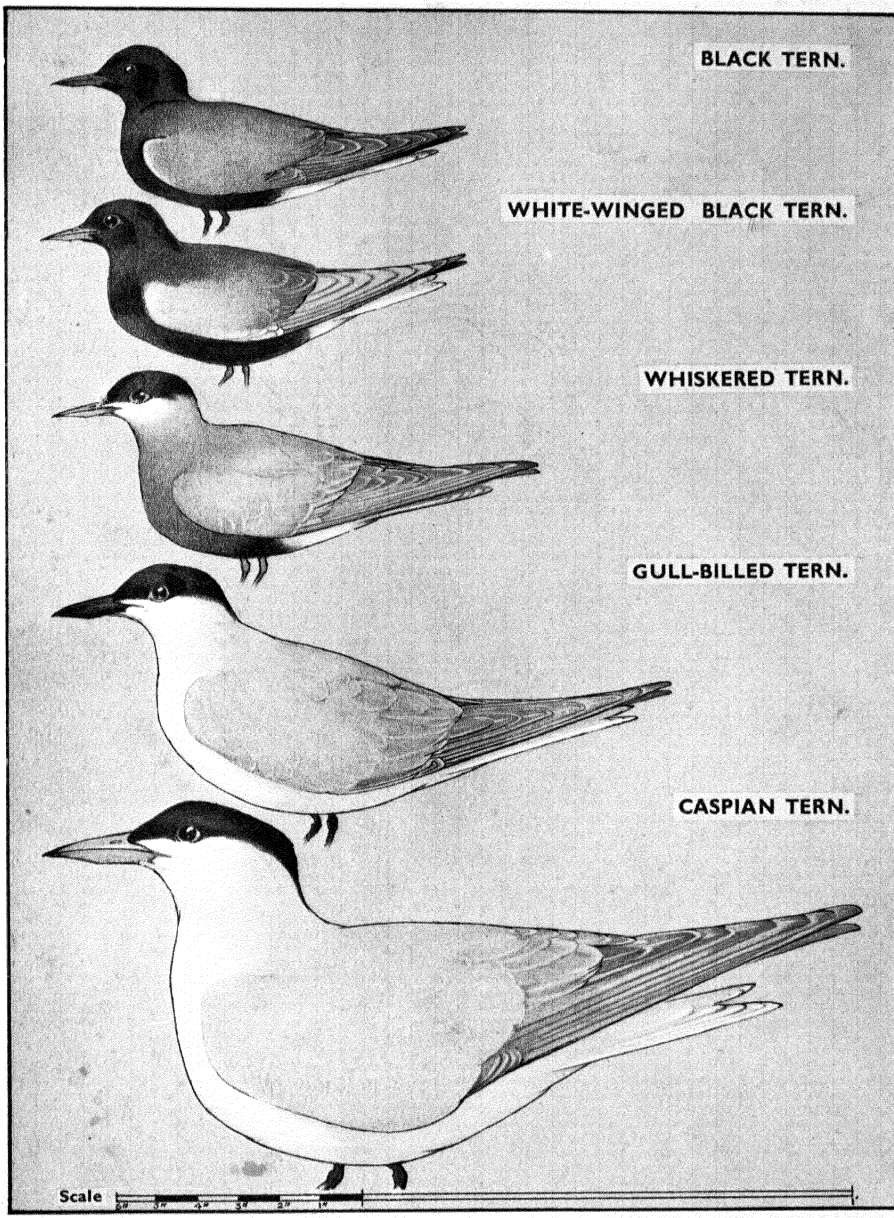
Of the visiting Terns the BLACK TERN (*Chlidonias niger niger* (*L.*)) (Pl. 7) is most frequently seen and is what is called a " bird of passage," *i.e.* one which is regular in appearance but does not stay to breed.

This is the Sterna nigra of Linnæus (1758). Hydrochelidon nigra (Linn.), Boie, 1822 (the Black Water-Swallow), is the name used by Yarrell and by Saunders, and Black Marsh-Tern by Macgillivray.

It has been called the Clover-footed Gull, which must be a mistake for the Cloven-footed Gull, so called by Ray from the divided webs to its feet. Pennant, in 1766, speaks of it as the Black Cloven-footed Gull. It was from the name " stern " or " starn " given to this bird in the Fens that Linnæus, through Turner, named the genus. Other common names are Black Kip, Coal Kip, and Blue darr from its colour and cry. Scare-crow and Carr-crow have already been mentioned. The foreign names are mostly based on the colour of the bird. In Wales it is Morwennol Ddu = the Black Sea Swallow and Ysgraell Ddu = the Black screamer. Guifette noire is its French name; Schwarze Seeschwalbe, the German; Zwarte Zeezwaluw, the Dutch. In Denmark it is called Mose-Terne, Blaa-Terne, Sort-Terne, and Sort-Kirre; in Norway, Sort-Terne; in Sweden, Svart-Tarna, and in Italy, Mignattino.

As we are only dealing specifically with the five British breeding Sea Terns it will be sufficient to say of the Black Tern that it was formerly one of our breeding birds, nesting in great numbers and so noisy that Turner refers to its " vile garrulity "; that its habitat was Kent, Norfolk, Cambridgeshire and Lincolnshire, probably Sussex, possibly the Sands of Barrie (Forfarshire), and in the Solway Firth, and there are records of it nesting near Driffield in East Yorkshire. Towards the end of the first half of the nineteenth century it ceased to breed owing to the drainage of its haunts. Since then it has made spasmodic attempts to nest, the last being in 1884, in Kent.

The records of the visits of Black Terns are too numerous to give in detail. As a passage migrant it has been seen, at one time or another, in at least three-quarters of the English counties, in half the Irish counties, in North and South Wales, in the Isle of Man, and at a number of places in Scotland. It has occurred as far north as the Shetlands,



7. COMPARATIVE DIAGRAM OF THE "PASSAGE MIGRANT" AND "VAGRANT" TERNS.

where it was observed by Thos. Edmondston a " few years previous " to recording it in the *Zoologist* in 1844. It has been noticed twice in the Orkneys (1.10.13 and –.6.18) and once in the Outer Hebrides (31.5.13). It has been seen as far south as the Scilly Isles (10.4.03, 26.4.05 and 12.4.25). Most of the visits, however, occur below a line drawn from the Mersey to the Humber. The bird often appears in small flocks and again in larger, as twenty-five to thirty at Marazion, Cornwall (19.4.01), fifty " Norfolk " (early Sept. 1919), and others. These visits take place, mainly, in Spring, when the birds are adults, and in the Autumn, when many are in immature plumage. None seem to have been seen before April or after October except on two occasions in Ireland (5.11.49 and 18.12.49) and one in Scotland (26.11.08).

The WHITE-WINGED BLACK TERN (*Chlidonias leucopterus* (*Temm.*)) (Pl. 7), also a Marsh Tern, is a much less frequent visitor to the British Isles than the Black Tern. Called by Temminck, in 1815, Sterna leucoptera—the White-winged Tern—it was renamed Hydrochelidon leucoptera—the White-winged water swallow—by Boie in 1822, which name was adopted by Yarrell and by Saunders.

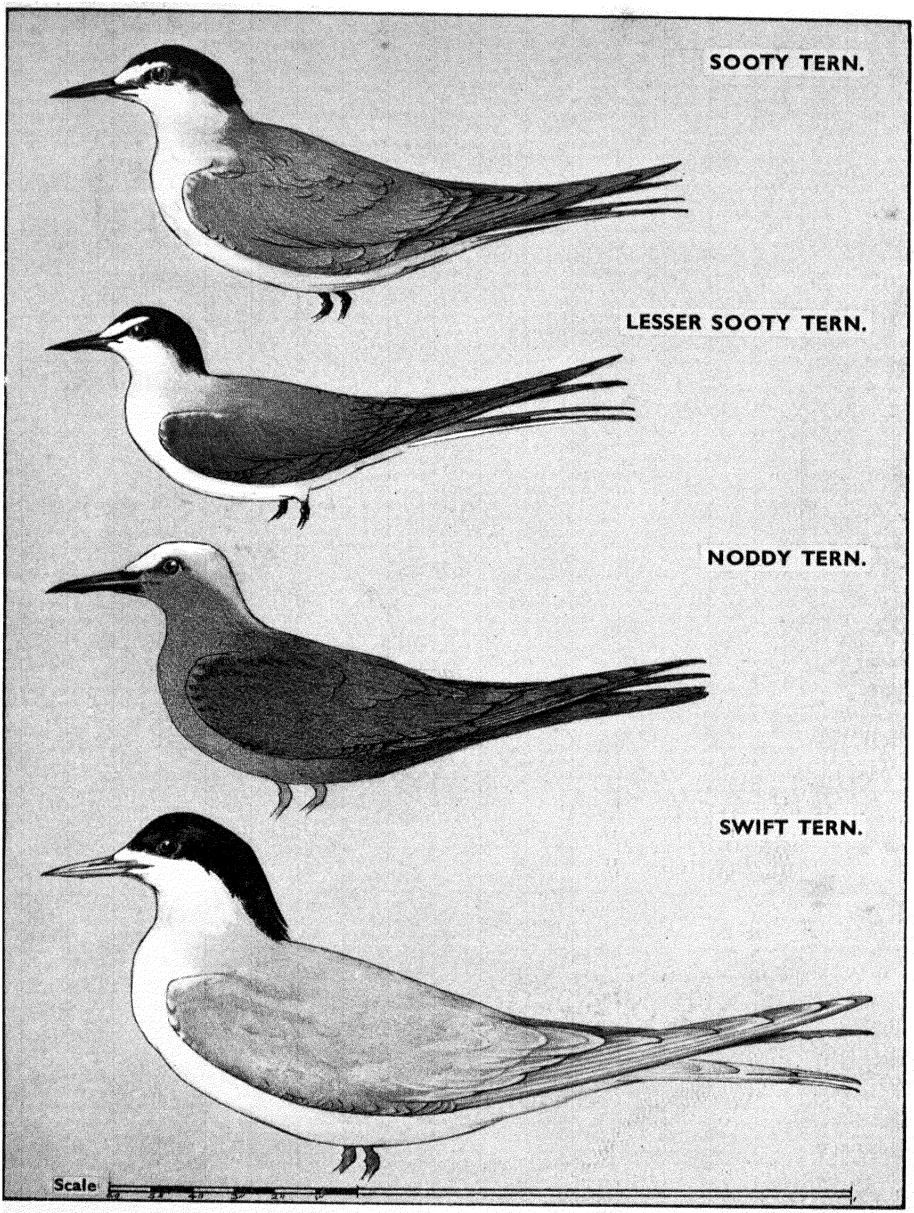
The French call it Hirondelle de mer leucoptère; the Germans Weisse-flügelige Seeschwalbe, and the Italians Mignattino ali-bianche. In Britain it does not appear to have received any common name except Macgillivray's " White-winged Marsh Tern."

From the following list of occurrences, birds shot or observed, it will be seen that sixty-five were obtained and forty others noted. Besides these, records which state a " number," " several," " some," " small flock " and " many " indicate group-visitations akin to those of the Black Tern. Yarrell observes that " many have been seen in May and June on the Hampshire and Dorset coasts," and a perusal of the list shows that, with two exceptions—Yorks (26.9.96) and Tring Res., Herts (7.10.29)—the dated occurrences took place in April, May and June. The White-winged Black Tern when in immature plumage closely resembles the young of the Black Tern, hence confusion has arisen and is likely to arise unless there is a close examination of any specimen seen.

OCCURRENCES.		Date.	References.
Dublin Bay (or the Shannon), Ireland.	1.	Oct. 1841.	*N.H. of I.*
,, ,,	1.	N.D.	*N.H. of I.*
Horsey, Norfolk.	1, and 1 seen.	17.5.1853.	*Z.* 1853, p. 3911.
Coventry, Warwick.	2.	June 1857.	Yar. 522–3.
Scalby, Yorks.	1.	Spring 1860.	Yar. 522–3.
Dublin Bay, Ireland.	1.	— 1866.	*Z.* 1866, p. 306.
Flamboro, Yorks.	1 adult seen.	Spring 1867.	Yar. 522–3.
Hickling, Norfolk.	2 males, 2 females.	27.6.1867.	Yar. 522–3.

OCCURRENCES.		Date.	References.
Teesmouth, Durham.	1.	15.5.1869.	*B. of North'd.*
Ilfracombe, Devon.	1.	11.2.1870.	Yar. 522–3.
Breydon, Norfolk.	2 males, 2 females shot, and 1 seen.	26.5.1871.	Yar. 522–3.
,, ,,	2 seen.	Spring 1872.	*B. of Nor.*
Hickling, Norfolk.	6 shot out of a number.	30.5.1873.	Yar. 522–3.
Breydon, Norfolk.	5 shot out of 7	28.5.1873.	*B. of Nor.*
Hickling, Norfolk.	1 shot and 1 seen.	10.6.1873.	Yar. 522–3.
South Weighton, Sussex.	1.	May 1873.	Yar. 522–3.
? Essex.	4 seen.	N.D.	*P.H.B.B.* 694.
Tipperary, Ireland.	1.	21.5.1874.	*B. of I.*
Nr. Eastbourne, Sussex.	1. some years previous to 1875.		Yar. 522–3.
Cappagh, Waterford.	1.	13.5.1875.	*B. of I.*
Nr. Limerick, Ireland.	1.	June 1875.	Yar. 522–3.
? Devon.	Several.	N.D.	*P.H.B.B.* 694.
Scilly Isles.	1.	June 1882.	Yar. 522–3.
Barton Broad, Norfolk.	2 seen.	8.6.1883.	*B. of Nor.*
Hickling, Norfolk.	1 shot and 1 seen.	10.6.1883.	*Z.* vii. 341.
Nr. Christchurch, Hants.	2.	2.5.1883.	*B. of H.*
Wolmer Pond, Hants.	3.	April 1883.	*B. of H.*
Horning, Norfolk.	1 seen.	30.5.1886.	*B. of Nor.*
Nr. Christchurch, Hants.	1.	18.5.1886.	*B. of H.*
Breydon, Norfolk.	1 immature, shot.	— 1888.	*B. of Nor.*
Cardiff, Glamorgan.	1 shot and 1 seen.	March 1891.	*B. of G.*
Midrips, Kent.	2 seen.	May 1891.	*B. of K.*
Avon River, Hants.	" Some seen passing down."	30.4.1892.	*B. of H.*
Horsey, Norfolk.	1.	May 1892.	*B. of Nor.*
,, ,,	1.	May 1893.	*B. of Nor.*
Newmarket, Clare, Ireland.	1.	25.6.1893.	*B. of I.*
Scalby, Yorks.	1 immature.	26.9.1896.	*Z.* 1896, p. 387.
Breydon, Norfolk.	1 male.	12.8.1896.	*B. of Nor.*
Nr. Portchester, Hants.	3 seen.	27.4.1897.	*Z.* March 1898.
Gosforth Park, Northumberland.	1 seen.	May, *c.* 1897.	*B. of North'd.*
Breydon, Norfolk.	8 seen.	22.4.1901.	*B. of Nor.*
,, ,,	1.	15.5.1901.	*B.B.* I.
Fritton Lake, Suffolk.	2.	— 1901.	*V. Hist. Suff.*
Dungeness, Kent.	5 shot out of small flock.	29.5.1904.	*B. of K.*
Packington, Leicester.	1.	8.5.1909.	*B.B.* III. 168.
Between Winchelsea and Rye, Sussex.	2 males, 1 female, shot, 4 seen.	29.5.1911.	*B.B.* V. 55.
Broad, Norfolk.	2.	16.5.1911.	*B.B.* V. 80.
Burnham, Essex.	4 seen.	28.5.1912.	*B.B.* VI. 127.
Tring Reservoir, Herts.	2.	7.10.1929.	*B.B.* XXIII. 196.
Poole Harbour, Dorset.	1, several seen.	June N.Y.	*B. of Dor.*
? Cornwall.	1.	N.D.	*P.H.B.B.* 694.
Many have been seen on the Hampshire and Dorset coasts in May and June.			Yar. 522–3.

The WHISKERED TERN (*Chlidonias leucopareius leucopareius* (*Temm.*)) (Pl. 7), another Marsh Tern, is a much less frequent visitor, fifteen specimens only having been obtained and five others seen since the first example was obtained at Lyme Regis, Dorset, in 1836. On the whole



8. COMPARATIVE DIAGRAM OF "VAGRANT" AND "DUBIOUS" TERNS.

they have appeared late in the season ; one strangely enough in December. First named Sterna leucopareia—the White-cheeked Tern—by Natterer, this name was adopted by Temminck in 1815. Pallas called it Hydrochelidon hybrida, a name under which it appears in Yarrell and Saunders ; Macgillivray having called it the Whiskered Marsh Tern. Abroad it is, in French, Hirondelle de mare moustac ; in German, Weiss bärtige Seeschwalbe and bleigrauwe Seeschwalbe ; and in Italian, Rondine di mare piombata and Mignattino bigio.

OCCURRENCES.		Date.	References.
Lyme Regis, Dorset.	1.	end Aug. 1836.	Yar. III. 517.
Dublin Bay, Ireland.	1.	Sept. 1839.	*Z.* 1847, p. 1878.
Hornby Castle, Yorks.	1 shot.	— 1842.	*B. of Y.* II. 650.
Hickling, Norfolk.	1 adult female.	17.6.1847.	*Z.* 1847, p. 1820.
Tresco, Scilly Isles.	1 immature.	end Aug. 1851.	*Z.* 1851, p. 3280.
,, ,,	1 immature.	Sept. 1857.	*B. of C.*
Plymouth, Devon.	1.	10.5.1865.	*Z.* 1865, p. 9629.
Christchurch, Hants.	1.	June 1875.	*B. of H.*
Dersingham, Norfolk.	1.	10.10.1890.	*B. of Nor.*
Carse Loch, Dumfries.	1.	28.5.1894.	*B. of Dum.*
Rye, Sussex.	2.	9.8.1905.	*B. of K.*
Dungeness, Kent.	2 shot and 2 seen.	9.8.1905.	*B. of K.*
Between Dungeness and Rye, Kent.	1.	9.8.1905.	*B. of K.*
Hickling, Norfolk.	1 seen.	16.6.1906.	*B. of Nor.*
Shingle Street, Suffolk.	1 adult, seen.	16.9.1910.	*B.B.* VI. 374.
Northwich, Cheshire.	1 seen.	8.12.1922.	*B.B.* XVI. 112.

The GULL-BILLED TERN (*Gelochelidon nilotica nilotica* (*Gm.*)) (Pl. 7) forms according to Yarrell " a natural link between the Marsh-Terns and those which frequent the sea-coast." Although it nests just across the North Sea it is somewhat rarer than the White-winged Black Tern, forty-seven (or fifty) having been shot since Montagu obtained his first specimen (which he did not recognise as a new species), in Sussex, somewhere prior to 1802. Montagu afterwards saw two shot at Rye (about 1813) ; he mentioned these as Sandwich Terns in his *Ornithological Dictionary* and only saw the difference in 1813 when Latham's type came into his hands. Seven have appeared in May ; six in September ; six in June ; five in July and one each in April and August. The rest are undated. A reference to this bird by Newton in his *Supplement to Montagu's British Birds*, p. 347 (1866 ed.), suggests that it is one of our lost breeding birds, for he says, " Without doubt this (*i.e.* the Sandwich Tern) and the Gull-billed Tern both breed on the Coast of Britain." Confirmation of this may be found in the report [1] of one which dropped an egg when shot near Brighton. Its rarity, according to Ticehurst,[2] seems to have increased with the dying out of the Sandwich Tern as a breeding species in Kent. The grounds for this statement are not apparent.

[1] *List of British Birds*, Rodd, 1869, p. 42.

[2] *Birds of Kent* (1909).

Sterna Nilotica—the Nile or Egyptian Tern—as it was called by Gmelin in 1789, became, at the hands of Montagu in 1830, Sterna Anglica—the English Tern. Macgillivray named it Gelochelidon palustris—the Marsh Swallow—in 1842, and Marsh Gull-billed Tern. It is known as Sterne-hansel in France; Lachmeer Schwalbe and Lach Seeschwalbe in Germany; Lach-Zeezwaluw in Holland; Sand-Tar and Engelsk Terne in Denmark, and Rondine di mare gambe nere in Italy.

OCCURRENCES.		Date.	References.
? Sussex.	1. Montagu's orig. spec.	Prior to 1802.	
? Sussex.	1.	about 1813.	Mac. V. 667.
Rye, Sussex.	2.	about 1813.	Yar. 350.
Blackpool, Lancs.	1.	Summer 1832.	*Mag. N.H.* 1838, II.
Rye, Sussex.	1.	— 1839.	*B. of K.*
Hunstanton, Norfolk.	1.	Spring 1839.	*B. of N.*
? Kent.	1.	June 1839.	Yar. 531–2.
Nr. Leeds, Yorks.	1.	end July 1843.	Yar. 531–2.
? West Norfolk.	1.	— 1846.	*Z.* 1846.
Breydon, Norfolk.	1 adult male.	14.4.1849.	*B. of N.* Riv.
,, ,,	1 adult male.	31.7.1849.	*B. of N.* Riv.
,, ,,	2 adult male and female.	1.9.1849.	*Z.* 1849, p. 2592.
? Norfolk.	1.	N.D.	Yar.
Yarmouth, Norfolk.	1 adult male (or 3).	24.5.1850.	*Z.* 1850, p. 2854.
,, ,,	1 adult male.	early July 1851.	*Z.* 1851, p. 3235.
Nr. Brighton, Sussex.	1.	N.D.	Yar. 531–2.
Rye, Sussex.	1.	N.D.	Yar. 531–2.
Selsey, Sussex.	1.	31.3.1852.	Yar. 531–2.
Tresco, Scilly Isles.	1 adult.	end May or early June 1852.	*B. of C.*
Between Shoreham and Brighton, Sussex.	1.	May 1855.	*B. of Sus.*
Portslade, Sussex.	3.	27 June 1855.	*B. of Sus.*
Barnstaple, Devon.	2.	Autumn 1859.	*Z.* 1859, p. 6762.
Romney Marsh, Kent.	1.	12.9.1862.	*B.B.* V. 120.
Nr. Plymouth, Devon.	1 immature.	12.9.1866.	*Z.* 1867, p. 557.
Nr. Christchurch, Hants.	1 adult.	14.5.1872.	*B. of H.*
St. Just, Cornwall.	1 female.	11.7.1872.	*B. of C.*
Exe, Devon.	1 immature.	25.8.N.Y.	*B. of Dev.*
Yarmouth, Norfolk.	1 adult male and 1 adult female.	8.5.1878.	*B. of N.* Riv.
Hunstanton, Norfolk.	1.	July 1878.	*B. of N.* Riv.
Whitstable, Kent.	1.	1886–87.	*B. of K.*
Belfast Lough, Ireland.	1 immature.	end Sept. 1887.	*List Irish B.*
Hunstanton, Norfolk.	1 adult male.	5.9.1896.	*B. of N.* Riv.
Pentland Skerries, Orkney.	1 male.	7.5.1913.	*B.B.* VII. 90.
Winchelsea, Sussex.	1 male.	18.6.1913.	*B.B.* VII. 86.
,, ,,	1 female.	21.6.1913.	*B.B.* VII. 86.
,, ,,	1 male.	23.6.1913.	*B.B.* VII. 86.
Longmere, Norfolk.	1.	17.5.1925.	*B.B.* XIX. 245.
Breydon, Norfolk.	4.	17.5.1925.	*B.B.* XIX. 245.
? Lancs.	1.	N.D.	*H.B.B.B.* II. 697.
? Kent.	1 or 2.	N.D.	*H.B.B.B.* II. 697.

The CASPIAN TERN (*Hydroprogne caspia* (*Pall.*))—the Caspian Water

Swallow (Pl. 7)—is the biggest of the race and is a Sea Tern. Thirty-three have been obtained since the first British specimen was shot some time before 1825 and eight or ten others seen. It is not a regular visitor, considerable gaps occurring between its visits, it does not appear to have been seen since 1918, and this notwithstanding that it nests only an hour or two's flight away across the North Sea. It has been obtained only in England and the largest number shot or seen in any month is eight birds in June. There are several doubtful records—one said to have been obtained at Conway, N. Wales, no date given;[1] two killed at Yarmouth, October 1825, and one killed "Norfolk" 1825[2] may probably be referred to the first three on the list. Yarrell[3] gives one without date as having been obtained at Christchurch, Hants; this may be the Highcliffe bird of 1852, Highcliffe being close to Christchurch. Gurney recorded Kentish specimens but afterwards withdrew; Harting repeated the mistake in *Handbook of Birds of Kent* and in the *Victoria County History of Kent*.

Named Sterna caspia from the Caspian Sea, where it was obtained by Pallas in 1770, it was called, in the same year, Sterna Tschegrava, from a naturalist of that name, by Lepechin. Pallas' name was adopted by Yarrell and in this he was followed by Saunders. Macgillivray called it the Caspian Strong-billed Tern. Sterna tschegrava is the name adopted in France; Raub-Meerschwalbe and Raub-Seeschwalbe in Germany; Reus Zeezwaluw in Holland; Rov-terne and Skraal terne in Denmark; Skräntarna in Sweden; Rondine di mare maggiore and Beccapesci maggiore in Italy.

OCCURRENCES.		Date.	References.
Yarmouth, Norfolk.	1.	N.D.	Mac. V. 627.
,, ,,	2.	4.10.1825.	Mac. V. 627.
Caistor, Norfolk.	1.	N.D.	Yar.
Aldeburgh, Suffolk.	1 shot, 3 or 4 seen.	N.D.	*Hist. B.E.* VIII.
Yarmouth, Norfolk.	1.	— 1830.	*B. of N.* Riv.
Cromer, Norfolk.	1.	— 1836.	*B. of N.* Riv.
Yarmouth, Norfolk.	1 shot.	16.4.1839.	*B. of N.* Riv.
Topsham, Devon.	1 shot.	Oct. 1861.	*B. of Dev.*
Weymouth, Dorset.	2.	Autumn 1848.	*B. of Dor.*
Yarmouth, Norfolk.	1 female, shot.	2.6.1849.	*Z.* 1849, p. 2499.
Breydon, Norfolk.	1.	9.6.1849.	Yar. III. 498.
,, ,,	1 male, shot.	June 1850.	Yar.
,, ,,	1 adult, shot; 2 or 3 others seen.	16.7.1850.	*Z.* 1850, p. 2915.
Yarmouth, Norfolk.	1 adult male.	11.8.1851.	*Z.* 1851, p. 3235.
Highcliffe, Hants.	1.	Autumn 1852.	*Z.* 1867.
Caythorpe, Lincs.	1 adult.	17.5.1853.	*Z.* 1853, p. 3946.
Teignmouth, Devon.	1 immature.	–.10.1861.	*B. of Dev.*
Yarmouth, Norfolk.	1 adult male.	2.5.1862.	*Z.* 1862, p. 8093.

[1] *Fauna of N. Wales*, p. 370, Forrest (1907). [2] *British Birds*, V. 627, Macgillivray (1837–52).
[3] *Hist. of British Birds*, pp. 536–37 (1871–85).

OCCURRENCES.		Date.	References.
Poole, Dorset.	1.	— 1869.	*B. of Dor.*
Wareham, Dorset.	1.	July 1872.	*Hist. B.E.* VIII.
Torbay, Devon.	1.	28.9.1873.	*B. of Dev.*
Filey, Yorks.	1 shot.	early Sept. 1874.	*Z.* 1887, p. 458.
Aldeburgh, Suffolk.	1.	N.D.	*B. of Suff.*
Farne Is., Northumberland.	1 seen.	6.6.1880.	*Z.* 1887, p. 458.
Findhorn, Nairn.	1 shot and 1 seen.	2.6.1887.	*F.M.B.*
Breydon, Norfolk.	1.	22.7.1901.	*B.B.* I.
,, ,,	1.	24.6.1902.	*B.B.* I.
,, ,,	1.	10.8.1010.	*B. of N.* Riv.
Rye, Sussex.	1 male, shot.	4.6.1913.	*B.B.* VII. 59.
Lydd, Kent.	2.	4.8.1915.	*B.B.* IX. 98.
Rye, Sussex.	1 male, shot.	3.6.1916.	*B.B.* XII. 118.
Yarmouth, Norfolk.	2 seen.	17.5.1918.	*B.B.* XII. 256.
? Notts.	2.	N.D.	*P.H.B.B.* 700.
Conway, Carnarvon.	1, doubtful.	N.D.	*F. of N.W.*

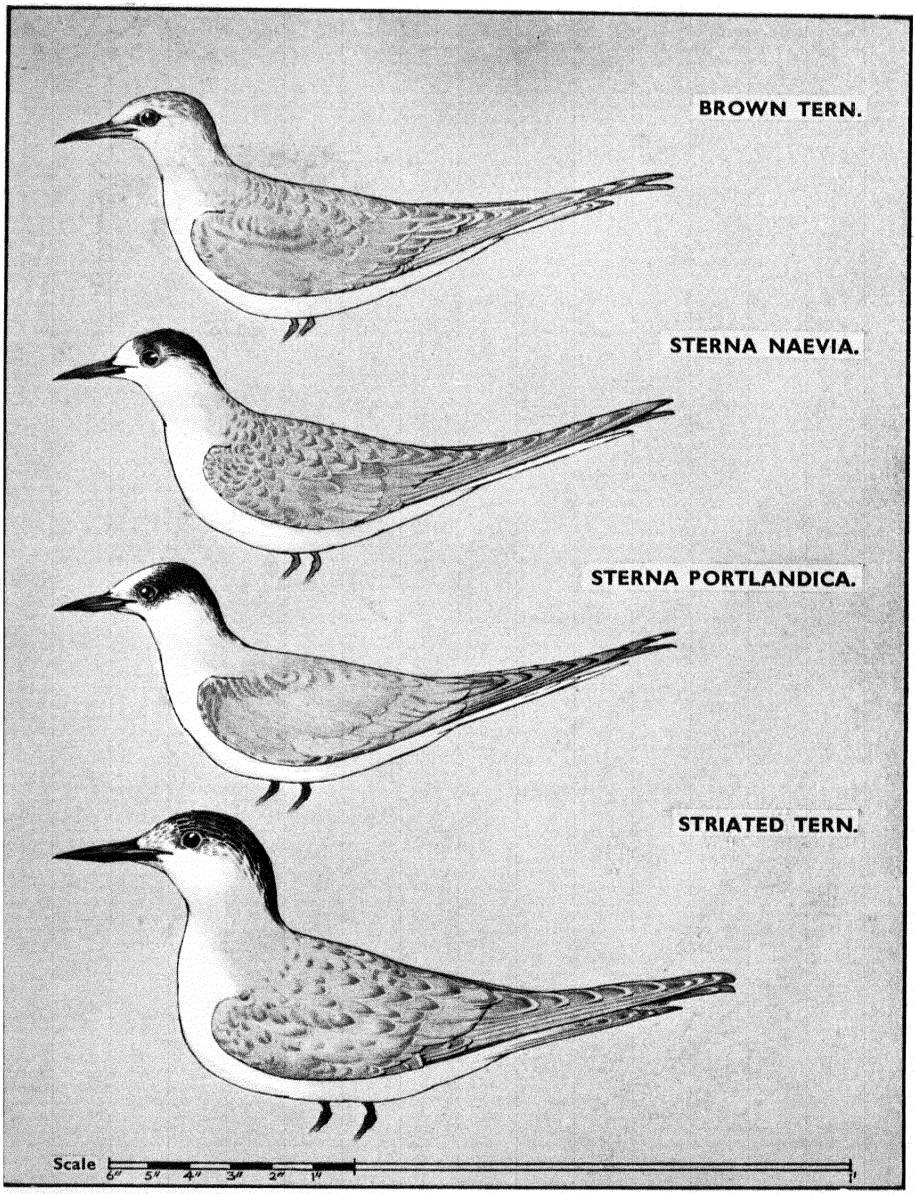
Yarrell gives (*B.B.* 536–7) one at Christchurch, Hants, without date; this may be the Highcliffe record of 1852.

The Sooty Tern (*Sterna fuscata fuscata L.*), the Dusky Tern (Pl. 8), is the Sterna fuscata of Linnæus (1766): the S. fuliginosa—the Sooty Tern—of Gmelin (1789) and of Yarrell and of Saunders. Sterna fuligineuse is its French name; russ-braune Seeschwalbe its German, and Rondine de mare scura its Italian name.

The first specimen was shot at Tutbury in Staffordshire in October 1852, and at wide intervals others have been obtained to the number of ten or twelve. The birds reported as shot at Santon Downham, Norfolk,[1] Brandon, Suffolk,[2] and the Thetford, Norfolk, example,[3] all of the same date, relate probably to the same bird. A doubtful example, owing to lost evidence, is the bird from Axminster, Devon. Another from Scalby, Yorks., in 1863, recorded by Cordeaux,[4] turned out to be a Black Tern.[5]

OCCURRENCES.			Date.	References.
Tutbury, Staffs.	1.		Oct. 1852.	*Dict. of B.B.* 348.
Wallingford, Berks.	1.		21.6.1869.	Yar.
Nr. Colchester, Essex.	1.		Winter 1880–81.	*B. of E.*
Bath, Somerset.	1.		4–5.10.1885.	*B. of Dev.*
Santon Downham, Norfolk.	1.	Probably the same bird.	April 1900.	*B. of N.* Riv.
Brandon, Suffolk.	1.		April 1900.	*P.H.B.B.* 720.
Thetford, Norfolk.	1.		April 1900.	*B.B.* II.
Hulme, Lancs.	1.		9.10.1901.	*B.B.* II.
Barmouth, Merioneth.	1.		17.8.1909.	*Z.* 1900, p. 438.
Brighton, Sussex.	1.		24.4.1911.	*B.B.* V. 81.
Lydd, Kent.	1.		9.4.1914.	*B.B.* IX. 98.
,, ,,	1.		10.4.1914.	*B.B.* IX. 98.
Axminster, Devon.	1. Doubtful, may have been a Black Tern.		17.7.1869.	Yar.

[1] *Birds of Norfolk*, Rivière. [2] *Practical Handbook of British Birds*, II. 720 (1924).
[3] *Hist. of British Birds*, Yarrell, II. (1871–85).
[4] *Birds of the Humber District* (1872). [5] *Birds of Yorkshire*, Nelson (1907).



9. COMPARATIVE DIAGRAM OF THE "SPURIOUS" TERNS.

One example of the LESSER SOOTY TERN (*Sterna anæsthetus Scop.*) (Pl. 8) has been obtained. Yarrell[1] says, "The evidence for this does not seem to be perfect." Saunders[2] in recording this occurrence wrote, "It is said—and I believe with truth—to have been captured on one of the lightships at the mouth of the Thames in September 1875," but, echoing Yarrell, added, "The evidence is, however, slightly imperfect." The *British Bird Book* (1912), p. 570, says the "alleged occurrence . . . requires confirmation." The *P.H.B.B.*[3] considered the evidence "not sufficiently perfect to warrant the introduction of the species as a British bird." Ticehurst,[4] however, admits it to his list of Kentish birds without qualification.

Both the Sooty Terns are inhabitants of the tropics and nest in the West Indies.

OCCURRENCES.			Date.	References.
Lightship in Mouth of Thames, Kent.	1.	Evidence not perfect.	Sept. 1875.	Yar.
Lightship in Mouth of Thames, Kent.	1.	Same bird, evidence accepted.	Sept. 1875.	*B. of K.*

Three occurrences of the NODDY TERN (*Anous stolidus stolidus L.*) (Pl. 8), the Sterna stolidus—Stupid Tern—of Linnæus (1758), have been reported. The first two of these were recorded by Thompson[5] in these words: "Two mature birds shot about May 1830, between Tuskar and Dublin Bay." Yarrell[6] stated rather cautiously that "two examples are said to have been obtained in the summer of 1830 between the Tuskar lighthouse off the coast of Wexford and Dublin Bay." A skin of one of these birds is in the Dublin Museum and is catalogued in the *List of Irish Birds in the Dublin Museum*, 1890, as "the only occurrence in Europe." Ussher and Warren[7] say, "Two adults were shot on the Leinster coast between Tuskar and Dublin Bay." But in his *List of Irish Birds* (1908), p. 48, Ussher had decided the evidence was too unsatisfactory to warrant the inclusion of the species in the British list. The same conclusion was arrived at by Coward[8] in respect to the Noddy Tern alleged to have been shot on the Dee marshes.

Macgillivray[9] says this species is "stated to appear in St. George's Channel," but gives no particulars.

It is a tropical species breeding in the West Indies.

[1] *Hist. of British Birds*, p. 565 (1871–85).
[2] *Manual of British Birds*, p. 638 (1889).
[3] *Practical Handbook of British Birds*, II. 720.
[4] *Birds of Kent* (1909).
[5] *Nat. Hist. of Ireland*, pp. 266–309 (1851).
[6] *Hist. of British Birds*, p. 567 (1882).
[7] *Birds of Ireland* (1900).
[8] *Birds of Cheshire*, p. 229 (1900).
[9] *Hist. of British Birds*, V. 676 (1871–85).

OCCURRENCES.		Date.	References.
Between Tuskar Light and Dublin Bay.	2. Evidence for this record not considered satisfactory by Ussher.	about May 1830.	*N.H. of I.*
Dee Marshes, Cheshire.	1. Evidence considered to be strong against this record by Coward.	about 1891.	*B. of Ches.*

We have also the curious case of the SWIFT TERN (*Sterna velox*) (Pl. 8), also known as Ruppell's Tern, and the S. bergii of Lichtenstein. This is a purely tropical species. Montagu[1] says, "One was shot by Mr. Lynch of Cork Street, Dublin, near Sutton, a place between Dublin and Howth at the end of September (or December), 1846 (or March, 1847); two others of the same species were seen." This statement, under the head of Ruppell's Tern, was repeated by Macgillivray.[2] Yarrell,[3] however, says, "This seems to have been a hoax perpetrated by a young taxidermist," and thus disposes of the record.

Of the spurious species the BROWN TERN (Pl. 9) received the most attention and careful description. It was first made known here by the *Ornithology of Francis Willughby, Wherein All the Birds hitherto known Being reduced into a Method suitable to their Natures are accurately described*, so runs the title of the 1678 edition translated into English by John Ray, F.R.S. The Brown Tern there appeared as the Larus cinereus minor of Aldrovandus and is thus described: "It scarce exceeds a span in length. On the back and wings it is an ash colour, but far deeper in that, inclining to blue. The quill feathers of the Wings are, on the outside cinereus but on the inside black; on both sides on the ends white. The bill is slender (or small) for the proportion of the body, a little bending and black. The crown of the head toward the hind part black. The feet, legs and membranes uniting the Toes of a Saffron-colour. The Claws black. All the other parts purely white. It flies up and down continually over the water in pursuit of Gnats and other water Insects. It feeds also on Fish. This is also the Brown Tern of Mr. Johnson (if I be not mistaken), whose underside is all white, the upper brown: the Wings partly brown, partly ash-coloured: The Head black: The Tail not forked. The Birds of this Kind are gregarious, flying in companies." Latham[4] says, "Such is the description of Ray and Willughby, from which no certainty can be drawn. It is probably, from the circumstance of the tail not being forked, a young bird; but whether of the Tern or Gull kind yet remains in obscurity." Montagu[5] classifies it as Sterna obscura (Gmelin), Sterna

[1] *Dict. of British Birds* (1802).
[2] *British Birds*, V. 629 (1837–52).
[3] *Hist. of British Birds*, p. 539 (1871).
[4] *General Synopsis* (1781–1801).
[5] *Ornitholog. Dict.* (1802).

fusca (Ray) and Brown Tern (Latham), and says, " With respect to the Brown Tern of Ray, it ever has, and ever will be in obscurity; but there cannot be the least doubt that it is one of the Terns in its immature plumage, most likely the common species S. hirundo, which is at first brown above and the tail scarcely forked." Again, " We rather think the Brown Tern is the young of the Common Tern, S. hirundo." And, " Whether the Brown Tern of the older naturalists is a Tern or a Gull is perhaps a doubt. With respect to the Brown Gull whether it is or is not the Brown Tern of older authors is of no importance, as at any rate it is an immature bird." Finally, his doubts are solved, for he says definitely, " Sterna fusca of Ray is the young of Common Tern."

Of STERNA NÆVIA (Pl. 9), Latham thought it the young of the Sandwich Tern, but Montagu,[1] on the other hand, says that " S. Nævia (Linnæus, Gmelin, Brisson) is the young of Common Tern in a state of adolescence."

Newton, editing Montagu's *Ornithological Dictionary*, 1886, says of the STRIATED TERN (Pl. 9), " Mr. Yarrell informs me that this is the young of the Sandwich Tern."

Yet another immature bird which at one time received specific rank is STERNA PORTLANDICA (Ridgway, 1874) (Pl. 9). It is now known to be the Arctic Tern when one year old before having completely moulted. The forehead is white, the crown nearly so, the rest of the head black flecked with white. The lesser wing coverts are conspicuously dark, the remainder of the plumage being as in the adult. The bill is black and the legs and feet black with a tinge of red.

[1] *Dict. of British Birds*, p. 343.

OF RECOGNITION

FOUR things are to be taken into account—the appearance of the bird; its actions; the place where it is seen, and the time of year. Thus it will be possible to recognise a Tern.

In appearance all Sea Terns are unmistakable. White beneath and pale grey above, they have in addition two distinctive features which, in conjunction, are possessed by no other British bird. The first of these is a black cap and the other a deeply forked tail (Pl. 10). A word of warning should be given; when the bird is flying, the tail seems pointed and is only seen to be forked when it is spread: this action should be looked for.

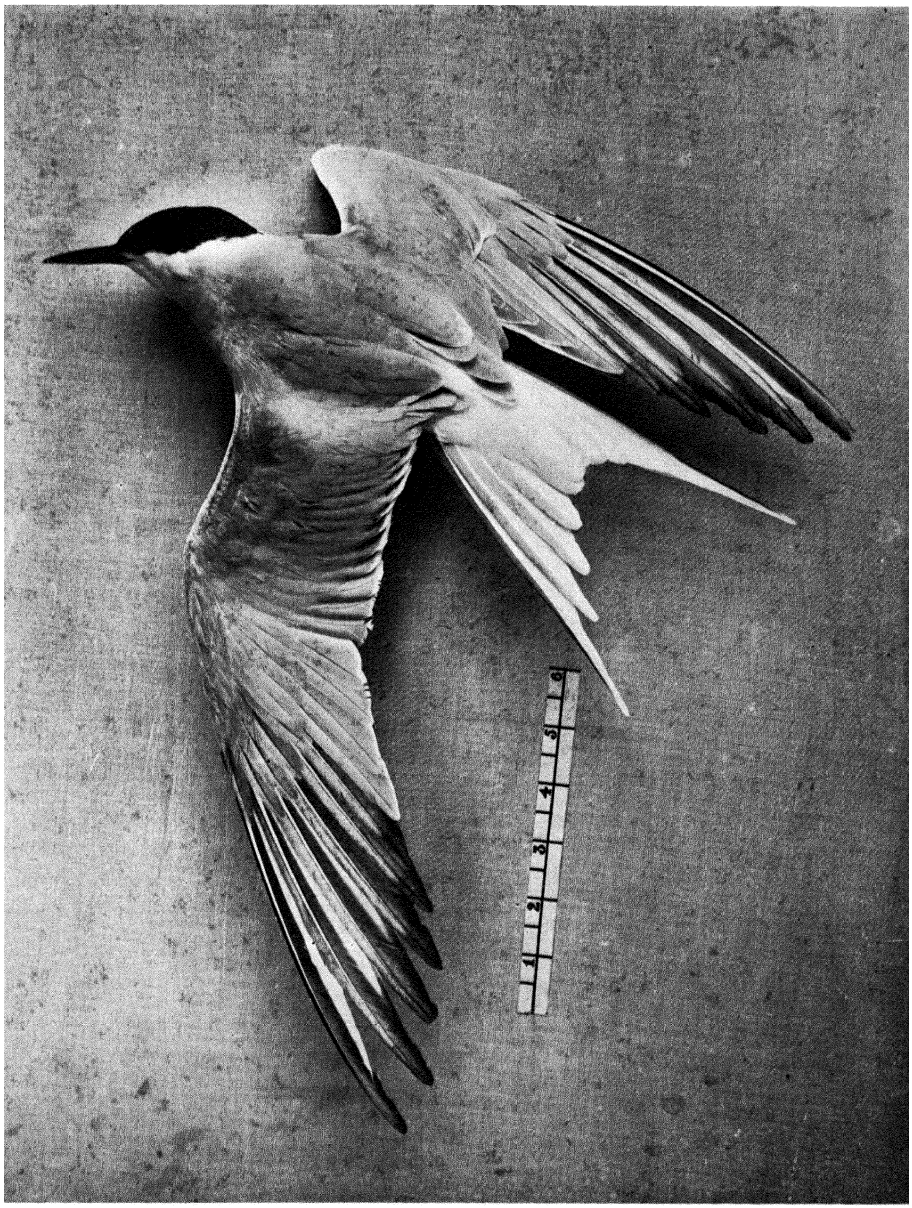
The Tern is the only sea-bird to wear a black cap, by which is meant that it has a jet-black face, crown and nape. True it is that the Skua has a cap, but this is dark brown; moreover, the back of a Skua is dark brown also, not pale grey as with the Tern. On the other hand, Gulls are white beneath and—most of them—pale grey above, but no Gull wears a black cap. Some Gulls, mostly rare species and not likely to be seen here, have, not caps, but black heads. But there is one which it is just possible may be mistaken for a Tern, this being the so-called Black-headed Gull. This bird has, like some of the Terns, red legs and a red bill; it is also white beneath and grey above. Instead, however, of possessing a black cap, three-quarters of its head is of a dark brown colour, notwithstanding its name.

One Tern, the Sooty, is a little different from the others, having a much darker back, but it also has the distinctive cap.

Certain land birds also have black caps, but none of these could possibly be mistaken for Terns as they do not possess any other Tern characters.

The deeply forked tail is the special prerogative of the Terns. All have it with one exception. Moreover, except for the Swallow, this feature is not seen in any other British bird. As the Swallow is, in general appearance, black and small, there is no possibility of it being confounded with a Tern.

The Marsh Terns are not so easy to recognise: they differ in appearance from the Sea Terns, though one of them wears the characteristic black cap. Their tails are not so deeply forked and two species are very dark



10. UPPER VIEW OF COMMON TERN, SHOWING ALL MAIN CHARACTERISTICS.

grey, almost black, with lighter wings. They have a superficial resemblance to House Martins and behave in somewhat the same way, *i.e.* they hawk for flies over pools and lakes. But a House Martin is much smaller, has a shorter beak, a white rump and white breast and does not, when flying, utter harsh cries as do the Marsh Terns.

As for their actions, Sea Terns are fond of sitting on the tops of posts standing in or near water, on buoys and other sea marks. In Spring they follow the coast-line in small companies, in pairs or as individuals, moving northward. In Autumn they pass southward, often in large flocks. They fly in a graceful, leisurely manner, often with curious hesitating flaps of their long pointed wings. They hang, with fluttering wings, suspended at some height above the water, into which they make sudden, headlong plunges in pursuit of food, after which they may be seen carrying off a small, shining fish or sand-eel dependent from the beak. Their distinctive action is this " headlong plunge," and any bird seen performing in this way is almost certainly a Sea Tern. Two other birds have this habit, one a sea bird, the Gannet, and the other a land bird, the Kingfisher. The Gannet, superficially like a Tern in its colouring when seen at a distance, also drops from a height into the water, but its great size—it is six feet across its wings—and the fact that it does not dive near the shore nor carry fish hanging from its bill, are sufficient to prevent its being mistaken for a Tern. The other " precipitator," the Kingfisher, is seen only on inland streams. Its well-known brilliant blue plumage alone is enough to distinguish it from any other bird.

April to September, or possibly October, is the time when Terns are likely to be seen. While it is just possible they may be noticed in Winter, this is extremely unlikely.

Marsh Terns, when they appear, are usually seen flying about over pools and marshes such as the Meres of Cheshire and the Norfolk Broads, hawking for flies like so many Swallows. During this procedure they utter characteristically harsh cries and are often in company with Sea Terns. One should not expect the Marsh Terns to dive, though they will descend and take flies from the surface of the water or even splash for small fish which may be swimming there.

The Little Tern can readily be recognised by its small size—it is about the bigness of a Starling—and by its white face and yellow legs and beak.

The Marsh Terns with their dark plumage do not resemble any of the Sea Terns except the Sooty and the Noddy, both of which are, however, much larger and browner.

The Black Tern is entirely black and dark grey, lighter beneath, and has a white vent. The White-winged Black Tern is very similar,

except that the angle of the wings, the vent, and the tail are white. The Whiskered Tern has a black cap, a white stripe on each side of the head—the " whiskers "—a grey back, and white vent and tail. The two latter Terns have red bill and legs, and the former a black bill and reddish legs, features which can only be seen if the birds are resting.

The part of the country in which the Tern is observed may have some bearing on the identity of its species, though too great stress need not be laid on this fact.

A Tern noticed inland will, almost certainly, be a Common or an Arctic Tern; the former if the bird is observed in England, or either species if seen in Ireland, that is, of course, unless it is one of the Marsh Terns. The chances are that any Tern seen in the North of Scotland, say, above the Caledonian Canal, will be of the Arctic species; any observed between that Canal and the Roman Wall are equally likely to be Common or Arctic; below the Roman Wall the probability is that any Tern seen is a Common Tern. If, however, the bird is observed in the neighbourhood of Cumberland, the Farne Islands or Norfolk it may be a Sandwich Tern. The likelihood of seeing a Roseate Tern, unless it is on migration, will only occur in certain districts in England, Wales and more particularly in Ireland, as this Tern is more restricted in its breeding places than the others. The Little Tern, though it may be seen in Scotland or Ireland, will, with greater certainty, be observed in England and on the East Coast.

The Marsh Terns are seldom seen except over pools and marsh land. Norfolk is the most likely county, while Cheshire and S. Lancashire are often favoured with their visits. They are much more often seen below a line drawn from the Mersey to the Humber than further North.

Taking the distinctive features together—the black cap, the deeply forked tail and the white and grey plumage—their habit of dropping into the water from a height—the place where seen, *i.e.* seashore, lake or river—and the time, during Spring, Summer or early Autumn—and the bird will be readily recognised as a Sea Tern.

Or, if it is a dark bird almost black, flying rapidly to and fro over a pool, calling harshly, and this in Spring or Autumn, it may be put down as a Marsh Tern.

It is one thing, however, to decide that a bird under observation is a Tern and another to assign it to the species to which it belongs. Detailed characters of each Tern have been given in the preceding chapter: many of these are such that they can only be seen if the bird is in the hand; it will be sufficient here to state features possible of recognition when the bird is in the air or resting on the ground.

If the Tern is large, about the size of a Crow or Rook, and has a tail

shorter than its wings and slightly forked, a red bill and black legs, it will be a Caspian Tern.

If similar in length to a Pigeon but more slender it is either a Sandwich, a Gull-billed, a Sooty or a Noddy Tern. Now a Sandwich and a Gull-billed Tern are practically alike except for one feature, and that is the bill of the latter is broader than that of the Sandwich, more clumsy, and with a decided angle underneath. This detail, difficult to see when the bird is in the air, is visible in a good light if powerful binoculars are used and it is on the ground. The other two Terns are similar to each other though quite different from the other two. Both have dark rusty-grey backs and wings, but the Sooty has a black cap *darker* than its back, while the Noddy has a cap *lighter* than its back. Moreover, the Sooty has a forked tail and the Noddy has a cuneate tail, *i.e.* one which is the reverse of forked.

If a little longer than a Jackdaw, the bird will be either a Roseate, a Common or an Arctic, for these Terns are almost equal in size. In the air the Common Tern cannot, with certainty, be distinguished from the Arctic: the Roseate differs from both in having its tail more deeply forked with very long outer feathers—the " streamers." On the ground the crimson hue of the red of the Arctic Tern's beak differentiates this bird from the Common Tern, which has a scarlet, dark-tipped bill. Its almost black bill, its long tail and lighter grey back separate the Roseate Tern from the others. The " roseate " hue of the breast of this bird, be it noted, is not, as a rule, sufficiently pronounced to be relied on as a means of identification.

Of the rarer Terns, few have been noticed far from the coast. They seem to have preferred certain districts—Kent and Norfolk—though, as they are " vagrants," it is possible they may be seen anywhere, though not probable.

Nothing has been said about the calls of Terns as a means of identification. In the chapter " Of Vocabulary " these are given in detail and it will be obvious after perusal of that section that, except for the expert, it will be better to rely on " sight " rather than " sound " for recognition, it being so easy to be misled by cries which are, in many cases, closely similar. One call may be mentioned which can, with safety, be used to determine the species, for it is peculiar and easily distinguishable from all others, and that is the harsh " Kraak " of the Roseate Tern.

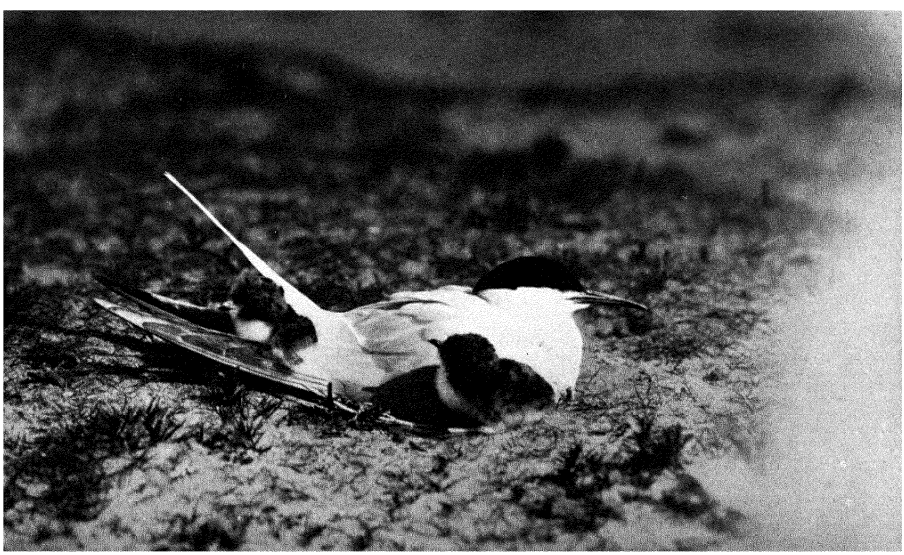
Warning should be taken that the plumage characters spoken of are those of adult birds in breeding dress. Terns in immature plumage differ from the adults of their own species, while in some cases the plumage of the young of different species is alike or nearly so. But as the young have a recognisable black cap and they are usually associated with adults, it should be possible to identify them as Terns, though perhaps their

species may be in doubt. In any case, their actions and the situations in which they are seen will help to place them.

It may be observed too that the probability of seeing the Caspian and Sooty Terns is remote, and though it has been necessary to refer to all the British Terns, the Lesser Sooty, the Swift, and the Noddy Terns are not likely to be seen.



11. COMMON TERN GREETING ITS RETURNING CHICK.



12. A FAMILY GROUP OF **COMMON** TERNS.

OF TERNERIES AND DISTRIBUTION OF TERNS

TERNS favour, as breeding grounds, three types of environment—sandhills, shingle banks, and rocky islands (Pls. 27, 28, 29, 30, 31, 32). Of the first, Blakeney Point in Norfolk is an excellent example. In reality, the Point has for its foundation a succession of " hooks " of shingle brought and formed by the run of the tide. On each hook, blown sand has accumulated in the shape of high dunes. Between the hooks are low-lying areas of salt-marsh. The dunes are increasing seaward in the form of low mounds and sand has been spread on the higher part of the shingle beach. On the most recently deposited hook, which is known as " Far Point," small hills and banks of sand are accumulating, and through these and through the mounds on the beach are growths of marram grass (*Ammophila arenaria*) which serves the treble purpose of holding the sand-particles together, of affording shelter to the Terns, and providing them with building material. Other vegetation there is assisting the marram in its work.

The Terns, whether Common, Arctic or Roseate, nest on these low hills and stretches of pebbly sand found between the high-tide mark and the high dunes. Since its formation " Far Point " has found great favour with the Common Terns. All the species seem quite indifferent as to where they nest in these areas ; whether they lay their eggs on the bare sand or among the mounds or on the flat stretch of sandy beach, or whether they nest on the material thrown up by the sea which forms the high-tide mark. Seldom are nests found among the high hills, though in this situation they are not unknown. But it is not unusual for a few pairs of birds to choose shingle-banks in the salt-marsh for their home.

Sandwich Terns, for their part, utilise the more recently formed mounds on " Far Point," moving elsewhere if the sand piles up to greater heights.

The broad stretch of shingle-sand, or sand-shingle, which lies between the sandhills and the sea is the locality selected by the Little Terns, for this species never herds with its larger congeners.

This, then, is the kind of environment in which all the five kinds of British Terns may be found nesting in more or less close contact.

But the sandhill type of ternery is not always, or even usually, found on a shingle-spit foundation. Large, barren areas of sand thrown up

by wind and waves in the form of hills which often run for miles along the coast are equally fancied by the Terns, though the Sandwich Terns have, perhaps, a preference for situations somewhat surrounded by water.

Behind dunes of this type, which often run in ridges roughly parallel to the coast-line, are found hollows and flattish spaces which tend to hold water in Winter and remain marshy in Summer. In this habitat are growths of a different character from those found on the drier sandhills and in greater variety. One of these, a dwarf willow—*Salix repens*—pushes its way through the sand, and arresting the wind-blown particles, forms, in course of time, rounded mounds thickly clothed with dull green foliage. The great stretch of barren sandhills between Liverpool and Southport is an excellent example of this sand-dune type of nesting site.

These willow-clad hills share with those on which the marram grass is growing, the affection of the Terns, and groups of the nests of Common Terns, and sometimes of Arctic, are to be seen in either situation. These nests are not only placed near the sea, they are to be found, not infrequently, some considerable distance away.

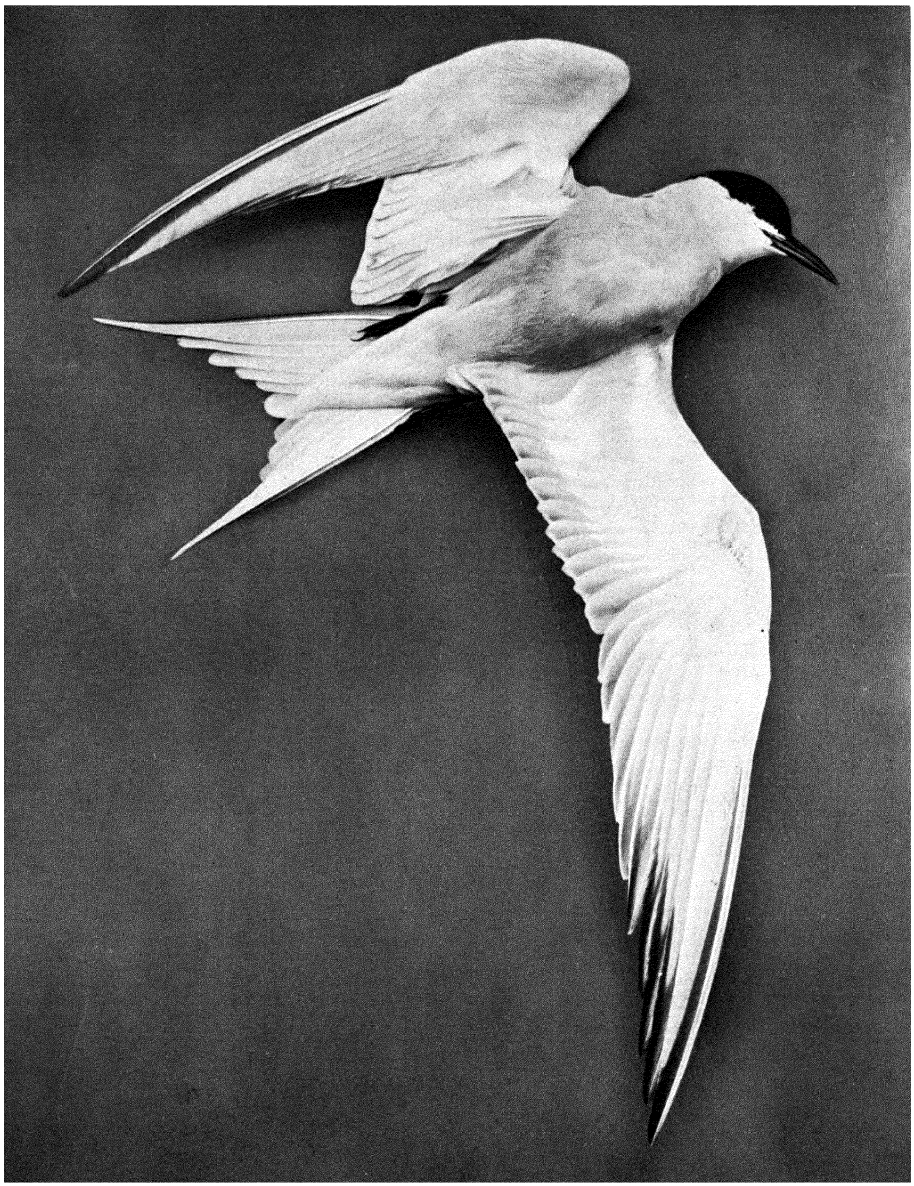
We are inclined to think the position of these " far back " nests indicates the situation of colonies originally established when the sea extended some considerable distance farther inland. The continual casting up of sand by the sea during centuries has gradually left these colonies in the rear of the sandhills. If this is so it points to the occupation of the same nesting sites, year after year, for hundreds of years, extending far beyond the time when man first came with his reclamation schemes to unsettle the Terns.

An interesting example of the ancient occupation of the " hinterland " of an area of sandhills, coupled with the colonising of newly-formed dunes, is that of Tentsmuir in Fifeshire referred to on page 203.

The low-lying land behind the seaward range of hills or sea-banks has its Tern population too, and it is in this situation, as in certain places such as Salthouse in Norfolk and in Holland, the Sandwich Tern delights to breed, as well as in the situations previously mentioned.

Often enough, through geological or tidal reasons, shingle spits and beaches never become enveloped in sand. Nevertheless, the Terns resort to such for breeding purposes. Terneries on this type of nesting ground are to be seen at Dungeness in Kent, Chesil Bank in Dorset and in various places in Scotland and elsewhere. They remain nothing more than an aggregation of pebbles, more or less large, whose starkness is moderated, not by sand, but by vegetation of various kinds. The structure of these sites may be flat, slabby stones ranging in size from quite small pieces to slabs eight or ten inches long, or small to large rounded pebbles.

In the West of Scotland are formations known as " raised beaches "



13. Under view of Arctic Tern, showing darker tone of breast.

which are said to have been, ages ago, normal sea-shores but which have been raised to their present positions much above the high-water mark by the " tilting " of the land. These " raised beaches " are, in many cases, a conglomeration of round stones many of which are as large as one's head and are quite innocent of vegetation other than lichens. On one of these, in Jura, we found a colony of nesting Arctic Terns. These birds, owing to the large crevices between the stones, had been constrained to build large nests, which they had done with green moss carried from a distance. We were very puzzled as to how the wandering chicks escaped the ever-present danger of slipping down a crevice and being lost.

This danger is not experienced on shingle banks formed of smaller stones, for on this kind of bank are to be found large mats of vegetation appropriate to the situation, such as coarse grasses, sea campion—*Silene maritima*—scurvy grass—*Cochlearia officinalis*—sea-pea—*Lathyrus maritimus*—and other sea growths which enable the parent Terns to avoid building nests without subjecting the young to the hardship of a bare stone nursery, afford shelter and refuge to the young ones and provide material if they wish to build.

The reason why one kind of site is selected for the colony in preference to another when there is a choice close at hand is not apparent. Usually one would say the proximity of a regular supply of suitable food is the factor in determination. But it is not unusual to see, where two types of nesting ground are found close together, that one is taken and the other left.

One such choice of situation we have in mind where, notwithstanding the presence of a large stretch of sandhills quite secluded and to all appearance as suitable as many other similar and occupied sites, the Terns have elected to colonise a rock islet from which vegetation is almost absent. Here they have, perforce, to lay their eggs on bare rock or utilise the unsuitable sea beet—*Beta maritima*—growing there or carry material from the mainland. Besides this disability, the exposure to the wind and driven spray would seem to indicate the desirability of the more comfortable sandhills site.

But not always are these rock stations quite as bare and exposed as those " skerries " or " stacks " which are merely fangs of rock of no great size protruding through the water. Larger rock islands are more generously clothed with verdure which softens the asperities. An overspreading lichen, some peat or soil accumulated at the bottom of rock clefts and crevices, thrift or sea-pink, grass tussocks and beds of moss, all mitigate the hardness of the place chosen for the deposition of the eggs.

On these larger islands, too, are extensive areas of short grass which offer pleasanter conditions, and on one such island in Ireland we found

wide stretches of bracken, beneath and among which the Terns were nesting in comparative concealment—an unusual situation.

Often, also, on these larger rock stations, drifted or washed up sand stretches are found which are seized upon by Arctic or Little Terns for their nesting sites.

It would be convenient if one could say that each species has its own particular type of situation, but, except perhaps in the case of the Little Tern, this is not so. Terns are of a gregarious nature, and quite commonly three and even four species may be found breeding in close proximity. Not indeed mixed up but in groups side by side. It is, therefore, not safe to say that any colony is tenanted exclusively by one species, for it often occurs that, without advertising their presence, one or two pairs of another species than the predominant one are present.

It will be gathered that Terns are not, within certain limits, at all particular as to the position and kind of locality they choose for nesting purposes.

So much for the terneries, but what of the distribution of the Terns occupying them?

It is difficult, nay impossible, to convey an accurate presentment of the distribution and numbers of the Terns in the British Isles. In the early days of interest in these birds no definite records were kept by observers. At that time there was none of the reticence as to the situation of the terneries which is usual to-day, but guess-work as to numbers was quite as prevalent. Then, as now, if figures were given of the number of breeding birds they were " round," and all such are open to suspicion; very " round " figures like 500 and 1000 being doubly so. " Estimates " are still made, and by guessing at a population which cannot be counted a false impression is conveyed. The only statement of any real value is that based on a count of nests; this is seldom done. To be really useful this should be done twice in a season.

The use of such ambiguities as " numerous," " in great abundance," " swarms " is to be deplored. They cannot convey the true state of a ternery, for the meaning of these terms depends entirely on the experience of the person reporting. One used to colonies of twenty to thirty birds regards a population of a hundred as " large." One familiar with the large terneries of a thousand birds might refer to a hundred as " small." Generalities of this kind should be accepted with caution.

The effect of enthusiasm is not negligible. Plomley's statement[1] in regard to the numbers of Sandwich Terns in the Kent colonies in 1847 is an amusing case in point. " In a limited space of one or two yards," he said, " many hundreds of eggs have been found almost in

[1] *Birds of Kent*, p. 498.



14. ARCTIC TERN ALIGHTING ON NEST.



15. ARCTIC TERNS "CHANGING OVER."

contact." Now, if the eggs actually touched there would be approximately 453·6 in a square yard, and if " almost in contact " rather fewer. But the birds must sit on the eggs, and as a Sandwich Tern occupies a space of something like 16″ × 3″, twenty-four birds only could sit touching each other in a square yard. This means, if each bird had two eggs, no more than forty-eight eggs to the yard. As a matter of fact, according to measurements we have made in different terneries (see pp. 136, 145), Sandwich Terns sit at an average distance of 17·5″ apart, which gives a maximum of only eighteen eggs to the square yard, not " many hundreds " as the enthusiastic Plomley claimed.

Here is another example. Thompson [1] has the statement that Common Terns bred " in great numbers on Kinrevoch, Islay, Scotland: 500 pairs in 1848, and in 1849 they were said to be twenty birds for one in 1848." Thompson's informant seems to have been indulging in a " flight of fancy," for that would, literally, mean the astounding increase in one year from 1000 to 20,000 birds!

The dates on which a ternery is visited by the observer may decide whether it is reported as " abandoned," " increased " or " decreased." In 1932 we visited a ternery which is circumscribed in area, with which we are quite familiar. This was on a date when young birds should have been still running and some eggs not yet hatched. We wished to see the Sandwich Terns, but none were to be found except one in the air, though Common Terns' eggs and young were plentiful. Our notes read, " Sandwich Terns not nesting this season." Shortly afterwards we saw a published report that the Sandwich Terns had increased enormously and beaten all previous records for numbers! Evidently the eggs had hatched and the young fledged and flown unusually early, and we were led by their absence to think the old birds had not returned that season. Something similar must have happened at the Culbin Sands to cause the two mutually contradictory reports mentioned by Harvie-Brown in *The Fauna of the Moray Basin*.[2]

Confusion existed in the early days—indeed it does still exist—as to species, and observers were unable to recognise or distinguish them. Consequently early statements are often puzzling. Mistakes in identification certainly occurred, as witness the statement that Sandwich and Roseate Terns breed on an island in Loch Lomond, which Yarrell said " appeared to be devoid of foundation." Macgillivray, in 1837, reported the Common Tern to be " in great numbers in Barra, South Uist, and the whole range of Long Island." Elwes, about 1868, said the Common Tern was commonly breeding in the Hebrides. Harvie-Browne, in 1888, " utterly failed to identify the species there." The *Practical Handbook of British Birds* says it " breeds rarely " in the Hebrides, and it was

[1] *Nat. Hist. of Ireland*, III. 291. [2] Pp. 210–11.

authoritatively stated to have bred there for the first time in 1901! Someone had blundered, and it is more than likely that the informants of the earlier writers meant the Arctic Tern, which nested there in numbers, and by saying the Tern was " common " gave rise to the misunderstanding. A similar case is that of the report, by Edmonston, that the Common Tern " was the only Tern to visit Shetland," while Dunn declared " he had never seen any Tern in Shetland other than the Arctic Tern."

There are other contradictions which may have arisen in the same way, although the explanation, often given, is that Terns are erratic and move about mysteriously. It is on the evidence furnished by these ambiguities and misunderstandings that statements relative to " disappearing species " and " instability " are often made, the wrong conclusion having been drawn.

Perhaps the most noted of British terneries is the now abandoned Cumbrae Island site in the Firth of Clyde, for it was here the ROSEATE TERNS were shot which led that species to be recognised and included in the British List.

Dr. Macdougall of Glasgow and friends went, in 1812, to the Cumbraes to shoot Terns and Gulls. That it was the breeding season was no deterrent in those days and they appear to have blazed away indiscriminately at the hosts of Terns flying over their nests. On counting their spoil—could a better word be found for the wanton destruction of so much beauty and interest?—they discovered several birds differing in certain particulars from the other Terns they had shot. One of these was sent to Montagu, who euphemistically said " it was shot by accident."

This first Roseate colony does not seem to have been very large, for Macdougall said that he computed there was not above one Roseate Tern to two hundred Common Terns, of which " there were thousands."

