

'WHITE-FACED' TERNS

BY RALPH S. PALMER

Plate 7

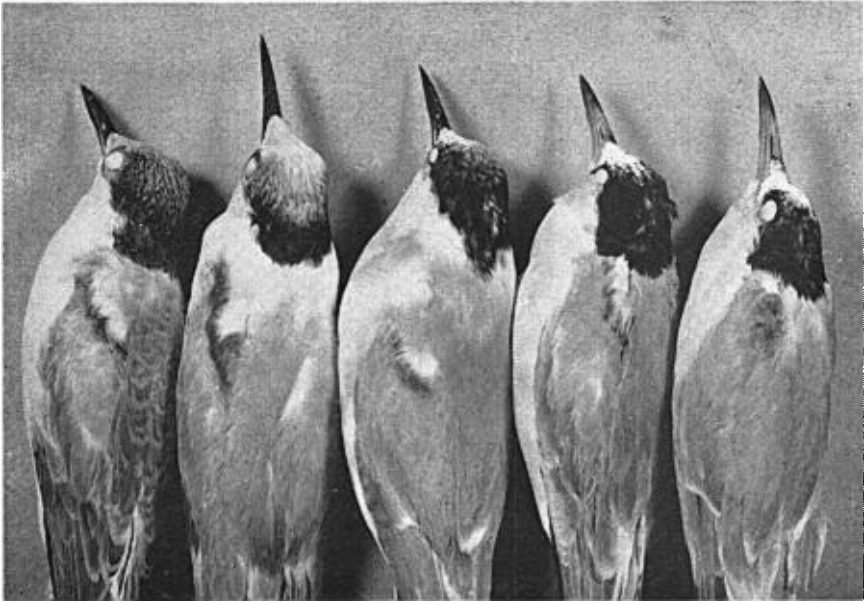
DIFFERENT plumages of the same species of terns have been given new names so many times that the Marples have included in their book on 'Sea Terns' (1934: opp. p. 23) a plate labelled "Comparative Diagram of the 'Spurious' Terns." One of the birds shown is the non-breeding 'white-faced' Arctic Tern, *Sterna 'portlandica.'* While conducting a behavior study of the Common Tern (*Sterna hirundo*) on the Sugarloaf Islands, at Popham Beach, Maine, the writer has collected and observed both breeding and non-breeding 'white-faced' examples of this species. Since the significance and occurrence of 'white-faced' plumages in terns are not generally understood, the writer has undertaken to sum up here the available evidence on plumage sequence in the Common Tern. While most of the facts presented refer specifically to the Common Tern, they apply equally well to the Arctic and, in many respects, to the Roseate and other terns.

The writer wishes to acknowledge the assistance he has received from the following institutions and individuals: the authorities in charge of the U. S. National Museum and Biological Survey collections, the authorities of the American Museum of Natural History, and Mr. Arthur H. Norton of the Portland (Maine) Society of Natural History for the loan of valuable specimens. Professor S. A. Asdell, of the Department of Animal Breeding at Cornell University, has kindly loaned the writer many reprints from his files and has made helpful suggestions pertaining to the endocrine aspect of plumage sequence.

