Howland Island, Its Birds and Rats, as Observed by a Certain Mr. Stetson in 1854

LLEWELLYN HOWLAND[1]

THE FOLLOWING ACCOUNT of a visit to Howland Island in 1854 is an abridged fragment of a communication from a Mr. Stetson addressed to my grandfather and his half brother, partners in the firm of George and Mathew Howland of New Bedford. Unfortunately all information concerning Mr. Stetson, even his initials, is lost to us. Indeed the original of his manuscript has disappeared, in all likelihood having been destroyed with other records of the United States Guano Company when my grandfather's counting house in the "Candle Works," Hillman Street, was cleaned out between 1884 and 1886, soon after his death. My uncle, the late Mathew Morris Howland of Jacksonville, Florida, made a copy of the part of Stetson's report which I assume he, in going over his father's papers in the counting house, thought he would like to preserve for future reference, and that copy is reproduced in part here.

Such is the history of the Stetson report so far as I know it. I will add that my uncle Morris Howland and I were for many years after my grandfather's death affectionate relatives and good companions, with added bonds of sympathy, a love of the sea, retentive memories, and a deep interest in the history of the Howland family. The Stetson report, and the man himself, were frequently the subjects of conversation when we were on outdoor expeditions or otherwise together; so that I am willing to bet my head against a football that the report is authentic excepting the detail of the name of the ship and captain involved, and even in this item I have checked the available shipping records and am of the opinion that "Rousseau" and Captain Pope are the means whereby the survey was made.

To my knowledge the report never has been published. I referred to it briefly in my book *Sou' West and West of Cape Cod* (1947), as did G. E. Hutchinson in his *Biogeochemistry of Vertebrate Excretion* (1950).

I have only a short note to add to the island's history. My ownership of the island consisted of my having bought out all right, title, and interest of those of the family who might, through inheritance of the U. S. Guano Company, have a legal claim. When I presented my case to the United States Government in 1926 my friend, Assistant Secretary of State William Phillips, gave me his opinion, quoting chapter and verse from documents in Government files, that British subjects had established squatters rights and if I was prepared to guarantee costs of $50,000 the State Department would be glad to present my case to the British Government. Not choosing to so obligate myself at the time and learning later that the British Government and the United States had come to an understanding that while the United States should take title to the island, Great Britain, under a contract, would have equal rights to use it as a flying field, I abandoned all thought of my claim to this remote property.

Mr. J. C. Greenway, Jr. has kindly assisted in arranging for publication of this paper and has written the natural history notes and observations which follow the Stetson letter.

[1] Hope's Garden, South Dartmouth, Massachusetts.
Manuscript received July 7, 1954.

TO: George and Matthew Howland
New Bedford,
Mass.

Dear Friends:

At thy request I submit herewith a report of my activities while engaged in the investigations of thy property known as "Howland Island" in the Pacific Ocean [about 1600 miles south of Honolulu].

Agreeable to thy arrangements and instructions I joined thy bark "ROUSSEAU" at New Bedford on the 10th month [October] 15th day of 1853 . . .

At 5 bells in the forenoon watch on the 28th, [April, 1854] we raised land which proved to be Baker Island and in a short time after had Howland Island in sight . . .

I spent this day checking up and preparing the supplies and gear that I proposed to take ashore with me. At Captain Pope's suggestion, I had several weeks before made arrangements with two members of the crew, Obed Handy, a young man of superior intelligence, and Cotton Bole Snow, a colored boy who could cook to some extent, whereby they agreed to act as my assistant and servant respectively during my sojourn on the Island . . . I prepared two large tents and spare canvas and poles for extra coverage in case of loss or damage to the tents. As there was no indication of sweet drinking water from the discovery report, a sufficient supply in bbls. for 3 months was prepared . . . Lines and hooks, firearms and powder, medicines, clothing and my instruments and specimen viols, etc. were all looked to, so that when on the early morning of the 29th, we backed the main yard when within, I should judge, two miles of the S. W. aspect of the Island in 60 fathoms of water, it required but a short time to embark our party and the gear in two boats and put out for the shore.

