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Volume 34

JUNE 10, 1952

No. 1

References to the Tuatara in the Stephen Island Letter Book

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My visit to New Zealand in January and February of 1949, as a member of the Seventh Pacific Science Congress, made it possible for me to make some personal investigation of the status of the tuatara, the lizard-like reptile so remarkably confined to New Zealand and of so much zoological interest. Perhaps to still more purpose, I was able to stimulate and promote renewed observation of the famous reptile on the part of New Zealand students. As any collecting of specimens (either dead or alive) is strictly forbidden by New Zealand law, our observations were directed first to the question of actual population numbers on the several islets visited; second, to determining the temperature of living specimens in relation to their immediate environment; and third, to the obtaining of blood samples to be examined for parasites. A few observations could be made on food habits, on the population structure, and on details of the environment in which the tuataras are found. I suppose that I had first heard of the tuatara in my freshman year in college, in 1907, and the effort to see the famous creature in its native habitat and in life was by way of being a herpetological pilgrimage.

With the friendly aid of Dr. R. A. Falla, Director of the Dominion Museum at Wellington, I made arrangements with Mr. William H. Dawbin, of the Department of Zoology of Victoria University College, to see what we could of the tuatara in a two-day stay on Stephen Island. This island is especially known as the source of the principal collections on which the first adequate studies of the embryology of the tuatara were made. Stephen Island is as familiar to American herpetologists as any corner of far-off New Zealand is likely to be, on account of the visit of the Blanchards in 1927, later described by Mrs. Blanchard (1936).

A second trip to Stephen Island was made by Mr. Dawbin later in the year, under the auspices of the American Museum of Natural History, and he writes me that he has now (1951) made repeated visits under the auspices of the New Zealand Department of Internal Affairs. It is my hope that he will assemble his more technical observations for early publication. His paper (1949) gives an informal and partial summary of our observations.

Mr. Dawbin and I had taken camping gear and food along, having failed to reckon with the well-known hospitality of lighthouse keepers. Mr. G. L. Fox, Principal Keeper of the Stephen Island Lighthouse, and Mrs. Fox made us extremely comfortable, and our brief stay was made the more effective. I am now further indebted to Mr. Fox for the following excerpts from the Stephen Island Letter Book, which contains longhand copies of all official correspondence with the Secretary of the Marine Department in Wellington. We have extracted all references to earlier collectors and to the dramatic extermination of the feral cats, whose hordes once threatened the colony of dove petrels and must have taken a heavy toll of young tuataras. These letters afford a unique glimpse of the vicissitudes of feline and human origin suffered by the Stephen Island tuataras in the past 55 years.

In the papers published by the two German scientists who visited Stephen Island before 1900, I find certain observations that supplement other accounts and that seem to have been neglected by subsequent writers. I am quoting or summarizing some of this information.

The first letter is dated February 8, 1894. The first mention of the tuatara, and of collecting, is not to be found in the letter book, but is referred to in published papers by Arthur Dendy, Professor of Biology at Canterbury University College, at Christchurch, New Zealand, material for whose embryological studies was procured in November, 1896. Professor Dendy (1898) writes: "Thanks to the most generous and freely rendered services of Mr. P. Henaghan, Principal Keeper of the Lighthouse on Stephen's Island in Cook Straits, I have lately obtained a very perfect series of Tuatara embryos, ranging in age from just before the appearance of the blastopore to about the time of hatching." In a second paper (1899), Professor Dendy summarizes the observations of Mr. Henaghan on the life of the tuatara, establishing the fact that the egg-laying season is November (i.e., late spring) and that the eggs are not laid in the petrel burrows ordinarily inhabited by the animal.



A



B

FIG. 1. Stephen Island, off the coast of New Zealand.

A. The Stephen Island Lighthouse; the light is 600 feet above the sea, facing Cook Strait.

B. Ragan Back, from the lighthouse. The upper slopes of the island are covered with grass, and cliffs of steep bare rock surround the island below.