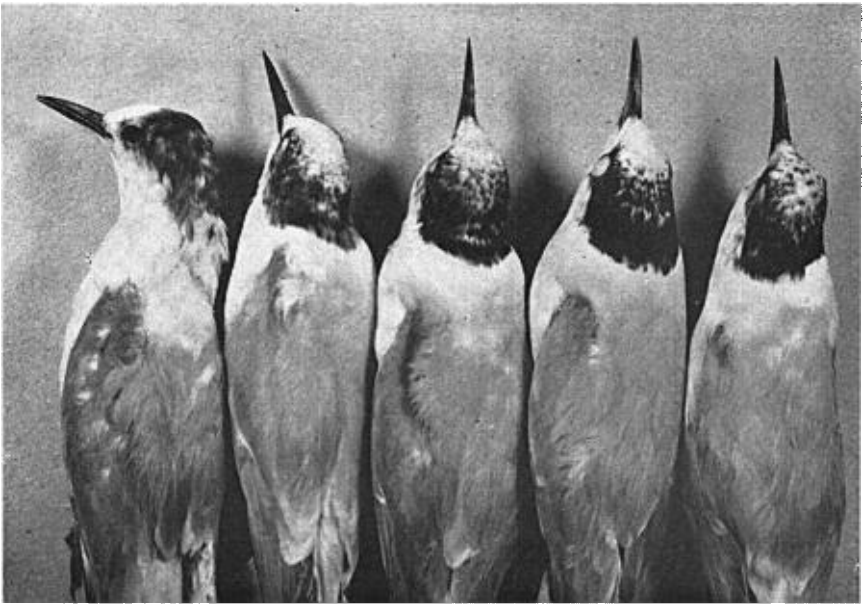
EXPLANATION OF PLATE 7

Common Terns—The left-hand bird is a juvenal and can be so recognized by the markings on the back. In other respects it is much like the next two specimens, which are summer non-breeders in fresh eclipse, i. e., '*portlandica*,' plumage. The two right-hand birds are old-age breeders. The nature of the cap and the color of the bases of the bills at once differentiate them from '*portlandica*' specimens.

Arctic Terns—The left-hand bird is the type of *Sterna portlandica* Ridgway. It is badly soiled and does not show the cubital wing band very well in the plate. The next two are also summer-eclipse or '*portlandica*' birds. The fourth is an old-age breeder of the '*piki*' type. The fifth may possibly represent either a partial assumption of breeding plumage by an 'immature' bird or a condition approaching old age.



JUVENAL AND 'WHITE-FACED' COMMON TERNS



'WHITE-FACED' ARCTIC TERNS

RELATION OF GONADS TO BREEDING AND ECLIPSE PLUMAGES

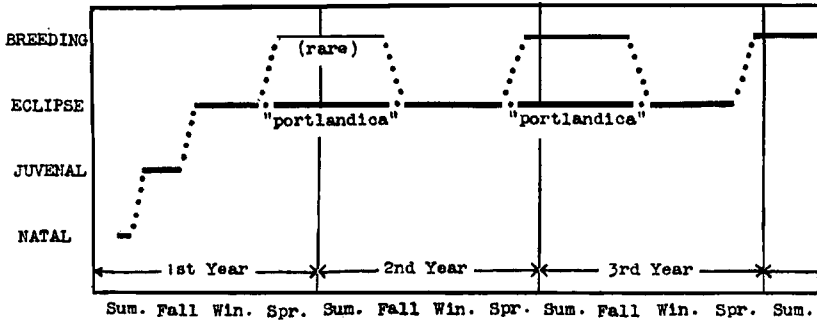
As here used, the term 'eclipse' includes all postjuvinal plumages assumed by certain 'hooded' or 'capped' Laridae when the gonads are quiescent or relatively so. The juvinal stage might also be called eclipse, but it is not so called because this plumage is easily distinguishable from subsequent non-breeding plumages. This definition of eclipse pertains to the species under discussion, since the physiological basis for arriving at equivalent plumages in ducks and other birds is known to differ from that of gulls and terns.

Both sexes of the Common, Arctic and Roseate Terns exhibit the following characters in the juvinal and in the eclipse states: (1) a light forehead and a blackish crown; (2) pure white under parts; (3) a dusky cubital band on each wing; (4) less highly colored bills and feet than in breeding plumage.

Both sexes of the same three species have the following characters in breeding plumage (with an exception which will be discussed later): (1) a black cap, which includes both forehead and crown; (2) under parts either gray or white tinted with pink; (3) no dusky cubital band; (4) relatively highly colored bills and feet (in breeding Roseate Terns the bill at the base is bright orange-red and not all black, as is commonly believed).