The weather was of variable nature, scorching sun at short intervals between squally cloudiness, but no severe rain and but little wind. Captain Pope was in charge of the leading boat and a boat steerer the other. The Island appeared to be of coral formation and not over 20 feet above sea level at any point . . . [I] place the centre of thy property known as Howland Island in Lat. 0° 49′ 00″ North, and Long. 176° 43′ 23″ W. The extreme length on the centre axis from S. E. to N. W. is 1.4 miles. 0.5 miles is the width at the widest point situated in the southerly part and 0.2 miles from the extreme South shore line. The coral reefs run completely around the Island without a break except for several narrow leads where there is a passage for a light draught boat to approach the shore without being too much endangered by the breakers . . . This was much smaller than had been anticipated and gave me food for thought as to the need of a long stay to complete my investigations.

As we approached the fringe of reefs the multitude of birds hovering over the Island became more and more astounding in its number and whenever a puff of wind came off shore the noise and stench were most noticeable. The nearer we approached the land the more difficult it appeared to be to find a passage through the coral that might afford us a landing place free from the surf . . . By this time it had been forcibly impressed on me that thy property as a possible place of residence was out of the question unless fresh water and soil of some sort capable of producing vegetation should be discovered . . . No man would willingly undertake to reside there for long except from sheer necessity, as the smell, while probably of no serious moment so far as health is concerned, is of so constant and over-powering a pungency that it has

a gagging effect when first encountered and even after long exposure to it, seems to permeate to one's vitals. Were it not for the rapid oxidation due to the savage and direct rays of the tropical sun, I doubt if life could be supported even with all things necessary, as we had, for more than a few days so ever present is the flavor arising from these huge deposits of bird droppings.

Shortly after noon, a suitable landing place had been found and Captain Pope and I took council as to my future plans. Telling the boats' crews to leave the supplies in the boats and stand by them, we started to walk in an easterly direction to discover the size and character of the Island. The walk was most exhausting and filthy and the extraordinary tameness of the birds made it necessary to scuffle through them at times as one would if walking through windrows of dead leaves in the autumn at home. We succeeded, after more than an hour's picking our way through nests and filth and very broken ground, in reaching the eastern shore of the Island . . . The surface of the land, what little we could see of it, seemed to be made up of rocks of a loose lime stone sort, very much honeycomed by erosion, with considerable patches of low dry bushes and coarse dry grass in the low parts.

Next to the birds and living in close and constant proximity to them, the only fauna we observed were armies of rats. They appeared to be of the gray Scandinavian variety and to be subsisting and thriving on the eggs and fledglings it was only too easy for them to obtain. Occasionally the birds would make a raid on a band of rats engaged in these depredations and succeed in seizing some of the younger robbers. They would, we observed, kill the rats by tearing them to pieces with their beaks and talons, or more often where the rat was of a small size, fly off to a point at a considerable height above the reefs and drop their prey into the pounding surf where it would seem the rat would perish . . .

I am of the opinion [that] originally there was some condition of the rock formation that allowed the rain water to collect and stand on the surface and by slow degrees give the sand and chance blown and dropped seeds opportunity to gradually develop into a sort of soil in which has grown the short tough grass and low bush which forms the only vegetation on the Island. Six more such hollows were discovered and in every case there was a depression or natural basin. It is my belief that the bushes which in no case were of more than three feet in height are a variety of grass rather than a shrub as there did not appear to be a well defined leaf system on them and their habit of growth and the structure of their branches all starting from a common root or root cluster and the arrangement of the blossoms and seed vessels indicated that they belonged to the grass family rather than the tree family. Their color was of sage green and their tips in most cases seemed to be withered and scorched by the sun and wind. The grass was coarse like Bermuda grass but grew much less closely than this in isolated clumps and colonies but without a trace that I could discover of any other form of vegetation . . . During this entire journey . . . vast armies of rats were as unafraid of us as the birds and squealed and bit at us as we trod on their squirming tails and often destroyed several at a time by coming down directly on their bodies as we slipped or dropped off of the rocks. We seemed to be targets for the birds that rose at our approach and long before we arrived at the North End of the Island, we were completely encased in a thick film of bird manure which the sun baked quickly into something resembling a whitish pie crust in consistency . . .

