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Expedition of the California Academy of Sciences to the Galapagos Islands, 1905-1906

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The Gigantic Land Tortoises of the Galapagos Archipelago

BY

JOHN VAN DENBURGH

Curator of the Department of Herpetology

SAN FRANCISCO

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INTRODUCTION.

The gigantic land tortoises do not differ essentially, in any other respect than in size, from the numerous small species of the genus *Testudo* which exist in Europe, Asia, Africa, and the Western Hemisphere. They are typical chelonians, modified, as are the other members of the genus, for a purely terrestrial life, but differing from the ordinary type in their gigantic proportions. Even in size, however, there is no very sharp line of division between the smallest adults of some "gigantic" races and the largest individuals of certain species that are not so designated.

The geological history of the gigantic tortoises is still but fragmentary. We know that in the Tertiary period they were far more widely distributed than during historic times. Their remains appear as early as the Eocene, but become more numerous in Miocene and Pliocene formations. They have been found in Nebraska and Wyoming, in France, Germany, Malta, on the Lebanon, in the Sivalik Hills in India, and perhaps also in Brazil. It thus appears that these huge tortoises were formerly widely distributed over the earth; but it yet remains to be shown whether these giant races are closely related one to another, or have been independently developed from smaller species in situations where climate and food and the absence of enemies were most favorable to their growth.

In recent and historic times gigantic land tortoises have existed only in certain isolated groups of islands in the Indian and Pacific oceans, where the early explorers found them in almost incredible numbers. The rapidity with which they have disappeared from these islands upon the advent of man, and even upon the advent of the smaller predatory mammals, sufficiently explains their earlier extinction upon all the continents where they formerly occurred.

Although this paper will be immediately concerned only with the tortoises native to the Galapagos Archipelago, in the eastern Pacific, it will be well to review the history and distribution of the tortoises of the islands of the Indian Ocean. I therefore quote a few paragraphs from Dr. Günther's excellent presidential address to the Linnean Society (1898).

"The historical evidence of their existence in Madagascar is extremely scanty and vague. They had been cleared off from the inhabited parts of the island at the time when the first Europeans landed. If any of them had existed near the districts occupied by the French settlers of the seventeenth century, they would have been mentioned in some of the reports on the natural productions of the country which these people sent home. But their osseous remains, some in very perfect condition and of comparatively recent appearance, show that these animals were at one time widely spread over the island; they are often found associated with bones of *Æpyornithes, Hippopotamus,* cattle, and belong to two or three species. Their extermination probably began with the arrival of man in Madagascar; and it is highly improbable, though by no means impossible, that some individuals have survived and still linger in the vast tracts of country which are still unexplored.

"Very different were the conditions of life in the islands which are scattered over the ocean in a semi-circle round the north of Madagascar. With the exception of the Comoro group, none of these islands were inhabited by man or large mammals. Consequently the tortoises lived there in absolute security for ages, and multiplied to a degree which excited the admiration of all the early European visitors. They occupied in incredible numbers not only the larger islands of the Aldabra group, the Seychelles, Reunion, Mauritius, Rodriguez, but also the small ones with an area of a few square miles only, and with their highest points raised scarcely 100 feet above the level of the water, provided that the coral soil produced a sufficient amount of vegetation to supply them with food and shelter from the sun. Of this we have not only the testimony of trustworthy voyagers of the last two centuries, but the direct evidence of remains which accident now and then brings to the surface. A short time ago I received from my friend, Dr. Bruce, a resident at Mahe, to whom many a naturalist is indebted for assistance and hospitality, the well-preserved egg-shells of a gigantic land tortoise, imbedded in a conglomerated mass of coral-sand. They came from a small island of the Amirante group, on which Dr. Bruce formed a plantation of Cocoanut-palms, and on which no tortoise had ever been known to live. In order to secure the moisture requisite for germination and the growth of the seedling, it was necessary to plant the nuts in pits dug through loose sand to a depth of about three feet, and then through a crust of solidified coral-sand of one foot thickness. It was below this crust that the eggs were found, showing that probably centuries had elapsed since the eggs were deposited, and indicating at the same time that we shall have to go below the surface, if we want to become acquainted with the extinct autochthont races of these islands.

"The sad history of the extermination of the Mascarene tortoises is so well known that I may dispense with a repetition of its details. I will only allude to some facts with which I have become recently acquainted. The tortoises, as you know, have proved excellent and more wholesome food than the turtles. Therefore every passing ship stowed away for her long voyage as many as she could carry. With the increase of the population of the settlements, augmented by military and naval forces, the indigenous supply was rapidly exhausted; it was then supplemented by importation from other islands; and we can form an idea of the extent to which this inter-insular transport was carried from official reports to the French Indian Company. In 1759 four small vessels were especially appointed for the service of bringing tortoises from Rodriguez to Mauritius; one vessel carried a cargo of 6000; and altogether more than 30,000 were imported into Mauritius within the space of eighteen months.

"The result of this prodigality was that, at the beginning of our century, the tortoises had been pretty well swept off the whole of the islands in the Indian Ocean, so that at the present time only one spot remains where they have survived in a wild state, viz., the south island of the Aldabran atoll. Although only 18 miles long and about one mile wide, it offers by its rugged, deeply fissured surface, which is overgrown with impenetrable bush, a safe retreat to the small number of the survivors. Aldabra has never been inhabited, and only within recent years a station has been established on it for a few men who are engaged in industrial pursuits for the lessee, who rents the island from the Mauritian Government."

Turning now to the islands of the Pacific Ocean we find evidence of the natural existence of land tortoises only in the Galapagos Archipelago.

The Galapagos Islands form a fairly compact group lying under the equator, some five or six hundred miles west of the coast of Ecuador. There are some twenty-four named islands, and numerous islets and rocks. The principal islands are Albemarle, Indefatigable, Narborough, James, Chatham, Charles, Hood, Bindloe, Abingdon, Barrington, Duncan, Tower and Jervis. All are volcanic. There are said to be at least two thousand craters, some of which, on the larger islands, are of immense size, rising to a height of from three to four thousand feet. A terrific eruption occurred on Narborough in 1825, but no great volcanic activity has been reported in any of the craters since 1835.

"Considering that these islands are placed directly under the equator, the climate is far from being excessively hot; this seems chiefly caused by the singularly low temperature of the surrounding water brought here by the great southern polar current. Excepting during one short season, very little rain falls, and even then it is irregular; but the clouds generally hang low. Hence, while the lower parts of the islands are very sterile, the upper parts, at a height of a thousand feet and upward, possess a damp climate and a tolerably luxuriant vegetation. This is especially the case on the windward sides of the islands, which first receive and condense the moisture from the atmosphere."

There is some uncertainty as to who first discovered the Galapagos Islands. Some historians think it possible that they may have been visited by the Inca, Tupac Yupangi, grandfather of the Inca, Atahualpa, whom Pizarro put to death. But however this may have been, there were no signs of human habitation when the islands were discovered by Europeans in the sixteenth century. The credit for this discovery, which is said to have occurred on the 10th of March, 1535, has been given to the Spaniard, Fray Tomas de Berlanga. The early Spanish visitors found these islands occupied by tortoises in such numbers that they applied to the group the Spanish term for these creatures,—Galapagos.