The juvinal and eclipse plumages are assumed during the time when the gonads are relatively quiescent. The *breeding* plumage in at least part of the Laridae is apparently the one dependent upon the secretion of a sex hormone for its development. Whereas this is not the case in many birds, as has been explained adequately by Domm (1939), I feel certain it is true with the terns with which we are dealing because of evidence from castration experiments on the Black-headed Gull, *Larus ridibundus* (Van Oordt and Junge, 1930, 1933a, 1933b). This gull has a plumage sequence and certain secondary sexual characters very similar to those in Common, Arctic and Roseate Terns. It has a 'hood' on the head, as well as bright-colored bill and feet, which are present during the breeding season in *both* sexes. Characters of this nature have been called 'ambosexual' characters by Champy (1930) and Champy et al. (1931). If gulls of this species are castrated in winter plumage—either first winter or succeeding ones—the nuptial plumage fails to develop. At the time of the prenuptial molt the birds *again assume the winter (eclipse) plumage*. Furthermore, the bill and feet remain in winter condition. Therefore, the assumption of the nuptial plumage and bright bill and foot color appear to be influenced by a testis hormone which cannot be secreted by castrated birds.

While Van Oordt worked on male birds only, a matter commented on by Domm (1939: 283), he stated that he supposed that ovariectomy would produce the same result, since females and males have similar plumages. The fact that Common and Arctic Terns of *both sexes*, that have very small gonads and do not breed, revert to the eclipse plumage at the time of the spring molt, lends support to his statement. As we shall soon see, Common Terns ordinarily do not breed at an early age, nor do first-year birds appear on the breeding grounds in any numbers. Those which do appear usually have minute non-breeding gonads and are found to be in fresh eclipse plumage which they acquired by a complete spring molt. That '*portlandica*' birds were non-breeders that acquired such a plumage in spring was well



TEXT-FIG. 1.—Diagrammatic representation of the sequence of plumages in early life in the Common Tern. The probable normal sequence is shown by the heaviest line. Dotted spaces indicate, in a general way, times of molt.

understood by Dwight (1901: 52). These birds are, in plumage, equivalent to Van Oordt's castrated gulls.

Just how long a tern may revert to the eclipse stage semi-annually is not definitely known, but it is fair to assume that they do so as long as they stay away from their breeding grounds. The matter can only be definitely settled when many banded non-breeding birds are recovered at various times of the year. In general, the sequence of plumages of the Common Tern in early life appears to be thus: (1) natal (acquired before hatching); (2) juvenal; (3) first-winter eclipse; (4) first-summer eclipse—'*portlandica*' (rarely a breeding plumage is acquired instead); (5) second-winter eclipse; (6) second summer, either: *a*, eclipse again ('*portlandica*'), or *b*, first-nuptial plumage.

Many birds require another year before attaining their first-nuptial stage. The diagram of plumage sequence shows the probable normal sequence up to the fourth summer. It does not show duration of molt.

I have not called the immature summer plumages 'nuptial' plumages, as Dwight (1925) has done with gulls, since the term is more appropriate for *breeding* stages.

The Common Tern resembles some of the smaller gulls much more closely, both in time of beginning to breed and in time of assumption of breeding plumage, than many writers have heretofore realized. The following data will make this clear.

YOUNG 'WHITE-FACED' TERNS

Attainment of breeding age.—No Common or Arctic Tern appears yet to have been recorded with absolute certainty as breeding in any form of immature '*portlandica*' or eclipse plumage. Colonies of Cabot's and Sandwich Terns (races of *Thalasseus sandvicensis*) and Royal Terns (*T. maximus*) have a fair share of the breeding population showing white in the foreheads. These lighter birds appear to be first-year birds and are quite definitely known to breed in this plumage (H. W. Robinson, 1910, 1940). One Sandwich Tern in "full winter plumage" has been seen to incubate an egg (Robinson, 1940: 150). The Black-headed Gull breeds regularly in "immature" plumage (Kirkman, 1937: 111). Haverschmidt (1931) mentions the same fact and also states that the Herring Gull (*L. argentatus*) and the Lesser Black-backed Gull (*L. fuscus*) breed before attaining the fully adult stage. Tinbergen (1936) reported that immature Herring Gulls may pair, nest and copulate, but fail to lay eggs. Many sub-adult Larinae very commonly 'play' with nesting material at the season when adults are breeding. Juvenal Common Terns often pick up grass and twigs on or near the territory where they were hatched, but the reason for their so doing is not clear.

