We were disappointed in our hope of hearing something of old records of the Carolina Paroquet. Among the present inhabitants there seems to be not even a tradition of its occurrence in the swamp, which lies well within its former range.

NOTES ON OFFSHORE BIRDS.[1]

BY JOHN TREADWELL NICHOLS.

DURING a number of years past, the writer has had opportunity to make observations from time to time on sea birds off our coast from Cape Cod southward, which, though fragmentary, yet seem worth recording in view of the scant opportunity of ornithologists to make such observations, and the consequent paucity of our knowledge of these birds.

On December 22, 1900, he sailed east-southeast from New York on a merchant sailing ship. As the coast was left behind, a few Kittiwake Gulls (*Rissa tridactyla tridactyla*) still were seen daily in varying numbers, the last being recorded January 5, 1901, 25° 57′ North 37° 43′ West, 2360 sea miles[2] east of Miami, Florida, 1350 west of the African coast, 660 further south than the species occurs on our Atlantic coast.[3]

On January 1, 1905, the writer was on a freight steamer off Cape Cod, making the trip from New York to Boston. A single Gannet (*Sula bassana*) seen flying close to the water off the back side of the cape is a far northern winter record for this species, which very rarely occurs as far north as New York in winter. Dovekies (*Alle alle*) were numerous, sitting on the water. As the steamer's bow approached, they would sometimes flutter along the surface, then dive below it and swim off rapidly, using their short wings as

[1] The first part of this paper was read before the Nuttall Ornithological Club.

[2] Distances throughout this paper are approximate, in sea miles.

[3] See Bennett, *Bird-Lore*, VIII, 1906, p. 90.

The theory that the same individual sea birds, Gulls, Albatrosses, or Petrels, follow a ship day after day, is in the writer's opinion fallacious.

paddles. Kittiwakes were common, and flocks of Eider Ducks were seen about off Monomoy.

On August 7, 1906, sailed east-southeast from New York on a sailing ship. When well to sea Wilson's Petrels (*Oceanites oceanicus*) became numerous and remained so across the Gulf Stream, but had disappeared entirely before reaching 38° North 64° West on August 11, a point 335 sea miles southeast of Nantucket. A single Limicoline bird came about the ship on August 9, 39° 40′ North 70° 14′ West and again one on August 12, 37° 02′ North 59° 27′ West, and it was interesting to see this bird east of the Petrels. A broad, almost birdless area of ocean, where Kittiwake Gulls had been seen in winter five years previous, was now crossed. The first three or four days of the voyage a few Swallows were seen, the last surely identified as such on August 9, 39° 40′ North 70° 14′ West, 90 sea miles south of Nantucket, the nearest land. The record is of interest in view of the irregular occurrence of migrant Swallows in Bermuda.

In summer time, especially after a period of foggy weather, Wilson's Petrels often become very abundant close to shore off New York, and enter New York harbor.

On February 17, 1912, left New York for Havana, Cuba, by sea. The coldness of the passing winter was evidenced by two Holbœll's Grebes (*Colymbus holbœllii*) in New York harbor. Other birds of consequence were not observed until the second day, approaching Cape Hatteras, where we crossed from the shallow, cold green water to the north, to the deep, warm blue water with gulf weed to the south. Just north of this line, over the green water, the air was full of haze, and in the haze birds were numerous. There were Red-throated Loons (*Gavia stellata*), Gannets (*Sula bassana*), flocks of medium sized Alcidæ (unfortunately not identified), a few Horned Grebes (*Colymbus auritus*), and two Dovekies (*Alle alle*) were seen. On passing south onto the blue water, all these birds disappeared. A dwindling flock of Herring Gulls (*Larus argentatus*) still followed the ship, and an occasional Herring Gull was observed even from the north shore of Cuba. On February 19, 30° North 77° West (230 miles east of Saint Augustine), steaming through a wonderfully smooth sea, an Audubon's Shearwater (*Puffinus lherminieri*) appeared gliding close to the water, gave

its stiff, narrow wings a few quick flaps, and slid out of sight behind a swell.

Coming north from Havana, Hatteras was passed after dark, so that the bird life there was not observed except that Herring Gulls became tolerably common and three Gannets were seen on blue water with gulf weed just south of that cape. March 11, 32° 30′ North 77° 00′ West (145 miles east of Charleston) several Puffinidæ, about ten in all, were seen. They were wild and none came near enough to the steamer for a satisfactory view, but they were noted as probably Greater Shearwaters (*Puffinus gravis*) and I marvelled greatly that this species should be found off Hatteras at a season when it would have been expected to be just finishing its breeding in the southern hemisphere. In the light of later observations, these birds were very likely the Black-capped Petrel.