During the latter part of the seventeenth, the eighteenth, and the earlier part of the nineteenth centuries, the Galapagos Islands were visited at more or less frequent intervals by buccaneers, whalers, adventurers, war-vessels, and others, in search, often, of water and a supply of tortoises for food. To these visits are due the earlier accounts of the tortoises of these islands, as well as the specimens which, finding their way into museums, have served as a basis for the original descriptions of many species. It is difficult for us in these days of rapid travel, when vessels are supplied with an endless variety of canned foods, to appreciate the interest which the early navigators, on their long, slow voyages, had in these animals, which were easy of capture, could be stowed in numbers in the hold of a vessel, kept for months without food, and were used as needed to furnish an abundance of fresh meat. When we are told that single vessels took on board at one time three or four hundred tortoises, we cannot wonder that the number remaining on the islands was rapidly reduced.

It was especially toward the end of the seventeenth century that the Galapagos Islands were visted by buccaneers. Their accounts have been quoted by Baur and Günther. Cowley, Wafer, and Dampier have given accounts of these visits, and Cowley published a map of the islands. The first visit, by Cowley, Cooke, Dampier, and Edward Davis, was in 1684. Davis, Wafer, Knight and Harris were there again the next year, and in 1687 Davis and Wafer made a third visit.

It is to Dampier that we owe the first account of the land tortoises. He visited the Galapagos Islands several times, and in his *New Voyage Round the World,* published in 1697, tells us:

"The land-turtles are so numerous that five or six hundred men might subsist on them alone for several months, without any other sort of provision. They are extraordinary large and fat, and so sweet that no pullet eats more pleasantly. One of the largest of these creatures will weigh 150 or 200 weight, and some of them are two foot, or two foot six inches, over the callapee or belly."

In a later edition of his *Voyages* Dampier states:

"The oil saved from them was kept in jars, and used instead of butter to eat with dough-boys or dumplings. We lay here feeding sometimes on land-turtle, sometimes on sea-turtle, there being plenty of either sort; but the land-turtle, as they exceed in sweetness, so do they in numbers; it is incredible to report how numerous they are."

The French Captain, de Beauchesne, visited these islands in June, 1700, but his account is said to add nothing to the history of the land tortoises.

The best of the earlier accounts of the tortoises is that of Woodes Rogers, who was in the Galapagos Archipelago in September, 1707. I quote as follows:

"Some of the largest of the land-turtles are about 100 pounds weight, and those of the sea upwards of 400. The land-turtles laid eggs on our deck. Our men brought some from the shore about the bigness of a goose egg, white, with a large big shell, exactly round. The creatures are the ugliest in Nature, the shell not unlike the top of an old hackney-coach, as black as jet; and so is the outside skin, but shriveled and very rough. The legs and necks are very long, and about the bigness of a man's wrist; and they have club-feet, as big as one's fist, shaped much like those of an elephant, with five thick nails on the fore-foot and but four behind, and the head little, and visage small like snakes, and look very old and bleak. When at first surprised they shrink their neck, head, and legs under their shell. Two of our men, with Lieutenant Stratton and the trumpeter of the Duchess, affirm they saw vast large ones of this sort, about four feet high. They mounted two men on the back of one of them, which, with its usual slow pace, carried them and never regarded the weight. They supposed this could not weigh less than 700 pounds. I do not affect giving relations of strange creatures so frequently done by others; but when an uncommon creature falls in my way, I cannot omit it. The Spaniards tell us, they know of none elsewhere in these seas, but they are common in Brazil."

Different islands were visited by Rogers. He continues:

"I saw no sort of beast, but there are guanos [iguanas] in abundance, and land-turtles almost on every island. It is strange how the latter got here, because they cannot come of themselves, and none of that sort are found on the main."

In 1720, Clipperton was for ten days in these islands. Vancouver, who determined the position of some in 1795, did not go to land.

Captain James Colnett, whose *Voyage to the South Atlantic* was published in 1798, surveyed the Galapagos Archipelago in 1793. He was the first to mention the presence of tortoises on Abingdon Island.

Amasa Delano first visited the Galapagos Islands in 1800 but returned there later. He reports tortoises still abundant on Hood, Charles, James, and Albemarle islands. In his *Narrative of Voyages and Travels,* published in Boston in 1817, with a second edition in 1818, he says:

"The terrapin, or, as it is sometimes called, the land tortoise, that is found here, is by far the largest, best, and most numerous of any place I have ever visited. Some of the largest weigh three or four hundred pounds, but their common size is between fifty and one hundred pounds. They have a very long neck, which, together with their head, has a very disagreeable appearance, very much resembling a large serpent. I have seen them with necks between two and three feet long, and when they saw anything that was new to them, or met each other, they would raise their heads as high as they could, their necks being nearly vertical, and advance with their mouths wide open, appearing to be the most spiteful of any reptile whatever; sometimes two of them would come up to each other in that manner, so near as almost to touch, and stand in that position for two or three minutes, appearing so angry that their mouths, heads, and necks appeared to quiver with passion; when by the least touch of a stick against their necks or heads, they would sink back in an instant, and draw their necks, heads, and legs into their shells. This is the only quick motion I ever saw them perform. I was put in the same kind of fear that is felt at the sight or near approach of a snake at the first one I saw, which was very large. I was alone at the time, and he stretched himself as high as he could, opened his mouth, and advanced toward me. His body was raised more than a foot from the ground, his head turned forward in the manner of a snake in the act of biting, and raised two feet and a half above his body. I had a musket in my hand at the time, and when he advanced near enough to reach him with it, I held the muzzle out so that he hit his neck against it, at the touch of which he dropped himself upon the ground and instantly secured all his limbs within his shell. They are perfectly harmless, as much so as any animal I know of, notwithstanding their threatening appearance. They have no teeth, and of course cannot bite very hard. They take their food into their mouths by the assistance of the sharp edge of the upper and under jaw, which shut together one a little within the other, so as to nip grass, or any flowers, berries, or shrubbery, the only food they eat.

"Those who have seen the elephant have seen the exact resemblance of the leg and foot of a terrapin. I have thought that I could discover some faint resemblance to that animal in sagacity. They are very prudent in taking care of themselves and their eggs, and in their manner of securing them in their nests; and I have observed on board my own ship, as well as on others, that they can easily be taught to go to any place on the deck which may be fixed for them to be constantly kept in. The method to effect this is by whipping them with a small line when they are out of place, and to take them up and carry them to the place arranged for them, which being repeated a few times will bring them into the practice of going themselves, by being whipped when they are out of their place. They can be taught to eat on board a ship as well as a sheep or a goat, and will live for a long time if there is proper food provided for them. This I always took care to do when in a place where I could procure it. The most suitable to take on board a ship is prickly pear-trees, the trunk of which is a soft, pithy substance, of a sweetish taste, and full of juice. Sometimes I procured grass for them. Either of these being strewed on the quarter-deck, the pear-tree being cut fine, would immediately entice them to come from all parts of the deck to it; and they would eat in their way as well as any domestic animal. I have known them to live several months without food; but they always in that case grow lighter and their fat diminishes, as common sense teaches, notwithstanding some writers have asserted the contrary. If food will fatten animals, to go without it will make them lean.

"I carried at one time from James Island three hundred very good terrapins to the island of Massa Fuero, and there landed more than one-half of them, after having them sixty days on board my ship. Half of the number landed died as soon as they took food. This was owing to the stomachs having got so weak and out of tone that they could not digest it. As soon as they eat any grass after landing they would froth at the mouth, and appeared to be in a state of insanity, and died in the course of a day or two. This satisfied me that they were in some degree like other animals, and only differed from them by being slower in their motions, and that it takes a longer time to produce an effect upon their system than upon that of other creatures. Those that survived the shock which was occasioned by this sudden transition from total abstinence to that of abundance, soon became tranquil, and appeared to be as healthy and as contented with the climate as when they were at their native place, and they would probably have lived as long had they not been killed for food. Their flesh, without exception, is of a sweet and pleasant flavor as any that I ever ate. It was common to take out of one of them ten or twelve pounds of fat when they were opened, besides what was necessary to cook them with. This was as yellow as our best butter, and of a sweeter flavor than hog's lard. They are the slowest in their motions of any animal I ever saw except the sloth. They are remarkable for their strength; one of them would bear a man's weight on his back and walk with him. I have seen them at one or two other places only. One instance was those brought from Madagascar to the Isle of France, but they were far inferior in size, had longer legs, and were much more ugly in looks than those of the Galapagos Islands. I think I have likewise seen them at some of the Oriental Islands which I visited.