C. Radio beacon masts, used in World War II, on the upper part of Stephen Island. Note the recovery of the vegetation beyond the fence.



C

Photos courtesy of G. L. Fox.

The first mention in the letter book of further collecting of tuatara eggs for embryological studies is the following:

December 31, 1896

On the 31st Professor Schauinsland¹ from Germany arrived in a boat from French Pass and on the Secretary's recommendation every facility will be given him to obtain specimens of Natural Science.

P. HENAGHAN, *Principal Keeper*

In his first papers on the development of the tuatara (1898, 1899), in addition to the more technical embryological material, Professor Schauinsland gives some account of the life-history of the tuatara, dealing with its association with various species of petrels, food, sex ratio, sex differences, egg-laying season, time of development in the egg, and the juvenile color pattern of the hatchling. Professor Schauinsland visited Trios Island (=Middle Trios) and Stephen Island. He published six papers, in all, on the tuatara. His statements on sex ratio and on the distinctions between the sexes are as follows (in free translation):

"The numerical relations between the sexes are very unequal; I estimate that on Stephens Island there are about five males to one female, unless it is to be assumed that the females remain more continuously in the burrows, and are thus more rarely seen and taken than the males. The female is distinguished by its more rounded head, by the frequent nearly complete absence of the dorsal crest, and by its otherwise more delicate proportions. The female is distinctly smaller. Old males on Stephens Island reach a length of $\frac{3}{4}$ meter."

The letters continue:

July 31, 1897

As there are a large number of cats running wild on the island, I think it would be advisable to employ some means to destroy them. If there are any shotguns in the Marine Store and they could be spared for a while, we would be obliged if a couple would be sent and also a supply of ammunition.

P. HENAGHAN

October 31, 1898

Dr. Thilenius² and his assistant were landed. They are collecting specimens of Natural History and studying their habits.

P. HENAGHAN

¹ Professor H. Schauinsland was later Director of the Städtisches Museum für Natur-, Völker-, und Handelskunde in Bremen.

² Dr. G. Thilenius was later Director of the Städtisches Museum für Völkerkunde in Hamburg.

November 30, 1898

Dr. Thilenius and assistant left this station by fishing boat in the morning of the above date.

ROBERT CATHCART, *Principal Keeper*

Dr. Thilenius' first paper (1899) contradicts the Schauinsland belief that there is a great preponderance of males of the tuatara. He writes: "With the beginning of spring the number of tuataras that are visible outside their burrows increases rapidly and conspicuously. Whereas during summer, from about December on, the males and females to be found at the entrances of the burrows, or near-by, are roughly in equal numbers, it is only males that are to be seen at mid-day in spring. A few females appear in early morning or late evening. Observations at this season would accordingly lead to the conclusion that there is a great preponderance of males. According to my observations on Karewa in December and January, and on Stephen's Island after October, the numbers of individuals of each sex are approximately equal, and there may even be a slight excess of females." After describing the physical aspect of Stephen Island, he describes the vegetation as follows: "A thick growth of vegetation with a height of about ten feet covers the island to the upper rims of the sea-cliffs. This includes Nikau palms, a creeping *Pandanus*, and various species of *Coprosma*, which last make up the greater part of the 'Bush.' Under the more open *Coprosma* growth there is a little grass and fern, and at the edge of the bare cliffs there is a narrow and often interrupted band of bunch grass. Under the bush, but especially in the ravines filled with soft earth and shaded by the low *Coprosma* trees lie the innumerable burrows and sleeping places of the petrels, whereas the gulls prefer the border of the cliff. Tuataras are found everywhere, though the majority are in or near the ravines."

The interest of this description lies in the radical contrast of the present-day vegetation of the island, in which the *Coprosma* thicket has all but disappeared, evidently as a result of grazing by sheep. Thilenius describes the egg-laying sites, the method of digging the nest cavity, the arrangement of the eggs, their measurements, their fertility, and the relations of the adults with the petrels.