The Irish Sea seems to have been, and is certainly to-day, more to the liking of the Roseate Terns than the other coasts of the British Isles, for it is in that region that the largest colonies of the species have been and are to be found, and in no other area.

The belief that it once existed in large numbers in the Farne Islands is based on a statement by Selby which will not bear examination, but, having been supported by Yarrell and repeated by other writers, the statement has gained credence. This is what Selby, writing about the year 1833,[1] said: " Upon the Fern Islands I met with it *plentifully* for the last fifteen years." On the other hand, Hewitson, writing in 1831,[2] said, " Upon the Fern and Coquet Islands it (the Roseate Tern) is *very limited*, a few pairs only, mixed with Arctic and Sandwich Terns in many

[1] *Illus. of Brit. Ornitho.*, II. 471. [2] *British Oology*, I. 66.

thousands." Selby also wrote, " It had only been noticed for a year or two previous . . . as a distinct species." An oversight of this kind was not likely if it had bred " plentifully," whereas Hewitson's " few pairs " might escape notice in thousands of other Terns. Considering this probability and the fact that, since Selby's time, on the East Coast, not excluding the Farne Islands, where it has been protected since 1888, nowhere have more than five or six pairs bred, we must conclude that for " plentifully " we should read " several."

This interpretation, if correct, would bring the Farne Island Roseates into line with the practice the Roseate Tern has followed for years past of establishing its main colonies only on the shores of the Irish Sea. In this area there have been for, certainly, a hundred years, that is since any records have been kept, and are still, the only substantial colonies in the British Isles. Outside this area nesting has never been anything but casual, and the number of nests we have been able to trace is very small—only twenty-seven, with a few not enumerated. These have ranged, in situation, down the East Coast from the Culbin Sands in Nairne, Loch Lomond, Tentsmuir, the Isle of May, the Farne Islands—where the largest group, five to six, ever found outside the Irish Sea nested in 1898—Scolt Head, Blakeney Point to Chesil Bank in Dorset. These nestings extend over a period of fifty-two years, a small matter of 0·6 nest a year.

The incidence of the Irish Sea colonies extends from Kilbrannan Sound in the Firth of Clyde to Cornwall and the Scilly Isles, where they were abundant in 1869,[1] and they are found on both sides of the sea.

Except the East Coast examples, the Chesil Bank occurrence and the Irish Sea colonies there does not appear to be a record from any other part of the country.

Of the Irish Sea colonies the early records speak of the Roseate Tern as breeding in a few localities in Ireland in 1827, and it was referred to as nesting on an island near Belfast in 1831, where by 1833 it had decreased. It was first noticed at Rockabill in 1837. Foulney in Lancashire was said to have, in 1840, Roseates in equal numbers to the Common Terns. This would have been enlightening had the writer stated, which he unfortunately did not, how many Common Terns there were. In 1840 also they were nesting on Rockabill in Dublin Bay, where, in 1844, they were stated to be " in hundreds," but by 1847 the numbers had diminished, while by 1850 they had decreased to between 70 and 80. In that year another ternery was said to have become deserted. Between 1850 and 1900, according to one account, no Roseate Terns were known to have bred in Ireland, but a colony seems to have been in existence

[1] Rodd, *List of British Birds*, p. 42.

in 1874, while, though it had become " more scarce," it was still nesting in " a very few localities " in 1890. In 1896, Seebohm[1] wrote: " It is doubtful whether the Roseate Tern nests in any part of the British Isles at the present time," and Ussher and Warren[2] said (in 1900): " There is not sufficient evidence to show that the Roseate Tern breeds in Ireland at the present day." It was found in an undisclosed locality in Ireland in 1908. From that date till 1913 no account seems to have been published of the Irish Roseates nor any definite figures relating to those in the two Welsh stations. With regard to the latter, Jourdain estimated the inhabitants of one colony at " fifteen or twenty pairs " and the other from " three to four hundred." In 1913 the species was reported to be breeding at Malahide, where it seems to have nested in small numbers till 1921; the largest number in any (reported) year being eight nests. Another colony of some 80 birds, also in Ireland, was discovered in 1913, the ternery containing 20–25 nests. Another, or perhaps it was the same station, appears to have had 23 nests in 1917. Yet another, discovered in 1921, consisted of 20–25 pairs of birds, while a report for 1922 gave the large number of 100–150 pairs as being present. Malahide seems to have been reoccupied in 1922–23 and one pair were found nesting in a colony of Arctic Terns in 1924. Roseate Terns were breeding in 1923 and 1924 on " a certain island " where there was an estimated 500 pairs nesting. This station was deserted in 1925 entirely, but the birds returned in 1929, when there were " plenty." In the following year 30 pairs were present, but in 1931 only seven nests were found. When we visited this station in 1932 we found 23 nests, others in all probability being there. In the same year we visited another station where several adult Roseate Terns were flying about; the nests had been entirely destroyed by rats. In this station about a dozen pairs were breeding in 1926, and in 1929 " quantities " of birds were flying about. Yet another colony which contained three nests in 1932 does not seem to have been recorded as a breeding station; while a fourth we found to be exceedingly flourishing, for we were able to count 329 nests containing 472 eggs.

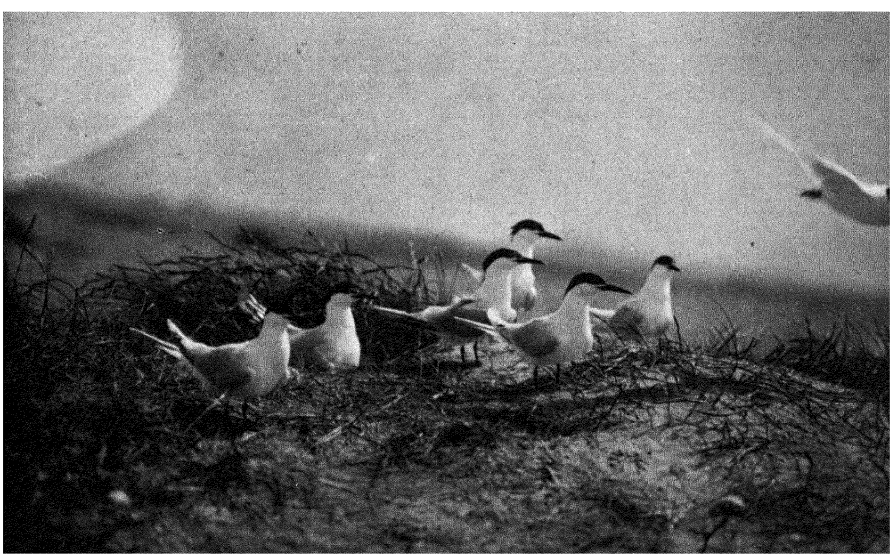
Some of the colonies have ceased to exist; Rockabill lost its breeding Roseates soon after 1850, Foulney and Walney in 1912, and it was in 1928 that one of the Welsh terneries was evacuated, though there are rumours (1933) that some of the birds have returned.

The Roseate Tern seldom leaves the coast, never following the rivers as does the Common Tern. Three inland occurrences only have been reported. Two of these, curiously enough, came from the same place, Llanymynech, in Shropshire, one in 1830 and the other in 1914; the third being from Elliot in Forfarshire, 10.6.26.

[1] *Eggs of British Birds*, p. 101. [2] *Birds of Ireland*, p. 319.



16. SANDWICH TERNS ALIGHTING.



17. SANDWICH TERNS STANDING BY THEIR EGGS.

The connection of the SANDWICH TERN with Kent is not only due to the species having been first recognised there in 1784 and its association, by name, with the town of Sandwich; it is also that the earliest records we have of this Tern relate to the status of the species in the county and its neighbour, Sussex.

Latham, writing between 1781 and 1801, said the Sandwich Tern was "pretty common" on the coasts of Kent and bred there, and "it frequents Sandwich in vast flocks, making a screaming noise." Not only is it difficult to reconcile Latham's lukewarm, "pretty common" with his "vast flocks," it is strange that birds occurring in such numbers and expressing themselves so emphatically should have "passed unnoticed," as he says, elsewhere, they did. If, too, he knew of it breeding there why should it be said, "nor could we ever find where it bred" and "we . . . have never, with certainty, heard of its eggs being found"? Both these statements are certainly very curious in view of his earlier report of the "vast flocks." Curious, too, is Macgillivray's statement[1] that it "was said to be of infrequent occurrence, although it is supposed to breed there."

The Sandwich Tern continued to breed in South Kent and probably in North Kent until 1865, when a few pairs were said to have nested on Dungeness. An earlier report, however, gave the year 1847 as the date they ceased breeding there. This was made by Plomley, who recorded that "forty to fifty years ago (*i.e. circa* 1800) it was very numerous on Dungeness in the parish of Lydd and Romney Marsh." It is said to have bred on Dungeness in 1899.[2]

Though Kent was the county where the Sandwich Tern was first brought to the notice of ornithologists it was some time before the species was found to be breeding elsewhere. We find in an early report of the year 1830 that they had "deserted a particular islet of the Fern group and fled to the Coquet Island." This report is the beginning of the history, yet to be written, of the long association of the Sandwich Terns with the Farne Islands and their extraordinary comings and goings.

Mention has been made of the Coquet Island. That island, as well as Holy Island, shared with the Farnes the privilege of providing homes for the Terns. Coquet ceased as a breeding station in 1882. A few pairs continued to nest on Holy Island and on Black Law, on the mainland near by, until 1900. Since that date the Farnes are the only nesting-place in the North of England. A large colony seems to have existed there continuously with one short break since about 1832, when all the birds deserted the islands. They have always been restless, occupying an island for a short period, spreading out over several, concentrating again on their earlier home, or, perhaps, on another island. Thus, in 1856, they were widely dispersed and must have been very numerous,

[1] *Hist. of British Birds*, V. 1837–52. [2] *Birds of Kent*, p. 501.

for they occupied, simultaneously, the Longstone, North Hares, the Brownsman, the two Wide-opens and the Knoxes. In 1867 only 200 nests were there and a colony was present in 1870. In 1885 they were occupying the Wide-opens and the Knoxes. The year 1892 saw an enormous increase, for no less than 2400 nests were reported. In 1909 and in 1911 they were once more occupying the Wide-opens and the Knoxes. The next year they spread to the Brownsman, the chief colony being on the Knoxes, while others were nesting on the Wide-opens. In the year 1913 they were again nesting on the same islands, 1000 nests being found on the Brownsman alone. Great numbers nested in 1918, there being 1000–1200 nests on the Knoxes, but by 1921 they had again moved to the Brownsman.

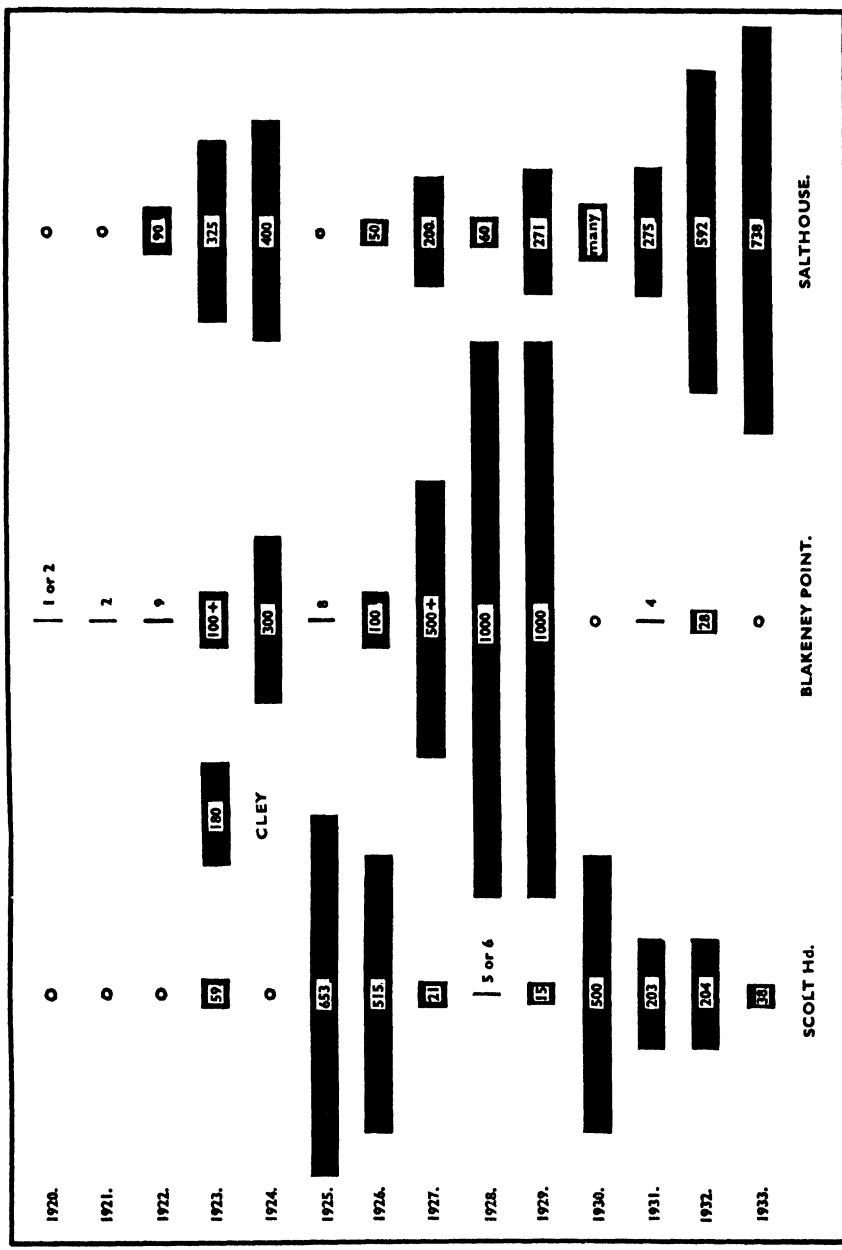
A temporary desertion took place in 1923 which was coincident with a big increase of Sandwich Terns in the Norfolk terneries. There can be little doubt the two occurrences were related.

When we visited the Farnes in 1932 all the Sandwich Terns were concentrated on the Brownsman, where they were in great force.

Thus, for many years, the Farne Islands were the great stronghold of the breeding Sandwich Terns, but a rival was about to arise.

In North Norfolk there had existed for generations colonies of Common Terns, in various places. But, though the Sandwich Tern had visited the county while on migration—19 or thereabouts having been shot and others seen—it was not until 1893 that it was rumoured to have bred there, the site not being made public. In 1920, " one or two " pairs were said to have nested on Blakeney Point; one nest, also, being found in another locality. There is more certainty about 1921, for two pairs stayed to breed on the Point, and this occurrence was stated to be the first authentic record of the Sandwich Tern breeding on Blakeney Point and the first time of its breeding on the East Coast below the Farne Islands. This statement is obviously a mistake, for there was a large colony on Coquet Island in 1832 and in 1833. The year 1834 saw them breeding at the mouth of the Blackwater, on Colne beach, and probably elsewhere in Essex up to about 1880. Yarrell records the species as breeding not only in Essex but in Suffolk too, where it nested in 1906 and 1923. It probably bred also on the other side of the Thames in North Kent.

The Sandwich Terns found the experiment of nesting on Blakeney Point a satisfactory one, for it was repeated the following year, 1922, when nine nests were recorded on the Point and 90 as occurring on Salthouse Marsh. (Another report claims 80–100 nests in one colony and 90 nests in the other.) In 1923 Salthouse Marsh had again the largest number, there being 303 nests and 22 others deserted. Cley Marsh, lying between Salthouse and Blakeney Point, was also adopted as a breeding

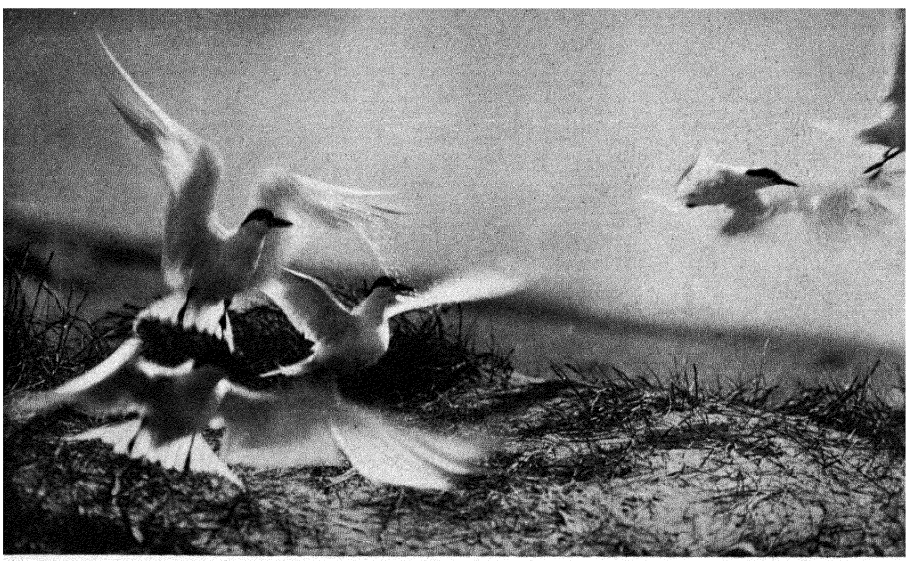


Showing the relative SANDWICH TERN population at SCOLT HEAD, BLAKENEY POINT and SALTHOUSE MARSH for the fourteen years—1920 to 1933.

ground in which were 180 nests. (It may be well to say here that up to the present this is the only time Cley Marsh has been favoured by the Sandwich Terns as a nesting ground.) Blakeney Point had " just over 100 nests " and Scolt Head had, for the first time, its share, 59 nests being found there. The year 1924 found an " estimated " 300 nests on Blakeney Point and 403 on Salthouse Marsh, the other two localities not being favoured. Salthouse was not, in 1925, made use of, for, though 30 to 40 birds visited the breeding ground, they did not stay to nest. Only eight nests were found on Blakeney Point and none of the eggs in them were hatched off. The birds seem to have concentrated on Scolt Head, which is some miles west of Blakeney Point, for, on the Head, 653 nests were found. The next year, 1926, the Sandwich Terns came back in small numbers to Salthouse Marsh, where were 45 nests with eggs. " These eggs were all destroyed, apparently by rats." Five other nests were found subsequently. At Blakeney Point there were 100 nests. Scolt Head retained its supremacy with 515 nests. Scolt Head was the colony to decrease in 1927, there being only 21 nests. Salthouse Marsh ternery increased in numbers to 200 nests and Blakeney Point became pre-eminent with an estimated " over 500." Once again, in 1928, Scolt Head was rejected by the breeding birds, five to six nests, only, being found, most of which were abandoned. Salthouse Marsh colony decreased to about 60 nests. Blakeney Point suddenly increased to twice the population of the previous year, there being about 1000 nests. In the year 1929 the nests on Salthouse Marsh were 271. Scolt Head again had only a small number, 21 eggs being noted, all of which were deserted—the number of nests is not on record. Blakeney Point once more became the home of an abnormal number of birds and it was stated that again 1000 nests were there, an estimate which was said to be " conservative." The year 1930 saw " many nests " on Salthouse Marsh. At Scolt Head 473 were counted and 500 estimated later, but on Blakeney Point there were none at all! The following year, 1931, four nests were found on Blakeney Point. On Scolt Head there were 203 nests, and " two colonies " in which 380 young were " ringed " at Salthouse Marsh. In 1932 the largest number assembled at Salthouse Marsh. In a photograph we took of the birds in the air above their nests we counted 535 birds; others were outside the scope of the photograph and doubtless still more were off fishing. The nests we did not count. But Mr. R. M. Garnett did so and found 572, so that it would be safe to say there were close on 1200 birds nesting there. At Blakeney Point we counted 28 and at Scolt Head we saw 99 nests on June 9th; the official report gives 204 nests. Again in 1933 Salthouse Marsh was preferred by the largest number of birds, 738 being reported as having nested there. None seem to have nested on Blakeney Point, while Scolt Head had only 38 nests (p. 41).



18. SANDWICH TERNS QUARRELLING.



19. SANDWICH TERNS RISING.

Most of the details given above of the extremely interesting alternation of numbers in the three Norfolk colonies are taken from the excellent reports of the Norfolk and Norwich Naturalists Society.

Walney Island in Lancashire has been the home of this species, with perhaps a break of a season or so, since they were first notified as breeding there in 1843. At first they inhabited the North end; then, in 1879, three pairs colonised the South end. These Walney colonies have had their ebb and flow. Forty pairs nested there in 1880, none in 1901, over 30 pairs in 1912 and so on. The spread was not only to the South end, but it is probable that the 10 pairs which settled in the Ravenglass ternery some time before 1887 were an overflow from Walney Island.

The birds occupying this newly-formed Ravenglass colony were the first known to breed there. It increased in 1888 to 15 pairs, and the following year 21 pairs were present. In 1891 there were 71 nests, in 1906 there were 104 nests, and in 1907 they were said to be " steadily increasing." Over 100 nests were found in 1909. We visited the colony in 1915 and found 15 nests were there, and again in 1923, when there were seven nests only. This drop in numbers continued, for in 1930 only 12 pairs nested. The year following the numbers were up and 70 nests were found in the ternery. In 1932 Ravenglass had its highest number on record, there being 365–379 Sandwich Terns nests.

This species may have nested farther north in Cumberland, on Rockliffe Marsh, but this is not certain. We could not find any trace of it when we visited the locality in 1916.

In 1910 eggs were laid in an " undisclosed locality " on the South Lancashire coast, and one pair seem to have hatched their young in 1912. In 1916 another nest was found at the same place. In 1917 " a few Sandwich Terns " were reported as nesting in the ternery at Formby.

The species is reputed to have nested in various places in Cornwall in 1865 and was " nesting in fair numbers " up to the " early 'forties " in the Scilly Isles. Only a few pairs were there in 1854 and it was last seen nesting in 1867. Elsewhere it is said that the species began to disappear about 1886 and by 1920 it was said to have completely left the islands, the last nest on record being in 1900.

It has bred on an islet off Jersey and breeds also in Guernsey.

A nest was found in Dorset in 1923, but this attempt at colonisation of the county has not been repeated.

In 1914 a colony of a few pairs was discovered in Anglesey, and here, in 1915, 30–40 nests were found.

It was thought that a pair nested in the Isle of Man in 1931 and 1932.

Apart from the counties mentioned as containing nesting stations, Sandwich Terns have been seen or shot in the following English sea-coast counties:—Yorkshire, Lincolnshire, Sussex, Devon, Somerset, South Wales, Cheshire, the Isle of Man and one inland county only, Shropshire.

Gray, writing in 1871 of the status of the Sandwich Tern in Scotland, was more pessimistic than precise. Here is his statement: "Serious inroads have been made on its breeding haunts on both the east and west coasts, and in places where formerly their eggs could be seen in hundreds it is now a rare occurrence to find more than . . . one or two nests"; and, "it is questionable whether there is any breeding station in Scotland at present equal to those of twenty years ago." Of the three localities mentioned as breeding places, Gray said the islets near the Bass Rock and islands in the Firth of Clyde were entirely deserted; while Yarrell discredited Gray's report that the species was breeding on the island of Inchmoin in Loch Lomond.

Apart from the above, Sutherland (Kyle of Tongue?), in 1878, is the earliest record. There was one nest at Fort George, in Nairne, in 1881 and one pair at the mouth of the Findhorn, in Elgin, in 1886. In the same place, in 1888, there were 20–25 nests and more the preceding year, when there were 32 nests on the Old Bar of Findhorn. Although Harvie-Brown[1] said the Sandwich Tern had not, since, occupied that ground, Major Chadwick speaks of 20–25 nests occurring there each year. North Ronaldshay, in the Orkneys, had 11 nests in 1893. There was a large colony on Sanday in 1910. In the same year a small but increasing colony was reported from Kirkcudbright. One pair bred on the Outer Skerries, Shetland, in 1923; while in 1923 one nest was found in the Clyde Estuary and four nests in the same place the next year.

That Pennant was personally acquainted with the Sandwich Tern seems unlikely, but he cited the isles of Loch Leven as a breeding place; this, if correct, would be the only inland fresh-water colony in Scotland. It does not breed there at the present day.

As regards Ireland, Thompson[2] says it was first indicated as an Irish species in 1832; that it was probably breeding at Clontarf in 1834 and on Strangford Lough in 1844.

Another statement gives the first occurrence of breeding by Sandwich Tern in Ireland as on Rockabill Island off the Dublin coast in 1850. The following year it was found nesting on the Isle of Bartragh in Killala Bay, Co. Mayo. It was recorded as first breeding in 1857 on Lough Cloonagh, Co. Mayo, where there was a small colony. In 1858 the birds had moved three miles to Lough Rathroen, where they seem to have

[1] *Fauna of Moray Basin*, II. 207. [2] *Nat. Hist. of Ireland*, III. 268–70.

remained. Here, in 1886, were 150 nests, and the colony still existed in 1900. In 1933 this colony was said to have been deserted for a number of years. Another early report was of a colony nesting on an inland lake in Donegal in 1861 and again in 1893, but from this station they were absent in 1896. On Lough Erne, Co. Fermanagh, there was, in 1900, a group of 20 pairs nesting. Sixty pairs were breeding in the same place in 1911. These had decreased in 1920, but several smaller groups were formed in the vicinity. A few nests were found on Lough Conn, Co. Mayo, in 1903. The next year this colony consisted of 100 pairs of birds; in 1906 only 37 nests were found, but in 1923 the colony consisted of 300 breeding pairs. In 1906 two small groups were discovered in Co. Down, and what appears to be the same colony was still in existence in 1914. Now followed the discovery of several new colonies. In 1917 one of these contained over 100 nests, and in another part of the country there was another group for which the number of nests was not disclosed. At the first of these resorts 110 pairs were breeding in 1918; in 1919 there was a decided increase, 150 nests being recorded, but, in 1920, 21 nests only were found. A fresh locality was found in 1922, with a " few breeding pairs," and in yet another resort about 20 pairs were nesting in the same year. Mutton Island, Co. Galway, had a group of 25 birds in 1917, and four pairs bred there in 1918. Another report gives a group of five nests, locality not stated, as the first nesting in Galway. Malahide shore, Co. Dublin, had two nests in 1922. Owing to the reticence of the discoverers of the later colonies as to the precise localities it is not possible to state with certainty how many coast stations exist in Ireland; there would appear to be eleven, though some of these may have been counted twice.

Four inland fresh-water colonies appear to be present, one of which contained " plenty " of nests in 1909 and again in 1910.

By the courtesy of Messrs. J. Cunningham, H. T. Malcomson and L. Turtle, we are able to give useful details of several colonies:

The small colony " A " when discovered by H. T. M. in 1906 had in it four nests; four also in 1914 and six nests in 1932.

Station " B " had 36 nests in 1918; one only in 1920; 60 in 1923 and 100 plus in 1925, and about the same number in the following year. In 1927, 60–70 pairs were present and approximately the same in 1928, in which year, when many eggs were " chipping " and a few hatched, the entire colony deserted. The birds returned in 1929 to the number of 20; but the next year 86 nests were counted. These, in 1931, had increased to 141. In 1932 there were 83 nests, of which over a dozen were deserted.

At Station " C " there seems to be another variable colony which had, in 1925, 24 nests, but in 1927, only five nests.

For Station " D " is a record for 1909 of a " few pairs " breeding. In

1932, rats destroyed the nests of all species except two Common Terns' nests.

At Station " E " were 150 nests in 1923; 40–50 in 1926; a " good number " in both 1927 and 1928, and between 50 and 100 in 1932.

One other Station, " F," seems occasionally to have several Sandwich Terns' nests.

An adequate realisation of the distribution of the COMMON TERN is marred by its close resemblance to the Arctic Tern and the inability of the earlier observers to distinguish between them and also from other species. It is to be remembered that the binocular field glass of high magnifying power had not then been invented and observers had to rely on their own unaided sight, or on a telescope which, if satisfactory, was big, heavy and costly and therefore not much used.

It is not surprising that, under such conditions, to shoot a bird was almost the only way of certain identification.

The unfortunate name of " Common " was the cause of many misconceptions and led to statements that Terns were " common " being translated into " Common Terns." For this reason, as we have said, reports of the state of things in the extreme North of Scotland must be accepted with a certain amount of caution.

The earliest reference to the breeding of the Common Tern in the British Isles is of the estuary of the Tees in 1604, from which we learn that " Neer unto Dobhoome (the port in the mouth of the Tease so named) . . . an infinite number of sea-fowle laye their egges heere and there scatteringlie in such sorte that in tyme of breedinge one can hardly sette his foote soe warylye that hee spoyle not many of their nestes."[1] It is said that old inhabitants still remembered—in 1906—their nesting in great quantities in that district.

Hornsey Mere in East Yorkshire seems to have been a breeding place for Terns in 1693, for a letter written in that year says, " Sir, . . . I had almost forgotten to add that there are three hills in the marr (mere), two of them at the season of the year are so full of tern eggs and birds as can be imagined." [2]

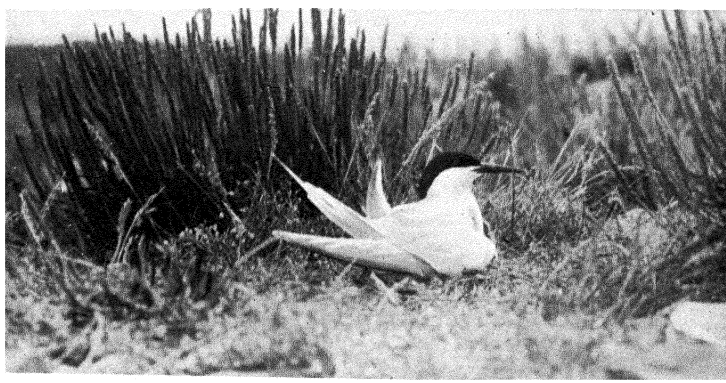
The Terns spoken of by Ray as nesting on Caldey and Puffin Islands in 1662 and those referred to by Leigh (see p. 4) as breeding on the Isle of Walney in 1700 may have been Common Terns. Jardine,[3] writing in 1843, makes the interesting statement that the Common Tern was " a much more uncommon bird than either Roseate or Arctic."

Selby, writing of the Common Tern in 1833, says, " Upon the Ferne Islands I have never seen more than two or three pairs in a season." A

[1] Quoted in *Birds of Yorks.*, II. 656. [2] *Ibid.* [3] *Nat. Hist. of Birds*, p. 276.



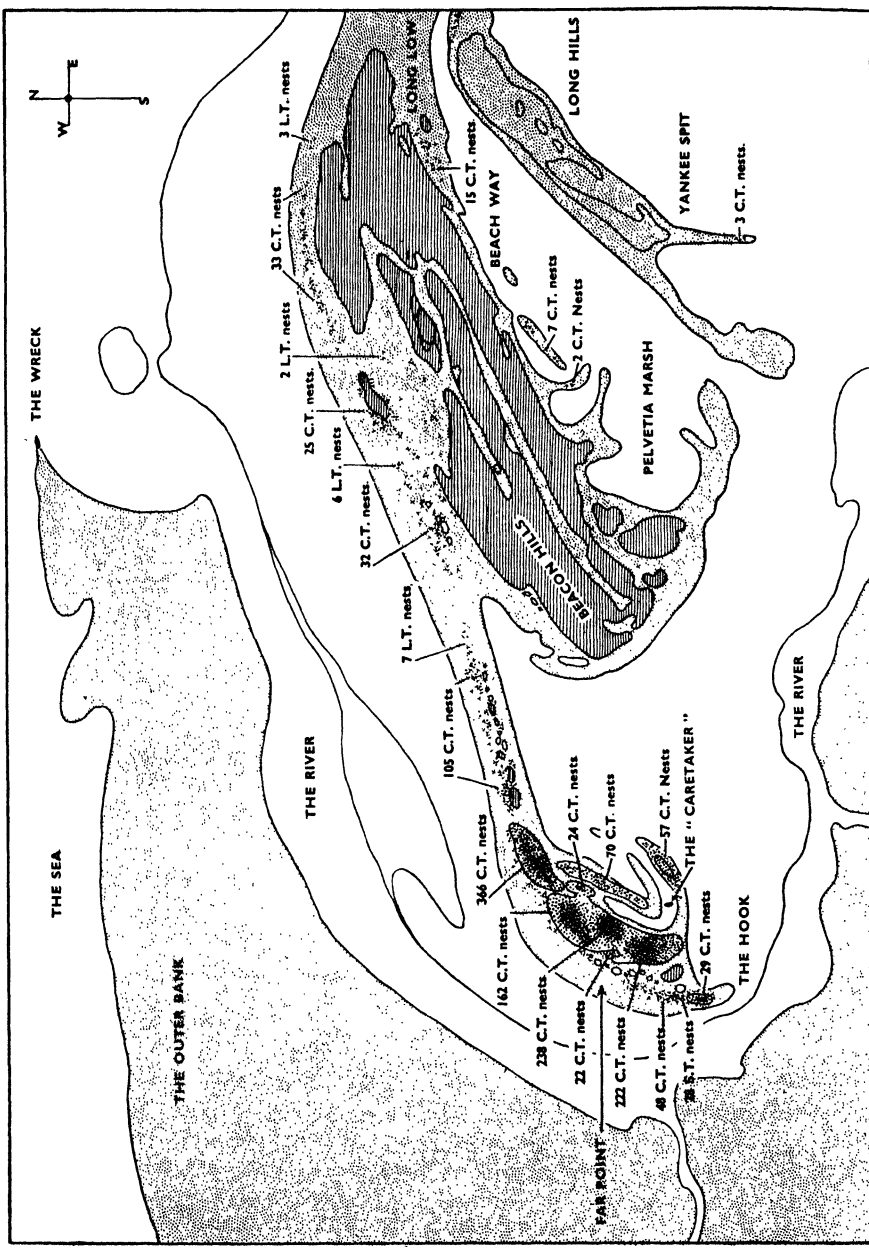
20. ROSEATE TERNS "CHANGING OVER."



21. ROSEATE TERN ON NEST, SHOWING CURIOUS BUT CHARACTERISTIC POSITION OF FAR WING.



22. ROSEATE TERN ENTERING ALCOVE IN WHICH ARE HER EGGS.



Distribution of Terns' nests, BLAKENEY POINT, Norfolk, on June 9th, 1932.

few pairs were reported to be there in 1856. In 1874 Common Terns were reported to be abundant on the Farnes and on Coquet Island. In 1900 a pair or two nested on Holy Island, and for several years a few bred there and on the mainland near by. A colony of some size appears to have existed on the Inner Wide-opens and the Knoxes in 1912, and were there still in considerable numbers in 1918. In 1921 there were two colonies on the Longstone, where we found a large number in 1932.

Whether the Farnes are occupied by this species intermittently or continuously is not on record.

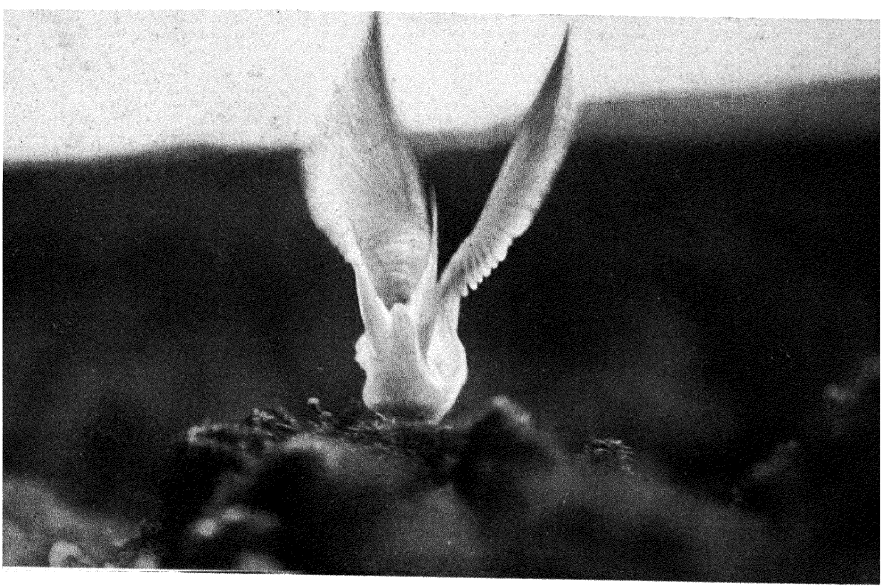
The next considerable colony is that on Blakeney Point and the coast eastward towards Cley. We hear of this breeding ground existing in 1815 and it seems to have continued, without intermission, to the present day. The largest assemblage is that found on Blakeney Point, the numbers thinning out eastward. Since Far Point was thrown up by the sea by far the greatest number settle there. The numbers are always large. Some 200–300 were there in 1921. Blakeney Point was reputed to have " probably 2000 " in 1922 and a " slight increase " on this figure was reported the following year. For 1924 no figures were given, but 700 nests were found in 1925. In 1926 there were " two colonies of several hundreds " and the " usual number " in 1927. The year 1928 saw 700 nests there. " Several hundreds " were said to be there in 1929. In 1930 there were the " usual number," while in 1931 some thousand nests were seen. In 1932 we made a careful census and found there were no less than 1459 nests, containing 3799 eggs. This was on June 9th, when, probably, the birds had finished laying. Hatching had just begun, there being one chick in the ternery (p. 47). In 1933 the large number of 1543 nests were counted.

Besides this, the most important Norfolk colony, there are, or were, for some are abandoned, other groups of Common Terns nesting in the county. And this appears to have been the case since, at least, 1834, when they were said to be " very common." The largest of the remaining colonies is on Scolt Head; another good one is Salthouse Marsh, where the species was recorded as nesting in 1846. These terneries, and Blakeney Point too, are carefully protected.

The figures are not as complete as one could wish, but some idea can be gathered of the extent of the Common Tern population of the county of Norfolk. Not counting the figures, given above, for Blakeney Point, we find that, in 1922, in the remaining terneries, there was a total of 627 nests; in 1923, 515 nests; in 1924, 1070 nests; in 1925, 385 nests; in 1926, 665 nests; in 1927, 584 nests plus " a good colony "; in 1928, 900 nests; in 1929, 547 nests; in 1930, 700 nests, and in 1931, 500 nests plus " a considerable number," while in 1932 there were 500–600 nests on Scolt Head and a number on Salthouse Marsh.



23. ROSEATE TERN ALIGHTING ON " PERCHING " STONE.



24. ROSEATE TERN RISING, SHOWING " STREAMERS."

In Suffolk the Common Tern was said to be abundant, at Aldeburgh, in 1881 and also on Orford Ness.

In Essex it nested fairly commonly, but for many years had not done so until 1910 and again in 1913, when there were 16 nests.

In an early reference, 1802, to Kentish colonies now almost extinct, we hear of the great abundance of the Common Tern between Winchelsea and Dungeness. In 1824 it was nesting on Dungeness, where " it had bred for centuries," and, as Latham said, " in this kingdom it is nowhere in greater abundance than on the Kentish and Sussex coasts." In 1842 it was breeding " rather plentifully " between Margate and Reculver, but ten years later it had ceased to nest there. A few scattered nesting pairs are to be found in Kent and Sussex and the nests appear to be increasing.

Eggs were laid in the neighbourhood of Christchurch, Hampshire, in 1902 and a pair nested on Freshwater Down, Isle of Wight, in 1845.

For many years a large colony has nested on the Chesil Bank in Dorset. It was recorded as far back as 1871 and again in 1883 and in the year 1917, a thousand pairs are reputed to have nested there. In 1918 there were two or three groups in addition to the main colony. On the occasion of our last visit we made a partial count of the nests, ceasing after having reached a total of 300. Besides those counted we saw many more and it is probable that 500 pairs were breeding in that year, 1932.

There appears to be no record of the species breeding in either Devon or Somerset, but in Cornwall at one time it bred annually, though not in any numbers.

It is said to have been " less abundant in 1869 than the Roseate or Arctic Terns," [1] but to have increased and driven out the Arctic Tern from the Scilly Isles, where it was still plentiful in 1911. It now seems to have decreased, for only 20–30 pairs were known to nest there in 1914.

In South Wales a small colony of about 20 pairs bred on Skokholm Stack in 1884. In Glamorgan, though not common, it bred regularly according to a report in 1900.

North Wales has several good colonies though none of them are large. One of these contained, when in 1928 we paid it a visit, 40 nests; in another colony 15 pairs were nesting and the same number in a third colony. A few stragglers were nesting a mile or so away. They were found breeding in the Skerries in 1908, there being some 50–60 pairs. Another site has been evacuated. There is still a colony farther north at

[1] Rodd, *List of British Birds*, p. 42.

Point of Air, which, starting with two nests in 1910, steadily increased until, in 1916, 126 nests were counted. Subsequently it became almost deserted.

The Common Tern is believed to have nested in Cheshire in 1874. This is not unlikely, as there was, at that time, much suitable territory. Though we have not actually found a nest we believe one or two pairs are now breeding in a certain place.

Ainsdale, in Lancashire, has a long-established colony which continues to flourish under protection. It is known to have existed in 1873. We have known it personally for many years as having a fairly regular population of several hundreds of birds which we have never counted. In 1907 a " newly discovered " colony was reported as " near Southport " and to be " the first authentic instance of the species nesting on the Lancashire seaboard." The species bred plentifully at one time at Martin Mere. A small colony of Common and Arctic Terns established itself on Longton Marsh, near Preston, in 1918, but did not return. " Another recently established mixed colony . . . was this year, 1918, greatly increased in numbers, having an ' estimated ' 200 nests." This colony, the situation of which was not disclosed, was, subsequently, feared to be abandoned. The Lytham sandhills also appear to have been occupied in the past. Foulney, in 1840, was the breeding ground for considerable numbers. On Walney Island is a large colony which is in full occupation still, for, though it was abandoned in 1912, the birds have returned. At the South End, Walney, were 12 pairs in 1905. The species also nests in suitable places all along the coast of Furness.

There is no colony in Westmorland, though a few pairs have bred there in the past. How long the large ternery has existed at Ravenglass, in Cumberland, we do not know, but it is probably of long standing. It is still going strong. As in the Scilly Isles, both here and at Walney the Common Terns are said to have driven out the Arctic Tern. In this colony " up to 1911, the Common Tern nested in large numbers, but, after a sparse nesting in 1912, did not breed at all from 1913 to 1917, but, in 1918, nested almost as plentifully as they did prior to 1912. . . . A fair number came to Ravenglass each year between 1912 and 1917 but left after laying a few eggs." Another but small colony on Rockliffe Marsh, in North Cumberland, has been there for at least 100 years. A few pairs were reported to have bred near Skinburnness in 1843.

The Common Tern is, not unusually, seen inland when on migration. It seems to follow the large rivers and appears over reservoirs, some of which it visits regularly. Records of such visits have been received from



25. Little Tern alighting by nest.



26. Little Tern brooding.

Flint; Shropshire; many from Staffordshire, Worcestershire and Warwickshire; Cambridgeshire; Derbyshire; Wiltshire; Oxford; Middlesex; Hertfordshire. It has even been seen over Long Water in Kensington Gardens and the Serpentine in Hyde Park.

It was stated to be breeding in the Isle of Man in 1880, 1888 and 1901. A small colony was reported in 1911 and again in 1917 and 1919. The 1911 occurrence is said to be its first appearance in the Isle, the records of earlier nestings having, apparently, been overlooked.

In Scotland, while small colonies are fairly numerous below the Caledonian Canal line and up the North-east coast, the species thins out towards the North-west, where it is almost non-existent. The species is often found sharing a ternery with the Arctic Tern, and not unusually it breeds on fresh-water lochs, river banks and river islands.

By Selby, in 1833, it was said that the Common Tern was of rare occurrence upon the whole extent of the eastern shores of the North of England and Scotland; while Thompson said, in 1851, "The only localities yet recorded along the whole eastern line of England and Scotland are two—the Farn Islands and the Isle of May." From these statements, which do not represent the position to-day, it would seem probable that a great increase has taken place in the species.

It was first recorded in the Shetlands in 1901, but it has bred in various places in the Orkneys since 1860, though the " vast colony " which was said to exist on Hysgeir was not present, except for a few pairs, when that island was visited in 1891. Large numbers appear to nest on the Pentland Skerries. It was recorded as breeding for the first time in the Outer Hebrides in 1901; earlier reports of its presence seem to be incorrect. It was nesting in the Treshnish Isles in 1903, on the Arasaig Islands in 1892 and also on Skye and Tiree. We found it nesting in Islay and in Jura in 1917, though in small numbers, but did not find any breeding on Coll in 1923. The report of the largest colony ever recorded as existing in Islay, though made by a responsible ornithologist, must not be taken literally (see p. 35). A "fine colony" was reported to be on the east coast of Sutherland in 1895. On Culbin Sands in Elgin it seems to be abundant. Some hundreds were breeding on Tentsmuir in Fifeshire when we were there in 1930. It was breeding freely on the Isle of May in 1910. Before the discovery of the Roseate Tern in the Cumbrae Islands the Common Tern was reputed to " swarm " there, as recorded by Montagu in 1802; to-day this locality is abandoned, though the species still breeds in the Firth of Clyde as well as in Kirkcudbright and Wigtown.

In Ireland there are many colonies both on the coast and on fresh-

water loughs. It shows a greater tendency to breed on the latter than on the sea-coast. It is distinctly the more abundant species than the Arctic Tern. The earliest of the sea-colonies—the Copeland Islands—to be recorded in 1827–49, was said to contain " vast numbers of Terns." It is recorded as breeding on the shores of Donegal; at Rockabill, near Bray in Wicklow; off the coasts of Wexford and Waterford; on the Sovereign Islands, Co. Cork; in Bantry Bay in 1834; at Dundrum and Killough Bay, Co. Down, in 1836. It was said to be breeding on Malahide in 1837 and near Portaferry in the same year. It was breeding on the Aran Islands, on Deer Islands, on Hard Island and others in Co. Galway in 1844. It was resident on the Laithe Rock in 1846 and Granish Point in 1849. In the same year it was present, in small numbers, on islets in Strangford Lough, where, in 1850, were " very many." At Malahide, in 1908, the numbers of Common Terns mixed with Arctic Terns were described as " incalculable "; and in 1922 a " rough computation " put the size of the colony at 3000–4000, of which 90 per cent. were Common Terns. A few nested on the Lushings, Co. Clare, at one time. A colony existed in Killala Bay, Co. Mayo, and others nested on Inishkea and Duvillaum.

The Copeland Islands are still resorted to and are protected by the Commissioners of Irish Lights.

Of inland breeding places there are many. The species was nesting at Port Lough, Co. Donegal, in 1832, on Lough Neagh in 1833, on Lough Corrib, Co. Galway, in 1834 and 1850, on Lough Clay, Co. Down, in 1843, when they were very numerous, and again in 1845, when not so many were breeding. Also on Chautanee and Shircock Loughs, Co. Monaghan, and Lough Egish. They were nesting on Lough Conn and Loughs Carra and Mask, Co. Mayo, with, but less plentifully than, Arctic Terns. Also on Bunduff Lake, Co. Sligo, and on lakes in Co. Wexford and near Dunglow.

Of the ARCTIC TERN Selby wrote, in 1833, on the coasts of England and Scotland " it is met with in greater numbers than *even* the Roseate and Sandwich Terns." Coupling this statement with that of Jardine relative to the Common Tern (p. 46), we get the unexpected position that the Common Tern was the least common of the Terns.

In England its breeding grounds are few, even allowing for the fact that its presence is apt to be overlooked.

By far the largest colony on the East coast is the Farne Islands, where it bred as far back as 1687 and probably from time immemorial. It was present there in great numbers in 1833 when Selby " corrected his mistake " respecting the species, having first conceived it to be the Common Tern. In 1866 it was there in " great numbers " as well as in 1871 and 1882. In 1892, on the Knoxes and the Wide-opens, there were more than a

thousand nests. There were large numbers on the same islands in 1911, and in 1912 there was " a large and increasing colony on the Brownsman " numbering 1100 nests. They predominated over the Common Tern on the Knoxes in 1918, when there was also a smaller group on the Brownsman. Some time before 1920, the Common Terns were said to have driven the Arctic Terns away, but two colonies, each of 250 pairs, were nesting on the Longstone in 1921, in which year they had increased on the Brownsman. They were said to outnumber the Common Terns by thousands. Their former nesting site on the Knoxes was abandoned owing to the attentions of Black-backed Gulls. In 1932 we found them breeding in large numbers on the Brownsman and on the Lesser Farne, where there were two smaller colonies.

The Arctic Tern is stated to have bred in large numbers on Coquet Island, but in 1912 none had bred there for fifty or sixty years or even longer. These birds must have been an offshoot from the Farne Islands, as also was the pair which nested on the Ross Links in 1874, and the birds which began breeding on Holy Island in 1900.

They were said, by Yarrell, to have bred on the coast near the mouth of the Humber about 1871 ; whether he meant the group which, in 1872, were nesting on the North Cotes " fitties " in Lincolnshire but ceased shortly afterwards is not known. In 1883 and 1884 there was a colony on Friskney Flats in that county, and in 1912 we found a small group of eleven nests on Wrangle Flats.

As regards Norfolk " there was no reason to suppose it bred there " in 1866. But in 1922 a pair nested, for the first time, on Blakeney Point. The following year " at least ten pairs bred " there, and in the same year one nest was found at Wolferton. Since that date, although Arctic Terns have visited Blakeney Point regularly, no nest has been identified.

The species was supposed to have bred at Orford Ness in Suffolk in 1872, but there seems to be no proof of this ; while, in Essex, it seems never to have nested.

Along the South coast records are few. Kent does not appear to have been visited for breeding purposes. It was believed to breed near St. Leonards in Sussex in 1891 and that a considerable colony existed at Pevensey.

Hampshire has no record of its nesting.

Yarrell mentions the species as breeding on the Chesil Bank in Dorset in 1865 and 1871, and a pair nested there in 1883, but, in 1888, Mansell-Pleydell (*Birds of Dorset*) said, " It does not breed."

There is no breeding report from either Devon or Somerset.

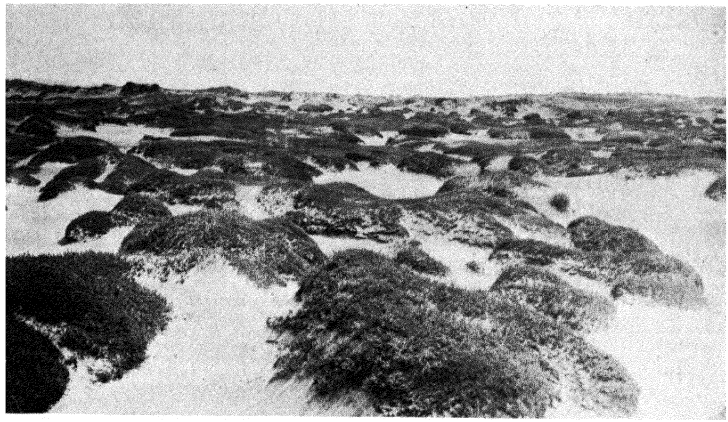
The reports from Cornwall are ambiguous, for two writers, Couch and Cocks, do not mention the bird in their lists, while More says, " It is a common species," though he does not say whether it was breeding or merely a visitor. In the Scilly Isles it was the commonest Tern in 1869 and bred annually about the year 1880. Yarrell said it was abundant in 1882, but in 1885, Seebohm said it was rarer than the Common Tern. It was reported to have disappeared by 1920. Another report said it had grown scarce in 1923.

From South Wales there is no breeding record. In North Wales, however, there are several colonies still. Yarrell mentions it as breeding in 1882. The presence of the species as breeding on the Skerries was recorded, by Jourdain, in 1909. And there was a small colony on a stack off the Anglesey coast in 1915.

In the Lancashire colony at Ainsdale, Coward found the Arctic Tern nesting in 1916 and 1918, and in the succeeding year just over 8 per cent. were stated to be of this species. In 1920 they were still nesting there, but, though we examined every Tern's nest there in 1925, we could only find one breeding pair of Arctic Terns. It nested again in 1928 but was said to be decreasing. A small colony of Arctic and Common Terns was found on Longton Marsh near Preston in 1918, and another recently established, mixed colony had that year increased greatly to an " estimated over 200 nests." In the north of the county the records of the Walney colony of Arctic Terns go back to 1865, when Saunders found Arctic and Common Terns in about equal numbers with a possible preponderance of Arctic, which were in considerable numbers. Yarrell stated that it was still breeding there in 1871. Durnford thought, in 1875, that the Common Tern had become the more numerous, about 75 per cent. being of that species. In 1885 Saunders failed to see a single Arctic Tern. It was said to have greatly decreased in 1891. Fifty pairs were nesting at South End, Walney, in 1905. Two or three separate colonies existed in 1907, the largest having 30 or more nests. They were still there in 1908 and 1911, and a small colony in 1930.

At Ravenglass, where they were reported to have equalled in numbers the Common Tern in 1865, they were said by Macpherson to have been entirely absent in 1892. This must have been but a temporary desertion, for though there is no further definite record, we find they are stated to have been driven away, about 1920, by the Common Terns.

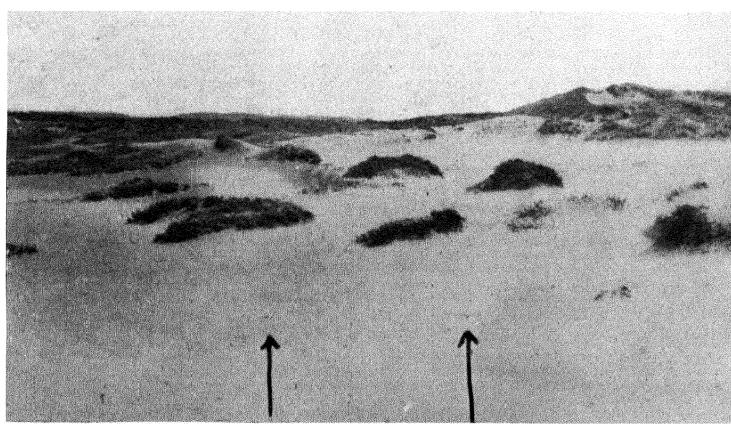
One colony seems to have flourished in the Isle of Man since before



27. AREA OF DWARF WILLOW OCCUPIED BY COMMON TERNS.



28. NEWLY-FORMED AREA OF SAND, SHINGLE AND MARRAM OCCUPIED BY ARCTIC TERN.



29. TYPICAL WILLOW AND MARRAM NESTING SITE. TWO COMMON TERNS' NESTS ON SAND IN FOREGROUND.

1862, of which date Crellin said, " There are generally hundreds of birds . . . but this year very few indeed." The main colony consisted of some 25 birds and farther on were a few more, and the site was " regularly frequented by about the same number since 1896 " ; this was written in 1905. A colony, whether the same as the above, we cannot say, was in existence in 1880, 1898, 1901, 1911, 1914 to 1917, and in 1919, of all which years there are records. Another colony of about 12 nests was found in 1917.

Inland occurrences are Church Stretton, Shropshire, 16.5.17, Witton Flash, Cheshire, 10.7.22, and Lower Bittell Reservoir, Worcestershire, 23.9.25.

In the North of Scotland the Arctic Tern is the predominant species, breeding generally and outnumbering the Common Tern, particularly in the North-west, in the Outer Hebrides, in the Orkneys and in the Shetlands. St. John says, " The Arctic Tern is rarer than the Common Tern and is more given to breeding inland than the latter species." Either the numbers have been reversed since his time and their habits changed or he accidentally got the names transposed, for the converse is the case to-day. Along the East coast, colonies are present in almost every county and they increase in numbers towards the North. On the Bass Rock and the Isle of May were good colonies in 1837. The Tentsmuir colony was said to consist of 12 pairs in 1885. They had nested in that breeding station for at least twenty years before that date. When we visited this colony in 1930 they had increased considerably, for we counted 92 nests and there were certainly others. In 1903 the species was breeding on St. Fergus' beach, but the report of its occupation of an island in Loch Strathbeg lacks confirmation. The Old Bar of Findhorn in Nairne has for long been a favourite breeding place. It was occupied in 1887 by hundreds of birds. Two extensive colonies existed on the Sutherland coast in the same year, the largest being near Little Ferry. The species was abundant on the Pentland Skerries in 1891 and nested in great numbers in the Orkneys, where they bred on Hoy, Sanday and Damsay ; on the latter also in 1890. In 1888 a colony occupied a grassy flat at Melsitter on which, for twenty years previous to that date, no Terns had bred ; they occupied the site for fifteen consecutive years, then abandoned the place. An island off Houten Head was annually tenanted by vast numbers. They also nested on the " Barrel of Butter."

The Arctic Tern is the common Tern of the Shetlands, where it breeds in great numbers. It was first reported in 1864. It was thought until 1901 to be the only Tern inhabiting these islands. It is still vastly predominant. They abounded in the Vie Skerries in 1874, but few were

breeding there in 1890. One of the largest colonies in 1874 was on the Island of Hunie off the shores of Unst. On Hascosay in 1899 was a large colony, their headquarters being in Scalloway Bay. Cure-water in North Maven, Grunnavoe in Walls, Setter in Aithsting, and Sandwater near Mossbank in Delting were each established colonies in 1899.

On the West coast they breed generally—we found a small colony in Jura in 1917 and another in Handa in 1929. In 1882 they were the predominating species on the Askribs; there were many there in 1888 and " swarms " in 1889. Colbost Island had a small colony in 1888. There was a group on Kylestrome, and on Skiniden were 50 nests. It is found nesting on rocky islets in Loch Sunart, Loch Alsh, Loch-na-Nuagh and Loch Etive. Also on the coast of Mull and the shores of the Inner Hebrides.

It nests in great numbers in the Outer Hebrides, frequenting the whole of the islands. A large colony was found on Haskeir in 1869, and on Ronay it nested in 1886 and 1887. In the latter year a great number were breeding on an island in the Sound of Harris. In South Uist there was a colony in 1928. Borreray, Bernera, Pabbay, Ensay, Killigray and many nameless rocks are breeding stations and are " literally covered with Terns and nests."

Few details are available in regard to the status of the Arctic Tern in Ireland. Colonies would appear to exist on all sides of the island, there being, also, a number of inland breeding places.

They are recorded as breeding on Rockabill in 1842, and as being plentiful on Magharee Island, Mucklaw, in Tralee Bay and at Beginish off the coast of Kerry in 1850. In 1874 they were breeding on the Copeland Islands. There was a colony of 30 pairs in North-west Mayo in 1924. On Malahide Island, Co. Dublin, they were described in 1908 as being " incalculable " in numbers, a statement which includes Common Terns. The following notes from the *Natural History of Ireland* relate to the year 1900 and before. They were breeding on the Skerries near Portrush, Co. Antrim; there was a colony on Inishtrahull, but the largest ternery was probably that on Roaninish. On the rocky shores of Inishbarnog and Inishduff off the Donegal coast and Ardboline in Co. Sligo there were said to be " enormous " colonies. Others were on Bartragh Island, Killala Bay, and on islands in Blacksod Bay and in Clew Bay, Co. Mayo. It was nesting on the Blaskets and Puffin Island, in Bantry Bay, on the Sovereign Islands in Co. Cork, and the Keeragh Islands in Co. Wexford. It was found on islands off the Connemara coast and on Deer Island, the Arans and other islands off the south coast of Connaught.

Of inland breeding stations there were colonies on Lough Corrib,

Galway, Lough Melvin, Co. Sligo, and Loughs Carra and Mask, Co. Mayo. The Carra colony ceased to exist in 1929, as did also one at Carrigeenawalla. A few still nest on Lough Mask. In Co. Down are many large colonies, some being in Strangford Lough and on the Copelands.

The LITTLE TERN breeds where it can find suitable, undisturbed nesting ground from the Moray Firth round the coast of England to the Solway. It does not, now, nest on the mainland of the West of Scotland though it does on the Inner and Outer Hebrides.

Before 1830 it bred abundantly between Bamborough Castle and Holy Island, 40–50 pairs being present. Selby knew of its breeding on the coast opposite Holy Island on the Old Law, at Ross Point, where, in 1832, were 10–12 pairs. The species was still breeding there in 1840, 1856, 1857 and 1861, but ceased to do so before 1873. It did not nest on the Farnes nor does so now. With the desertion of these stations it was thought to no longer breed in Northumberland, but in 1911 two nests were discovered, the locality not being stated. It was said, in 1876, to breed a mile or two west of the estuary on Tyne sands and one or two pairs nested on Gullane Links in 1902.

Little Terns visited the sands at Teesmouth for a number of years, but were not known to breed until a nest was discovered in 1910, this being the earliest record for this locality. The colony on Spurn Point has had varying fortunes. It is first heard of in 1861, when there were 40–50 nests. It was said to have greatly diminished in 1871. It still continued and was reported in 1885, in 1886 and again in 1893. In 1895 protection was instituted and by 1899 it was said to have "considerably increased": the following year there were 100 pairs nesting. In 1908 only 50–60 pairs were reported to be there. We made the acquaintance of this station in 1909, in which year the colony was flourishing and continued to do so for the next four years, during which time we visited it annually. In no case during these years did we find the nests to exceed 30.

The Lincolnshire colonies were nearly extinct in 1871, though in 1802 the species was said to be extremely common in some places, particularly near Skegness. It seems unlikely that it is breeding in the county at the present day.

There are some good colonies in Norfolk, the one at Scolt Head rivalling the Spurn group and is, possibly, the largest in the country. Several colonies which used to exist in the county are now extinct. At one time it bred on Hickling Broad and on Horsey Mere. At the latter place, in 1920, about 40–50 pairs were breeding and the same number in the following year. In 1922, 15–20 nests were found and 10–20 in

1923. In the year 1924 only 10 nests were discovered and in 1925 " about 12 nests." After this date it seems to have abandoned this locality. A few birds nested at Wells-on-Sea in 1921 and continued to do so for some years; they have now probably ceased to do so. The same fate has overtaken the ternery at Wolferton, where Little Terns, in 1922, had 20 nests. The next year there were 30 nests and in 1924 " about 40 nests." Twenty nests were found in 1925 and the same number in 1926. The removal of shingle from the beach for the manufacture of concrete had the inevitable result and in 1927 only two pairs were nesting. The following year there were about 30 nests on the Brancaster shore where there had been 12–20 pairs in 1923. In another locality in the county we discovered a small colony containing 14 nests, these being, in all probability, Wolferton birds driven out. This was in 1927 and the colony has kept up to this strength every year since. In 1919 another group was found nesting in the southern part of Norfolk, there being 50–60 pairs with 40 nests. The date when the Little Terns began nesting in the three large Tern colonies—Salthouse Marsh, Blakeney Point and Scolt Head—is not known. In all likelihood they have done so for many years. Unfortunately even the modern records are not complete. They start in 1921, when Blakeney Point was reported to have " some " breeding birds. The same report came from Blakeney Point in 1922, in which year Scolt Head had a group of 9 nests. In 1923 Salthouse Marsh was reported to have 50 nests, Blakeney Point 100 and Scolt Head " some." The report for 1924 was that Salthouse Marsh had " 40 counted but probably double that number." Blakeney Point was not mentioned, while Scolt Head had a " fairly large colony." In 1925 Salthouse Marsh had " a few "; Blakeney Point again was not reported and Scolt Head had " about 40 " nests. No report of either of these colonies is found for 1926, but in 1927, when again there is no mention of Salthouse Marsh, Blakeney Point had a colony of 42 nests and Scolt Head " over 100." In 1928 Scolt Head was the only one reported, with 94 nests, and the same thing occurred in 1929, when the same locality had the large number of 204 nests. In 1930 Blakeney Point had nests " about as usual " and Scolt Head 175 nests. No breeding was reported from Salthouse Marsh in 1931, in which year Blakeney Point was said to have a colony of 20 nests and Scolt Head 118 nests. We were only able to find, in 1932, 15 nests at Blakeney Point and 30 nests at Scolt Head: the official report gives 21 nests and 122 nests respectively. In 1933–34 nests were found at Blakeney Point and 87 at Scolt Head.

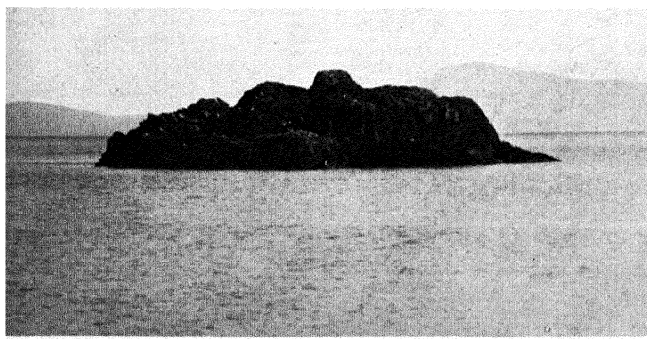
In Suffolk the Little Tern seems to have bred for many years; the records are not very definite. In 1850 it nested on Southwold beach and has been since reported as breeding at the same place. In 1876 it was found nesting at Landguard Point Common in considerable numbers.



30. DISTANT VIEW OF SANDWICH TERNERY.



31. NESTING AREA OF LITTLE TERNS.



32. ROCK ISLAND TERNERY.

It was also breeding on the Walton beach and probably on Orford Ness. Near Aldeburgh seems to have been a favourite breeding station.

The species used to breed commonly in Essex in suitable spots. It was said to nest "in great numbers" between Harwich and Walton-on-the-Naze and on the Harwich side of Handford Water, in 1876. At one time it nested on Osey Island and at Paglesham. There was one colony nesting " somewhere " in the county in 1890. In 1903 two small colonies were said to exist. Five stations were already known in 1929, in which year a sixth was discovered between the Colne and the Stour.

Kentish colonies at one time, before 1871, flourished in some numbers about Yantlet Island in North Kent, on the Isle of Grain, about Reculver and between Sandwich and Deal. One group was nesting in this part of the county in 1904, and one nest was reported at Romney Marsh in 1908. On the South coast there are fairly large colonies between Hythe and Dymchurch, and a decided increase was said to have taken place in the Dungeness area in 1909. In that year, too, small colonies were said to " form a broken chain from between Littlestone and Dungeness to the Sussex border," none of these having more than 20–30 pairs.

Breeding in Sussex occurs in a few places, particularly on the shore between Beachy Head and Rye.

As a nesting species the Little Tern has not often been reported from Hampshire. It, however, nested near Christchurch in 1902, to which site there are hopes of it returning. Meanwhile, there was a small colony breeding " elsewhere " in 1931 and 1932, where we saw 20 breeding pairs in 1933. A small colony nests in "another locality."

There seems to be one site only in Dorset where the species breeds, and that, which is the Chesil Bank, has been occupied from at least 1865, when it was said to be " not in any great numbers." In 1918 a number of small and larger colonies existed, ranging from " a few pairs " to a group of 16 pairs, the total number breeding on the Beach being, perhaps, 60 pairs.

No records seem to have been made of the bird's nesting in either North or South Devon.

It was reported as breeding in Somerset, on Steart Island, in 1924, where there were 10 nests, and also " somewhere else." A nest was found, locality not disclosed, in 1928.

As a breeding species the Little Tern is not known in Cornwall nor does it seem to have been reported as nesting in the Scilly Isles, certainly not within living memory.

In South Wales it breeds regularly but seems to be decreasing, 6 nests being found in Glamorgan where, fifteen years before, as many as 40–50 were seen. In another site three nests were found in 1925.

In North Wales are several breeding sites, one, on Point of Air, having been occupied since 1866. When we were last there, in 1928, the colony was quite small. One pair, and possibly two, bred on Mochras Island, where we saw them in 1912 and for several years afterwards. In the same year we found a colony with, certainly, nine nests and there were probably more, for we counted 33 birds in the air; this was in the Lleyn peninsula. This colony was just as strong when we visited it again in the years 1923 to 1926. A small group of birds has nested near Aberdovey to our knowledge for the last twelve years, and in Anglesey we have found single pairs nesting here and there. In all probability other groups are to be found in that island.

There is no evidence of the Little Tern nesting in Cheshire though the county is visited regularly.

The species used to breed near Lytham and Blackpool about 1855 and was common on the Formby shore, it is said, about 1880, but it has not bred there for the last fifteen years at least. It has nested for many years at Walney, where, in 1885, it was said to be much diminished, and breeding in only one part of the island. In 1891 there were only 18 nests reported, and in 1905 half a dozen pairs were said to be there.

We found one nest at Ravenglass in 1923 and it was nesting there again in 1925, but it never seems to be numerous in this locality. For other parts of Cumberland the only records we have been able to find are a colony at Skinburnness in 1843 which, after being deserted, was again occupied by a pair in 1890; and two nests at Dub Mill in 1891.

In the Isle of Man it had not been noted as a breeding species until 1898, when about 20 pairs were found nesting. The same site was reported as occupied again in 1899, 1900 and 1901. In 1903 there were two colonies not far apart. At that time there was no other colony on the island. In 1914 the birds had removed to another site where, in 1917, were several nests. The species was said to be still nesting " on various sites " in 1923.

It has been seen inland at Norton Pool, Staffs; Cofton Hackett, 1885; Knighton, Salop, 14.9.14; Knighton, Radnor, 23.9.15; Sonning-on-Thames, 13.5.18; Molesey-on-Thames, 19.9.27; Dowles Church, 1.6.27; Cambridge, 6.5.30; Barn Elms, Surrey, 7.5.31.

Gray, writing in 1871, said of Scotland, "Though not numerous is generally distributed over the East and West coasts—on the East coast the colonies being larger and more numerous." In 1833, Selby said it was plentiful on both sides of the Firth of Forth. Saunders wrote, 1889, that it had "ceased to breed in Haddingtonshire," where it had nested at Belhaven, but in 1908 it was reported to have nested there for a year or two past. Two pairs are said to have nested at Tyningham in East Lothian in 1908. In 1837 it was reported as breeding on the Sands of Barry; three miles north of the Don; near the mouth of the Ythan; near the Loch of Strathbeg and between Burghead and Findhorn. In 1887 they were in unusual numbers and 19 nests were found near Kinorth. Pairs bred between Findhorn, Lossiemouth and the mouth of the Spey in 1895. And a large colony nested near the mouth of the Findhorn and a smaller one on the Old Bar of Findhorn in the same year. About 1850 it was abundant at Tentsmuir, at the mouth of the Eden. In 1885 12 pairs nested in that locality. In 1886, 1887 and 1888 there were said to be 20 pairs nesting, and by 1904 the colony had increased to 30 and more pairs. It was still nesting there in 1920.

A colony has existed on one of the outer islands of the Outer Hebrides since 1885 or 1886. At Barra five pairs nested in 1901, 1902 and 1903. One nest was found in North Uist in 1907.

One nest has been noted in the Orkneys—on Damsay in 1891.

It does not appear to have bred in the Shetlands.

A few nested on Tiree in 1892; and a few pairs are said to have bred on Loch Lomond about 1871.