"I have been more particular in describing the terrapin than I otherwise should have been, had it not been for the many vague accounts given of it by some writers, and the incorrect statements made of the country in which it is to be found. The frequent political comparisons and allusions which have been made by our public papers and orators to this animal, may have led the people of this country into incorrect notions concerning them. It has been publicly said that terrapins are common to China, which I am confident is incorrect; for I have carried them to Canton at two different times, and every Chinese who came on board my ship was particularly curious in inspecting and asking questions about them, and not one, I am positive, had any knowledge of the animal before."

During the War of 1812, Captain, afterward Admiral, Porter of the United States navy, spent some time in the Galapagos Archipelago. He has given, in his *Journal of a Cruise Made to the Pacific Coast,* the most complete of the earlier accounts of these tortoises. It was he who first called attention to differences existing between the tortoises of the different islands. Tortoises were found in greater or less abundance in all the larger islands of the group which he visited, viz.: Hood, Marlborough, James, Charles, and Indefatigable (Porter's) islands. On Chatham Island, where he made a short stay, a few of their shells and bones were seen, but they appeared to have been long dead; and on Albemarle Island, the largest of the group, none was observed by him, evidently because he landed here only a few hours on the southwestern point. Abingdon, Bindloe, Downe, and Barrington islands were not visited by him. Some of the tortoises captured weighed from 300 to 400 pounds. On Indefatigable Island land tortoises were in the greatest abundance, of an enormous size, one of which measured five feet and a half long, four feet and a half wide, and three feet thick, and others were found by some of the seamen of larger size. On Hood Island he obtained tortoises in great numbers. On another visit he could not procure more than fifty tortoises, and they were small, but "of a quality far superior to those found on James Island." In regard to Charles Island he says:

"It abounds with tortoises, which frequent the springs for the sake of the water, and upwards of thirty of them were turned on their backs by us, as they came down to drink, during the short time we remained there, which was not more than an hour and a half. But we were enabled to bring down only one, and he was selected more for his antiquated appearance than for his size or supposed excellence. His weight was exactly one hundred and ninety-seven pounds, but he was far from being considered a large size. Later, between four and five hundred were taken on board. They were brought the distance of from three to four miles, through thorns and over sharp rocks, yet it was no uncommon thing for them to make three and four trips a day, each with tortoises weighing from fifty to a hundred weight.

"Although the parties in this employment (which were selected every day, to give all an opportunity of going on shore), indulged themselves in the most ample manner on tortoise meat (which for them was called Galapagos mutton), yet their relish for this food did not seem in the least abated, nor their exertions to get them on board in the least relaxed, for everyone appeared desirous of securing as large a stock of this provision as possible for the cruise."

Two vessels captured by Porter—"had been in at James Island, and had supplied themselves abundantly with these extraordinary animals, the tortoises of the Galapagos, which properly deserve the name of the elephant tortoise. Many of them were of a size to weigh upwards of three hundred weight. Numbers of them had been thrown overboard by the crews of the vessels before their capture, to clear them for action. A few days afterwards, at daylight in the morning, we were so fortunate as to find ourselves surrounded by about fifty of them, which were picked up and brought on board, as they had been lying in the same place where they had been thrown over, incapable of any exertion in that element, except that of stretching out their long necks."

Two other English vessels captured later, had been only a few days from James Island. Porter—"found on board them eight hundred tortoises of a very large size, and sufficient to furnish all the ships with fresh provisions for one month."

At another time Porter laid in a very large stock of tortoises from James Island.

"Four boats were dispatched every morning for this purpose, and returned at night, bringing with them twenty to thirty each, averaging sixty pounds. In four days we had as many on board as would weigh about fourteen tons, which was as much as we could conveniently stow. They were piled up on the quarter-deck for a few days, with an awning spread over to shield them from the sun, which renders them very restless, in order that they might have time to discharge the contents of their stomachs; after which they were stowed away below, as you would stow any other provisions, and used as occasion required. No description of stock is so convenient for ships to take to sea as the tortoises of these islands. They require no provisions or water for a year, nor is any farther attention to them necessary, than that their shells should be preserved unbroken. * * * The most of those we took on board were found near a bay on the northeast part of the Island, about eighteen miles from the ship. Among the whole only three were male, which may be easily known by their great size, and from the length of their tails, which are much longer than those of the females. As the females were found in low sandy bottoms, and all without exception were full of eggs, of which generally from ten to fourteen were hard, it is presumable that they came down from the mountains for the express purpose of laying. This opinion seems strengthened by the circumstance of there being no male tortoises among them, the few we found having been taken a considerable distance up the mountains. One remarkable peculiarity in this animal is, that the blood is cold. I shall leave it to those better acquainted with natural history to investigate the cause of a circumstance so extraordinary, my business is to state facts, not to reason from them.

"Nothing, perhaps, can be more disagreeable or clumsy than they are in their external appearance. Their motion resembles strongly that of the elephant; their steps slow, regular and heavy, they carry their body about a foot from the ground, and their legs and feet bears no slight resemblance to the animal to which I have likened them; their neck is from eighteen inches to two feet in length, and very slender; their head is proportioned to it, and strongly resembles that of a serpent. But, hideous and disgusting as is their appearance, no animal can possibly afford a more wholesome, luscious and delicate food than they do; the finest green-turtle is no more to compare to them in point of excellence than the coarsest beef is to the finest veal; and after once tasting the Galapagos tortoises, every other animal food fell greatly in our estimation. These animals are so fat as to require neither butter nor lard to cook them, and their fat does not possess that cloying quality, common to that of most other animals. When fried out, it furnishes an oil superior in taste to that of the olive. The meat of this animal is the easiest of digestion, and a quantity of it exceeding that of any other food, can be eaten without experiencing the slightest inconvenience. But what seems the most extraordinary in this animal, is the length of time that it can exist without food; for I have been well assured that they have been piled away among the casks in the hold of a ship, where they have been kept eighteen months, and when killed at the expiration of that time, were found to have suffered no diminution in fatness or excellence. They carry with them a constant supply of water, in a bag at the root of the neck, which contains about two gallons, and on testing that found in those we killed on board, it proved perfectly fresh and sweet. They are very restless when exposed to the light and heat of the sun, but will lie in the dark from one year's end to the other without moving. In the daytime, they appear remarkably quick-sighted and timid, drawing their head into their shell on the slightest motion of any object; but they are entirely destitute of hearing, as the loudest noise, even the firing of a gun, does not seem to alarm them in the slightest degree, and at night or in the dark they appear perfectly blind. * * * The shells of those of James Island are sometimes remarkably thin and easily broken, but more particularly so as they become advanced in age; when, whether owing to the injuries they receive from their repeated falls in ascending and descending the mountain, or from injuries received otherwise, or from the course of nature, their shells become very rough, and peel off in large scales, which renders them very thin and easily broken. Those of James Island appear to be a species entirely distinct from those of Hood and Charles islands. The form of the shell of the latter is elongated, turning up forward in the manner of a Spanish saddle, of a brown color and of considerable thickness. They are very disagreeable to the sight, but far superior to those of James Island in point of fatness, and their livers are considered the greatest delicacy. Those of James Island are round, plump, and black as ebony, some of them handsome to the eye, but their liver is black, hard when cooked, and the flesh altogether not so highly esteemed as the others. * * * [The tortoises of Hood's Island] were of a quality far superior to those found on James Island. They were similar in appearance to those of Charles Island, very fat and delicious."