As will be seen, the subject of tuatara eggs for Dr. Thilenius has a long sequel.

August 1, 1899

I beg to inform you that we have found a lot of dead lizards lately, partly eaten by the cats, which seem to have taken to the lizards when the birds are

scarce. I have shot over a hundred cats since I arrived here and they seem as plentiful as ever.

ROBERT CATHCART

December 1, 1899

I beg to inform you that on the 10th of March last I received your memorandum No. 485, granting permission to the Keepers at this station to procure 50 tuatara lizard eggs for Dr. Thilenius, which we accordingly did, the keepers agreeing to share the £15 which Dr. Thilenius had agreed to give us for procuring the eggs for him.

ROBERT CATHCART

This sum was paid over to one of the junior keepers, who refused to send the shares belonging to the two other keepers; he was finally forced to pay them in full, with lawyer's fees, the correspondence regarding the matter extending to August 13th, 1900.

February 1, 1900

In accordance with the permit granted by Acting Colonial Secretary, and also with the permission of this Department, I have forwarded to Mr. Thomas Edward Dunne six (6) Tuatara lizards, and twelve (12) Tuatara lizards eggs. . .

ROBERT CATHCART

April 30, 1901

On the 29th the S. S. *Hinemoa* arrived at the landing with His Excellency the Governor aboard. His Excellency sent for me and asked me if it was possible to collect a large number of tuatara lizards and also twelve (12) tuatara eggs. I informed His Excellency that we would have no trouble to collect the eggs and as for the lizards I thought that we would have some difficulty at this time of year to find the right holes, as at this time of the year the lizards were hibernating, and would continue so for the next three months (I may say that I have since found a way to find the lizards' holes without unnecessary digging).

His Excellency informed me that when he reached Wellington, he would see the Hon. Hull Jones and that full instructions would be sent me by next mail, but that I was to start collecting the lizards as soon as possible. We started next day and collected fifteen (15) large lizards and I now expect to be able to find all that will be required.

ROBERT CATHCART

The following information was supplied by Mr. G. L. Fox, Principal Keeper, in the form of notes rather than direct quotations.

May 4th, 1901

Robert Cathcart reports collecting fifty (50) lizards, some very good specimens measuring 13 to 22 inches.

May 14th, 1901

Mr. Cathcart reports having 110 lizards ready to send to Wellington. He was requested by the Governor General to collect a total of 200, but replied that he considered that such a number would be hard to secure at that time of year.

June 3, 1901

Twelve (12) lizards were sent away to Wellington and the rest liberated.

April 2, 1903

Principal Keeper Partington reports that wild cats still flock around the cottages in search of water. A good few were shot during the month.

March 20, 1904

Mr. Partington reports having placed two lizards in a box for three days with some small pieces of meat having a few drops of "Canthardin" on it but the lizards did not touch it, so he put a few drops of the solution on a piece of waste and forced it into the mouth of one of the lizards. Death resulted in half an hour. He suggests waiting before using the solution for killing cats.

May, 1904

Mr. Scope accepted an offer from the Department to destroy cats at 11 d per head.

November 1st, 1904

Received a memo and warrant for four lizards for the Zoological Society, Melbourne, Australia. These were sent on November 23, also 2 lizards for Mr. Lambert of Wellington.

February 1, 1905

Received warrant for 2 lizards for Mr. W. Waller, Wellington. These were forwarded February 28th.

August, 1905

Received warrant for 3 lizards for Mr. S. Lambert, Wellington, forwarded October, 1905.

December, 1905

Received warrant for one lizard for Mr. Vangioni.

January, 1906

Received warrant for 16 lizards for the Tourist Dept.; forwarded the 19th of January, 1906. Mr. Greig, Principal Keeper, received a memo asking for a number of lizards which he considers is too many. He suggests forwarding half the number requested [unfortunately the figures are not mentioned].