Whereas the Marples (1934: 120) stated that Common Terns normally breed when one year of age, the Austins think otherwise. O. L. Austin, Jr., (1929: 130) concluded from his very extensive banding and retrapping records that this species does not breed at the age of one year, that all do not breed when two years old, but that the third year normally sees them productive. Later, O. L. Austin, Jr., (1932: 137) reported capturing a single year-old Common Tern which was incubating eggs. Since nothing was said to indicate otherwise, we may assume that it had attained the breeding plumage and that it had a definite connection with the eggs. Thus it seems that the Common Tern may rarely breed when one year old.

From the facts that year-old birds are rarely retrapped at nests, that few two-year-old birds are taken, and that the birds are usually in their third year when first recaptured, we must come to one of two

conclusions: either (1) the young birds do not breed, or (2) if they do, they nest in other places rather than near the colony where they were banded as nestlings. Since the Austins have concluded from their data based on a number of Cape Cod colonies spread over a considerable area that Common Terns tend to return to breed "in the general vicinity" of their natal homes (O. L. Austin, Jr., 1929: 128), and since it is well known that once they begin to breed terns tend to come back to the same nesting site annually, we are faced with the first alternative, namely, that young birds do not breed. Furthermore, banding returns from more distant colonies in no way conflict with this conclusion.

Distribution.—There are relatively few data as to where non-breeding year-old and two-year-old Common Terns are to be found, although Lincoln (1927) published a small amount of evidence based on banded birds. Thousands of juvenals go south with their parents annually. Do they tend to wander like year-old Herring Gulls? This seems very likely. This wandering probably takes place in the tropics or even farther south. Many writers, such as Ticehurst (1924: 140), have stated that more southerly *summering* birds were in the 'portlandica' plumage. Such wandering might also account for the fact that several Common Terns, which were taken in the Antarctic regions, were referred to by Murphy (1936: 1099) as "birds of the year."

O. L. Austin (1938: 13) has attempted to account for young birds by considering them as "drones," or idle birds near breeding colonies. My own work in relatively small colonies (350 to 500 pairs of birds) does not favor this concept, but rather shows that the birds which gather in rows and flocks near colonies are *breeders* and that they are indulging in what may be called a social sunning reaction (Watson, 1908). Terns are social creatures and this tendency to become a member of a flock manifests itself frequently all during the breeding season. However, once a tern leaves a flock and flies to the nesting territory, it becomes strongly territorial in its reactions. Thus these idle flocks are, in general, made up of mature breeding birds in normal breeding plumage and not of "drones" or young non-breeding terns. A few exceptions will be discussed later.

As the mating season advances we find a sort of floating population, but this consists of birds that have lost their eggs or chicks and so were breeders when they arrived in the colonies.

Gonads and migration.—Putzig (1937) and Hann (1939) have shown that a total of five species—two gulls and three passerines—will migrate southward after castration. Therefore, their urge to undertake this migration is not dependent on the presence of male gonads. Of course,

when one stops to think about it, this does not seem very unusual, for the young of certain species whose gonads have never enlarged, migrate southward successfully even without accompanying adults of the same species.

The spring migration is another matter. It is indeed interesting that a few non-breeding '*portlandica*' terns, with their very minute and undeveloped gonads, should come northward at this season. Apparently terns tend to be social all the year round and these few young birds return to the breeding colonies not because of any urge to migrate within themselves, but because they happen to associate with normal migrating individuals.