As we worked South along the Easterly shore line, the going became better and the birds less troublesome. This condition appeared due to the fact that the depressions have become completely filled with guano and the surface baked hard or at least harder than where it is more broken. Such a condition seems to be less agreeable to the birds for nesting places and for this or some more subtle reason the birds on this side of the Island were more timid of us and rose at our approach more timely, so that we were not so afflicted by their attentions. . . .

In general this part of the walk differed little if any from what had gone before although the rocks were less jagged and the walking by reason of this fact less difficult and exhausting. For several hundred yards before reaching the camp site, the rocks pushing their sharp heads through the guano or surface soil were almost totally absent. From our later observations after a complete survey of the interior parts of thy domain, it was plain that we had happened to pitch our camp at the most suitable spot for such a purpose the Island affords. I will mention now the fact that the excavations that we subsequently made a few yards from our tent discovered at a depth of five feet a small supply of brackish water which might under severe necessity be used for drinking. At similar depth at other points on the Island where it was possible to make tests we found the same brackish water in small quantity.

We found, on arrival at the camp at 1:30 P.M. that our tent and supplies had been disposed as directed. We then proceeded to the ship with all possible speed where on our arrival we spent the best part of an hour in the head with buckets of water, scrubbing brushes and squares of rough canvas attempting to rid ourselves of our horrid enamel. After all our efforts we carried with us a strong smell that suggested a hen coop, which left me with little appetite.

For the next two days I repeated my first day's work with both Handy and the Black in attendance. I quartered over the interior of that part of the Island North of the camp the first day and the part South the second day. The rocks in the interior parts are less prevalent than along the shore lines. The deposits of guano are more solidified and as mentioned before we found six more cases of bush and grass. We found no fauna or flora other than that already described, but the colonies of rats were a source of constant interest to me, for in the first place it would appear that their presence must be accounted for by the discovery of the Island by an European ship at some date antidating any recorded voyage of our historical era. It is of course plain to be seen that the ancestors of these armies of rodents could not have come from the discovery ship when she so far as can be learned first sighted this Island and made such notes as to its location and general character as are set forth in her log, as it is distinctly stated that no landing was made at that time on account of the reefs and that there were noticed "some numbers of a small furry animal mingled with the myriad birds." Then thee will please observe that in spite of the many showers there is no trace of fresh water on the surface; for these showers are of such short duration and light intensity and the intervals of sun so scorching that the precipitation on the land can truly be said to be nonexistent so that unless there may be some subterranean supply that I could not come at, these rats are either able to drink salt water or the eggs and fledglings that they appear to live and thrive on furnish them with the equivalent of drink. While I could never observe any rats engaged in eating the grass or bush, I did find traces of what would appear to be

diggings either by the rats or birds at the roots of the grass patches and it is possible the rats obtain some food from the seeds at such times in the season as these plants fructify. Our stay did not coincide with such a period so I could observe nothing but unripened and immature seed vessels or old and fallen ones in and around the grass and bush. No trace could be found of any difference in the rat bands that were found in all parts of the Island. The rats were in one great common army, squirming and squealing wherever the birds nested and making common warfare on the birds. Their complete fearlessness of us would indicate their antiquity inasmuch as rats that had been lately arrived here would carry their instinct of fear of man with them, in no matter what location they found themselves . . .

The fifth day of our stay came in with a menacing bank of clouds to the S. W. and while the puffs of wind came from all quarters as usual, there was an uncomfortable feeling to the air and the barometer had fallen a 10th during the night. Captain Pope warned us as we were leaving the ship that we might find it necessary to spend the night ashore and to send the boat and crew off after landing with as little delay as possible. He advised me that in the event of his determining to make an offing he would hoist a basket at the main mast head and would make all haste to return after the weather had become propitious . . .