January 23, 1913, left New York for Havana by steamer. It was interesting to contrast the birds of an unusually warm winter with those observed in 1912. A single Bonaparte's Gull (*Larus philadelphia*) was seen in New York harbor, and two Gannets were observed outside, the first probably about ten miles south from Sandy Hook. On the Cape Hatteras grounds Gannets were numerous, but a single Loon and perhaps one or two Alcidæ were in contrast to the many birds seen here the year previous. Herring Gulls also were not noted as far south, the last being seen the day Hatteras was passed. On January 25, 31° 48′ North 75° 58′ West (250 miles east of Savannah), on blue water, alternating sunny and showery with a little lightning, the steamer butting into a brisk southwesterly breeze, a sharp lookout was kept for Puffinidæ, as they had been seen near this latitude the year before. Once or twice thin vanishing vertical shadows against the myriad horizontal wave shadows of the distance lead me to believe there were some of these birds about, and as I stood by the port side forward, looking towards the bow, a Black-capped Petrel (*Æstrelata hasitata*) darted away to the eastward above the waves, and I had a splendid view of its long, narrow, stiff wings, blackish cap and back, black tail, white side of neck underparts, lining of wings and upper tail coverts. First one then the other wing uppermost, it was shooting across the wind with almost unbelievable speed and soon out of sight among the distant seas. An Audubon's Shearwater, which

appeared in the trough of a sea near the vessel almost immediately, was noticeably smaller than the first bird. Two or three other birds, obviously Puffinidæ, were seen later in the day, but these were the only ones which came within fair binocular range. The flight and appearance of the Black-capped Petrel were very much like those of the Greater Shearwater. The distinguishing large amount of white over the tail was conspicuous.

January 26, 27° 18′ North 79° 40′ West, approaching the Florida coast, two or three Audubon's Shearwaters were seen; and January 27, 24° 20′ North 81° 10′ West, crossing from Florida to Cuba, they were common, but none were seen on the Cuban side of the Straits. I quote from my notes, "Blue water; practically no gulf weed. Wind moderate, 45° on our port bow. The Shearwaters were mostly flying parallel with the ship at about her speed, off her leeward bow. They crossed the bow from time to time and flew up to windward; apparently they had been flying into the wind, planning to pass in front of the ship, and did not allow for her progress. None were seen behind the ship or amidships to windward. They flew very close to the water, flapping a great deal, the sails much abbreviated. Sometimes one would half light and, with wings extended, kick itself into the air again with its feet against the water. Their rather long tails were noticeable.

Coming north from Santiago de Cuba on February 1, passing the Bahamas, a single Tropic Bird was seen 24° 40′ North 74° 30′ West, and two or three Puffinidæ in the distance were probably Audubon's Shearwater. February 2, 28° 35′ North 74° 35′ West, cloudy with fresh east-northeasterly wind, blue water and gulf weed, by watching diligently saw one Black-capped Petrel (*Æstrelata hasitata*) which flew along with the vessel for a few minutes off her starboard quarter. It resembled the one seen on January 25, but was not so close to the ship. Noted the white underwing surfaces, long wings, and conspicuous white wedge of the upper tail coverts. The first Herring Gull appeared February 3, 33° 45′ North 74° 35′ West, but these were not common until the next day. We were coming north further off shore than the Havana route, which perhaps accounts for the fact that a number of Kittiwakes (*Rissa tridactyla tridactyla*) were seen February 4, in the morning, 37° 46′ North 74° 10′ West (85 miles east of Maryland). They were absent after that until about sunset, when we were getting close

to New York, and a few of these gulls as well as several Gannets and one or two Dovekies were observed.

The following seem to be the most noteworthy generalizations which can be made from these fragmentary observations:

The Kittiwake Gull (*Rissa tridactyla tridactyla*) winters at sea across the mid-Atlantic, much farther south than on our coast, where it is found in numbers only as far south as New York, and probably a few to Hatteras.

The Gannet (*Sula bassana*) winters as far north as the Hatteras grounds and northward in diminishing numbers; very rarely to New York, stragglers sometimes off Cape Cod.

The Audubon's Shearwater (*Puffinus lherminieri*) occurs commonly off our southern states in winter, not far south of its coastwise summer range.

The Black-capped Petrel (*Æstrelata hasitata*), is not extinct and occurs off our southern states, observed in winter northward and eastward of the Audubon's Shearwater.

Alcidæ and Red-throated Loon (*Gavia stellata*) in severe winters occur south off the coast in numbers to the Hatteras grounds; in open winters they are less plentiful southward.

The Problem of the Sailing Bird.