Porter proceeded, after his cruise round the Galapagos, to the Marquesas Islands, making a prolonged stay at Madison [Rotumah] Island, where he "distributed from his stock several young tortoises among the chiefs, and permitted a great many to escape into the bushes and among the grass."

Captain Basil Hall found tortoises plentiful on Abingdon Island in January, 1822.

Captain Benjamin Morrell, in 1823 and again in 1825, hunted fur-seals in the Galapagos Archipelago, taking some five thousand skins in about two months. He states that tortoises "grow to even a greater size than that mentioned by Commodore Porter, as I have seen some that would weigh from six to eight hundred pounds. They are excellent food, and have no doubt saved the lives of thousands of seamen employed in the whale-fishing in those seas, both American and Englishmen. I have known whale-ships to take from six to nine hundred of the smallest size of these tortoises on board when about leaving the islands for their cruising grounds; thus providing themselves with provisions for six or eight months, and securing the men against the scurvy. I have had these animals on board my own vessels from five to six months without their once taking food or water; and on killing them I have found more than a quart of sweet fresh water in the receptacle which nature has furnished them for that purpose, while their flesh was in as good condition as when I first took them on board. They have been known to live on board of some of our whale-ships for fourteen months under similar circumstances, without any apparent diminuation of health or weight."

In February, 1825, Morrell observed a terrible eruption on Narborough Island. One hundred and eighty-seven tortoises were taken on Indefatigable between October 27 and November 10, 1825.

During all this time the Galapagos Islands remained without permanent inhabitants, with the exception of an Irishman, Patrick Watkins, who lived on Charles Island in 1809. It was in 1832 that the first colony was established. This was due to the exertions of J. Vilamil, who, although a native of Louisiana, had long been resident in Guayaquil, Ecuador. Political difficulties delayed his enterprise some twenty years, but finally, in 1831, the Government of Ecuador granted him a charter conceding possession of the islands and authorizing the establishment of a colony.

In January of the following year Colonel Hernandez, with twelve colonists, was sent to take possession of Charles Island, and settlers of both sexes followed in April and June. In October, 1832, Vilamil himself, with eighty colonists, arrived and "at once assumed his station as proprietor and governor of the island." The colony grew until it numbered several hundred persons, many of whom, it is said, had been banished from the mainland. These people and the domestic animals introduced, many of which multiplied and roamed at large, reduced the number of tortoises upon Charles Island so rapidly and to such an extent that within three years the people were obliged to send hunting parties to other islands to procure a supply for food. This colony later was removed to Chatham Island, where there still is a considerable settlement.

In 1833, Commodore John Downes visited Charles Island in the U. S. Frigate "Potomac." He obtained tortoises there, and carried some to Boston.

In the year 1835 the Galapagos Islands, for the first time in their history, were visited by a naturalist. In that year, Charles Darwin, during the voyage of the "Beagle," spent the weeks from September 15 to October 20 in this archipelago. In his classical *Journal* he has given by far the best account of the habits of the tortoises that has been written.

"The 'Beagle' sailed around Chatham Island, and anchored in several bays. One night I slept on shore on a part of the island, where black truncated cones were extraordinarily numerous: from one small eminence I counted sixty of them, all surmounted by craters more or less perfect. The greater number consisted merely of a ring of red scoriæ or slags, cemented together: and their height above the plain of lava was not more than from fifty to a hundred feet: none had been very lately active. The entire surface of this part of the island seems to have been permeated, like a sieve, by the subterranean vapors: here and there the lava, while soft, has been blown into great bubbles; and in other parts, the tops of caverns similarly formed have fallen in, leaving circular pits with steep sides. From the regular form of the many craters, they gave to the country an artificial appearance, which vividly reminded me of those parts of Staffordshire where the great iron foundries are most numerous. The day was glowing hot, and the scrambling over the rough surface and through the intricate thickets was very fatiguing; but I was well repaid by the strange Cyclopean scene. As I was walking alone I met two large tortoises, each of which must have weighed at least two hundred pounds: one was eating a piece of cactus, and as I approached, it stared at me and slowly stalked away; the other gave a deep hiss, and drew in its head. These huge reptiles, surrounded by the black lava, the leafless shrubs, and large cacti, seemed to my fancy like some antediluvian animals. The few dull colored birds cared no more for me than they did for the great tortoises.

"The 'Beagle' proceeded to Charles Island. This archipelago has long been frequented, first by the buccaneers, and latterly by whalers, but it is only within the last six years that a small colony has been established here. The inhabitants are between two and three hundred in number: they are nearly all people of color, who have been banished for political crimes from the Republic of the Equator, of which Quito is the capital. The settlement is placed about four and a half miles inland, and at a height probably of a thousand feet. In the first part of the road we passed through leafless thickets, as in Chatham Island. Higher up, the woods gradually became greener; and as soon as we crossed the ridge of the island we were cooled by a fine southerly breeze, and our sight refreshed by a green and thriving vegetation. In this upper region coarse grasses and ferns abound; but there are no tree-ferns: I saw nowhere any member of the Palm family, which is the more singular as, 360 miles northward, Cocos Island takes its name from the number of cocoanuts. The houses are irregularly scattered over a flat space of ground, which is cultivated with sweet potatoes and bananas. It will not easily be imagined how pleasant the sight of black mud was to us, after having been so long accustomed to the parched soil of Peru and northern Chile. The inhabitants, although complaining of poverty, obtain, without much trouble, the means of subsistance. In the woods there are many wild pigs and goats; but the staple article of animal food is supplied by the tortoises. Their numbers have of course been greatly reduced in this island, but the people yet count on two days' hunting giving them food for the rest of the week. It is said that formerly single vessels have taken away as many as seven hundred, and that the ship's company of a frigate some years since brought down in one day two hundred tortoises to the beach.

"October 8th.—We arrived at James Island: this island, as well as Charles Island, were long since thus named after the kings of the Stuart line. Mr. Bynoe, myself, and our servants were left here for a week, with provisions and a tent, while the 'Beagle' went for water. We found here a party of Spaniards, who had been sent from Charles Island to dry fish and to salt tortoise-meat. About six miles inland, and at the height of nearly 2,000 feet a hovel had been built in which two men lived, who were employed in catching tortoises, while the others were fishing on the coast. I paid this party two visits, and slept there one night. As in the other islands, the lower region was covered by nearly leafless bushes, but the trees were here of a larger growth than elsewhere, several being two feet and some even two feet nine inches in diameter. The upper region being kept damp by the clouds supports a green and flourishing vegetation. So damp was the ground that there were large beds of coarse *Cyperus,* in which great numbers of a very small water-rail lived and bred. While staying in this upper region we lived entirely upon tortoise-meat: the breast-plate roasted (as the Gauchos do *carne con cuero*), with the flesh on it, is very good; and the young tortoises make excellent soup; but otherwise the meat to my taste is indifferent. * * *

"Of sea-turtle I believe there is more than one species; and of tortoises there are, as we shall presently show, two or three species or races.

