there is comparatively little research being carried on to-day in either the Antarctic or the Arctic. Undoubtedly banding will be a very large factor in helping decide the matter.

NOTES ON BANDING TERNS AT CHATHAM, MASSACHUSETTS, FOR 1928

BY CHARLES B. FLOYD

THE fifth consecutive summer's work with the Common and Roseate Terns (*Sterna hirundo* and *dougalli*) on Tern Island, Chatham, Massachusetts, was begun on June 30, 1928. The purposes of this season's activities were:

1. To band a minimum of five thousand immature birds.
2. To determine by trapping whether or not any Terns banded during previous years return to the island to nest.
3. To secure as many parasites as possible from adults, young, and nests.
4. To make a series of blood smears for the Department of Tropical Medicine, Harvard University Medical School, from adult and young of both species.

The Terns arrived in Chatham, as in former years, early in May, and mating and incubating went along in due time despite the fact that the rainfall during June was nearly twice the normal amount. Warden Patterson tramped over the island on June 11th and estimated that the birds were present in their usual numbers and found nests with eggs everywhere in the grass and open sand. He noted that the birds were flying long distances for food, which was, apparently, difficult to obtain at that time. Upon visiting the island July 1st we found many young in all stages of growth, and literally hundreds were ready for banding. The Common Terns appeared more advanced than the Roseates. It was necessary to work fast in order to band the quota set, and we developed a most efficient method of procedure. All bands were opened the day previous to the one on which they were to be used, and the numbers recorded. They were then carried loose in side pockets. The young Tern was lifted from the ground with the left hand, head toward the body, and turned feet up as it was raised. The thumb was then pressed behind the left leg at the joint, holding it upright and firm. This permitted the bander to place the band around the tarsus with the right

hand and close it, whereupon the young Tern was placed in the grass from which it was taken. All unnecessary motion was eliminated by this method of handling, and it was not found practical or desirable to shift the bird from hand to hand by the head. Splendid assistance was given by two members of the Northeastern Bird-Banding Association, Richard B. Harding and Major William T. McMillan.

BANDING

The banding was done on the following dates:

IMMATURE

	Common Terns	*Roseate Terns*
July 1	500	15
" 2	530	85
" 3	470	49
" 5	500	99
" 6	500	20
" 7	900	60
" 9	601	124
" 10	728	48
" 11	201	..
" 12	87	..
" 13	114	..
Total	5131	Total 500

ADULTS

	Common Terns		*Roseate Terns*
July 2	16	Two returns	..
" 3	79	" "	2
" 9	20		..
" 10	12		..
" 11	39	One return	..
Totals	161	Five	2

Total of all adult and immature banded—5794.

This total represents the greatest number of Terns banded in any one season in any one colony.

RETURNS

It will be noted from the figures given of banded birds that five Common Terns were taken in traps that returned to nest in the same colony where they were hatched. We have never seen a Tern, alive or dead, wearing a band when at the island

in previous years until this visit. During 1927 we found a large number of adults that were killed at night, probably by an owl, but all were without bands. Also there was ample opportunity to observe many of the old birds with field-glasses when they sat on the open sand; but again none wore bands. This seemed strange indeed for twelve thousand on this island have had the identifying ring attached during the past four years. The first day's trapping resulted in our securing two Common Terns wearing numbers 382270 and 384122, and my records show that the bands were affixed on July 4th and 7th, 1925, when they were fledglings. The second day two more were captured, numbers 382692 and 383959, and they proved to be young of the same year, banded on July 6th and 7th. The last return was on July 11th, number 403143, and was a 1926 bird, having been banded on July 12th of that year. None was of 1927 banding, and in so far as the records go they bear out the theory that Common Terns do not breed the second year. Additional evidence is given by the fact that two immature Common Terns, banded at Chatham in July, 1926, were killed in the British West Indies in May, 1927, and two others of that year's banding were killed in the same place in June, 1927. Mr. John A. Gillespie also reports a recovery of a Common Tern banded by him in New Jersey on August 23, 1925, which was shot in the West Indies, on May 16, 1926.[1] The bands were in excellent condition, the numbers being very distinct, showing no harm from salt water, and the legs of the Terns did not show any marks suggestive of band-rubbing. There can be no doubt from the above records that the young of the Common Tern tend to return to nest in the same locality in which they were hatched. We hope to amplify these records next year by devoting a greater time to trapping.

Another interesting episode occurred. A trap was set over a nest containing eggs and in a short time an unbanded Common Tern was caught when it went to its nest under the trap to incubate. The bird was banded and released, and the trap was reset. Another adult without a band was taken in a few moments that also went to the nest to incubate. This occurred with a second pair, and shows that incubating is participated in by both sexes.