There has been some discussion of late as to what forces are utilized by the sailing bird and how they are utilized, perhaps sufficient to serve as excuse for offering the following explanation here, even though, being in the writer's opinion the true one, and quite simple, it very probably has often been stated before.

Let us take a simple, striking case of the phenomenon, and one not complicated by local conditions as cliffs or mountain ranges and their accompanying vertical air currents. An Albatross has been resting on the water during a calm spell (as is the custom with these birds); when a fresh wind springs up he launches himself in the air with much flapping and kicking of the water (again customary) and when well started, sails across the wind on stiff, motionless wings (again customary).[1] His wings are tremendously long and narrow; his big feet extended backward reach just beyond

[1] See Fisher, Bull. U. S. Com. Fish. for 1903, p. 23. The apparent difficulty of the Albatrosses here discussed to cross the wind may rather be explained as difficulty of turning short into or loss of relative momentum before it.

the end of his stumpy tail, which seems not to balance his big neck and shoulders. As he goes he leans far over, first to one side, then to the other. Now the tip of his lower wing actually cuts a knife-like furrow in the water, now he swings high into the air on a great bow. At first sight you say, of course the wind is the motive and supporting force. But on trying to explain how it is such, difficulties are apt to be experienced, and you would perhaps fall back on the theory that the bird utilizes rising air currents, except that this theory *does not satisfactorily explain the observed facts,* for the bird seems to go where it chooses and everywhere find the right air currents. So universal a distribution of rising currents will not meet the test of probability. It is believed that the difficulties spoken of come from trying to apply the force of wind always to the under side of the bird's wings and to brace it against gravity, whereas in fact it is commonly applied to the upper surface in gaining momentum. In order to use this force, the bird must oppose it to a comparatively rigid resistance, as that of the water against the flat side of a sailboat's hull. In the compressed air beneath him he finds just such a force, familiar enough to us as holding up parachutes etc., and it is significant that the sailing Albatross holds its wings somewhat downward, which would help them to function as a parachute. By raising or lowering and turning his head, he may steer readily with this bow rudder and maintain or increase his elevation by directing his course slightly upward through the air. It is an observed fact that he turns toward his lower wing, and doubtless leaning to the side is the important factor in steering to one side or the other. When his course is held upward by pressure of air on his breast and lower head, and at the same time he is being propelled forward by pressure on the upper side of his wings, obviously a very long wing is an advantage, which we find to be the type of wing possessed. It will be noted by our hypothesis that all forces being braced against the upward parachute pressure of the air beneath the bird's wings, the downward pressure opposed to it must be considerable, and the density of the air increasing with the pressure, the sailing bird rests on an invisible cushion of dense, compressed air. As he moves forward, fresh air is feeding into this cushion in front and an equal amount escaping from it behind, but the current through it is slight as in a lake though with inlet and outlet. Braced against this air cushion, the

Albatross can maintain his momentum by utilizing gusts of wind, merely turning his upper surfaces to its impact, or swooping down from time to time. If by inadvertence he does lose this momentum,— begin to drift (frequently observed in light and moderate breezes) — he can readily regain it by a few flaps of his wings (commonly observed in such cases). Care should be taken not to consider the upward parachute pressure of the air a force, for it is a resistance, not to confuse it with the pressure of the wind, and not to draw false analogies between an object in compressible air and one in non-compressible water. The above hypothesis will explain sailing close to the wind as well as across it. There are doubtless complications and adjustments which it does not cover, just as sailing birds doubtless experience and utilize more or less vertical currents which may at times make easier, but do not in general explain their sailing. It is also a conservation hypothesis in that it allows for a bird's shooting a long distance in still air by utilizing, instead of opposing, its elasticity.

As corollary we would expect Albatrosses, Shearwaters, circling Gulls and Hawks to attain their greatest velocity with their upper surfaces inclined to the wind. That my memory fails me as to whether or not they do so, shows how meager our observations often are without a theory to direct them. In a way it is an advantage to draw up the hypothesis without these observations, as then when made they will be new facts to test it by.

The compressed air hypothesis does not preclude a bird's being lifted by the wind below its wings while losing momentum, nor of its attaining momentum by being braced upward against the air pressure, if its wing be flat and firm enough to meet perpendicular resistant air pressure above, which the wings of most birds probably are not, though quite capable of utilizing the glancing impact of the wind. A bird with a wing which would admit of the former would be expected, in its ordinary flapping flight, to raise its wing edgewise, turn it and bring it down flatwise. It is possible that Shearwaters do fly somewhat in this manner, and that it explains a certain stiffness which has been observed in their motions.

In conclusion it is quite possible for a bird to utilize the wind by bracing it against more or less vertical air pressure, and vertical air currents are unnecessary as they are ineffectual in explaining its sailing.