"I have not as yet noticed by far the most remarkable feature in the natural history of this archipelago; it is, that the different islands to a considerable extent are inhabited by a different set of beings. My attention was first called to this fact by the Vice-Governor, Mr. Lawson, declaring that the tortoises differed from the different islands, and that he could with certainty tell from which island any one was brought. I did not for some time pay sufficient attention to this statement, and I had already partially mingled together the collection from two of these islands. I never dreamed that islands, about fifty or sixty miles apart, and most of them in sight of each other, formed of precisely the same rocks, placed under a quite similar climate, rising to a nearly equal height, would have been differently tenanted; but we shall soon see that this is the case. It is the fate of most voyagers, no sooner to discover what is most interesting in any locality than they are hurried from it; but I ought, perhaps, to be thankful that I obtained sufficient materials to establish this most remarkable fact in the distribution of organic beings.

"The inhabitants, as I have said, state that they can distinguish the tortoises from the different islands; and that they differ not only in size, but in other characters. Captain Porter has described those from Charles and from the nearest island to it, namely, Hood Island, as having their shells in front thick and turned up like a Spanish saddle, while the tortoises from James Island are rounder, blacker, and have a better taste when cooked. M. Bibron, moreover, informs me that he has seen what he considers two distinct species of tortoise from the Galapagos, but he does not know from which islands. The specimens that I brought from three islands were young ones; and probably owing to this cause, neither Mr. Gray nor myself could find in them any specific differences.

"I will first describe the habits of the tortoise *(Testudo nigra,* formerly called *Indica),* which has been so frequently alluded to. These animals are found, I believe, on all the islands of the archipelago; certainly on the greater number. They frequent in preference the high damp parts, but they likewise live in the lower and arid districts. I have already shown, from the numbers which have been caught in a single day, how very numerous they must be. Some grow to an immense size: Mr. Lawson, an Englishman, and Vice-Governor of the colony, told us that he had seen several so large that it required six or eight men to lift them from the ground; and that some had afforded as much as two hundred pounds of meat. The old males are the largest, the females rarely growing to so great a size; the male can readily be distinguished from the female by the greater length of its tail. The tortoises which live on those islands where there is no water, or in the lower and arid parts of the others, feed chiefly on the succulent cactus. Those which frequent the higher and damp regions eat the leaves of various trees, a kind of berry (called *guayavita*) which is acid and austere, and likewise a pale green filamentous lichen (*Usnea plicata*) that hangs in tresses from the boughs of the trees.

"The tortoise is very fond of water, drinking large quantities and wallowing in the mud. The larger islands alone possess springs, and these are always situated toward the central parts, and at a considerable height. The tortoises, therefore, which frequent the lower districts, when thirsty, are obliged to travel from a long distance. Hence broad and well-beaten paths branch off in every direction from the wells down to the sea-coast; and the Spaniards, by following them up, first discovered the watering places. When I landed at Chatham Island, I could not imagine what animal traveled so methodically along well-chosen tracks. Near the springs it was a curious spectacle to behold many of these huge creatures, one set eagerly traveling onward with outstretched necks, and another set returning, after having drunk their fill. When the tortoise arrives at the spring, quite regardless of any spectator, he buries his head in the water above his eyes, and greedily swallows great mouthfuls, at the rate of about ten in a minute. The inhabitants say each animal stays three or four days in the neighborhood of the water, and then returns to the lower country; but they differed respecting the frequency of these visits. The animal probably regulates them according to the nature of the food on which he has lived. It is, however, certain that tortoises can subsist even on those islands where there is no other water than what falls during a few rainy days in the year.

"I believe it is well ascertained that the bladder of the frog acts as a reservoir for the moisture necessary to its existence: such seems to be the case with the tortoise. For some time after a visit to the springs, their urinary bladders are distended with fluid, which is said gradually to decrease in volume, and to become less pure. The inhabitants, when walking in the lower district, and overcome with thirst, often take advantage of this circumstance, and drink the contents of the bladder if full: in one I saw killed, the fluid was quite limpid, and had only a very slightly bitter taste. The inhabitants, however, always first drink the water in the pericardium, which is described as being best.

"The tortoises, when purposely moving toward any point, travel by night and day, and arrive at their journey's end much sooner than would be expected. The inhabitants, from observing marked individuals, consider that they travel a distance of about eight miles in two or three days. One large tortoise, which I watched, walked at the rate of sixty yards in ten minutes, that is 360 yards in the hour, or four miles a day—allowing a little time for it to eat on the road. During the breeding season, when the male and female are together, the male utters a hoarse roar or bellowing, which, it is said, can be heard at the distance of more than a hundred yards. The female never uses her voice, and the male only at these times; so that when the people hear this noise they know that the two are together. They were at this time (October) laying their eggs. The female, when the soil is sandy, deposits them together, and covers them up with sand; but when the ground is rocky she drops them indiscriminately in any hole: Mr. Bynoe found seven placed in a fissure. The egg is white and spherical; one which I measured was seven inches and three-eighths in circumference, and therefore larger than a hen's egg. The young tortoises, as soon as they are hatched, fall a prey in great numbers to the carrion-feeding buzzards. The old ones seem generally to die from accidents, as from falling down precipices: at least several of the inhabitants told me that they had never found one dead without some evident cause.

"The inhabitants believe that these animals are absolutely deaf; certainly they do not overhear a person walking close behind them. I was always amused when overtaking one of these great monsters, as it was quietly pacing along, to see how suddenly, the instant I passed, it would draw in its head and legs, and uttering a deep hiss fall to the ground with a heavy sound, as if struck dead. I frequently got on their backs, and then giving a few raps on the hinder part of their shells, they would rise up and walk away—but I found it very difficult to keep my balance. The flesh of this animal is largely employed, both fresh and salted; and a beautifully clear oil is prepared from the fat. When a tortoise is caught, the man makes a slit in the skin near its tail, so as to see inside its body, whether the fat under the dorsal plate is thick.

If it is not, the animal is liberated; and it is said to recover soon from this strange operation. In order to secure the tortoises, it is not sufficient to turn them like turtle, for they are often able to get on their legs again.

"There can be little doubt that this tortoise is an aboriginal inhabitant of the Galapagos; for it is found on all, or nearly all, the islands, even on some of the smaller ones where there is no water; had it been an imported species, this would hardly have been the case in a group which has been so little frequented. Moreover, the old buccaneers found this tortoise in greater numbers even than at present: Wood and Rogers also, in 1708, say that it is the opinion of the Spaniards that it is found nowhere else in this quarter of the world."

The visit of the French frigate "Vénus," from June 21 to July 15, 1838, needs merely to be mentioned; while that of the English "Herald," from January 6 to 16, 1846, is chiefly of interest because of the statement of its naturalist, B. Seemann, that "no turpin, or terrapin, are living" on Charles Island where wild dogs, pigs, goats and cattle had increased wonderfully. Terrapin or galapago were bought on Chatham Island at the rate of six shillings apiece, and were two feet two inches in length, one foot ten inches broad, and stood one foot two inches off the ground."

Dr. Kinberg in the Swedish vessel "Eugenie," in 1852, collected reptiles on Charles, Chatham, Indefatigable, James and Albemarle islands. Nothing of importance was discovered regarding the tortoises. The same may be said concerning the researches of Dr. Habel, who, from July 22, 1868, to January 1, 1869, made collections of birds, fishes, snakes, lizards, insects, mollusks, and radiates on Abingdon, Bindloe, Hood, and Indefatigable islands.

From June 10 to 19, 1872, the Hassler Expedition, under Professor Louis Agassiz, collected chiefly fishes, at Charles, Albemarle, Indefatigable, James, and Jervis islands. It is said that a female tortoise was purchased by Professor Agassiz on Charles Island.

