

LEG COLOR IN ROYAL TERNS<sup>1</sup>

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THOSE engaged in banding young terns cannot fail to notice the many color variations present in the legs and feet of these birds. Before discussing this matter, however, a few words about the banding method evolved may be of interest. In handling young terns and other birds of similar habits and habitats, we have found the safest and most effective method to be the use of a low circular fence of chicken wire. Wings extend from this corral, and the young birds, usually found wandering about the breeding grounds in bands of varying size, are carefully rounded up and slowly driven into the funnel-shaped opening of the corral. The birds to be banded are the young ones just starting to fly, or within a week or less of flight age, and measure about fifteen inches in total length. Birds younger than these are 'cut out' of the group being driven into the banding corral, in order to eliminate danger of injury or loss from overcrowding, often fatal to downy young. When the birds have been driven in, the wings of the corral are closed. Further safety is insured by the use of pockets in the corral fence. Into these pockets are driven about two dozen birds at a time. The remainder of the corralled young are kept slowly moving in the center of the pen, away from the enclosing wire. An operator places himself in front of each pocket, bands the birds within it, and drops them over the low fence, whence they go back to the main colony. In this manner we have banded as many as three thousand young at a time without a single fatality.

In June 1937, members of The Charleston Museum staff cooperated with the U. S. Bureau of Biological Survey in banding about two thousand young Royal Terns (*Thalasseus maximus*) at the Cape Romain Refuge, in Charleston County, South Carolina. In order to determine the amount of color variation present in the legs and feet of birds of banding age, each bird was examined while being banded and notes were made of the colors found.

In this study, 1940 young Royal Terns were handled. Of these, 1563 (80%), proved to have legs and feet of an immaculate or 'solid' color. The remaining 377 birds (20%) had mottled legs and feet. Taking up the first and more numerous group, we found solid colors present in the following order: slate to black, orange, and flesh color. The slate to black group (hereafter called black) consisted of 926 birds, 59% of the solids and 48% of entire lot of birds examined. This means that, at flying age, almost half of

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these young birds had attained leg and foot coloration closely approximating that of the adults. The next color, orange (and its variants), accounted for 408 birds, 26% of the 'solids' and 20% of the whole. The third 'solid' color, flesh, was found in 229 birds, 15% of the 'solids' and 12% of the entire number.

Occasionally a bird classed as 'solid' in one of the three colors would show a small amount of another of these colors. For example, certain black-legged birds showed a narrow band or garter of orange or flesh around the 'legs' at the edges of the feather tract. One got the impression that here the black had gradually crept upward, finally gaining complete ascendancy. Furthermore, some birds showed what might be considered the genesis of the foregoing condition. In these birds were found orange or flesh-colored legs with a concentration of black pigment along the front edges of the tarsi. Again, an occasional orange- or flesh-legged bird would have a fine, fairly even, sprinkling of black dots over the legs and feet. One is tempted to assume an orderly progression in color pattern from hatching to maturity. Yet the assumption is hazardous, for birds of the same size and probable age might show any one of several 'solid' colors.

Turning now to birds with mottled legs and feet, we found the following five color combinations, in order of prevalence: orange and black, flesh and black, olive and black, yellow and black, and lastly, orange and flesh. (It is noted that the parent color, black, enters into the mottling in four of these five groups, appearing in fact in 372 out of the 377 mottled birds examined.) The first of these combinations, orange and black, contained 209 birds, 55% of the mottled and 10% of the whole number studied. The second mottled group, flesh and black, followed with 137 birds, 36.5% of the mottled and 7% of the whole. The remaining color combinations were found in comparatively few birds, in fact in only 31, or less than 2% of the whole. Of this little group fifteen were olive and black (4% of the mottled), eleven were yellow and black (2.9% of the mottled), and five were orange and flesh (1.3% of the mottled). Thus the mottled-legged birds showed no indication of order in the intensity or pattern of pigment present. Color blotches varied from dots to areas covering most of the legs. Scarcely two birds could be found with similarly arranged color patterns. Indeed, each bird's legs and feet usually differed in pattern of blotches, though not in the colors present. Again, birds of the same size and age had legs and feet of any one of the several combinations of colors.

At just what age color differentiation begins to appear I am unable to say. In the Cape Romain Refuge colony newly hatched young had legs and feet of purplish-flesh color. In fourteen birds, about ten days younger than the groups discussed above and measuring about ten inches in total length, six were black-legged and five orange. The remaining three were mottled, two

with yellow and black and one with flesh and black. In this small number, at least, color relationships appeared much the same as those shown in birds almost ready to fly.

From the foregoing it seems extremely difficult to determine any orderly sequence in the color changes undergone by the legs and feet, from the purplish-flesh of the newly hatched young to the black of the adult birds. For example, in the 'solid' group, it would seem that in some young slate may follow the color at hatching, and in turn darken to black by the time the bird is awing. In other young, orange or flesh may follow the purplish-flesh, and black may or may not be attained by the time the bird is flying. In the mottled groups the problem seems even more complicated. Here apparently any one of five color combinations may follow the livid coloring of the legs of newly hatched young. Again, in some birds these colors may change to black before, or after, the birds take wing. I have never seen a fully adult Royal Tern with other than black legs and feet. Some reported to me as being other than black I believe to have been birds not long on the wing.

That conditions similar to those discussed in this paper prevail in some other terns I am certain, since I have noticed indications in the Least and Cabot's Terns. Six of the latter were handled in the course of the above study. The legs of two were slate or black, two orange, one mottled flesh and black, and the last bird mottled greenish-yellow and black. These young were likewise nearly ready to fly.

While this study was in progress attention was paid to plumage variation in an attempt to ascertain whether there existed any correlation between plumage variations and those found in the coloring of legs and feet. While at least three plumage phases, light, dark, and mottled (with seeming intergrades) were apparent, no evidence was found of correlation between these various phases and the colors of legs and feet.

In the foregoing I am aware that there may be a percentage of error in the designation of colors. Time did not permit me to examine every bird personally and seldom do several workers see a color exactly the same. Nevertheless, I believe that the colors as given are approximately correct. Nor do I think that this factor enters seriously into the problem. In order to follow up this problem it is suggested that a group of young, numbering at least two hundred birds, be banded or marked shortly after hatching and that weekly observations be made on these individuals. For this purpose a small colony of several hundred birds would be far more suitable than a colony like the one at Cape Romain Refuge, numbering, as it does, some four or five thousand young. In such a colony the successive isolation at frequent periods would be exceedingly difficult, and would involve great labor and danger to the young.

To several friends I would express appreciation for aid rendered me in this work, especially to Mr. E. Milby Burton and Mr. G. Robert Lunz, Jr., of The Charleston Museum staff, and to Mr. Andrew H. DuPre, in charge of the Cape Romain Refuge.

I close with the question: Have the terns as a group only recently settled on black as their most suitable leg color?

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