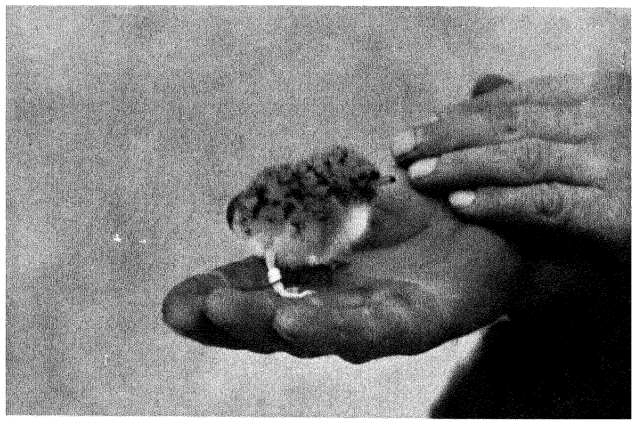
None nest in West Ross or Dumfries.

The earliest reference to the Little Tern breeding in Ireland is of two pairs on Dunnyneill Island, Strangford Lough, in 1832. They were found in the same place and others at Dundrum in 1836. Malahide had a colony in 1840 and a few were there in 1922, and between Malahide and Portrane, there were from 60–100 nests. Since that date they have greatly decreased there. In the same year some were nesting on Deer Island and others off the Galway coast, also on the Keroe Islands off County Wexford. A colony existed at Killala in 1904 and nine nests were found in Dublin Bay in 1909. On an island in Clew Bay 25 nests were found, the year not being given, but probably 1923. A number of localities used as breeding grounds are given in *Birds of Ireland* (1900) with few dates or details:—Inishkea, Duvillaun and Achill in Co. Mayo; Roundstone in Connemara and the Aran Islands in Galway Bay; Drumcliffe Bay, Co. Sligo, where 10 pairs were seen in 1932; the shores of Lough Swilly; the strands of Naran and on Roaninish. Several pairs on the Keeraghs. On the mainland of Co. Wexford; on the Wicklow coast and two resorts

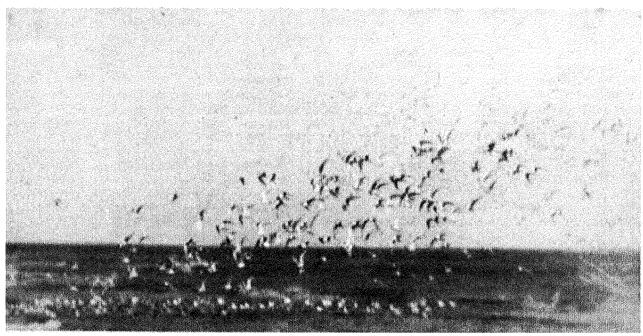
in Dublin Bay, in one of which 50 or more pairs bred. They also nest on the Inch in Killala Bay, where, in 1895, there were said to be 60–70 pairs and where, when we made our visit in 1914, there were 15 nests; a few pairs nested in Ballyharuan Bay, Co. Down, but the colony became extinct about 1923. The first record for Magilligan Strand is of two nests in 1924; a colony was still nesting there in 1932. An island in Clew Bay held a small colony of 25 nests, the year not being stated.



33. Arrival of migrating terns.



34. Chick of Common Tern "ringed."



35. Departure of mixed species of tern.

OF ARRIVAL AND DEPARTURE

THE Terns start moving northward from their winter quarters soon after the end of the year and the first comers are seen on our coasts quite early in the breeding season. Some have arrived at abnormally early dates (if they are not birds which have stayed over the winter here), as the following records from the coasts of Scotland and the South of England show. Clyde (24.2.12); Kintyre (1 and 4.2.12); Argyle (22.3.13); (1) St. Andrews (Jan. 1919); (1) St. Andrews (Jan. 1920); (2) Aberdeen (Feb. 1920); (2) St. Andrews (Feb. 1920) (*B.B.* XV. 297); Cornwall (18.3.13) (*B.B.* XXII. 327); Dawlish, Devon (s.d.) (*B.B.* XXII. 377); and Peel, I. of M. (11.2.26) (Isle of Man Migration Report, 1926).

We were informed by fishermen in Northern Ireland that the Terns always appeared in the harbour before going to their nesting grounds and that " they always come in a fog and go in a fog. It is always the same," they said. According to Thompson,[1] " every year in the month of May a heavy fog comes on, and after it has cleared away the rocks are studded with them," *i.e.* Roseate Terns. These statements are paralleled by a similar one from the Orkneys, where it is believed the Terns " always arrive in thick weather." [2]

April is the more usual month for their coming. A Common Tern was reported as seen at Oxford on April 3rd. A Little Tern was recorded from Kent on April 9th. On the East coast Terns have been seen by fishermen out at sea as early as April 6th. They have visited the outer sandbanks at Blakeney Point, Norfolk, by April 9th.

The birds do not appear on the shore, as a rule, till about the middle of April, and on the west coast seem normally to arrive a little later than on the east (Hoylake, April 20th, 1925; Ainsdale, April 28th, 1928). The first arrivals come singly, or in small parties. The numbers increase daily, the vicinity of a ternery forming a place of assembly, not only for those intending to remain and breed there, but for many others which rest and gossip before passing on to breeding grounds farther North.

When returning from their winter quarters the greater number of birds naturally follow the coast-line as providing food as well as a defined

[1] *Nat. Hist. of Ireland*, III. 272. [2] *Field*, 22.10.81.

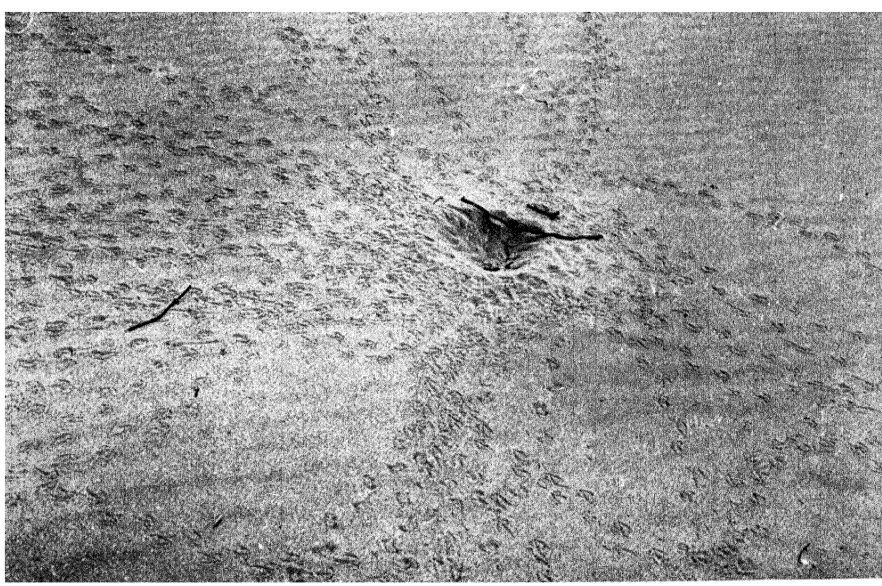
route. Some, however, strays perhaps, follow the great waterways—the Thames and Severn—and account for the inland records such as those of birds seen on the Tring, Bittell and other reservoirs. The Terns seen on the Cheshire meres would seem to have followed the course of the Mersey or possibly the Dee.

We have observed three methods of arrival. One, which is perhaps the usual, is the passage of a thin stream of birds following the coast-line in a leisurely manner, stopping to rest at suitable places such as sandbanks and isolated rocks, fishing where opportunity offers. Whether, in their progress along the coast, the Terns cut off corners like Land's End or the Lleyn peninsula in Wales, we are not sure, but believe they cling to the sea for the most part, and this may be the reason for the later date of their arrival at the west coast and the Irish breeding grounds.

A typical and favourite place of call is a small island on the western route contiguous to large tracts of sand. Here, on arrival, they will drop on to the water, wash themselves well, rise and fly a yard or so, shivering their wings and bodies to throw off the water again, drop and repeat the process several times. They will then join others already resting on the island. Here some stand with wings partly spread, Cormorant like. Others will hold their beaks pointing upwards, or depress their heads in a graceful curve with beak downwards, these actions being love gestures. All have much to say to each other with wide-open bill. The scene resembles the meeting of garrulous old friends after a lengthy parting. This discourse they vary by facing each other with wings depressed, beak down and tail cocked, actions which are evidently early efforts at courting. On this rock they stay until, rested enough, they proceed on a further stage of their journey. As they pass along the coast the Terns often travel in pairs, separated from couples in front and behind by comparatively short intervals. Or they move singly, divided from others by a considerable distance, but not unusually they travel in small bands of six or eight. In any case they ultimately arrive on the shore opposite a ternery, where they will remain without entering the breeding ground, additions being continually made to their numbers. In this way we find from our *Journal* " the first arrivals of the year were passing along the edge of the tide outside the breeding ground. About thirty in number, they were apparently unmated, being usually alone and separated by some distance from each other. These were Common Terns and one flock of five alighted on the beach. Among the travellers were a Sandwich Tern or two. One Common Tern swerved and sailed down wind calling loudly and excitedly ' Pee$_{er}$ ' in quick succession, having suddenly discovered it had lost its friends. Soon it rounded into the wind and joined a large flock which had just arrived and was resting on the sand. Two birds appeared from the ternery flying high and calling a short, sharp cry. Perhaps incited by the



36. CIRCLE AND LOOP MADE BY ARCTIC TERN.



37. TRACKS RADIATING FROM SAND NEST OF COMMON TERN.

message brought by this pair, a group of eighteen now decided to investigate the nesting ground. Small parties continued to arrive and settle to rest. These groups increased steadily, for, at intervals, they were joined by new-comers. More birds flew the half-mile to the ternery and a fair number of these remained, circling over the ground for some time but none alighted on the sandhills, all returning to the sea. These proceedings were quite leisurely except that now and then an excited bird would search for a missing friend, calling loudly. They appeared merely to be investigating, deciding whether to remain here and breed or to move on to other terneries up the coast."

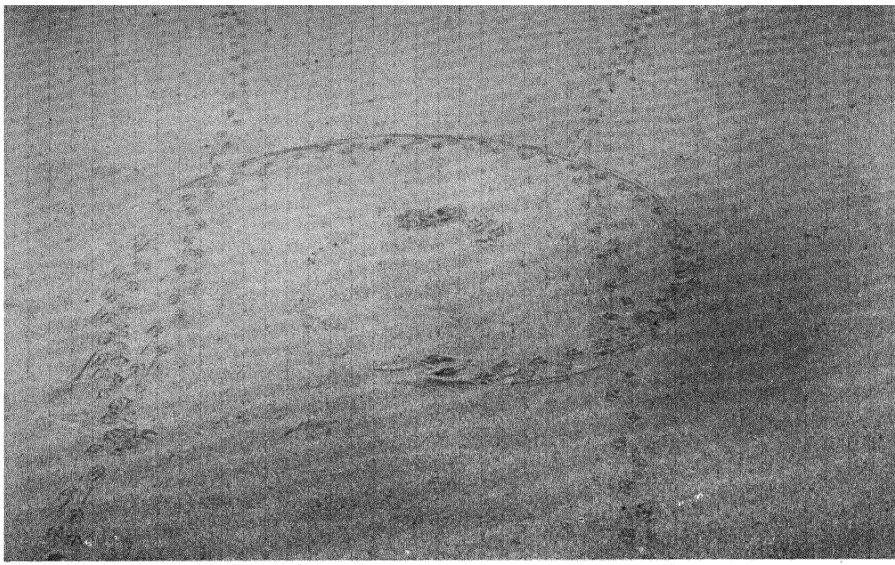
This prolonged migration may extend over a considerable period of time. We have noticed, in a ternery where birds had already settled down and were breeding, a steady addition to their numbers continuing over three or four weeks. We have seen groups of Sandwich Terns, late in coming, take possession of sections of the ternery separate from their congeners which had arrived earlier and had gone so far in their operations as to have laid eggs.

This is one and, possibly, the usual manner of migration, but there are times when the birds arrive in different fashion. Suddenly, without any warning, the ears will be assailed by a babel of small, sharp cries, and out of the sky a number of Terns will drop almost vertically, or fall quickly, like pieces of paper, " banking " right and left, dashing about as though extremely excited. Appearing " out of the nowhere into here," they descend thus directly on to the breeding ground or on to the near-by shore. These would seem to be belated birds which have flown direct at a great height, without following the coast, and having arrived over their destination, let themselves fall with great speed and with startling dramatic effect.

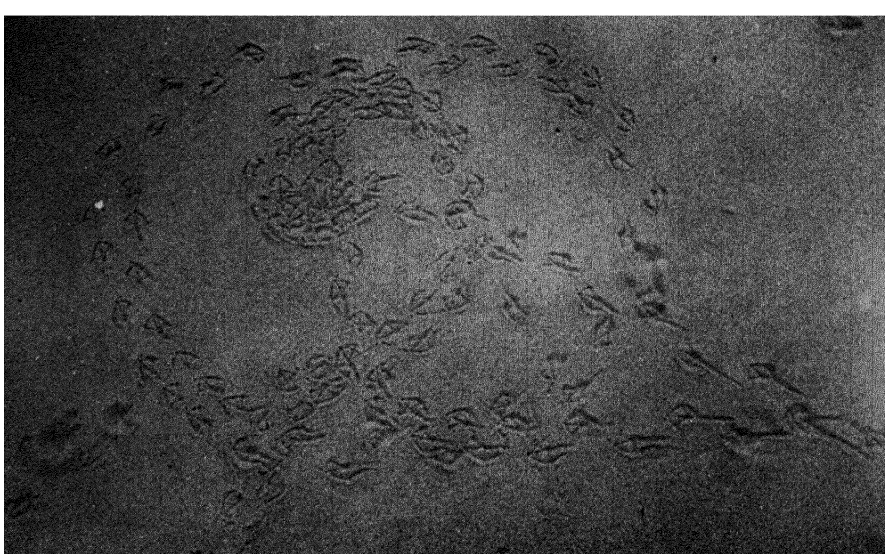
Contrast with these two methods of arrival, one which is far the most impressive, the " rush," though this, perhaps, is not the best word to apply to a progress in which there is no unusual speed of flight displayed. What is the cause of this manner of migration is not clear. It may be that an unusual plentifulness of food at some place on the way attracts and collects a great number of birds. This, when exhausted, frees them to proceed to their destination, which they do in a large body. Or adverse weather conditions may hold them up until a " block " has been created. Modification of these conditions releases them and in a crowd they press on towards their goal. Whatever the cause, the result is an unbroken succession of arriving birds pouring in over a long or shorter period: a strong flowing stream exciting to watch and somewhat awe-inspiring in the determination and purposefulness exhibited in their flight.

One such influx we witnessed, in 1930, at Blakeney Point. A few birds were already established there when we arrived on April 24, and

about 6 p.m. we could see 24 birds, these being Sandwich Terns. A little later we noticed birds beginning to come in steadily, always from a point out at sea, north-east by north. These were Common Terns proclaiming their identity by their calls. At 7 p.m. came a single Tern, followed quickly by another. Nine arrived at 7.10; 12 at 7.15; 5 a little later; 3 at 7.17; then 2; then 1. All came from exactly the same direction, travelling about the same height from the water. None flew low, and while a few, especially later, flew very high, most were moving rather high than low. At 7.20 came 3; 10 at 7.21; then 2; 4; 3; 5; 6. They could often be heard calling long before they were seen. Now came 4; then 5. New-comers seemed always to be greeted with enthusiasm by those already arrived which had established themselves, not on the Point, but near the mainland over the river. Next arrived 4; then 2. Always, with a few late exceptions, they seemed to be the same distance away as well as the same height, *i.e.* they were all following a definite line of flight as though it had been mapped out for them. They were too far off to be certain always, of the species, but, though they usually travelled silently, calls at times betrayed the presence of Sandwich Terns. The majority were Common Terns with an admixture of Arctic Terns (this was established later when they were seen in daylight), and it was definite that no Little Terns accompanied the others. Eleven came next, followed by 18; then 4. It was now 7.40 p.m. The next few groups flew higher than their predecessors. Four birds came at 7.41; 11 at 7.42; 25 at 7.43—from their cries these were Sandwich Terns. Came 5 at 7.44; then 8; then 5; followed by 11 Sandwich Terns; then 9. These last, only, showed any hesitation in their flight, turning back as though to alight on a sandbank they had passed; they then changed their minds, proceeding to join the others on the mainland. Three came next and then 4 Sandwich Terns. By this time it was close upon 8 p.m. and something like 250 birds had been counted. It was getting too dark to see any more of the incomers, but as from time to time calls could be heard out at sea, followed shortly afterwards by cries of welcome from the established birds, it was evident the " rush " was continuing in the dark. And this clamorous greeting continued to break out, at intervals, until quite late into the night. Two striking features of the passage may be emphasised:—the steady, purposeful feeling about the flight of the incoming birds and the fact that not a single one alighted, or attempted to alight on the ternery itself, all passing close by, to alight on the mainland. There, on a long spit of sand running out into the river channel, was the alighting spot, though almost all moved from this to a near-by bank of sand for the night. Here, as we could see faintly in the gloom when we went quietly out to the " Far Point " late in the night, was a great assembly, closely packed. The wind, which was cool and not strong, blew steadily



38. COMPASS-PERFECT CIRCULAR PARADE OF COMMON TERN.



39. DOUBLE CIRCLE BY MALE COMMON TERN ENDING IN PRESENTATION OR CONSUMMATION.

from the east. The afternoon had been sunny and warmish, decidedly warmer than hitherto, and had been followed by a short, sharp thunderstorm, and as the earlier birds passed an angry sun was sinking behind ominous clouds, its light flaring red and orange through narrow rifts. The sea glowed a reddish-purple. A large area of apricot sky north of the sun formed a clear background against which the migrating birds could easily be seen.

Dawn came next morning with a cold, grey-blue sky, just beginning to be suffused with warmth at the spot where the sun would rise. A long, low, flat bank of cloud crossed the east. The land was very dark, warm-grey, and from the waking birds on their sandspit came a continuous, grating clamour, though it was too dark for them to be seen. As the light increased, silent ghostly forms would be disclosed for an instant and be gone, slight flickers of something lighter than the dawn-gloom of sea and sky. Soon these forms materialised and were seen to be Terns in " amatory flight." A few parties were noticed coming in on the flight-line of the previous night, but no stream was observed: these birds came when it was just light and were barely discernible. At 10.30 a.m. the birds on the spit divided into two parts, flew off and settled on the outer sandbanks about half a mile apart. Though some birds had been flighting over the ternery in the early hours, by 10 a.m. these had departed, and during the day the breeding ground was entirely deserted.

At 5.20 there was a moderate wind from the south with a hot sun. The tide was almost high and a few Common Terns came in from the sea along the flight-line of last night. At 5.30, 8 appeared; then 2; 3, and 2; and at 5.35, 4. Evidently the migration was resumed. Now 11 Little Terns passed. At 5.36, 3 Sandwich Terns came. Now came more small groups of Little Terns. Next a Sandwich Tern at 5.43; another and 4 at 5.46; and more single ones and pairs up to 5.48. They all flew wearily. Followed 9 Sandwich Terns at 5.52; 1 and 5 at 5.55; 1 and 2 at 5.57; 7, then 2, at 5.58; 15 at 6.1; then 4 and 3 at 6.3. These were mixed Common Terns and Sandwich Terns. Eleven Little Terns came, then 2 Common Terns at 6.45; 1 and 5 at 6.7; 14 Common Terns and Little Terns at 6.8; 12 at 6.9; 6 more and 9 followed by 6 at 6.16. Next 4 and 3 Sandwich Terns; then 2, and 2, and 3 at 6.19. At 6.21, 6 came, then 11; and with them a small flock of Curlews. Eight Terns arrived at 6.23; next 2; 10; 2; 18; and then 7, by 6.30. A few were now coming from a point a little farther north. From this time they arrived steadily, every minute or so, until by 7 p.m. 224 had been seen, and between 7 and 8 p.m., 435 had arrived; making in all 659, a considerably larger number than the night before. The largest flocks seen were 33, 36 and 48. Their grouping, as they arrived, was much looser than last night. There were more single birds and the large groups were composed of individuals rather widely

spread. The general height was the same. All, with the exceptions mentioned above, came from exactly the same direction as on April 24th. Most of them flew on, past the Point, circled in the air, then settled on the sandspits of the Stiffkey shore, as they did last night. A few continued up the river and one or two fished and were chased by an Arctic Skua. This evening there was a certain amount of indecision and one bird settled on the marram grass growing on the ternery and another on the shingle; neither stayed long.

In the morning, April 26th, the ternery was looked over, but the entire absence of footprints in the sand proved that none had roosted there during the night, and that none had alighted during the day. All day flighting over the Point was done by both Common and Sandwich Terns, but in the afternoon the ternery was quite deserted. A few birds were fishing in the river and the main body had moved to the outer fringe of the " Great Bank " as it did yesterday. Presently the rising tide roused them, causing all to fly with a great uproar which reached our ears over the steady thunder of the surf, sounding something like cheering at a distant football match.

That evening only three groups of 13 each of migrating birds arrived and a few others.

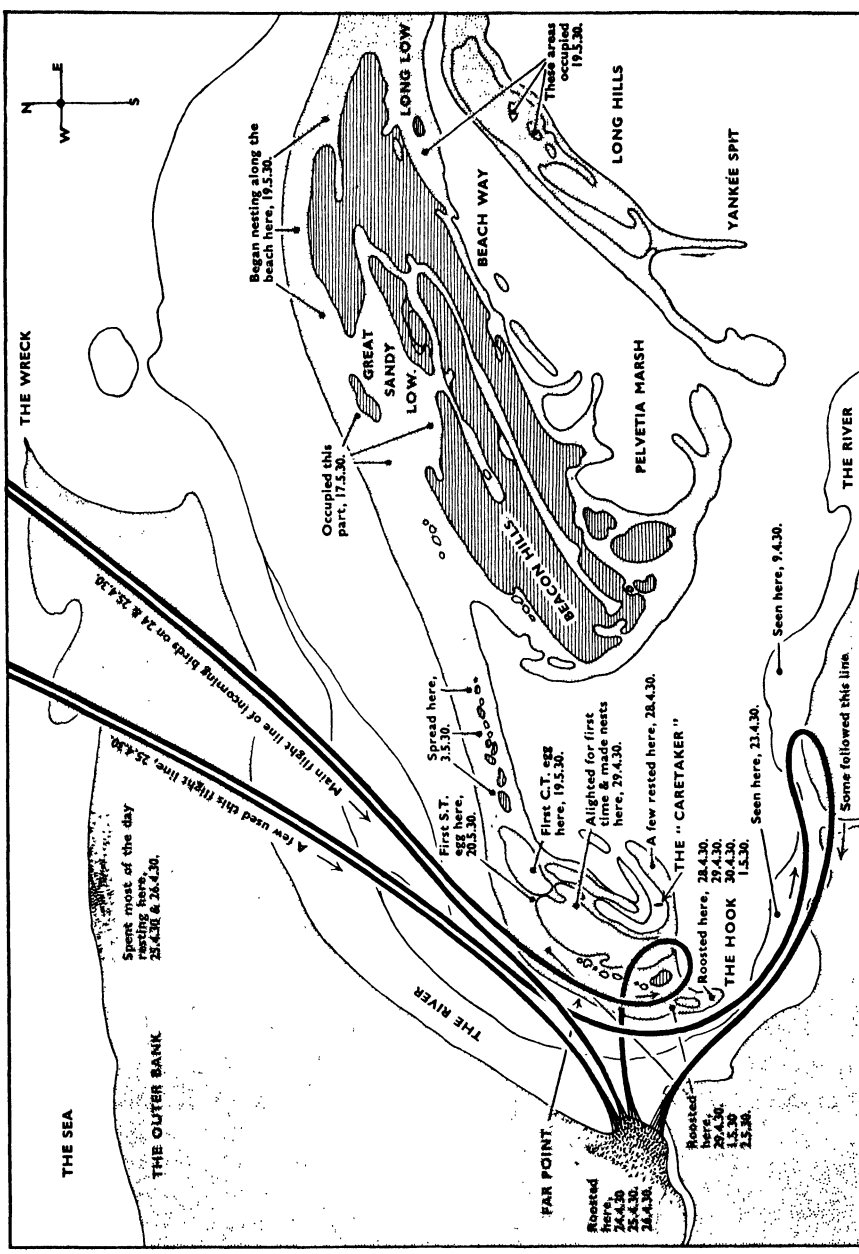
But quite different was the scene over the breeding ground. In the air were many of the previous days' arrivals, calling, gliding and beating in " amorous flight." This performance gradually ceased and at 8 p.m. all was quiet over the ternery, the birds had gone to roost on the Stiffkey shore. The migratory " rush " was over and the occupation of the ternery had begun.

The coast-line at Blakeney Point runs north-west by west; changes to south-west to the " Far Point," where it turns south to the Blakeney river. Roughly parallel with the coast-line is the " Great Bank," the termination seaward of the Stiffkey mainland. On the eastern corner of the " Great Bank " lies an old wreck. The rigging-draped mast of this hulk formed a convenient mark for judging the distance of the arriving birds and for counting them as they passed it. The migrating Terns were easily distinguished from the birds proceeding to and returning from their fishing and from the amorous ones courting over the sea, by their intentional, direct and somewhat weary flight (p. 69).

Birds continue to arrive, as before noted, for several weeks; for example, Watcher Pinchen reported a great influx of some thousands of Common Terns on May 29th, 1929, over a month later than the arrival of the first comers. These birds passed on after a brief rest.

Though the first comers take some considerable time to settle down to nesting, the later ones commence business at once.

The latest birds to appear seem hardly to have got settled in the



Lines of migration and dates of occupation of Blakeney Point, Norfolk, 1930.

terneries when the reverse migration begins. Young ones which have been hatched early set off with their parents for their winter quarters as soon as they can fly properly. The earliest of these reverse movements we have seen was at Ainsdale on June 26th, when, in a hollow of the sandhills, a fair-sized party was resting on its way South. Along with adult birds were many young ones with white faces and immature plumage. All were Common Terns, but though they were resting among and in a ternery of Common Terns, they were not local birds, for the Ainsdale young ones had not arrived at the flying stage. July is, however, the month when the bulk of the earliest birds begin their travels, and it was on July 19th we saw a flock of about 30 Sandwich Terns leave Blakeney Point. This was about 10 p.m. when it was nearly dark, and they set off eastward along the coast, a moderate wind being behind them. The young fliers among Sandwich Terns tend to accumulate in bands along the shore. There they are fed by anxious parents, and there they sleep and get strength for their long journey, and it must have been the starting of one of these groups which we witnessed. August sees most of the birds on the move. Some terneries will be entirely vacated early in this month, as an extract from our diary shows. " August 4th. Not a vestige of Tern life left on the sandhills "—this was the Ainsdale ternery, which contained with the exception of two or three pairs of Arctic Terns nothing but Common Terns—" No eggs, no footprints, no birds, young or old. But on the adjacent shore was a flock of many hundreds. Disturbed by our appearance, many stretched themselves preparatory to flight: the wings were extended vertically above the back, the tail depressed, the neck hollowed and head lowered till the beak touched the ground. The stretching commenced in the part of the flock nearest to the disturbers and was communicated to the next birds and so ran across the flock, wing rising after wing, till every member of the flock stood with upstretched wings. This necessity for stretching seems a certain indication that the birds had come far, probably from some distance North, and that they were not the inhabitants of this ternery. They rose with short cries, drifted with the wind and, reluctant to depart, planed back and settled to rest once more. All seemed to be adults."

During their journey southward the Terns favour, as resting-places, the same rocks, the same sandbanks, used on their coming. Here through August and well into September, individuals and small or large bands may be seen on most days; or if not seen, may be inferred from the numerous footprints they have left in the sand. The parties, usually, are mixed—young and old and all species are represented. Often enough with them will be one or more of those pirate birds, the Skuas, accompanying the Terns on their journey in order to rob them of the fruits of their fishing. The migrating birds not only rest and fish, they will, on occasion,



40. "IMPULSE" NESTS CONSTRUCTED IN DRIFT MATERIAL BY COMMON TERN: ONLY THE CENTRE ONE WAS USED.



41. TRIAL "SCRAPES" OF ARCTIC TERN: ONE ONLY WAS OCCUPIED.

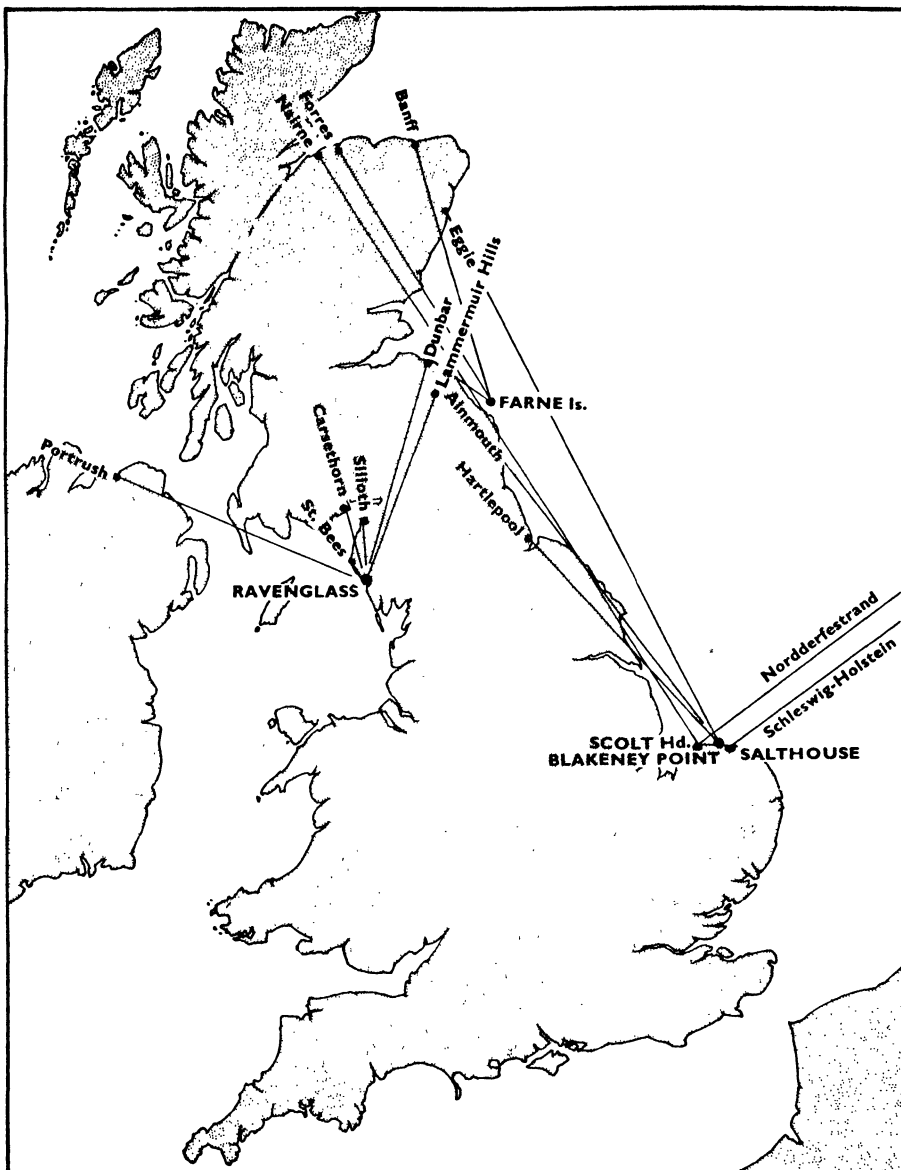
indulge, more or less, in courting " displays " on the ground or " glide " and beat through the air in " amatory flight," although the season for that sort of thing had passed. They stay a short time only, then proceed in easy-going fashion on another stage of their travels.

Even on this return journey a " rush " of sorts is sometimes seen. Here is one which began before and lasted till just after high tide, near the middle of the day. The date was August 18th, the day bright, the wind gentle and from the east. We were on a small rock island which was being visited by single Terns, small groups and one large flock of mixed Terns. Suddenly we realised the birds were coming more quickly and in greater numbers ; that a " rush " had begun. The birds were coming from all sides, but mainly from north, north-east. After watching their arrival and departure for some time we began to count and continued counting for exactly one hour. During this time 335 birds arrived. They were Common Terns mainly and we must assume Arctic Terns, though we could not distinguish these in the air, with many Little Terns and some Sandwich Terns. They came in small numbers thus : 1 ; 1 ; 1 ; 2 ; 1 ; 1 ; 1 ; 2 (1 being chased by an Arctic Skua) ; 6 ; 1 ; 3 ; 2 ; 1 ; 1 ; 1 ; 2 ; and so on : the largest group seen being 10. Besides those which called at the rock were many larger bodies of Terns seen passing by out at sea, but these were not counted.

There were no adverse weather conditions to explain this migration, but another, in the same place, was carried out in the teeth of a south-westerly gale. This was later in the year. For some time small parties, as was commonly the case about this date, had been working their way along the Wirral coast. These birds were outliers from the main migratory streams which seems to cross Liverpool Bay from the Lancashire coast to Anglesey and North Wales and so southward. On September 20th came the gale, which had the effect of driving the birds in from their sea route on to the coast of Wirral. Here they found a temporary resting-place and refuge from the force of the wind on the Hilbre Islands and the rocks on the mainland opposite known as the " Red Rocks." This " rush " lasted about three hours during the period of high tide, and it is worth noting that every large migration we have witnessed has taken place when the tide was high. As the nearest Lancashire Terns had left their breeding place some weeks before this " rush " developed, it is clear that these migrants must have been Scottish birds or from farther North, and this supposition is borne out not only by the presence of several Arctic Skuas intent on looting the fish caught by the Terns, but with them, also, was a Great Skua, a bird which has very rarely been noted as visiting that part of the coast and whose habitat is the far North of Scotland. Many proceeded direct to the Hilbre Islands, from which, after recuperation, they passed on to the sandhills on the Welsh coast at Point of Air.

Most of them made for the " Red Rocks," where they alighted among a crowd of Cormorants and waders of various kinds, until, driven off by the breaking waves, they transferred themselves to the shore near the Hoylake Golf Links, where, forming two large flocks, they preened and slept. So tired were these birds that they could be approached closely. All the varieties breeding in the British Isles were represented except Roseate Terns, though by far the greater number were Common and Arctic Terns. Not a few were still habited in full breeding plumage: others showed from the white face that the winter change had begun, or that they were young birds. Many had the warmer mottled plumage of the immature young bird. As the stream of birds approached the " Red Rocks " it was seen to be composed of groups varying in size, the largest being from 50–100 strong. These thinned out and disintegrated under the force of the wind, uniting only to be again dispersed. All flew low over the water, so low that the spray torn from the waves broke over them. Their wings beat slowly: their absolute weariness was evident. As they arrived at their haven of rest, many dropped into the comparatively sheltered water behind the " Rocks " and washed themselves with great vigour and obvious enjoyment. But the more weary gathered into masses behind the rock ledges, crouching low with head to wind, too exhausted even to preen their disarranged plumage. After a brief rest flock after flock moved off on another stage of their southern journey, their places on the rock and on the sands being at once taken by new-comers pouring in across the heaving waters of the Bay. Two strong impressions remained in the mind after crouching for three hours in what shelter we could find:—the one of unceasing movement—the tired flap, flap, flap of myriads of long pointed wings confused with the wheeling and dashing of clouds of Knots and Dunlins anxious to obtain a lodgment on the " Rocks," but driven off time after time by the breaking waves: the screaming hurry of the wind: the driven spindrift: the crash after crash of the breakers and their running hiss up the shore. The other—the striking contrast to this tumult of the quiet colour effect—a lovely harmony of greys: the silvery-grey of the Terns: the pebble-grey of the Knots' plumage: the ash-grey of Sanderlings and Gulls: the warm brown-grey of Dunlins: dull dark grey of distant Cormorants and, as a background, grey sky and heaving grey waters (Pl. 35).

All these birds were making their way South, but there is evidence that some Sandwich Terns, at any rate for a time, take a northward direction immediately on leaving their breeding ground (p. 73). There are records, too, of several Common Terns being found north of their ternery. Do these birds work their way round the North of Scotland? Do they cut across to the West coast from the Forth to the Clyde? Or have they merely lost direction and return on their tracks down the East coast?



To show *northward* movement of Terns from their terneries before beginning their southward migration.

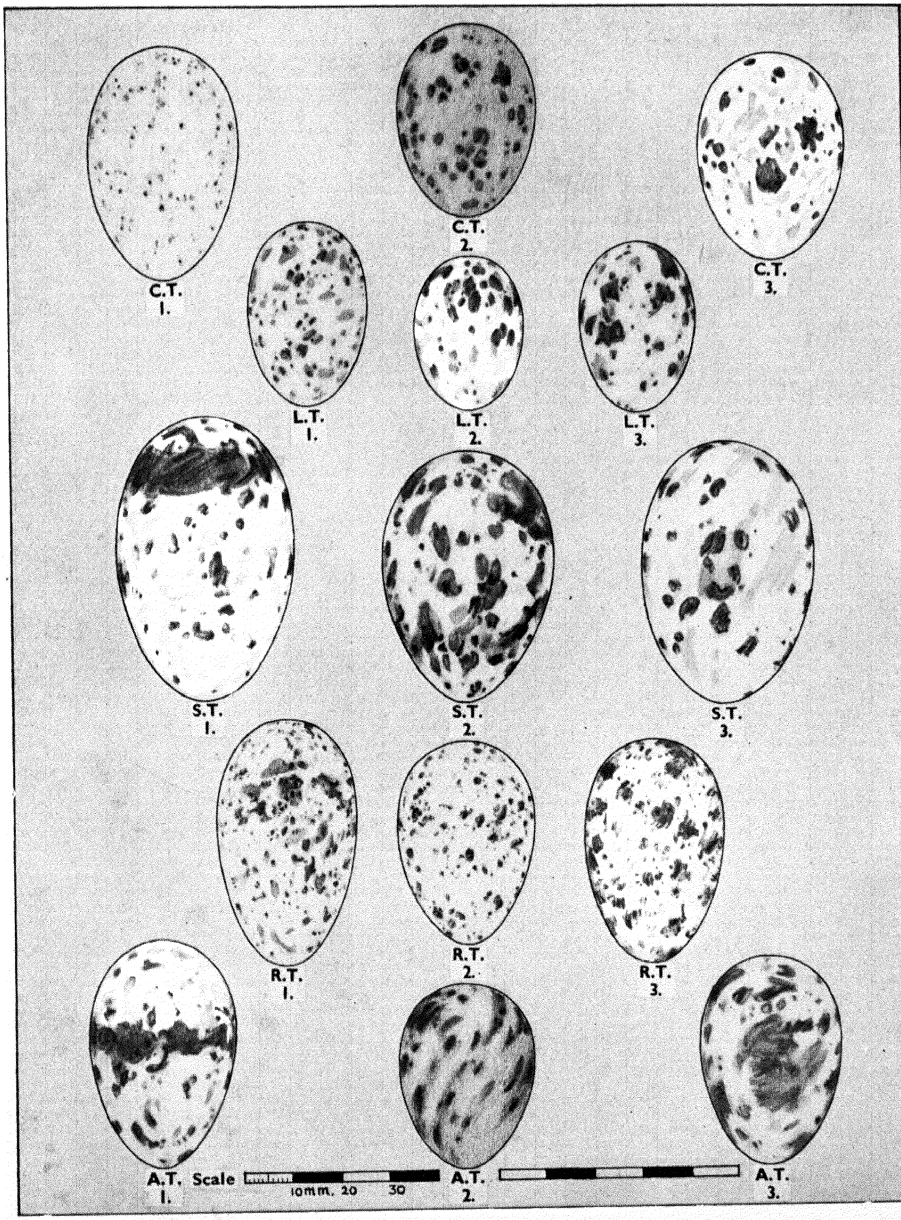
The evidence for these northward movements is furnished by recoveries of " ringed " birds, of which these are the details :—

Species.	Where ringed.	Date.	Where recovered.	Date.	References.
S.T.	Ravenglass.	30.6.09.	Dunbar.	23.10.09.	*B.B.* III. 181.
C.T.	,,	23.7.10.	St. Bees, Cumberland.	28.8.10.	*B.B.* IV. 279.
C.T.	,,	23.7.10.	Lammermuir Hills.	20.9.10.	*B.B.* IV. 178.
C.T.	,,	25.7.10.	Carsethorn, Solway.	19.8.10.	*B.B.* IV. 178.
S.T.	Farne Islands.	15.7.14.	Forres, Elgin.	29.8.14.	*B.B.* VIII. 113.
S.T.	Blakeney Point.	30.6.28.	Eggie, Aberdeen.	27.8.28.	*B.B.* XXII. 187.
S.T.	Ravenglass.	27.6.32.	Portrush, Ireland.	26.8.32.	*B.B.* XXVI. 220.
S.T.	Salthouse Marsh	27.6.31.	Nairne.	16.8.31.	*B.B.* XXV. 331.
S.T.	Blakeney Point.	30.6.28.	East Hartlepool.	2.9.28.	*B.B.* XXII. 187.
S.T.	,, ,,	1.7.28.	Alnmouth, Northumberland.	24.8.28.	*B.B.* XXII. 187.
S.T.	Norfolk.	10.6.30.	Schleswig-Holstein.	23.8.30.	*B.B.* XXV. 247.
S.T.	Scolt Head.	28.6.30.	Norddorferstrand, Denmark.	23.8.30.	*B.B.* XXV. 216.
S.T.	Farnes.	4.7.30.	Banff.	25.8.30.	*B.B.* XXIV. 216.

By September almost all Terns will have left British waters, but each year some delay their departure. The latest dates on which we have seen migrant Terns are: 6 Sandwich Terns on 18.9.16; a flock of 50 Common Terns on 22.9.17; while on 26.9.25 a group of Little Terns were dipping for shrimps on the Hoylake sandbanks. Even in October a few Terns may be seen, but these are exceptional. For example, Common Terns were seen at Banks, Lancs., 4.10.28 (*B.B.* XXIII. 55); Tring, Herts., 7.10.29 (*B.B.* XXIII. 197); Exmouth, Devon, 9.10.11 (*B.B.* V. 162); Leicester, 18.10.10; Burnham, Somerset, 21.10.09 (*B.B.* V. 339); Northumberland, 27.10.11; Landguard Fort, Essex, 5.11.60 (*Birds of Essex*); Chicken L. H., Isle of Man, 16.10.25 (*I. of M. Mig. Rep.*). Sandwich Terns have been recorded from Scolt Head, 12.10.30 (*B.B.* XXIV. 360); Dublin Bay, 2.10.22 (*I.N.* XXXIII. 30); Yorkshire, 11.10.10; Fife, 16.11.10; Edenmouth, 23.10.11; Yarmouth Harbour, 5.10.57 (*B. of Norfolk*). Little Terns have been seen as late as, Dunvegan, Skye, 15.10.30 (*B.B.* XXIV. 226); Exe estuary, Devon, 29.10.27 (*B.B.* XXI. 187); and Arctic Terns at Bembridge, Hants, 1.10.57 (*B. of Hants*), and Lower Hope, Essex, 3.10.67 (*B. of Essex*). Common Terns off Flamboro Head, Yorks., 19.11.93 (*List of B. of Humber Dist.*, Cordeaux). Sandwich Terns, Lowestoft, –.11.74 (*B. of Suffolk*); Filey, 15.12.75 (*Zoologist*, 1876, p. 4804); Redcar, 7.10.81 (*B. of Yorkshire*, II. 654); Northallerton, 10.11.81 (*B. of Yorkshire*, II. 654).

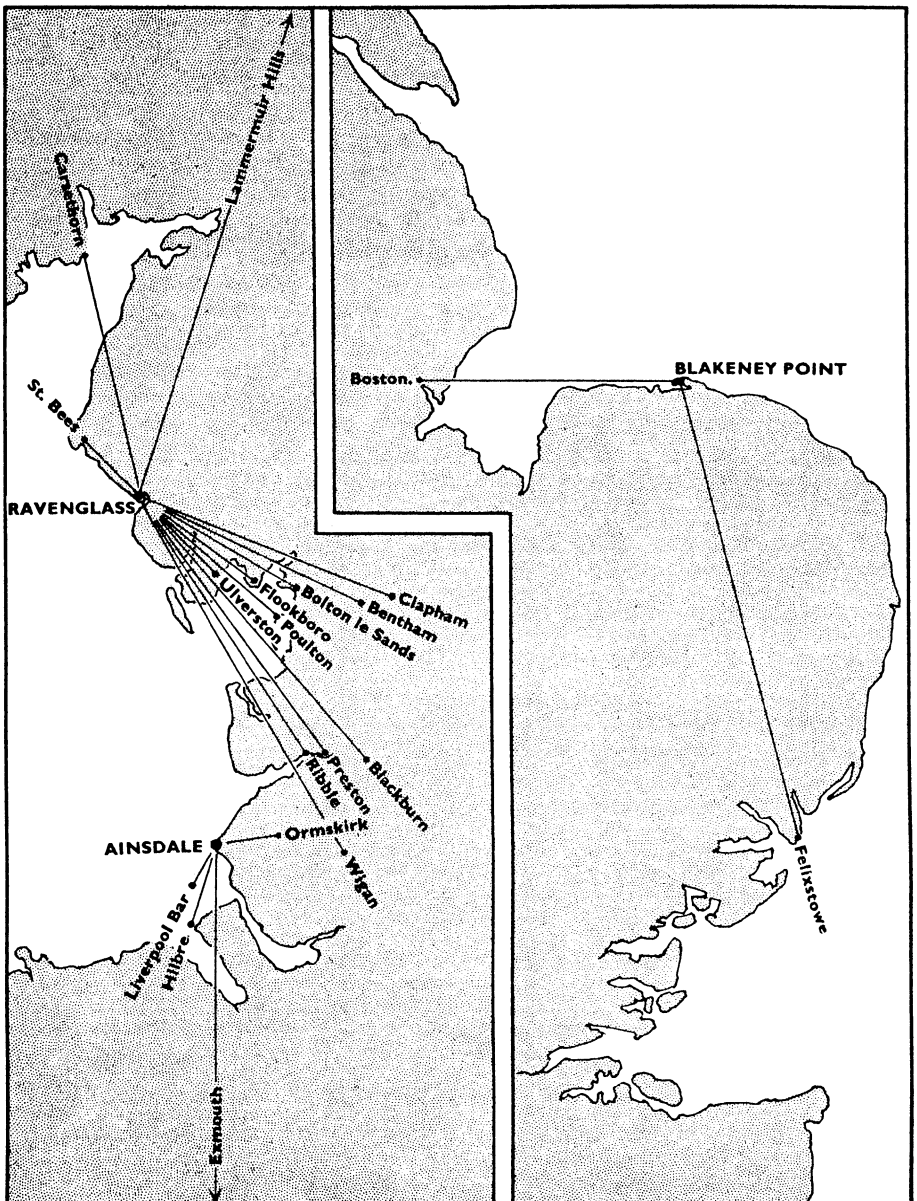
These records, widely separated in time and place, relate, probably, to birds retarded a little by illness or some slight injury.

Very curious are the reports of extremely belated Terns which were seen, two at Aberdeen on December 1918; one at St. Andrews in December 1919; five from different parts of the East coast in December 1920, besides others in November. In January 1919 one was seen at St. Andrews



42. SHOWING RELATIVE SIZES OF EGGS AND VARIETIES OF MARKING.

1. LARGEST EGG MEASURED; 2. SMALLEST EGG MEASURED; 3. AVERAGE-SIZED EGG.



To show *local* migration of Common Terns from east and west coast terneries.

and another at the same place in January 1920. Two were seen near Aberdeen and two at St. Andrews in February 1920. All these were Common Terns and adult birds (*Food of Terns*, Collinge, 38). Besides these Scottish examples are the Terns which appeared in 1925, on December 16th at Tooting Bec Common, and at West Norwood on December 17th in the same year (*B.B.* XIX. 256); and the one seen over an Essex reservoir on December 9th, 1933 (*B.B.* XXVI. 258).

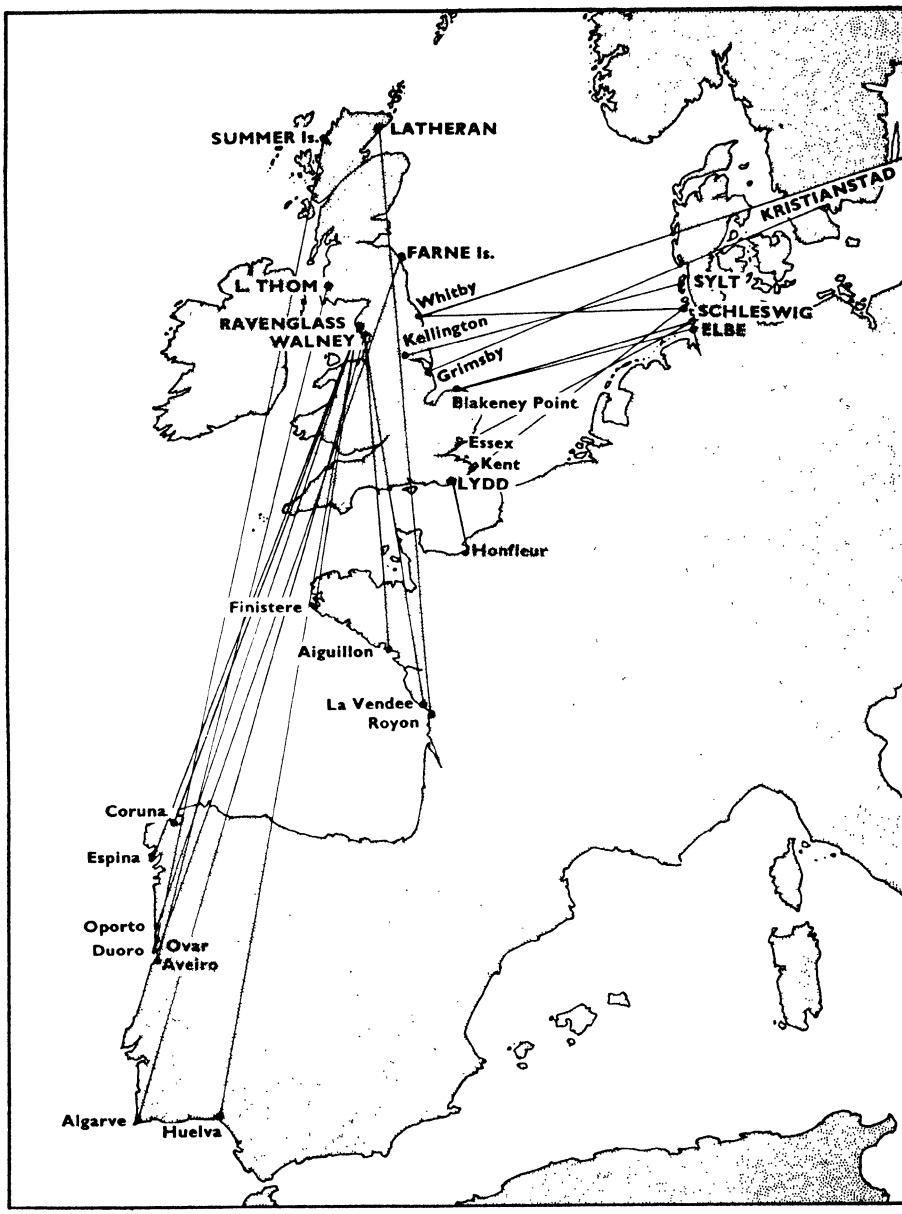
Where, exactly, is the destination of these outgoing birds does not seem to be known with certainty. It is supposed that, in general, the South is their goal and results of the " British Birds " ringing scheme are throwing some light on their wanderings during the winter and tend to confirm this supposition. Up to the present no British Common Tern has been found below the South of Spain, but Sandwich Terns have been recovered as far away as Port Elizabeth in Cape Colony. The discovery of Arctic Terns as far South as the Weddell Sea, where they were observed in considerable numbers by the Scottish National Antarctic Expedition in 1904,[1] has led to statements that these birds had travelled that distance from their nesting stations in Northern Europe, but there is some authority for the belief that these Antarctic Terns are a sub-species—*Sterna antistropha*—whose breeding grounds, apparently, exist somewhere in the southern hemisphere (Richenow, *Ornitholog. Monats.*, 1907, p. 107). This view is not subscribed to by the *Practical Handbook of British Birds*,[2] which states that " the Antarctic Terns do not appear to differ from northern examples."

The " British Birds " ringing scheme is one by which small aluminium rings bearing an identification number and address are fixed round the legs of young birds before they leave the nest (Pl. 34). Thus Terns which may be picked up dead, or shot, if " ringed " can be reported to the address on the ring and the extent of their journey from their birth-place becomes known. Terns " ringed " in this way at British terneries have been recovered as follows :—

Species.	Where ringed.	Date.	Where recovered.	Date.	References.
C.T.	Ravenglass, Cumb.	30.7.09.	Coruña, Spain.	21.9.09.	*B.B.* XXV. 248.
C.T.	,, ,,	30.6.09.	Espina, Spain.	21.9.09.	*B.B.* III. 181.
C.T.	,, ,,	14.7.10.	Huelva, Spain.	28.10.13.	*B.B.* VII. 225.
C.T.	,, ,,	14.7.10.	Finistère, Fr.	25.8.12.	*B.B.* XVI. 88.
C.T.	,, ,,	23.7.10.	Oporto, Port.	12.9.10.	*B.B.* IV. 178.
C.T.	Loch Thom, Renfrew.	22.7.11.	Aveiro, Port.	11.10.11.	*B.B.* V. 187.
C.T.	Summer Is., Ross.	5.8.11.	Oporto, Port.	-.10.11.	*B.B.* V. 187.
C.T.	Holy Is., North'd.	27.6.14.	Ovar, Port.	8.9.14.	*B.B.* VIII. 1.
C.T.	Lancashire.	7.8.24.	La Vendée, Fr.	-.10.24.	*B.B.* XXV, 248.
C.T.	Lydd, Kent.	30.6.12.	Honfleur, Fr.	11.9.12.	*B.B.* XXV. 248.
C.T.	Caithness.	13.7.31.	Charente Inf., Fr.	5.9.31.	*B.B.* XXV. 248.
C.T.	Farne Islands.	27.6.14.	Douro, Port.	8.9.14.	*B.B.* VIII. 103.

[1] *British Birds*, I. 28.

[2] Vol. II. p. 714.



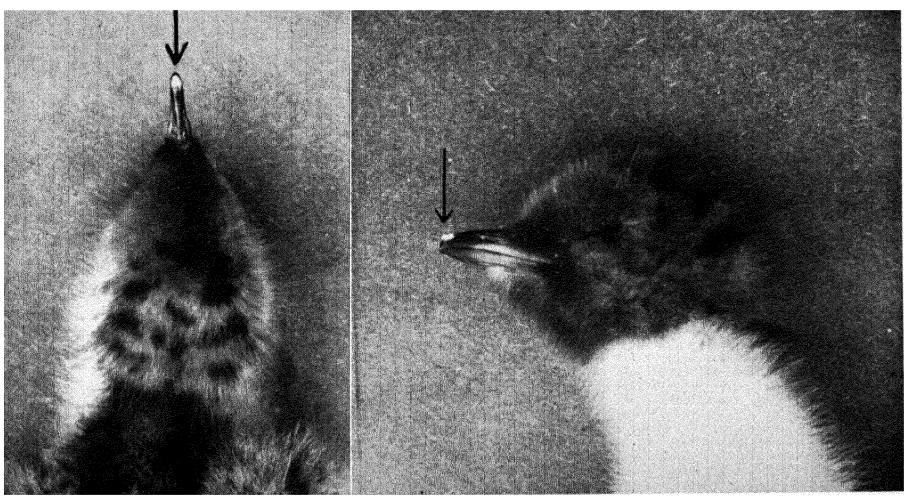
To show places of " recovery " of migrating Common Terns.

Species.	Where ringed.	Date.	Where recovered.	Date.	References.
C.T.	Lancashire.	12.6.32.	Algarve, Port.	–.9.32.	*B.B.* XXVI. 360.
S.T.	Norfolk.	10.6.30.	Schleswig-Holstein.	23.8.30.	*B.B.* XXV. 247.
S.T.	Farne Islands.	9.7.13.	Morbihan, Fr.	–.9.13.	*B.B.* VII. 165.
S.T.	Ravenglass.	25.6.10.	Archacon, Fr.	28.3.14.	*B.B.* VII. 339.
S.T.	Farne Islands.	9.7.13.	Assinie, Ivory Co.	9.2.14.	*B.B.* VII. 339.
S.T.	,, ,,	15.7.14.	Algarve, Port.	30.9.14.	*B.B.* IX. 46.
S.T.	,, ,,	8.7.19.	Berg River, Cape C.	–.8.25.	*B.B.* XIX. 173.
S.T.	Walney Island.	18.6.23.	Mossamedes, W. Af.	18.5.24.	*B.B.* XVIII. 19.
S.T.	Tentsmuir, Fife.	30.6.23.	Finisterre, Spain.	20.9.26.	*B.B.* XXI. 89.
S.T.	Walney Is.	–.6.24.	Lisbon, Port.	14.7.25.	*B.B.* XX. 52.
S.T.	Scolt Head.	17.6.25.	Oporto, Port.	5.10.27.	*B.B.* XXII. 251.
S.T.	Blakeney Point.	30.6.28.	Benguela, W. Af.	–.1.29.	*B.B.* XXIII. 124.
S.T.	,, ,,	30.6.28.	Cap Matafou, Algiers.	11.8.29.	*B.B.* XXIII. 303.
S.T.	,, ,,	30.6.28.	Mossamedes, W. Af.	–.12.28.	*B.B.* XXIII. 303.
S.T.	Walney Island.	2.6.29.	Loanda, W. Af.	–.4.31.	*B.B.* XXV. 77.
S.T.	,, ,,	2.6.29.	,, ,,	–.4.31.	*B.B.* XXV. 77.
S.T.	,, ,,	8.6.30.	,, ,,	20.3.31.	*B.B.* XXV. 77.
S.T.	,, ,,	8.7.31.	Port Alexandre, W. Af.	–.10.31.	*B.B.* XXV. 247.
S.T.	,, ,,	5.6.29.	Mossamedes, W. Af.	–.7.30.	*B.B.* XXIV. 216.
S.T.	,, ,,	5.6.29.	Durban, S. Af.	4.1.31.	*B.B.* XXV. 77.
S.T.	,, ,,	12.6.27.	Benguela, W. Af.	–.12.30.	*B.B.* XXV. 77.
S.T.	Ravenglass.	12.6.27.	Luderitz, S.-W. Af.	23.2.31.	*B.B.* XXV. 77.
S.T.	Salthouse Marsh.	1.7.29.	Port Elizabeth, S. Af.	–.1.30.	*B.B.* XXIV. 216.
S.T.	Scolt Head.	28.6.30.	Tabou, Fr. W. Af.	2.5.31.	*B.B.* XXV. 77.
S.T.	,, ,,	7.7.30.	Loanda, W. Af.	27.4.31.	*B.B.* XXV. 77.
S.T.	,, ,,	7.7.30.	St. Valery, Fr.	2.9.30.	*B.B.* XXIV. 216.
S.T.	,, ,,	28.6.30.	Calvados, Fr.	–.10.30.	*B.B.* XXIV. 216.
S.T.	,, ,,	28.6.30.	St. Antonio, Port.	25.11.30.	*B.B.* XXIV. 216.
S.T.	,, ,,	28.6.30.	Amrum Is., Den.	23.8.30.	*B.B.* XXIV. 216.
S.T.	Blakeney Point.	13.7.29.	Ivory Co., W. Af.	–.2.30.	*B.B.* XXIV. 216.
S.T.	Walney Island.	2.6.29.	Port Alexandre, W. Af.	–.11.31.	*B.B.* XXV. 330.
S.T.	,, ,,	23.6.30.	Mossamedes, W. Af.	21.12.31.	*B.B.* XXV. 247.
S.T.	Blakeney Point.	30.6.28.	Takoradi, Gold Co.	29.11.31.	*B.B.* XXV. 247.
S.T.	Salthouse Marsh.	27.6.31.	Accra, Gold Co.	29.10.31.	*B.B.* XXV. 331.
S.T.	,, ,,	14.6.32.	Gravelines, Fr.	19.8.32.	*B.B.* XXVI. 360.
S.T.	,, ,,	30.6.32.	St. Pol, Fr.	4.9.32.	*B.B.* XXVI. 360.
S.T.	,, ,,	1.–.32.	St. Valery, Fr.	28.8.32.	*B.B.* XXVI. 360.
S.T.	,, ,,	10.6.32.	Calvados, Fr.	10.9.32.	*B.B.* XXVI. 360.
S.T.	Scolt Head.	2.7.32.	Oporto, Port.	22.9.32.	*B.B.* XXVI. 360.
S.T.	Farne Islands.	26.6.32.	Huelva, Spain.	6.11.32.	*B.B.* XXVI. 360.
S.T.	Ravenglass.	19.6.32.	Senegal, W. Af. Winter,	1932–33.	*B.B.* XXVI. 360.
S.T.	Scolt Head.	28.6.30.	Port Alexandre, W. Af.	24.4.32.	*B.B.* XXVI. 360.
S.T.	Collieston, Aberdeen.	20.6.32.	Axim, Gold Co.	16.3.33.	*B.B.* XXVII. 102.
S.T.	Scolt Head.	2.7.32.	Barcelona, Spain.	5.3.33.	*B.B.* XXVII. 102.
S.T.	Salthouse Marsh.	14.6.32.	Keta, Gold Co.	25.2.33.	*B.B.* XXVII. 102.
S.T.	Strangford Lough.	9.7.32.	Benguela, W. Af.	–.12.32.	*B.B.* XXVII. 102.
L.T.	Sizewell Thorp, Yorks.	27.6.12.	La Vendée, Fr.	27.8.12.	*B.B.* VI. 214.
L.T.	Kilnsea, Yorks.	10.7.14.	Oporto, Port.	29.9.14.	*B.B.* XXV. 249.

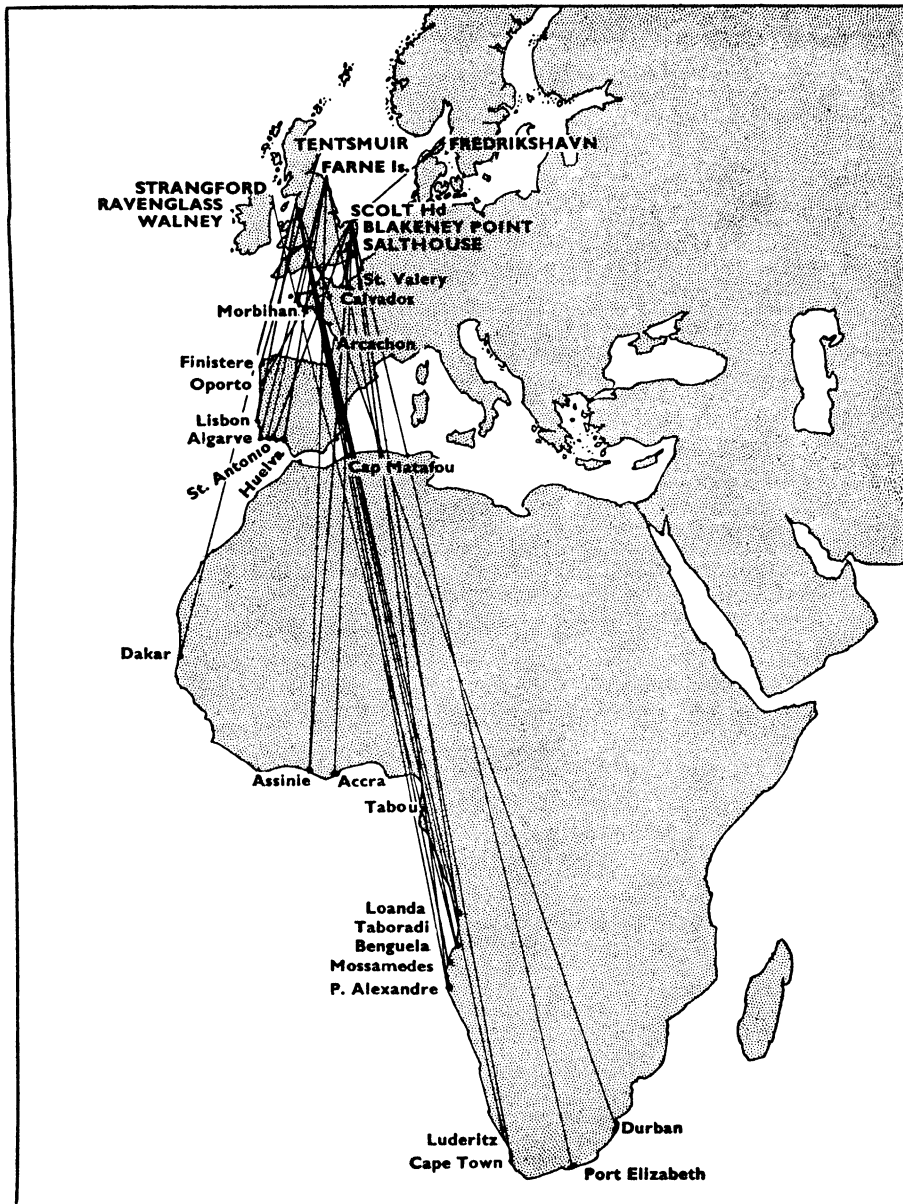
These records seem to prove that many Terns from the British Isles travel by way of the western coasts of France, Spain and Portugal to the



43. HOLE IN WHICH IS SEEN THE TIP OF THE BEAK OF THE CHICK.



44. TWO VIEWS OF THE "EGG TOOTH." YOUNG COMMON TERN.



To show places of " recovery " of migrating Sandwich Terns.

West Coast of Africa (pp. 77 and 79). But they show more than this, more, we fancy, than the authors of the scheme foresaw. We have stated that migration is, normally, a leisurely progress. At least so it seems, but the " ringing " reports are disclosing that, in addition to their normal purpose of showing the direction and destination of migrating Terns, the probability is that their rate of progress increases, at any rate on the outward journey. That is to say, that the farther the birds travel the faster they fly ; that they approach their destination at a greater rate than the speed they set out. If this is so it will explain how it is that they often arrive at a great pace in the spring, while when they leave us they travel in leisurely fashion. A few examples will show this increase of pace clearly. Terns begin their southern journey approximately a month after they are hatched, so that if we deduct 30 days from the date each example was " ringed," we get the approximate date on which they commenced their migration. Example A was " ringed " at Scolt Head, 7.7.30. It was reported from St. Valery sur Somme, France, 57 days after, *i.e.* 2.9.30. Deducting 30 days for the period before it left the ternery, it was travelling 27 days, and as St. Valery is some 280 miles away as the crow flies, the bird travelled at an average rate per day of 10·3 miles. Example B was " ringed " at the Farne Islands on 27.6.14. It was reported from Douro, Portugal, 1050 miles away, on 8.9.14. After deducting the 30 days' " lag " period it is seen that this bird travelled at the rate of 24·4 miles per day. Example C, " ringed " at Salthouse Marsh, 27.6.31, was reported from Accra on the Gold Coast, a distance of 3190 miles away, on 29.10.31, having travelled at the rate of 33·8 miles per day. Example D, also " ringed " at Salthouse Marsh, on 1.7.29, was picked up at Port Elizabeth, South Africa, a distance of 6160 miles, 184 days afterwards. Again deducting as before the 30 days in the ternery the bird is seen to have travelled at the rate of 40 miles per day. It is clear that the farther a Tern went the faster it travelled in comparison with others which did not go so far. It is not to be said that every bird acts in this way, some travel slower than they should and others faster, but the majority of the birds whose data are available do seem to carry out the suggestion we make above.

Having travelled so far, whether to the Antarctic or to South Africa or the West Coast of that continent, do the Terns return to their birth-place ? Here again " ringing " will in time furnish an answer to this question. So far we have not sufficient information. On the one hand, we picked up, in the Chesil Bank ternery, a dead adult Common Tern which had been " ringed " in that same ternery as a young one three years before, while a Sandwich Tern " ringed " at Walney Island was recovered there the next year (*B.B.* XX. 52). On the other hand, a Tern " ringed " in the Farne Islands in 1914 was found nesting in the Ravenglass ternery

five years later (*B.B.* XIII. 3). Naturally the authorities protecting Terns in their nesting-places are averse from having nesting Terns which are seen to bear rings trapped or shot. We are therefore thrown back on the remote chance of dead ringed birds being picked up to furnish proof.

OF OCCUPATION

All evidence points to a gradual occupation of the breeding ground. Why there should be any delay is not at all apparent. Can it be that the males travel alone and arrive first as is the case with some other birds, and that they do not take possession of the ternery until the females arrive? Unfortunately there is no plumage difference to enable this to be discovered. Certain incidents in the behaviour of the early arrivals point to the presence of both sexes, but this may not be conclusive.

As we have said, the earliest birds to arrive do not, at first, even come ashore, apparently remaining out at sea though in the neighbourhood of the ternery. The next move seems for these early birds to visit the shore near the breeding ground, then go away again for a time.

After this follows the definite use of the vicinity of the ternery by small parties as a resting and roosting place, though not of the breeding ground itself, this being followed by the arrival of birds in larger numbers. Details of these happenings have already been given in the chapter "OF ARRIVAL AND DEPARTURE."

Later arrivals do not follow this course but, from the first, occupy the shore close to the nesting area before entering it. Some of these birds pass on to more distant nesting grounds, as will be seen later: others remain to breed. We may say here that the last to arrive, the really belated ones, probably enter at once on their occupation of the nesting sites, though of this we are not quite certain.

The Terns then, having arrived in numbers and on April 26th begun flighting over the ternery but not yet having taken possession, we find that on the following day, quoting from our *Journal* of the events at Blakeney Point in 1930, "They are still roosting on the mainland and again no tracks are found in the ternery." As we continue our quotations we shall show the Terns, first, entering the ternery, next courting and making "false" or "impulse" nests there daily, settling down, continuing their breeding preliminaries and day by day extending the area of occupation.

"28.4.30. For the first time the birds have come on to the ternery to roost, congregating on the inside of the high, shingle ridge forming the 'hook' termination of 'FAR POINT.' The larger species kept itself separate, in the main, from the smaller. We estimated there were between 400 and 500 Sandwich Terns in a separate group, and many more Common



45. DECAPITATED EGGSHELL FROM WHICH THE CHICK HAS JUST EMERGED.



46. PARENT TERN REMOVING EGGSHELL.

Terns. With the latter there were a number of Arctic Terns and in their midst a little group of more Sandwich Terns. Some of the birds moved to a point of shingle behind the 'CARETAKER'—the watcher's boat—and voices could be heard beyond the sandhills. Some alighted on the ternery but did not stay. Many flighted in the air above it."