In the year 1875, Commander Cookson of the British navy, visited the Galapagos in the "Peterel." He obtained tortoises on Albemarle and Abingdon islands. The following notes are extracted from his report to Rear-Admiral Cochrane who, at the suggestion of Dr. Günther, had instructed him to obtain the desired information and specimens.

"These tortoises are extinct in Charles Island; and only a very few individuals are supposed to survive on Chatham Island. In Hood, James, and Indefatigable islands the numbers are so reduced that they are no longer hunted, the few left being in the most inaccessible parts of the islands; and I was assured that a search of a fortnight might not result in finding a single individual on either of these islands. Albemarle and Abingdon are the only remaining islands in which they have ever been found. In parts of Albemarle Island they are still very abundant, especially at the south-east end.

"They are still tolerably numerous near Tagus Cove. Landing a party of twenty-four men about half a mile south-east of Tagus Cove, we found in a few hours thirty tortoises; the three largest weighed respectively 241 pounds, 185 pounds, and 173 pounds; these, I was told, were as large as they are commonly found now.

"Tagus Cove is a favorite resort of whalers for the purpose of getting tortoises. The anchorage is perfectly secure; and the custom is for almost the entire crew to be landed until as many tortoises are secured as can be conveniently taken on board, some whalers going to sea with as many as 100.

"We found a good trail leading from the landing-place (at one of the gullies before mentioned as having pools of fresh water at its mouth) to the ground where tortoises are found, a distance of about three miles; quantities of tortoise-shells and traces of fires showed the numerous camping-grounds.

"Tortoises were never, I believe, very abundant on Abingdon Island: our searching party found four on this island. They were on the high ground; and it was a work of great labour getting them down to the boats. The distance was about four miles; but the ground was exceedingly rugged, and covered with thick brush, through which a trail had to be cut for the entire distance. The largest found on this island weighed 201 pounds, and the smallest 135 pounds.

"In consequence of the extent of Albemarle Island, and the inaccessibility of many parts of it, I have no doubt these animals are still very numerous on it, and likely to be so for a long period, even at the present rate at which they are destroyed; but I have already shown the havoc made amongst them by the oil-makers. This is the cause of their being nearly extinct on James and Indefatigable islands, where they used to be so numerous. Admiral Fitzroy found a party on James Island making oil in 1835.

"In Abingdon Island, where they are not numerous, I believe they are doomed to destruction directly the orchilla-pickers are placed on the island; for a party of sixty or eighty men will soon hunt over this small island and discover every individual on it."

The "Challenger" reached the Galapagos Islands shortly after the "Peterel." It carried home some of the tortoises secured by Commander Cookson, but obtained no additional information.

In April (4-16), 1888, the United States Fish Commission steamer "Albatross" collected reptiles on Albemarle, Charles, Chatham, Duncan, and Indefatigable islands. Tortoises were secured on Albemarle and Duncan. A second visit by the "Albatross" with Professor A. Agassiz, from March 28 to April 4, 1891, resulted in no new information concerning tortoises.

On June 10, 1891, Dr. George Baur and Mr. C. F. Adams reached the Galapagos Islands. They remained until September 6 of the same year, and collected on Albemarle, Abingdon, Bindloe, Barrington, Charles, Chatham, Duncan, Hood, Indefatigable, James, Jervis, and Tower islands. Tortoises were found only on Duncan and in southern Albemarle. Twenty-one specimens were collected—eight on Duncan and thirteen from southeastern Albemarle.

Acting for the Hon. Walter Rothschild, Mr. Frank B. Webster, in 1897, organized an expedition to search for tortoises in the Galapagos Archipelago, under the leadership of Mr. C. M. Harris. The original party having been broken up at Panama by the death from yellow fever of three of its five members, a second party was gathered at San Francisco, where Harris had chartered the "Lila and Mattie," a small schooner commanded by Captain Linbridge. Those composing the collecting force of the second party were Mr. Harris, Mr. F. P. Drowne, Mr. G. D. Hull, and Mr. R. H. Beck. They set sail from San Francisco June 21, and arrived at the Galapagos

Islands July 25, 1897. Collections were made on Culpepper, Wenman, Abingdon, Bindloe, Indefatigable, Duncan, Jervis, James, Barrington, Chatham, Hood, Charles, southeastern Albemarle, Tagus Cove, Narborough, and Tower islands. Setting sail from Tower Island December 28, 1897, the return to San Francisco was accomplished February 8, 1898. Tortoises were secured only from southeastern Albemarle and from Duncan islands. The following extracts from Mr. Drowne's journal tell the difficulties overcome in collecting tortoises on Duncan Island:

"Sept. 5, 1897. After a long walk I arrived at the edge of the crater at about 11 a. m. Harris was already inside. We climbed down the side, I should say 250 feet, and reached the bottom, which was level and covered all around with thick bushes on the border. Grass, 2 feet high or more, covered the entire centre. *Geospiza, Certhidea,* and *Camarhynchus* were abundant, and occasionally *Pyrocephalus* and *Myiarchus* were seen. Soon after reaching the bottom I heard Harris calling out that he had caught a tortoise. Hull and myself got there as soon as possible, and we tied the tortoise up. The grass was full of tortoise trails, and we set out in search of others. Harris found two more, and Hull and myself each two. We turned them all over, and weighted them down with heavy rocks. After fixing the last one, we revisited the first and found it loose. This made it necessary to revisit the others, which we did, finding that they had all got loose. We weighted them down again with more and heavier rocks, and returned to the starting-place. Some of the tortoises which we found feeding were eating the blossoms from a creeping vine, rising upon their forelegs and stretching their necks out to full extent. The odor from them reminded me very much of that from an elephant. After tramping about so much and lifting so many heavy rocks, we were very tired, but had to brace up and climb out of the crater, and walk to the shore over a long distance of broken rock. The crater was quite three-quarters of a mile in diameter, with a very flat bottom, surrounded by a high wall or embankment, making it resemble greatly pictures of the old Roman amphitheaters. Arrived on board at 6:30, very tired and very thirsty.

"Sept. 7.—Another hard day's work. Got up at 4:45 A. M. and started to heave up anchor. Sailed over to Duncan Island. Had breakfast at 6:30, and went ashore soon after, starting immediately up to the crater, with poles, ropes, etc., to get the tortoises out. Managed to recover our tortoises of last Sunday, some of which had got away. Found one dead, a rock having fallen on his neck during his struggles and shut off his wind. Found one more, making a total of eight. The work of making them fast lasted till about 2 o'clock, when we started for the shore with a tortoise strung on a pole between each two men, one of the sailors and myself taking one. It was very hard getting them up the side of the crater, walking being so rough and thorns so plentiful. But this was nothing to be compared with going down on the other side, which was very steep and terrible walking. The sailor had on a pair of wooden clogs, which soon began to chafe his feet. After a long time spent in tumbling over lava blocks, tearing through thorn bushes and other such pleasantries, we reached a point as near the shore as we could, tied the creatures up securely, and left them. Now came a long walk before we could get to the skiff. We were all so tired, having had nothing to eat since breakfast, that the distance seemed terribly long. It was a rough road, up and down, over broken lava and through thorns. Reached the skiff about 6 P. M., every one being well tired out. A good drink of wine and water was served with the lunch that was in the boat. We got aboard the schooner a little later. This was the hardest day's work thus far, with the possible exception of last Sunday's. The trip was very hard on the tortoise also, and they acted as if 'played out.' Two of them being set down close together got their poles somewhat tangled up, and by the way they opened their mouths at each other it looked as if they were going to have a fight.