February, 1907

Mr. Greig reports no increase in lizard population. He states that very few cats are now left.

September 4th, 1908

Forwarded 4 lizards required for the Dunedin Museum.

There is no further mention of the "lizards" after this date, and it appears that the tuatara was left essentially alone. A permit was given to Dr. Frank N. Blanchard to collect a single specimen in 1927.

In May, 1921, an order was issued prohibiting the taking or killing of *Liopelma hamiltoni*, the frog known only from Stephen Island.

In December, 1922, an order was issued prohibiting the keeping of cats on the island. It seems certain that the feral cats had been exterminated some time before. When the bounty was set at a shilling per tail, two of the three keepers took over the lighthouse watches and detailed the third to devote himself to the slaughter of the cats. Their complete eradication was favored, of course, by the limited area involved and the determined efforts made by the lighthouse personnel. At any rate there were no cats present in 1949.

Mr. Fox writes that there were no fences around the bush reserve up to 1926, and that stock had free access to all the island. At present (June 6, 1949) the bush has started to grow up again and the Internal Affairs Department, perhaps on the recommendation of Mr. Dawbin and myself, has decided to fence the top half of the island so as to preserve the bush. Mr. Fox thinks that this will not make any difference to the lizards, as "they do not inhabit the bush, but are in the main found around the dwellings" [of the lighthouse personnel]. This does not agree with the observation of Mr. Dawbin and myself of several specimens on the highest part of the island, inhabiting holes of their own (instead of petrel burrows). Mr. Fox states, finally, that since his arrival in June, 1947, the tuataras have more than held their own, and believes that if the place is not overstocked and they are left alone that they should perhaps show a slight increase. He estimates the total population as about 150. Both Mr. Dawbin and I believe the number to be much larger.

The numbers of specimens taken by or for Dendy, Schauinsland, and Thilenius are not known. After 1899 the numbers removed from the island or otherwise recorded were as follows:

<i>Captors</i>	<i>Adults</i>	<i>Eggs</i>
Thilenius (eggs only), 1899	50
Dunne, 1900.....	6	12
Governor General, 1901 (110 collected, 98 liberated).....	12	12
Experiment, 1904.....	2	..
Melbourne Zoological Society, 1904.....	4	..
Waller, 1905.....	2	..
Lambert, 1904, 1905.....	5	..
Vangioni, 1905.....	1	..
Tourist Department, 1906.....	16	..
Dunedin Museum, 1908.....	4	..
Blanchard, 1927.....	1	..

Thus 53 adults and 74 eggs are recorded as having been taken from the island. I believe that a "good few" more (to use the island phrase) must have been taken to Wellington and Auckland without record.

In 1901, 110 tuataras were collected by the lighthouse keepers within two weeks; when it is remembered that at this time a continuous blanket of *Coprosma* bush covered the island, I believe it may be assumed that these came from the vicinity of the lighthouse and of the paths to the tramway and gardens. In the light of Professor Thilenius' observations on the distribution of the animal over the island, I believe that this indicates a population of many hundreds in 1901.

A small transplanted colony of five tuataras exists at French Pass. Mr. Jacobson, our host at the French Pass guest house, and an excellent naturalist, reports that these have long been there and that they have shown neither increase nor decrease. Mr. Jacobson also reports that several specimens of the Stephen Island frog were taken by American sailors on leave during World War II, but at his insistence returned to their proper habitat. We found no trace of the frog on our 1949 visit.

It appears from recent experience on offshore islands in New Zealand, as reported, for example, for the Three Kings, that regeneration of the original woody vegetation takes place to a surprising and most satisfactory degree when grazing of goats and sheep is entirely eliminated. Every effort to protect the *vegetation* on the islands known to be inhabited by tuataras should be made; in the long run the conservation of their habitats is the only effective way to preserve the species of animals.