OLD-AGE 'WHITE-FACED' TERNS

Longevity.—O. L. Austin, Jr., (1932: 139) stated that the 'average' length of a Common Tern's life was somewhat less than nine and a half years. Flower (1938: 224) reported the average life span for twenty banded terns of three species as eight years and nine months. Considering the great age attained by some of their gull relatives, it is not surprising to find that many terns live well beyond their average span of life. Cooke (1937: 55–56) reported twelve-year-old Common Terns, nine-year-old Arctic Terns, and seven-year-old Roseate Terns. The Austins find thirteen-year-old Common Terns quite regularly, and these appear to show first the old-age 'white-faced' condition. The Marples (1934: 123) quoted from Trans. Norfolk and Norwich Nat. Soc., 1922, an interesting case where a Common Tern nest was found on the same site for seventeen consecutive years, and contained "very distinctive unspotted eggs." The bird was killed by a stoat in 1920 and similar eggs have not been found there since. If this bird did not breed until the second or third year, it had attained altogether an age equal to double the average life span for the species. A banded Black Tern has been recovered in Italy at the age of at least eighteen years (Schenk, 1934: 69).

There is little evidence that birds past breeding age form part of a breeding colony. There are few idle birds of any sort present. The specialized mode of life and the long migrations which terns undertake insure that less vigorous individuals are weeded out and do not survive. The case appears somewhat different with Kirkman's Black-headed Gulls, for he states (1937: 62) that there were birds too old to breed present in the Twigmoor gullery and that they were easily recognized by their "dilapidated plumage" and "general air of feebleness." He further points out that these birds excite hostility and attack from more vigorous individuals. Since this species is fed

in parks and about cities in Europe, and is not a highly migratory one, individuals stand a better chance of surviving to past breeding age than do any species of terns.

Plumage.—O. L. Austin (1938: 21) has reported that thirteen-year-old *breeding* Common Terns show certain plumage changes, such as a "marked whitening of the feathers on the crown," which renders these birds easily recognizable to an experienced bander. He gave no further details regarding the appearance of these birds. The writer, however, has observed and collected birds in this plumage and has examined others in various collections. At the prenuptial molt these old birds (Common, Arctic, and probably Roseate Terns) acquire the following characteristics: (1) white, or at least lighter, under parts; (2) a white or mottled forehead and black crown; (3) a dusky cubital band on each wing; (4) highly colored bills and feet.

Characteristics 1, 2 and 3 are shared in a general way by old-age breeders with the juvenal and all eclipse stages. In contrast to the others, however, the old birds are definitely known to *breed* (Austin, *loc. cit.*); they have bright bills and feet, and the precise nature of the light and dark feathers of the cap is quite distinctive. They have striking characteristics of both non-breeding and breeding birds. This plumage appears to be comparable to the *Sterna pikei* of Lawrence (1853), which Ridgway (1875) separated from '*portlandica*' on the basis of colors of soft parts. Both birds were Arctic Terns.

The blackish crown of juvenal and eclipse Common, Arctic and Roseate Terns has a rather washed-out appearance, and merges very gradually into the forehead. In 'white-faced' breeders it appears as if a cap as black as that of younger breeding birds had been assumed, then the forehead part of it shed and replaced by pure-white feathers. This is exactly the appearance of the heads of younger breeders when they begin to assume the eclipse plumage in September. However, with these old birds all the feathers of both forehead and crown seem to be of an equal age in May, June and July specimens. Both sexes have this plumage, which is not merely an early onset of the fall molt of younger breeders.

In the case of skins of some summer individuals which I have examined, that have black feathers scattered throughout the light forehead and yet otherwise resemble old-age terns, I am not certain but what this intermediate plumage may represent young birds in a first imperfect breeding plumage. However, it might equally well represent an onset of the old-age condition. There are no published data from banders dealing with this matter.

Possibly a sex hormone influences plumage by its presence or ab-

sence. These terns, as they approach old age, show characteristics of the non-breeding plumages. There may be a differential threshold of amounts of hormone necessary for the assumption of (1) the bright colors in bill, legs and feet, and (2) the full normal breeding plumage. The birds are able to breed when they do not produce the full breeding plumage.