" 29.4.30. Again all the birds roosted on the shingle of the 'Point' and on the shore, but none on the breeding ground. During the day many flew above the ternery. For the first time a number alighted there, and courting took place, as was evidenced by the numerous footprints."

" 30.4.30. A repetition of yesterday."

" 1.5.30. Myriads of footprints in the sand on the breeding grounds showing walking, standing, and displaying-tracks and the first 'false' nests, indicating that, in the early dawn, the breeding ground had been invaded. As on the last few days, the ternery has been deserted during the day; none have alighted there and few have flown above it. But in the evening we counted sixty birds in 'amatory flight' over the breeding ground, continually separating into pairs, 'gliding' or 'fish chasing.' At intervals a pair would drop into the ternery. All the birds roosted on the shingle of the 'Far Point.'"

" 2.5.30. The breeding ground has been again visited by the Terns in the early morning as the multitude of footprints prove. But it was again deserted during the day. A section of the birds roosted on the shingle of the 'Point,' the rest slept on the shore."

" 3.5.30. This morning the Terns were found to have extended their range of occupation, for not only were there numerous footprints and 'false' nests among the sandhills of the main ternery, but the same evidence showed they had begun to occupy the neck of mingled shingle and sand which joins 'Far Point' to the 'HIGH HILLS,' *i.e.* the large sandhills which formed the end of the old 'BLAKENEY POINT' before 'Far Point' came into existence. Once again during the day the ternery was unoccupied. The majority of the birds, last night, roosted between the sandhills of the 'Far Point' and the seashore, where, on an area of ten yards wide and for a long distance just above high tide mark, thousands of footprints had been left."

" 4.5.30. An entirely windless dawn, a faint grey light and at 4 a.m. an Oyster-Catcher's call breaks the night-silence, followed, at once, by the song of the first Skylark. Then in the ternery, sounds of awakening are heard, sounds which increase in volume and quantity as we plod, barefoot, over the ooze and sand left wet by the just retreated tide. Thus, for the first time this season, the Terns have spent the night on the breeding ground itself. Our object in visiting the ternery at so early an hour was to learn, from the vantage-point of the 'Caretaker,' the proceedings which caused the myriad footprints in the ternery in early morning. Calls in

the air show that some of the Terns are already flighting although it is still dark. By 4.30 a.m. we have gained the seclusion of the boat's cabin without disturbing the birds, for from all around comes a chorus of sound. Of this sound there seem to be three layers or strata—a general hubbub which is indescribable, a conglomerate of noises out of which breaks now and then a higher layer, 'Peeri peeri'; an occasional 'Peearr' and at times 'Ki Ki'; all showing that birds are in flight doing 'AERIAL COURTING.' Ghostly forms begin to be manifest, flitting by, visible for a moment then lost in the gloom. Below all this sound is a 'continuous ground bass' of 'Gurrgurrgurrgurr,' sometimes increasing in rapidity, then slowing again. Here and there it rises into a querulous 'Kerkerker,' then subsides into the guttural 'Gurr.' The growing light now shows birds courting on the ground, and these are responsible for the growling 'bass' notes, and also discloses pairs in 'amatory flight,' skimming, gliding, beating low over the sandhills and ever and anon alighting to increase the number of ground birds. These latter, standing in pairs, among the bunches of marram grass, are separated from their neighbours by a yard or so. Most of the pairs are about a foot apart but many are close together. These are doing nothing, just waiting for the renewed vigour of the coming day. In other cases one—whether male or female is a matter of surmise—is quiescent, crouching low, while the other is 'nest-making,' breast down, tail and wings almost vertical, slowly, without enthusiasm. In a few cases 'DISPLAY' is taking place, barely visible in the dim light, but unmistakable. With the growing light the 'display' actions increase. By 5.15 a.m. most of the birds have left the ternery, which has evidently been, for the first time, the roosting place of the bulk of the birds. When it got light enough most of the birds visible from the boat were seen to be Common Terns and with them a few Arctic Terns were behaving in the same way. It was remarkable that no Sandwich Terns were among them and we saw, presently, that they had remained roosting under the shingle bank of the extreme 'Point.'"

It may be said here that for some reason the Sandwich Terns never took possession of their nesting sites for the 1930 season. They stayed about for several days, their numbers getting smaller: they always roosted outside the ternery and finally departed, having decided apparently to nest at SCOLT HEAD. All, that is, except four or five which stayed and laid eggs, but before laying the full clutch abandoned them, and departed to be seen no more.

The same proceedings took place without difference until the 17th.

"17.5.30. By this date the Terns have not only settled down to breed on 'Far Point,' where they have occupied all the sandhills and numerous nests have been 'scraped,' but they have extended all along the shore as far as 'GREAT SANDY LOW' and into the 'PELVETIA MARSH.'"

" 18.5.30. To-day there seems to be a lull in the frenzied nest-making and the ternery is much quieter. All seem paired."

" 19.5.30. The first egg laid was found to-day: it belonged to a Common Tern."

" 20.5.30. Several more eggs of Common Tern and one Sandwich Tern egg. The occupation of the ternery is now complete."

From this date, eggs became more numerous each day until the full clutches were all laid and a comparative quiet settled over the ternery. The " sky courting " almost ceased and gave place to flying seaward for fishing and returning with fish for their mates who were sitting on the eggs.

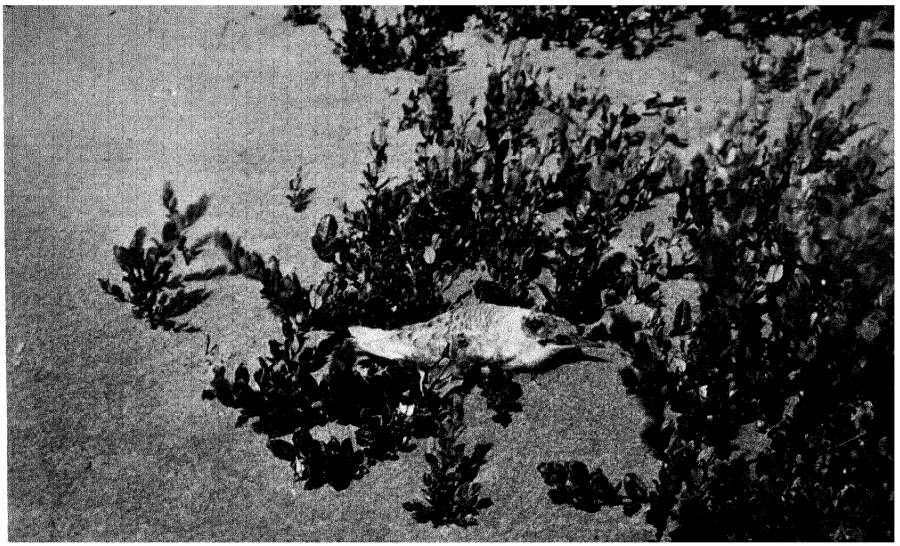
Whether the proceedings we have observed at Blakeney Point and have described are followed at all other terneries we cannot, of course, say. But we know that at the west coast ternery at AINSDALE the Terns there do assemble on the shore for some days before taking possession of their nesting ground and that " aerial courting " takes place over the ternery for some time before the birds definitely occupy it, though in this case we have never had the opportunity of watching them day and night as we had at Blakeney Point in 1930.

OF COURTSHIP AND MARRIAGE

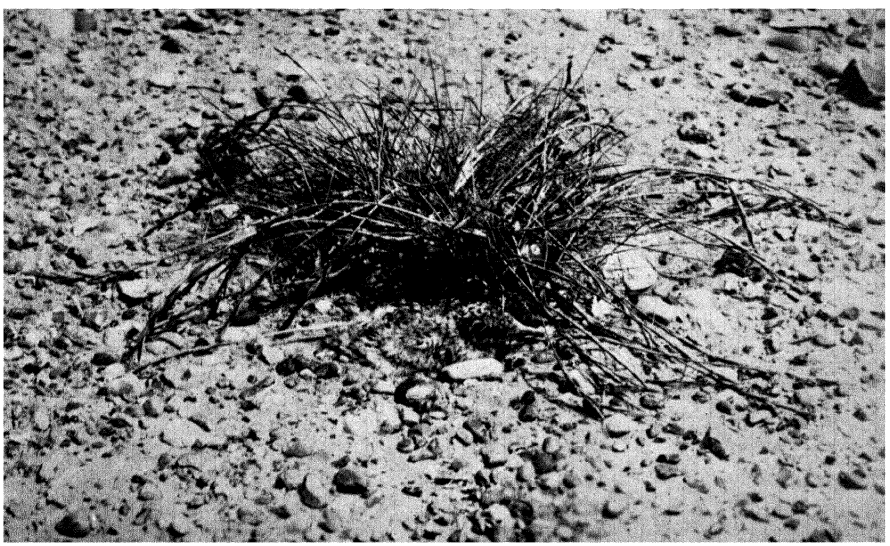
THE earliest manifestations of courtship are not only to be witnessed immediately on the arrival of the Terns in the neighbourhood of their breeding grounds, they may even be seen during the passage of the birds up the coast. These preliminary demonstrations may possibly be made to their last year's mates, in which case they would show that Terns mate for life. The tendency for the birds to fly in twos while on migration rather points to a permanent union. Pairs may be observed passing northward along the coast with distinct intervals of as much as ten minutes between them. Flocks, composed of pairs sitting a little apart from their neighbours, rest on the shore near the ternery before they occupy it. A flying flock in these early days seems distinctly to be a congerie of pairs, and the case of the birds at Wells which laid clutches of " red " eggs would seem to be proof positive that Terns pair for life. On the other hand, it may indicate that the male is " hanging on," showing a preference for the society of the lady of his choice, and it is possible that these early expressions of affection are the initial steps taken in forming a new alliance.

But these indications of having permanent mates are not invariable. Terns often travel singly and in the flocks some are obviously unattached. These single birds may be the young of the previous year returning for their first breeding season. Possibly they are birds which, for some reason or other, have lost their partners during the winter. It is, therefore, unwise to assert that the selection of the male takes place after arrival or that the demonstrations witnessed are made by the males to arouse the admiration of the opposite sex. Indeed, as both sexes " display " almost, if not quite, equally and as the plumage of both sexes is identical we are inclined to believe that the question as to where the affection shall be placed has already been settled before arriving at the ternery, and that the demonstrations made in the ternery have the object of exciting, simultaneously, the mating instinct in each bird of the pair.

Thus, the second phase of a Tern's life begins—the courting actions which are known as " DISPLAY." The best known and most striking example of " display " in the bird world is that of a peacock spreading its tail. The Terns have their own methods, not as impressive but equally effective and containing more points of interest. These actions take



47. Well-fledged young Common Tern hiding.



48. Young Sandwich Tern hiding in its "scrape."

place on the ground—forming the " GROUND DISPLAY," and in the air—the " AMATORY FLIGHT." Whether the one precedes the other in this order is not clear, for the stages of courtship cannot be observed in complete sequence as they extend over a period of two or three weeks. One can, however, watch the various sections and by careful observation perceive the connection of one incident with the others. During courtship the birds are not always at the same pitch of excitement, hence the incidents may be only partial, the excitation often dying down before the complete display action has been performed.

Assuming that " ground display " is the first amorous expression, it consists of " POSTURING," when the beak, wings and tail assume unusual positions; " FICTITIOUS NEST or SCRAPE MAKING " done by one or other of the sexes or by both; and the " PARADE," when the two birds walk side by side, ceremoniously, or the male circumambulates his mate.

During the " amatory flight," when the courtship is transferred to the air and is conducted on wings, we see the " FISH CHASE " in which one bird carries a fish and is chased by or chases the other. This resolves itself, in moments of highest excitation, into the " GLIDE," the most dramatic and beautiful of all the love expressions of the Terns. The " glide " may change into the " VEE SOAR," in which the wings are held stiffly in " vee " shape over the back and, at times, into the " DOWNWARD RUSH," a spectacular performance during which the bird slides down steeply and with great speed from a height.

Besides these there are the " MOUNTING " and " UPWARD FLUTTER," two actions done singly or consecutively where the birds lift themselves *slowly*, with rapid beating of wings. These exhibitions of emotion we have, so far, failed to fit into the sequence of courtship actions; they may be expressions of jealousy and not part of the normal courtship ceremonial.

Again, the usual procedure may be interrupted by the intrusion of a third party producing the " TRIANGLE," or occasionally by a fourth.

Obviously of great importance is the " PRESENTATION," the giving of a fish to the other bird as a love offering, a ceremony which in almost every case takes place on the ground.

Finally, we have the goal to which all these amatory exercises lead and that is " CONSUMMATION."

All stages of courtship are accompanied by appropriate cries, calls, and, we believe, a " song."

When the Terns have completed the whole sequence of courtship actions, or as many of them as are necessary to attain the goal, both birds, and particularly the female, sit about in a dull mopish fashion. She is becoming " broody," a state in which, to some extent, the male seems to share.

The nest is now made and the third phase of a Tern's life—breeding—begins and shortly the first egg is laid.

One would expect the birds, having reached the breeding stage, no longer to indulge in the amatory demonstrations, but, occasionally, one sees " ground display " and the " glide " during the nesting season. We have seen this as late as the middle of July taking place over the ternery. Whether the birds concerned are old married couples burdened with the cares of a nursery, or whether they are late arrivals who are conducting their preliminaries at a time when the others have more serious business in hand, is impossible to say. Nor was it obvious why some birds which had left the ternery and were making their way South should be indulging in " amatory flight " on August 10th, as we once witnessed.

A little " ground display " and some incipient " flighting," neither of which is complete, are the indications of love-making one sees in the early days after the coming of the birds. On arrival at the ternery, but before entering it, courtship takes place in a crowd, as the birds stand in a flock close together, and it seems, generally, to be conducted with entire good-humour. Much of this early display is more individual than dual and is of a general character instead of one directed towards a particular bird. It seems to arise from an internal impulse rather than being induced by the sight and actions of another Tern, as it does later, for it is often performed by a solitary bird quite distant from the flock. The courting birds first of all tend to divide into pairs which in their turn separate themselves a little from their fellows.

It is in this manner that the disintegration of the flock comes about.

The next phase now begins and is the " DUAL DISPLAY," most of which takes place at and just after dawn, and to see this properly it is necessary to conceal oneself in the ternery and wait until the growing light discloses the doings of the birds. Many birds are on the ground standing about or, perhaps, slowly nest-making: from these now and again individuals detach themselves and take to the air. Others drop from the sky on to the sand and commence the " ground display." Crouching low, one bird walks with wings drooped, the flight feathers held horizontal and just off the ground, the tail being cocked up at a slight angle. By its side the other walks draggingly, its tail held at an angle of forty-five degrees, its wings depressed at the wrist joints, the wing points being elevated and the beak either held point down or erected vertically with point up. They walk about, one a little in advance of the other. The first bird sits down, depresses its breast, its head and neck are stretched out flat on the sand, its tail is cocked up vertically, its wings nearly so. It kicks, making the sand fly, and perhaps it rotates. This bird is, we believe, the male exciting the nest-making instincts of the female. She approaches, he leaves the " scrape " he has just made; she

enters it and kicks sand, rotating the while. This " ground display " is accompanied by much guttural growling, sounds which in the aggregate form such a decided feature of early morning and, later on, evening, in the ternery. At first they make many " scrapes," both birds at times doing this simultaneously, sitting close together or somewhat apart. After a time they tend to remain in the same spot and return, both birds, to the same scrape. This means, we think, that matters are getting settled and that there, or thereabouts, the actual nest will be made. Here are a few eye-witness' descriptions of the " posturing " from our *Journal.*

" Two birds posturing; one held its head on one side with beak pointing down, threw it up several times—a sort of reverse bowing—then held it upright with point in the air. It next made a ' scrape,' the other (he ?) walking round it two or three times with one wing or both trailing in the sand and tail erect—the ' parade.' He then walked off and joined another bird. The first followed and they were joined by a fourth. Three of these now did the reverse bowing, calling at the same time. They next separated into two pairs and one bird in each pair held its wings outstretched vertically over its back; one of the others partly holding its wings in the same manner: some nest-making now took place, after which all flew."

" Four others alighted together; all depressed their wings until they almost touched the ground; they cocked up their tails and all pointed their beaks downwards." These demonstrations took place early in the season when the birds were still inclined to act as a flock rather than as pairs.

" One bird was standing; another alighted close by her. She held her beak down as though preening her breast, drooped her wings till they touched the ground and elevated her tail; then crouched and kicked sand. The other walked round her twice, with head erect, hanging wings, and upstanding tail."

In all these cases we see the complete " ground display "—beak and wing actions; nest-making; followed by the " parade." In the next example there was no " parade."

" One Tern held its beak point downwards, wings drooped, flights horizontal and tail cocked at an angle of forty-five degrees. The other stood with head and beak vertical, point up; its wings stood out from its body horizontally, the tips of the flights meeting at the back beneath the tail, which was also cocked at the same angle as the other."

" One, flying with a fish, alighted, calling loudly. Another settled by its side. Both at once held their beaks pointing upwards, drooped their wings and elevated their tails. No ' presentation ' took place."

" One bird was standing; another alighted and both pointed beaks upward. The second walked with wings trailing on the ground, crouched

and kicked sand, then left the ' scrape ' thus made. The other entered the ' scrape ' and also crouched and kicked. Both then ' postured,' ' paraded ' and shouted. One went back to the ' scrape ' and re-entered, kicking as before. Getting out, its place was taken by the other, which kicked also. They then both ' paraded ' with spread wings and elevated tail, calling loudly."

The posturing often takes place when a bird is alone.

Besides the two positions for the beak, pointing up or down, the action of the wings is worthy of notice. They may be pressed close to the body with the tips elevated: they may be held away from the body, in a flat sort of way with their points meeting beneath the cocked tail, or they may be elevated as though the bird had just alighted. These are phases of display and are doubtless pregnant with meaning to the other bird. Other forms of wing action, equally significant, will be noticed further on.

The " parade " is so interesting that a detailed description may fitly be given. In one manifestation of this action the two birds wander, seemingly without aim, side by side, displaying a little, perhaps with head down, both having a furtive look. Sometimes this type of " parade " may be a lengthy one: occasionally the birds have walked in this fashion round large sandhills and returned to the spot where it began. But usually it is short, and is often done by one bird only.

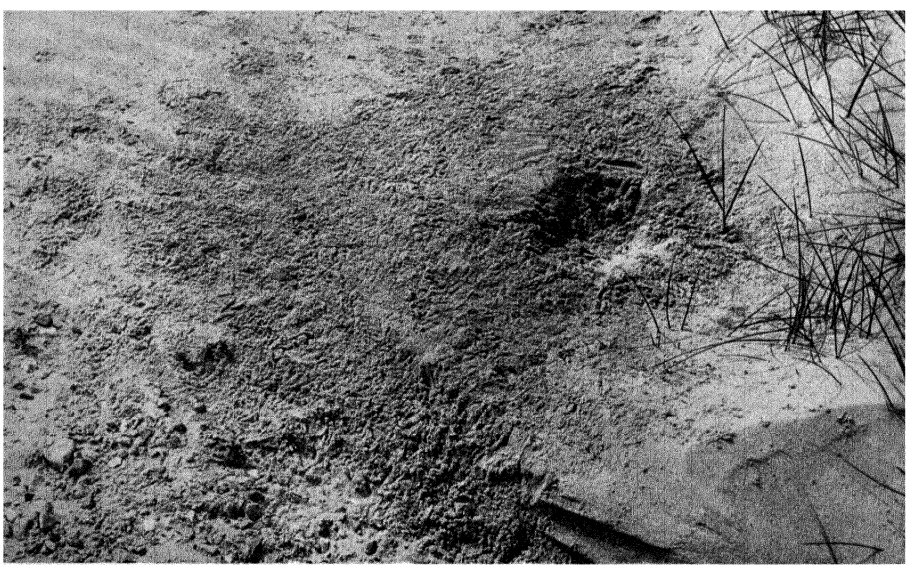
The most striking " parade " is the " CIRCULAR PARADE," which is performed by one bird, presumably the male. In this he walks round his mate, or more correctly his would-be mate, in a circle, using that word in its exact sense, for it is extraordinary how geometrically perfect the circle often is. As he patters over the sand, his little feet make clear impressions. Often the wrist joint of his wing scores a line in the sand, or this may be done by the primary feathers, and it is curious to note that he leans a little outward, as only the outside wing makes this mark. It is not unusual to find that he has made the circular tour twice, or even more. In the centre of the circle will be the marks made by the female's feet, and the changing position of these impressions shows that, as he is making his progression, she turns round so as to face him all the time.

" One bird had been standing for some time when another alighted holding a fish and circled round the first bird five or six times, moving anti-clockwise. She then flew, and he, with the fish, after standing for a few moments, flew off also. In a short time she came back and he, too, still bearing the fish. He then displayed by lowering his wings and elevating his tail; then walked round her once, as before, against the clock. She then made a dash at him, he rose, flew around, came back, alighted, then flew off with the fish, leaving the lady fish-less."

On another occasion, " a pair displaying with wings down, circulated round each other no less than *ten times*, as though they were fastened



49. COMMON TERN ROTATING AND KICKING SAND TO FORM NEST.



50. NEST FORMED BY ROTATING AND KICKING.

together by a length of string and were gyrating round a central point, except that the centre was not a fixed one, for they gradually moved along. One held its neck up, stiffly, with head on one side and " (as in the preceding case) " they moved anti-clockwise. Neither had a fish and nothing further developed."

Often during the " parade " the beak is open and one or both give an intermittent growling sound, " Krurr-krurr-krurr." Sometimes one has a fish which may be intended as a love offering; the other may seem to beg for it or may appear indifferent.

In the early period, when " display " is growing daily, the effect of the excitement is seen in the sand of the ternery. Various stages of nest-making, from a slight " scrape " to deep nests excavated in a frenzy of emotion, are seen on all sides and around them sand has been thrown in every direction. These nests are surrounded by a maze of footprints and often circles more or less complete made during the " parades." In the section " OF TRACKS " further details of these signs of the " ground courting " will be found.

The " amatory flight " and " glide " precede and follow the " ground display," and when each is perfectly done and combined, present a spectacle of extreme beauty. It is the high-water mark of " aerial courtship." There are several varieties, which may be done slowly or at great speed. The performance starts by the birds beating high into the air, one chasing the other, this is the " amatory flight." After doing this for some time they change into the " glide." For this the wings are fully extended and curved slightly downward. They then begin to " SIDE-SLIP " to the right and to the left alternately, the plane of their wings taking an angle of something like thirty to forty degrees. This " side-slipping " may be done in unison, the Terns keeping close together but one above the other. Or one of them, it may be the upper one or the lower, will " SLIDE " more quickly. In any case after " gliding " for some time they will beat again into the upper air and when high enough once again resume the " gliding." They may next, after continuing this performance, suddenly " SLIDE " on a long slant down to the ground and there " display." Or they may just drift apart. Often during the " glide " one of the birds, never both, will hang its head down in curious fashion. We are almost certain that this action is done by the female bird and is invitatory in its meaning. The distance of the birds apart is a yard or so, or nearer. At times they approach so close as to appear to touch, perhaps in an attempt to give or take the fish which is sometimes, though not invariably, carried. Or possibly one is attempting to take hold of the other.

They do not always " slide " right or left together; sometimes one slips to the right while the other is slipping towards the left, which has the appearance of one bird trying to avoid the other.

The action may, perhaps, be better understood if each hand is considered to represent a bird and is held at arm's length with fingers widely extended. Place one hand above the other and about six inches from it. Tilt the hands at a considerable angle and allow them to slide towards the left: tilt the hands the other way and slide them to the right. By repeating this action you get a fair imitation of a "SYNCHRONISED GLIDE." Now, keeping the right hand somewhat vertical and the left sloping, allow both to slide to the right, the left hand travelling much quicker than the other: tilt them the opposite way, bring them back again to the left and you illustrate another form of the "glide." Do exactly the same thing, except, this time, allowing the upper hand to cover the longer distance, and you see the third "glide" form.

Usually the "glide" is of comparatively short duration; beating of the wings follows it, the "glide" is resumed; then the flight, and so on. But when the ecstasy is intense the "glide" will last a considerable time without being broken by a single wing flap. The longest "glide" we have timed was one hundred and sixty seconds without a break, performed by two sunlit, silver birds against an intense blue sky, a lovely sight.

"One with a fish was chasing another which out-distanced its pursuer for a time. The 'FISH-BEARER' made a special effort, beat rapidly and catching up, glided beneath the other a foot or so away with stiff set wings, a wooden-looking attitude."

"A bird carrying a fish flew round, and round again, followed by another. The chase was not fast. When the chaser caught up with the 'fish-bearer,' as it was allowed to do, the latter soared with hanging head. Then both began to 'glide,' shortly afterwards changing to the slow chase, then again to the 'glide,' continuing thus alternately for some time."

"A pair flew very high with quick-beating wings so close as to seem almost touching and beat about around the same spot. They then changed to the 'glide,' banking steeply right and left, and descended with small cries almost to the ground, then beat swiftly up again to repeat the performance."

Usually the "glide" seems slow and is certainly leisurely, but at times a sudden excitement overtakes the birds and they drop in the "downward rush." At an immense pace, without any wing flap, they fall from a height, "side slipping" in unison right and left until they reach the ground. Or they will "TUMBLE" with great speed, turning as they fall till the plane of their wings is vertical, first one wing being uppermost, then the other. The delirium may die down before they reach the ground, in which case they will resume their flight on a lower level.

In these examples the performers were, perhaps, paired, but one can see amusing instances of birds which are obviously out on the "pick up"

if we may be excused the term. Whether they are unpaired Terns seeking a mate or " gay Lotharios " cannot be determined. One bird of this persuasion we followed, with the binoculars, for some time. It was beating about, in aimless fashion, over the ternery, striking its wings very rapidly as though in great haste, but making slow progress. Then it slowed its wing strokes considerably and was joined by another and a " glide " commenced. Shortly after, they parted and the first resumed his rapid beating and slow progression. Again it slowed and " picked up " with another bird, the " glide " being repeated. We saw this bird " get off " in this manner no less than four times, with a different bird each time! and could always tell by the slowing of his wing beats that he had done so even when the other bird was not in the field of the lens. One of the glides lasted thirty-six seconds and the " picked-up " bird during the glide hung her head. The whole of this performance was done to a continuity of cries and not one of the birds concerned carried a fish.

As the birds are about to alight from a glide they, with wings partly depressed and tail half open, swing from side to side, pendulum like, in unison with extreme grace. Just before they actually alight, the tail is spread, the wings beat several times, the feet meet the ground and the wings are held momentarily over the back before being folded.

The " fish chase " differs from the " amatory flight " in that the birds never glide or at most for very short periods. It does not seem a question of a robber chasing a victim, as the position in the chase often changes, the chaser becoming the chasee, and back again. It appears rather that the fish is a symbol, not a comestible. One seems to be watching a swain offering a love gift, then snatching it away, being then chased by the lady, who presently tires of the game, or, piqued, flies away, in her turn to be followed by the repentant lover with his present. In some such performance two, one with a fish, beat about over the ternery for over four minutes. During this long time they never glided except for a second now and then. They continually changed places, now the fishless one was the chaser, then the one with the fish. While this chase took place, possibly two attempts were made to take or present the fish, but we were not certain. During the flight they kept quite close together, but, after a time, the distance apart increased, suggesting a slackening of interest on the part of one of them. Shortly afterwards they drifted apart out of sight.

Often enough excited cries form an accompaniment to this performance and we think the " fish-bearer " usually is responsible. His volubility does not seem in the least impaired by the fish he is carrying, for he will cry with great vigour a high " " Kee$_{er}$i-Kee$_{er}$i " or " Kār$_i$." The other may reply with a staccato " Ti Ti Ti Ti," though usually she seems silent.

High up in the sky these " fish chases " occur, often several pairs being in the air at the same time.

Chases without fish are not uncommon. Possibly on these occasions, as one sees when they feed their young, a very small object which cannot be seen by the observer is carried in the beak.

It is not unusual to see a Tern behaving as though searching for its mate. These searchers always carry a fish and generally fly about over one portion of the ternery. Their behaviour suggests that two birds have arranged to meet near a given spot. A similar call is always employed, " Pee$_{er}$," and is given slowly and at intervals. When animated it is given more quickly and oftener : excitement usually adds another syllable.

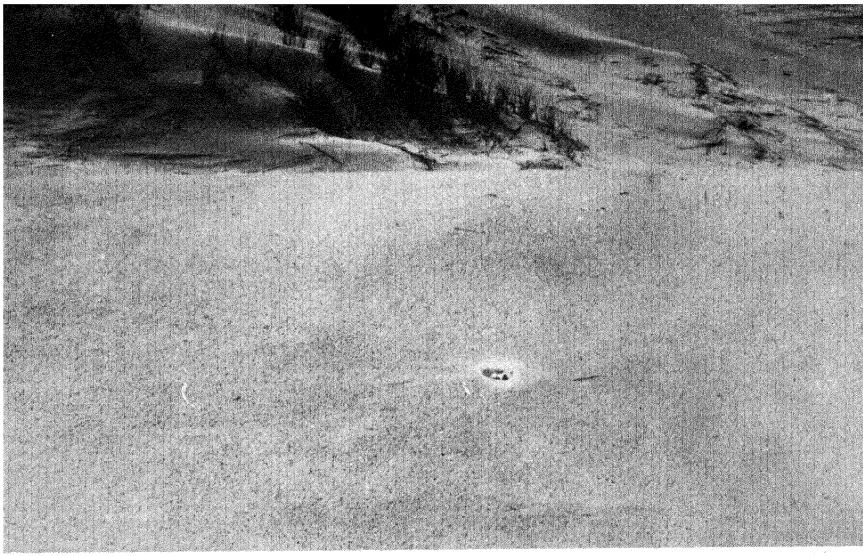
" A Tern flying alone bearing a fish called ' Pee$_{ar}$,' sometimes enunciating it slowly, at times more quickly. He flew back and forth and around, keeping to the same area, a portion of the ternery perhaps three acres in extent. After flying in this way for five minutes he alighted on a little hill but stayed only for a few seconds, then flew off a distance of half a mile. Returning he flew round and round as before for a long time." No other bird appeared.

" A fish-carrying bird called, quickly and incessantly, ' Pee$_{er}$ri ' and flew slowly about as though searching. When another came near he changed his call to a lower, growling version, but this was not the bird he expected. He continued to sail about over the same area for some time, then flew seaward. He soon came back and resumed his flying over the same place, calling as before. He then changed to a single call at short intervals, resuming the quick repetition of the other call if another Tern came near."

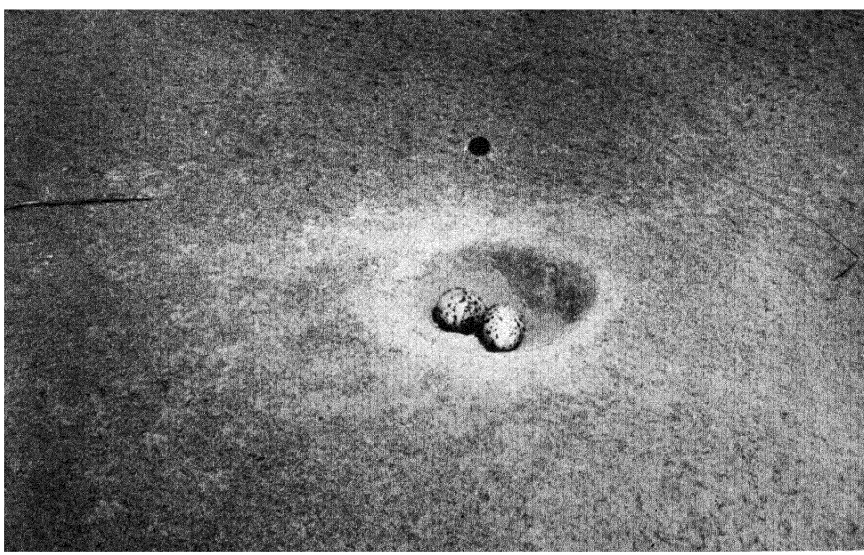
On the other hand, birds often loiter about as though expecting their mate to come with food : their heads tilt at times as though looking at a passing bird : sometimes they call.

In the same patient (though often impatient) way, Terns with fish will stand looking about them, the swinging fish they are holding catching the sunlight now and then in a flash of silver light. It seems as though an assignation has been made and the other party is late in keeping it.

" One had been standing on the sand for a considerable period as though waiting. Getting impatient, she went off for longer or shorter periods, always returning to the same spot, where she stood wearing an expectant look. Unable to stand still, she rose some twelve feet into the air, called ' Wee^{a} wee^{a},' then presently departed. Another then arrived with a fish, calling ' Pee$_{er}$ri ' rapidly, loudly and repeatedly. Was he the missing lover late for his tryst ? But she was no longer there. He changed his cry to a mournful ' Kee$_{errr}$,' a descending sound, calling this several times. There being no response he went away. Now one without a fish arrived and standing on the same spot called ' Pee$_{er}$ri ' many times, then changed to several guttural cries of ' Kaaa^{er}.' Was this the lady returned or her lover who had swallowed his gift ? Whichever sex it was



51. SITE OF NEST HOLLOW WITHOUT MATERIAL, COMMON TERN.



52. CLOSE-UP OF ABOVE NEST.

it flew off, only to return and stand on the usual spot calling and looking round."

Such an episode may, spasmodically, interrupt the normal courting procedure.

Something has been said about the use of wing action in display and it is certain the position of the wings has some sexual significance. But those already referred to are not the only exhibitions of the use of wings, actions which take place in the air and immediately on alighting. One of these when seen is usually a concomitant of the " glide," though not always. The wings are held rigidly over the back in " vee " shape, an attitude which is often seen with domestic pigeons.

" Two birds were in the air, one above the other, both flying slowly. The upper one then dropped with ' vee ' wings to the other and both began to ' glide.' "

This wing action sometimes takes place after a " glide."

" Two having been ' gliding ' for some time, descended, one of them dropping to the ground with wings held ' vee ' fashion, calling rapidly ' Kukukukuku.' "

Solitary birds will sometimes soar with " vee " held wings.

A bird carrying a fish sailed about alone in this way calling " Kakakeeee." The action will also appear occasionally during a " chase."

The " fish-bearer," flying very slowly, will suddenly change and float with rigid wings held " vee " fashion, the other almost touching him. We surmise it is intended to have a stimulating effect on a possibly lukewarm lover. While soaring thus, the bird will indulge in guttural growls, similar to the sounds associated with " ground display."

The same demonstration also occurs in " triangle flights."

" A very fast chase of three birds took place, one carrying a fish. Round and round they flew with great speed and several times one, undoubtedly, struck another. They did not ' glide,' but twice the ' vee ' soar occurred."

There is another wing movement which does not occur in normal flight and which, like the " vee " position, we take to be sexual in its implication. This is lazy-looking, slow and deliberate and moves the body upwards a little at each down stroke of the wings. This peculiar motion of the wings has a decided pause at the moment when each downward stroke has reached its limit, as though the bird were about to stop. During this motion the wings are rather stiffly curved downwards. One bird may fly in this manner, or two, flying together, may each do it, then change simultaneously into the " glide."

When Terns alight by their nest it is quite usual for the wings to remain outstretched for a moment before they are folded. It is this attitude which one sees so often in photographs of Terns alighting by the nest. Normally it means nothing, but there are times when it is

without doubt a part of the series of " display " motions. When used for stimulation purposes it is usually seen when a bird alights by the side of its mate. In this case the wings are held erect and are kept there for several seconds. The resemblance of this attitude to the one assumed in the " vee " soar is evident; indeed, not infrequently the one becomes the other, that is, a descent with " vee " held wings is followed by an alight in which the wings remain extended in that form. Its use occurs when no other bird is present. Thus several were seen to alight and remain for some moments with erect wings looking conscious as though waiting for approval: they then lowered them to the usual position in " ground display." In no case was another bird present on these occasions nor did another bird come. Another bird, dropping with the slow, hesitating wing beats, alighted, and held its wings vertical. It next displayed a little, then crouched as though brooding: it was alone. Another bird passed in the air, when the one on the ground at once displayed.

This demonstration is not always wasted.

" One bird alighted and held its wings erect, after which it assumed the normal ' ground display ' attitude with beak pointing down. Shortly after another dropped from the air, evidently attracted, and stood by the side of the first with depressed wings and beak held upright."

" Another had been standing for some time on a sandbank. A second bird arrived; whereupon the first held its head and beak vertical. The new-comer stood with wings upright for a few seconds, then drooped its wings, cocked its tail upright and pointed its beak to the ground."

In another case " one alighted by another, held its wings up over its back for a second and pointed its beak downwards. The other depressed its wings, elevated its tail and also pointed its beak downwards."

Still another example, where " one with depressed wings, tail cocked and beak held horizontally, waddled away, followed by its mate, which held its wings upright while it walked."

Other attitudes of the wing are but rarely seen.

" One original Tern alighted near another and held its wings stretched out wide to their fullest extent, their tips resting on the ground. After standing in this unnatural position for several seconds it partly closed its wings and walked up to the other." This was the only occasion we have seen this attitude.

" Two alighted and stood side by side with beaks raised vertically. One half erected its wings over its back while the other ' paraded ' round it."

All these wing actions seem linked with the " aerial display."

It is remarkable, notwithstanding the great play made with fish and the very considerable part it takes in various phases of courtship, that, although a careful watch had been kept from morning till night from the

beginning of the season, we could write after eight days' watch : " There have been many cases since we came of one bird carrying a fish alighting by another or one without a fish settling by the side of another holding a fish, yet they have always flown away without ' presentation.' " It was later on the same day that we were to see as *un fait accompli* a " presentation," after which it became quite common.

At the outset one is inclined to think of the fish simply and solely as food, first, for the one which catches it, and second, with which to feed his mate, and later as sustenance for their young.

But there is much more in it than that, though it is difficult to understand its *raison d'être* completely. We are convinced that it plays a great part in the courtship as a symbol of affection, a love offering which is not merely food, indeed not food at all. It has every appearance of a bribe but, in the early days of courtship at least, is a bribe which does not leave the briber. How else can one interpret the " chases " which so commonly take place where a " fish-bearer " is chased by another for a time and then the " fish-bearer " chases the other ? In one case it seems that the " chase " is an effort to get the fish from an unwilling owner ; yet the other indicates a desire of the owner to present it and finds, notwithstanding his efforts, that his gift is declined.

There seems to follow a stage when one bird is as anxious to get the titbit as the other is to retain it and ensues a struggle which often results in part remaining with each bird. At this stage the incident can hardly be called a " presentation," it is a taking, nay, often a literal " grabbing."

The true " presentation " follows in due course, when the fish is given and taken without hesitation or any unseemly wrangle or when an " amatory flight " precedes the giving of the present.

Here is a case where the " fish-bearer " decidedly disliked surrendering the fish.

" One having alighted holding a fish, another bird dropped close by, but the ' fish-bearer ' leapt into the air calling ' Garrgarr-garrgarr ' and drove it off." These birds may have been strangers, but not so the next pair.

" One had been standing for some time looking dejected. Another arrived with a fish. At once the first ' displayed,' holding its beak vertically downwards. The ' fish-bearer,' furtive-looking, crouched a little and walked away, followed by the first. Round and back they pattered : then both flew off."

Just as abortive is the next example, though more effort was made to get the prize.

" One stood on the ground with partly open beak ; she had evidently detected ' his ' presence in the air. Soon he dropped by her side, then walked about, fish dangling from beak, wings depressed, tail elevated.

She followed, still with beak partly open, uttering little guttural cries, now and then making a small rush at him as though to snatch the fish. At each rush he turned his head away and, at times, when she was too determined, leapt into the air a few inches with extended wings as though in mind to fly."

These are examples of the desire to take and the wish to retain.

Here is an instance which definitely connects the " presentation " with the " glide."

" Both birds slid to the ground after a ' glide,' the ' fish-bearer ' first. Both depressed their wings and one grabbed the fish by the tail, and followed a struggle in which both pulled, the original owner retaining the fish and flying off."

Whether the next two birds had been gliding we were not sure but thought so.

" One alighted holding what looked like a leech and stood, drooping his wings. Another dropped by his side. He walked away, she followed, mouth wide open, making small, continuous noises. He turned his head away when she made to take the leech. At last she seized it and both tugged. In the struggle she got it, but both flew without its being eaten."

" One having descended with a fish stood in the usual ' display ' attitude with beak pointing downwards. She dropped by his side, ' displaying ' in the same way, except that her beak pointed upwards. Then she snatched at the fish, and in the following struggle it parted. The male walked away with his half fish and continued to ' display,' clucking all the time as they do to their young. Afterwards he flew, still carrying his moiety."

" A bird was flying around for some time alone carrying a fish and calling ' Peeerye.' Then he chased another which afterwards chased him. He alighted and the ' chaser ' dropped near him and both ' displayed ' a very little. He stood as though ready to leap into the air at the slightest provocation. After standing thus for perhaps half a minute she sidled up to him and made a grab at the fish. He declined to release it. She pulled and shortly the fish broke in two parts. She at once swallowed her portion and flew off. He, after standing for some time holding the half fish, flew also."

In neither of these cases was the result quite satisfactory either for the birds or the observers.

It will be seen that " presentation " appears to be accompanied by distinct difficulties and often fails of accomplishment. The " fish-bearer " never seems anxious to part. Possibly he is demanding some return for his gift which she will not render, for, usually, much guttural language passes between them. Quite often, after he has flown off, he does not go



53. "RING" NEST OF MARRAM GRASS, COMMON TERN.



54. "LINED" NEST OF MARRAM GRASS, COMMON TERN.

far and soon returns, dropping by her side, once more to tempt her with the glittering prize, but which he refuses to give her!

Still, the time comes, either in the individual " presentation " or in the progress of the breeding season, when all difficulties seem smoothed away.

The first satisfactory " presentation " we saw took place on May 4th. " Both birds arrived from a ' glide,' one carrying what looked like a shrimp. Both ' displayed.' The male then went to a ' SCRAPE ' and sat in it holding the shrimp, but did not kick. She walked to him, both pointing their beaks down, then she took the shrimp. He now flew away and she swallowed her present." There was no tugging, no hesitation of either bird, nor was there in the next case, in which a shrimp also figured.

" Two having alighted; one ' displayed ' fully; the other, which carried the shrimp, much less so. He walked about followed by the lady, then flew off. Returning at once he walked to a ' scrape ' and seemed about to enter it but refrained. She also walked to the ' scrape,' sat in it and took the shrimp. After she had swallowed it both birds ' paraded,' after which they took their departure."

It will be noticed that another factor had entered—the " scrape "—and this we observed was the case with *all* complete " presentations." Occupation of the " scrape " and full " presentation " point, we take it, to an advancement in their courtship: a step nearer their goal of " consummation."

Courtship does not always run smoothly, for something not unlike jealousy is not absent from a ternery. The eternal " triangle " exists as surely among Terns as with human beings, though it seems more transitory nor is it so potent for mischief. Unfortunately the impossibility of distinguishing the sexes prevents us from knowing whether " triangles " consist of two males enamoured of the same female or two females captivated with the charms of one male. Either of these suppositions may meet the case early in the season, but examples of " triangles " such as the one described under " upward flutter " seem to be instances of the equanimity of a married couple being upset by the attentions, sometimes seemingly acceptable to, presumably, the wife, but at times equally objectionable to each member of the couple; for these " flutters " take place later in the season.

Another aspect may be that of regarding the interloper as intending to commit the less heinous but sufficiently reprehensible crime of theft, and this may well be so, as in many cases one of the birds is in possession of a fish.

What happens is that when all seems peaceful and two birds are executing the " glide " in perfect unison and amity, a third bird will

try to join in. Usually it happens that this intervention is unsuccessful, but at times one of the " gliders " will go off with the interloper.

The intruder is often persistent. One " triangle " flight lasted three and a half minutes, during which period the birds chased quickly up and down a small area, not gliding. At the end of the time one bird left and for a further minute and a half the remaining birds wrangled, their actions suggesting something in the nature of a marital dispute.

" One bird was flying with a sand eel dangling from its beak. Two others flying after it attacked each other without striking. The ' eel-bearer ' flew on, now and then soaring with ' vee ' set wings. After some time the quarrelsome pair went off, leaving the ' eel-bearer ' soaring alone."

" Two were ' gliding,' one carrying a fish, when a third butted in, calling loudly. At once the companion of the ' fish-bearer ' attacked the intruder and a ' rough and tumble ' followed. Having shaken off his assailant, the interloper hurried in chase of the ' fish-bearer,' whose original companion now returned and set on the interloper again and, quarrelling in this way, followed behind the ' fish-bearer ' for some time. In the end they drifted away, still fighting, and the other bird carrying the fish continued his flight alone."

" One chasing another carrying a fish called softly ' Queea,' neither flying rapidly. The one without a fish was attacked by a third seemingly with the object of driving it away. The speed of flight increased as the third called in an excited manner ' Karrkarrkarr Karrkarrkarr ' repeated. The attack was continually renewed and for some time the three birds manœuvred in the sky. One then went away but, coming back, the tussle was renewed. They ascended, spirally, to a great height, drifting at the same time. The original pair now separated themselves from the other and continued to rise, but the third repeatedly dashed in and the combat became closely knit, high in the sky. Each attack of one on the other produced angry guttural creaky cries of ' Karr,' changing into a ' chatter.' Out of sight and hearing they went but were soon back. After several turns over the area two of the birds alighted and ' displayed.' This affectionate demonstration was spoiled by ' Number three,' which alighted a yard away. The pair made for him with wide-open beaks and revilings. All now rose and resumed the ' flight.' Two always remained near together, but after they had drifted some distance, the interloper joined the one with the fish, the other leaving them, and these two now ' glided,' ' banking ' right and left, perfectly synchronised, finally sliding down and alighting. This triangular flight continued for a long time; it was observed for *over an hour* and almost always over the same area. The fish disappeared early in the dispute, whether dropped or swallowed could not be seen. As they continued to quarrel for a long time afterwards the fish cannot have been the ' bone(s) of contention.' "

In this case the interloper, if he was such and not the husband, returned to find his wife with an admirer, and seems to have ousted " Number two."

On several occasions one bird carrying a fish alighted by another on the ground, but in each case was driven off by a third. Was he the rightful husband or a thief wanting to steal the fish ?

The redundancy extends, at times, beyond one interloper.

We saw, one day, five Terns chasing about after the manner of Swifts. They flew round and round, weaving in and out, mainly in the lee of a high sandhill, seldom leaving a small area of a few hundred square yards. They constantly separated into three and two, but never remained in the same grouping for more than a short time. From the group, suddenly, one would turn and shoot off very swiftly ; another would turn and follow instantly. On they would fly, rapidly skimming the ground, and then the others would join in the rush. Cries would break forth—a staccato " Ti," high and sharp lengthening into " Teet " repeated, was heard, and a quick guttural " Karr_{aa} " ; while a wild recurring " Ker_{er}wi " increased in speed with the ardour of the chase. Once two of these birds descended and alighted for a while ; presumably they " displayed," but a hill of sand veiled their doings. For a long time they passed and repassed, a maze of movement, now light against the shadowed " tumps " of marram, now dark as they crossed the sunlit sand.

Mention has been made of a performance we have called the " upward flutter " which in some ways has the appearance of a quarrel, yet, in its development, has affinity with courtship. In this achievement, two Terns, which may be quite close together without appearing to collide or may be a dozen yards or more apart, will beat their wings with extreme rapidity, sustaining themselves in the air by so doing in an almost upright position, their tails being widely spread. At times one bird may sheer off, when the other will dash at it and the " flutter " be resumed. Or they will give an exhibition of " mounting," in which act, notwithstanding the seeming strenuousness and speed of their wing strokes, will lift themselves, *quite slowly*, up and up, until they attain such a height as to appear quite small.

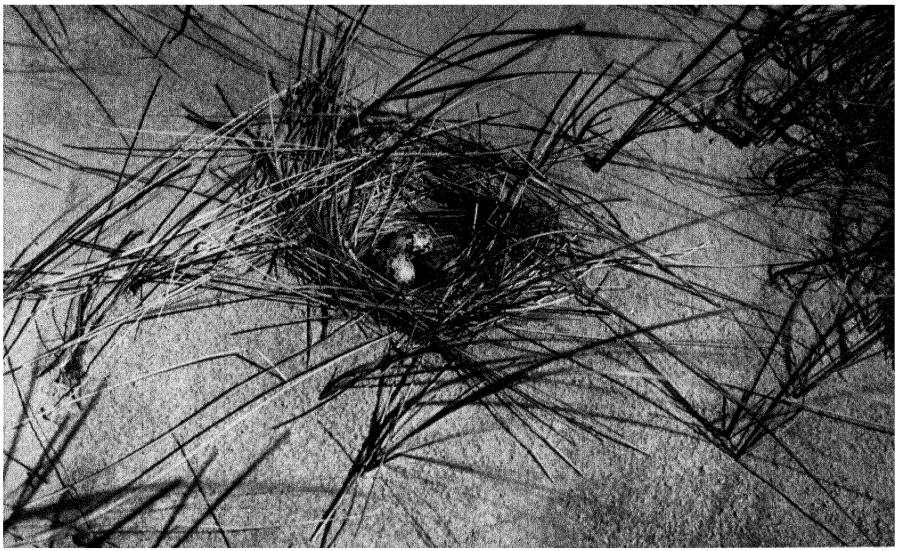
Two birds we were watching engaged in the " flutter," having reached a great altitude, began to " glide," continuing for some time, then made a long " slide " to the ground, where they " displayed " in the usual manner, jerking their heads upwards. A second time they indulged in the " flutter," and " mounting " separated by thirty or forty feet they rose in this way, slowly, so high as to be barely visible, then commenced to " glide " and were lost to sight.

This type of " aerial display," for such it seems to be, may be complicated by the intrusion of another Tern. On one occasion when we

witnessed such a " triangular contest " the " upward flutter " of a pair was interfered with by a third Tern which introduced himself into, what should have been, conjugal felicity. One of the pair drove the interloper away and seemed to admonish his wife to refrain, by the " upward flutter." The stranger, although it was made apparent, at least by one of the pair, that he was not wanted, returned time after time. His expulsion was always followed by the " flutter," and the alternation of " driving away " and " flutter " continued for seventeen minutes, when the interloper went right away. The original pair now began to " mount," but the intruder returning the alternation was resumed and went on for another three or four minutes. " Number three " now removed himself; the pair again " mounted," continuing up and up, spiralling to a great height, which having attained, they did not " glide " but beat about in leisurely fashion. Suddenly one of them took a headlong dive, dropping with great rapidity and almost vertically, the other following more slowly. Whether the *tertium quid* had been observed from that great altitude and was the cause of that thrilling descent we do not know, but certain it is that he had put in an appearance, and for a short while the alternation of " driving " and " flutter " was resumed. They all then drifted away after occupying twenty-five minutes by the whole exhibition. There was a cool blue sky across which sailed soft balloon clouds. The birds changed from glittering white to dark grey as they caught the sunlight or shadowed their white bodies with their wings; while the " flutter " was so rapid that the moving pinions produced a bewildering multitude of curved shapes as though each bird had many wings.

An extraordinary demonstration of this type took place on May 21st, a fine day with bright sun and clouds sailing in a gentle north-east wind. From the time we became aware of what was happening the affair lasted twenty minutes and took place over a small section of the ternery.

Two Common Terns beat swiftly, just above the sand, up and down, turning and twisting as though in chase. Then suddenly they shot up into the higher air and ascended spirally in the " upward flutter " till they attained a great height. Down, now, they came with a swoop, beat around as before and, as unexpectedly, climbed again with that peculiar fluttering flight. No less than *twenty-seven times* did the " chase " change to the " flutter " and the slide down. Almost noiselessly was the performance conducted; only an occasional " Tip " and sometimes, when one made a particularly determined dash at the other, a harsh " Kaa$_{arr}$." This same cry was made when they clashed for the " upward flutter," but by which bird we could not determine. As the sound indicates anger, one of the birds must have been considerably annoyed. As far as we could tell, the " chaser " never became the " chasee," though, without being certain, we were inclined to think this happened several times. As a rule there was



55. LARGE NEST OF MARRAM GRASS, COMMON TERN.



56. "BUTTRESS" NEST OF COMMON TERN.

only a yard or so between the birds, but often in the chase they would get separated by several yards and it was then that the angry " Karr " and a swift swoop brought them together again to resume their clash. Once one alighted as though it had " had enough " and crouched on the ground with beak held vertically and point up, whereupon the other swooped at it with an intimidating " Kaa$_{arr}$ " and drove it into the air again. Sometimes the " chasee " would be tempted away by a passing Tern which would promptly be driven off. On one occasion such a temporary defection resulted in both alighting close together and immediately " displaying," but the " chaser " would have none of it and diving down put an end to the flirtation.

Was all this exhibition merely play, an aerial dance? Was it " cave man stuff " following " rejected addresses "? Yet not once did the birds actually strike. Neither bird had a fish. There was no " gliding " and there seemed to be no affinity with the " amatory flight." Whatever its meaning, the impulse evaporated after twenty minutes and the performers melted into the throng of birds flying over the ternery and were lost to sight.

The object of all these demonstrations, the end to which they are directed, is " consummation." But this act is not deferred until the complete ritual of courtship has been observed; it even occurs immediately the Terns arrive on the coast, before they have taken possession of the ternery or have selected their nesting site. And this may be evidence that the Terns pair for life, as it certainly is that some, at least, must have paired before arrival.

Watching the intermittent arrival of birds on the shore near the Ainsdale ternery, a pair, among the latest to come, had alighted on the sand by the water's edge and were standing quite still, side by side. Without any preliminary display, one jumped on the other's back, balancing, occasionally holding to the female's crown until coition had taken place. Afterwards they stood together, head to wind, with beaks held pointing up, and wings trailing, " displaying " *after* the event! This accomplished, each began to preen, after which both stood without moving.

Usually, as is to be expected, " consummation " does not take place until the ternery has been occupied for some time and there has been considerable " aerial " as well as " ground " courtship. It would seem natural for this act to take place after the " glide," that apogee of emotion, and particularly following the thrilling " downward rush." And probably it does so, for the Terns often drop into their selected area. Unfortunately we cannot confirm this surmise as intervening sandhills and clumps of marram grass have always prevented us seeing this culmination.

In the example previously given no preliminaries preceded the act, nor did they on another occasion which took place later in the season.

The birds concerned had been standing together for quite a while doing nothing except preen a little. Without any warning the male leaped on to his mate's back, stood there quite erect, balancing, his wings and tail held in their normal position. He pecked now and again at the other's head while she crouched, somewhat motionless, except that several times she elevated her tail. He stood there for seventy seconds, then both stood and " paraded," " displaying " with beaks pointing downwards, after which the male called loudly with wide-open beak and head on one side.

Here again there were no preliminaries and " display " *followed* the act.

One would naturally suppose that " display " would be precedent and the incitement to the event. And so it often is, at least " ground display," which is the only kind we have seen.

One Tern had been standing on the top of a little hill for some time. A male alighted without a fish and did the normal " ground display." She opened her beak wide and called rapidly for some time " Kerr Kerr," guttural and subdued. He also opened his beak, not so widely, but we could not tell what sound, if any, he made. He then raised his crest and leaped lightly on to her back, where he stayed for two hundred and thirty-five seconds. She then pushed him off and shook herself, whereupon both flew away.

So the whole course of actions precedent to egg-laying is rounded off. The descriptions given are, in the main, drawn from observations of the Common Tern. They are applicable with a few slight differences, which will now be emphasised, to the other three Sea Terns.

The courtship of the Arctic Tern follows faithfully the ritual as previously described. Two differences we have noticed, both of which have been mentioned. They are small and not very important but, if they are peculiar to the Arctic Tern as we believe, they will add means of identification when both Common and Arctic Terns are breeding in company in the same ternery.

The first of these differences is the common habit of one of a pair holding its head very much on one side and always to the right.

" One, standing alone, suddenly drooped her wings and elevated her tail. Another alighted. She (?) waddled towards him, put her breast down, head and neck stretched forward on the sand and tail held upright. She kicked sand. He made the ' circular parade,' displaying the while, then stood watching her operations. They then made an ' amatory flight,' ' glided ' and descended to the same spot. One went at once to the ' scrape ' and repeated the earlier actions. The other having pointed its beak down, held its head on one side, walked about the other with elevated tail and trailing wings, one or both ' gurring ' all the time."

The other difference is a trick of throwing the chin up in the same manner as a disturbed Shelduck; a sort of reverse bowing done by one or both birds singly or in unison.

" Two alighted, neither carrying a fish. They both bent their heads down and held the beak as though preening the breast feathers; the beak was then thrown up with a jerk, all these actions being done simultaneously by both birds."

Another similar performance was seen.

" One having alighted by another, at once bent his head down and elevated it a number of times. The other did this action twice. Both had their wings drooping."

As far as we have seen the Roseate Tern conducts its amatory affairs much in the same way. We have not as yet been able to be present in a Roseate ternery before the eggs were laid.

In all essentials the Sandwich Tern resembles the Common Tern in its mode of courtship. But there are several differences, the chief being that the " amatory flight " and the " glide " are much more spectacular. Aerial courting is often carried out at such a height that the birds are mere specks, almost invisible. Even at this height the calling, which is more usual with this species than with the others, is so loud that the far-distant cries can clearly be heard. The " flight " begins by a fairly long chase with beating wings, the birds being some distance apart. One may, or may not, carry a fish or eel. Usually the flight is very vociferous: something like " Keererer " is called by one bird often so quickly in the excitement of the chase as to become two syllables only. The other bird calls " Ker " or " Kar " at intervals. The flight sometimes changes to a circle, high in the sky.

" Two were ' CIRCLING ' thus not far apart; they then reversed and sailed round the other way for a time, changed into the ' glide,' then at great speed in a long slant, both shouting all the time and banking so much as they fell as almost to turn over."

" Another pair, high up, each ' circled ' the opposite way to the other, their circles intersecting. Often they were far apart, at other times they almost met. They then joined and ' glided.' "

Normally the " amatory flight " after the birds get high enough changes to the " glide." Their line of progress becomes, not a simultaneous zigzag as with the Common Terns, but each bird flies in an independent zigzag, crossing and recrossing the flight line of the other. Sometimes the " gliding " brings them down to the ternery, where " ground display " takes place and the fish is " presented." At others they commence flapping again, mount high in chase, as before, and repeat the " gliding." The " glide," if a long one, may be interrupted by a few lazy wing-flaps quite different in character from the ordinary flight action. The " amatory

flights " commence in the darkness of early morning when they cannot be seen. We have heard them calling high up at 4 a.m. They continue through the day until darkness falls. On one occasion when it was almost dark at 10 p.m., and most of the birds had quieted down for the night, two pairs and a " triangle " were still engaged in " gliding " and " flighting " over the ternery.

The " ground display," which consists of " posturing," " nest-making " and the " parade," differs in that the birds face each other during " posturing " and they, like Arctic Terns, throw their beaks upwards. The wings are held farther from their sides, suggesting crinolines or panniers, and they do not touch the ground. In moments of extreme excitement they are held far from the body. On such an occasion the crest is erected, giving the birds an air of extreme surprise. The tail, usually, is not elevated and the beak points neither up nor down.

" Two were on the ground, facing. Alternately and together they threw up their beaks, which were wide open, calling. One waved its head from side to side. Then for some time they ' circled ' round each other, ' parading ' first clock-wise, then reversing, against the clock."

" Two, ' facing,' threw their beaks up from the horizontal to about forty-five degrees in unison many times, opening their beaks and calling at the same moment."

" Two stood about one foot apart, with crests erect and beaks open, ' facing.' They bowed to each other, calling ' Kra rara craaa cra r r r ' very quickly, almost like a low hurried quacking. They approached, still bowing, till their open beaks met. They seemed to fence with them and touched, they then parted."

Partly because of its size and partly owing to its smaller numbers and more scattered distribution in the ternery, it has not been possible to watch the Little Tern so completely nor describe its courting actions so fully.

The noticeable things about the "flight" of the Little Tern are the curve back of the wing; the curious, deliberate, hesitating wing strokes; that they often sail with " vee " set wings; and that the " glide," while similar to that of the Common Tern, is much shorter.

" A pair had finished gliding when one slid down steeply and the other dropped a considerable distance with ' vee ' wings." But the " glide " is very seldom seen, usually they fly about two yards apart, beating quickly and deeply or with the deliberate flight.

They often alight, usually about a yard apart, this probably after an " amatory flight," then one, or both, will " nest-make," tail up and body wriggling from side to side, but never rotating.

A remarkable difference in the " presentation " is that there seems to be none of the difficulty experienced by the Common Terns. The " presentation " is always satisfactory to both parties and is over in very quick time.



57. COMMON TERN'S NEST OF WILLOW LEAVES.



58. COMMON TERN'S NEST MADE OF DEAD WILLOW TWIGS.

All the " presentations " seen have been almost identical. The " fish-bearer " alights near or a yard or two from his lady ; they walk and meet or she stands waiting for him to come ; she takes the fish and swallows it and he flies off.

" One bearing a small fish came calling ' Wheeit ' and settled two yards from his mate. He then flew to her and at once gave the fish, and while she swallowed the gift, held his beak in the air. No other display was given by either."

The transference of the fish is done in a moment, the alighting, " presentation," swallowing and flying off taking something like thirty seconds only.

" Two alighted about a yard apart. The one carrying a fish walked to the other with a curiously furtive air, almost crouching with his head held down. He presented the fish, which the other took and gulped down. As soon as he had given it he held his beak pointing vertically upward."

These courting ceremonies may not only be witnessed but many of them leave behind records in the sand which may be studied during the period, usually short though sometimes longer, between their making and their obliteration by the wind. These sand records exhibit peculiarities which merit special attention and will be found discussed in the next chapter, " OF TRACKS."

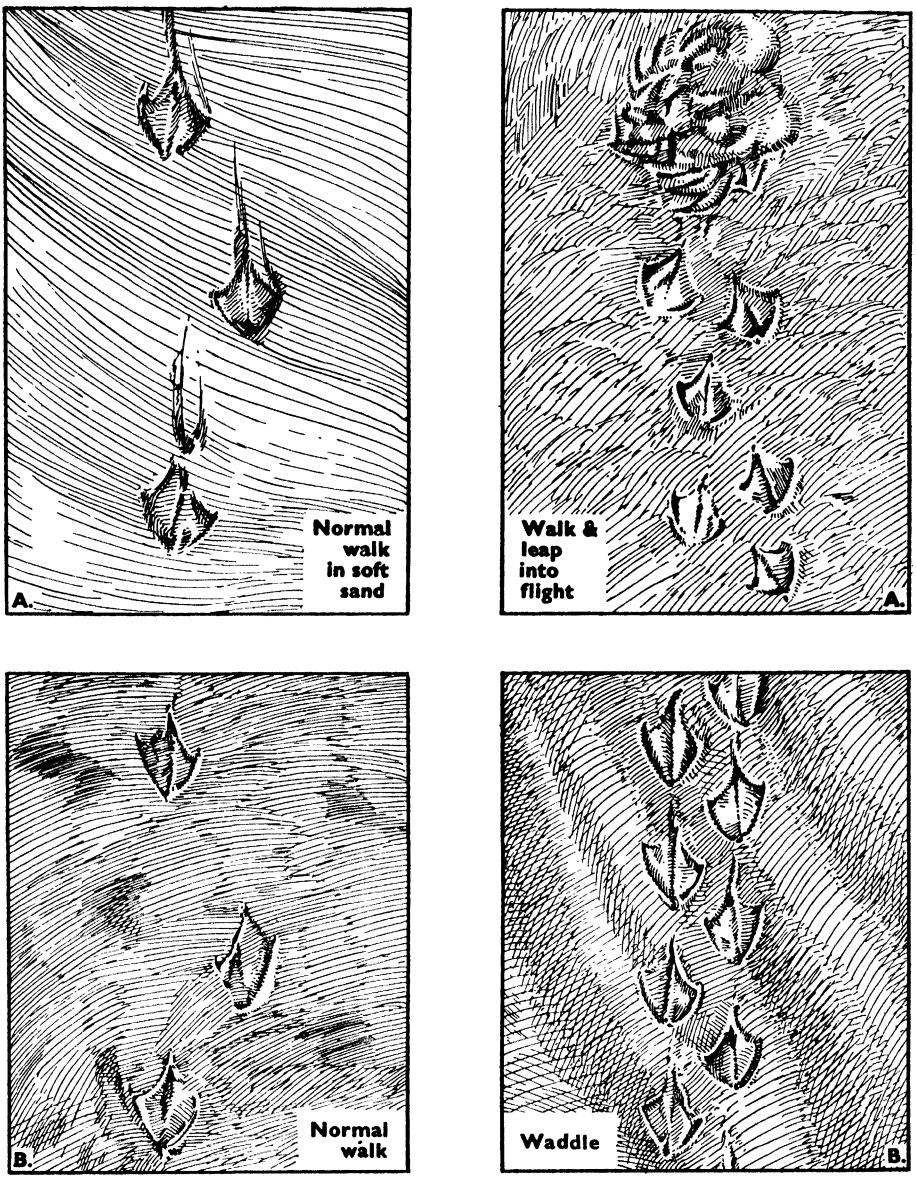
OF TRACKS

FEATURES of great interest, present in all terneries where there are sandy areas, are the " TRACKS " made by the Terns, tracks which record, in a greater or lesser degree, some of the habits of the birds. Their little feet leave us messages in the sand and there, triangular and clear, as in a book written in cuneiform characters, we may read the accounts of their doings.

The best " tracks " are those made in quite dry sand which a gentle wind has spread smoothly and having prepared it for the impressions has died down before the footprints are made. Even the faintest wind soon blurs and then obliterates the " tracks " ; hence, to study them, the right opportunity must be seized. When made in damp sand they are not clear ; the Terns are not heavy enough effectively to mark sand in this condition. If the sand is wet and therefore softer, though the " tracks " are deep and well defined when first made, they tend quickly to lose their sharpness owing to the sand particles silting into the prints through excess of moisture.

Provided the impressions are well defined their size helps one to judge which species of Tern has made them. Sandwich Tern " tracks " are the largest—they measure 36 mm. in length and 28 mm. across—and are thus readily recognised ; and so are those of the Little Tern, which, being about 20 mm. by 18 mm., are the smallest. " Tracks " made by the three other species, Common, Arctic and Roseate Terns, are almost alike in shape and size, those of the Common Tern being a little the largest, 26 mm. by 24 mm. They can only be assigned to the species with certainty if they have been made by a bird under observation or are found in the vicinity of a nest the ownership of which is known.

The earliest " tracks " likely to be found are those made on the shore by birds arriving about the end of April. If any such are seen at that time we may be certain that the stream of incoming birds has begun to flow. These early prints are either in small groups made by tired birds or are the impressions of the feet of a large flock resting on the beach. In the latter case the prints made are so numerous as to obliterate each other, showing that the birds stood, closely, shoulder to shoulder, while sleeping. If the tide was flowing while they were resting the footprints show that the birds had been driven up the shore by the rising water.



A. Footprints of Common Tern. B. Footprints of Sandwich Tern.
Scale: Half actual size (approx.).

The latest " tracks " to be seen are those found towards the end of August and in September, made by birds which, having finished breeding, are on their southward migration. These prints will not be so numerous, for they are formed by small, perhaps family, parties or by groups of birds originating from the same breeding locality. Many times have we been able to deduce, from " tracks " found on the Ainsdale and Hoylake shores, the passage of this species or that, from examination of footprints left by passing Terns, though not a bird has been seen.

The usual " track " is, of course, that made by the bird during its " NORMAL WALK " (pp. 109, 111). By following such a " track " backwards to its beginning we possibly find two deep impressions, one a little in advance of the other, perhaps preceded by sliding marks. These show where the Tern " pitched " on to the sand before commencing to walk (p. 113). We notice the walking track is more lightly impressed than the " PITCH," and then we probably find a confusion of impressions which were produced when the bird stood to preen and rest. Still continuing along the " track " we come again to more decided marks showing where it jumped into flight (pp. 109, 113).

Apart from the normal walk there are several varieties each of which indicates a departure from the ordinary straightforward progression.

One of these is a strange, " HALTING STRIDE " showing two foot impressions close together, then a wider gap, then two close and so on: thus differing from the normal walk in which the strides are the same length. What conditions produce this abnormality we are not sure, but are inclined to think the bird is walking in a strong side wind, for we have only found them in wet sand which the wind does not affect (p. 111).

Another variety of walk is the " WADDLE," where the steps are at regular distances but close together; the stride in this case is only about 25 mm. compared with the usual one of something like 140 mm. Here, it would seem, the bird is being hustled along, unwillingly, by a strong wind from behind or perhaps retarded a little owing to a head wind (p. 109).