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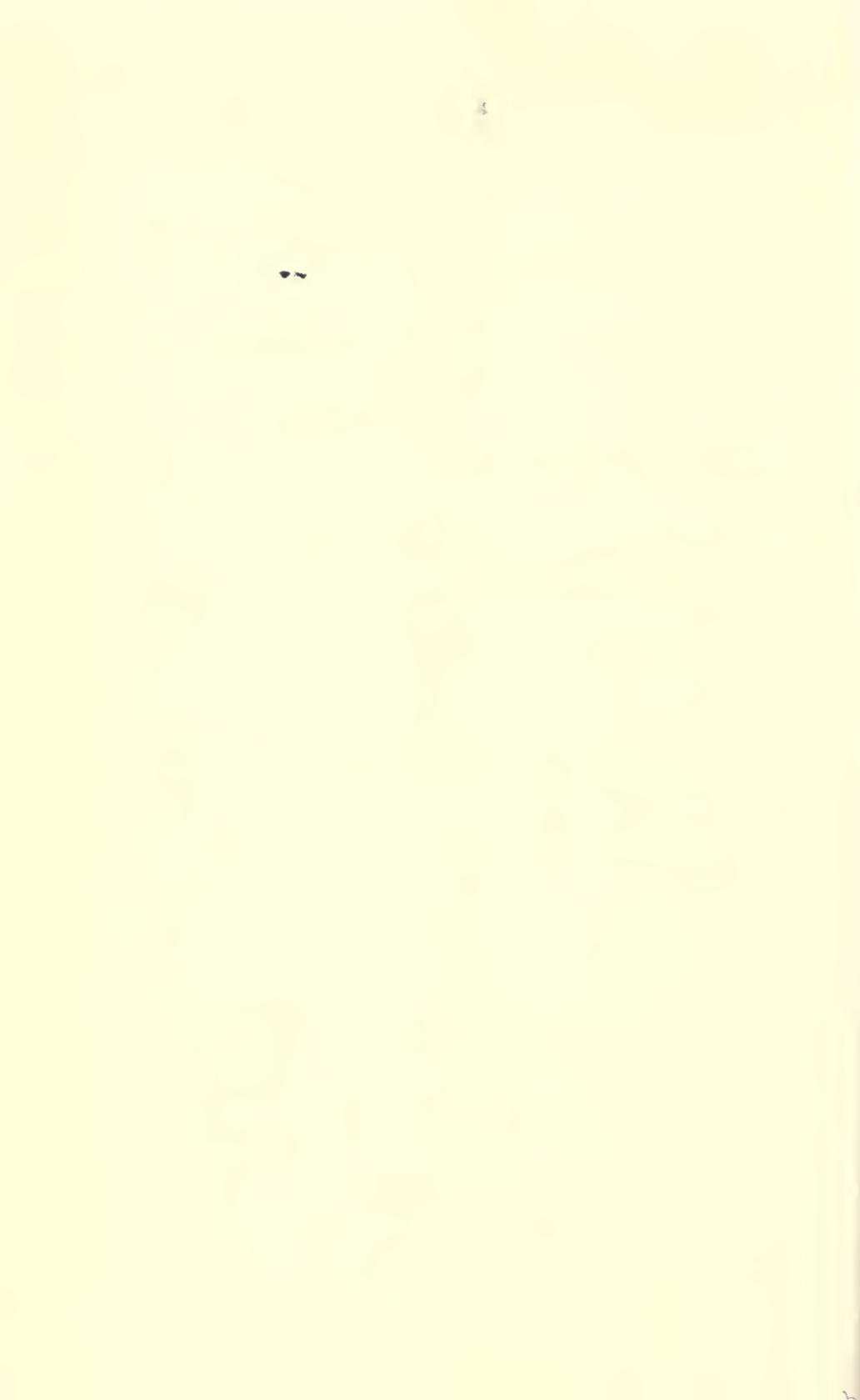
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