Whether or not Sandwich and Royal Terns have an old-age 'white-faced' breeding plumage appears to be unknown. If different species of terns do have this plumage and acquire it at different ages in each species, the facts might be determined by banders:

It is well known that birds in captivity or in a half-wild state show plumage changes of various sorts when they become old. Millais (1902: 17) has recorded such changes in both sexes of the Mallard, but these changes appeared after the birds passed breeding age.

Numbers.—Neither the Austins nor the Marples have reported on the numbers of 'white-faced' terns in the colonies which they have studied. After '*portlandica*' was described, the bird was stated to be "of rare occurrence" in such lists as that of Brewer (1875: 450). Coues wrote about the bird several times, but said little or nothing of its numbers. Hersey (1920: 203) stated that many Arctic Tern colonies had no so-called Portland Terns, while other colonies contained a "considerable number." Dwight reported one '*portlandica*' bird to a thousand normal breeders in the large Sable Island, Nova Scotia, colony. Upon examination of his series I find that one of his Sable Island 'white-faced' terns is in the old-age and not the '*portlandica*' plumage.

At the Sugarloaf Islands I have noticed about one 'white-faced' bird (including both sub-adult and old-age terns) to 150 pairs of ordinary-plumaged breeding Common Terns during the summers of 1938 and 1939. Immature and old-age birds were about equal in number in these small colonies. I rather suspect that the latter would predominate if the colonies were older, but they have had an interrupted existence, and the present population began to colonize the islands about 1923. Some Maine gunners of a past generation were familiar with birds with light foreheads, and referred to them as 'White-faced Medricks'.

By the time that the banding of nestlings and the trapping of banded adults has progressed beyond the extreme life probability of terns in a number of large colonies, it should be possible to construct a histogram showing the relative numbers of each age class up through the old-age 'white-faced' stage. One could then ascertain with reasonable mathematical accuracy the relative numbers of 'white-faced'

breeders for a colony of any given size. O. L. Austin, Jr., (1932: 137) has prepared such a histogram covering eight years' work, but this is not long enough to provide data on old birds. The eclipse-plumaged birds are not truly migratory, hence their numbers are not predictable.

Behavior of 'white-faced' birds.—Dwight (1901: 52–53) reported that attention was often drawn to the '*portlandica*' Arctic Terns on Sable Island, Nova Scotia, by their "single harsh croak seldom uttered. . . ." They must, indeed, have been conspicuous, for he succeeded in getting eight 'white-faced' specimens. Holder and Wagstaffe (1928) reported seeing a few non-breeding Common Terns each summer for several years on the South Lancashire coast, where the birds possessed some of the pugnacity of adults and occasionally would swoop at humans on the beach. The few '*portlandica*' Common Terns which I have observed have usually been silent. I have not noticed that they were unusually conspicuous in a colony insofar as they themselves were concerned, but they were sometimes followed about by several breeding adults as Barn Swallows pursue an albino fellow member of their species. Breeding terns seem to recognize these non-breeders in summer-eclipse plumage as not being part of the breeding colony. Perhaps non-breeders fail to indulge in the formalized posturing of sexually active individuals.

Austin (1938: 21) has pointed out that clutches of eggs of 'white-faced' Common Tern breeders are of average or larger size, and that fertility seems to be normal. These old-age birds are not very conspicuous, nor are they accorded different treatment by younger breeders, as can be seen from the following extract from my records made from a blind on July 2, 1939:

A white-faced bird came and stood on a common perching rock within sight. It called to passersby; would face in one direction, then in another. Bird has orange in bill and highly-colored feet—much different from white-faced bird I collected in June. No other bird paid any noticeable attention to it.

Another bird standing by a nest not far away has a number of white feathers in the forehead. It is mated to a bird with an all-black cap.