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[1] *Bull. Northeastern Bird-Banding Association*, Oct., 1926, p. 90.

PARASITES

We did not discover any parasites on the Terns, either adult or juvenile. This is not surprising in the latter case, since almost no nest is made and the young often leave the nest within a few hours after they are hatched. Two nests that had more than the usual amount of nest-material were taken for further examination. These were placed in white cotton bags twelve inches across the top and eighteen inches deep, with the top carefully folded over and securely tied. The method was to keep the bags a week or ten days to permit any parasites such as fleas or flies to hatch out, and then to secure these by carefully rolling back the top and seizing the insect before it escapes. At this writing none has been found. Little is known at the present time about the parasites to which the birds are host.

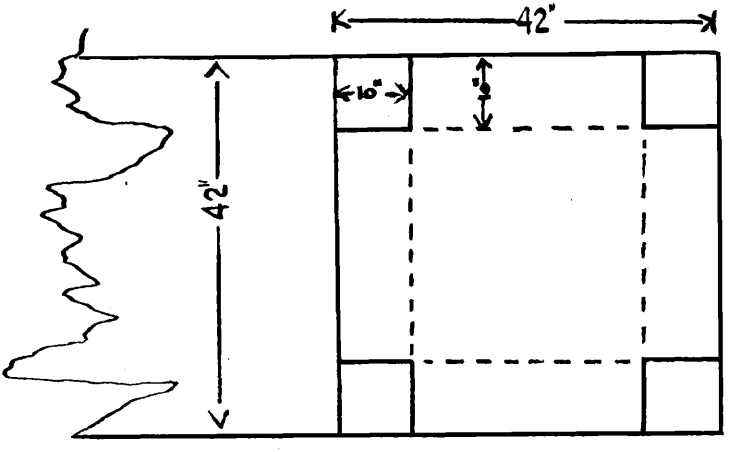
The adult Terns were in splendid condition and surprisingly clean. Perhaps their constant diving into the water many times a day is the explanation.

BLOOD SMEARS

The Department of Tropical Medicine of Harvard University Medical School is interested in obtaining further knowledge of the diseases of birds caused by blood protozoa and malarial infection. Dr. Clyde G. Huff writes: "From the zoölogical viewpoint, malarial infection in birds presents some interesting and difficult problems. These concern the distribution of the species of parasites geographically and the various genera and species of birds, the question of the vectors of many of the Hæmoproteus infections, and the matter of the pathogenicity of the infections for various species." For research work it is necessary to have blood smears taken from adult and juvenile birds. These are made by pricking the leg with a needle and squeezing a minute drop of blood to the surface, which is then spread on one end of a glass slide 3″ x 1″. The smears are dried, care being taken to keep dust and dirt away, and the proper data are then written upon a gummed label stuck to the opposite end of the slide. No difficulty was experienced in obtaining the drop of blood and the Terns were not inconvenienced in any way. One adult bird that came particularly under our notice was trapped, banded, examined for parasites, had a blood smear taken, and was released. Within a few minutes it returned to its nest and was retaken.

DROP TRAPS

The traps used in connection with our work were fashioned from ordinary large-mesh chicken-wire cut to finish twenty-two inches square and ten inches high. Mr. Harding's ideas were followed in the construction of the very simple traps which were made thus: The roll of wire used was laid out to weather several weeks prior to its being used in order that the new appearance might be entirely done away with and the traps thus rendered less conspicuous. When ready to use, the wire



CUT ON BLACK LINES
FOLD ON DOTTED LINES

METHOD OF MAKING TERN DROP TRAPS

was unrolled and pieces forty-two inches long were severed and flattened. At each corner a square ten inches on a side was cut out. The edges (see accompanying figure) were then folded into line with cuts and twisted together or laced with copper wire. It was not necessary to fashion a door or use a taking-cage, for the bander could easily slip his hand under the trap, which rested lightly on the sand, and remove the bird. The large mesh was selected so that the Terns, if they attempted to escape, could poke their heads through and not

bruise themselves as would be the case with a smaller-size mesh. The traps were placed over nests situated in the open sand that contained either eggs or young birds, and operated by a pull-string. One side rested on the ground, and the other, when the trap was set, was raised by a stake twelve inches long. A string extended from the stake to the place where the operator sat, and the trap was dropped by a quick or steady pull on the string. A battery of six traps to each operator was found to be sufficient, and the strings running from the trip-sticks extended about thirty to forty feet to a common center. Here the operator sat in full view of the birds, with bands and note-book, and pulled the strings when the obliging Terns went underneath the trap to incubate the eggs or to brood the young. The lack of fear shown by the birds was astonishing. It often happened that when one of a pair went under the trap to the nest its mate came soon after, sometimes with food, and sat on the sand beside the brooding bird as though to keep it company. Thus both were taken at the same time. The drop of the trap oftentimes did not disturb them, and the captive bird continued to brood apparently without knowing that it was under restraint.