"Sept. 8.—We went ashore quite early, and started immediately for the crater, after looking in vain for more tortoises for a short time. The mate took a small one on his back. Harris and myself, Hull and Beck carried one swung on a pole between us, and we started for the boat by a much easier route than yesterday, and got two of them right aboard the skiff. The other one and the three brought down yesterday were tied up in a sack, one at a time, and then lowered down to the skiff from the top of a bluff 75 feet high. Getting them into the skiff, at 4 P. M. we were aboard the schooner with six live tortoises. The small one which was found yesterday appeared to be nearly dead when visited today. The soil at the bottom of the crater is full of cracks in places, showing that probably during the wet season there is water there. There were several rocks with depressions in their tops, and the prints of tortoise feet near them showed that the animals probably relied on these places for their supply of water during the dry season. It rained last Sunday while we were in the crater, and in one of these holes quite a little water had collected.

"Sept. 9.—Went ashore at about 8 A. M., or rather started at that time, it being a long pull to the island. Harris, Hull, and Beck carried the guns, while the mate and a sailor (Herman Jahnke) and myself were to bring down the two tortoises. We got into the crater at about 11 A. M.; picked up the bones of a tortoise that had been found some time before. We saw a snake that was about 1½ ft. long, slender and blackish, with white rings. The mate noticed it first and called me, but I only arrived in time to see it disappearing under the grass, from which we were unable to dislodge it. The mate was afraid of snakes. We ate lunch in the crater. Just as we were commencing, Harris brought in a small tortoise which had escaped last Sunday, the one first caught. The mate claimed that this one bit him while he was tying it up. After lunch we started out of the crater, a sailor and myself carrying the large dead one on a pole, and the mate the live one in a pack on his back. We got down to the bluff in good time, when we lowered them down, and then climbed down ourselves. At a little after 4 P. M. the rest of the party appeared, bringing in another dead tortoise and the small live one, the sack of bones, and some birds. Beck carried a big tortoise from the other side of the island, and reported seeing five others in a gulch on the other side of the crater, three of them being larger than any secured thus far. He said that one of the big ones was feeding on an old dead cactus. We got on board after a long pull, and started over to Conway Bay, where we anchored at 7 P. M.

"Sept. 13.—Got up at 4:30, and, after having coffee, hoisted anchor and set the sails. Weather very foggy, and fine rain. We sailed over to Duncan, went ashore rather late, and all hands started at once for the crater, the idea being to work over the other side of it, and look for the tortoises that Beck had seen as well as others. We found in one of the craters (a section so thickly covered with bushes that it had not been so carefully examined) a good-sized tortoise. This find altered the plans somewhat. The mate and the sailor took the tortoise on a pole, I a sack of bones and their surplus baggage, and after eating lunch started back, the others having gone on. We reached the skiff after a long walk, the others arriving at about the same time. They reported six tortoises tied up, and the remains of another found. We got aboard the vessel about 6 P. M., and sailed for Conway Bay, coming to anchor at 7:30.

"Sept. 16.—Arose at 5 A. M. and had breakfast; then both parties started for the first station with a big tortoise. Reaching there, the mate and myself started down for the beach after water and provisions, there being only half a canteen of water to leave the others for their morning's work. We got to shore in 50 minutes, and started immediately to pack up. The mate took the five-gallon breaker of water, and I the knapsack, well loaded with canned fruit, meat, sardines, bread, sugar, butter, coffee, rice, etc., and three canteens of water. We started back right in the heat of the day, and the mate's load soon exhausted him. We decided that I should go ahead and get to the boys with the water in the canteens, while he came on by short stages. I reached the camp about 1 P. M., very tired by the long walk in the sun. Beck and Hull had carried out three tortoises to the first station. We lunched, and later the mate reached the camp. Hull and myself got a good-sized tortoise into the camp in the afternoon (the farthest away), while Beck brought in a little one on his shoulder. A little later Beck and myself took one of the big ones around the trail to the first station, while Hull brought another little one into the camp, and the mate got several. We sat around the camp-fire awhile after supper, and then retired.

"Sept. 18.—Arose about 5 A. M., it being then quite rainy. After breakfast we got the tents, blankets, etc., packed up, and started for the shore, Beck and the mate each taking a little tortoise, while Hull and myself carried the tents, etc., all on a pole. Arrived at the shore, after quite a short rest we started up again to bring down some more tortoises. Beck and the mate went up again after dinner, bringing down two more. Meantime Hull and myself got the stuff packed up, the tortoises in the boat, and things arranged for leaving. We then took the skiff, leaving the camp outfit ashore, as we were to return on Monday. The schooner had left Conway Bay some time before, and was quite close by the island; and in a short time we were all on board with our seven tortoises.

"Sept. 20.—Went ashore quite early. We pitched tents and went up to the first station; brought down two tortoises half way, ate a little lunch we had taken up with us, and took a short rest. We went up to the first station again and brought the tortoises down to the shore. The mate cooked a good supper of rice, coffee, meat (canned corned beef), and bread and butter, canned fruit for dessert. We sat around the campfire till 8 o'clock. The seals kept up a continual noise all night.

"Sept. 21.—Had an early breakfast, and all went to the first station. The mate and myself brought a tortoise down to the camp (moved down to shore). While Hull and Beck brought one half way and returned for another, mate and myself ate lunch, then went to half-way station and brought another one down to the shore. Meantime Beck and Hull got theirs down. It was getting late in the afternoon, so we lay off for the remainder of the day.

"Sept. 22.—Got up early. After breakfast we went up to the half-way station and brought down two tortoises; went up again immediately and brought down two more. Had dinner and took a rest. At about 3 p. m. we went up again and brought down two more, which made the last of the twenty-nine tortoises from Duncan Island.

"Sept. 23.—Did not get up quite as early. After breakfast I worked a little around the beach, turning over rocks for marine animals; then secured several lizards. We got the eleven tortoises down on the beach. We then put six into the skiff, together with the outfit. Beck steering, the mate and myself pulled to the vessel, which had come over from Conway Bay. We got aboard all right, and shortly after the rest of the tortoises and Hull were taken aboard. Then we headed off for Jervis, and anchored at the north side of the island at 5 P. M. We are doubtful if more than two or three tortoises are left on Duncan Island, because our party covered practically all the part of the island where they would be found.

"Sept. 24.—Went ashore on Jervis Island. Fine beach, with a little lagoon right behind it, around the edge of which we found tracks of a tortoise, but were unable to find it after thoroughly searching the island. There is more soil on this island than on any visited thus far. We secured about 115 birds in all."

In the fall of 1898, the Department of Zoology of Stanford University sent to these islands two collectors, Mr. Robert E. Snodgrass and Mr. Edmund Heller. Sailing on the sealing schooner "Julia E. Whalen," they were given an opportunity to collect on every island of the group. Their visit extended from December 10, 1898, to June 26, 1899. Some twelve hundred reptiles were collected. Tortoises were found only on Duncan Island and at Tagus and Iguana Coves, Albemarle Island. Heller thought them extinct on all the other islands except Abingdon. He gives the following account of the habits, based on observation of the three species collected, viz., *Testudo microphyes, T. vicina* and *T. ephippium:*

"Their food consists of various species of grasses and cactus *(Opuntia)*. During the rainy season, and in the moist portions of the islands the year round, grass forms their chief food, especially a large, woody-stemmed, perennial species. During the dry season in the arid portions of the islands, as at Tagus Cove, Albemarle, and on Duncan Island, the *Opuntia* becomes quite an important food plant. The green succulent leaf-like stems of this cactus and its fruit, the prickly pear, are eagerly devoured by the tortoises, regardless of the sharp spines with which they are armed. One specimen collected near Tagus Cove had the whole palate and pharynx bristling with the cactus spines, from which there was apparently no suffering. The juicy cactus stems supply the tortoises with the necessary water in the dry regions where springs are absent, and thus make possible its existence in such localities. Cactus seems to be preferred, when it can be easily secured; all the tortoises we took on board the schooner would take no other kind of food except when compelled by hunger. The *Opuntia* are tree-like in habit, growing usually to a large size, and it is only the young and smaller plants that are within reach of the tortoises. Grass can be secured much easier, and it is perhaps due to this fact that it forms a larger proportion of their food.