At 12:30 P.M. Handy and I were returning toward Camp when we observed the signal of departure run up to the masthead on the "ROUSSEAU" and presently saw her fill away on the starboard tack under short sail and stretch away to the S. E. We noticed the bank of clouds had worked up to the Zenith and that the wind was set steady at W. by S. and increasing rapidly. By 3 o'clock that afternoon the wind was blowing hard in squalls of shortening intervals, the sky was completely overcast with low flying scud, but no rain. We knocked off work and spent some time putting extra lashings and guys on our tent poles. When we saw the last of the ship I had a very empty feeling in the pit of my stomach and could not help my mind from dwelling on the horrid situation that my two companions and I would be in should any untoward thing happen to prevent the return of the ship within a few days . . .

I, for one, spent this first night on the Island with a lower range of spirit than I could remember and but little repose. The squalls were terrific by midnight and it seemed doubtful whether our shelter would remain with us long. Furthermore, the smell of our food attracted the rats and we found ourselves compelled to light our lanterns and actually defend ourselves with constant vigilance against this apparently ever increasing army of boarders.

Towards morning . . . and by the time we were able to look about us we found ourselves surrounded by a small rampart of rats that we had slain and to our unspeakable distress, realized that the dead were the attraction for the living and that we were apparently doomed to a hopeless contest for as long as we should try to maintain ourselves in our camp, as it was apparent that the more rats we killed the more would come to devour the remains and anything else that could be found of an edible nature. Breakfast was out of the question under these conditions so we fell to with all our might to clear away the corpses to such a distance as would give space and a breathing spell for refreshment. At first it seemed, in spite of our efforts, we had undertaken to clear the Augean Stables as the rats continued to pour into our midst in seemingly ever increasing hordes, and I for one became pannicky as to the outcome

of our battle with these pests. After half an hour of intense effort killing with clubs and dragging away the remains the result of which seemed only to increase our embarrassment, I organized our forces thus: I loaded two of our fowling pieces and laid out at hand an ample supply of ammunition. Handy stood by to reload the guns and the Black was told off to lay a train, as it were, of the slain that would lead away from our tent and surroundings. The guns proved effective after ten minutes of rapid firing and I was able to spare Handy to assist Cotton Bole in extending the line of carrion and gradually move our combined operations further and further away from our campsite. When I tell thee that we were furiously engaged in this unexpected labor for over an hour, thee will understand perhaps the countless number of rodents that infest thy property, and can comprehend how easy it would be for a shipwrecked crew less favorably supplied with strength and firearms than we were, to be overcome by these animals and finally to be horribly destroyed by them as is supposed to have been the case by the finding of the human bones dreadfully dragged about on Huafo Island which was similarly infested with these dreadful creatures. When it seemed that we had shifted the invading forces from our camp to a spot somewhat more than 100 yds. away I took account of stock to find to my considerable added uneasiness that allowing for a shooting party each 24 hours of the same proportions as this we had just concluded, we should be bare of ammunition by the next day but one. Such a situation could not be tolerated and it was plain that if the ship did not return within the next 24 hours some plan must be worked out for our protection that would be effective without the use of firearms, so that we might hold our ammunition for an emergency. I sent Cotton Bole back to the tent to prepare breakfast and explained my gloomy thoughts to Handy, meantime keeping a concentrated watch on the movements of our enemy. During this watch, which lasted half an hour, it became evident that as the supply of dead dwindled the living tended to return to their more natural and usual avocation of preying on the birds' nests, became more scattered and showed no tendency to return in unusual numbers to the camp. We were greatly relieved when we were satisfied of this situation and I became convinced that could we, by some well prepared arrangements, keep the camp clear during the hours of darkness, we should not have to face again another attack of such terrifying proportions, as it was evident from our last night's experience that our troubles had been largely brought about first by the smell of the scraps of meat and fat that remained after our supper by which the rats were first attracted in our direction and second by the smell of blood caused by our slaying them when their numbers became alarming in the night. While we were eating our breakfast I resolved on a plan for our next night that I felt would give us a chance of some reasonable rest and protection. Accordingly, I constituted our company into three watches as on shipboard. Handy from 12 noon to 4 P.M., the Black from 4 P.M. to 8 P.M., myself from 8 P.M. to midnight and so on, until the ship might rescue us from this Desert Island, as it had become to me. This arrangement we kept in force for the remainder of our stay and found it was most helpful as a means of keeping up our strength against the heat, anxiety and generally sapping conditions under which we were existing. I next prepared a bamboo pole with a crotch at one end. This crotch was constructed by splitting one joint and forcing a wedge into the split thereby spreading the two halves to an extent that I thought would fit over and hold tight the average rat. We next prepared a canvas bag with a placket, which I judged would hold a hundred of these vermin.