When operating the traps we had a splendid opportunity to study the adults at close range. They came readily enough when we sat quietly, and alighted on the sand before us, uttering a sharp single note, repeated constantly, and accompanied by a nervous twitching of the wings, which were held slightly out from the body The brooding birds went on their nests while others strutted back and forth, fought with new arrivals, or merely stared suspiciously at us, all the while uttering their protesting cries. We observed many of the interesting happenings in a Tern colony, such as the feeding of one adult by another, probably its mate, the courtship displays, and the care of the young.

When the traps were sprung, the captured birds were carefully removed, banded, and released, and the traps were then set in a new location in order that our work might not be harmful to eggs or young. In two instances we trapped one of a pair of Common Terns, banded and released it. The trap was again set over the same nest, and soon a second bird, bandless, walked under the trap and settled on the eggs. It, too, was secured and banded. The actions of the Terns when they passed under the trap were interesting. After attempting to enter from the rear, where one side of the trap rested on the ground, the bird came slowly around to the front seeking a way under. Soon, with bowed head and mincing

steps, it passed slowly beneath the wire and settled on the nest. Sometimes the birds sat on the sand beside the trap, apparently unable to determine what was best to do, but they finally discovered the way to their nests. We spent an entire day in this interesting spot on the island, operating the traps and observing the Terns, without a dull moment. The largest number trapped during any one day was seventy-nine.

LIGHT

In order to observe the reaction of the old and young Terns to light at night, we sailed to the island one evening at dusk. Heavy fog was creeping in from the ocean, obscuring the stars and making the night exceedingly black. Major McMillan was dressed in white, and Dr. John B. May and the writer wore dark clothes that we might be as inconspicuous as possible. Major McMillan's figure showed plainly against the dark background of green, but blended well against the sand. On the other hand, the dark costumes were indistinguishable. We lay on the beach until complete darkness set in, while hundreds of Terns passed screaming over our heads or alighted on the sand, head to the wind, not far from us. As their numbers increased, the long line of birds moved nearer and hundreds sat motionless, gazing suspiciously in our direction.

The young Terns were strongly attracted by the lights we used, which were ordinary electric two-battery hand flashes. When pointed down on the beach, the Terns came like large moths and literally flitted into the circle of light, sitting motionless to stare at the strange sight, or moving slowly forward in a bewildered way until they actually bumped our legs. Others flew to the lights which we held in our hands and struck our heads or bodies in a blinded manner. We found also that it was possible to walk up the beach, or over the island, using the light, and to secure as many young as we desired, but, while many can be thus captured, it is not a practical or satisfactory way to band large numbers.

As a whole the adult Terns were frightened by the light. We are confident it was the light and not ourselves, for we were invisible in the dark behind the flash. When we walked toward a point on the beach where the old birds were resting, and focussed the light upon them, they immediately took wing with loud cries. On the other hand, when we came to birds on the nest it was possible to blind a single individual with the light and secure it, but others on nearby nests im-

mediately disappeared. In doing this, we gained the impression that the bird was blinded but not attracted by the light, and it may have been a desire to keep the eggs or young covered that kept the bird from flying, for the same thing could not be done with adults resting on the beach. A more powerful light and one less diffused would have a more blinding effect and perhaps produce more satisfactory results.

In the air the Terns, old and young, were not attracted, but decidedly alarmed. The lights were set in the sand pointing upward and so arranged that they merged into one strong vertical ray. This proved to be no attraction, and when we trained the lights on flying birds they made off rapidly.

Our conclusion was that young Terns are attracted by a strong light, but the old birds are not and in reality are frightened. The adults can be secured on the nest, but not on the beach where they pass the night. Curiosity or fascination for the light is exhibited by the young alone, but taking them in this manner is not practical for banding.

The completion of this season's work brings the number of Terns banded on this island under the writer's direction to over seventeen thousand. As I have said, more time will be devoted next year to work with the adults through trapping.

Auburndale, Massachusetts.

HOW LONG DO PURPLE FINCHES LIVE?

BY M. J. MAGEE

THE following statistical study of my Purple Finch banding records at Sault Ste. Marie, Michigan, made during the spring, summer, and autumn, should be considered as a preliminary report, subject to revision as more data are obtained. A few more years of banding should give us fairly definite information, if all banders handling any number of Purple Finches will coöperate.

I do not believe the average life of Purple Finches, eliminating the mortality among the young birds before they are able to fly, is much, if any, over two years.

I have had this species feeding at my station every year since 1916 and have been banding them actively since 1922. All the birds were trapped within seventy-five feet of my dining-room window.