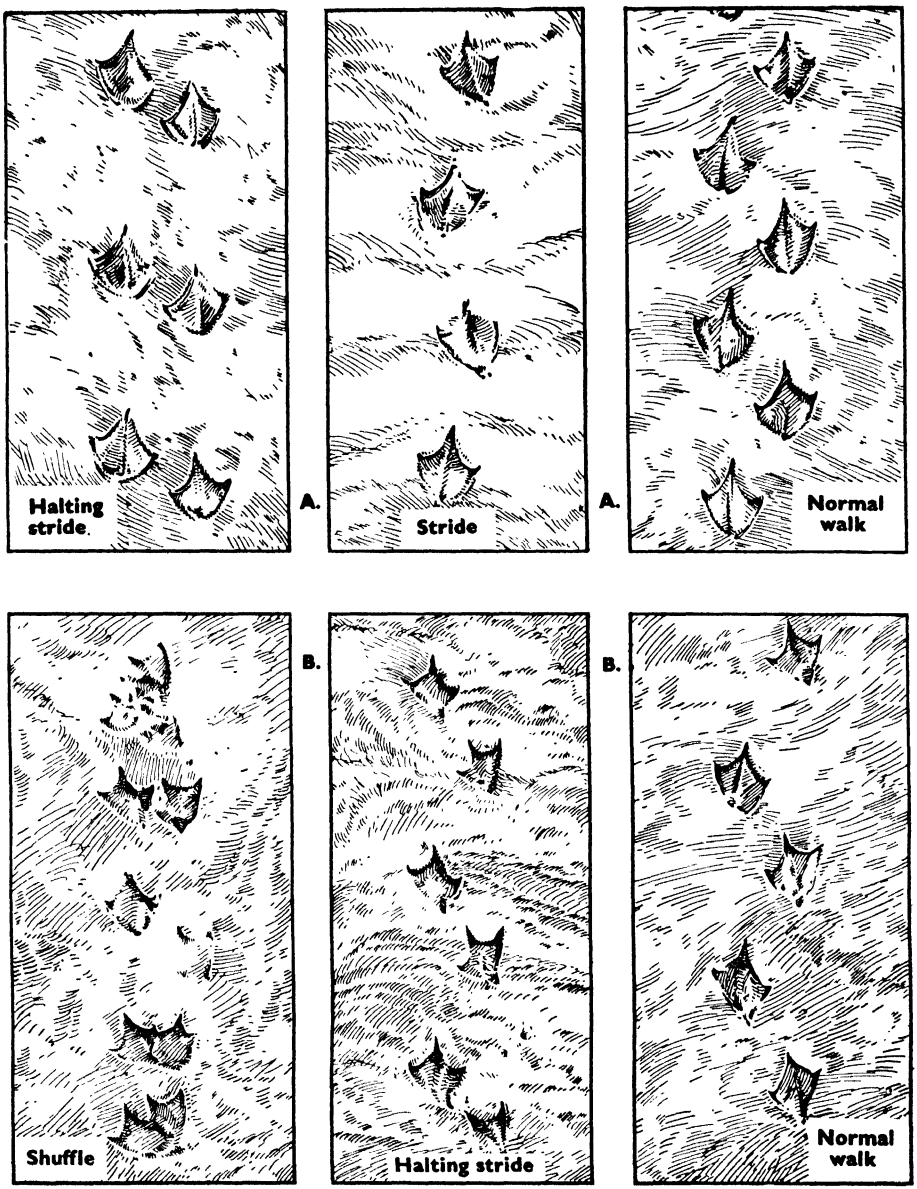
In a previous chapter something has been said about the slow, tentative occupation of the ternery at the beginning of the breeding season. It is from the daily examination of the sand of the ternery that the progress of the occupation can be estimated. If we examine the footprints made when the ternery is becoming occupied, we find they give evidence of a growing sexual excitement, for, in addition to the normal walking " tracks," there are impressions showing unusual details. The earliest indication of the urge of sex is seen, perhaps, in the " SHUFFLE," which shows the bird has taken very short steps indeed. These may be made by a bird which is waiting alone or one which has its potential mate standing by, in which case there are two sets of " shuffles." In either case the " shuffle " is interrupted now and then while the bird stands uneasily moving. Perhaps



59. EGGS WITHOUT NEST ON ROCK ISLET, COMMON TERN.



60. LARGE NEST OF MARRAM CARRIED TO ROCK ISLET BY COMMON TERN.



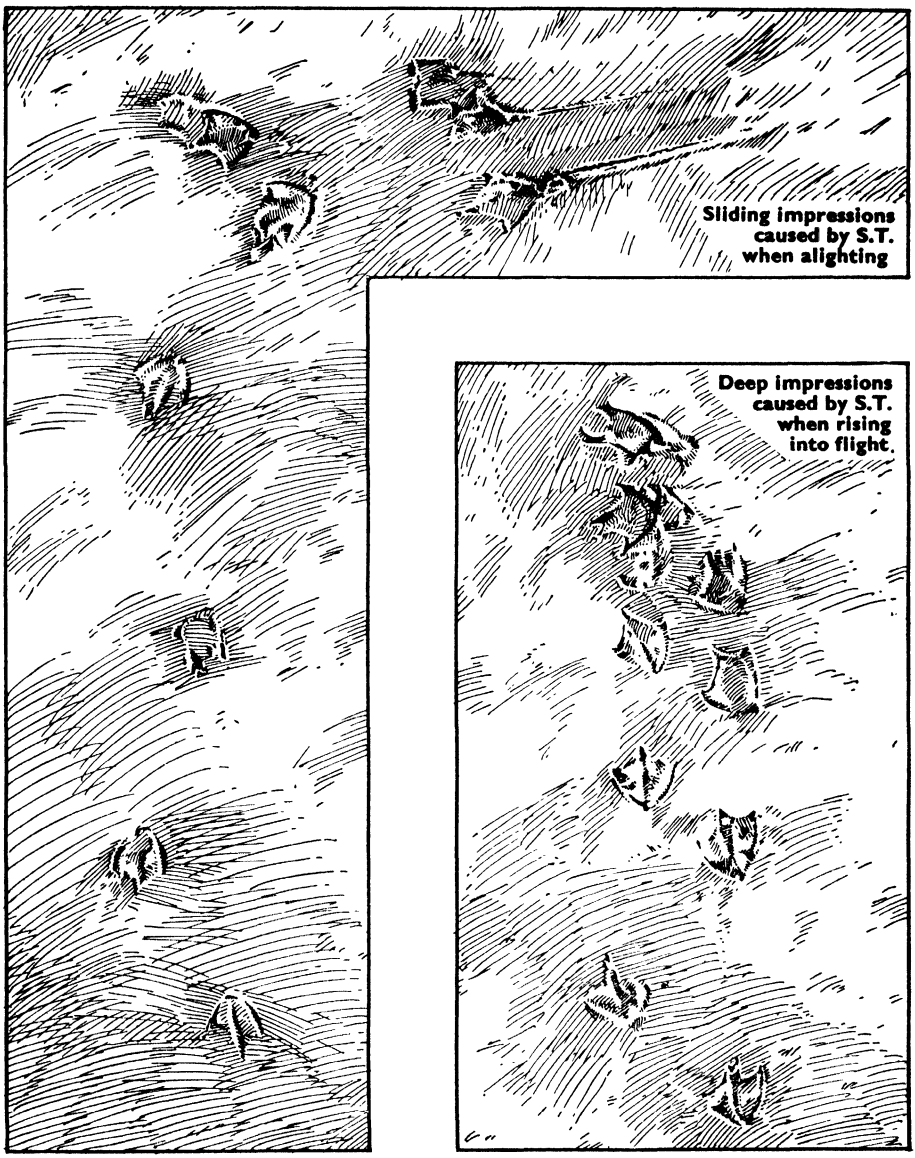
A. Footprints of Arctic Tern. B. Footprints of Little Tern.
Scale: Half actual size (approx.).

it is looking up to the sky waiting for a wooer to come or, possibly, hoping for some demonstration from the hoped-for partner standing by (p. 111).

In a few days matters proceed apace and we find evidence that the female stands shifting her weight from one foot to the other while her admirer walks past. In the illustration (p. 115) it seems as though she had stood as he stepped out bravely and passed her, and with lingering steps—the marks are closer together—moved on a little farther, then stood and looked back at the lady, eyeing her in appraisement of her worth. We must not be too ready to attribute human actions to the Terns, though something of this sort must take place or there would be no continuation of species.

As will be expected, the wooer is not always satisfied with walking past. Sooner or later amatory advances are made. We have found " tracks " which show where one bird—we will charitably suppose it was the male—in order to attract attention, dropped direct on the sand facing the female who was walking. His breast made a rough hollow and his wings marked the sand. He then appears to have leaped, assisted by his wings, 48 inches, landing first on his left foot, then putting down his right, after which he made six muddled steps, then jumped about 6 inches. Here he made three impressions similar to the first but superposed. He next jumped 24 inches, making marks with breast, wings and tail. Then 12 inches and made similar impressions. The leaps appear to have diverted from its direct course the walking bird, which passed on with unconcern. She may have been unmoved by his exertions or have been betraying that seeming indifference which is so strange and marked a feature in the bird world. This frenzy of excitement was an endeavour to arouse an answering passion in another bird which walked, judging from the tracks, with considerable frigidity past the amorous swain.

We have already described, in a preceding chapter, a general form of demonstration which we have called the " parade " in which the female stands—shall we say coyly ?—while her would-be spouse walks round her. Some of the " tracks " left by this demonstration of affection are singular in their geometrical accuracy, as will be seen from the various illustrations where the circles described by the feet and trailing wing or wings of the parading bird are almost complete and well-nigh compass-perfect. In the illustration (Pl. 38) the female had alighted first and there she stood. The male alighted also—we know this by the deep feet impressions without any precedent ones. He then walked around the lady at a distance of about 12 inches against the clock, during which he either leaned a little outwards or trailed one wing only, as seen by the single wing mark, until he decided to fly. Was she indifferent to him while he did this ? Not entirely, for the prints tell us that while he encircled her she turned, facing him as he passed.



Tracks made by Sandwich Terns.
Scale: Half actual size (approx.).

Another example (p. 115) shows the female alighted, where she stood uneasily. The male approached in the air, flew low, his hanging toes touching the sand, making parallel marks. When he alighted his spread tail made a fan-shaped impression in the sand. The encircling " parade " was then made, this time with the clock. When this was complete the female seems to have walked off. Whereupon the male made a loop and followed her. As the direction of their footsteps converges we may consider that matters were in the way of being satisfactorily settled.

The same happy result may be predicted from the impressions shown on Pl. 39. Here the going-away tracks join but, before doing so, the amorous male had to make two circuits of the female. Both were made " widdershins," and there are no wing marks. She had arrived first; we know this because her arriving footprints are more blurred than the others. The stride will be seen to vary in length. This seems to have some significance, for, as the male approached, he took shorter steps, but when they walked off together the strides of both birds lengthened, having increased to more than twice the previous length. Do we detect in this a certain jubilation possessing both birds?

The illustration on page 118 shows three small, almost complete circles made by an Arctic Tern. They are difficult to understand as they are complicated by the footprints of Common Gulls. They are almost exactly the same size, two being 11 inches in diameter and the other 10 inches. Each one shows, on the left, parallel lines made by the points of two flight feathers, but one only on the right. Both these features suggest the circles were made by the same bird, as also does the fact that all were made by promenading against the clock. Where the female stood is not clear.

We now come to a most interesting example of a double circle (p. 117). The female appears to have stood where she dropped, then walked. The male alighted, almost flopped, marks made by his tail feathers being left in the sand. Here he stood for a while, then commenced to circle round the female, striding out and dragging both wings. He had completed his circle when he found the lady had moved 18 inches. Whereupon he continued his " parade " and made another and larger circle, trailing his wings lightly the whole time. After completing the second circle he flew. The female formed the centre of each circle, both of which were made " widdershins."

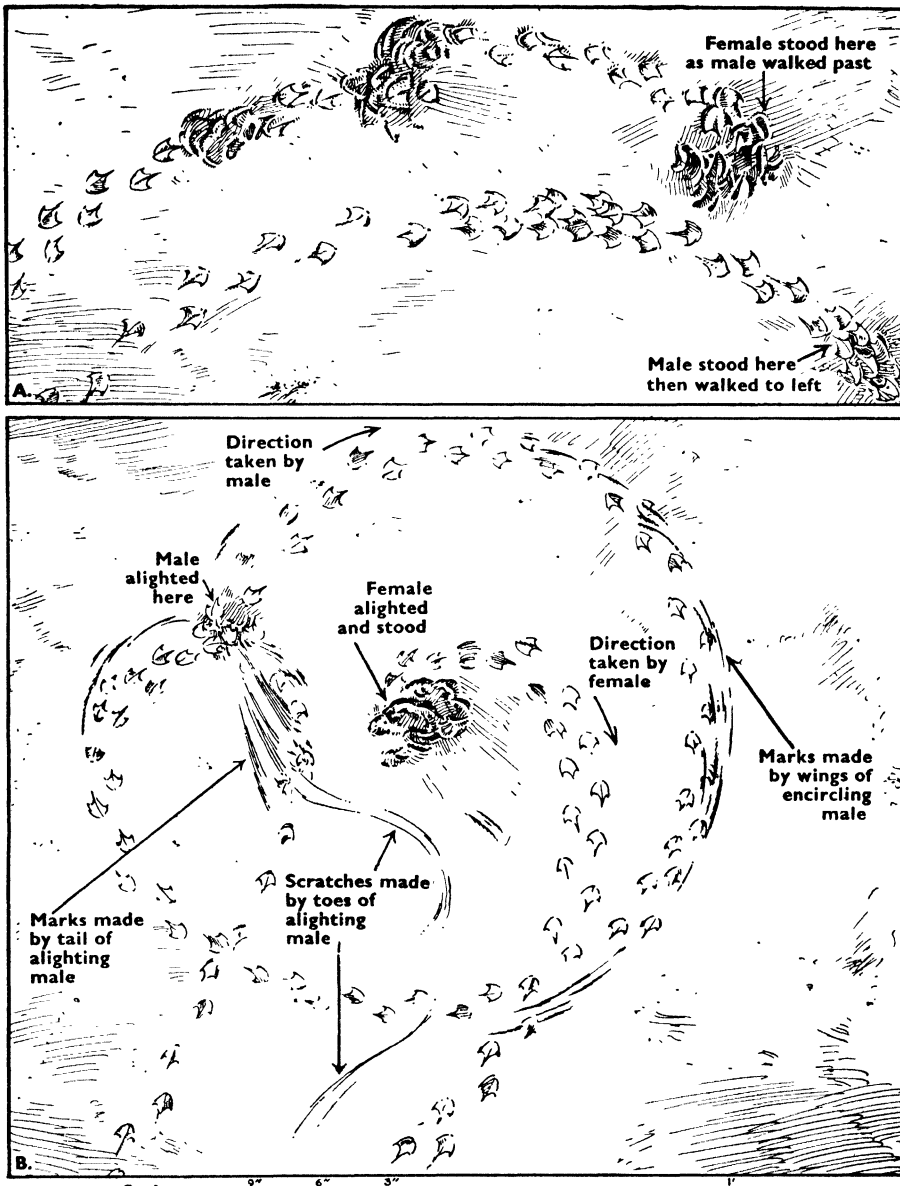
The last example of " parade " (p. 118) shows what we conceive to be impressions made preceding " consummation " (or " presentation "). The beginnings of the " tracks " appear where the male alighted and his breast touched the sand, wiping out footprints. They show the female curving round to the right with the male on her left and a little behind. His wings make curved lines as they are lowered and touch the sand. We know he was behind because his right wing has made a mark



61. NEST MADE OF ROCK FRAGMENTS BY COMMON TERN.



62. NEST MADE OF SMALL PEBBLES BY COMMON TERN.



A. Appraisement of female Common Tern by the male.
B. Circle and loop made by displaying male Common Tern.

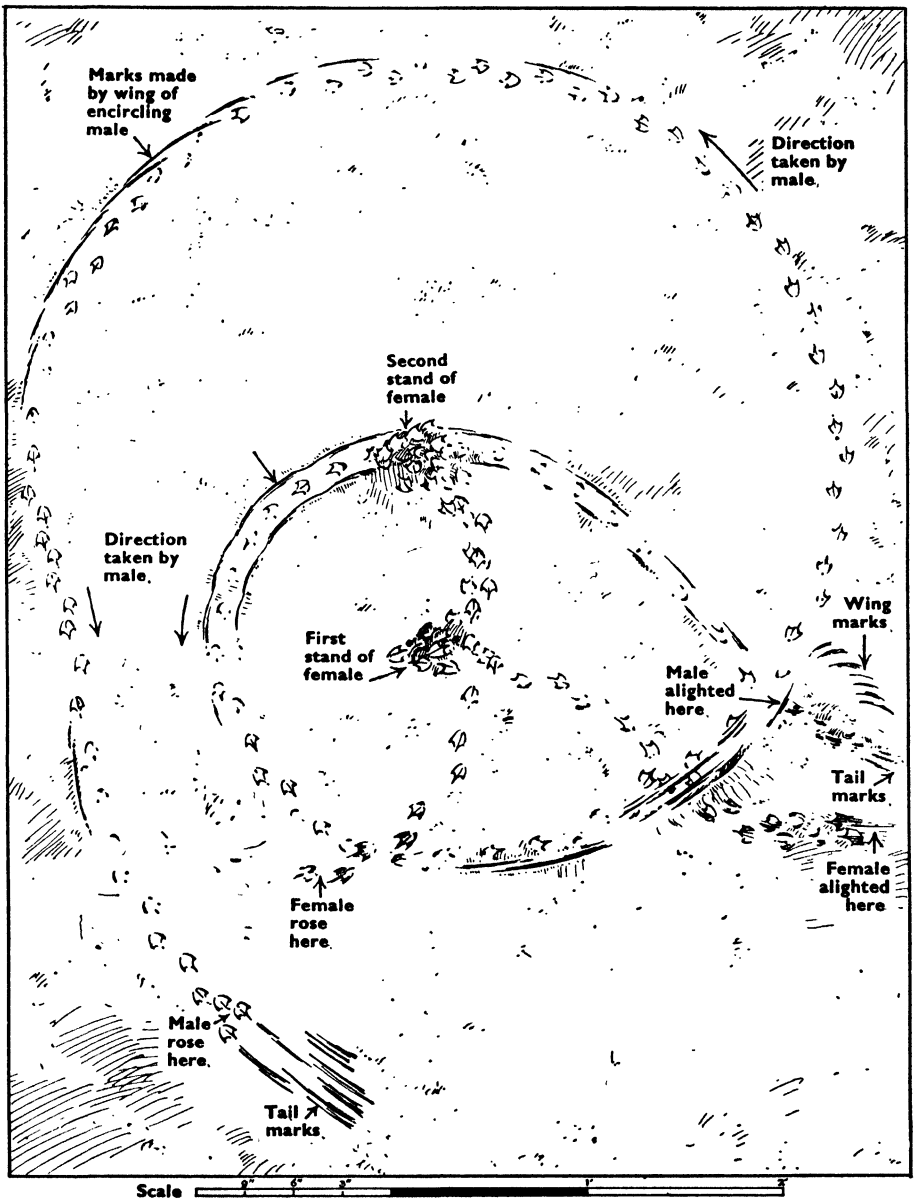
across one of the lady's footprints. As she turned to the right so did he, walking parallel to her " track." She next stood. He approached her, depressing his wings till the wrists made deep marks. The consummation (or presentation) then took place, after which both flew.

All this sexual excitement, the " display " in its various forms, results in making " FALSE NESTS." At first this is caused by an uncontrollable impulse and affects both birds. It grows by degrees and one may see, early in the season in the " tracks " made in the ternery, all stages of the manifestation of this urge from slight scratches to deep nests excavated in a frenzy of excitement, during which the sand is thrown in all directions (Pl. 50).

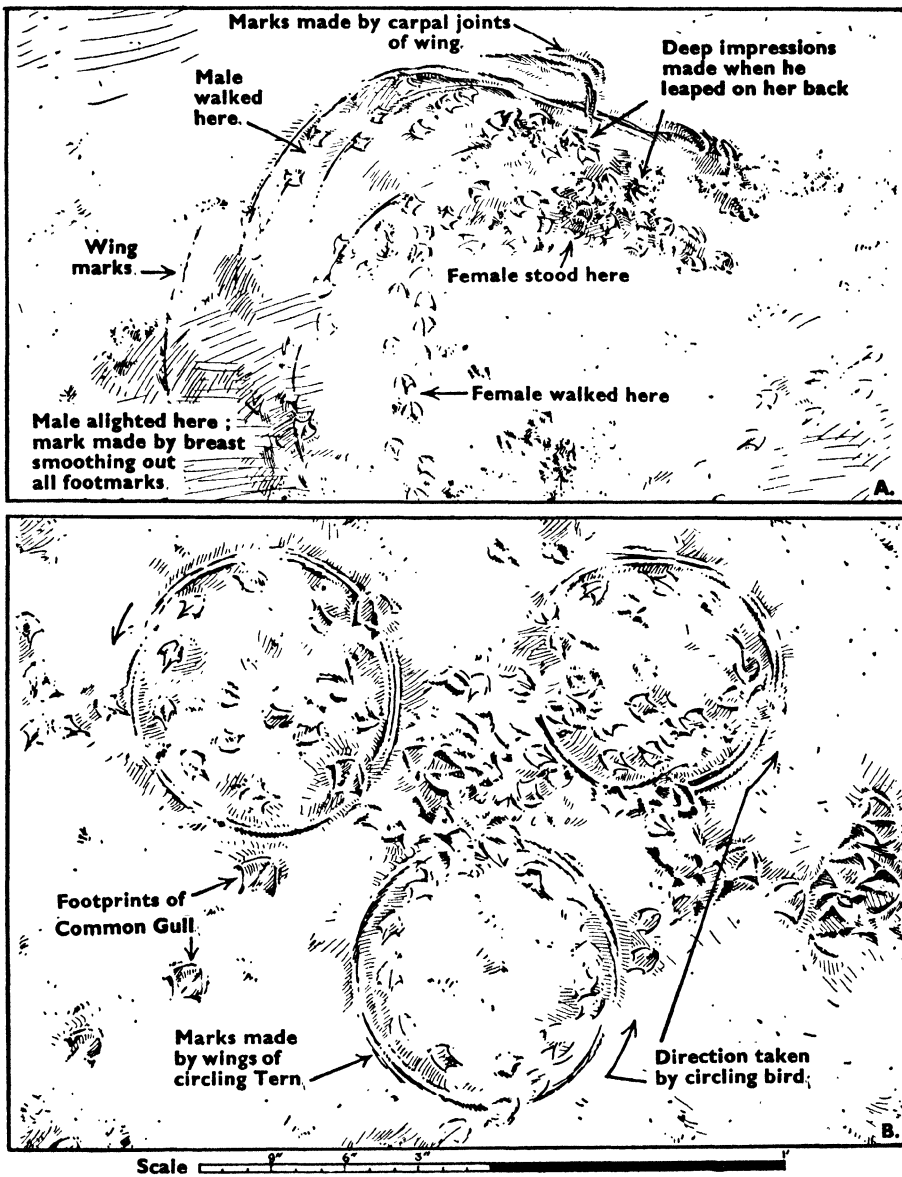
As has been noted, the making of " false " nests by the male bird seems to precede nest-making by the female, and it is curious that *any* depression in the sand, made by the male or even by any other agency, seems to excite the nest-making instinct. We noticed, for instance, half-a-dozen of these " IMPULSE " nests made in heel impressions left in the sand by the boots of someone who had walked across the ternery. And early on May 5th at Blakeney Point we found in a succession of twenty-six footprints made by the " watcher " the night before, that *no less than seventeen* of them had been converted into incipient nests of this kind. The making of these " impulse " nests, usually called cock's nests, is not for the purpose of containing eggs but to excite the breeding instinct of the female and is common to many and perhaps all birds. Some of these nests seem to form a centre of attraction either for their makers or for other Terns, for they often have numerous tracks radiating from them like spokes of a wheel (Pl. 37). These footprints show that many visits have been paid by the birds to the nests. Not one of the nests of this type we have kept under observation has ever been used to contain eggs.

Still there does come a time when the eggs must be laid, and then it is not unusual to find a number of " TRIAL SCRAPES " made in close proximity, one of them being selected for the true nest. Such a group we found in an Arctic ternery (Pl. 41). The " scrapes " were exceptionally deep. Four were placed square-wise close together, with another near by, while a small distance away were two others. They were, in appearance, the work of one bird labouring under intense excitement. A few days later an Arctic Tern was found sitting on one of them which contained a thrush-blue egg entirely innocent of markings. None of the other " scrapes " were ever occupied.

While speaking of the " scraping " of several nests before the laying of the first egg, it may not be inappropriate to mention, though these were not " scrapes " but nests well made of material, a series of five or six " trial " nests close together. Like the Arctic Tern " scrapes " mentioned above, none of these were used, except one in which the eggs were laid. They were the work of a Common Tern (Pl. 40).



Double circle made by displaying male Common Tern.



A. Record of Consummation (?) of Common Tern.

B. Three display circles made by an Arctic Tern.



63. Arctic Tern's nest of mussel shells.



64. Common Tern's nest of cockle shells.

During the period of incubation the ternery is patterned with " tracks " and round each nest the " tracks " tend to group, though little hills favoured by the male birds as watching posts or places of meeting with other males are also covered with footprints. The wind wipes them clean away from time to time, then spreads the sand smoothly again to receive further impressions. These are renewed constantly and as often obliterated until the little ones are hatched, when a different series is formed. These, made by the parents, concentrate round the young ones, whose " tracks " are easily recognisable, as the prints are small, and the steps, slow and toilsome in the sand, are short and close together. We can see from these that the little bird stands about a good deal, and near these standing marks will often be the impression of a " pitch " formed by larger feet: this is caused by the parent dropping by its child when bringing welcome food.

If, during the night, the wind has obliterated all " tracks " it is easy to find where the young ones are concealed in the marram grass or willow by following newly-formed lines of little footprints which lead to their hiding-places.

As the season advances, more and more young birds wander over the sandhills, which now become covered with small and large " tracks " formed by the children and their parents; there are now so many they erase each other's " tracks " and thus their doings cannot be read.

One may at this time of the season, in a ternery where Sandwich Terns are breeding, find at the roots of marram grass small deepish oval depressions. A search will reveal some of these to be occupied by young Sandwich Terns. Whether for coolness or concealment, the young of this species excavate these holes which just contain their bodies, and in them they squat half hidden (Pl. 48).

Presently on spits of sand jutting into the water, and on the edge of the tide, will be seen a multitude of confused impressions. The young, almost fully fledged, are leaving the ternery: they are assembling in hundreds with their parents on the shore, preparing for their migration. By the beginning of August most of the Terns will have left their breeding grounds, and when the evacuation is complete the wind will obliterate all their " tracks " and nests in the ternery, and the last we shall see of their little footprints will be on the sandbanks or seashore where parties alight for a brief rest while making their way along the coast towards the country where they will spend the Winter.

OF NESTS, EGGS, AND YOUNG

THE great business of life has now begun in real earnest. The long Spring journey has brought the Terns back to their chosen nesting grounds. The preliminaries have been accomplished and they now settle down to bring up their young. That the race may continue to exist a certain number of chicks must be reared each year. The disasters which overtake the adult birds, the wastage through illness and old age, must be counteracted. It is not known, and probably never will be, what really is the " expectation of life " of a Tern. " Ringing " is throwing a little light on this problem and will, as records accumulate, throw more. From it we have learned that the oldest Sandwich Tern whose age is known lived 6 years and 4 months[1] and that a Common Tern lived for as long as 9 years and 8 months.[2] In this connection there is a remarkable report of a pair of Common Terns which for 17 successive years at Wells in Norfolk laid strikingly red eggs (see p. 123). One of these birds, if not both, must have been at least 18 years old, and this may indicate that Terns live a considerable time. From the facts already accumulated we know that $2\frac{9}{12}$ years is the average life of a Sandwich Tern and $4\frac{8}{12}$ years that of a Common Tern. Of other species of Tern there are, as yet, no records. Now, seeing that most of the birds whose rings have yielded this information have been shot, something may safely be added to their age and we can, perhaps, assume an average life of 5 years for a Tern. This would be a conservative estimate.

The end of the first year of a Tern's life will, normally, see it productive. From the data in our possession it would seem that the average number of eggs laid by each pair of breeding birds is :—Sandwich Tern 1·6, Common Tern 2·49, Arctic Tern 1·81, Roseate Tern 1·51 and Little Tern 2·2. If these figures are multiplied by five, the assumed years of " expectation of life," it follows that each female Sandwich Tern lays 8·0 eggs during its lifetime; Common Terns 12·45, Arctic Terns 9·05, Roseate Terns 7·55 and Little Terns 11·0. And as, in order to secure the maintenance of the race, two only of the chicks from these eggs need reach maturity, something like 72·41 of all the eggs or young may perish, and still the species will continue with normal numbers. This is worth remembering in view of the great mortality occurring, at intervals, among young

[1] *British Birds*, XXVI. 351. [2] *Ibid.*, XXV. 77.

Terns, of which more will be said later. It will have been noticed that with the Sandwich Terns, and particularly the Roseate, the " margin of safety " is decidedly smaller than with the other species, hence the fact that in the British colonies of these Terns the numbers are much fewer than in colonies of the others, and are too near the extinction line for comfort. Still, there is at present no need for serious anxiety if only " protection " can be carried out on sane lines.

This obvious stage—the egg-laying—in the unconscious desire for race continuation needs a nest, and the simplest type, which is common to all Sea Terns, takes very little time—a matter of a minute or so—to prepare. It is merely a hollow in the sand made by rotating and kicking. More elaborate kinds of nests will be described later. Several of these sand hollows will be made during the courting excitement, some by the cock bird as well as by his mate. Then, like a barndoor fowl, the female Tern becomes " broody," sits around moodily in the vicinity of the nest, or occupies the " scrape," crouching low, as though already brooding eggs, though the nest is still empty. Soon, however, the desired event takes place, the first egg appears, and at intervals of every other day (though sometimes the eggs are laid on consecutive days) one or two others will be laid. The date on which the first egg may be expected is May 16th : the dates when the event has happened over a period of years varied between May 8th and May 19th. If disaster overtakes the initial laying, a second clutch may be produced consisting of two eggs, or one only, the egg-laying capacity having become somewhat exhausted. Whether Terns, having successfully reared one brood, ever adventure on a second is not known with certainty, but is thought improbable. The eggs are somewhat pyriform in shape, though not so much so as those of a Redshank. They are full of variety both in colour and markings. These decorations are entirely involuntary on the part of the bird. The supposition that a Tern can and does control the appearance of its eggs in order, by simulation of their surroundings, to escape the attention of their enemies, can neither be proved nor is such a theory, fascinating as it is, borne out by observation.

It may not be inappropriate, here, to give some account of the method by which colour and marking of eggs are produced.

The egg-shell is carbonate of lime acquired by the bird through its food or possibly picked up with an instinctive view to its ultimate use. We have seen a Tern swallow fragments of egg-shell thrown off by one of its own hatching chicks, an interesting example of the utilisation of waste products. This lime, having been dissolved in the stomach, is converted into a sort of thin paste which, in the right place in the oviduct, and at the right time, encloses the egg and forms the egg-shell. This shell substance is very pale blue in colour and seems to envelope the egg in successive layers until the shell is sufficiently thick. It may be noted that

it is the absence of this inherent blue which permits the production of the reddish type of egg known as " erythristic." The last layer applied appears to be more or less pigmented, and it is this which forms the ground colour of the egg-shell, that is to say, the ground colour is not spread over the egg-shell after it has been formed but is incorporated in the last layer. This ground colour ranges from near white through pale grey blue, greenish-grey, greens of various types, buff and stone colour to brown.

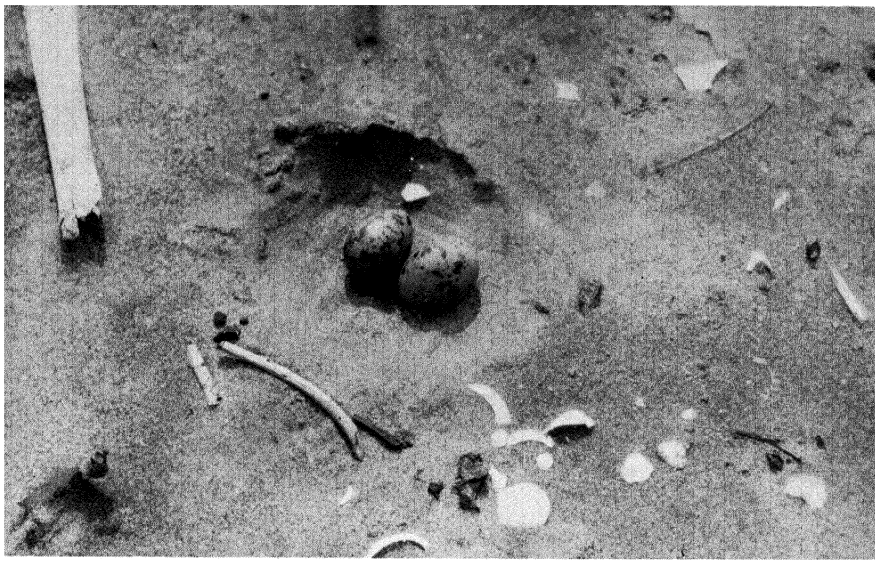
After this colour layer has been formed the external markings are applied. The egg, which during these processes is in the oviduct, comes in contact with the ends of channels through which flow waste products derived from the blood and bile. The lime of the shell, being of an absorbent nature, imbibes this product, which is indelible, and the decoration is made. The application of decoration appears, in almost every case, to be a double and often a triple process. The first markings distinctly underlying the surface of the shell, and known as " under-marks," are applied in an early stage of the construction and then layers of the shell substance are spread over them, the result being that, seen through one or two layers, the dark pigment looks light or dark grey, just as a blot of ink would if overspread with a thin layer of Chinese white.

Usually, at this stage, the egg remains stationary, or almost so, in the oviduct, thus allowing the ends of the colour tubes or glands to deposit their contents on the ground colour, and so form the surface markings. These decorations are commonly very dark brown or black, though often they are vandyke brown, sepia or sienna. They take the form of spots varying in size from pinpoint specks to large ones; or patches little and big, irregular in shape, as it were spots run together.

If, for any reason, the egg moves unnaturally in the oviduct, the markings become irregular, elongated, wriggly and in some cases take a spiral form, showing that the egg took a forward and rotatory movement while the colour ducts were working. This spiral is, according to Professor Rowan,[1] always from right to left. At times the colouring matter is thick, like oil-paint, and smears by contact with the bird's body after extrusion.

The arrangement of the constituents of the decoration varies. While some eggs have specks and spots, sometimes many, sometimes few, irregularly distributed all over the surface, others have them concentrated in zones, usually at the blunt end, though very occasionally at the other. Other eggs are decorated with a few large irregular-shaped patches. At times eggs quite free from any markings are found, and these, most often, are a clear pale grey or blue colour and appear to be shells of which the final coat was free from colouring matter or was never applied. The latter is the more usual, as this type of egg often has a very thin shell. This seems due to a derangement of the appropriate pigmenting organs

[1] *British Birds*, X. 96.



65. Arctic Tern's nest in bare sand.



66. Arctic Tern's nest in grass.

in the individual, and this defect must have been widespread in 1911 when unpigmented eggs were common in the Blakeney Point ternery.[1] This aberrant type of egg was attributed to disturbances through various local causes, but in the same year, in the Chesil Bank ternery where no disturbance was reported, ten nests each had one clear blue egg.[2] One nest found in another ternery had one egg pure white and two unusually dark, as though the colouring matter which should have been used for three eggs had been concentrated on two. In a ternery in North Norfolk in 1912 there were four clutches, each consisting of three pale blue unspotted eggs and a number of nests containing a single uncoloured egg.[3] Eggs of the red type—" erythristic "—though not common are not unusual. The most interesting example of this type was the one at Wells, where " for seventeen successive years was a nest of Common Tern containing very distinctive unspotted red eggs. . . . The nest was always placed on the same site in the dunes adjacent to a piece of old wreckage. In 1920 the bird was killed by a stoat and the watcher found the latter with the dead bird and the eggs in a rabbit-hole near by. He has not since found a nest containing similar eggs."[4]

In some terneries the eggs, as a whole, are similar in type of ground colour and decoration; in others they are fascinating in their wide diversity. We are inclined to think that the difference is due to the kind of food available and is a peculiarity which we have noticed in colonies of Black-headed Gulls, in some of which there is the same lack of variety, and in others a great range of colour and markings. We have noted too that on the east coast, a large number of the Terns' eggs tend to have the ground colour of a greenish hue, while on the west coast the stone-coloured type prevails. It has been suggested that green colouring protects the embryo from superabundant sunshine. Does the east coast get such an appreciably greater amount of sunshine as to need this special provision for the protection of the eggs?

There is a loss of colour, and a change of hue, in the eggs as time progresses. The original ground colour is somewhat evanescent, at least the blue in it seems to be; the sunlight bleaches some of it away. For this reason a green egg tends to become stone colour; the yellow and red, as well as some of the blue which remains, combining to produce this hue, owing to the partial transparency of the shell. There is also an external change of hue, following the alteration in the colour of the contents of the shell, as incubation advances.

There is a fairly widespread habit, among Terns, of laying larger clutches of eggs than normal. We, ourselves, have seen 23 Common Terns' nests each containing four eggs and two holding five eggs. And

[1] *British Birds*, VI. 161. [2] *Ibid.*, V. 196. [3] *Ibid.*, V. 169.
[4] *Trans. Norfolk and Norwich Nat. Soc.*, 1922.

we have records, from various sources, of 36 other clutches of four and seven with clutches of five eggs. From America is a report of two nests with four eggs, one with six eggs and another with ten eggs![1]

This habit is not confined to the Common Tern, for we have seen two Roseate Terns' nests with three eggs each—the normal number being two—and have records of two other clutches of three. Also records of one Sandwich Tern with four eggs and five Little Terns with four eggs each.

There is some doubt as to the parentage of these abnormal clutches. The view is held, in some quarters, that eggs laid in excess of the normal are laid by a second bird. This belief appears to be based on dissimilarity in colour and markings of the eggs in the large clutch. As it is not unusual to find quite dissimilar eggs in admittedly normal clutches, it is not clear why such variations in "fours" should be considered proof of double parentage. On the other hand, often enough, the four eggs will be alike in all respects and so, presumably, the product of one bird. Moreover, by analogy with other birds, there seems no reason why Terns should not, at times, lay more than a normal clutch.

There is little if anything to distinguish COMMON TERNS' eggs from those of ARCTIC TERNS. Though usually supposed to have distinctive characters, neither size, shape, colour nor markings are sufficiently different to enable one to separate them. The weight may do so, but we have not yet weighed enough to compare satisfactorily, though, judging by the similarity of size, the weight should be similar too. We took note of 2088 nests of the Common Tern. Among these 23 nests contained clutches of four eggs, 1203 had three eggs each, 685 held two eggs and 177 one egg only. We leave out two nests containing five eggs each as possibly being the result of two females using the same nest. Counting in the 23 nests with four eggs as the laying of one bird in each case, it is seen that more than half, *i.e.* 59·2 per cent., contained three eggs each. From this it is evident that three is the full clutch of the Common Tern.

Of Arctic Terns' nests 92 were examined: of these 21 contained three eggs; 39, two eggs, and 32, one egg each. This gives 22·82 per cent. with three eggs, 42·39 with two eggs and 34·80 with one egg. The evidence here is that a clutch of two is more likely than the other numbers and is therefore the normal laying of the Arctic Tern, for although it is certain that many of those containing two eggs when the count was made, might, subsequently, have a third egg laid in them, it is equally possible that those with one egg would have had a second added.

From 160 eggs of the Common Tern the following details were noted: the average length was 40·88 mm. and the average width 30·09 mm., the longest egg was 45·8 (× 31·0) mm.; the shortest (37·8 ×) 29·0 mm.; the widest was (31·6 ×) 40·0 mm. and the narrowest (39·2 ×) 28·3 mm.

[1] *British Birds*, IX. 73.

The average weight was 18·38 gr., the heaviest being 22·1 gr. (44·4 × 30·7 mm.), and the lightest 14·4 gr. (38·0 × 29·0 mm.).

Compare these details with those obtained from 173 eggs of the Arctic Tern and it will be seen that size does not indicate to which species the eggs belonged. The average length of the eggs of the Arctic Terns was 41·55 mm. and the average width 29·82 mm.; the longest egg measured was 45·4 mm. (× 30·5 mm.), the shortest 36·7 mm. (× 29·6 mm.); the widest was 32·0 mm. (× 41·6 mm.), and the narrowest 27·5 mm. (× 41·0 mm.).

With the first egg of the clutch incubation commences and is shared by both parents. As the birds are indistinguishable this can only be determined by a careful watch. One bird, however, does the major share of the work. The natural presumption is that this is the female, though short of shooting the bird on the nest and dissecting it proof is unobtainable.

We have often seen the " change over " take place. A Common Tern was sitting on the nest when another (let us assume it was the male) alighted about twenty yards away and began calling a low, soft " Krurr Krurr." He waddled towards his mate, repeating his remark all the while. When nearing the nest, he changed it to a two-syllabled word, " Kwi-kwi," which he gave, without pause, until he was quite close. The sitter then got up and, without a sound, walked away and he took her place on the eggs.

Towards another nest, one walked saying quietly but quickly, " Ku Ku Ku," a sound like a cluck. Arriving at the nest the sitter replied " Kurr Kurr—Kurr Kurr " and left the eggs, her place being taken by the mate. Having walked two yards away she stood and preened. After five minutes came sounds of " Kurr Kurr," low and guttural, from one, replied to by the other using the same sound. This seemed to be a notification that her toilet was completed, or perhaps from the male, that it was time it was finished. Anyway, she walked to the nest and the " change over " took place a second time.

The language used during changing seems to vary, as well it might.

A bird alighted and stood some twelve yards from a sitting Tern, neither saying anything. The sitter looked over her shoulder several times at her mate, then flew off, calling a short, sharp " Tip " twice. The other straightway began to waddle to the nest but did not, at once, go on. Instead, he rose, flew round, returned, alighted and immediately went on. Not a sound, except the two " Tips," was given to indicate the desire to change.

An Arctic Tern, sitting, was approached by another, which made a continuous guttural call, from behind. The sitter then left the nest, its place being taken by the other, which ceased calling. The first bird now walked slowly away, picking up, as she went, small bits of shell and

stones, which she threw, or placed, on either side of her, mostly on the left. Doing this silently, she proceeded some eighteen inches, then, after standing some time, flew away. During all this she made no sound, nor did she ever appear to look at her mate (Pl. 15).

It is possible that the " change over " takes place in order to let the sitter rest, for she will, when her place is taken, stand a short distance away doing nothing, then return to her duties. Or, at times, it may be to allow the sitter to go off for food or bathing. Often the direct way she flies right away, and the length of time she is absent, suggest this explanation.

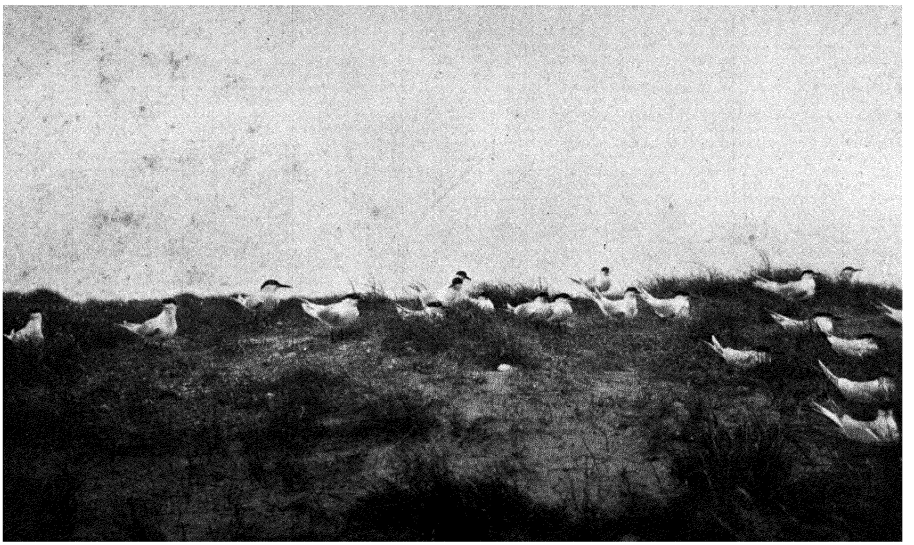
Normally, the sitter is quite indifferent to the birds which pass and repass overhead. But she can detect, in some mysterious way, the coming of her spouse, and recognises him long before he comes near. With wide-open, red-lined mouth she will call loudly and excitedly " Keearr " and, at times, high and sharp " Ki Ki," half rising from the nest in her eagerness for the food he is bringing. Soon he appears and, gliding down, drops near the nest. Leaving her eggs, she runs the yard or so which separates them, and snatches the silver fish which depends from his beak.

In our experience Terns are extremely good sitters, commencing to incubate when the first egg is laid, and brooding the eggs closely and continuously, leaving only when disturbed, or to change with the mate. The following extraordinary statement by Thompson prompts the speculation as to whether Terns have altered their habits in the course of the last hundred years.[1] " It is commonly believed," he writes, " at all the breeding haunts of Terns which I have visited, that the bird never sits on its eggs during the day. Our boatman had never seen Terns leave the ground so that they could say that they were just off the nests. The various boatmen who rowed us to Mew Island made a similar remark. An intelligent boatman told us the belief here is that the sun incubates the eggs, which are always placed on the sunny side of the rocks; he remarked that it must be so, as the birds do not sit on their nests by day. That the birds do not sit on the eggs during the day, or do so very rarely, is certainly the case at the several islands visited by myself. If they did so, they would be hardly less conspicuous than ' snow upon a raven's back,' and hence instinct may prompt them to absent themselves from their nests in the day-time." [2]

In the course of twenty days or so—the average date being around June 10th—the mother gets uneasy, often looking beneath her feathers at the eggs and moving them with her beak. Then on the widest part of one of the eggs, signs of hatching appear; radiating cracks develop as though the egg had been dropped; small fragments of shell break away; the young one is struggling to get out.

[1] See also p. 9.

[2] *Nat. Hist. of Ireland,* III. 283.



67. SANDWICH TERNS AT NESTING SITE IN PLAN A (p. 145).



68. SANDWICH TERNS' NESTS AROUND MARRAM "TUMP," PLAN B (p. 136).

If one listens carefully, slight squeaks and a faint " tap-tap, tap-tap, tap," can be heard, an irregular sound indicating that the young one is breaking its way out of the shell by using its " egg tooth " as a tool. Soon a small hole appears in which is seen the end of the beak of the little bird, and on the tip is a small white spot shaped like a flat-iron (Pl. 44). This is the " egg tooth " and is a fragment of hard lime fixed on the tip of the upper mandible—the lower mandible also has a " tooth " though very tiny. This is a specially hardened point to the beak, which, at this stage, is comparatively soft, and forms a sort of pick by which the chick, jerking its head, so weakens the shell that its convulsive struggles force off the top of the egg and the newly-born infant lies a wet helpless mass, feebly moving, having freed itself from its prison entirely by its own exertions (Pl. 45). Its work being finished, this egg tooth, this tool, after about three days, drops off. The uneasiness of the mother continues, but she is not assisting the young one to emerge. No! what she is concerned about is the eggshell, for as soon as the chick is completely free, she seizes the shell in her beak and flies off with it to drop it clear of the vicinity of the nest, to which she, at once, returns. Thus she removes, one after the other, the evidence of the birth of her offspring and does so, presumably, to protect them from danger, for the presence of the shells would draw attention to the nest (Pl. 46).

It is interesting to note that the weight of the chick at the moment of hatching is distinctly less than that of the egg, and that a wasting continues during the first day of the young bird's existence. After this the wastage ceases, and, in every case where normal feeding takes place, the chick, as is to be expected, rapidly puts on weight. The weight of the abandoned shell with its lining membrane, the evaporation of moisture during incubation and absorption of the yolk by the young bird, account for this wastage.

To ascertain the loss due to these causes 12 chicks were weighed at the moment of emergence from the shell. The average weight of the eggs before hatching was 18·18 gr.: the average weight of the young birds was 13·91 gr.: showing an average loss of 4·27 gr., *i.e.* approximately a quarter of the original egg weight. The weight of these chicks varied from 16·95 gr. (egg weight 21·60 gr.; egg size 45·80 mm. × 31·00 mm.) to 11·73 gr. (egg weight 14·50 gr.; egg size 38·40 mm. × 28·70 mm.).

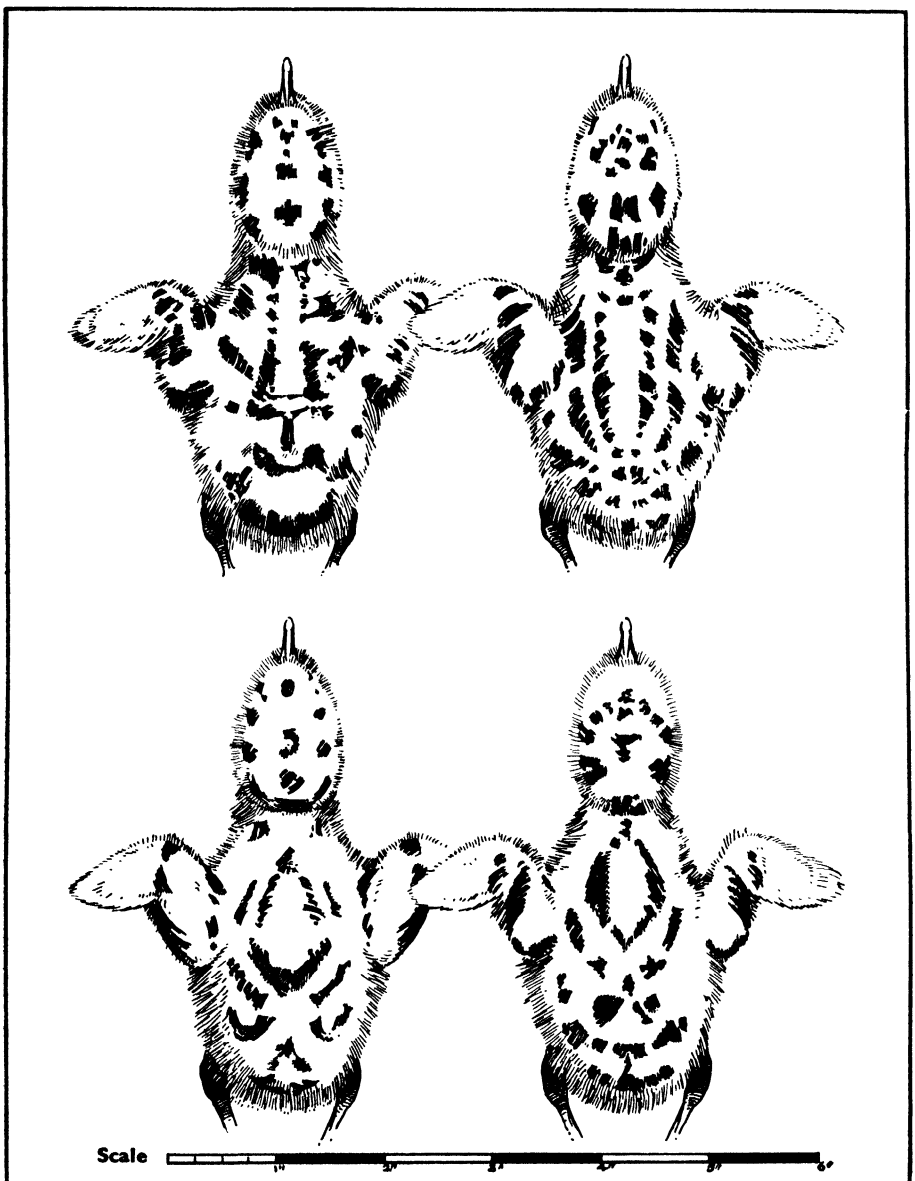
Eighteen other chicks were weighed on the day of their birth. The weights of these varied from 16·15 gr. (egg weight 19·37 gr.; egg size 41·90 mm. × 32·20 mm.) to 9·57 gr. (egg weight 16·32 gr.; egg size 38·0 mm. × 30·0 mm.). The average loss of weight during the first day on the 30 eggs under observation was 4·90 gr. and during this period the chicks did not appear to be fed by their parents.

In 1931 the season at Blakeney Point was a bad one. Absence of fish,

owing to cold, windy weather, brought about a famine among the Terns. This was aided by a storm, and the combined causes were responsible for the death of hundreds of young birds. Curious to ascertain the effect of this starvation, we weighed 54 of the dead chicks, none of which was more than three days old. While the average weight of a similar number of properly fed chicks at the same early period of life would be 14·74 gr., these starved ones averaged only 11·31 gr.

After several hours of life the down on the young one dries; the friction caused by the uneasy movements of mother and child, and the heat of their bodies, both tending to this end. The drying does not seem to be so speedy if left to the sun and the wind, as it is when the little bird is brooded. When dry, the chick is a soft, fluffy, downy thing, buffish in colour, marked with a black pattern, " sitting up and taking notice." The faint " cheep " heard from inside the egg is now louder and gets more insistent as hunger begins to be felt for the first time. The young ones vary somewhat in the colour of their down. There are dark and light varieties, some which are mouse grey, others fawn and even cinnamon brown. The inside of their mouth and the colour of their feet differ too; some are a pallid pink, others flesh-coloured or orange-yellow. All hues between these extremes are found. Even brothers in the same nest may not be alike in this respect.

Their upper part is decorated with a pattern, formed of black or very dark brown spots or patches, which is never quite symmetrical, though usually nearly so. These spots are said to have " no definite pattern." A casual glance would seem to confirm this statement, which arises from the appearance when the longish down covering the chick is disarranged. A more careful examination, however, shows that the pattern is quite definite, but, while no two chicks have exactly the same markings, there is a broad similarity which may be summarised thus. The pattern is arranged to balance on the median line of the head and back. The head has a central group of spots beginning at eye-level and running to the back of the head. On either side, also beginning at eye-level, is a curved series following the contour of the head. All these spots increase in size towards the rear. Starting from the nape, on either side of which is a spot, is a main-series placed right and left of the backbone, first diverging, then converging. Parallel to this on either side are less conspicuous rows of spots. The lower back and rump are ornamented with groups which follow the contour of the lower body. The wings and thighs each have their spot patterns. Typical arrangements will be seen in the diagrams, in which the general resemblance will be perceived. Though spoken of as " spots " the markings are more in the nature of patches, having an irregularity of shape which is due mainly to the length of the down of which they are composed (pp. 129, 147).



Patterns on Common Tern Chicks.

Below, the chick is usually, though not always, white in the angle of the lower mandible. The throat is dark, ranging from grey through dark grey to black, dark grey being the most usual. The extent of this dark area varies considerably. The rest of the underparts is white.

The Arctic Tern chick resembles the chick of the Common Tern with this exception—the flanks and rump, as far as the vent, and in some cases beyond, are pale or darkish grey ; a distinctive feature which provides for identification.

We find no ground for the theory that the chick, in its coloration and pattern, resembles the eggshell from which it has emerged, that is to say, that dark chicks are produced from dark eggshells and that chicks with sparse decoration have emerged from lightly spotted eggshells. We have watched many hatchings, and while a dark egg will, sometimes, produce a dark chick, more often the chick will be found to be normal. At Blakeney Point, in 1930, Watcher Pinchen encircled for us a clutch of three very dark eggs, with wire netting, to ensure that the chicks could be examined before they strayed from the nest ; in the result we found the chicks were normal in every way. In 1931 the darkest eggs we found there were a pair, one of which was a dull muddy stone colour with spots and specks of black and many under-marks, the other a dark, rich, sienna-brown with large spots and few under-marks. The chicks from these diverse and dark eggs were alike in detail and normal in colour. We have noted, too, a dark and a light chick, produced from two eggs closely resembling each other in colour and markings.

In a day or so the chick becomes strong enough to leave the nest and advance to meet its parent when he or she returns bearing a fish. It becomes capable of seeking shelter from the sun in the shade of some herbage or large stone. As it grows in strength it begins to wander about the ternery, causing much perturbation in its parents and annoyance to the neighbours. How the parents find them in their hiding-places or distinguish them from other youngsters almost identical in appearance is a mystery, but they do. The chicks are not so clever. They frequently mistake stranger Terns for their own parents, often with dire results, for assaults on these wandering chicks are common. They are lucky if they escape with nothing worse than a buffeting, for it is not unusual for the vagrant to be killed outright.

As they get older they begin to lose their down, which is replaced by pale grey feathers. They become conspicuous and concealment in the herbage is resorted to. Soon their wing and tail feathers develop ; they become able to leap into the air a little, flapping and trying their wings. As the season advances many of these jumping birds can be seen at their exercises. They now become " near-flyers " able to cover from fifty to a hundred yards before needing to alight. At this stage they look very



69. WELL-CONSTRUCTED NEST OF SANDWICH TERN.



70. SANDWICH TERN'S EGGS ON BARE SAND AMONG THIN MARRAM.

like grey pigeons. Their nestling down has now almost gone; some clings to the crown feathers, which are becoming black, and some may be seen on the wing coverts and rump. The face is white. The back feathers are medium warm grey tipped with a curve of fawn. The fore edge of the wings is white followed by a triangular area of dark grey indicating the lesser wing coverts; this is conspicuous when the bird is at rest or in flight. Some birds are free from this dark patch. The greater wing coverts are grey, tipped with fawn, and the remainder of the wing much as in an adult. The tail, though shorter, is like the adult except the feathers are tipped buff. Beneath, it is white. There is much variation in the colour of the mandibles and the legs at this stage. Out of 27 birds examined, two had orange-red mandibles; one was red-grey; seven, orange-grey; the remainder had horn-colour, tinged flesh, orange or red. The legs ranged from orange, eight; orange-red, two; orange-flesh, five; pallid flesh, four; while three had legs of a peculiar bluish-grey, a leaden colour.

The live weight of a youngster just capable of flying is about 78·0 gr., and the average wing length of 10 was 190·12 mm.

A month has now passed since the day of their birth. They are now well able to take care of themselves, either by flying or swimming. They assemble in groups by the water's edge, where they are still fed by the assiduous parents. This attention continues even after the time when they essay fish-catching for themselves.

About the middle of July, the early hatched birds begin, with their parents and others, to move along the coast in little groups on the first stage of their autumn pilgrimage to more southern shores. As July progresses the majority of the young birds are ready to depart, and by the end of the month, in normal years, the ternery is deserted. The date of departure varies with the position of the ternery and according to whether incubation has been delayed or frustrated by bad weather or lack of food. In late seasons, and with adverse climatic conditions, the departing birds often amalgamate in great flocks and travel down the coast together in this way. Stragglers and laggards may remain into September and even into October.

It is now necessary to examine the nests and eggs of each species in detail.

It must be understood that the incipient nests already spoken of were hollows made in the sand without building material of any kind. These are made quite easily and quickly; the bird turns as on a pivot, breast down and tail up, and as it turns kicks the sand from beneath its body until the hollow thus made is deep enough to contain the eggs. A turn or two to smooth and round the hollow and the nest is finished, the housing problem settled. Drifting sand is always a menace to this type of nest;

it will fill the hollow and submerge the eggs during a wind storm. Even during normal occupancy, the sand tends to silt into the " scrape " owing to the drying action of the warmth of the bird's body and to its movements. If this happens the bird acts in the same way as in making the original nest —*i.e.* rotates and kicks until the eggs are clear of sand, and on windy or sunny days, the sitting birds are extremely restless owing to the necessity of frequently clearing away the infiltrating sand (Pl. 49).

Between these bare sand hollows and nests largely constructed of material, lies a whole series differing in various ways. It is often stated that the bird, starting with a bare hollow, proceeds, during the period of laying and incubation, gradually to build a nest, so that by the time the chicks are hatched they have a substantial domicile. This may be so in some cases, but it is not the usual habit of the birds. As it happens many nests remain as bare sand hollows during the whole time of brooding, there being *no attempt whatever*, on the part of the owners of the " scrape," to collect material and make a nest (Pl. 52). Scores of nests we have seen were simple hollows in the bare sand in which full clutches of three eggs had been laid and the young hatched without a vestige of building material being added. Many more would remain in this state were it not for the wind blowing fragments of dead marram grass or other material which " fetch up " against the sitting bird. Yet others would be guiltless of material were it not for marram straws or what not lying within reach of the sitting bird, which, we are convinced, through sheer ennui at sitting so long with nothing to do, picks such things up and drops them near her person. The slight, material nests one sees result from one or other of these causes.

On the other hand, we have seen many substantial nests which have been constructed before the laying of the first egg. The truth appears to lie in this : if the bird elects to nest on the bare sand, it manages to conduct its affairs without any nest but the " scape," for a Tern does not, like many birds, go any distance for its building material.

If, however, the site selected for the nest is proximate to suitable material, the bird stretches out, lifts it and drops it, piece by piece, around itself ; or walks a few steps to fetch it, and in this way first encircles and then lines the sand hollow.

Thus it is that there is such a variety of material used in building nests, and it is for this reason that nests of all types, from the bare sand " scrape " to those in which a considerable volume of material has been accumulated, may be found in the same ternery, fashioned by the same species of Tern.

Here are descriptions of the method of building taken from our *Journal*.

" A bird sitting on the nest reached forward and picking up bits of marram dropped them over her shoulders, right and left. She then stepped to the edge of the nest and repeated the same actions. Soon she

walked a few steps farther, still acting in the same way ; then down a little hill where, at the bottom, she picked up a long marram straw. She then flew, without the straw, and settled on the nest and brooded. Soon she was off the nest, again picking up material. She did not carry anything ; always threw with a petulant-looking jerk. The actions seemed more like tidying the vicinity of the nest rather than building . . . she then reached out and pulled straws and seemed to be placing them by her side. She seemed to ' nibble ' each one as though bending it to a curved shape."

" Sitting in a ' scrape ' on bare sand a bird moved and used her beak as though arranging material, stretching forward now and then. This was dumb show, for there was no material, unless she was picking up grains of sand."

It is necessary to qualify the statement that Terns " never go far for material " in the case of birds nesting on rocky islets not far from the coast. For, under this circumstance, some of the Islet Terns, though not all, will fetch material from the mainland even to the extent of carrying rabbit bones to their island for use as lining to their nests.

For nests on the sand dunes the general material is either the dead straws of marram grass (*Ammophila arenaria*) or fragments and leaves of dwarf willow (*Salix repens*). The amount of " Ammophila " used varies from a little to a considerable quantity.

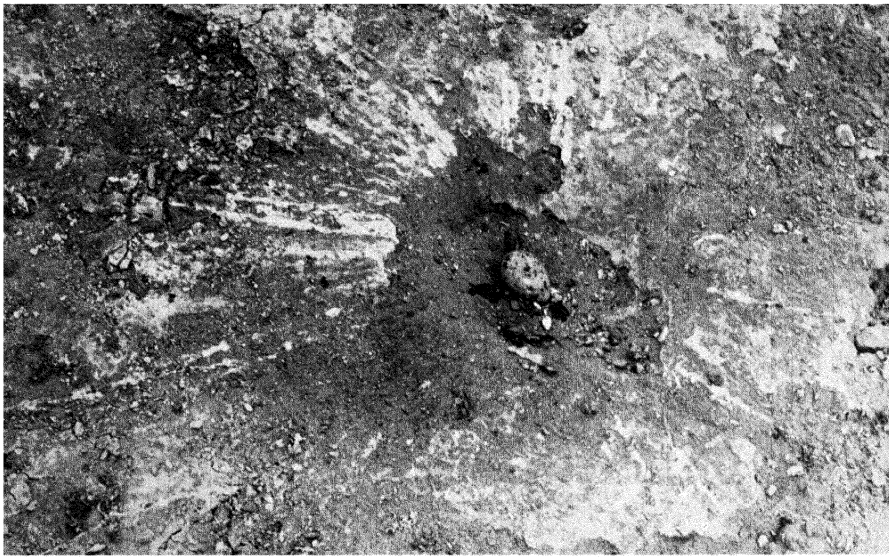
A few straws may be roughly disposed in circular fashion, straws which have been carried by the wind. These may be called " adventitious nests." There is, also, the well-arranged rim encircling a nest in which there is no lining (Pl. 53). The material forming these " ring nests " has been carefully placed by the bird. A constructional advance on this type is the kind which is not only encircled but well lined—the " lined nest " (Pl. 54). At times quite bulky nests are found resembling the nests of Black-headed Gulls, but these seem unusual. A very interesting type is one we may term the " buttress " nest (Pl. 56). This kind is built on a slope, more or less steep, and in addition to the material used for the rim and lining of the nest a quantity is placed below like a buttress holding up the nest, keeping it level, and preventing it and the eggs, resting on the unstable sand slope, from slipping down the hill. It would be interesting to know whether this danger is realised by the bird and the buttress constructed to guard against it, or whether the buttress is fortuitous, caused by straws slipping down the slope from the material of the nests during the process of building. We have not yet been able to decide by observation, but whatever the cause, it is a most useful arrangement.

Other material than marram straws may be found in an " Ammophila " nest, but this is more or less accidental. But not so is the substance of the nests on the areas where the dwarf willow grows. These " willow " nests are, first of all, made by the bird squatting on the plant and turning

round, in exactly the same way as it does in nest-making in the sand. And, like the sand hollow, this depression may be used in its simple state. Often, to the hollow thus formed, both loose leaves and twigs are added, the leaves being plucked off the living plant by the bird as she sits and placed beneath her. The twigs used are, almost always, dead willow stems which the bird breaks off the plant or finds lying ready to hand, or rather to beak. Here again among willow nests slight nests and others more bulky may be found, and, in truth, the size of the nest depends on the amount of loose material available close by (Pl. 57).

Nests built among the marram sand-dunes and those hills clothed with dwarf willow are found placed on the tops and sides of the hills as well as in the flat areas lying between the hills. We have often thought that the nests occupying the higher ground are built first and those constructed in the flat "bottoms," which are usually swampy and so possibly less desirable, are made later in the season when the ground becomes drier.

The eggs, in colonies of birds nesting on shingle banks, may be found deposited on the stones without any material whatever, but the spot chosen usually has a little sand which mitigates the hardness of the site. Otherwise the nests made are mere depressions in patches of grass or sea campion (*Silene maritima*) or slightly constructed from the surrounding vegetation. An instance where, on a beach formed of large stones, large nests of carried moss had been made by the Arctic Terns forming the colony is referred to in the chapter "Of Terneries and Distribution" (p. 33). The eggs laid in hollows of rocky islands often repose on rock whose hardness is unrelieved by a single straw. Sand drifted into the hollows offers a pleasanter foundation and is sometimes utilised. Or the nest may be a depression formed in moss, peat, or other material native to the island. On one such rocky islet we visited some eggs were on the bare rock without nest; some lay in nests formed of dead stems of sea beet (*Beta maritima*) which grew on the rock; others rested on crushed down stems of the living beet (Pl. 59). One clutch of three eggs lay in an extremely large nest constructed of marram grass roots and dead thrift (*Armeria vulgaris*), neither of which existed, naturally, on the island. In this case every bit of the material had, certainly, been carried from the mainland, some 500 yards away (Pl. 60). On another islet we found the same use of local and carried material, seaweed, moss, lichen, dock and bracken. Yet another island, in addition to normal island nests, had an extraordinary one constructed of rock fragments. These were rough and angular and varied from the size of a pea to about 1½ inches. The smallest fragments were in the nest proper, the others being disposed to form the outer circumference (Pl. 61). The nest was on the bare top of a fairly high rock and each fragment must have been carried there, as none were naturally present.



71. SANDWICH TERN'S NEST WITH CHARACTERISTIC RADIATING PATTERN OF "WHITEWASH."



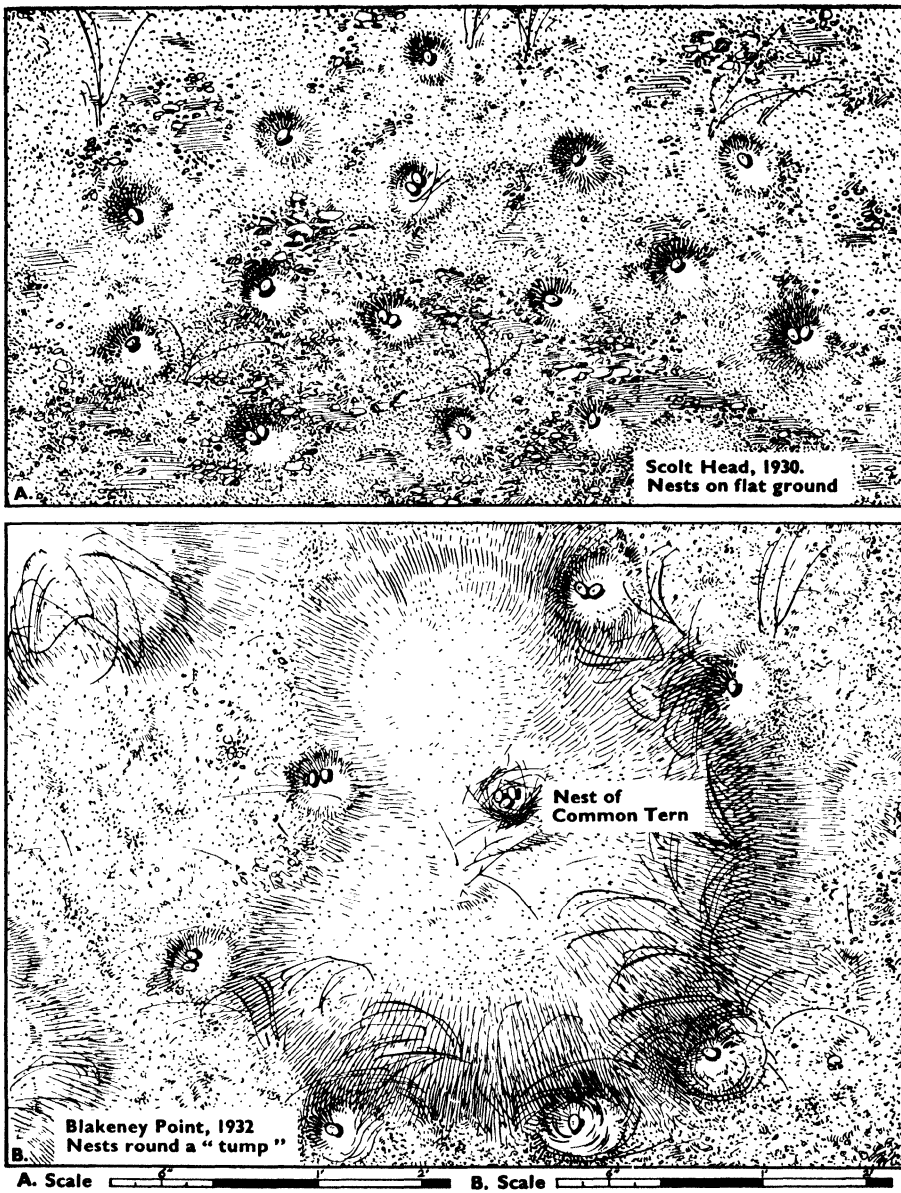
72. THREE WELL-MADE SANDWICH TERNS' NESTS SHOWING CONTIGUOUS NESTING HABIT.

Was it prevision which made the builders use these stones? Had marram straw been used, or any such material, it would have been blown away at once, as the site was completely exposed to wind and weather. If the eggs had been laid on the bare rock they, too, would have been dislodged by the wind and rolled to destruction. Yet there reposed two young ones which had been brought up in this uncomfortable bed. There was no necessity for the birds on Blakeney Point, which elected to build their nest of rounded pebbles about half the size of a nut, to weigh these considerations. The pebbles, with which were a small razor shell and a few cockle shells, were carefully selected to match in size and had been picked out of the sand close around the nest (Pl. 62). In the immediate vicinity were many normal nests built of marram grass. No clue was afforded to the reason for this aberrant type of nest. Another deviation from the normal was seen in a nest composed almost entirely of cockle shells (Pl. 64). This was in a ternery where all other nests were of the usual type. These were Common Terns' nests, but several we found in a Scottish ternery, also made of shell, belonged to Arctic Terns (Pl. 65).

A favourite site in all types of colony is the tide wrack where, in addition to seaweed, all kinds of queer material may be found. Eggs are laid in depressions in masses of seaweed. On one such pad, in an Irish ternery, were no less than 19 nests in close proximity, some having a few straws beneath the eggs. Besides the usual vegetation, bits of dead twig, feathers, straw from jettisoned " donkey's breakfasts," are utilised: nothing seems to come amiss to the builders. At Blakeney Point, a favourite material is the washed-up ribbon-like dead leaves of some foreign reed which closely resemble wood shavings.

There seems to be little reason for supposing that the Common Terns' nests are built usually away from the sea or vice versa. We know colonies where the eggs are laid a mile from the nearest water and others where the nests of this species are just above the limit of the high tides. The same can be said of the nests of the Arctic Tern, which may be near or far from the sea or mixed up with those of the Common Tern. On the Farne Islands in 1932 one Arctic colony was found nesting on a sandy beach, another among large pebbles and little cliffs of another beach, and the nests of a third were deeply buried in grass and other herbage on the highest part of the island.