It being now about 10:30 forenoon we all three set forth to test our rat-catching instruments and within an hour had a bag full, the forked pole proving effective to pin a rat so that it could be lifted alive from the ground and dropped into the bag after a sharp blow with a club on the nose as the rat was held over the placket had dispatched it without the spilling of blood on the ground. On our return to our camp we suspended this bag from the tent poles about two feet above the surface of the ground. At noon, after a light repast of ship's biscuit, the crumbs from which we carefully picked up and burned so as to leave no trace of food for our nasty neighbors, I directed Handy to take our tarpaulin to a spot some 200 yds. north by East from the camp and after slinging it from our sounding rods to empty the bag of rats into this suspended cache and then occupy himself with all diligence by killing and collecting for the tarpaulin as many rats as he could during his watch. The Black and I during this 4 hour period after first slinging two hammocks on our tent poles, got some much needed sleep. At four in the afternoon watch, Handy reported that he had collected what he considered about 500 rats. I then ordered the Black to continue Handy's work until 6 P.M. when he was to return to prepare supper while I would prepare our catch for the night. Cotton Bole must have thoroughly enjoyed his work as he came to turn me out with grins of pleasure wrinkling his face. Armed with the spades and picks that the blacksmith had cleverly wrought for me before we came to thy Island, I set forth to the cache and after two hours hard work, I had prepared beneath but a little to one side of the tarpaulin, a trench or hole in the ground of sufficient area I judged to accommodate the catch and bury it some 4″ below the surface. Mortification had, I suspected, begun to taint the air to leeward of the cache as I noticed an unusual uneasiness and commotion among the bands of rats in this quarter. At, as I judged, a half hour before darkness would fall, we all three after clearing every vestige of our supper from the premises, left camp and repaired to the cache. We let go two of the guys of the tarpaulin and thereby dumped the entire catch into the excavation and promptly covered it loosely with pieces of rock and sand, just enough I judged to force the living to work for their horrid feast. On top of this grave we spread some scraps of fat pork. It now being near the time of my watch, I mounted a rock with a lantern and club, prepared to observe what I could of the results of our preparations while Handy and Cotton Bole returned to camp to get their rest. Before two hours of my watch was up I judged that most of the rats in the vicinity of our camp were busy for at least the best part of the remaining darkness and I returned to the tent to keep watch until my time was up. An occasional intruder was found in the tent, but no real invasion such as the night before took place and as the weather had settled into its regular course we had a peaceful and refreshing night of it. I give this experience with the rats in detail so that thee may realize the unconsidered and unexpected difficulties of operations to be met with in exploring such out of the way places and so that if thee propose to operate the guano beds here thee may take steps to first cope with this vermin which is a very vital menace to human life ashore . . .