Thus it seems that old breeding birds with white foreheads find that a whitening about the 'brows' is no drawback to acquiring a mate, or in participating in any phase of the normal breeding cycle. They are as readily accepted for mates, as long as their *behavior* is suitable, as are the oddly plumaged first-year male American Redstarts (*Setophaga*).

I have no field data on old-age Arctic Terns. The 'white-faced' birds known to be breeding and seen by Lord W. Percy in Siberia and by Jourdain in Spitsbergen, which were mentioned by Witherby

(1924: 713, footnote), were almost certainly of the old-age type which I have discussed, and not true '*portlandica*' examples.

SYNOPSIS OF COMMON TERN PLUMAGES

Much of the data here presented are supplementary to the material in Dwight's paper (1901).

Natal plumage.—The thick natal down which chicks wear at hatching is replaced by a complete postnatal molt. The natal down of Roseate Terns has a distinctive spinous character, like that of *T. sandvicensis*. Natal Common and Arctic Terns show a wide variation and cannot always be distinguished from each other. The throat of Common Terns ranges from white to black, but is usually quite dark. The forehead is generally light. Natal Arctic Terns usually have a dark throat, and this color extends up and across the forehead, but those skins showing a light forehead cannot be separated with certainty from Common Terns. The natal down is pushed out gradually and there are usually only traces of it left about the head and flanks when the juvenals begin to fly between the ages of 27 and 32 days.

Juvenal plumage.—The crown in juvenals is whitish or pale buff, usually grading rather gradually into the rather dark crown. This can be seen in the juvenal Common Tern shown in the accompanying plate (Plate 7). The back exhibits a widely varying pattern from bird to bird. The ventral surface is white. There is a dark cubital band on the wings. When Common Terns are a week old and still downy, the bill is usually light flesh-color at the base and blackish toward the tip. This color usually brightens as the birds grow older, and is more or less orange-red in flying juvenals. After the birds have been flying about two weeks (i. e., about September 10 in Maine), the bill begins to darken and in a short time it is practically black—in first-winter condition. However, the bills of a few individuals never brighten thus in the late pre-flying and early-flying stages. The bill stays dark and is essentially in first-winter condition when these birds begin to fly, or from late August onward.

The feet of natal Common Terns are generally pale. Those of juvenals at flying age range from pale flesh-color through a brilliant orange to nearly black. Chamberlain (1939) has reported a wide range of color in the legs of young Royal Terns. Like the bills, the feet tend to brighten, then later grow dark and are practically black during the first winter. Also, as with the bills, some feet are blackish long before the birds fly. It is important that banders should realize that dark-footed flightless young exist, for some banders of limited experience, who work in mixed colonies of Common and Roseate

Terns, use leg color to distinguish juvenals of the two species. It is not wise to assume that all dark-footed young are Roseate Terns, since some may be Common Terns. Natal Roseate Terns are easily recognized, while juvenals of this species have fine markings on the back and a generally different 'look' from Common or Arctic Terns. There is a close association between intensity of leg and bill color in individuals of all ages.

The heaviest Common Terns which the writer has weighed have been September juvenals. Floyd (1927) and Heinroth (1928) have provided some data on weight and growth rate of young terns.

First-winter eclipse plumage.—Dwight (1901: 54) stated that the first-winter (eclipse) plumage is acquired by a partial postjuvinal molt, limited mainly to the body feathers. Some individuals may not molt at all (Witherby, 1924: 710) and so retain a worn juvenal plumage throughout the winter. Birds in first-winter eclipse plumage have white under parts, a dark cubital band on the wings, a whitish forehead grading into the blackish occiput, and dark bills and feet.

There seems to be no certain way of distinguishing between first and subsequent eclipse stages. Judging from museum skins, it appears that eclipse birds having some color in the bills and feet are probably breeders in winter condition, and that they do not lose as much of the color then as do younger birds which had less color to begin with. One should be careful in accepting statements pertaining to birds seen or collected in 'first-winter plumage' unless the birds actually were banded and their ages known. Tern skins retain the colors of soft parts very well, but after ageing for a few decades in museum cases there is a noticeable deterioration, perhaps caused by grease in the skins.