As in situation, so in construction, from neither of these can one postulate the species to which the nests belong. Out of 123 Arctic Terns' nests examined in one locality, 50 were mere hollows in the sand. These were on flat sand without any vegetable material near. Amongst them were 4 well-made nests of shell and several with very slight nests of dead rushes or marram leaves which had probably been blown against the birds while they were sitting. Of the remainder, 7 were mere depressions in damp



Plans showing proximity of Sandwich Terns' nests, drawn to scale.

mossy hollows, and 23 were on the sides or tops of sandhills, all these latter being constructions of the marram grass found growing all around. They varied from slight to good lined nests, with one very large one. The other 43 were found in flat rushy "bottoms." Here the nests were hollowed in the moss or grass, and had, usually, a foundation which varied from two fragments of rush to a small pad of the same material. This arrangement may have been intended to lift the eggs a little from the water which, in wet weather, accumulated in the nest hollow—a sort of drainage system! Here, again, the prevailing loose vegetation was dead rush leaves and where, here and there, a patch of dwarf willow grew, the nest linings were made of the dead leaves of that plant (Pl. 66).

Both species of Tern, Common and Arctic alike, nest in communities more or less large. Those in the extreme north of the British Isles seem to consist exclusively of Arctic Terns: those in the south, of Common Terns only, though in either case a pair or two of the other species may be present. But in the zone where the most northerly nesting of the Common Tern overlaps the most southerly of the Arctic Tern the two species nest in close proximity in the same ternery.

It can, we think, be demonstrated that within each ternery the nests of whatever species may be present are arranged in groups or small colonies separated more or less from the neighbouring groups, *i.e.* a ternery is an aggregation of small colonies. One is tempted to play with the idea that each of these groups is a family consisting of related birds of different generations with, perhaps, a patriarch at the head, all holding themselves a little aloof from the other families. This suggestion may be supported by the fact that groups seem to arrive together and at different times from others, as though a common bond existed inside the species bond.

This same singularity, as is well known, is found with the Sandwich Terns, but in a more definite manner, for not only are the groups of these birds more compact, they are more widely separated from the little colonies of the same species in the ternery in which they are nesting. So closely and evenly spaced are the nests in these Sandwich Tern groups that we strongly suspect they are placed just so far apart and no more as to prevent interference of one bird by another. A reference to the plans, which were measured and drawn from typical arrangements of Sandwich Terns' nests, will make clear how constantly they are separated by a space roughly equal to the length of the bird itself. So that the distance between the birds when sitting is just enough to prevent them from indulging in neighbourly attacks on each other (pp. 136, 145).

We have noticed, as a peculiarity among Sandwich Terns, that in a colony, always will be seen several breeding birds which are either adults retaining part of their winter dress or birds in their first year not having attained full adult plumage. These birds have the crown considerably

flecked with white and, in a more striking case, the crown was almost white and the forehead completely so.

Often in these Sandwich Tern colonies will be found one Common Tern's nest, its owner sitting, without concern, among the larger species, aloof from their constant quarrels and free from interference. This is a seeming intrusion which only occurs when the Sandwich Terns select an area for their nurseries in which a Common Tern is already sitting on her eggs.

Two main types of nesting site seem to be in favour with the SANDWICH TERN. The " sand-dune " site may be on pure sand on the side or top of a sandhill, or on a flatter area between the hills where there is an admixture of stones with sand. In such a situation as this the eggs are, frequently, deposited around small sand " tumps " which have marram grass growing through them. The blown sand has been arrested by an Ammophila plant, the upper part of which now protrudes through the accumulation of sand. These " tumps " are, more or less, circular, and where the hillock joins the flat the eggs are placed (Pl. 68). The " dune " type of nest may be merely a " scrape " formed in the same way as those of the other species—*i.e.* by turning round. In other cases, that the method of nest-making is by rotation is shown by the living marram being formed into a circular nest, there being no lining. Indeed, seldom it is that nests on the dunes are anything more than " scrapes " or rings. Out of 37 " dune " nests we noted one only which had a little dead marram forming a lining in addition to a ring of rotated living marram leaves, seven had this living ring and no lining and 29 were nothing more than depressions in the sand.

The other kind of site is on a flat mud-formed islet in a marsh or pool. Here all the eggs are contained in nests of a more or less bulky nature: they are formed of substantial material and some are quite large. This arises from the presence of dead fragments and stems of plants of once vigorous growth—sea aster (*Aster tripolium*), ragwort (*Silene jacobæa*), reeds (*Arundo phragmites*) and the like (Pl. 69). It may be that the wetness of the site dictates a more substantial nest.

In either of these sites one has to step warily, for the nests are so crowded together it is only with care that one can walk among them.

Seebohm[1] says, " The nests and their contents are so difficult to distinguish from the sand and fine gravel that my first discovery of the colony was to find I had put my foot in it ! " One can only think that Seebohm must have suffered from acute myopia, for not only are the eggs strikingly visible, but they are made more so by the bird's habit of decorating the vicinity of its nest with a radiating pattern of " whitewash."

[1] *Hist. of Brit. Birds*, III. 275.



73. LIGHT AND DARK VARIETIES OF SANDWICH TERN CHICKS.



74. ROSEATE TERN CHICK SHOWING SPINOUS CHARACTER OF DOWN.

So much of this deposit is present that the sites of last year's nests are readily traced, so caked with guano are the surroundings (Pl. 71).

The eggs, whether laid on sandhill or islet, are the same type and are, decidedly, the most handsome amongst Terns' eggs. They are laid, approximately, in the middle of May—the earliest date we have is May 10th, the average date for the years 1922–1932 inclusive being May 17th–18th. The ground colour is, almost always, a light tint which varies from warm white through creamy white, cream, pale ochre, fawn, to light brown ; these being the predominating colours. Grounds of bluish or greenish-white, pale green, pale yellow-green and pale greenish-grey are not uncommon. At Scolt Head in 1932, among 122 eggs we examined, 46 had white ground, 21 cream, 33 buff, 5 brown, while 6 had greenish-white and 11 blue-white grounds. The same year at Blakeney Point we found that 4 eggs had white grounds, 5 were warm-white, 5 cream, 6 fawn, 1 light brown, 1 greenish-white and 1 grey-white.

As with the other species, spots, specks, patches and " scribblings " form the decoration, and these may be black, very dark brown, rich red-brown, or sepia. At times the markings are warm brown, almost sienna, blurred and softened at the edges and occasionally spirally arranged. The under-marks, usually light or dark grey, are not infrequently lilac and sometimes purple.

The shape is the same as that of eggs of the other species but, of course, the larger bird lays a larger egg. Out of 56 we measured the average length was 51·53 mm. and the width 35·63 mm. The longest was 56·5 mm. (× 36·6 mm.) and weighed 35·66 gr. ; the shortest 49·4 mm. (× 35·7 mm.) and weighed 30·45 gr. The widest was 37·5 mm. (× 50·5 mm.) and weighed 33·30 gr., the narrowest 32·8 mm. (× 46·5 mm.) and weighed 23·40 gr. The average weight of 43 eggs was found to be 32·12 gr., the heaviest being 38·3 gr. and the lightest 23·4 gr.

It is well-nigh impossible to arrive at an exact estimate of the full number of eggs laid in each nest. One cannot take a census at a number of terneries when all the birds have laid their full clutches. This understood, counts taken on twenty-one occasions—a number by ourselves and others reported in *Trans. Norfolk and Norwich Naturalists Society*—at east coast terneries during a period of ten years show that out of 5249 nests 28 contained three eggs, 40·73 two eggs and 58·98 one egg. It is interesting to note we found a more frequent occurrence of larger clutches in four other colonies, two in England and two in Ireland, where the percentage of nests with three eggs was 1·24, with two 64·10 and with one egg 34·64. From these figures it is evident that two is the full clutch.

As with the other species, both parents share in incubation. Its monotony is diversified by constant quarrels and the " change over " is the cause of considerable excitement in each group of sitters ; crests are

raised, always a sign of emotion, and much shouting indulged in by the neighbours, who turn what should be a " matter of course " into the excuse for a " scene," as though to change places were something scandalous. Incubation lasts about 20 days and the chicks effect their emergence from the shell in the same way as the other species.

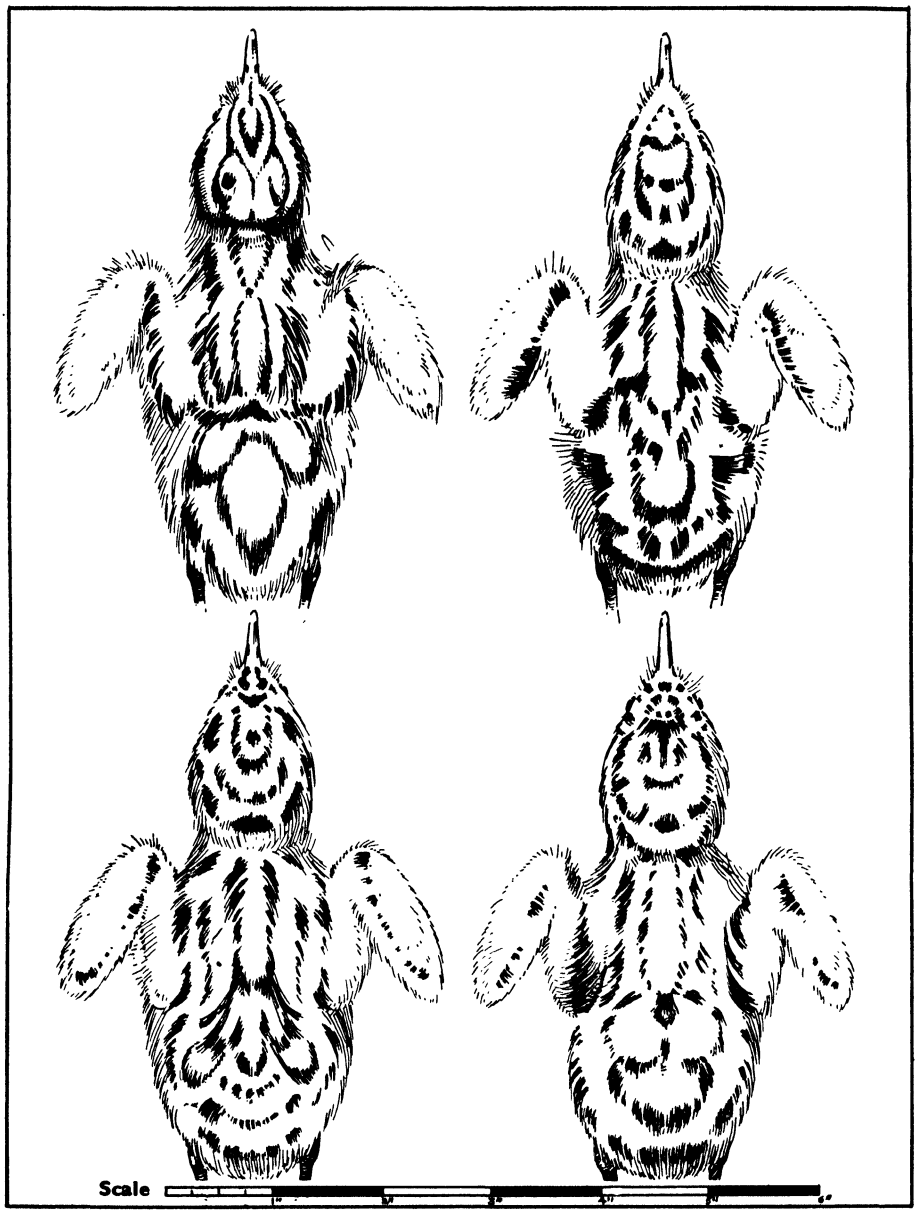
The chicks are seen, on examination, to reveal certain peculiar characteristics. In the first place, there are curious variations in the colour of legs, beak and inside the mouth. Grey is the permeating colour in all these parts; the legs may be just dark grey or they may be orange-grey, purple-grey or flesh-grey. The beak, too, may be variously leaden or bluish-grey, flesh-grey, dark or light, ochre-grey or a yellow-grey which is sometimes almost green. There is variety too in the mouth colour—some chicks having flesh-coloured mouths, others orange-flesh, grey-orange, or grey-flesh, the latter being perhaps the most common. The beak at times is tipped with black, much or little, or is not " tipped " at all. There seems no fixed relationship between these colours; *e.g.* one chick with orange-grey legs had a very grey-flesh beak and flesh-coloured mouth: another whose legs were purplish-grey had an almost green beak with an orange-flesh mouth.

The general colour of the down may be a pale grey, almost white, a pale, but warmer, grey—the most general—and pale fawn, which is not uncommon. Whatever this colour may be, it is always warmer on the crown, back and the humeral regions. This ground colour is patterned by markings, spots or patches, which are sometimes black, or dark brown, or dark grey. These vary in quantity and size, causing the chicks to look dark or light as the case may be. The pattern is quite definite, being concentrically arranged on the head, following the contours of the body and symmetrically disposed. On this general planning, the details of no two birds seem exactly alike even if they are from the same nest (p. 141). The pattern, which is obvious in the very young birds, tends to become less defined as they get older. The underparts are white, though, not unusually, the chin—except the part next the mandible—ear-coverts, and sides of neck may be warm grey: exceptionally these areas are black.

There are two singular features—the bare tracts on the back and the spinous character of the down.

When the wings are extended the upper-back pin feathers are seen to be in four groups following the backbone. These are separated by three areas, one running down the backbone and the other parallel to it and about 6 mm. away. These areas are, except for tiny white feathers, almost bare, and show the leaden-coloured flesh skin. A similar area runs along the back of each humerus. These bare tracts are discernible on the birds just after hatching.

The down differs from that of the Common and Arctic Terns' young



Patterns on Sandwich Tern Chicks.

in that, instead of being soft and furry all over, on the back it has the appearance of being spinous and prickly. This is an appearance only, for, although it is a little harder than the down on the other species, it cannot be called really " prickly." This effect seems to be caused by the filaments of the down on the back being coalesced at the tip (Pl. 73).

The average weight of four chicks a day or two old we found to be 20·75 gr.

The young ones soon disperse about the breeding ground, hiding in the shadows of the grass tussocks, or crouching in " scrapes " which they make to the shape of their bodies and as deep as themselves. They have a tendency when quite young, which we have not noted in other species, to visit the beach near the water.

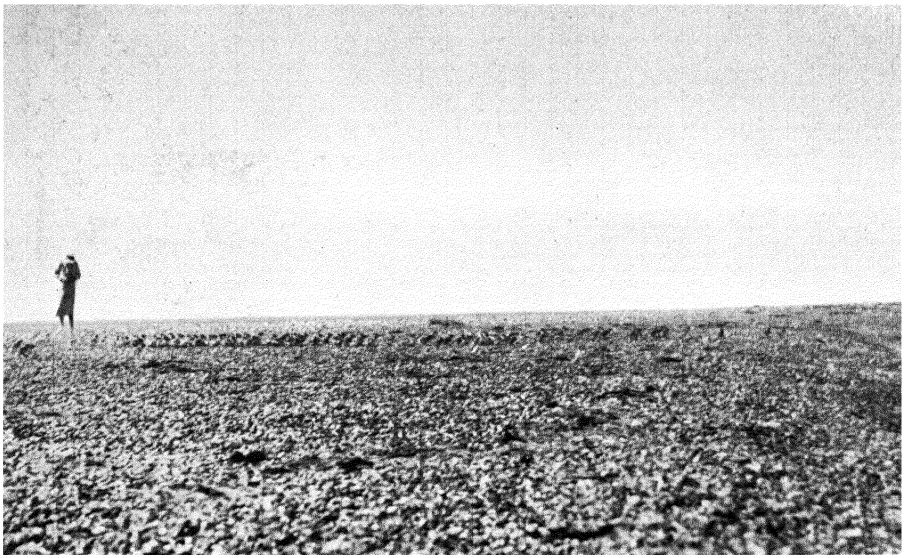
Later on, when they are strong enough to run freely, and the feathers start growing in wings and tail, they assemble in a group on the shore outside the ternery, where they are attended by their parents. This congregation grows daily and, if disturbed, the chicks run quickly, keeping in a compact body, turning this way and that as at a word of command. As they are about the same age and size, their plumage, which consists of a dark cap, white face and speckled coat, looks much alike and suggests a regiment in uniform. This likeness to a regiment is heightened by stragglers running at the edges of the "army" and preceding it, resembling officers (Pl. 75).

Here then, on the shore, they wait to be fed. The older ones, the " fliers," rise into the air now and then and settle again into the army. With them are parents, resting after having brought food, or flying in a clamorous crowd in the air, arriving with fish or departing for further supplies. In a large colony, many hundreds of birds, young and old, will be assembled on the shore. And the sight on a brilliant sunny day, of the flashing white of the wings of the flying birds, the incessant movement, the uproar, forms a scene not readily forgotten (Pl. 76).

From time to time " fliers," as they get strong enough, form into companies and with their parents leave the ternery. Such defections happen at intervals until all the young birds have flown, and though in exceptional years—like 1921, for example, when the last young did not leave Blakeney Point until August 28th—they may leave later, usually the ternery will be deserted by the end of July.

The breeding of the ROSEATE TERN has not been so carefully studied, the restrictions imposed by the protecting Societies preventing an enlargement of our knowledge of the birds without in any way conducing to an increase in their numbers.

They are the last Terns to arrive, the few pairs which nest in English terneries are not seen until well into May. Leaving out two abnormally



75. "ARMY" OF YOUNG SANDWICH TERNS.



76. CONGREGATION OF YOUNG SANDWICH TERNS BEING FED BY PARENTS.

late arrivals—June 22nd, 1924, at Scolt Head, and July 1st the next year, at Blakeney Point—the average date appears to be May 21st, a date by which the breeding of the other species is well under way. They are not long, however, starting and in about ten days may be expected to commence laying.

In the choice of nesting site the Roseate Terns resemble the other species. We have seen three types—one on sand-dunes where the nests were somewhat apart, though not quite removed, from the other Terns, a preference, as it seemed, for a certain amount of concealment inducing the birds to make their nests on the side of a small hill or on a small pebble ridge close to roots and somewhat overhung by the leaves of marram plants. In such situations there seems to be no attempt at making a nest, a depression in the sand and stones sufficing to hold the eggs (Pl. 77).

The second type of nesting site was on a rocky island where the strata standing up on edge like a series of rough ragged boards provided crevices, sometimes narrow, sometimes wider, between the upstanding pieces, which had been utilised by the birds. Here the eggs were, variously, laid on the bare rock, on turf or peat formed in the rock crevices or on fragments of dead dock, hemlock stem, lichen, or other near-by growths. In this ternery there was no concealment whatever except that afforded by the depth of the crevice (Pl. 78).

The third site was on the coast, where, escaping the wash of the higher seas, is a rank growth of some form of grass, much of it green, but more dead and of a yellow colour through lack of moisture or excess of salt spray. Running into this grass are patches of coarse shingle, and the edges of these areas were lined with nests. Two of these birds had unusual clutches of three eggs. The nests were fairly close together, eighteen inches to two feet apart. Some were on the very edge of the shingle. Many were on the grass close to the edge. A few nests were in little bowers of over-arching grass and almost, or quite, hidden. We thought this concealment was due to the growth of the grass since the site of the nest was decided on rather than the result of intention on the part of the bird, otherwise the majority of nests would have been hidden, for there were ample opportunities. The nests on the shingle were formed of the ends of the living grass coiled round but still hanging from the tussocks, or, if on the grass, were merely depressions made by the rotatory movement of the birds. Others on the stones had a thin ring of dead loose grass constructed around the eggs. Some nests near those of the Sandwich Terns, rather farther inland, were made of dead scurvy grass (*Cochlearia officinalis*), and one was well made of dead stems of may-weed (*Anthemis cotula*), 3·5 inches long and about the thickness of a lead pencil. In all cases the material used was that obtained close by the nests (Pls. 79, 80).

Like the Sandwich Tern, the Roseate tends to nest in groups within

the boundaries of the general ternery. In one colony tenanted mainly by Common and Arctic Terns we found two distinct groups of Roseate Terns about 100 yards apart: in another were five groups, one being among Sandwich Terns (p. 145).

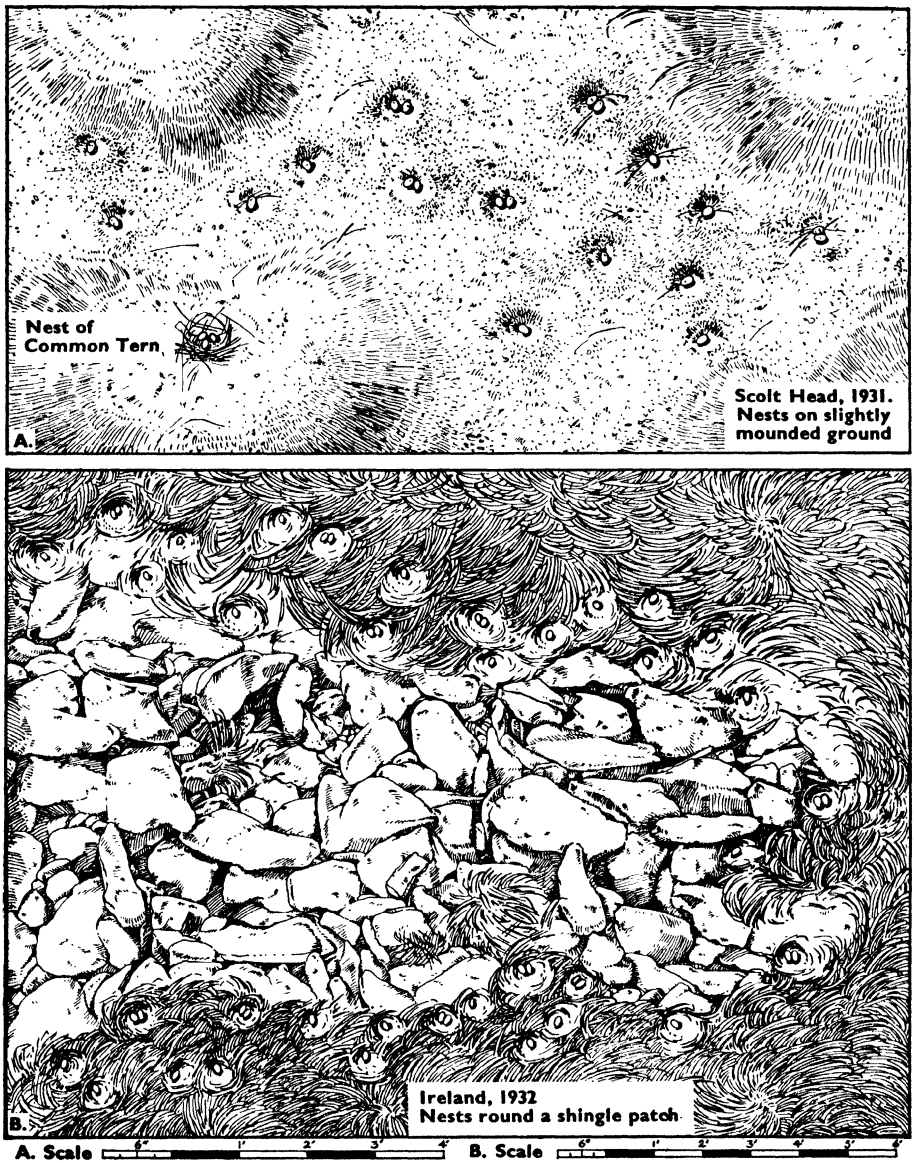
Roseate Terns' eggs have this difference from those of the other Terns: they lack variety, to describe one is to describe almost all. They are more elongated, are of a stone colour, light or dark and occasionally grey. Out of 37 eggs, 13 were light stone, 18 darker stone, 3 pale green-grey and 3 pale warm-grey. They have many black or dark brown small spots and specks and numerous small pale or darker grey under-marks. Light and dark eggs may be found in the same nest. The average size of 37 eggs was: length 43·83 mm.; breadth 29·18 mm.; the longest being 48·5 mm. (× 29·8 mm.), the shortest 39·6 mm. (× 29·7 mm.); the widest 31·4 mm. (× 42·5 mm.) and the narrowest 27·9 mm. (× 48·4 mm.). The average weight of 32 was 18·96 gr., the heaviest being 23·37 gr. and the lightest 16·29 gr.

There seems some doubt as to the number of eggs in a clutch. Thompson [1] says, "Nests contain, generally, three eggs": Seebohm,[2] "Eggs . . . are two or three in number." It is said to "lay one egg only in Ireland while in England commonly two." [3] And again, "This Tern seldom lays more than one egg." [4] Also "Evidence of three in British Isles unsatisfactory." [5] Having examined 373 nests we found two had three eggs, 155 had two eggs and 216 had one egg only: thus 41·55 contained two eggs against 57·90 with one. One can say, therefore, that two eggs are just as likely to be the full clutch as one, as many of the ones would be increased to two in due course. As to the nests with three eggs, though exceptional they were certainly genuine: to have watched the birds on the nests, "changing over" and performing their other duties, at close quarters from a "hide" as we did, is to make certain: to have photographed the nest with the eggs and the bird sitting is to make certain, sure (Pl. 82).

The incubation seems to last 21 days, and is undertaken by both parents. One year, at Blakeney Point, a Roseate Tern was thought to have mated with a Common Tern.[6] It is a pity that this unique occurrence, if indeed it did take place, was not properly verified.

As with the eggs, so the young present far less variation than do those of the Common species. Nor is the pattern definite. The feet are leaden-grey, the beak bluish-grey next the head, changing to grey-flesh, ending with a tip of dark reddish-brown (in some examples the legs are fleshy-grey and the beak of a similar colour), the mouth inside is grey-flesh. The

[1] *Nat. Hist. of Ireland*, III. 272.
[2] *Hist. of British Birds*, III. 278.
[3] *British Birds*, VII. 250.
[4] *Irish Naturalist*, XXXI. 129.
[5] *Practical Handbook of British Birds*, II. 707.
[6] *British Birds*, II. 307.



Plans showing proximity of (A) Sandwich and (B) Roseate Terns' nests, drawn to scale.

upper parts are dark yellowish-grey or fawn-colour with a quite indistinct pattern of smallish dark grey, almost black, spots closely arranged, giving a mottled appearance. The throat and chin are warm grey and the rest of the underparts either white or very pale bluish-grey. A distinctive feature is the down on the back, which, while it resembles that of the young of the Sandwich Tern, separates the Roseate young from those of the Common and Arctic Terns in that it has a prickly look as though the down had been replaced by spines; this appearance being due to the filaments being gathered together in each down-feather into a point in a similar manner to the young of Sandwich Terns. This spiny down continues all over the upper surface of the little bird (Pl. 74).

Shortly after hatching the young become very active, they will run rapidly and conceal themselves effectually at the first opportunity. Soon they leave the vicinity of the nest and wander away long distances on to the shore, in this as in so many other ways resembling the Sandwich Tern. How their plumage develops and what are their proceedings up to the point of their departure we have not, as yet, had opportunity of observing. We have noted them, however, on the west coast in September in company with the other four species engaged in passing south to their winter quarters on the coasts of Africa.

The LITTLE TERNS arrive at their nesting grounds somewhere about April 23rd and colonise apart from the general ternery, though often enough at no great distance. This proximity is, after all, entirely accidental and is due to suitable nesting ground being found in the vicinity of the other Terns. They find the shingle banks along the shore or the sand above high-water mark most desirable but do not despise areas of sandy pebbles exposed among the sandhills away from the sea when nesting. Among shingle, they seek places with stones smaller than the eggs, or small areas of sand, on which to deposit their eggs (Pl. 83). It is the only species of Tern to habitually lay its eggs without building a nest of vegetable material, though this custom is observed, at times, to be broken. On two occasions only have we found nests, small, it is true, of short pieces of stalks, out of many hundreds of nests examined. A more usual habit, if any nest is made, is to collect fragments of cockle-shell or little stones to form a lining to the nest hollow (Pl. 86).

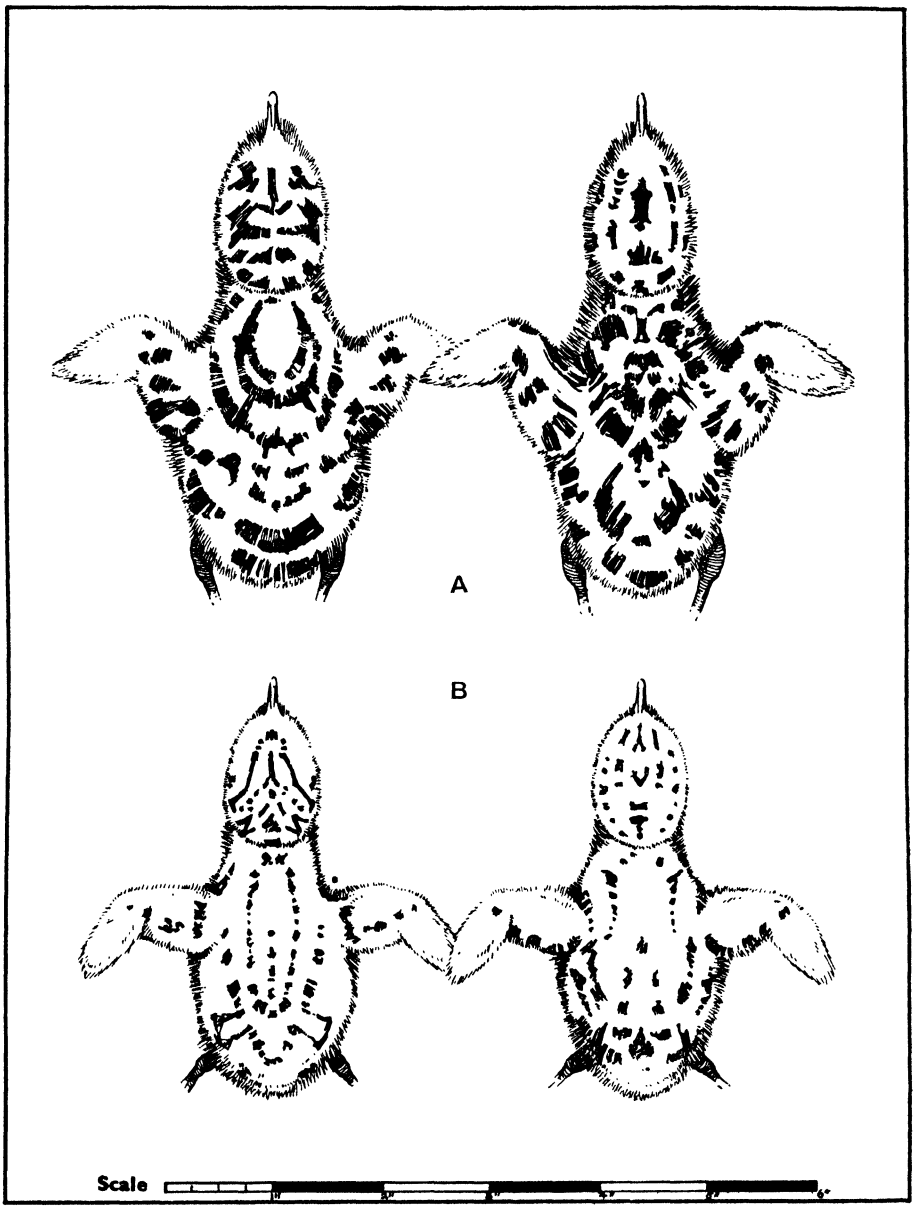
They commence laying, in general, about May 20th, the earliest date we have noted being May 10th. The number in the clutch seems more usually to be two, but three eggs are quite common. Out of 64 nests noted, 28·12 contained three eggs, 48·44 had two eggs and 23·44 one egg only. Occasionally four eggs are laid. One nest we found contained one Little Tern's egg and two Ringed Plover's eggs, to which bird belonged the nest (?) unfortunately we could not stay to find out.



77. SAND DUNE SITE OF ROSEATE TERN'S NEST.



78. ROCK ISLAND SITE OF ROSEATE TERNS' NESTS.



Patterns on :—(A) Arctic Tern and (B) Little Tern Chicks.

The eggs do not show great variety either in colour or markings. The ground colour seems most generally to be greenish-grey, but eggs of a warmer grey and even stone-colour are found at times. The markings are either black or dark brown and take the form of spots and specks with under-marks of bluish-purple or grey. At times these dark markings consist of patches, sometimes quite large and striking, and spiral markings occur. The eggs are more ovoid than any of the other four species. Out of 65 eggs measured, the longest was 35·5 mm. (× 24·3 mm.); the average length was 33·06 mm., and the average width 24·1 mm.; the shortest was 30·1 mm. (× 22·7 mm.). The widest egg was 25·6 mm. (× 32·8 mm.) and the narrowest 22·7 mm. (× 30·1 mm.). The heaviest egg out of 53 weighed 11·5 gr. (34·7 mm. × 24·0 mm.); the lightest was 7·28 gr. (31·5 mm. × 23·2 mm.), the average weight being 9·64 gr.

Partly owing to their small size, partly to their colour and shape-resemblance to the pebbles among which they are laid, the eggs are more difficult to see than those of any other species. Even when laid on sand they still tend to elude the eye, though not so completely as when in other situations.

Incubation, which lasts some 20 days, is undertaken by both birds. As the eggs hatch the parent carries away each shell to some distance. The young weigh about 7·00 gr. when hatched, but speedily increase in weight until after two or three days their weight will be two and a half to three times as much. When just dry after hatching the legs are flesh colour, the beak flesh-grey with dark brown tip. The general colour is exactly like sand, rather warmer on head, shoulders and arm with a pattern of spots: dark or grey-brown. The underparts are white.

The young ones hide, very effectually, by simulating the sandy areas among the pebbles forming their nesting ground. They run actively when they get older and their down is replaced by fawn-coloured feathers each of which has on it a dark grey or black " vee "-shaped mark. These marks are small on the head, larger on the mantles and mottle the back. Beneath the chicks are a delicious creamy white. They are easily the most beautiful and decorative of Tern chicks (Pl. 88). The wings develop and the primaries and secondaries are then medium grey with black quills. They still retain a certain amount of down on head and rump. One we weighed at this stage was 22·90 gr. Not being so numerous as the other species, the concluding stage of their development is not easy to watch. But we have observed them on migration with companies of Common and Arctic Terns, still clamouring for food, following their parents in the air, and receiving the attention they demanded.

OF FOOD AND FEEDING

NEXT to the proceedings connected with the continuation of their species, obtaining food is the most important part of a Tern's life. And, indeed, the two activities, reproduction and feeding, are more involved than appears at first sight. The fact is obvious to anyone having a close and continuous association with any ternery, large or small. A plentiful food supply means numerous and healthy young ones, while even a temporary failure of the fishing ensures a terrible mortality among the chicks. Nay, more than this, it seems probable that the erratic movements of Terns from one breeding locality to another are not due to human persecution and egg-taking but to corresponding movements on the part of the fish on which the Terns feed. And before these Tern movements can be completely understood it will be necessary to know more of the why and when of the fish-wanderings.

The SEA TERNS obtain the bulk of their food by fishing, mostly in the sea, though they do fish in streams and inland pools, at times by choice, at times through necessity. Occasionally they add to their menu by catching insects in the air after the manner of swallows. The MARSH TERNS seem to reverse this habit, for, in their case, insects appear to form the staple part of their food, though fishing is not an unknown accomplishment.

The fish are captured in the same manner by all the British Sea Terns, *i.e.* by diving, though the details of the method vary a little with the different species.

Common Terns, Roseate and Arctic too, fly slowly along over the water with head hanging down and beak vertical, watching for the fish. On seeing one sufficiently near the surface, they drop like a stone, with wings partly closed, making little or no splash. Usually they completely submerge and often remain beneath the surface for about the period of one second. As Latham graphically puts it, " They fly up and down over the water intent upon their prey, and when they espy a fish, they cast themselves down with wonderful swiftness into the water, and catching it up, fly away with it in a trice." At other times while the body is submerged the wings remain out of the water. If the fish, when seen, is not near enough to the surface, they hover with quickly beating wings and depressed, spread tail, keeping the same position in the air. During the

performance of this feat the wing strokes are made rather forward and back, not up and down, the reason of this being apparently to correct the drift caused by the wind. It is quite common to see the birds drop and check, very cleverly, before reaching the water, then rise again. We suppose that when this happens the fish on which the bird was intent had descended out of harm's way and for the bird to continue the dive was useless. Coming out of the sea after a dive they shiver the wings and body to throw off the clinging water. Whether they submerge or not seems to depend on the depth of the water, and it is noticeable that, when fishing close to the shore or in shallow pools, they do not drop so far and only partly submerge. Whether they drop vertically or on a slant, as they often do, depends on the strength of the wind. They constantly fall at an angle of about 80 degrees and we have seen them descend at an angle of 45 degrees. They must exercise considerable judgment in deciding the right spot to start their descent when a wind is compelling them to drop on the slant, in order that they may enter the water at the exact spot where the fish is lying.

Sandwich Terns dive with a big splash, the water spurting a yard high and the noise of the impact is clearly heard. They, too, completely submerge, perhaps oftener than do the other species. They will remain under water for as much as a second and a half. At times, just before dropping, they will rise a yard or so as though, suddenly realising the need to dive to an increased depth, they feel it necessary to provide themselves with a greater impetus. The Common Tern reappears from the water in the same spot at which it enters, but the Sandwich Tern, especially when it has entered the water on a slant, will emerge a foot or so from the place of entry. Fluttering over shallow pools left by the tide, they hang six to twelve feet above the surface. They enter the water head first, submerge the whole body, but leave the wings, which are elevated above the back just before breaking the surface, above the water.

There are many submergences which result in failure to catch a fish. On the other hand, at times luck is with them: one white-faced youngster we watched caught seven fish in ten dives, and ate each one as soon as caught.

The fish is held, daintily by the gills, in the tip of the beak, and it is curious to note that in the majority of cases it hangs down on the left side. This applies to all the Terns and seems to be the general custom. The fish when passed to the mate or given to the chick is placed head first into the bill, not laid on the ground to be picked up, and it is always swallowed head first. If given to a young one and accidentally dropped, there it lies, for the chicks seem unable to pick up food from the ground. Many fish, thus lost, lie about a ternery. If the parent is keen, it will pick up the dropped fish and again give it to the youngster. Watching



79. GROUP OF ROSEATE TERNS' EGGS ON GRASS.



80. WELL-MADE NEST OF ROSEATE TERN ON SHINGLE.

a family, we saw the male return with a whitebait. A young one was roaming round the mother, who was sitting on the nest. It ran to meet its father and was presented with the fish. The chick tried to swallow it, but failed and dropped it. The father picked it up and walked towards the nest with the fish hanging from his beak. The chick followed and was again given the titbit. Again it made a gallant attempt to get it down. It was a large fish for so small a bird and it once more failed and let it fall. The parent picked it up and for the third time gave it to his young one. Now followed a protracted struggle between the chick and the fish, father standing by calling, perhaps encouragement. At last the chick seemed to conquer, the fish began slowly to disappear. It was half swallowed, a shining silver tail was all that was left, when, for some reason, the fish suddenly reappeared and fell to the ground. For the fourth time the father picked it up ; the chick held its mouth wide open for the dainty ; we were just thinking " What a patient bird " when he turned it in his beak and swallowed it himself !

One young one sat in the nest with the tail of a small sand eel sticking out of its beak. It had been unable to swallow it completely and was waiting patiently for the head-parts to digest in order to dispose of the remainder and complete its meal. Causing it to eject its *bonne bouche,* part of the fish was seen to have disappeared, it had been digested away. It is not an uncommon sight in a ternery to see chicks thus patiently waiting on digestion or to see half-digested fish lying about on the sand.

As a rule fishing is a deliberate proceeding. The Terns get a fish here and there as they beat along against the wind, often enough diving many times without seeming to catch anything. They may, on some of these seemingly fruitless dives, pick up some small thing which to the observer is invisible : indeed, we have a number of times, when in our " hide " close to a nest, seen birds return and pass to their mate something so small, possibly the bigness of a grain of rice, that we could not tell what it was.

During a Tern's leisurely beating over the water a small shoal of fish may be espied ; the discoverer becomes animated and drops often and rapidly. The bird's movements are seen by other Terns, their purport is known, they hurry to the scene and a small crowd quickly assembles, their eagerness being indicated by cries as well as in their swift movements. The shoal may be small and soon caught or it may disperse ; the excitement dies down, the birds drift apart and resume their easy-going search for other fish.

One such gathering was witnessed when a very large shoal was observed by several Sandwich Terns in the Blakeney river. The discovery was instantly communicated, by their incessant diving, to the other birds on the Point, where many hungry young ones were assembled. The parents

of these were soon on the spot and tremendous excitement ensued. The air was filled with a multitude of cries and the swiftly falling forms of the Terns. Then began a stream of fish-laden birds beating off to the ternery, flying quite close to the water against the wind. The fish having been delivered to the young, the parents returned to the shoal, now flying much higher. Thus the flow of birds to the ternery passed beneath the returning stream. How long this lasted we cannot say, but during five minutes as the birds flying to the ternery passed a sea-mark we counted eight hundred and sixteen going in the one direction. At the same time a stream of similar density was returning to the fishing.

On another occasion the tide had retreated and left large pools in the sand. Our attention was called to these by a scene of astonishing agitation, clamour and rapid movement. The Terns had discovered that the pools were thick with whitebait. In no time every available Tern seemed to be there dashing about, screaming, falling headlong into the water quicker than we could count. Hovering over the pools was a dense, horizontal, fluttering mass of birds from which individuals dropped like stones with great rapidity one after another (Pl. 89). The water spurted up in all directions as the birds struck the surface. Quickly the clamorous dropping crowd over the pools was joined to the ternery by an unbroken stream, going and returning, one fish-laden, the other going back for a fresh supply. With the Terns were Gulls, Herring, Black-headed and Black-backed, equally excited, but ludicrously incompetent fishers in comparison with the supremely adequate Terns. The larger Gulls could not dive at all. Seated on the water they were content to up-end like so many ducks. The Black-headed Gulls did make ineffectual efforts to dive, dropping a distance of two or three feet, but their bodies refused to submerge. Nevertheless, the fish being present in millions, they all managed to attain repleteness, when, along with Terns who were in the same blissful state, they sat about heavily on the sand bordering the pools until digestion permitted them to return and regorge themselves. On visiting the pools we found each one crammed with whitebait to such an extent that the fish showed as a dull, dark green, slowly moving mass occupying almost the whole area of the water. On the sands near by and floating on the pools were multitudes of dead fish, showing their silver sides, fish caught and dropped in the excitement. Whether Terns will not touch a dead fish, as we suspect, or whether they take live fish by preference, it is certain that on this occasion the dead fish were left to the Gulls. In this connection an interesting statement about Roseate Terns feeding is given by Thompson:[1] "Little fish, flung into the air towards them (*i.e.* by fishermen in the boat), were sure to be seized before reaching the water." In the offing, one or two Arctic Skuas, not troubling

[1] *Nat. Hist. of Ireland*, III. 272.

to fish for themselves, worried the flying Terns until they dropped their fish. Nor were the Skuas the only robbers the Terns had to fear. Gulls, both Herring and Black-headed, also waylaid them in the, usually, vain hope of stealing the fish being carried home. This turbulent scene recurred for several days in decreasing intensity. At each low tide the pools retained myriads of the little fish, but in less and less quantity each day, until only a few could be seen. The condition of the ternery reflected the super-abundance of food, for everywhere, lying on the ground, was a litter of decomposing fish which had been carried to the young but had not been eaten (Pl. 89).

It is when fish are thus plentiful that a ternery flourishes.

Besides whitebait, called "herring-syle" on the East Coast, and sprats, other fish, as well as an occasional sand eel, are brought by Common Terns for their mates and young. The sand eels are in much greater favour with the Sandwich Terns and specimens as long as nine inches are, at times, carried. We have seen Arctic Terns bring to their young ones, smooth brown shining cases, an inch or so long, which looked like some kind of chrysalis (Pls. 90, 91, 92). On several occasions a leech was brought by a Common Tern: this had, probably, been caught in one of the "slacks," *i.e.* accumulations of rain-water in hollows in the sandhills.

Above these "slacks" occasionally is enacted a scene recalling the excitement of the Terns over the whitebait, but without any diving. The cause is a hatch of some form of ephemera. The birds congregate in hundreds and dash back and forth, up and down, snapping at the insects as they pass, calling continuously as they do so.

An observer can only record what he sees: dissection offers more complete evidence of the food of Terns, and investigations carried out in this manner by Dr. Collinge [1] have provided some interesting results. Of the birds examined these show, briefly, that 40·32 per cent. only of the food of Common Terns consisted of fish; 25·48 per cent. being food fishes—whiting, haddock, herring and whitebait—and 14·84 per cent. being sand eels; 19·09 per cent. insects, and the rest crustacea, marine worms and shellfish. Sandwich Terns' food consisted of 66·25 per cent. of fish, 32·50 per cent. of marine worms, and 1·25 per cent. marine molluscs: the fish being made up of remains of food fishes, 34·79 per cent. and of sand eels, 32·50 per cent. Little Terns contained 1·87 per cent. fish and 96·88 per cent. crustacea and 1·25 per cent. marine molluscs. No traces of freshwater or flat-fishes were met with.

Fishing begins with dawn and as soon as it is light numbers of Terns will be seen beating away to sea and returning fish-laden. Away in the distance, if the fishing is good, is heard the clamour of the excited birds. As the tide rises the eels which have been buried in the sand are roused,

[1] *Investigation into Food of Terns*, pp. 39 *et seq.*

and this is the opportunity of the Sandwich Terns in particular. Rather later, in an hour or so, the hurry to and fro of the fishers dies down; the night hunger has, in the main, been satisfied, though some may still be seen carrying fish. These, if it is early in the season, are mostly courting birds. Throughout the day, fishing is carried on spasmodically, increasing in intensity as the season progresses. At first each bird satisfies its own hunger. Then the males catch fish as presents for their intended mates. After the eggs are laid the sitting bird must be fed by her husband, who has now to fish for two. Still later, when the first chicks are hatched, both the mother and the young ones need food. The ternery now becomes a busy and noisier place. When all the eggs are hatched, the mother is released from her duties of brooding and joins her mate in catching food to satisfy the demands of their family. In a good year this means that the hungry mouths are, at least, doubled. The hurry from the ternery to the fishing ground is intensified; the air is full of going and coming birds; the clamour is unceasing; the labours of the parents extend from dawn to dark without intermission. At 10 p.m., when it is almost dark, the procession of returning birds flies low from the fishing ground to the ternery. Their labours are over for the day. Yet, even at this time, some high-flying silhouettes just discernible against the faintly-lighted, western sky can dimly be seen making off to get a final fish to satisfy their own hunger or satiate their young.

But these " fat years," periods of over-feeding, do not always occur. From time to time there come " lean years," seasons of starvation, when, owing to insufficient food, the young die like flies. If this shortage, as it often does, coincides with inclement weather, the condition of the young birds is pitiable indeed, for, added to the risk of starvation, is a weakness of physique which unfits them to withstand sandstorms or deluges of cold rain. For some reason at present unknown, the fish which form such a large part of the Terns' food supply not unusually fail to put in an appearance in sufficient quantity at the right time and place. Whether a cold current develops in the sea and prevents the herring fry from moving freely along the coast; whether the surface layer of water remains at too low a temperature to allow the small fish to rise to the surface; whether it is that rough water near the shore deters them from coming in, we do not know, but certain it is that fluctuations of food supply cause the adult birds to change their breeding quarters, and, what is worse, bring about extensive mortality among the young. Such a calamity occurred at Blakeney Point in 1931. The death-rate was appalling, probably 75 per cent. of the young succumbed. On one morning we picked up one hundred dead chicks, mostly newly hatched. In some nests all three young ones were found dead. Many nests were abandoned by their owners, leaving one or two eggs to their fate. It would seem



81. Clutch of four Common Tern's eggs laid by one bird.



82. Unusual clutch of three Roseate Tern's eggs.

that, having hatched one (or two) eggs and being unable to feed the chicks, the parents had lost heart and discarded further responsibility. So hungry do the adult birds get under these circumstances that the sitting bird will literally snatch the fish from the mouth of her young one as it is being fed by her mate. It is at such times, when parties of fishers are seen returning from their labours without any catch, that a successful bird will be assailed by others of his kind and there follows a noisy scramble for the possession of the fish.

Owing to their smaller numbers there are, among the Little Tern, none of the mass-feeding displays which are so spectacular with the larger species. The food of this Tern consists of smaller fish of the same kinds—except sand eels, which we have not observed—as are eaten by the other Terns and very small dabs or flat-fish. As we have noted, Dr. Collinge found that a very large percentage of their food consisted of crustaceans, and we have seen Little Terns very busily " dipping " for shrimps in small runnels on the sandbanks. Their fishing takes place in the shallower pools, the edges of the tide and in tidal rivers. As with the larger birds, the captured fish is held by the gills with the tip of the bill and is used, not only for definitely feeding purposes, but as an offering to the prospective bride. They hang, when fishing, with head down, facing the wind, fluttering their wings but not moving forward. At times they will hang a moment with motionless wings. They drop vertically, or if at an angle will, just before entering the water head first, deflect and drop in vertically. They immerse completely or not according to the position of the fish or the shallowness of the water. The wings are rather spread or are kept so until the Tern is about a foot from the water, when they are quickly closed. Their sight must be wonderful, for they will beat slowly against the wind, following the edge of a descending tide at a height of something like thirty feet and yet see and capture the tiny fish. Little Terns seem to fish nearer home than the larger species, in the river or beach adjacent to their nesting ground.

The quaint description of the Little Tern's method of fishing written by Johns [1] in 1862 is worth reproducing. " Flying slowly along," he says, " some fifteen or twenty feet above the surface of some shallow tidal pool, or pond, in a salt marsh, suddenly it arrests its onward progress, soars like a kestrel for a second or two with its beak pointed downwards. It has descried a shrimp or small fish, and this is its way of taking aim. Employing the mechanism with which its Creator has provided it, it throws out of gear its apparatus of feathers and air tubes and falls like a plummet into the water, and, in an instant, having captured and swallowed its petty booty, returns to its aerial watch post."

Carrying a fish does not impair the faculty Terns have for producing

[1] *British Birds in their Haunts*, 1862.

sound : their calls are just as loud and harsh as when the beak is disengaged. But there *is* a slight weakness in pronunciation. When seeking its mate the call given by the Common Tern is " $P\bar{e}_{er}ri$ " given singly or repeated quickly. When carrying a fish a sort of short-tongued version of this cry seems to be given, due, no doubt, to the beak, or more probably the tongue, being obstructed by the fish-head. This causes the last " r " to be dropped, hence the call sounds like " $P\bar{e}_{er}yi$." Arctic Terns have a similar call ; both species often announce their successful return from fishing by calling " $P\bar{e}\bar{a}$ " long before they get anywhere near the ternery, that is a half-mile or more away. This call has in it an exultant ring and may be a song of triumph. A notification call of " $K\bar{a}_{er}i$," of which a variation seems to be " $Kroi\bar{e}_a$," is made by Sandwich Terns under similar circumstances. " $Cheeker$ " would appear to be the equivalent cry of the Roseate Tern ; while the Little Tern uses the call " $Ch\bar{e}e_{er}{}^{i}$."

OF ATTACKS AND DEFENCE

FOR so strikingly obvious a bird, made more visible by its habit of nesting in open spaces in communities, the Terns have singularly few enemies. Apart from man and the weather they have little to fear, though, as will be seen, they take no chances.

Man is the only thing persistently and increasingly inimical to them by reason of what is, ironically, termed the " march of civilisation." The internal combustion engine and the housing question are the Terns' greatest enemies : while the " open-air " movement and golf, in particular, are almost as destructive. The popularising and populating the sea-coast, the spread of seaside towns, the shore bungalow habit, the death duties causing the break-up of large estates, the motor-car and bus facilities for getting to secluded parts of the coast, all operate in the same direction and are, year by year, attacking Terns and driving them from their age-long breeding places. Ranges of sandhills which for generations were considered worthless have not only been appropriated for golf courses but are now acquiring value as building land, and one has only to visit such places as Hoylake and Formby, the district called " Sandhills " in Poole Harbour, Dawlish Warren and other places, all, at one time, haunts of the Terns, to see what is happening.

Even the usage of shingle banks for the making of concrete, as at Wolferton in Norfolk, is indirectly driving these birds away by destroying their nesting facilities. Just as the inevitable drainage of the Fens eliminated the Black Tern as a British breeding species, so these other social changes will, in time, crowd out the other Terns, though, perhaps, not so completely. Nothing can prevent this except a drastic change in social development, not even the establishment of " sanctuaries," though such amenities will retard their extinction in England. Places difficult to reach may remain the homes of the Terns for generations ; the more remote parts of Scotland and Ireland will continue, for some considerable time, to offer secluded nesting areas.

The beauty of the birds and their eggs are responsible for a certain amount of loss caused by the gunner and egg collector. But though the loss of birds through these causes is almost negligible, such as it is has been checked somewhat by the protection laws. But it is probable that unheeding visitors to Tern sanctuaries are the unwitting cause of more

destruction than either shooting or collecting. In such places the nests are so thick on the ground and the chicks so vagrant, that visitors, looking about them and at the wonderful spectacle of the birds in the air, fail to heed their steps and tread on eggs and young. Some sort of " reservation " *inside* a " sanctuary " into which visitors might *look but not enter* could easily be arranged and would prevent much of this kind of destruction.

Unmistakably brutal to the Terns, at times, is the weather. Yet, as far as one can tell from the incomplete records, the birds succeed in preserving the *status quo* even if they do not increase in numbers. This weather danger usually comes to the Terns in June, when all the eggs have been laid and the young are beginning to hatch out. Given a cold, wet spell, exposed as their nests are to all weathers, the sitting birds have difficulty in keeping their offspring warm and dry. But let the inclement weather be accompanied by a high wind when the sand is driven violently across the nesting ground, and eggs will be buried beyond recovery, young ones blinded and choked by the drifting sand and the mortality will be severe (Pl. 96).

But this destruction is as nothing compared with the loss of life owing to a shortage of food, when the young herrings and other small fish which constitute the food of the Terns fail, from time to time, to appear in satisfactory numbers. At these times the young birds die by scores, starved to death, and the terneries present a pitiable sight. To this reference has been made in the preceding chapter. Such a catastrophe takes place every few years. In the same year, 1931, as the Blakeney Point calamity mentioned, in the Abbotsbury ternery the young ones escaped an early death only to succumb to starvation and exposure when they had almost grown their feathers. And in the same ternery a little later in the same season, those which had escaped the earlier peril and were just about to fly, suffered a similar deprivation and died wholesale.

It may be of interest to interpolate here the information that, notwithstanding this wholesale destruction at the Abbotsbury ternery, in the following year, 1932, the Terns were thought to be more numerous than usual, and that at Blakeney Point, as will be seen from the report of the number of nests and eggs (pp. 42, 48), no diminution in the numbers of returning birds was experienced.

These calamitous seasons do not occur every year, though nearly so, as will be seen from the following extracts from the Norfolk and Norwich Naturalists Society's excellent reports:—Salthouse, 1924, " About half the chicks died." Scolt Head, 1925, " Gales and rain destroyed many young and eggs." Scolt Head, 1926, " Young died in large numbers." Salthouse, 1927, " 25 per cent. succumbed to cold rainy weather." Scolt Head, 1927, " 50–75 per cent. dying within twenty-four hours of hatching."



83. LITTLE TERN'S EGGS LAID ON SHINGLE.



84. LITTLE TERN'S NEST ON SAND AMONG SHINGLE.

Blakeney Point, 1929, " Hundreds died as soon as hatched." Scolt Head, 1929, " Gale and very high tide washed out nests and chicks, which were either drowned or choked." Scolt Head, 1930, " Gale with sand-storm, many dead." Fortunately the birds are able to repair these terrible losses and regain their normal numbers and *even increase*.[1]

Another natural peril, as will have been noticed in the above reports, is that of abnormal high tides, or high tides accompanied by a strong, inshore wind. As many Terns in a colony nest on the debris forming the high-water mark, these unusual tides work havoc among nests in this situation. Little Terns are particularly liable to this form of destruction, for they will even nest below the limit of the highest tides, and though their nests are often washed away, never profit by their experience. If one is on the spot, the eggs can be moved out of the reach of the advancing water, and as, fortunately, the birds take kindly to such removals, all may be well. An account of such an incident will be found in the chapter " Of Experiments."

Terns cannot put up a defence against these destructive agencies, but when they have visitors which give them cause for fear they are not slow to take such steps as are possible to expel them from the ternery.

Man in the mass they cannot deal with, but, singly, he is far from immune from their attack. All the species, particularly at certain times, resent the intrusion of human beings, though twice only have we been attacked by a Sandwich Tern, and that in a half-hearted fashion. But the other species can make themselves extremely unpleasant, the Roseate Tern, however, being less aggressive than the other three. Often, as a means of defence and, most emphatically, as a means of offence, Common and Arctic Terns too employ artillery of a foul nature, a fluid which they deliberately discharge with considerable accuracy on the unlucky intruder. Ingenious as is this weapon it is not their only means of defence. Considerably more alarming, and often decidedly more painful, is their habit of swooping at one's head when near the nest or young. All the species do this ; they may vary a little in exact detail, but the result is the same—very unpleasant. Common and Arctic Terns will beat about in the air over one's head to a constant, repeated, short call until, having got suitably placed, they will turn into the wind and beat down towards one with short, rapid wing strokes, then precipitate themselves in a headlong dive. When a yard or so from one's head they scream, an awe-inspiring sound, rising to a thin shriek, " Chakakakakarrrr." If one is lucky they turn suddenly upward, almost vertically, without striking, sail with the wind, commence calling " Ki " again, beat back, and

[1] *Wild Bird Protection in Norfolk*, 1930, p. 55.

repeat the swoop and scream. If one is unlucky they strike one's head with some force, and if one's luck is really out they will discharge their offensive fluid at the same time. The force of the blow will be gathered from the experience of one of us. An irate pair resented his near approach to their nest. In quick succession they swooped and struck his head twelve times so hard as almost to knock his cap off, and even to penetrate the cloth, though it was thick tweed and lined, piercing his scalp with their sharp beaks three times, causing a considerable flow of blood. Both birds, which were Common Terns, were concerned in the attack and followed each other quickly along the same " attack curve," and the effect of a rapid succession of birds hurling themselves down at his head, often striking it and always emitting a hideous scream, was a little unnerving. On another occasion on coming out of the hide—he had been photographing the bird's mate sitting on her eggs—he suddenly and unexpectedly received a great blow on his head, immediately preceded by a fierce " Karrrr " from the male Arctic Tern, the result being two punctures in his scalp half an inch apart which bled freely. This preliminary was followed by the persistent attentions of both birds, chattering in the air and hurling themselves rapidly time after time at his head, each descent being accompanied by a scream. On yet another occasion he was struck in this manner, also by Arctic Terns (which we believe are either more courageous or shorter-tempered than the others), no less than twenty-eight times. Dazed and bewildered, he beat a hasty and undignified retreat.

The Little Tern, though smaller, is almost as violent, though less noisy. Their " attack curve," which descends at about 60 degrees and rises almost vertically, follows a quiet calling of " Tip—tip " in the air. It is made with short quick wing-strokes until about 8 or 10 feet from one's head, when the wings are held " vee " shape until the bottom of the curve is reached. The descent is silent, but, when passing close to the head, a loud " Queerk " is given. Both birds engage in the attack, calling incessantly the " Tip " cry. We have never, as yet, been struck by this species.

Anxious to get a photograph of a Tern in the act of striking, and having in mind the hunter who tethers a goat to attract the tiger, he persuaded his wife to stand near a nest of that species. The bait was eminently successful, for the birds struck time after time, banging her hat out of shape and finally knocking it off (Pl. 98).

Individual Terns vary in this respect considerably. Some do not attack, others more or less mildly. Whether there is an attack or not depends on the species, and on the stage reached in incubation. In its early days a visitor is received with equanimity, a protest by calling from the air is all that is made. But later, when the eggs are nearly hatching,

and after they are hatched, trouble is probable, and many untoward incidents are likely to occur.

Seeing that Terns resent the presence of human beings with such demonstrations, it is not surprising to find they attack other animals and birds which may venture into or near a ternery. Whether these animals are harmful or not matters little. Rats, for example, once they get a foothold in a ternery, can be extremely destructive, eggs, young, and even the old birds at times, fall victims to this plague, and it requires unceasing vigilance and effort on the part of the "Watchers" to keep the foe at bay. We visited one unprotected island, where, we had been told, the nests were so numerous as to make walking difficult. By some means one of these pests had landed there, with the result that only two nests with eggs were left, though the island was strewn with eggshells and empty nests. Not that the rat, though always the aggressor, comes off best every time. There have been cases when the Terns, justifiably incensed at the rat's plundering, have retaliated with sharply pointed beak so effectively as to leave the rat dead, with a punctured skull (Pl. 95).

Rabbits are harmless enough, one would think, but one, running across some smooth turf, was attacked by a Common Tern which swooped at it with a scream. The rabbit bolted, then stopped to look round, when at once two birds made for it and caused it to run into the marram for safety. Shortly afterwards, thinking the coast was clear, it essayed another crossing, and again a Tern swooped and drove it back. The Terns were not so noisy or menacing as when attacking human beings, but sufficiently so to intimidate the rabbit. Nevertheless, it made a third attempt, but was driven to retreat once more. On the short turf were two nests, and the Terns seemed to think that a passing rabbit was a possible foe.

The Terns take no risks and attack most things which come near their nesting ground. We have seen an unoffending sheep incontinently driven from the vicinity of a nest by the violent behaviour of the owners of the eggs, and its still more blameless lambs skipping and jumping as though full of the joy of life, though, really, reacting to the stimulus of the pricks made by the sharp bills of the swooping Terns.

In another ternery we were attracted by a dozen or more Terns hovering, kestrel like, and fluttering, then dropping in quick succession on something invisible. Investigation showed that the cause of this display was a pair of Partridges, nothing more harmful, squatting in the marram grass.

Birds which live in terneries alongside the Terns, such as Shelducks, Stockdoves, Oyster-Catchers, Ringed Plovers and the like and little birds, are usually immune from attack; their presence is understood and accepted, though even they come in for unwelcome attentions at times.

One amusing sight we saw was an Eider Duck on one of the Farne Islands, returning from the sea, waddling across the breeding ground of Arctic Terns towards its own nest. The Terns were not pleased and showed it. Every time they swooped it " ducked," and its progress, slow but continuous, was accompanied by a quick succession of " ducks," but it crossed in time and regained its nest.

On several occasions we have seen Ringed Plovers swooped at for alighting near a Tern's nest, the scream of the Tern and its " stoop " making the Plover leap a short way into the air each time.

Usually these birds are simply ignored, and so with Redshanks. On one occasion, however, we watched a *fracas* between one of these birds and a Common Tern over the Redshank's proximity to a young Tern, which would wander from its mother, who was trying to hatch the remainder of her eggs. The commotion helped to pass the time when sitting with what patience we possessed in our " hide." The Redshank's nerves were on edge because we were too near its nest, and it stood on a " tump " calling continuously. The Tern thought this demonstration was against herself and resented it. Also her chick at times went nearer to this noisy bird than the mother thought safe. When this happened she would leave her eggs with a wild dash at the innocent Redshank and there followed a " rough and tumble." The many times this incident happened was varied by the Redshank amusingly anticipating an attack and becoming the aggressor, to the Tern's great annoyance.

The various kinds of Gulls are not averse from picking up unconsidered trifles in the way of eggs and young in the terneries, yet we think their efforts in this direction are not serious. True, remains of young Terns have been reported as found in Black-headed Gulls' nests, which is a remarkable thing in view of the usual food of this Gull.

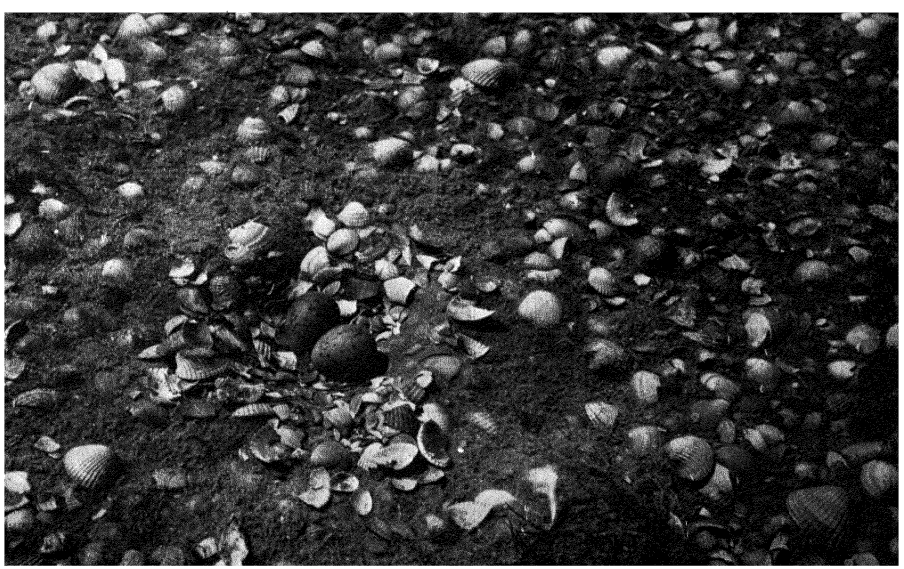
Not that the Black-headed Gull is above sucking eggs, as we have seen them do with the Sandwich Terns' eggs at Ravenglass. There, as well as at Ainsdale, Anglesey, and other places, they live on the premises and have every opportunity. Still, the appropriations by these birds do not amount to much. The danger rather from this species and the Herring Gull lies in crowding out the Terns from their nesting ground. Such a happening occurred at Ynys Aderyn in Anglesey, as we have noted elsewhere (p. 204).

Mysterious happenings to the eggs known as " PRICKINGS," which occur from time to time though not with any frequency, appear to be confined to Blakeney Point ternery and to the eggs of the Sandwich Terns there.

These differ from the cases, common to all terneries, of " EGG PECKING," which is done by Gulls of various kinds and by members of the



85. Unusual nest of straw made by Little Tern.



86. Cockle-shell nest of Little Tern.

family *Corvidæ* in search of the contents of the eggs. The holes in the shells are large enough to admit the bill of a Gull or Crow (Pl. 97).

" Prickings " are small holes, such as might be made by the sharp point of a Tern's beak, through which the white oozes out, the yolk usually remaining inside. The egg remains in the nest.

It will be noted that Coward [1] uses the word " smashed " to describe the damage, a term which describes quite well the effect of the visits of Gull or Rook but not that under discussion.

Coward thought the habit " new and unexplained," by which he meant not satisfactorily explained, for several explanations have been put forward both by himself and others.

He himself believed the " Watcher " on Blakeney Point was right in attributing the mischief to the Terns and thought that " the eggs were either ' smashed ' by the Common Terns objecting to the increase of the larger species or by the Sandwich Terns themselves." He also put forward the suggestion " that unpaired or dissolute males may deliberately have destroyed fresh eggs, the last attempt of delayed or worn-out females to rear young," and that " there is another possible solution," " the season was late . . . if late eggs or too many eggs are a danger to the colony, the over-ruling spirit may have ordained their destruction."

Oliver [2] suggested that the " prickings " were " done by the Terns themselves possibly as a sort of measure of ' birth control ' to prevent the colony from becoming overcrowded."

These propositions were made, be it noted, after observations taken *late* in the season, and when the numbers of Sandwich Terns in the ternery were extremely large.

On the other hand, the suggestion that the trouble was " due to a shortage of food " had reference to eggs laid at the beginning of the season, and it was *first-laid* eggs, also, which were pricked in each of two seasons when we were present in the ternery. In both cases the damage was done to a small group of eggs. In one case the eggs were pricked on consecutive days, the larger number on the first day; and in the other case all the eggs were pricked on one day. In neither case did the Sandwich Terns continue laying, all the birds completely deserting the ternery for the season. As in both happenings the eggs had been laid some distance from the Common Terns, we felt certain that the cause could not have been overcrowding, but that the pricking was done by the Sandwich Terns after they had decided to nest elsewhere and no longer wanted the eggs they had laid.

The Terns are quite alive to the possibilities of the Gulls and take care to herd any intentional, or unintentional, thief quickly away from the ternery. It is amusing to watch the way they have with interlopers.

[1] *The Birds of Blakeney Point*, pp. 9–10. [2] *A Souvenir of Blakeney Point*, p. 13.

No sooner does a Gull appear than several angry Terns dash into the air to check him. Though we have not yet seen a Sandwich Tern attack a Gull, the other species commonly do so. The dash and abandon with which they hurl themselves at the foe make the piteous cries uttered by the unfortunate bird quite understandable. Turning and twisting in its flight, the Gull endeavours to escape the onslaught of its tiny foes. Fortunate it is for the Gull that the attack is not pressed home. Seldom do the Terns seem actually to strike, and as the Gull passes from the territory of one group, they relinquish the attack only to have their places taken by others equally irate. The Terns call constantly during an attack, but their voices, often, are drowned in the protestant whinings of the larger bird. Herring Gulls breaking the unwritten law that they may not cross the ternery seem always to be birds in immature plumage; presumably the adults know limitations must be put to their activities or are away at their nesting grounds. Why this species is attacked is not clear unless it is on the principle that " it is better to be safe than sorry," for we have never seen a Herring Gull interfere with the nests or young or seen any evidence of their eating eggs. Though so big, he is attacked with great fervour. He wheels here and there, twists and dives in his efforts to escape, calling woefully " He_{ow} . . . He_{ow} " as he flies. The Little Terns are no less courageous and reckless and rise in defence of their treasures like diminutive aeroplanes attacking a zeppelin. With tremendous vigour they fall upon the hulking Gull with swoops and cries until, bewildered and thoroughly annoyed by the succession of buffets and possibly stabs of the sharp beaks, the Gull sheers off with a final angry and half-contemptuous " Ga_{rrrrr}."

It is not every Black-headed Gull which is attacked. Do the Terns know when the Black-heads are on their " lawful occasions " or when they have knavery in mind? We fancy those attacked must be strangers and not the birds breeding in the ternery, otherwise there would be continual fighting, which there is not. But when the Terns are aggressive they are not to be despised by any Gull. We watched two Terns which disapproved of a Black-headed Gull, drive down on it quickly, one after the other, with daring and verve. The Gull called a querulous angry " Ah_{rr} Ah_{rr} " and then " E_{ow}," the last when the swoop brought the Tern almost in contact with him. Indeed, though we could not see that they actually struck the Gull, the " E_{ow} " sounded as though the beak had found a vulnerable spot. Each time they stooped the Terns " chattered," a sound like stones lightly and quickly tapped together. The Gull, very frightened, dashed about and often turned up his head with beak widely open to receive the descending foe or to emit the fear-produced cry of " Wah_{rr}," or he would attempt to retaliate by beating up heavily against one of the Terns. After some time the Gull alighted,

still screaming. The Terns continued to dash at him. Each time as they stooped the Gull cowered but did not counter-attack. As at each swoop the Terns rose and returned from the other side the Gull was kept busy turning about this way and that to face each descending foe. At last, summoning up his courage, he rose and fled before their wrath, calling piteously until out of sight and hearing.