My observation of the sea fowl and their habits leads me to believe them to be of the same species as those abounding on the guano Islands on the West Coast of South America, although of this I am not sure, as I have only read a meagre account of these latter that I found among some papers in thy counting room that were published in London, 1841, or about the time guano first made its appearance in

England. The birds at Howland Island have the general shape of small pelicans, but are of a lighter colored plumage, although there seems to be a considerable difference in color between the birds at different stages of their development. Their daily habits seem to be to alternately go off to the edge of the reefs in large flocks and fish with great skill and persistency for about six hours and then return to the Island and allow another gang to go to the fishing. There is a tremendous noise and commotion when a returning flock arrives from the fishing grounds, and those that have been ashore prepare to go to sea. While on shore the birds, except when the eggs are first laid, do not sit on their nests with any regularity as I suspect the sun does the incubating without troubling the birds so far as heat is concerned. I believe however that in the heat of the day when the weather is not overcast, the birds, both cock and hen, by some instinct will stand over and sometimes sit on the eggs to protect and shade them from the direct rays of the sun. I am of the opinion that a vast number of eggs are addled by too much sun where the old birds have been careless in letting the eggs lie exposed too long. The chief use the birds make of their time ashore is guarding their nests from rats or those of their own kind who are apparently unmated and yet have a keen desire to acquire a nest and rear a family.

The nests are very varied in form and substance and are spread round indiscriminately and on all sorts of surfaces; but as a whole they consist of a slight depression about a foot in diameter surrounded or marked in a rough circle by bits of coral intermixed with dry sea weed with which high water mark abounds. By marking a pair of what I believe to be fully developed birds with a band of red cotton thread on their legs I was able to satisfy myself that this pair at least knew its own nest and always returned to it after their spell at the reefs. I am of the opinion that all the other pairs were equally sure of their own quarters, although the confusion and aimless flutterings that took place constantly until darkness fell, would convince a casual observer that there was no law or order in the colony and that nests were used by all and any without reference to ownership or eggs. It would appear that at night the birds take turns keeping their eggs warm or hiding the fledglings under themselves. The young birds are fed by the old bird's regurgitating a part of his own meal at very frequent intervals. During the day when not engaged in shading the eggs or feeding the young the bird in charge of the nest spends his or her time beating off the attacks of the rats. In cases where a band of well grown rats is on the warpath and makes an attack on a nest or group of nests, the sea fowl in that vicinity will band themselves together and make a concerted attack on the rats using wings, beak and talons and keeping their enemies quite busy until they have moved off. The young rats of small size have a hard time of it, as the birds often kill these under-sized enemies either outright or swooping off with them to the surf as I have described before. I made sure that under certain conditions the birds would eat young rats by catching several youngsters and tying them in pairs with ten fathoms of light fish line to each pair. These teams I set down near nests with fledglings in them and quickly observed the nearby old birds catch and promptly swallow these rats. The result was I soon had several pairs of birds in harness so to speak and to my shame, their antics to escape from one another with a long line between them made me laugh. I cannot feel too much compunction at this boyish and perhaps cruel trick, inasmuch as this device gave me an opportunity to study these tethered fowl at my leisure, and further I am sure it was not many hours before the juices of the craws of these birds rotted off the

line and they became free. Such few birds as I treated to this trick would at first finding themselves fast to an anchor of some sort flutter into the air and fly off generally in opposite directions at their best speed until brought up and often down to earth with a sudden jerk as the line between them tightened. After going through every sort of move to get apart they would generally drop to earth and sit sullenly down to wait for Nature to release them. In one case one of the birds threw up his rat but promptly swallowed it again and evidently made up his mind to keep his dinner even at the cost of a long wait for digestion to relieve him of his enforced partner. After rehearsing in my mind the habits and occupations of the fowl and vermin, I am of the opinion that the young of each is the prey of the other and that except where eggs are cracked by the birds themselves the rats do not affect an appreciable amount of damage by their destruction of eggs. I only observed a few caset where the rats were successful in rolling a whole uncracked egg to a point where is was pushed over a ledge with sufficient drop to break it when it landed below. However, it would require a much longer sojourn than mine and a trained observer to come to accurate conclusions with regard to the life histories of these so strangely assorted creatures on thy property. The schools of fish from which the fowl draw their chief substance are similar in size and habits to schools of small herring and on some days seemed to completely surround the Island in a solid mass staying from rather close in on the reefs to sometimes a mile or more off shore. The birds did their fishing wherever the fish were breaking the surface, hovering over those parts of the school that were most easily gotten at and scooping the fish up rather than diving beneath the sea for them. As the fish sought lower levels the birds would rise to about sixty feet and fly off to a point where a darkling patch would indicate the fish were breaking water. All this on a vastly greater scale than anything I have seen at home. The contemplation and consideration of the cycle of events taking place in this humanly remote spot impresses the observer with awe, and in my case with terror, at the ferocity and at the same time delicacy of God's immutable laws that govern the workings of our World and in spite of my anxiety of mind and extreme discomfort of body created in me a humbler and more trusting faith in the Divine Omnipotence . . .