First-summer eclipse plumage.—The first spring molt, which is a complete one, is thought to start later and end later than succeeding ones. This molt may be followed by a nuptial plumage in a few individuals. Usually the birds assume the eclipse again, both in feathers and in soft parts, and apparently cannot be separated with certainty from eclipse birds of any age.

I have already pointed out that O. L. Austin, Jr., (1932) recorded capturing a year-old bird on a nest, also that it is possible that an imperfect breeding plumage may sometimes be assumed by some young birds.

Second-winter eclipse plumage.—After a complete fall molt the birds repeat the eclipse again. We may be certain that this molt takes place because (1) older birds have a complete fall molt, and (2) because available 'white-faced' birds do not show the extreme amount of wear

exhibited by late-winter examples that failed to shed their juvenal feathers.

In regard to Herring Gulls of this age, Dwight (1925: 188) reported that an "unknown proportion" of second-winter birds reverts to the "first year plumage or a type resembling it," which partly accounts for the large number of "young birds" which are seen or collected.

Second-summer plumage.—Since a few Common Terns breed at this age, it is certain that some then acquire the adult characteristics which I have already listed earlier in this paper. The prenuptial molt, which takes place normally between February and late April, is a complete one, and breeders have fresh feathers in wings and tails as well as new body-feathers. Non-breeders go into the eclipse stage again.

Third-winter eclipse plumage.—Presumably like other eclipse stages.

Third-summer plumage.—All Common Terns appear to breed at this age. The succeeding fall molt begins to be in evidence by early August, when feathers can be seen on the brood-spots. In Maine the tail 'streamers' are shed and the winter cubital bands begin to appear in the majority of individuals before they start southward.

'White-faced' breeding plumage.—If a bird has survived about ten years of breeding life, which takes it well past average age, it acquires the 'white-faced' breeding plumage, which I have already described in some detail. It has also been pointed out how this plumage differs from eclipse birds. Collectors have frequently written "sterile" or "gonads minute" on labels of '*portlandica*' skins, but we do not find this on tags of old-age breeders. They appear to have been considered as normal breeders which were molting unusually early, but I have already shown that another explanation for this 'white-faced' condition is more in keeping with the known facts.

It is not yet known for how many summers the old-age plumage may be worn, nor whether it is acquired at different ages in different species. Skins of Arctic Terns having the old-age type of cap sometimes have rather grayish under parts and so, unlike Common Terns, are not as pale as eclipse birds. Although I have seen summer-eclipse Roseate Terns, I have never seen a skin or live bird of this species which I could refer with absolute certainty to the old-age category.

All the plumages which I have listed are acquired by Common Terns of both sexes. This is probably true of other species also.

SUMMARY

(1) Common Terns usually start breeding when two or three years old. Evidence indicates that non-breeders having small gonads wear only the eclipse type and never the nuptial type of plumage.

(2) Data are lacking as to where the majority of non-breeders are to be found, but probably they are on the winter range of breeders, or even farther south.

(3) Assumption of breeding plumage appears to be influenced by a sex hormone, as is the case with the Black-headed Gull. Some of the smaller gulls and certain terns parallel one another in many respects.

(4) Old birds show intermediate characters between eclipse and nuptial stages, while still being able to breed.

(5) Terns have a long life span, but birds past breeding age have not yet been recorded definitely as occurring in breeding colonies.

(6) Eclipse-plumaged terns in nesting colonies are not treated like breeders by fellow members of their species.

(7) The spring migration is undertaken by a few eclipse-plumaged birds with very small gonads, probably not because of any urge within themselves to migrate, but because they tend to associate with normal migrants and are reacting socially with them.

(8) Both sexes of the Common Tern acquire the summer-eclipse ('portlandica') and old-age breeding ('piki') plumage which I have discussed.

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