But there are times when the tables are turned, when the interloper becomes the aggressor. In these cases the Tern is carrying a fish which the Black-headed Gull wants badly. The Tern, though its beak holds the fish, manages to call frenziedly " Keerit Keerit " as it uses every endeavour to escape its pursuer. As they twist and turn rapidly, the Gull, close behind, tries to frighten the Tern into dropping the fish by shouting at intervals a guttural " Korrr."

We have yet to see a Gull successful in one of these chases, but not so with the Arctic Skua, that aerial pirate which lives by depriving lesser birds of their lawful spoil. Swiftly descending on a fish-carrying Tern, the Skua chases it, relentlessly, until the Tern, either through fear or fatigue, drops its fish, which the Skua with swift descent cleverly catches in the air before it reaches the ground or water. That is unless the Tern saves the situation by hurriedly bolting the fish, as we have seen them do. Not only does the Skua frequent the neighbourhood of the terneries in the North, but it is not unusual as an unwelcome visitor to the nesting colonies in England, and when Terns are travelling south on migration, Skuas frequently accompany them in their progress, to take toll of their catches of fish. The Terns resent their presence and often make counter-attacks on the Skuas while they are resting on the sandbanks, swooping down at them with fierce cries.

After these assaults on more or less innocent intruders one expects that similar attention will be paid to recognised egg-stealers such as Rooks or Crows. These depredators do not seem to experience the same panic fear as do the Gulls when attacked, with the result that they often do damage by sucking eggs or worse, though one does see, at times, these birds protesting, raucously, at being buffeted out of the ternery. A remarkable incident of a body of Terns mobbing a Hooded Crow to such purpose that he was driven down into the sea and finally drowned, is described by Saxby.[1]

Herons, though they, we are sure, would never be averse from swallowing a young Tern if it came their way, would hardly enter a ternery with that object in view. Yet the Terns of Blakeney Point, which is almost on the line of flight between the Cley marshes, the Herons' favourite feeding ground, and their home at Holkham Park, regard passing Herons with grave suspicion. A babel of excited cries from on high called our

[1] *Birds of Shetland*, p. 134.

attention to a flock of Sandwich Terns mobbing a Heron. The great bird flapped slowly along, heeling this way and that, turning and twisting to shake off the indignant Terns, which stooped at him in quick succession. The Heron, whose great bill could have quickly disposed of his assailants, did not retaliate, merely wished to be left alone. The affray drifted away over the mainland, back over the ternery and away again. It was not till they had driven the Heron far over the Stiffkey marshes that the Terns relinquished the attack and, having decided they had effectually guarded their eggs, returned home. Another Heron, before arriving at the ternery, was met by two irate Common Terns. He stood their unwelcome attentions for some time, then banked several times steeply right and left. At times he slanted so much in his haste that one wing was vertically over the other. Nearing their breeding ground the two Terns were reinforced by others, and still more, till a great crowd were joined in the onset. This combined assault was too much for the Heron, for he dropped on to the shore, where he stood seemingly quite oblivious to the attack, which did not fade away for some time.

Earlier on the same day a Montagu's Harrier flying over the sandhills was assaulted by a solitary Common Tern. Flying along in a leisurely manner the Harrier betrayed little cognisance of the presence of his foe, only when the menace came too close did he swerve a little.

The Harrier might have helped himself to a young Tern, but a Kestrel certainly would not; nevertheless, one hovering was attacked by a pair of Terns. One of these soon gave up, but the other continued its aggression. All the time the Kestrel continued to hover, intent on a mouse or vole seen below in the sandhills, and showed its knowledge of the presence of its aggressor only by slight movements when the Tern passed.

All was quiet in the ternery, that is, as quiet as a ternery ever can be, when an Oyster-Catcher gave a warning call. At once all the Terns left their nests and made off in the direction of the Oyster-Catcher. The cause of the trouble was a Hawk of species undetermined. At once the Terns attacked. The Hawk spiralled, against the clock, upward to a great height. The Terns followed, dashing at him, a pack of violently excited birds. As each Tern swooped, the Hawk shook his wings quickly, though the Terns never seemed to touch him. When the mêlée had travelled almost out of sight, the Hawk, deciding that the woods were a pleasanter place, slid off towards them in a long swift glide, still followed by the Terns, who did not desist until he disappeared into the trees.

The one member of the *Falconidæ* which is a definite menace to the Terns, and one with which their belief that the best method of defence is to attack is of no avail, is the Peregrine Falcon. Yet this bird apparently has little fancy for Tern flesh and would seem to attack the Terns but rarely, perhaps only when other food has been unattainable. The



87. Chicks of Common Tern.



88. Chick of Little Tern.

Falcon's depredations, if they can be so called, are often attributed to Owls. Thus in one ternery we picked up the head of a Tern neatly severed from the body. The " Watcher " attributed the mischief to Little Owls, " Cat " Owls he called them, which he said came from the mainland and decapitated the Terns as they sat on their nests. The body was missing in this case, but shortly afterwards we found it half a mile away on the top of a sandhill plucked and eaten in the manner usually adopted by a Peregrine Falcon, which showed that whatever might be the truth about Owls beheading Terns, this particular murder was the work of a Falcon. In another breeding ground in addition to a number of Terns eaten in true Falcon fashion, we found twenty-three headless bodies, not one of which had been eaten. In two cases the heads lay by the bodies, which were all of young birds fully fledged, but none of the other heads were to be seen. The keepers differed as to the cause. One thought it the work of Owls on the ground that a Peregrine Falcon would not strike at a bird on the ground. The other keeper attributed the mischief to a Peregrine Falcon, first, because he had seen one in the ternery and, second, because the birds were fledged enough to fly short distances and so might have been struck while in the air. This seemed to us more reasonable than that Owls should fly half a mile over a sheet of water, decapitate Terns and carry their heads back to the mainland, particularly as there are no records of Terns' heads ever being found in Owl-castings.

We have not seen or heard of Terns attacking aeroplanes or gliders, though one would think they were sufficiently like birds to give cause for fear. Perhaps it is felt the planes are too noisy, the gliders too big, and are best left alone, for the normal passage of an aeroplane over a ternery seems to be ignored; it neither causes fear nor resentment, the birds are not in the least disturbed. This, however, was not so in a Scottish colony where bombing planes roared their way along the beach not many yards from the sand where the rattle of quick-firing guns, a quarter of a mile along the shore, was constant on three days a week. Here the Arctic Terns sitting on their nests found the planes roaring over them somewhat disconcerting. They clung to their nests until the planes were quite close, then rose, but returned directly the planes had passed. A few did not mind the passing planes, they stayed on their eggs, though alert and ready to fly if their fears increased. As for the firing, this the Terns regarded as negligible, they took no notice whatsoever. We, lying on the sandhills watching the birds, or crouching in our " hide," found the roaring quite disturbing enough, but one supposes the almost daily experience of this tornado of sound coming from the planes and the tearing explosions has inured the birds. If these low-flying roaring planes are disconcerting to human beings, what must they

be to a highly sensitive nervous organism like a bird? Yet the only effect we could see, and in this we may be wrong, was that the Terns nesting on the shore nearest the targets were not so advanced in incubation as those further away and inland, either because this part of the ternery, being less desirable on account of this menace, was occupied later, or because incubation was delayed owing to the sitting birds so often leaving the nests.

OF ALARMS, DREADS AND PANICS

THE fears described in the last chapter are tangible menaces, obvious and comprehensible, but there are others, strange, vague, inexplicable terrors which assail the Terns from time to time and under whose shadow they pass the reproductive periods of their lives.

One cannot continue long in a ternery without observing these curious phenomena for which there is as yet no adequate explanation. Ussher and Warren [1] refer to these as having " no other object than enjoyment " ! Without any apparent reason a section of the Terns, or possibly the whole colony, will start into the air with an uncanny quietness, fly off a short distance, return and resume their usual occupations and clamour. These strange flights are " DREADS " and differ from the ordinary " ALARM " which causes the Terns to leave their nests when an intruder appears in the ternery in that they affect, not only the sitting birds, but also those flying in the air above the nesting ground.

In the " alarm " the sitting birds leave their eggs, fly into the air, hover or beat about above the region of their nest, calling loudly, and return, one by one, to their duties as soon as the intruder moves a little way from their particular nesting area. This is a normal nervousness and departs with the departure of the cause of the alarm. It is individual and affects different birds with varying intensity. Some are disturbed by the appearance of an intruder half a mile away and fly into the air shouting. Others are so little affected that one may come within a few yards of their nest before they are sufficiently alarmed to leave it. Such a bird, at Blakeney Point, was remarkable in that it allowed us to approach quite closely to its nest before it flew off, returning at once as soon as we moved a few feet away (Pl. 103).

At times the " dreads " degenerate into " PANICS," as though the apprehension which impelled the birds to leave the ternery developed into an affright, terrible in its suddenness and fear of consequence. Neither " dreads " nor " panics " are individual ; each seems to be an example of that curious " herd obedience " which is not uncommon in the bird world ; an instinct which impels flocks to move in unison as a result perhaps of a community of thought or, possibly, in response to an invisible—that is, to us—signal or command from their leader. Such

[1] *Birds of Ireland*, p. 322.

mass movements as are seen in great beauty and perfection in the wonderful wheeling and turning evolutions of flocks of Knots and Dunlins on our shores: those "Proteus flocks" which, as Drummond of Hawthornden puts it, "dance measures to the tide."

From secure hiding-places which ensured that the Terns were not affected by the ordinary "alarm" due to the presence of an intruder, we have watched successions of these "dreads" without being able to detect any cause for them. One naturally suspects some inimical presence among the birds, rats or a stoat perhaps, but there cannot be so many of these animals at large in terneries as to cause the constant repetition of these "dreads." Moreover, on one occasion we saw a rat run across towards the nesting area, pass close between three sitting birds which did not seem even to notice its presence, then pursue its devious way across the ternery without producing any disturbance. No panic fear was caused by this visit. On another occasion we watched a large mixed flock of Sandwich and Common Terns resting on a tiny island of sand and small shingle surrounded by the tide. On this islet there was no cover whatever, not even a large stone, to hide an enemy, yet, time after time, these birds beat off in a "dread," leaving the island obviously bare and untenanted by rat or anything which could have affrighted them. The passing of a hawk overhead would seem an adequate cause, but the Terns deal with such a menace by means of direct, bold attack, quite different behaviour from the nameless fear which produces the "dreads" (Pl. 101).

What happens during a "dread" is this. It is early in the season. The Terns are going about the ordinary business of the day. They are courting on the ground, displaying, nest-making; many are in the air above, making love. Suddenly the diverse calls which produce the normal ternery clamour become unified, the volume of sound increases. Those on the ground rise precipitately, adding their voices to the babel until the sky is filled with beating forms, each one shouting loudly, every bird in the ternery being in the air. Then with extreme suddenness they drop into dead silence, during which they wing their way rapidly seaward, low over the water. Abruptly they turn and drift back to the nesting ground on horizontal wings. Reaching the ternery they find their voices, and the normal noise breaks out as they flutter and drop to the ground and resume their former occupations. Later in the year, when many are sitting on their eggs or tending the young, while their mates are flying overhead going to or returning from their fishing, they frequently start off with that uncanny, abrupt silence, but show less fear. At this time of the year sectional and species "dreads" take place, more often than those embracing the whole of the inhabitants of the ternery. That is to say, the "dread" will affect a group; this group will leap



89. Sandwich Terns fishing for whitebait.



90. Arctic Tern with sand-eel.

into the air in silence, leaving the rest of the Terns unaffected. Or the fear will be transmitted to another group which will rise a little later than the first, and in this way, by sections, the whole colony may be involved. In watching a mixed colony of Sandwich and Common Terns, the former species, nesting as it does in closely-packed groups, seems particularly prone to " dreads." An excited group of wildly beating forms will leap from the ground, calling, beat away in silence and return, thus disclosing their presence and the situation of their nests. Similarly, the position of other groups of Sandwich Terns will be shown from time to time in the same way, by its inhabitants starting affrightedly into the air. They too, mutely, will swing round with the wind and in a moment or two veer and plane back to their nesting site. In such cases the same bird seems to be the leader in the start up and also the first to alight, and this bird is followed by the others in quick succession. Isolated " dreads " like these do not affect the other species among which the small group is nesting, though at times the fear is transmitted to the whole colony.

We have, so far, never seen the Little Terns affected in this strange way, but it is common with the other species, though perhaps less frequent with the Roseate Terns.

The duration of each " dread " is short. Of those we have timed the longest lasted 25 seconds from the rise to the return and the shortest 7 seconds. Whatever the cause, it soon ceases to operate. Other times we have noted in the order they occurred are 15 seconds, 3 : 10 : 18 : 16 : 15 : 25 : 25 : 7 : 10 and 20. When watching Common Terns on April 29th, 1930, we saw fourteen " dreads " between 6 and 7 p.m. and twelve between 7 and 8 p.m., while on May 4th we counted eight between 6 and 7 a.m. In a Roseate Tern colony we noted that five " dreads " only took place in seven hours, three being merely partial, which seems to confirm the impression one gets of their general behaviour—that Roseate Terns are less fearful than the other species (Pl. 102).

The " panics " occur less frequently than the " dreads " and seem to affect, more especially, the birds already on the wing. The usual noisy cries fill the air when there comes the sudden silence and all the flying birds beat down wind at great speed. They then dash down almost to the ground, banking quickly and falling like a multitude of pieces of paper as though an additional terror had assailed them while in the air. Low across the water they fly, still in silence, then turn, rising against the wind, and flap back to resume their calling over the nesting ground. Here is a note from our diary. " The uproar in the ternery was great. Came a sudden complete silence as many of the birds gathered into a loose flock and fled down wind at great speed as though escaping from some sudden, unseen foe. The silence and spectacle

were eerie. After dashing about in the air, most of the birds zigzagged down rapidly, resembling falling leaves, till they reached within two feet of the water, across which they drove. Shortly they rounded into the wind, their fear departed, and they beat back to the nesting area calling loudly, their combined cries sounding like bells jangling out of tune."

Always in both " dreads " and " panics," if the water is near, the affrighted birds make for it as though the cause of their fear was on land.

Apart from the curious interest and uncanniness of these alarms they have their use for the observer, as it is only then that the numbers in a ternery can be estimated with any approach to accuracy—apart, of course, from counting the nests, which is not always feasible—for all the birds are in the air at the same time.

OF EXPERIMENTS

ORDINARILY, during a gale, the Tern sits tight on her nest, facing the wind. The sand drifts upon her, piles against her breast and streams by on either side. This diversion she helps by fluffing out her feathers a little, while to escape the force of the storm she flattens herself as much as possible. Nevertheless, the sand filters through her feathers and accumulates in the nest hollow. From time to time she shakes herself, wriggles about and kicks, making the sand fly out behind her. Thus she keeps her eggs and young free from the inundating particles. But not until the strength of the gale is abated does she rotate on the eggs.

If, from any cause, she is disturbed and leaves the nest, the hollow is immediately filled and the eggs buried. What happens under such circumstances? Can she find the location of the nest? If she does, what will she do about the eggs? Will she disinter them, and how? It is not always that eggs which have come to disaster of this kind are rescued, for it is not unusual for a winter wind to remove sand-drifts formed during a summer storm and disclose buried eggs which their owner remembered for perhaps half a day but was unable to find.

To get some detailed information and photographic record of the bird's doings under these and other trying circumstances a series of experiments was made. These showed that the position of the nest remained in the bird's memory no matter what happened to it, but that the eggs were more significant to some birds than others and that the ability to connect eggs and nest varied greatly.

All the experiments were made with Common Terns except when Little Terns are mentioned.

In Experiment 1 we covered eggs in a nest with sand, completely hiding them. The owner soon came back, walked to a little hill by the nest, stood there, walked about and over the nest several times, pecked it, walked away a little distance where she crouched and kicked, then flew. She seemed to have a vague idea, only, as to the position of the nest, and the eggs were not found.

Ex. 2.—Here we buried the one egg in a nest as before with sand. The bird alighted and stood for ten minutes as though bewildered and unable to decide what to do. After the high pipe of an Oyster-Catcher

had frightened her away her footprints showed she had located the nest, for she had stood three inches from the buried egg looking somewhat helpless. As she seemed quite at a loss we now exposed a small portion of the egg. She returned and stood in the same inadequate way as before, simply gazing around as though waiting for something to happen, not attempting to look for the egg. And it was three hours before she realised that the egg was still there and proceeded to disinter it. In this case the bird showed the same combination of memory of the location of the nest and inability to grasp the situation even though the egg was partly visible.

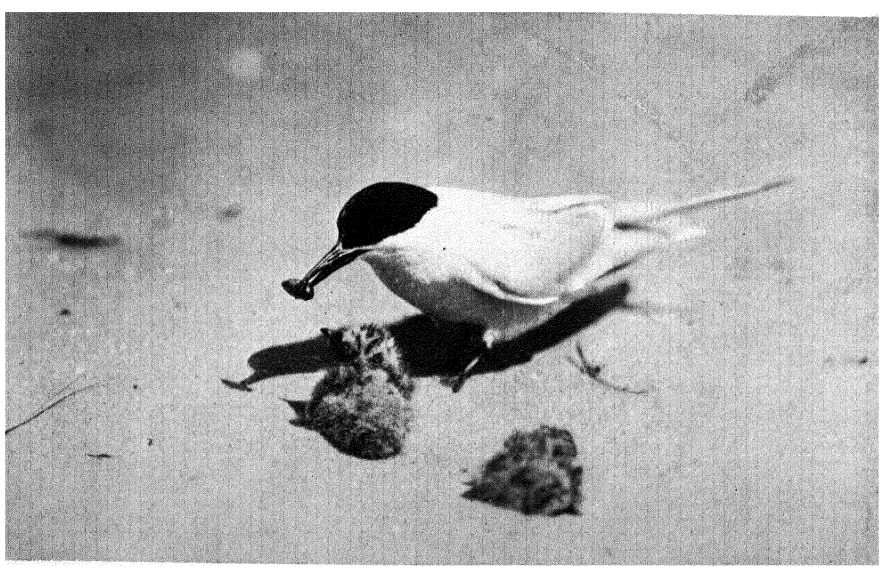
Ex. 3.—The two eggs in a different nest which we had buried as before were found by their owner in twenty-five minutes, and it may be noticed that she disinterred by kicking the sand away, not by digging the eggs out with her beak. But they may have been found accidentally when kicking sand. The bird came back, walked to the site of the nest, stood and picked up bits of wood and marram. She walked around some six inches from the hidden eggs, kicked sand with breast down and tail up; walked again, once more picked up bits, then found the nest. She now put her breast down, kicked hard, making the sand fly, rotated, kicked sand again, and having cleared the eggs, then settled down to brood them.

Ex. 4.—The last bird profited by her experience. Next day her eggs were covered again. In half an hour she alighted, giving one cry of "Ki," walked about, then went and inspected the site of the nest, walked away and stood. She now returned to the nest, picked up bits of debris, crouched kicking, several inches beyond the nest, moved nearer and again kicked the sand. After this she walked off and stood, then flew: this was at 12.7 p.m. Either she had some idea the eggs were buried or thinking of the eggs roused the nest-making instinct. Returning at 12.16 she stood thinking: at 12.25 she walked towards the nest and stood a yard from it: at 12.35 she walked to the nest, strode over it and around, pecked and soon disclosed the eggs. She then sat and kicked the sand from around them, wriggled and settled down to brood.

Ex. 5.—Here was a case of a bird not only knowing the situation of the nest but realising what had happened to the eggs. She dug them out with her beak, be it noted, after showing some knowledge of their position, not kicking the sand away from them as did the bird in Ex. 3 (Pl. 104). We had buried the eggs, when, after a considerable absence, both owners arrived. It was not usual, we found, for both birds to be interested in the nest and eggs, though this was not the only case in which they were: usually the work of rescue or what not was done by one bird only, in all probability the female. In this instance, while one bird searched for and dug out the eggs, the other stood by and looked on.



91. COMMON TERN FEEDING YOUNG WITH WHITEBAIT.



92. ARCTIC TERN WITH CHRYSALIS.

One of the birds went directly to the nest, probed in the sand with her beak and at once dug the eggs out without kicking, or very little. She soon had them arranged to her satisfaction, then brooded, idly picking up bits of grass and twigs as she sat.

In our sixth Experiment we selected, and covered with sand, the nest of a Little Tern, leaving small parts of the eggs showing. The owner, on coming back, dropped directly on to the nest. With her beak she dug out the eggs, lifting each a little, holding it between her beak and breast, while she kicked the sand away first with one foot and then the other, till the eggs were clear and the nest remade.

From these experiments it would appear that the nest situation was remembered more or less accurately, but that four of the birds did not realise the eggs were buried, and when found they were found accidentally. The other two knew the location of the nest and that the eggs were still there though out of sight. It is interesting to note that both these knowing birds disinterred the eggs by digging, not by kicking.

A new series of experiments was now made to test the ability of the bird to recognise the nesting site and to discover whether the environmental features acted as landmarks and guides.

Ex. 7.—From around a nest of a Little Tern all conspicuous objects were removed and all the larger stones, the smaller being rearranged over an area of a yard or so round the nest. We then covered the eggs completely with sand. When the bird returned she dropped twice, some little distance away. This was her usual custom and not due to the rearrangement of the environment of the nest. The next time she returned she dropped directly on to the sand covering the nest, prodded into it with her beak and soon discovered one egg. This she "towed" away *from* the nest, walking backwards with the egg held between her beak and breast. She brooded it; in a moment she ran across the nest site and back to the egg, brooding it again, then dragging it a little further away with beak and breast as before. The other eggs seemed to be in her mind for, again, she walked about a little, over and past the nest site. Returning, she probed and found another egg, which she moved in the same manner as the first, though not so far. She now dragged the first egg to the second, brooded them a little and kicked sand first with one foot, then the other, not violently, rather pushing than kicking. Revisiting the nest site, she probed again and found the third egg, disinterring it this time by kicking the sand away. She now dragged the other two eggs to the third, turned round and round, kicking and using her beak to pass the eggs properly beneath her body until the nest was remade on the old site, where she sat as calmly as before the liberties had been taken with her domiciliary arrangements.

This bird showed considerable "*nous*." She not only knew the situation of the nest despite the alterations to its surroundings, she realised the eggs were there too, though they were quite concealed. The workmanlike way in which the eggs were disinterred by digging with the beak and the clever manœuvring with the eggs as each one was found were extremely interesting and exhibited an intelligence which was not shown by the Common Terns under easier conditions.

Ex. 8.—All landmarks were removed from a Common Tern's nest and the eggs hidden with sand. The owner, arriving, alighted near the buried eggs, saying at intervals "Peeeurrrrr—Peeeurrrrr." After leaving she returned, alighting almost on the eggs, stood, walked away a little, then stood for a long time considering. She then flew repeatedly calling "Ker," a sound given quickly and explosively. She alighted between nest and hide. This was caused by a change in the direction of the wind. (It is always better to place the hide on the windward side of the nest. The bird prefers to alight against the wind, and to interfere with this desire is to delay its return.) She now walked over the eggs, stood, returned, gave a peck or two at the sand, walked away, stood, then flew. This series of actions was repeated and by this time the eggs were exposed. She stood close to them for a long time, then flew, returned and alighted a yard away and called "Quer" and "Peeurr." This she did for a while, adding "Ki" to her remarks. She now advanced to the nest, arranged the eggs with her beak and kicked the sand from around them. Here, though the Tern knew the location of the nest despite the removal of the landmarks, the eggs were discovered accidentally, and even when exposed were not accepted immediately.

In Experiment 9 and the one following, not only were the natural landmarks removed, but considerable additions were made to the landscape around and about the nest. As will be seen, neither the removal of nor the addition to the familiar features impaired in the least the bird's power of recognising the nesting site. We removed irregularities and growths, created hillocks of turf, assembled masses of marram grass and planted dock and ragwort. Notwithstanding our labour, in fifteen minutes the Tern was on its nest, the alterations not having deceived it in the least. We then made drastic alterations to another nest: to this the owner returned at once without the slightest hesitation (Pls. 106, 107).

Ex. 10.—Again we camouflaged a nest with grass tussocks, large plants of ragwort, masses of bright yellow flowering sedum acre and stones of various sizes, changing it from an open plain "scrape" to a nest surrounded and embowered in foliage. The owner betrayed no hesitation and in twenty minutes she was back on the eggs.

Ex. 11.—This time a nest was disguised by burying it entirely with straws of marram. The owner, when she returned, alighted on the mass

of marram directly over the eggs, investigated with her beak, kicked a little and did much shuffling until she had disclosed the eggs, when she sat and brooded them. She did not remove any of the marram with her beak.

But the bird in Experiment 12 did so. Her two eggs were covered with sticks and marram at 1.10 p.m. She returned and stood some yards from the nest, calling at times the "uneasy" note "Ki." After a while the male, standing not far away, called once a quiet "Peeeerrr": the other by the nest answered "Ki" and then "Peeeerrr." After this, at intervals, one spoke a single "Peeeeerrrr," the other replying with the same vocable or with "Ki." The one which had stood by the nest flew away and returning alighted above the nest: this was at 1.40. She stood there for a while, then moved some of the marram a little with her beak. Flying off, she returned in ten minutes, thrust her head down between the marram straws, kicked a little and picked up straws. She then found the eggs, not by removing the sticks and straws with her beak, but by pushing them aside.

It had now become obvious that the location of the nest remains in the Tern's mind: that it can return with considerable accuracy to the spot where the eggs had been laid. Our next endeavour was to find out what part the eggs played in this memory: *i.e.* was it a memory of the place only or of the eggs or both? Accordingly, several nests and eggs were moved from the spot where they had been placed by the bird.

Ex. 13.—From a "scrape" on the bare sand two eggs were moved six yards. The bird returned and dropped almost on to the eggs, then rose and hovered over them as though making an examination. She then went to the site of the old nest which we had obliterated, hovered over that and almost alighted several times. She now dropped close to the eggs, then flew off, returning to alight near the old nest site. Round this she walked several times, then sat on it, turning round and round and looking under her breast for her eggs. She then got up, walked about and appeared to be searching; she then flew. After having settled near the eggs for a moment she returned to the original site. Instead of sitting, she, this time, walked about, pecking the sand here and there as though prospecting for buried eggs. Again she sat on the old site and looked under herself, rotated, putting her breast down and tail up, and kicked sand in showers. She then turned and kicked sand in another direction. She now probed with her beak as though searching. A third time she kicked sand, then left the nest and walked about, this time extending her walk in the direction of the eggs. Flying off she sailed about, then alighted near the eggs. Her footprints showed she had stood quite close to them but did not recognise her own eggs. But that was only for a time, for, later in the day, we found she had accepted the new

situation and was comfortably sitting on the eggs in their new position, where she made a hollow for them.

Ex. 14.—This was not an experiment really but an act of mercy. A Little Tern's nest with two eggs was in danger of being trampled on by bathers. Arguing that bare-toed persons would avoid unpleasant obstacles, we surrounded the nest with large stones. This device proved effectual, and notwithstanding the change of appearance the Tern continued to sit. Some days later, the nest was menaced by an unusually high tide. So we moved the eggs fifteen feet up the beach on to a ridge. And only just in time, for a few minutes later the original nest site was submerged. The bird came back, hung over the waves where had been the nest, searched all about, hovering two or three yards from the water and the ground with head hanging down. In process of this search she came upon the eggs, hovered over them, dropped lower, hovered again and again dropped, evidently considering them. She now returned where the original site had been and again hovered over the water and at various points in the vicinity. She then returned to the eggs, having remembered where they were, hung over them and dropped, hovered and dropped till at last she alighted on them. Staying only a short time she flew off and made another search, after which she returned to the new nest. This she did several times, staying on the eggs only a short while on each alighting. She evidently was not entirely satisfied that she had found her own eggs. Next morning, however, all was satisfactory and she was sitting closely on the eggs in their new position and eventually she got her young ones off in safety (Pl. 109). This bird kept up the reputation of the Little Tern for solving problems which the larger species find too much for them.

Ex. 15.—We moved a clutch of three eggs from a nest in short willow to a similar spot nine feet away, and a clutch of two from a bare space among willow shoots to another bare place nine feet away. These removals were made at 11 a.m. At 4.30 p.m. the new site for the first nest had been adopted and already a new nest had been constructed round the eggs. The second, as far as we could tell, had not been touched. A week later both clutches were lying in well-made nests.

In these experiments the eggs only were moved. In the next series several large nests were selected and, with the eggs, were moved bodily various distances.

Ex. 16.—There is no need to detail this series, as in all cases each owner of a nest was back, had found it and was sitting on it in its new position in a few minutes: none experienced any difficulty.

It would seem, from these results, that a Tern will follow its eggs and that it is the eggs, as is proper, rather than the site of the nest which loom largest in the bird's affections. It also seemed probable that the regard for the eggs might lead the bird to follow them any distance



93. Mother Common Tern and chick answering "father's" call.



94. Chick disappointed with food "father" has brought.

from the original nest site if they were judiciously moved. This proved to be the case: and there does indeed seem to be no limit, except the patience and pertinacity of the experimenter, to the distance a Tern will follow its eggs if moved not more than a few feet at a time.

The recognition by the Little Tern in Experiment 14 of its own eggs when they had been moved a distance of fifteen feet from their original position, suggested making tests to find out the conditions under which the eggs are known. The next experiments deal with this point by means of camouflaged eggs and have distinctly interesting features. Sight, of either colour or shape, cannot have helped the birds: smell was of no assistance: how was it done? The vexed question of "protective colouring" may be concerned as well as the matter of "deterrent colours."

Ex. 17.—We changed the eggs from one nest to another, putting three from "A" into "B" and two from "B" into "A." In two minutes "A" was back to its nest, sitting on "B's" eggs. In a few moments "B" was back and brooding "A's" eggs. The eggs were adopted and we left them so, and in due course the foster parents hatched out each other's eggs!

Ex. 18.—Selecting a nest with three very dark eggs we painted them pale grey, almost white. The owner returned almost immediately. We then painted a clutch of three light-coloured eggs a dark brown. In a very short while the parent was back and sitting on them. The upper surface only of these eggs was painted, and this disclosed the fact that from the time they were painted till the day they were hatched, which both sets did in due course, the eggs were never turned over. Incidentally, one of these nests was found by a member of the committee of a well-known bird Society, who, before he was disillusioned, commenced a report on the finding of an extraordinary, parti-coloured, clutch of eggs.

In the experiment the colours used to alter the eggs, warm grey and brown, were similar in type to the natural colours of Terns' eggs. The change, to the birds, was one of tone only. But it mattered nothing to the birds whether they had untouched eggs belonging to a neighbour or eggs of a different tone. In succeeding experiments unusual colours (for Terns' eggs) and tones were used.

For Experiment 19 we gathered a quantity of egg-shaped blue-grey pebbles, a number of which were about the size of Terns' eggs. These were spread over a fair-sized area around a nest containing three eggs. We then painted the eggs blue-grey, exactly to match the pebbles. So alike were they that it was difficult for us, the authors of their colours, to distinguish them from the stones and only a recognition of their shape betrayed them (Pl. 108, A). In five minutes the Tern alighted eighteen inches from the nest. There she stood looking puzzled, walked about, flew

and at once returned and alighted at the same spot. Again she walked, then rose, but returning at once walked to the eggs and looked at them. She now walked away to the edge of the pebble patch. She there found one of our footprints in the sand, sat in it and rotated, looking beneath her body as though for eggs. She then flew and, feeling irritable, attacked a passing neighbour. Returning, she walked to the eggs, seeming to touch them with her beak and almost sitting down, then went away and made a " scrape." The situation of her nest was known to her but she was not sure of the eggs. After half an hour we moved some of the stones from the immediate neighbourhood of the eggs, making them rather more conspicuous. She returned, walked and flew several times, then, after fifteen minutes, sat down as though to make a " scrape," picked up bits of debris and threw them over her shoulder. She got up and at once walked to the eggs, looked at them, sat on them and rotated.

Here the eggs were painted in similarity to their surroundings and humanly speaking the camouflage was perfect. When mixed with the stones the bird could not satisfy herself about the eggs, though when isolated a little she found them; perhaps the shape helped her. This suggested altering the shape of the eggs, for which see Ex. 26.

We now (Ex. 20) painted three eggs in nest " C " white, and those in another nest, " D," dark bright-blue. In half a minute " D " came back, settled by her nest and rose again. In one minute both were standing twelve inches away from their respective nests. They rose and returned, rose again, and in three minutes " C " went on her nest, tucked her (white) eggs beneath her and sat brooding them. Meanwhile " D " walked past her nest, rose, returned, walked to the nest and gave her (blue) eggs two pecks, walked off, then flew. She now went to a pool on the shore, bathed and preened. Returning, she flew and hung over the nest to examine it but did not drop on it. Instead she alighted and walked to it but decided against sitting. All this time " C " was brooding her white eggs.

To find out if the blue colour was a deterrent we now placed the white eggs in " D " nest and the blue eggs in " C " nest. In half a minute " C " stood about a foot from the nest for a moment, then rose and returned, repeated these actions several times, then went off a few yards and stood. In two and a half minutes she went to the nest, pecked the eggs, then " sidled " off. Approaching again she again " sidled " away. (By " sidle " is meant a lingering, sideways shuffle as though disinclined to go yet feeling compelled.) She flew off and stood some distance away, rose, flew to the nest, alighted and " sidled " sideways on to the eggs, not covering them from the front in normal fashion. This was after another four minutes. The other bird did not put in an appearance at all. After letting " C " sit for twenty minutes she was put off but returned at once, and this time went on the blue eggs without hesitation. " D "

also returned and stood about twelve feet from her nest, calling " Chib " incessantly. One cannot say that the colour (white) of her eggs had disturbed her, for she had not been near the nest. On the other hand, while " C " accepted the white eggs she was a little, at the outset, deterred by the blue ones.

After half an hour we exchanged these eggs for eggs from two other nests, placing the blue eggs from " C " nest in " E " nest and the " E " (natural) eggs in " C," and the white eggs from " D " in " F " nest and the (natural) " F " eggs in " D." After one and a half minutes " E " alighted twelve inches away from her nest, flew up, returned, doing this several times till she went close, looked at the blue eggs, backed away and flew. In a further two and a half minutes she returned, stood on the edge of the nest, touched the eggs with her beak, then went on. Shortly afterwards we disturbed her, but she returned in half a minute and " sidled " on in the same manner as " C." " F " now returned and hung in the air over her nest but did not alight. After some time, as there were no indications of anything happening, we changed the blue eggs from " E " to " F," and the white from " F " to " E." In two and a half minutes " E " alighted on the edge of the nest but did not stay. In another half-minute she returned, again stood by the side of the nest, calling, and looked at the eggs. She then backed away, walked about, then approached the nest, almost sat on the eggs, then flew. This alternate approach to the nest and departure continued until in twenty minutes from the change of eggs she mustered up her courage and sat on the white eggs. The owner of " F " nest did not return at all. We now washed the colour from all the eggs and restored each clutch to its rightful owner. " C " returned at once to her nest, " E " almost as soon. " D " came back after a short while, but when we left ten minutes after, " F " had not returned. In this case one bird, " E," accepted both the blue and white eggs and the other, " F," accepted neither.

Ex. 21.—For this we coloured a clutch of three and a single egg vermilion red. In one minute the neighbouring birds were back on their eggs, but the red colour certainly deterred the owners from returning. Evidently the colour was noticed, for the birds flew over their nests a number of times and examined the eggs from the air. The bird with three eggs, " G," dropped three yards from the nest, then took a low flight over it, dropping four yards on the other side. She then flew round the nest several times, after which she soared down as though to alight, but when two yards over the eggs, refrained. The next made several " surveying " flights : then slid to within two feet of the eggs but decided " not " and alighted further on. Again she inspected the nest, hanging kestrel-like over it, but settled eight yards beyond. Her mate now arrived and, calling, alighted near the nest. She walked towards the nest and he walked away.

Having got close to the eggs she had a good look, then " sidled " away. He called and also walked to the nest and gazed at the red eggs. Both flew away. She returned and dropped near the nest, looking. She was puzzled, the eggs were there but what a colour! Meanwhile the bird with one egg, " H," after several high surveying flights, seemed to lose interest. " G " now came back and waddled, with determination, to the nest, but the sight of her " ugly ducklings " made her hesitate and turn away. Bracing herself, once more she faced the nest, walked warily towards it, passed it by, turned and stood close to it, looked again and walked past. Returning she looked more closely at the eggs and at last, with considerable hesitation, let herself slowly down over them. " Out of sight, out of mind " ; she touched the eggs with her beak, pushed them beneath her feathers and thirty-one minutes from the beginning, snuggled down to brood.

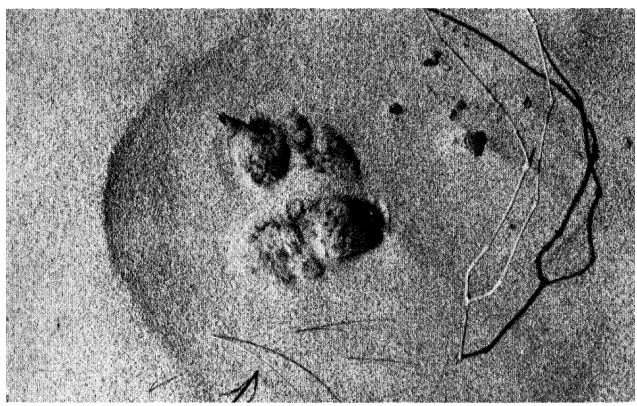
One would have thought that three red eggs were more repugnant than one, but the other bird continued to ignore its duties and did not return till the colour was washed off, after which it came back at once.

Ex. 22.—The red was washed off the " G " eggs also and they were painted bright blue: a more familiar type of colour, if Terns have any sense of colour, as many of the stones in the shingle were blue-grey. In one minute she glided down to the nest, almost touching it, but deciding not, sailed up again. She next made a series of investigating flights, hovering over the nest like a Kestrel, reconnoitring, calling at intervals. Next she alighted twelve inches from the nest and stood wondering for three or four minutes, then waddled close to it and contemplated the " protean " eggs once stone colour, red, now blue. She walked to the other side and considered the problem from another point of view. Next she got at closer grips with the puzzle, scrutinising the eggs, changed her position, gazed again, then went on to the nest. The time taken before she dare do this was in all twelve minutes.

Ex. 23.—We continued this type of experiment by painting the eggs in two other nests, " J " being coloured red and " K " yellow. In two minutes " J " returned, settled near the nest, looked at the eggs, then flew away and did not return. It took " K " six minutes to return. She then alighted a foot from the nest, looked at her yellow eggs, and went off. In four more minutes she settled, walked to the nest, gave a peck or two at the eggs and one minute after sat on the eggs and arranged them beneath her with her beak. After allowing her to sit for ten minutes we changed the eggs, placing the red eggs in " K " and the yellow in " J." In two minutes " J " settled close to her nest, walked about, touched the eggs with her beak, then flew. Returning, she alighted close to the nest and appeared to be considering the strange eggs. Reassured, she in one minute walked to the nest, sat, and continued to sit for twenty-five minutes. While



95. Eggs eaten by rats.



96. Chicks buried in sand by a storm.



97. Eggs sucked by rook or gull, an example of "egg pecking" not "pricking."

this happened " K " came and walked near her nest and flew off. After six and a half minutes she alighted within a yard of the nest, stood, walked away and flew. Staying away for four minutes, she came back and hung, hovering, over the nest to examine its contents, then dropped and stood, but not for long. In one minute she was back and walking towards the eggs: she, however, went past the nest and flew. In two minutes more she was back and hanging in the air over the eggs. This returning and leaving continued for some time until she seemed to give the matter up and flew directly out to sea.

From these experiments it will be seen that both birds accepted the yellow eggs and both refused the red ones. Experiments 18, 19 and 20 may be termed " deterrent colour tests." Now follow attempts to disguise the shape of the eggs (*a*) by broken colour effects and (*b*) by actually altering the shape of the egg with additions of plasticine of " deterrent colours." This was done as it seemed possible that the shape of the egg and not its colour might be responsible for egg recognition.

For Experiment 24 a nest on short turf, quite open and free from surrounding plants, was selected. Grey stones were placed in the nest and spread irregularly around and branches of ragwort were planted about the nest. The eggs were painted red, white, blue, and grey in patches. It took their owner five minutes only to return and brood them.

Ex. 25.—Another nest had its three eggs striped black and white and a number of oval stones egg size as well as larger ones were painted similarly. The eggs were placed two feet from the nest among a spread of painted stones (Pl. 108, B). The bird returned at once, went first to the stones, then to the nest, in which she sat and rotated, looking under herself and kicking. Very shortly, she went to the stones, found the striped eggs and brooded them—all this taking no more than two minutes.

For Experiment 26 two nests each having two eggs were selected. One egg in each nest had its shape altered with lumps of red plasticine and the other with yellow plasticine. The eggs were then placed several inches outside their respective homes. In one minute " L " had returned and pulled one of the malformed eggs into her nest but, very uneasy, shuffled a good deal and looked beneath her at the odd-shaped lump, touching it with her beak. " M " dropped near her nest and in two minutes walked to it and pulled the red egg *away* from the nest, then sat on the empty nest unheeding either egg. We then put the birds off and replaced the eggs outside the nests. " L " returned at once, sat for a while on the empty nest, then pushed both red and yellow eggs beneath her with her beak. After which she shuffled and proceeded to pick up marram straws and place them around her as if nest-making. We waited twenty minutes, but the other bird did not return, but by next morning

she had adopted both red and yellow, malformed eggs and was brooding them.

It is interesting to note that time after time the Terns when in doubt would give the eggs several sharp pecks. Whether the small sounds thus made were reassuring or whether the "feel" of the egg conveyed anything we cannot know: there was, no doubt, some usefulness in this action.

There are times when, the nest being on a slope, an injudicious movement on the part of the bird or a strong wind causes an egg to roll away from the nest. In such cases, as we have seen evidenced by the tracks of the bird, efforts are made to restore the egg to the nest. Several experiments, suggested by such an occurrence, were made with the result of finding that up to a distance of about eighteen inches the bird would retrieve the vagrant egg, but beyond that distance the egg was either ignored or there was evidence of a distinct effort of mind to decide whether to make a new nest for the outside egg where it lay and abandon the old nest.

In the first of these (Ex. 27), one egg was placed twelve inches outside nest "O," and one egg from nest "P" six inches away. In three-quarters of an hour each egg had been replaced in its nest.

Ex. 28.—Nest "Q" had three eggs, one of which was placed twelve inches away. Both birds alighted and somewhat perturbed called at intervals "Peee$_{errr}$." One went up to the nest calling "Ki—ki—ki" very loudly and fiercely, then a long "Peeeee$_{errrrr}$" at intervals. After varying this performance many times, in one and a half hours she went on to the nest, ignoring the outside egg. We then moved it nearer to the nest. She alighted some forty yards away and ran part way to the nest. Her mate came and called as before a high "Peee$_{err}$": she replying with a lower "Pee$_{arr}$." She next went on to the nest and sat, then, seeing the outside egg, at once went to it and began to pull it to the nest. She then left it and flew. Returning she walked to the outer egg and made some attempt to brood it, then sat on the nest with her back to the egg. In a moment she turned round, saw the egg, reached out and touched it with the point of her beak, then got off and fetched it in (Pl. 105).

For Experiment 29 the only egg in a nest was placed eighteen inches away on the windward side. When the owner returned she alighted on the egg, then walked to the nest, where she sat for some time. She now returned to the egg and pulled it about six inches toward the nest, then left it and returned to the nest and sat. After some time she went back to the egg and brooded it, very uneasily, then flew off, came back, again alighted on the egg to brood it. Back and forth between the egg and nest she went several times, rotating in the latter and kicking sand. This alternation was done five times, after which she flew off. Returning

she brooded the egg once more. Here the connection between the egg and the nest was obvious at first. She made an effort to bring them together when she pulled the egg, but the mental connection seemed to fade after a time and she made a new " scrape " to hold the egg where it lay. The mental connection seemed to have revived later, possibly owing to a visit from the male, which always seems to have a stimulating effect, for, when we looked at her some time afterwards, we found she had pulled the egg into her original nest.

As a final test of egg recognition (Ex. 30), an imitation egg was prepared in all respects like a real egg except in smell. At 6.30 one evening this was placed outside a nest containing a clutch of three. The imitation, which was of wax, was the same size, shape, colour and markings as a real egg: it weighed 19·15 gr., the average weight of a real egg being about 18·38 gr. The bird hovered many times with outspread, motionless wings, or beating to keep her position over the nest, with head hanging down to examine this new thing. Next morning at 8 a.m. we found she had pulled it in and was sitting on it and her own three eggs. Whether this was because she was unable to count or had no objection to a larger clutch than three cannot be known.

But indifference to numbers and a strongly developed acquisitive faculty were equally possessed by the bird which *stole three eggs* from a neighbour. This was an accidental discovery. For another experiment we were intending it was necessary that two nests should be in close proximity and we had, gradually, moved the eggs of two Common Terns until they were exactly eighteen inches apart. Neither bird resented this interference with their domestic arrangements. Each nest contained a clutch of three eggs. One evening, in passing, we saw, to our surprise, that one nest, " R," contained four eggs and the other, " S," only two. As the two clutches were quite dissimilar in colour it was easy to see that an egg had passed from one nest to the other, but how? Between the two nests there was a meandering furrow bordered by Tern footprints which suggested a Tern was responsible for the transfer.

Early next morning we were there with " hide " and camera to find that nest " R " now contained five eggs and nest " S " only one. We awaited developments in the " hide." In due course the owner of nest " R " returned and her endeavours adequately to cover the five eggs caused her considerable embarrassment. She turned and shuffled and pushed this egg and that beneath her feathers, but her efforts were never entirely successful, for she would always find that one egg was still outside.

But her acquisitive faculty was not long dormant, for very shortly she walked to the other nest and looked at the egg there, evidently wondering whether it might not be as well " to be hung for a sheep as a lamb."

However, she resisted the temptation and went back to resume her endeavours to brood the five eggs. At last she decided to acquire the sixth egg: she walked across, and after a short look put her beak down and with the egg firmly held to her breast backed slowly to her own nest, dragging the egg after her. Plate 111 was taken as she rotated on the nest trying to cover the six eggs, and shows her inability to do this. The bird's-eye view, Plate 110, shows all six eggs in nest " R," the empty nest " S " and the furrow between them made by the dragging of the egg: the three nearer eggs are the stolen ones.

At first the thief was extremely nervous, more than was natural; she had stolen property in her possession. But as time went on and nothing happened, she settled down to brood her ill-gotten gains, and when Plate 111 was taken her fears had so far departed that she allowed the " hide " to be placed quite close to the nest.

What was the owner of the stolen eggs doing meanwhile? We hoped something dramatic might happen, but alas! she had no spirit and submitted without more protest than to call " Kyar " to having her treasures taken from her.

In the result the thief could never cover the six eggs properly, and having hatched out two of her own, left the nest to look after her chicks when they commenced to wander and abandoned her third egg and the stolen ones to their fate.

The last experiments were carried out with the view of discovering something of the nest-building propensity of the Terns.

Ex. 31.—From two nests each with three eggs, both well built of marram straws, all material was removed and scattered round about, twelve inches away. In a short time both nests had been reconstructed from the scattered material.

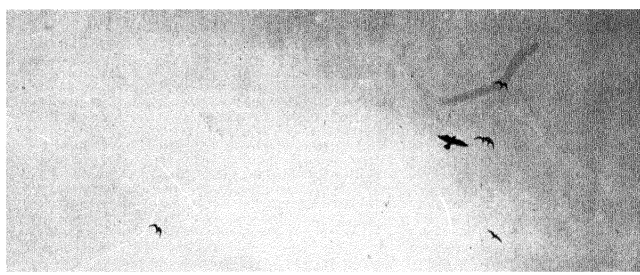
Ex. 32.—We removed a nest of marram and another of small sticks and placed this material nine inches on the leeward side of the birds, *i.e.* where they could not see it as they sat. In two hours both birds had partially reconstructed their nests, and later, completely so.

Ex. 33.—We cleared a nest of bulky material and removed everything for a radius of two feet around the nest, leaving nothing but bare sand. Several days later a fair-sized nest had been built, showing that the material had been carried bit by bit and not reached for by the bird when sitting on its eggs as is usual.

Ex. 34.—For this we selected a nest which was a " scrape " only, without any material whatever. This we surrounded, at a distance of six to nine inches, with marram straws. The next day a few straws had been arranged around the edge of the " scrape " and in three days a good nest had been constructed. Here was a bird which had laid its full clutch of eggs in a " scrape " nest, but on being provided with material proceeded



98. COMMON TERNS ATTACKING AN INTRUDER.



99. COMMON TERNS ATTACKING BLACK-HEADED GULL.



100. ROSEATE TERN ATTACKED BY ANOTHER.

to build a nest, showing that nest-building was not a process of time, nor an individual idiosyncrasy, but due to propinquity of material.

It should be recorded that in no case did our interference with the domestic arrangements of the Terns have any untoward result; in every nest the young ones appeared in due course.

OF VOCABULARY

It is notoriously difficult to convey to others by means of written syllables, the songs and sounds made by birds. When one considers the variety of opinion as to the way even a simple, well-known bird call should be written, the task of rendering the complex and unfamiliar would seem impossible.

The best known example of this difficulty is that of the Cuckoo's call. In the ancient song, " Sumer is icumen in," the call appears as " Cucu." In Middle English it appears, variously, as " Cucow," " Cocowe," " Cauko," " Cucko," " Cockou " and " Coccou." Chaucer wrote it " Cuckowe "; Shakespeare, Spenser and others agreed on " Cuckow "; Turner, in 1544, called it " Cukkow "; Milton's version was " Cuccoo "; Heywood, in 1587, spelled it " Koocoo "; it appears in 1643 as " Cuckoe "; Merrett, in 1667, gave it as " Guckoe "; while the present-day rendering is, in Chambers' Dictionary, " Koo'kōō," in Murray's Dictionary, " Ku'kū," and in the *Handbook of British Birds* " Cuck—oo."

Apart from the English renderings, the Welsh express the sound as " Gycw "; Sweden has it " Kuku "; Holland calls it " Koekoek "; Germany " Kukuk " and " Guckguck "; France " Coucou "; Italy " Cucco "; Switzerland " Guggu," and Spain " Cuco."

It is more than probable that the reason for this great variety of ways of expressing what would seem to be a simple call lies in the possibility that sounds seem different to different people, just as colours are not seen alike by everybody.

We can here, then, only hope to record the calls and cries of the Terns as we hear them ourselves.

To express a bird call properly four things, it would seem, must be given. These are:

1. Some syllabication of the sounds.
2. An indication of the pitch—whether high or low.
3. The speed at which the sounds are given.
4. The quality of the sound—whether sharp, harsh, guttural, nasal, etc.

Usually, even in books on Birds, one of these only, the " Syllabication," is given.

The method we have adopted is to overline a vowel to indicate a lengthened sound and to duplicate the letter if the sound is more prolonged. If the vowel is not overlined it is given its short sound, *e.g.* as " i " in " wit." The letter " C," because of its two sounds, is dropped in favour of " K "; and " Q " is replaced by " Kw." A reiterated cry is separated from those that follow by a line, short or long according to the length of the interval. An indication of the pitch of different syllables is shown, roughly, by placing them on different levels, as " Kukō."

Compilers of works of reference on birds restrict themselves, very severely, in the matter of recording the cries of Terns, contenting themselves with noting one only, or several, of the more obvious. In reality Terns have a quite extensive vocabulary, their range of language and expression is great. And it is certain there are many more cries than the examples and variations we give. With patience and careful comparison, it would be possible to note the whole range of their speech and assign each call to its emotional or functional origin; the result would be astonishing.

Apart from the difficulty of conveying the sound of a call in writing, it is not easy to determine the exact sound unless it is repeated very often. Indeed similar calls seem to vary a little and, in some cases, do, without doubt. This difference is, at times, certainly sexual, as can be noted when two birds of a pair are calling at the same time, the difference being, usually, expressed by pitch. This habit is found in all the species. An example may be heard when a Common Tern gives a call which is between " Chak " and " Chuk " while its mate is calling essentially the same but making a sound between " Chuk " and " Chik."

One point it seems necessary to emphasise. A distant call is often different from its seeming when given close at hand, for when the bird is some way off the initial sound and the ultimate syllable are often unheard.

The initial sound is never easy to determine. " Kak " will, sometimes, seem " Chak," or even " Krak," and it may well be that the birds do make an actual difference in order to convey different meanings.

So, too, excitement, by causing the addition of a consonant, will give emphasis to a termination, as when " Chi " becomes " Chif," " Chib," or " Chip," all of which forms of " Chi " we have noted.

Emotional stress often adds an explosive quality to the initial sound.

Cries are often " associated," that is to say, while one bird is expressing itself in one way, its mate uses an entirely different vocable. For example, when a Tern, annoyed at an intruder, emphasises its feelings by calling " Keaaaarrr," his mate will fly round calling " Ki——ki——ki——ki." This difference may be of sex but, owing to the impossibility of distinguishing the sexes with certainty, we have not been able to make sure which sex is responsible for which call. Neither have we been able to find out

whether one of these calls is confined to one sex and the other to the opposite sex, or whether they are interchangeable as we suspect.

The cries are roughly divisible into two groups :—" Pleasure " cries and " Fear " cries.

Among the " pleasure " cries are those associated with love-making and those incident to family life. The " fear " cries are also dual in character : those arising out of the normal fears of life—" Anxiety " cries—and those produced under conditions of unusual excitement—" Anger " cries.

Of all the " pleasure " cries the most striking are those heard when a COMMON TERN, presumably the male, having caught a fish, wishes to present it to his wife *in esse* or *in posse*. Bearing the fish, he announces his return from the fishing ground some time before he gets anywhere near the ternery, by calling, at intervals, a joyous " $P\bar{e}_a$," or it may be " $K\bar{e}_a$." He comes in at a great pace, full of eagerness. When he gets to the area where his mate is or should be, he changes his call to " $P\bar{e}_{er}{}^{ri}$," increases its frequency and repeats it rapidly, with intense excitement. If Terns have a song, we think this triumphant love-call is the one. Often it is given so quickly as to become two syllables only, " $P\bar{e}{}^{ri}$." It is the ultimate syllable which gives the call its wild effect, but this is, at times, omitted and the cry becomes " Peee-er," the syllables being given quite separately and slowly.

The call of " $P\bar{e}_{er}{}^{ri}$ " is also given during the wild " amatory chases " in the sky, by one of the birds, the other contributing short cries of " Kit," " Ket," or " Kut," sometimes seeming to be one, sometimes the other. This is another example of " associated " cries. We have heard both birds in a " chase " calling " $P\bar{e}_{er}{}^{ri}$ " very quickly and, more often, when the one carrying the fish was chasing the other.

Holding the fish, while it does not diminish the vigour of the call, interferes somewhat with the articulation, giving the " song " a short-tongued sound like " $P\bar{e}_{er}{}^{yi}$."

There is a variation of this song, also used in the " fish-chase," in which both Terns call quickly and repeatedly, but not loudly, " $K\bar{a}r{}^{i}$," one bird having the fish and chasing, or being chased, by another. This cry sometimes changes to a growl, given by one of the birds when the pursuer draws close to the pursued. Which of the birds gives the cry we are not certain, but are inclined to think the one carrying the fish. The " Kār " is guttural and rough and the " i " very short. Often the other bird responds with a short " Ti——ti——ti——ti."

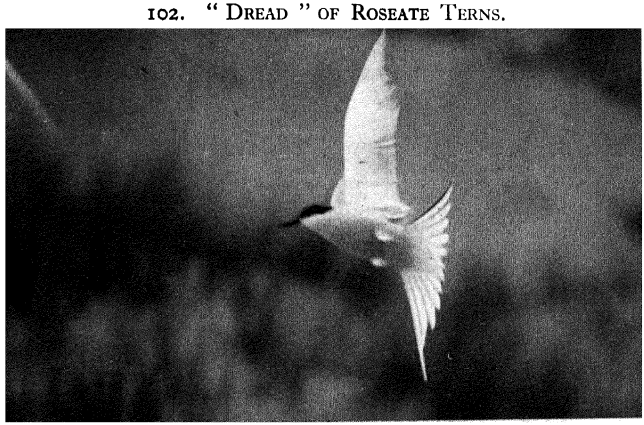
Quite different is the loud, passionate " $Chutta_{che}{}^{a}$ " and its variations, given when " sky courting." This call we heard reiterated rapidly by one of a pair toying in the air, after which both dropped with " vee " set wings from a height. Variants are " $Chutter_{ch\bar{e}}{}^{\bar{e}}$," an excited sound



101. COMMON TERN PANICKY.



102. "DREAD" OF ROSEATE TERNS.



103. ARCTIC TERN ALARMED.

given under the same circumstances and in the same manner; and " Chutterter$_{dē^{ē}}$ " constantly uttered when in rapid chase. One of a pair in " amatory flight " called " Chut$_{ut}$ur—chut$_{ut}$ur " *ad lib.* and the other a small " Kwi," both quiet sounds.

When one bird is in quick pursuit of another carrying a fish, one of them will rapidly repeat " Chu$_{ur^{i}}$."

Sometimes during these chases the cry sounds like " Chukerchuker-chuker " continued, quickly, without pause. Part of this cry is given singly when flying alone and sounds something like " Che$_{ō^{k}}$."

The " associated " sound " Kwi " is one of a group of " family " vocables. It may be heard when a pair is flying normally, not in " amatory flight " ; it is repeated a number of times very softly. At times it is prolonged into " Kwē$_{a}$ " under the same circumstances.

Language used in close connection with family life is very different, as might be expected.

During the mating period, when the birds are " ground courting " in the ternery, there is a continuous general sound of " Gurrgurrgurrgurr " which, now and again, increases in rapidity and rises into a querulous " Kerkerkerker," subsiding again into the " Gurr." Each Tern (though it may be only one of each pair) is making a sort of throaty grunting and clucking. The grunting, when heard at close quarters, seems to vary a little, probably according to the intensity of the feeling being expressed, and may be represented as " Gr$_{ou}$ " or " Kr$_{au}$ " ; " Krurr " or " Grō$_{arr}$ " ; " Kurr " or " Karr." These sounds are equivalent to the ones made by a broody hen. The clucking sounds like " Ku " or " Chu " are repeated at intervals or given more continuously.

These vocables, often, are given after an " amatory flight." For example, two had been " gliding," one alighted, then the other; the second ran to the first, making the clucking sound " Ku—ku—ku—ku—ku " on reaching him (?), both then began the " Grougrou." Another Tern alighted by a standing bird, a female, and " displayed " in the usual manner. She, opening her beak, addressed her mate with " Kurrkurrkurrkurr," quiet, quick and guttural. Quite soon these endearments were followed by coition.

When the eggs have been laid the same speech is used between the two parents: imperfect speech it may be, but the meaning is, at times, quite clear and is evidently understood by the other bird.

One bird flew over the nest calling a short, high " Chi," then alighted, walked to the nest saying " Ti$_{u}$-ti$_{u}$-ti$_{u}$-grougrougrougrouch$_{u}$ch$_{u}$ch$_{u}$-grouti$_{u}$-ti$_{u}$," at the same time depressing his wings and elevating his tail. The mate, who was standing by the nest, made a similar display but did not call.

On another nest a bird was sitting when her mate, who had been

standing for some time twenty yards away, began to waddle towards the nest saying a low " Krurrkrurr " continuously until he got near the nest, when he changed to a quiet " Kwi-kwi-kwi-kwi." The sitter now left the nest and the other went on. The two sounds evidently conveyed the desire or necessity for a change of sitter.

Again, one alighted near an occupied nest calling a high " Pi—pi—pi—pi." The sitting bird clucked and grunted, then stood up and arranged the eggs with her beak, afterwards sitting down again. Obviously one had asked the other whether she wanted to change and received a negative reply.

A Tern, crouching low, repeated, *sotto voce*, " Kurr-kurr-kurr " and walked after another which was silent. The second bird then went on the nest, which had been unoccupied for a while. Whereupon the first bird stopped talking and walked off. This seemed an instance of the common practice of a male bird ordering his mate to get on with her " job of work."

A quick, delighted clucking, in which was interspersed the lower, guttural " Grou," occurred when a fish was brought to a sitting bird; possibly each bird contributed a different sound.

The clucking and growling are continued by the parent birds after the eggs are hatched. The young, at first, give feeble, hoarse chirps which quickly increase in strength and volume; so that in two or three days they are able to express their joy in no uncertain tones when a parent brings a fish. The cluckings seem terms of endearment and are used to the young when the mother settles on the nest after an absence, when the chick pushes its head out of its mother's feathers, or when one of them wanders a little from the nest. The clucking is used, too, when the male alights near the nest with food. The growling or grunting seems an expression of satisfaction, of contentment, for cries of " Grou " from the sitting bird, also, greet the male when he appears with food.

Perhaps the most usual cry heard in a ternery is the " Fear " cry, which is a two-syllable word " $K\bar{e}_{ar}$." This is heard all around when one enters a ternery. The birds, alarmed and anxious, fill the air with this call. It is an " anxiety " cry and is, therefore, not heard with the same frequency when one is in a " hide." It seems to be used more often when incubation has continued for a little time; a different form, " $P\bar{e}_{ar}$," being used earlier in the season before the eggs are laid, or when one or two eggs, only, are in the nest. It alters in expression, in both forms, if the fear of the birds is not great. At such times it is given a deliberate, lazy sound, often both syllables being prolonged into " $Keeeee_{arrrrr}$." It is given, too, when hovering over the nest and is commonly heard when one's " hide " is being tolerated, but not entirely accepted, as part of the landscape.

But, with increasing anxiety, as when one nears a nest of well-incubated eggs, or one containing young chicks, emphasis will be placed on the initial " P," which becomes explosive. Anxiety is changing to alarm and, with some birds, this develops into anger or even into rage. When this happens, the softening " e " sound is dropped, the second syllable is accented and prolonged and the cry produced under the greatest stress is " $Kaaa_{aar}$ " or " $Gaaa_{aar}$," either falling in pitch to the end.

With the " $K\bar{e}_{ar}$ " is commonly associated another " anxiety " cry, a sharp, high monosyllable " Ki." It, also, is explosive in quality, and is given at intervals of one second, but, with growing fear, it increases in frequency. This cry is, most usually, given by the male, that is, by the bird which is not on the nest. He will make this call when standing some way off or when flying in the air. The sitter, too, will make the same call when, being disturbed, she flies off the nest. With increasing excitement this sound becomes " Kip " or " Kif." As anxiety dies down, the cry becomes less frequent and shorter, the ultimate letter being shed; then, presently, calling ceases entirely.

Besides its use alone, this monosyllable " Ki " is often associated with the more violent and dramatic use of " $K\bar{e}_{ar}$," when certain highly temperamental birds work themselves up into a storm of anger with an intruder. When this happens, both birds of a pair will fly round calling " Ki " incessantly. Then one, and sometimes each in turn, will change into a " chatter " which sounds something like stones being tapped together. If one can say it quickly enough, which is very difficult, the sound " Ka " very rapidly repeated will, fairly well, reproduce this sound.

The main cause of the utterance of this group of sounds is an approach to a nest containing well-incubated eggs or, it may be, to chicks which have not long been hatched. We have not, as yet, been able to satisfy ourselves as to the precise circumstances which engender the attack associated with these sounds, for, apparently under the same conditions, one pair will make a fierce assault accompanied by these cries, while others will be satisfied by sailing round and slowly calling " $K\bar{e}_{ar}$." Terns vary in temperament as do human beings; some are easy-going, others quick to anger. This group of sounds may be a manifestation of anger or may be intended to affright. And, indeed, when the birds precipitate themselves at one's head, changing from " Ki—ki—ki—kikiki-kiki " to " Kakakakakakakakaka " terminating in a wild " $K_{aarrrrrr}$ " which is almost a scream, as they pierce one's scalp with their sharp beaks, the whole procedure *is* truly affrighting.

A variation of this " Ki " cry seems to be " Chi " with its modifications " Chif," " Chip " and " Chib," due to different degrees of emotion. " Chi " is used in exactly the same circumstances as " Ki " and in the same manner. It is also used when chasing in the air; then it will be

repeated at intervals, or strung together, thus: " Chi—chi—chi—chi—chi—chi chi chichichichichi," from which it will change to the " chatter."

The " chatter " is the usual accompaniment of their quarrels. Thus, from a pair tussling in the air proceeded a sort of growl " Kaaarrrr " from one bird, and, from the other, the " chatter." A " fish-chase " may be quite other than aerial love-making, as when a pirate bird dashes at another which, carrying a fish, is calling the cheerful " $P\bar{e}_{er}^{ri}$," with a wild " chatter " " Kakakakakaka " changing to a throaty, long-drawn " Kaaaaarrrrr." Terrestrial intruders, like dogs, rabbits, etc., as well as aerial trespassers such as Gulls and Hawks, are received with the downward dash and its accompanying " chatter."

The short, staccato " Ti," mentioned above, is given when flying with others and, also, when alone. There is nothing of anxiety or alarm about it. It is somewhat playful and may be intended to keep a group in touch. Usually given in quick succession or more slowly and separate, it is, on occasion, lengthened to " Tut " and to " Teet."

Some of the cries may be termed " small." These are short, sharp, high, quickly given, little squeaks, almost mouse-like. After a " glide " and the birds have descended steeply to the ground, we have heard them utter these tiny cries. Exactly the same sounds we heard from a flock of fifty which " fell " out of the sky, arriving on migration. Most of the birds in the flock called this note just before alighting. It may be taken to express contentment.

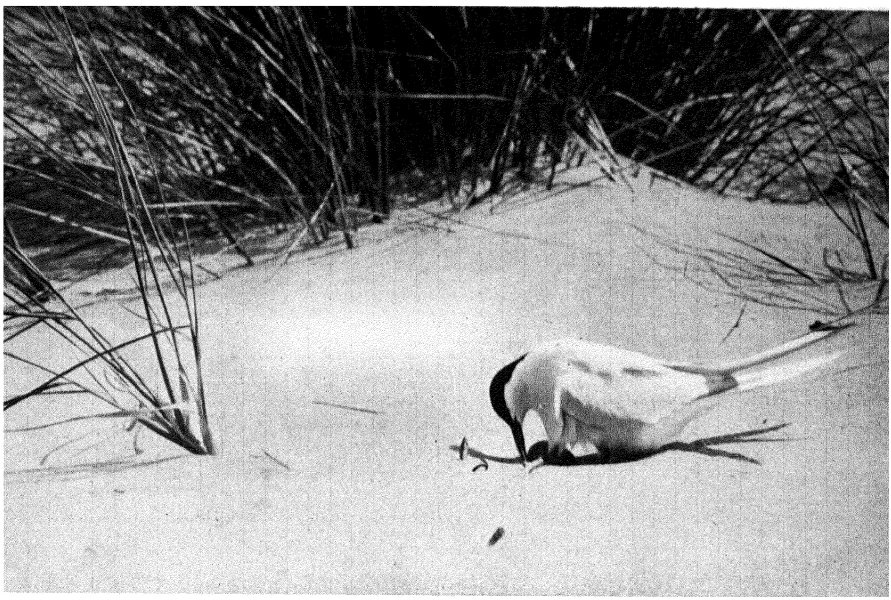
Something of the same kind is heard when a flock is " hawking " for flies over a pond, as occurs when they are migrating. Not only these tiny squeaks are then given, but a number of small sounds of different pitches, like the creaking produced by leather rubbing against leather.

The cries made by the Terns when they, themselves, are affrighted, are quite different from their " alarm " cries. Pursued by a Black-headed Gull, one squealed, incessantly, " $K\bar{e}r^{it}$—$k\bar{e}r^{it}$." And another, attacked by a Herring Gull, called, in great distress, " $K\bar{e}_r$—$k\bar{e}_r$—$k\bar{e}_r$." These may truly be called " fear " cries.

All the cries detailed above were made by Common Terns. While there is a similarity to the sounds made by Arctic Terns under comparable conditions, the latter have, in addition, their own cries peculiar to their species.

The close resemblance of the ARCTIC TERN to the Common Tern would lead to the expectation of a similarity in their vocabulary, and, in the main, the likeness holds good. But there are differences, and there is one small sound and one call in particular which seem peculiar to the Arctic Tern.

It may be well to notice, at the outset, that, on the whole, their cries



104. ARCTIC TERN DIGGING OUT BURIED EGG.



105. LITTLE TERN RETRIEVING EGG PLACED OUTSIDE NEST.

are slighter and softer than those of the Common Tern, and that they are more " creaky," in this recalling the cries of the Black Tern.

The corresponding call to the one we have called the " song " of the Common Tern seems to be " $K\bar{e}_{er}^{wi}$," which is given at intervals, or, when the bird is excited, is repeated rapidly. It is moderate in pitch, is heard in similar circumstances to the song of the other species and is, also, used when the young have grown into " fliers " and the parents are still bringing food to them. This call also takes the form of " $K\bar{e}_{a}$-$k\bar{e}_{a}$-kakakakaka." When much excited the succession of " ka's " resembles a " chatter." This is not only used by the bird bringing a fish to its mate, but by the mate to greet him. One Tern we saw searching for his mate, and bearing a fish, repeated this variation many times as he flew about on his quest. " $P\bar{e}_{er}$kakakakaka " he called, sometimes using the " $P\bar{e}_{er}$ " alone, and occasionally more " Ka's," but usually five only.

The guttural growling " Gurrgurrgurrgurr " is used when displaying and making " scrapes " in the early season, increasing in intensity and dying down as emotion waxes and wanes. This " gurring " is accompanied by the " Kuk." A pair, displaying, were noted to have conversed in low tones, " $Kuku_{kurr}kuku_{kurr}$," a combination of " gurring " and " clucking." Possibly one sound came from the male and the other from the female.

The " clucking " is more often heard when the eggs are laid and, particularly, when the chicks have emerged. It may be heard from a sitting bird as she arranges the eggs beneath her. Given quickly, and in a very soft tone, it is intended to induce a wandering chick to return to its mother.

When " changing over," another call may be heard, this being " Chib—chib—chib " given when the mate alighted by the sitter. It seems to be an inquiry and is responded to by the sitter saying " Grau-grau-grau-grau-grau "—to rhyme with cow—many times, very low and gutturally and by getting off the nest for the other to occupy it.

It is when the female is sitting that one hears the sounds which are the special property of the Arctic Tern.