At sunrise I swept the horizon with my glass and to my unspeakable relief made out what seemed at first a cloudlet in S.E. close down on the water, but as the sun rose higher this cloud-like object stood out clearly as a sail and in an hour we could partake of our breakfasts with the sauce of assurance that the "ROUSSEAU" was in sight standing for the Island . . . The weather, remaining on the whole calm, the ship made very moderate progress towards us, so much so that Captain Pope evidently sensing our state of mind and body, dispatched a whale boat at noon when the ship was still, I should judge, ten miles from her station on the Westerly side of the Island. In spite of the heat and the considerable distance to be covered the crew of the boat sent her along to such good purpose that at 2 P.M. we on the Island had embarked in the boat and were on our way back to the "ROUSSEAU" where we arrived at 4:30 P.M. and very glad to get there I assure thee and have the means to clean up, and feel the well ordered conditions aboard the ship surrounding us once more . . . All three of us had had enough of Howland Island to last us a life time. I feel assured that the sight of a rat will never cease to make my gorge rise with loathing.

NATURAL HISTORY NOTES AND OBSERVATIONS

J. C. GREENWAY, JR.[2]

Mr. Stetson was clearly an educated, observant man but apparently not an experienced naturalist. As is most often the case when the history of such islands is studied, the incomplete records of the past are, at least in part, at variance with what is known (or thought) to be true at the present. In any event this is the most graphic first hand account of the infestation of a small island by rats in existence.

Mr. Stetson assumed that the rats that troubled him belonged to the species variously called Ship Rat, Black Rat, Grey Rat, Roof Rat, Jungle Rat and Plague Rat (*Rattus rattus*). These together with a larger, stronger species, usually called Brown Rat have escaped from wrecked ships and those beached for repairs, have taken to the forests and wrought havoc on islands ever since Europeans have sailed the Pacific Ocean. They are said to have moved in armies on South Island, New Zealand in 1840, causing farmers to abandon fields (Thomson, 1922: 79). In 1919, soon after the wreck of a ship on the shores of tiny Lord Howe Island, 300 miles off the east coast of Australia, that island was overrun by rats and four endemic forms of birds were extirpated (Hindwood, 1940). If rats of Howland Island were in truth of this species this account would have been interesting, but its importance is much increased by the strong probability that they were actually Polynesian Rats (*Rattus exulans*). The only specimens known from Howland Island were collected in September 1924 by George C. Munro. At that time the island was said to be overrun by Polynesian Rats of both brown and black varieties (Emory, 1934). Through the kindness of E. H. Bryan of the Bernice P. Bishop Museum, Honolulu, four of these were made available to Miss B. Lawrence, curator of mammals in the Museum of Comparative Zoology at Harvard College, who affirms the identification on the basis of the generally small size of the specimens, including small bullae and small teeth. The pellage of two is gray, resembling that of *R. rattus*; that of the others is brown as in Polynesian Rats (*exulans*). A like dimorphism in *exulans* is reported by J. T. Marshall on Arno Atoll in the Marshall Islands. He suggests the possibility of hybridization, but the little that is known of their ecology, and also the rarity of morphologically intermediate individuals, make this hypothesis dependent upon further study.

Certainly to those who know Polynesian rats in life, the behavior of those on Howland Island is surprising, for they are characteristically shy and retiring compared to the other species and indeed were thought for a time to have been extirpated from Hawaii and New Zealand by introduced rats. Their staple in nature is generally seeds and fruits, however, they are known to be almost omnivorous in captivity, and it is not impossible that having lived up to and above the point of subsistence on such a small island as Howland their behavior might have adjusted to those special conditions.

J. D. Hague who visited Howland Island about the year 1860 says of them (Hague, 1862): "Rats were found on all these islands [the guano islands, Baker, Jarvis, Phoenix, and others] especially on Howland's where they had become astonishingly numerous. They are of very small size, being hardly larger than a large mouse, and, I think must have degenerated from their original state in consequence of the change of climate food and condition of life . . . I have known over 3,300 to have been killed in one day by a few men . . ." Thus Stetson's account is corroborated.

[2] Museum of Comparative Zoology, Cambridge, Massachusetts.

Hague like Stetson naturally thought that the rats had come ashore from a wreck, although he saw no signs of wreckage. An hypothesis that they swam ashore from the wreck of a Spanish ship 200 years before perhaps should not be abandoned, for possible variations of isolated populations of *Rattus rattus* are great.

If they are indeed Polynesian rats (*exulans*) the implications are far-reaching for they were almost certainly introduced on a great many Pacific islands by the wandering Polynesians, as were dogs, hogs, parrots and lizards, four hundred years before Captain Cook's first voyage. Evidences of the occupation of Howland Island by the Polynesians were found by Hague and later visitors, although they seem to have escaped Mr. Stetson's sharp eye. If Polynesian Rats behaved (even sometimes) in the manner described here, there must have been a holocaust of the land-birds of many Pacific islands. Sea birds have been able to protect themselves better as a rule, as witness the record of the certain extinction of 68 forms (species and subspecies) of Pacific island land-birds within the past 200 years, as against four populations of birds that find their food at sea. The probability is that many interesting native species were extirpated by rats long before the arrival of Europeans.

The island referred to as "Huafo" is probably Guafo off the coast of Chile. Early editions of "Sailing Directions" hint of wild dogs and wild men there.

To whatever species the rats belonged, they most probably killed off the tern colonies on Howland Island. Hague noted in 1860 (*loc. cit.*) that these birds "are almost entirely wanting on Howland's, and their absence, I think, may be attributed to the depredations of rats." He observed rats sucking the blood of the smaller birds on Baker's Island, 40 miles away, and Ellis (1937) records that terns no longer visit that island. These were probably Noddies (*Anous stolidus*) and sooty terns (*Sterna fuscata*).

The birds mentioned by Stetson as having "the general shape of small pelicans" were undoubtedly three species of boobies, the Red-Footed (*Sula sula rubripes*), the Brown (*Sula leucogaster plotus*) and the Blue-Faced (*Sula dactylatra personata*). Specimens of all three have been taken there recently and are in the Bernice P. Bishop Museum. Hague records also Tropic Birds (Phaethon), nesting under large blocks of rock.

Botanists find it impossible to believe that Stetson referred to a tree called "Kou" by Hawaiians (*Cordia subcordata*), but stunted specimens grow there now and are recorded by Hague (1862) as present in 1860. He wrote:

"Near the center of the island there are one or two thickets of leafless trees or brushwood and occupying an area of several acres. The tops of the trees, in which the birds [probably the Red-Footed Booby] roost, are apparently quite dead but the lower part near the roots, show signs of life after every rain . . . it is said to be a species called by the natives of the Sandwich Islands 'Kou'."

That these trees were planted during the six years between Stetson's and Hague's visits is quite unlikely.

The subsequent history of the island has been told by E. H. Bryan, Jr. in his *American Polynesia and the Hawaiian Chain* (1942) and by Sir Alfred F. Ellis in *Adventuring in Coral Seas* (1937). This involves nothing but the business of the removal of guano and the affairs of the American Guano Company and the United States Guano Co. until 1878, and John T. Arundel Co. until 1891. Hutchinson (1950) estimated that about 125,000 tons of guano were removed from the island: the supply is probably now exhausted. A small colony of men was established on Howland Island in 1935 and an airplane landing strip constructed by the United States government. It was to this field that Amelia Earhart expected to fly from New Guinea in 1937, on her attempted world-flight, but she never arrived and indeed was never seen again.

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