The first of these is the " Whistle," which is heard when the male brings his mate a fish. It may be syllabled " $K\bar{e}\bar{e}$—$k\bar{e}\bar{e}$," a rising note having a distinct, high, whistly sound. It is often followed by a reiterated " Ker " or " Kar." Thus, two adults alighted by their chick, one gave the " whistle," the other called " Kerkerkerkerker." Another sitter, when its mate came, called quickly, with wide-open beak, " $K\bar{e}\bar{e}k\bar{e}\bar{e}$karkarkar."

The other proprietary sound is a short, tiny, almost mouse-like squeak. This " mouse " cry may be expressed as " Whi " and is given when hovering over the nest, and when on the ground, many times at intervals. It is very often heard in an Arctic ternery. It is, possibly, this sound,

given rather more loudly, which we have noted as " Twitwitwitwit," a quiet, rather musical speech, made by a sitting bird to her mate on his arrival.

During the " amatory flight," a rough call of " Paaarp—paaarp " may be heard. It is possible the final " p " may be given by one bird, for one hears " Paaar " without it and " Pi," a short, sharp, high squeak, separately.

This latter seems, also, to occur as " Pit " and " Pēt-pēt," both somewhat creaky sounds. This is given in two pitches, presumably by two birds.

Other flight cries are " Kākākākākār " nasal in quality, given very quickly and repeated often. And " $K\bar{e}_{o}$—$k\bar{e}_{o}$ " in association with a short, sharp, high " Ti—ti—ti—ti " repeated at short intervals.

The " fear " cry varies like that of the Common Tern, which it much resembles, though it is not so rough and rather higher in pitch. A mild version of " $P\bar{e}_{er}$ " is used before incubation has proceeded very far. The " Pē," which may be short or long, is very high and thin, almost a squeak; the second syllable is low and sometimes very low and guttural like " Aarrrr." The " $P\bar{e}_{er}$ " cry can become fierce and intimidating when the parents conceive the eggs or young to be in danger. With this anxiety increasing, the cry changes to " $K\bar{e}_{aaarr}$ " and is not pitched so high. Should anger become the dominating emotion and the birds decide to attack, they adopt the tactics used with such effect by the Common Tern and swoop at the enemy with a fierce " $Paaaa_{aaarr}$," or a terrifying " $Yaaaa_{aaarrr}$ " precedes the assault.

If disturbed by an intruder whose actions are suspect, Arctic Terns fly, calling a high " Chi." This is a short, light cry given at intervals or reiterated more rapidly and is frequently heard. If an attack develops, a " chatter " is added to the " Chi." This combination of sounds is the favourite one adopted for the intimidation of Gulls and other reprehensible visitors to a ternery.

The " Chi " cry, or one very like it, is associated with courting. We watched one Arctic Tern arrive with a fish, calling a very high " Chi " at intervals. He settled every few yards and held his wings upright above his back. Shortly his mate came and took the fish, after which both made the normal display. " Cha " is a variation and is given extremely *staccato*. Both birds of a pair make this call in the air before alighting to display. This call may be strung together thus, " $Chachachachacha_{chēa}$," and to this accompaniment, loudly uttered, display will take place.

The short versions of " Chi " and " Cha," although noted as accompanying love-making, seem, at times, to be an expression of annoyance. This occurs when a Tern, waiting for its mate to arrive, becomes impatient at his lateness. She will, then, repeat one or other syllable continuously and monotonously at half-second intervals, resentfully.

With the SANDWICH TERN we come to a series of calls in which the creakiness, present, more or less, in all Tern cries, is intensified. And with these calls we find squeaky sounds which, on analysis, are found to be, really, high-pitched creaks. It is impossible to render the peculiar quality of this creakiness by print. It has extreme variation in pitch and sounds something like an ungreased cart-wheel, groaning as it rolls. The creaks often start low and rise to the end, and it is the termination which provides the " squeak." Besides these there is a multitude of short, sharp cries, but the general impression of the calls in a Sandwich ternery will be of loud creakings and harsh squeaks.

Sandwich Terns do not seem to have any call exactly like those heard from the other Terns. They have the differences of " pitch " in various calls which we have attributed to the different sexes, a difference in which one naturally attributes the higher call to the female, though this would be difficult to prove.

We may note, too, the occurrence of " associated " cries.

The love call or " song " is given under the same conditions as that of the other species, *i.e.* when a bird announces his return from fishing with his catch, or when one is searching for his mate. The " song " appears to be " $K\bar{a}_{er}{}^{i}$ " called at long intervals or repeated rapidly. We have noted certain variations of this call, all of which were given under the same circumstances as the above. They are " $K\bar{e}_{ar}{}^{i}$," sometimes drawn out into " $Keee_{aar}{}^{i}$," " $Krr\bar{a}^{i}$," " $K\bar{e}\bar{e}^{we}$," " $K\bar{e}\bar{e}^{ar}$ " or " $Kr\bar{e}\bar{e}^{ar}$," " $K\bar{e}_{er}{}^{er}$," a creaky sound, and " $Kroi\bar{e}_{a}$."

Additions, under stress of various kinds, are made, as in the case of birds returning from fishing in a thick sea fog, which called " $K\bar{e}_{ar}$ikar kar karr " and " $Keee\bar{e}_{yar}keee\bar{e}_{yar}$kurkurkurkur " and " Keeeē ē ē kerker-kerkerker."

The last, high note is sometimes missing or cannot be heard because of the distance, thus, "Ka_{arr}," "$K\bar{a}\bar{a}$," "$Kr\bar{a}\bar{a}$," "$Kr\bar{a}_{arr}$" and "Kraaaā."

Early in the season, low, guttural sounds issue from the ternery, made by the courting birds: these are too rough and throaty for one to be quite certain how to express them. For example, two birds, facing with crests erect, each bowed to the other, both saying a low " Krā krārārā krā rārā rr rr kraaa krārrr," this being given very quickly and almost like a guttural quacking. Though hurried in the main, it lingered, at times, on one note. Another bird, during display, threw up its head and gave utterance to a throaty croak, " $Kr\bar{a}^{i}kr\bar{a}^{i}$ kikikiki."

During incubation, the " brooding " sound given when arranging the eggs or tending the young was " $Kw\bar{e}^{k}$ $kw\bar{e}^{k}$ krōkrōkrōkrōkrō," continued *ad lib.* To a young one in the nest the mother reiterated a high " Kw^{i} " with a slight rasp in it, as the chick stood by the side of the nest. Hovering

over the nest before alighting, the sitting bird or the chick is addressed by a short " Krāk," repeated at intervals.

The nests are so proximate that much wordy quarrelling with the neighbours occurs: crests are erected and beaks open wide emit growls and creaks expressive of annoyance.

When in the nest the young give high, thin squeaks. This high quality remains with them when they become " runners " and when they develop into " flyers," following their parents about in the air, pestering them for food. This querulous cry may be rendered " Twi twi twi," repeated *ad lib.* We suppose that at this time, though flying, they have not learned to catch food for themselves. But when on migration and they have learned to dive for fish, they still demand food from the old birds, calling a high, fairly quick, insisting cry of " Pē ē ē ē," staccato, and sometimes they call " Chēēa."

Besides the " song " and its variations there are short cries given when in " amatory flight," either by one bird in " association " with longer calls from the other, or by both birds.

An example of the first are the calls given by a pair, flying round in a leisurely manner, one calling a slow, deep " Krāk——krāk——krāk " and the other a short, high " Kri-kri-kri-kri-kri."

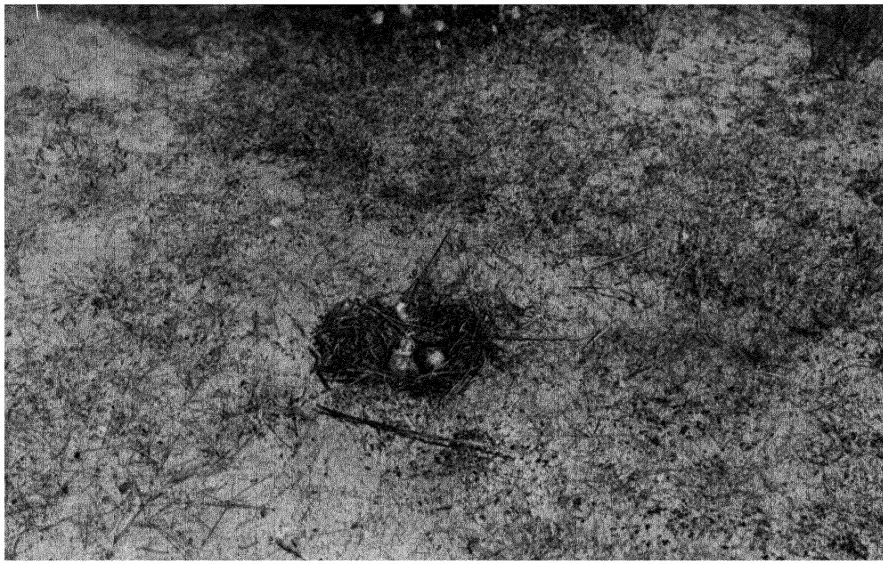
One of another pair up in the sky called " Karrr—karrr," at intervals, as though in reply to the other, which gave a short, sharp " Pi," intermittently.

Of two others in " amatory chase," one called a short, rather high " Ki " and the other an equally short but higher " Pi." These calls were given alternately and sounded like " Ki pi ki pi ki pi ki." At times the " Pi " was given twice, thus, " Ki pi ki pipi ki pipi ki," etc.

The common call, used when the birds are going about their ordinary affairs, seems to be a harsh " Kraaar," and this may be their " Fear " cry, too. Another cry expressive of alarm, given when disturbed from the nest, or in other ways, is a sharp cry of " Krek " or " Prek." At times it is higher, as " Krik," and this, possibly, comes from the other sex. These cries may be extended into " Prēk," or in a low, guttural form, as " Krēt."

It is not usual for Sandwich Terns to get annoyed enough to attack an intruder near their nest. During such rare occurrences we have noted, as " anger " cries, a repeated " Kaaaak " and a very rough, guttural " Kaaarrrk." On one occasion, when we were near a nest, the owners made half-hearted swoops, calling " Kerk—kerk—kerk—kerk—Kyerk—kyerkkyerk."

Quarrelling with their own species or with Common Terns they cry " Kwarrekwarrekwarrekwarre " quickly and repeatedly.



106. Nest of Common Tern before camouflage.



107. Same nest camouflaged.

What the cries are which are used in the " ground display " by the ROSEATE TERNS we have not, as yet, had an opportunity of learning.

On their arrival at the breeding ground, their cry seems to be a very harsh " Kāh," or often " Kyaaa." When an ill-disposed Common Tern swooped at newly-arrived Roseates with the usual " chatter," they replied by repeating " Chuk," lengthening it to " Chuker." A shorter cry of " Chik " was also given. These cries came from different birds and the difference is, probably, sexual. These may be " associated " cries.

During the breeding period their normal call is a harsh " Krā," a sound which is quite different from the cries of the other Tern species, and enables one readily to recognise the presence of Roseate Terns.

This call, with its several intonations, seems to be the " alarm " cry, for it is repeated, constantly, by birds in the air when an intruder is near the nests. When they are standing beside their nest, their uneasiness having abated slightly, though still perturbed, they call an intermittent " Kēk."

There is much quarrelling in the ternery both on the ground and in the air; the composite sound thus produced by the multitude of cries, proceeding from the many birds, sounds like the quacking of numerous ducks. The individual cries which compose this medley of sound are, usually, " Kaaarr," though quite often they seem like " Kwaarr."

When resettling on their nests after a " dread " or an " alarm " the air is filled with deafening shouts of " Kaaarr." This call is, also, heard from the birds engaged in incubation, though this may have a terminal " k," thus, " Kaaaak."

When standing by the nest or on the " perching stone," and an attack is made by a Common Tern, or, as is quite frequent, by another Roseate Tern, the standing bird will crouch and, with wide-open beak, shout " Krāk." The attacker, if a Roseate Tern, calls a quite different sound, " Choiik " or " Kroiik," a number of times, but not quickly. This cry is a creak not unlike that of a Sandwich Tern. An abbreviated form of this cry " Ik," a sort of chirp, was also used by a crouching bird when another struck at it.

This sound, without the terminal " ik," is heard, also, from the sitting birds, as " Choi."

A growling " chatter " is constantly heard during these quarrels.

We have not experienced, from Roseate Terns, the violent attacks such as the Common and Arctic Terns indulge in when their nests are approached, the Roseates always restricting themselves to short swoops. During these demonstrations their voices have none of the fierceness or menacing quality of the " swoop cry " of the other attacking species. Under these circumstances a rather quiet " Kaaa " is given, in which,

occasionally, there is the suggestion of a " y "—" Kyaaa." But there are times when their anger increases, in which case the cry, when flying overhead, becomes a guttural, loud " Kaaa$_k$ " which, with the downward swoop, becomes a very rapid " Kekekekekekaaaaak."

In general the voice of the Roseate Tern is quieter than that of the Common Tern, but decidedly more nasal in quality.

Owing to the smaller number of birds in a LITTLE TERN colony and their thin distribution over the nesting area, it is difficult to give an adequate statement of the vocabulary used by the birds when courting on the ground before the eggs are laid.

But, as with the larger kinds, they have their family speech and have cries, produced in response to fear for themselves or their offspring, or in order to instil fear into others.

If that triumphant call or " song " used by birds of the other species when bearing a fish, or mate-seeking, has a counterpart among Little Terns, we have seldom heard it.

From a pair engaged in " amatory flight " came a cry of " Chēer^{i}." This is, probably, the " song," as it is similar to that used by the Common Tern in the same circumstances. With this was an " associated " cry from the other bird of " Chit."

Both these sounds were heard, given by a pair on the ground when one presented the other with a fish. " Chēer^{i} chēer^{i} chēer^{i} " one called, quickly, the other replying with " Chit——chit——chit."

But there is another call often heard when a " fish-chase " is in progress. It is heard, too, at the " presentation." This is a playful sound and has its variations.

In the heat of a " chase " it is formed of short, quick syllables, repeated without pause, " Twididitwididitwididi." When flying with the characteristic, curious, slow wing flaps, a slight lengthening of the call occurs. Of this we have noted several varieties—" Twēdidi," " Twētiti," " Chudidi," " Chawdidi," " Chutididi " and " Chididi," each being called several times, quickly.

When scuffling in the sky, excitement running high, one of a pair called " Wēdididē," and, at times, " Wēdidē," repeated quickly.

" Cher$_t$idi " is also given during a " fish-chase " and the same cry was heard from another pair, one of which carried a fish while the other was doing the deliberate wing flaps. This phrase was always repeated three times, then a pause, given thrice again, a pause and so on.

Almost always, with these cries was an " associated " call, and one cannot resist the belief that one bird is responsible for the long one and the other for the short. One of these, " Chit," has been mentioned. This occurs, slightly prolonged, as " Chēit " and, shorter, as " Chi."

Another " associated " cry is " Whit," with its longer forms, " Whēt " and " Whert."

Besides these calls, which are all used during flight, we have noted " Cheaeecheaee " given during " amatory chase " and " Twerter " called by a lone bird carrying a fish, searching for its mate.

The " Ter " vocable is one in common use. It is repeated singly, at intervals, like stones being tapped together. Or it may be uttered quickly, many times in succession, as " Terterterterter," without any pause between the syllables. This call is quite different from the " chatter." It may be heard from a Tern searching for its mate and seems to be indicative of uneasiness. It is given, too, by a bird when its nest is approached. A male bird, for example, on the appearance of persons in the distance, left the ground, where he had been standing on guard for some time, and called " Tertertetechererkterteter," etc. He then dropped back to the ground repeating " Terterter " as he stood, continuously, until the intruders departed. Again, when one bird is on the nest, the other, uneasy at the presence of the " hide," calls " Tertertertetetеter " when on the ground and in the air. The short syllable is very quick, sometimes very, very quick, the other is less so. Another pair changed places on the nest. The one which relieved the other walked to the nest uttering a succession of noisy " Tertertetetеr," etc., which, given close to the " hide," sounded like a rusty racket wheel running at a quick rate, sticking a little every now and then, giving a few isolated " Ter "s, then running off again, rapidly. As she (he or she ?) settled down on the nest to brood the " Ter " softened into " Klōk " and this she repeated softly to the chick beneath her.

On another occasion, the bird, alighting, and standing by her nest, called " Kluk kluk," whereupon the chick rose and responded with a faint " Chēp."

" Pit-pit-pit," heard sometimes as an " associated " cry, is given, too, by birds flying about, normally, over the beach. It is heard, too, when the Terns are on migration, together with a shorter version " Pi " and a longer " Pēt " or " Tēt."

" Chi," " Chit " and " Chēit " have been noted above. The latter is often heard from one of a pair, the mate calling " Chert " a little lower. This seems to be an example of the sexes having calls of a slightly different pitch. This " Chi " we have heard so rapidly uttered as to resemble a metallic chinking, " Chichichichichichichi."

Some of these slight differences, especially the lack of the initial consonant, may be due to imperfect hearing, owing to the calling bird being farther off on one occasion than another, but it is quite certain there are small differences between calls which might be thought to be alike.

The " fear " cries take several forms according to the extent of the disturbance of the bird's feelings.

Anxiety caused a pair, disturbed from their nest, to call " Cher^{ep} " at intervals, one of the two doing most of the calling. A third bird alighted near the more silent of the two, which, at once, attacked the intruder, calling " Cherupper " quickly and angrily. Here again we noticed a sex difference in the calls, for one bird cried " Cher^{ep} " and the other a smoother " Ch$\bar{e}^{ep}$."

" Kwēt " is another of these " anxiety " utterances. This was given by a parent afraid to descend with a fish for its chick. As it hovered more closely over the nest the cry changed to " Kwē$^{\bar{e}}$-kwē$^{\bar{e}}$," almost " Kwē$^{\bar{e}k}$." Another disturbed by a camera left near the nest called, as it hovered to examine the strange object, " Kwer-kwer-kwer."

Disturbed from its young, one cried " Tit-tit-tit-tit-tit " many times, the speed at which it was given sometimes increasing to very quick. Occasionally " Kwēt " was interposed. Both birds gave this " fear " cry, which was fairly high in pitch. It went something like this, " Tit tit tit tit tit kwēt tit tittittittitititititititittit tit kwēt tit tit " and so on; the " tititiți " being given very quickly.

A similar call, resembling " Tut " or " Tet," was given by the disturbed owner of a nest containing eggs as she flew around. Usually one cry was given every three seconds, though, often, more quickly. Several times she called " Kwēt " or " Whēt."

The " anger " cry, which not only expresses emotion but is intended to affright, is " Kraaaak." This is heard when incubation is advanced or the chicks are hatched, the bird flying overhead. Very occasionally the Little Tern ventures to attack in a similar manner to the larger species, *i.e.* with the " downward swoop." It commences with a quiet " Tip—tip—tip," repeated continually, as it flies round. Then begins the " swoop," during which it is silent, until, when passing close to one's head, it shouts a loud " Kwēr^{rk} " rising to a short screech. It then resumes the " Tip—tip " while its mate swoops and screams.

Also intended to affright is the " chatter," a quick knocking or tapping sound. It is sometimes given when an intruder is near the nest, though this is not usual. We have heard it from birds chasing high in the sky. But it is commonly used as an objurgation to others of its species who intrude, and to put fear into Ringed Plovers or other aliens invading the breeding territory.



108.

A. Eggs coloured same as surrounding stones for experiment.

B. Eggs and stones striped and coloured for experiment.



109. Nest of Little Tern rescued from waves.

OF REMOVALS, FLUCTUATIONS AND DESERTIONS

TERNS are notoriously unstable in their ways. They indulge in removals from one part of their breeding ground to another; they, unaccountably, change from one ternery to a distant location.

Besides erratic movements such as these, fluctuations in the number of birds nesting in the colonies are frequent. Desertions, wholly or in part, temporary or permanent, of what seemed established strongholds are not unusual.

While some of these removals are traceable to definite causes, others are mysterious and the why and wherefore still in the region of supposition.

Internal movements in a nesting area are understandable, their reasons are fairly obvious. The short willow which is in full favour as an environment one season may, a year later, have grown taller. Terns have an aversion from being shut in. Alertness is essential to safety. To be able to rise into the air on the least suspicion of danger is imperative. They must see the movements of their fellows, for alarm spreads through a ternery by sight. Hence, if their vision is obscured by the growth of the willow, they move to another part, perhaps a short distance only, where the growth is not so high or is not present at all.

Then, too, an area of favoured ground may become sand-inundated during the winter storms. When the birds return in the Spring their old home is changed; it is unfamiliar; its desirable features no longer exist and it is abandoned, a settlement being made in another part of the ternery.

So, through one natural cause or another, there is constant shifting of ground in a ternery of any size and changes like these may frequently be witnessed.

But there are also slower alterations of the face of a ternery, changes which are more momentous, for they bring about a permanent shifting of the birds to another part of the breeding ground. A change of this type is now in operation at Blakeney Point, where the recent growth of the "Far Point" seems to be offering a more attractive territory than the long-occupied ground seaward of the "High Hills." Consequently, the newer area is becoming thickly populated while the inhabitants of the old are becoming sparse.

An alteration of this type is well illustrated, too, at Tentsmuir in Fife-

shire, where the occupants of the ternery are mainly Arctic and Common Terns. Here, along the shore-line, run several more or less parallel ranges of sand-dunes, among and on the flanks of which Common Terns are nesting. Behind these hills is a belt of flattish sand-formed land, damp here and there, and on the drier parts Arctic Terns have their nests. Still farther inland, perhaps half a mile from the sea, are more dunes also with a Common Tern population.

Out on the beach, a distance of several hundreds of yards seaward of the dunes, a low shell and shingle ridge has been thrown up by the waves. On this ridge, sand is accumulating, embryo sandhills are forming and "*ammophila*" and other plants have established themselves.

What, seemingly, is happening is that the flat ground behind the shore-line sandhills was, many generations ago, somewhere near high-water mark and was then occupied by a colony of Arctic Terns, the Common Terns colonising the higher sandhills behind. The present seaward range of dunes did not exist at that time, but after it was formed some Common Terns left the far hills and occupied the newly-formed ones. The more conservative birds remained in their old home and some of their descendants still nest there. The Arctic Terns, once established on the flatter ground, are, many of them, still there clinging desperately to their traditional dwelling-place. But their affection for it is weakening; its character is changing: its sandiness is disappearing: the hollows hold water: on the higher parts heather is now growing. In short, the Arctic Terns are finding it less desirable, more tempting ground is being formed on the shore and, though this is some considerable distance from their old domain, they are transferring themselves to the embryo hills on the beach.

These two instances, which can be paralleled elsewhere, are natural removals, still in progress, of a more permanent character than the internal changes mentioned previously brought about by botanical and surface alterations.

Removals caused by another type of interference are seen when encroachment of nesting territory by other orders of birds, usually Black-headed Gulls, causes the disturbance of normal conditions. Few Terns will remain nesting in the vicinity of the Gulls. This may be due to the noise made by these birds; or to their habits and tastes, particularly the one which impels them to regard the eggs of the Terns as a desirable addition to their diet. Whatever the reason, if the Gulls increase and extend their nesting area, the Terns will move to another part of the station. If there is plenty of room, as at Ravenglass, the two species remain in the same area, occupying different parts, but if the space is restricted the smaller birds clear out and form a settlement elsewhere.

Such a forced removal took place in Anglesey a few years ago. "Ynys

Aderyn " by Llandwyn had for a long time past been the sole prerogative of Terns as a habitation to which they returned each season in considerable numbers. Injudicious " protection " of Gulls and Cormorants on a neighbouring headland caused overcrowding. The surplus population had to find a home elsewhere and decided on " Ynys Aderyn." This island, which is a mere rock, could not accommodate more birds than those already there. Hence the arrival of the Gulls and Cormorants had the speedy result of causing all the Terns to move away and settle in other districts.

A similar eviction is said to have occurred at the Walney Island station in 1932, where Sandwich Terns were ousted by Lesser Black-backed and Herring Gulls.[1] And the same story is told of the Terns of the Scilly Isles, and that the same species were expelled from the Knoxes in the Farne Islands by Black-backed Gulls.

The alleged antagonism of one species of Tern to another has been given as instrumental in bringing about the desertion of breeding stations. Popularly, the Roseate Tern is supposed to suffer in this way, and this alleged persecution has also been assigned as the cause of the rarity of that species. We believe this comparative scarcity is due to another cause to be discussed later on. But with regard to desertion, Howard Saunders[2] reports a statement by Dr. Bureau that three colonies of Roseate Terns in Brittany had been dislodged, and says he is " inclined to attribute its diminution in a great measure to the increase of the larger, stronger-billed Common Tern." And Jourdain says Roseate Terns are " apparently crowded out by their neighbours," and adduces the Farne Islands as a place where " they have failed to hold their ground." The bases of these opinions are not apparent, for wherever the Roseate Tern has settled in Great Britain or Ireland, whether in small numbers as at Scolt Head and the Farne Islands or in larger colonies in other places, it seems to hold its own perfectly well. Indeed our own observation leads us to think that it is far more prone to attack other species than to suffer from their assaults.

This antagonism is not peculiar to the Roseate Tern, for a writer in *British Birds*[3] stated that the Common Tern had driven the Arctic Tern away from Ravenglass and from Walney and had already done so on the Farne Islands;[4] another statement being that the Walney Arctic Terns had driven out the Common Terns.

The failure, partial or complete, of the food supply is another and potent cause of fluctuations in number and station desertions.

Remarkable changes due, perhaps in the main, to this cause have been

[1] *British Birds*, XXVI. 167.
[2] *Manual of British Birds*, p. 629.
[3] *British Birds*, XIV. 281.
[4] The statement *re* the Farne Islands was disproved in *Brit. Birds*, XV. 47.

witnessed in the group of Norfolk terneries which, ten years or so ago, were suddenly adopted as breeding places by large numbers of Sandwich Terns. In the great year 1929, when the presence of over two thousand of these birds on Blakeney Point coincided with an extraordinary " inshoring " of " whitebait," we were for a period of four weeks living on the " Point." We were thus able to witness the extraordinary activity of the feeding Terns and to see the immense number of the small fish stranded in the tidal pools. These pools were so packed that the fish appeared as a solid mass and could hardly move. And from this we gained some idea of the astounding quantity of herring fry which must have been swimming in the sea in the vicinity of the " Point." We were present again, in 1931, when a failure of the " whitebait " to come inshore synchronised with the desertion of the " Point " by the breeding Sandwich Terns. These appear to be clear cases of cause and effect.

The strange occupations, desertions and reoccupations of the various islets forming the Farne Island group may have their root cause in the variableness of the food supply and are phenomena which certainly deserve closer study than has hitherto been accorded them.

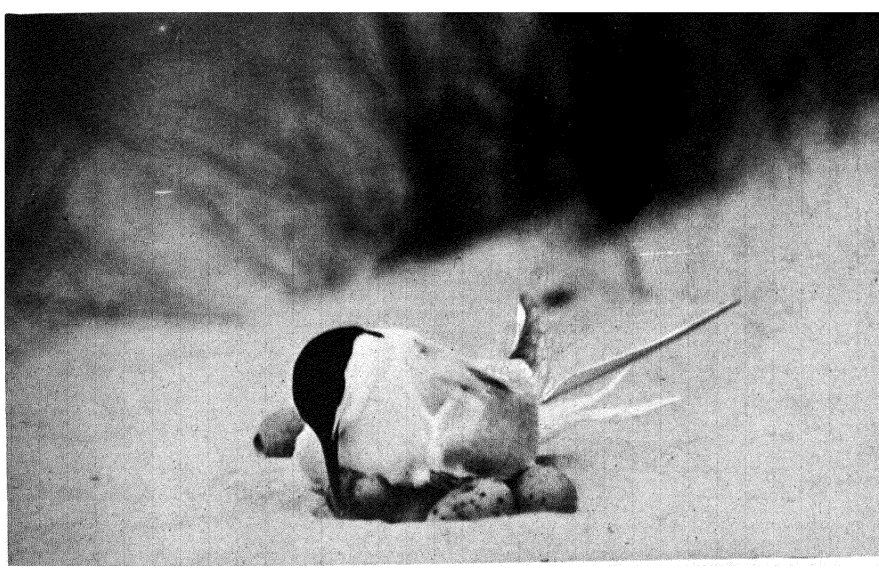
It seems a pity that " protection " should be deemed to include not only the keeping off of egg-takers but also of investigators into problems of bird life which have a definite scientific value.

There is yet another reason for " desertions " which has not hitherto, so far as we know, been taken into account. It is well known how stubbornly birds will cling to a place or area which has been their traditional nesting ground for generations (see p. 210). It seems just as likely that the converse takes place: that birds which have been ousted from their ancestral breeding stations through one cause or another, and have moved elsewhere, have not yet developed a sufficiently strong affection for their new home to " stay put," and for this reason are inclined to desert more easily than they are from a station which has been occupied by themselves and their progenitors for generations. So that if they are interfered with or if their food supply temporarily fails, they seek other and more congenial quarters much more readily than they otherwise would. If, indeed, the Norfolk Sandwich Terns are the dispossessed Romney Marsh birds or, as Jourdain thinks, deserters from the Farne Islands, this theory may account for their erratic behaviour. It may be noted in this connection that though the newly-settled Sandwich Terns in the Norfolk colonies are behaving in this unstable way, the Common Terns, which have been established there for generations and are firmly rooted, are not prone to desertions and returns.

In this connection, too, the important point may be noticed, that the more erratic Terns—the Sandwich and Roseate—are those which, in Great Britain, are on the " fringe " of their breeding region. They are,



110. THREE EGGS STOLEN BY COMMON TERN FROM A NEIGHBOUR AND ADDED TO HER OWN.



111. COMMON TERN THIEF ENDEAVOURING TO COVER STOLEN EGGS.

in a sense, pioneers breaking away from their mother country and are, like all pioneers, of a restless disposition.

Movements similar to those of the Norfolk Sandwich Terns may be observed at Ravenglass. Birds whose ancestral home is Walney Island are, seemingly, making tentative attempts to transfer from there to Ravenglass. They have made several moves in large or smaller numbers, but have returned to their traditional home only to desert it, more or less completely, again in their endeavour to found the new settlement.

Artificially caused " desertions " of terneries have occurred and others are in progress. These, brought about by changes in our own habits, are growing in number, and are happening on most parts of the coast of England. The uneasiness of the Walney Island birds may be due to this cause.

Thirty years and more ago the district of Liverpool known as " Sandhills " which is now a mass of houses deserved its name. This with the shore stretching towards Southport was a favourite nesting ground of the Little Tern. Building has destroyed the sandhills ; growth of population, the modern love of the open air, has caused this shore to be more and more visited, with the inevitable result that it is no longer frequented by Little Terns for breeding purposes.

The South Coast Terns have suffered in the same way. The extension of London to the coast, the growth of seaside resorts and all that these changes bring in their train, have brought about the almost complete desertion of age-old terneries. Each year a pair or two try to breed in their old haunts. The protection afforded them on Dungeness may prevent their total extinction, but the glory of the Kentish and Sussex terneries has gone for ever.

The reasons most commonly given as the cause of " diminution " in numbers and " desertions " of breeding grounds are " shooting " and " egg-taking," and to prevent these and also apparently to prevent the study of birds in their natural haunts that curious " Society for the Protection of Birds " was formed. That we are strong " protectionists " and that we feel a more intelligent form of protection is needed is perhaps beside the point. But it is certain that no one at all well informed on the matter would assign collecting as effect and cause. What is needed far more than the suppression of the shooters and egg-takers is the preservation of ancestral breeding grounds, as might easily have been done at " Ynys Aderyn," and conservation of food supplies. For while there is *plenty of proof* that interference with these last two is extremely destructive to the Terns, there seems *no evidence at all* that the collector has had a serious or indeed *any effect whatever* on the Tern population.

The classic example of the harm done by the collector is the disappearance of the Black Tern as a breeding species in England, where

at one time it nested in thousands. For some considerable time this loss has been attributed to the taking of eggs for food by the country people. It is, tardily, being admitted that " drainage " of the Black Tern breeding haunts may have been a contributory cause. It can, however, be shown that " drainage " has been entirely responsible and " egging " a negligible reason. A moment's thought should convince of this. For centuries the Black Tern nested in the Fen districts and for centuries, as was natural, the country people laid hands on all the eggs they could find for use as food. Notwithstanding the toll thus taken no diminution of the species took place, nor did it until the drainage of the Fens commenced. Here is what Lubbock in his *Fauna of Norfolk* has to say at this point: " The Black Tern used to breed in myriads " and " Since I first began to sport, about 1816, a marvellous alteration has taken place in Norfolk, particularly in the marshy parts. When first I remember our fens they were full of Terns, Ruffs and Redlegs, and yet the old fen-men declared there was not a tenth part of what they remembered when boys. Now (in 1847) *these very parts which were the best . . . are totally drained.*" (The italics are ours.) And more to the same effect. The drainage of the Fens was taken seriously in hand in 1621, two hundred years before Lubbock's time. And, although it was doubtless a long time before the birds were affected, the diminution must have begun even before the recollection of the " old fen-men." As a matter of fact drainage and disappearance went hand in hand.

Every year, Black Terns cross England in some numbers but none remain to nest. Once, when in 1852–1853 an abnormal flood temporarily reintroduced the old conditions, a few pairs did stay and breed. They will never, despite the most careful protection, become a nesting species again unless the land reverts to its old undrained condition. Provided the desired conditions remain no amount of shooting or robbing by the collector, no continuous egging by the fisherman or farm-labourer, causes any permanent harm. The tenacity of the Terns in clinging to traditional breeding places and their recuperative capacity prevent any " wiping out " of the species.

Let us examine some evidence—there is plenty more—in support of this statement.

Take, for example, the Farne Islands. These lie, at present, outside the possibility of " improvements." The natural conditions which have obtained from time immemorial remain the same to-day. The birds have been most carefully protected for over forty years! Do they increase? It does not appear so; they remain in numbers suited to the available food supply. In the past, before protection began, they were harried. The extent of the persecution may be gauged from a statement by Seebohm,[1]

[1] *Hist. of Brit. Birds*, III. 273.

the eminent collector. He visited the Farnes on June 9th, 1870, " To give the reader some idea of the riches of the locality," he copies from his journal the list of eggs he took on that one day—one hundred and forty-nine Sandwich, thirteen Common and forty Arctic Terns' eggs, besides eggs of other birds amounting in all to four hundred and fifty-six! Think of this haul by the man who constantly referred in his writings to the " rapacity of collectors," meaning other collectors, of course. In another place [1] he relates the taking of two hundred and fifty eggs of the Little Tern!—in using the term " rapacity " he would seem to have adopted the *mot juste*.

Notwithstanding this sort of thing, Evans was able to write of the Sandwich Terns in the Farne Islands in 1911, " There is no reason to suppose that the colony is not as large at the present day as in Selby's time," *i.e.* 1833. And the numbers to-day—a hundred years later—are as great as ever they were.

Here are " confessions " by other collectors, telling, with somewhat disarming naïveté, of their wholesale depredations; and at the same time never failing to execrate other persons who took eggs for food or shot for pleasure.

Two gentlemen, Thompson and Sinclair, visited an Irish Tern resort in June 1827. Thompson relates their doings: " After firing for some time at all birds which came within shot, and having killed thirteen, we ceased." In 1832 they again visited the colony and obtained a few Terns by firing " indiscriminately at all Terns as they came within shot." The same year they went again to the same island and " As in former years we fired at all Terns which came within range." So Thompson writes [2] and goes on to say, after relating how the eggs were regularly taken: " The birds, too, suffered much this year. In one forenoon a party butchered not less than fifty." He was horrified, this man who, himself, on three visits to the island had " butchered " no less than twenty-nine birds. How lucky it was for the birds that Thompson and his friend were so inefficient with the gun! He continues: " Our boatmen stated that they remembered the birds being more than ten times as numerous as at present. Their diminution is owing to their eggs being more than ever sought after and to the increasing wanton persecution to which the birds themselves are subjected in being killed by heartless shooters."

In calling attention to these " confessions " we are not concerned with the moral aspect of the matter. We wish to make the point that even systematic robbings such as these do not affect either the stability of the colony or the number of birds nesting there providing, as has happened on the island referred to, suitable and proper conditions remain.

[1] *Hist. of Brit. Birds*, III. 290.

[2] *Nat. Hist. of Ireland*, III. 272–3.

In verification of this, Garrett,[1] in 1849, wrote of this same Irish colony: "Terns were in great abundance on the island to-day. I endeavoured to estimate their numbers and considered there were no less than two thousand in sight." And at present, as we ourselves witnessed in July 1932, there are as many birds as ever still nesting in that colony.

Macpherson [2] says: "Some idea of the perseverance with which this species adhere to traditional breeding grounds even where most persecuted may be gathered from the fact that the Rockliffe (Cumb.) colony bred on the marsh as regularly fifty or sixty years ago as at the present time."

Other proof may be given. During the Great War, when many terneries were left unguarded owing to the Watchers having "joined up," eggs were taken wholesale without any lasting injury to the Terns or terneries. We remember seeing the Ainsdale ternery swept quite bare of eggs on two occasions in two weeks. Notwithstanding this, when the birds returned the next season they seemed to be up to their normal numbers and remained so in subsequent years. At Spurn Point it was not unusual for a steamer from Hull to deposit its crowd of passengers in the vicinity of the Little Tern colony. In a short while all eggs were trampled on and destroyed. Yet the colony is as strong to-day as ever.

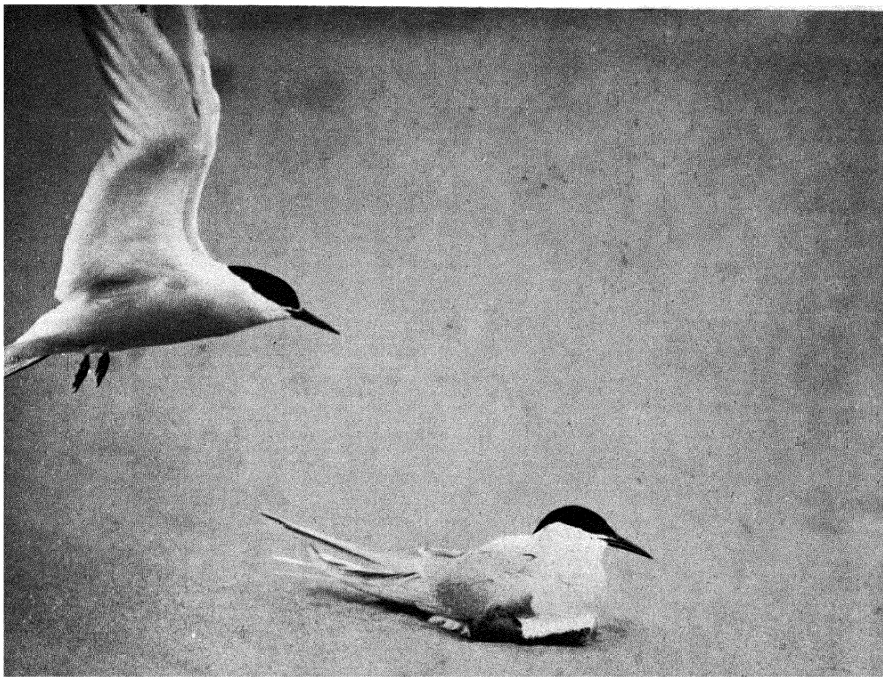
And we have seen, in Holland, certain terneries where Sandwich Terns' eggs are gathered daily, by permission of the Government, to be sold as food. These places are, in actuality, egg farms, rented for the purpose of exploiting the birds. Though the eggs are taken day after day, each unfortunate Tern laying far more eggs than its normal clutch, the egg farmer affirms that no diminution of the species will be experienced, and he seems justified in his belief.

If a careful census could be taken over a period of years it is not unlikely that we should find the aggregate Tern population of the British Isles remaining, approximately, the same, and if one colony showed a reduction in any year owing to desertions, the missing birds would be found augmenting another colony elsewhere or founding a new one. Such a removal took place, we believe, from Wales to Ireland when the Terns were driven from "Ynys Aderyn." And the new colony which established itself on Blakeney Point in 1922 may have originated with the Sandwich Terns evicted from Romney Marsh.

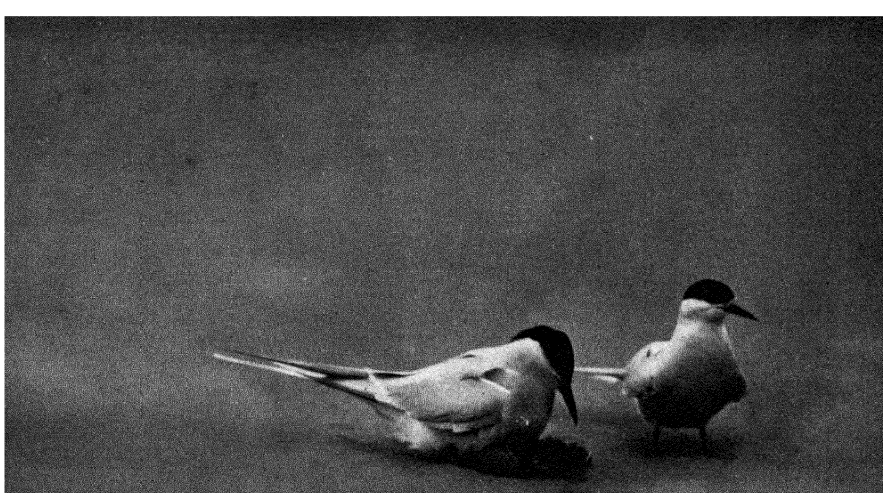
The only systematic census taken has been of the birds in the terneries of North Norfolk though, unfortunately, much of this was done by estimate. We have tried to show, graphically, the interrelation of the ebb and flow of the Tern population in these stations (p. 41). It is interesting to

[1] *Nat. Hist. of Ireland*, III. 277.

[2] *Fauna of Lakeland*, 1892.



112. ARCTIC TERN ALIGHTING TO " CHANGE OVER."



113. ARCTIC TERNS " CHANGING OVER."

find the combined totals for the three terneries—Salthouse Marsh, Blakeney Point and Scolt Head—remains much the same, thus illustrating in one county what we believe is occurring all over the country. Taking in the one year when the Cley marshes were occupied the average number of Sandwich Terns for twelve years was 1337·6; the largest number in one year being 2572 and the smallest 4. It would seem that 1300 Sandwich Terns or thereabouts is the " saturation point " in relation to the neighbouring food supply. The colonies are not of gradual growth developing from the one or two pairs which settled on Blakeney Point in 1921, for we find something like 200 birds nesting there in 1922. Blakeney Point is the " protected " area *par excellence*: its geographical features, its circumscribed area, permit it to be guarded in a manner hardly equalled elsewhere. The increase in the birds here has been attributed to the thorough and efficient protection afforded them, but much as we would like to believe this is so, and much as we admire the excellence of the methods of the authorities in charge there, we cannot but suspect that its real causes are the recent growth of the new sandhills on the Far Point providing a suitable domain for the Terns, the propinquity of suitable food and the crowding out of birds from some other ternery.

That " protection " is not the cause of the growth of the Norfolk colonies or even the maintaining factor is proved, almost to certainty, by the complete abandonment of Blakeney Point as a nesting ground by the Sandwich Terns in 1930—when the food supply failed—in favour of Scolt Head and Salthouse Marsh, where, presumably, the fish were more readily obtainable.

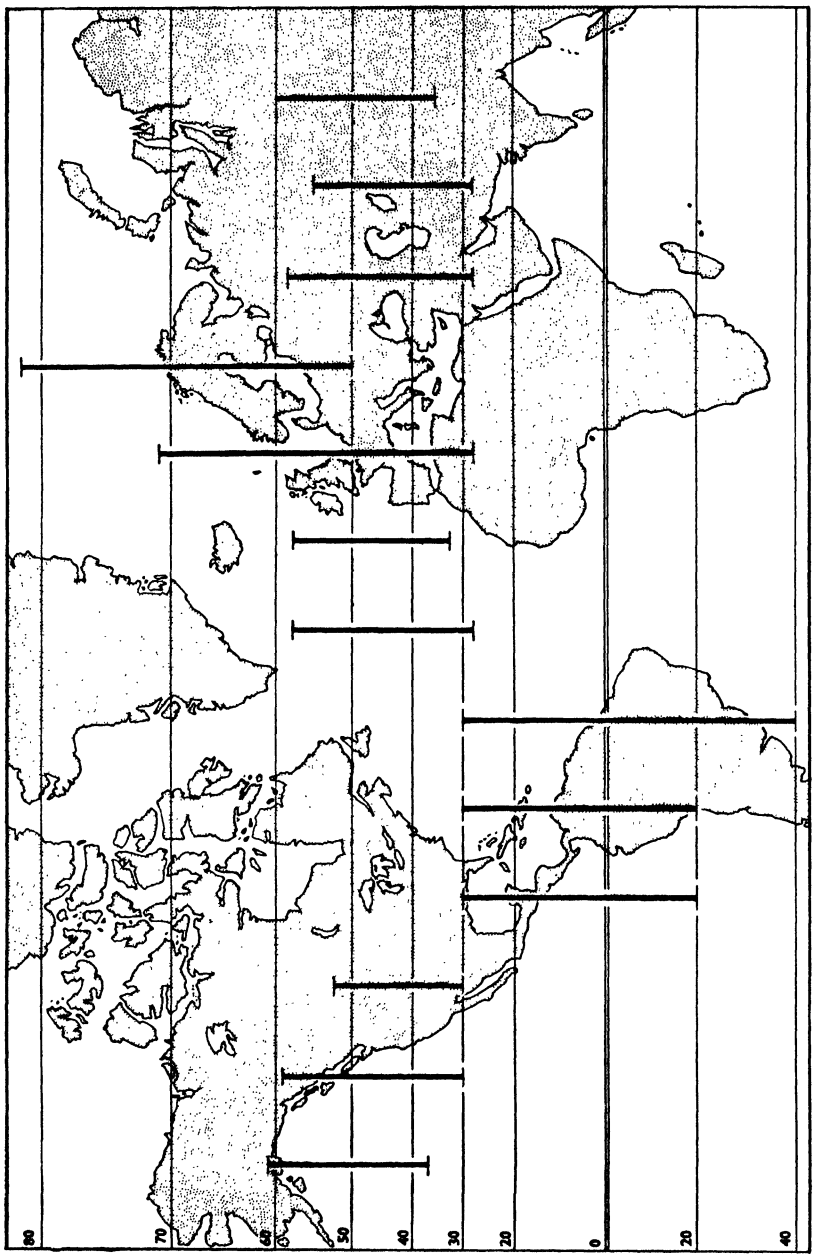
In arriving at the figures given above, two abnormal years were omitted —1928 and 1929—when totals of 2132 and 3306 Sandwich Terns were present in the three colonies. For this astonishing increase seems to be due to the advent of birds dispossessed elsewhere. In this connection it may be useful to quote Jourdain. " It is, however, a somewhat strange anomaly that the presence of Sandwich Terns in Norfolk is almost certainly due to the wholesale raiding (1923) of their homes on the Farnes for a short period when the protective system broke down and completely unsettled the birds for a time." [1]

It should be remembered that the above notes on the Norfolk colonies relate solely to the Sandwich Tern population: the other species there have been resident for generations and are not affected by the *wanderlust* to which the larger species is subject.

After reading the above paragraphs it will be of interest to recall Lubbock's [2] doleful statement made in 1845: " All these birds (Terns) now with us are hardly to be considered more than visitants, their nesting-places having been broken up by the incursions of man."

[1] *Brit. Birds*, XXIV. 228.

[2] *Observations on Fauna of Norfolk*, p. 122.



Showing the longitudinal distribution of the nesting areas of the British Terns.

If we are correct in assuming that the Tern population remains more or less constant in numbers it follows that a process of " concentration " is taking place.

We have referred elsewhere to the habit of Sandwich Terns of nesting in small communities somewhat separate from each other in the same breeding ground, and that there is some evidence to show that the other species behave in the same way though not to the same marked degree. This seems to show that " concentration " is in full swing and points to the probability that all species of Tern, before the modern appropriation of the seaside, nested in little communities widely separated along the shore much in the same way as the Little Tern does still.

In addition to the reasons for " fluctuations " and " desertions " already given, there remains one which always seems to be overlooked when deploring the instability of the breeding Terns and particularly the scarcity of species.

Terns, like all birds, have a particularly favoured region to which they resort for breeding purposes, a region in which the nests are congregated most thickly. On the " fringe " of this region, northward as well as southward, the nests are fewer in number. Still farther north and south the birds do not breed at all.

The nesting areas of the different British Tern species do not coincide (p. 212).

England and Wales appear to be the domain of the Common Tern and to lie in the area of the greatest density of this species. Hence, in these two countries, colonies occur with considerable frequency and the number of individual birds is large. The " fringe " of the Common Tern domain extends southward into France—with which we have no concern—and northward into Scotland, where the species, less numerous in South Scotland than in England, thins out in the extreme north and is rare as a breeding species in the Shetland Isles.

Conversely the Arctic Tern breeding focus point, as far as the British Isles is concerned, lies in the north of Scotland. There the colonies are large and numerous. The southern " fringe " extending to the north of England becomes attenuated until, in the south, the species is almost non-existent. In the area where the northern " fringe " of the Common Tern and the southern " fringe " of the Arctic overlap the species are somewhat similar in numbers.

The Sandwich Tern is a more southern species whose maximum breeding region appears to lie between 45 degrees and 50 degrees N. latitude. The birds of this species which nest with us are thus " birds of the fringe." They thin out in Southern Scotland and are infrequent in Northern Scotland.

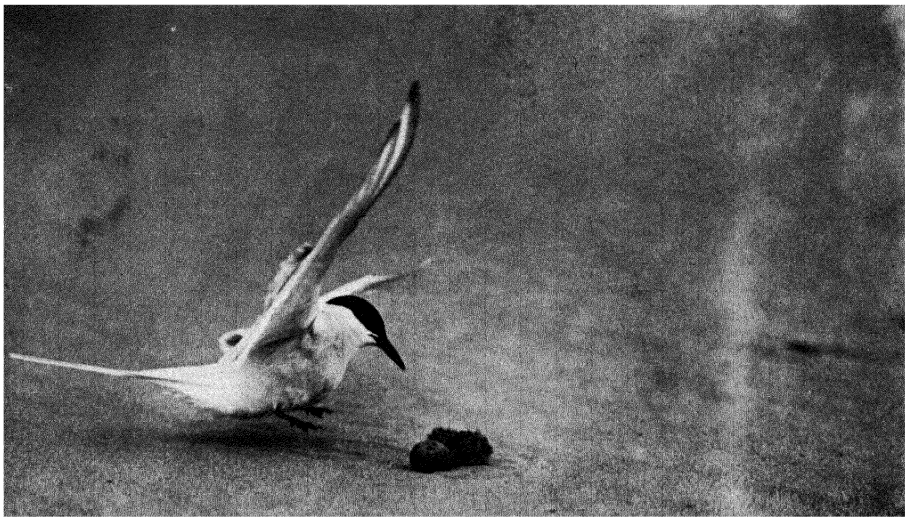
Much the same may be said of the Little Tern.

Both England and Ireland lie in the attenuated northern " fringe " of the Roseate Tern breeding region, the maximum density of which is still farther to the south than that of the Sandwich Tern. This " fringe " thins out to vanishing point in Scotland, where colonies are unknown, odd pairs only breeding.

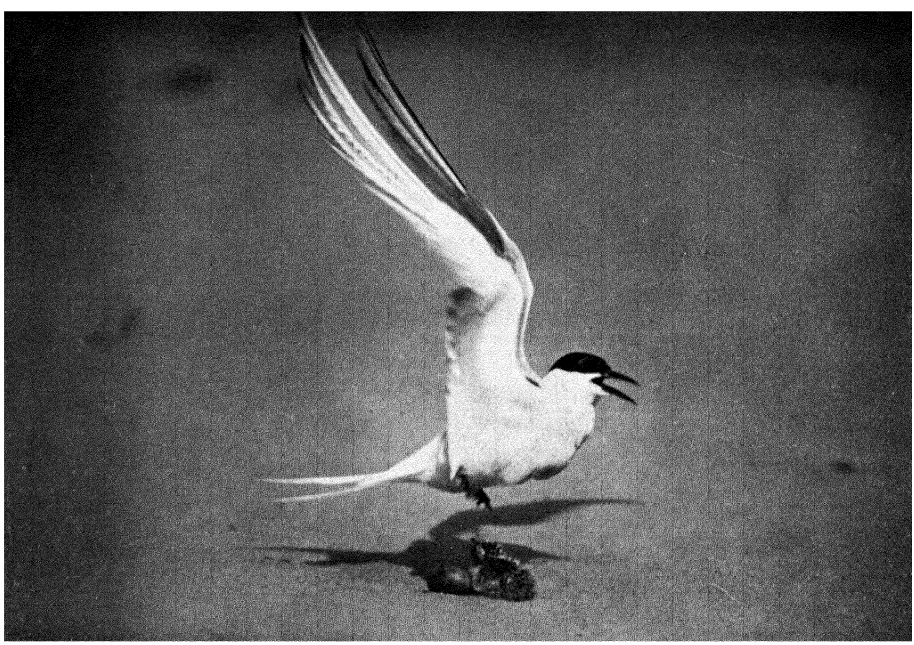
These facts negative the possibility of any increase of the species outside their natural areas, and it is hopeless to expect that even the most perfect protection will increase, except possibly spasmodically, the numbers of birds on the " fringe " or establish them outside the range of their domain.

As the Sandwich and Roseate Terns nesting in Great Britain are " birds of the fringe," it is apparent that they cannot settle and found new colonies farther north than at present. And as terneries, principally in the south of England, are evacuated their inhabitants must find breeding places in some new spot or join an already existing colony. This latter is the most likely happening, for suitable sites for the purposes are becoming reduced in numbers. We may, then, expect to see well-protected breeding grounds occupied by larger numbers of Terns as well as inaccessible sites such as the " stacks " off the North Wales coast.

In this way compensation will be found for the " desertions."



114. Arctic Tern alighting in a storm.



115. Arctic Tern rising alarmed.

OF ATMOSPHERE AND ENVIRONMENT

At no time does a ternery seem anything less than beautiful. Crowded with birds in Summer or when left untenanted in Winter; under every condition of weather; at dawn; throughout the day; as night falls; even during the night itself, the ternery is full of charm. What forms the particular attraction is not easy to determine, though it would seem to be bound up in the word "grey," for not even the most vivid sunshine can eliminate the greyness which is inherent in everything which goes to make up the atmosphere and environment of the Terns. But to say this does not mean that a ternery is colourless; on the contrary, it is full of colour, not obvious hues, but those indeterminate and of the most subtle tenderness.

The charm may perhaps be conveyed by transcribing notes we have made in different terneries under varying conditions, at all hours of the day and night.

Through the night all is vague-colour and form. One senses the shapes of the surrounding sandhills which cannot be seen; they are no more than a slightly more opaque form of the luminous greyness which envelops everything. The soft darkness not only obscures the reality of things, it muffles the swish of wind-stirred marram grass; it dulls the roar of the distant waters, still uneasy after yesterday's storm. It is 3 a.m. when, from the east, comes an intangible change. The settled silence which has aided the darkness in its effort to hide the birds is disturbed by a general uneasiness, felt rather than heard—the first sign of awakening. Whether the birds see or feel the dawn-change which can hardly be described as light, it has an immediate effect. Then a Lark is heard high above, singing in the still dark sky, and at once, all around, many others burst into a full-throated chorus. None can be seen. Now a faint light develops eastwardly, slowly evolving into a narrow band of greenish-yellow. As gradually a long, low line of cloud is disclosed crossing the sky, overtopped by a grey range slightly warmer in colour. Where unclouded, the sky is a cold grey-blue. The sandhills materialise as warm black silhouettes against the dawn. The wakened Terns are now heard calling all around; cries arrive from those already in amorous flight in the upper air, and from those still on the ground comes a continuous, grating clamour. Flitting through the dim dawn-light, appear and fade nebulous ghostly

forms, pale against the still dark sky and darker sandhills. Some call suddenly and harshly as they pass ; most are silent. The light strengthens as the dim yellow bar creeps slowly upwards. The warm clouds assume a rusty hue, nothing dramatic, menacing only, as the wind increases and with fitful gusts tugs at the tent in which we are hiding. The dim, grey forms surrounding us are now seen to be sitting Terns, trembling with eagerness as they nestle closer on their eggs. A silence descends on the scene. The Larks' chorus is ended. The sky is empty of the beating, flying Terns. All except the sitting birds have gone off to the fishing, to the cold, grey sea lying over there. Soon one and another are seen returning, some with a tiny fish hanging from their beak. All are uttering cheerful cries. With a burst of light comes the full day ; the business of life has commenced.

Great, shining clouds, ivory-white against the intense blue of a June sky, slowly rolling and seething, tormented by the wind. They gather, here and there, into masses of purple-grey, gloomy, malevolent ; their reflections darkening the sea to inky blackness against which the pale, grey sand gleams almost white. As the clouds gather the wind takes on a grateful coolness ; the radiant heat from the pebbled strand is stayed. But no rain falls, though yonder from a curtain of soft grey depending from the cloud's edge, slowly swinging as if in a draught, a deluge is descending.

The blue overhead is constantly disturbed by the passing and repassing of birds, Terns which are seldom silent. Their cries are almost as incessant as their wing beats. Myriads of soaring specks, now shining silver-white against the sky, now lost momentarily as they pass the shadowed cloud, all sustained by slowly striking or soaring wings. The sand, grey like old wash-leather, harmonises to perfection with the cool green of the dwarf willow and the slightly warmer marram grass. The shadows, dull purple, creep slowly down the dunes as the sun descends, they assume delightful curved forms as they pass over the rounded hills. Here and there Terns, sitting facing the wind, are brooding their eggs. Each has a mate standing not far away awaiting the time when his spouse will express her desire to rest from her labour, when he will waddle to her and take his turn on the eggs.

Watching these birds we consider the beauty and subtlety of their colouring. Their plumage is a combination of greys, cool bluish-grey with silver-white and pale grey which varies from slightly vinaceous to distinctly rosy. Combined with this a small quantity of lustrous black is harmonised with deft touches of vivid crimson, scarlet or coral, a scheme of the most delicate loveliness which holds its own, without effort, against the hues of those birds which have a more brilliant, obvious arrangement of colour.

But quality of colour cannot exist independently of its background, and in a ternery the environment of the birds seems cunningly devised to enhance the attractiveness of their plumage. The Terns, then, must be visualised as existing among the tawny grey of sandhills sunlit with purple shade, or under stormy skies; among the dull green of the marram weaving its spell of delightfully curved, myriad leaves with their echoing shadows; among reaches of many-hued pebbles; among aged lichen-covered rocks. Or they must be seen repeating, with their greys and whites, the delicately shadowed clouds harmonised by the cool blue of the open sky. So we see the larger Terns.

The Little Tern, too, on the pebble-strewn beach, pebbles whose common factor is grey, ranging from dull white, greys, blue; greys, fawn; greys, brown; greys, purplish; greys, black. Beyond these static greys we see the luminous grey, ever-changing clouds against which, caught by a sudden sunray, a distant hill gleams an exquisite grey-emerald. Seeing the Little Tern in this atmosphere of grey often without a single green plant near by, we know why Nature has bestowed upon this little bird yellow instead of the red of its congeners—yellow bill, yellow legs. Just as the other species must provide in their red beaks and red legs a contrast to the grey-green of the marram grass and dwarf willow, so the Little Tern must be furnished with another colour as proper contrast with its environment.

But colour alone does not comprise all beauty; surely there is form, the grace of shape and line, and in this, too, the Terns far outstrip any of their rivals in the bird world. The sweeping lines of their long wing feathers and the tail " streamers " bringing the slender body to a long point in the rear are echoed at the other end by the narrowing head and long tapering bill; all forming a wonderful combination of harmonised and contrasted curved lines. Built for movement which is at once leisurely and graceful, the bird is designed on the most exquisite " speed lines " imaginable—a shape perfectly adapted for needs. As we watch the doings of the birds in the ternery—whether commending themselves to their mates, or battling with a rival; whether winging their way to or from their fishing; arriving in Spring or departing in Autumn—almost always their movements are without haste. No! the exquisite grace of the " lines " of the birds is not for speed of flight; rather they are designed to facilitate the breeding ceremonies, the aerial displays, and the fishing operations—the swift stone-like drop from a height into the sea, ease in entering the water so that the rapid fish may not escape.

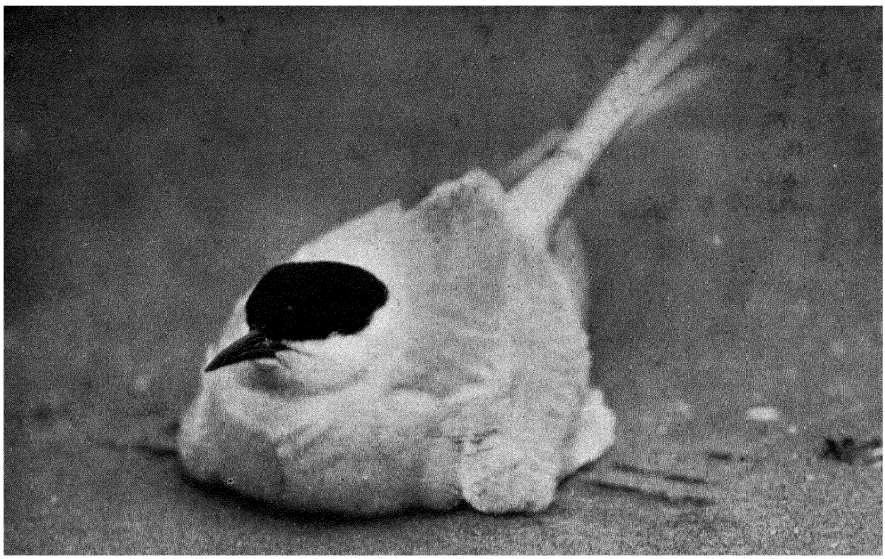
This loveliness of the Terns, like all beauty in the bird world, is accompanied by a deplorable voice, cries always ugly, dissonant, and often, literally, a " scream." They are calling now overhead. Their calls to

their sitting mates or those which drift down to our ears from their aerial courting, are voices without charm. As they fly, they tack and veer, taking advantage of all air currents. With their white sails and ready evolutions they seem yachts of the air and contrast strongly with the Shelducks beating heavily past, birds which suggest old tramp steamers, steadily ploughing their way along, painted white and black, with rusty bows.

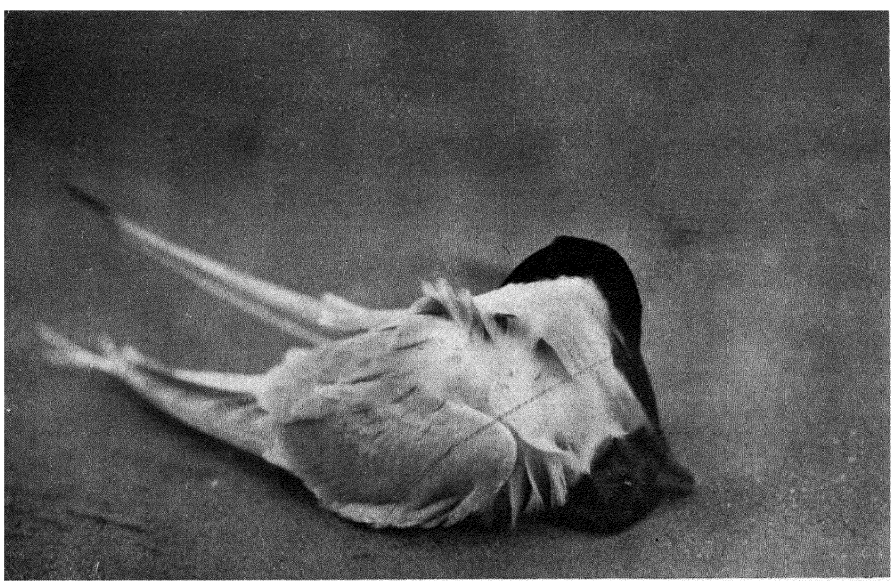
The heavy clouds are now massed into solid formation; the sunlight vanishes. So fascinating in their artfulness are the grey hues of the ternery that, with the absence of the sunshine, the change merely brings a different, but still superb arrangement. The birds show more vividly against the lurid purplish-grey of the thunder-clouds. The greyness of the marram takes on a yellow hue which was not apparent before. The warmth fades out of the sand. The dunes gleam ghostly against the arch of black cloud drifting slowly. A huge bank of cumulus rolls steadily northward. So retarded is its progress that, to a casual glance, it seems stationary; a closer scrutiny reveals not only progression but an internal ferment constantly producing new forms. The multiplicity and delicacy of these internal cloud-shapes beggar description; the whole mass is built up of innumerable similar groups each delicately edged with blue-grey. A stab of flickering light breaks from the blackness; the following thunder-roll is but the presage to violent rain; but neither cloud blackness, lightning thrust nor downpour disturbs the Terns in the least, they continue their occupations as though nothing was happening. Below the great clouds' dark edge, the blue-grey sky carries range behind range of other storm clouds all faintly copper-coloured.

As the great mass drifts away, the sun, breaking forth again, finds the ternery a fairyland of twinkling gold and silver lights, for every blade of grass is hung with a row of glittering, trembling diamonds. A sudden sweep of wind, the diamonds fall, the lights are gone. But the colours of the pebbles and the verdure are more vivid for their wetness and the Terns gleam brighter by contrast with the now dark sand.

On a sudden a sea-fog materialises, bears down rapidly and envelops the scene, bringing with it an uncanny slackening of sound. The dull beat of the rising tide faintly reaches our ears. Muffled sounds of unseen birds come from all around. Right and left and in front all things melt into a flat, grey background. The tussocks, visible only as grass close at hand, waver slightly in the faint, wet wind. Every outline is soft and run together. We need carefully to watch our steps lest we destroy the eggs which now and again appear at our feet. Their owners, lighter grey than the enveloping mist, rise with a startled scream and are at once lost to sight. Others evolve from the fog-grey, grow almost distinct, then fade



116. Female Arctic Tern brooding in a storm.



117. Male Arctic Tern covering chick in a storm.

rapidly as they veer and beat away. The Terns' voices too partake of the greyness, blanketed by the wet air, for, though still harsh, the thick moisture softens them. Those not quite near are lost in the distant murmur of the surf and cannot be heard. The colours of the pebbles with their many shades of grey are accentuated by the wetness clinging to them; their tone-differences are exaggerated. A drift of wind comes from the left. The fog swirls in wreaths, thinning here and there. A yellowish disc shows momentarily, then vanishes, swallowed up as the mist thickens again. Another gust and the sun is seen more clearly, warming up the greyness, and with the now clearing sky comes a clearer sound of birds. As the fog thins our outlook extends, the pervading greyness melts, sand, grass and birds resume their normal colour.

Once the storm developed into a gale which swept mercilessly across the waste of sand. We watched the effect on a brooding bird. She cowered close down, flattening herself to avoid the force of the wind. The sand, driven swiftly with a continuous sibilant sound, rapidly drifted around her, piling up against her breast. She fluffed out her feathers until she seemed half as large again as her normal size. Now and again she shook herself to get free from the investing sand. She half raised herself and with her beak comforted the chick which she was brooding, or kicked to recreate the nest-hollow. Most of the time she was brooding she kept her eyes shut to resist the flying particles, but when she opened them her nictitating membrane slipped rapidly across her eyeball, producing flicks of white among the black feathers of her face. The nest was a mere hollow in the sand of a long smooth slope devoid of any vegetation. The chick, restless, needed much attention from its mother's consoling, blood-red beak. The faint pink flush of her breast was distinctly visible; by contrast the grey of her back seemed coldly blue. A thin call from the air caused her to turn her head and gaze into the sky. She had not hitherto heeded any call from passing bird, but this is " papa " and she knows his voice at once. So, too, does the chick, which, heedlessly, leaves the protection of its mother when he alights with a *bonne bouche*. It staggers towards him, but is caught by the wind and bowled over and over. He followed with a few high squeaks and " beaked " the titbit to the quivering chick. After swallowing with difficulty, it tried, but was unable, to get back to its mother. As the sand commenced to bury it she clucked hoarsely, holding her wings partly open, inviting it to shelter, but it could not move, the wind was too strong. She left the nest, which was seen to contain one egg, but her spouse anticipated her and settled over the chick. The egg was at once submerged, but she knew where it lay, for she at once dug it out of the sand, and brooding it, they sat side by side—father on the chick and mother on the egg, and there we leave them,

courageously facing the gale, guarding their treasures from harm (Pl. 116).

A blazing setting sun is reflected as molten silver in the wet bay behind the sandhills. As it drops, the silver changes to a burning glow on either side of which the shallow water, overspreading the flat muddy sand, gleams gold and pink and milky opal. A flock of Dunlins, black against the shining sea, arrive on gliding wings and alight on the edge of the water. The uncovered area of the flat, like the sandhills in the ternery, is a cold heavy grey, in violent contrast with the delicately rippled opal water. A few Terns are still love-making in the air, the rest having alighted on the beach to roost. The shallow, advancing tide runs over the flat, swinging round to the right in a delicious curve, blue-grey in hue, edged with golden pearl. Following the moving water, thigh deep, and busily feeding, come the Dunlins. The tiny waves break with a gentle " plop," a crash in miniature. Now dark grey-green yet glittering golden, they run up the shore like gliding, living things, sinuous sea-beasts, parabolically curved. Beyond and among them the surface is golden-opal laced with lilac-grey and rippled with milky-blue. Chill and forbidding heave the shoulders of the cold, heavy grey ternery dunes, softened on their edges by the dull, hueless, waving grass. Afar off, sandbanks fringed on the seaward edge with pale grey breakers form a warm band of colour crossing the cool grey of the heaving sea. As we watch, four seals appear; one drags himself laboriously upon the sand, leaving its mates to frisk and gambol in the near-by water. Soon they too will emerge and creep heavily up the bank, writhing like dark brown slugs. Perhaps they will be joined by others to the number of twenty-eight as they were the other day. With the fading of the light, the brilliance of the water in the bay departs, leaving an expanse of cold hueless grey, rather lighter than the hills. No bird life is now to be seen. The Dunlins have flown. The Terns have settled for the night and are invisible, enveloped in the on-creeping gloom. All save one pair high in the sky but unseen, report of whose whereabouts comes to us through their reiterated calls. Soon these aerial cries cease, the birds have dropped swiftly to the beach to join their roosting friends, and as the last, tenuous light fades from the west, the night-quiet settles over the ternery for the hours of darkness.

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Note on Abbreviations.—A. T. = Arctic Tern ; B. T. = Black Tern ; C. T. = Common Tern ; G. B. T. = Gull-billed Tern ; L. T. = Little Tern ; R. T. = Roseate Tern ; S. T. = Sandwich Tern.

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PRINTED IN GREAT BRITAIN BY
RICHARD CLAY & SONS, LIMITED.
BUNGAY, SUFFOLK.