"The tortoises do a great deal of apparently unnecessary traveling; and, though slow, are so persistent in their journeys that they cover several miles a day. Most of the traveling is done early in the morning and late in the afternoon, the hot hours of noon being spent in the shade of some bush, wallowing in the damp soil. The wallowing probably cools them, and incidentally relieves them of a few of the numerous wood ticks (*Amblyoma pilosum*) which infest them at the joints and wherever the skin is thin enough to allow them to pierce it. After heavy rains they delight to wallow in the mud. They are very determined travelers, and once started in a certain direction no obstacles can stop them. Not infrequently they ascend very steep, rocky hills. Sometimes their shells are broken, and occasionally they are killed, by rolling down these inclines, but if uninjured after these falls they will make repeated efforts to reascend until crowned by success. They retire early for the night, drawing in their limbs and neck, and after sunset do not move from the place chosen for the night. Darwin, however, states that they travel both day and night when on their periodical visits to the springs.

"All three of the species we observed make seasonal vertical migrations. Soon after the rainy season they descend the mountains to the grass-covered flats at their bases, to feed and deposit their eggs in the light soil. After the grass has withered, they again ascend the mountains to the moist meadows produced by the trade winds at an elevation of 2,000 feet and above. These migrations are most marked in the dry regions, as at Tagus Cove, Albemarle; but even at Iguana Cove on the same island, where there is an abundance of moisture at lower elevations, a nearly complete migration takes place. On Duncan Island the tortoises scatter out so in the dry season that their movements can scarcely be called a vertical migration. In their seasonal pilgrimages they follow well-established trails used perhaps for generations. These trails radiate from the higher plateaus as a center and usually follow the floors of the canyons to the flats below. Some of the trails are of

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considerable length, requiring several days of persistent effort on the part of the tortoise to cover them.

"When surprised they draw in their limbs and necks with a deep hiss, and suspend operations until they think the danger past. No amount of noise seems to frighten them and the Ecuadorians assert that they are deaf. A small one, however, taken at Iguana Cove, Albemarle, learned to recognize the voice of its keeper in a few months, and would come to the gate of its pen when called though the keeper was hidden from its sight.

"The males are sometimes quarrelsome, especially in the breeding season. In fighting the jaws are opened widely, and the animals, raised by outstretched necks and limbs to their greatest height, attack one another. Superior height seems to be quite an advantage in a combat, allowing the taller to bite down upon the head of his adversary. In these fights they seldom succeed in doing much damage. When turned over on their backs they right themselves by swinging their limbs all in the same direction, which causes the animal to rotate and clear the ground, so that by thrusting out their long necks to the ground and pushing with them the body falls over on the plastron. During this operation they usually indulge in much grumbling and groaning as if it were a terrible tax on their anatomy. During the breeding season the males are said to 'bellow like bulls.' The 'bellowing' which we heard consisted of a rather low prolonged note which could not have been heard more than a few yards away.

"The young do not take on their specific characters until nearly adult; they remain very similar in shape, in all the species for a considerable time. All the young observed possessed striated shells, but adults seem to retain or lose this character indifferently in most of the species.

"Growth takes place by additions to the outer border of each plate along the soft white seams, and probably continues as long as life exists; the largest specimens possess the whitish seams which mark the growing edges of the plates. In youth the annual increase is probably much greater than later. A specimen from Iguana Cove, weighing 29 pounds when taken, doubled its original weight in twelve months, accompanied by an increase to the margin of each plate of the carapace of about half an inch or an inch to the diameter of the plate. Its total gain during the year was: in length of carapace, four inches; in breadth, three inches; and in height, one and one-fourth inches. During the colder winter months the consumption of food was greatly lessened and growth correspondingly retarded. The increase in weight during the summer months amounted to nearly three pounds monthly. This tortoise now [1902] weighs 130 pounds, having gained 100 pounds in three years. This rapid increase may be abnormal, but it shows how rapid their growth may be under favorable conditions of food and warmth, which we believe are even more favorable in the Galapagos where no cool winter season retards their growth."

In 1900 Captain Noyes again visited the Galapagos Archipelago. He searched for tortoises on Duncan Island, but found only four; and stated that he thought no more would be found there. In the southern part of Albemarle, however, he had better luck, securing nineteen tortoises. These were delivered to Mr. Frank B. Webster, who sent seven of them to Rothschild. Mr. Webster states:

"In all about a hundred and twenty-five tortoises from the Galapagos Islands have passed through my hands, the great majority of which were for the Honorable Walter Rothschild. I consider, now that these creatures are so nearly extinct, that any remaining ones will be only stragglers, and will only be secured at a great expense of time, hardship and money."

Early in 1901, Mr. Beck returned to the Galapagos Islands to hunt for tortoises for Mr. Rothschild. One small specimen was taken on Indefatigable February 16, 1901. Duncan Island yielded five tortoises. Three were taken at Tagus Cove, and one at Cape Berkeley, Albemarle Island, and two were secured on Abingdon. The single specimen from Cape Berkeley proved to be a new species and was named by Rothschild *Testudo becki.*

In November of the same year, Mr. Beck again visited the Galapagos Islands, in the little schooner "Mary Sacks." He returned to San Francisco August 15, 1902, with twenty-three dead and twenty-seven living tortoises. Eight or nine of these were from Indefatigable, six from Bank's Bay, three from Tagus Cove, five from Iguana Cove, and the rest from Vilamil.

These tortoises also went to Rothschild's museum at Tring, England. Mr. Beck has published in the seventh report of the New York Zoological Society some interesting notes on the habits of the tortoises. He says, in part:

"The tortoise seemed to have no regular time for feeding, being at all hours of the day eating or walking about. During the middle of the day, if the sun is shining, they keep in the shade of the trees, but if it is cloudy many spend the time wandering back and forth on the trails. We were told by the natives that in the summer the tortoises go up to the top of the mountain; and this statement confirmed my observations of similar habits of other species in the Archipelago.

"We found that the tortoise trails extend up and down the [Vilamil] mountain side for miles, one of the objective points at the lower part of the range being a rocky basin where water collects during rains. By centuries of constant use these rocks have been worn so smooth that it is almost impossible to walk over them after a rain, while they are wet. Once we noticed four tortoises slaking their thirst at a rocky pool near the trail, but during our stay at the ranch the rainfall was so great that every little hollow in the ground held water, and a tortoise could get a drink anywhere.

"One afternoon, while standing under a tree during a heavy downpour, I was surprised to see a big tortoise come slowly down the hill through the wet grass, walk into a rapidly-forming pool of water, take a long drink, and then lie down in the pool. When he settled down, the depth of the water was only two inches; but in a few minutes it had increased to eight inches; and he seemed entirely content, until his attention was attracted to a female tortoise, which also came to the pool to drink. That attraction was the stronger, so he left the water and set out to make her acquaintance.

"After the rain had ceased, I went down the trail some distance and saw another tortoise living in a hollow filled with water. He remained there all night, apparently, for on our return the next morning he was still in it. These two observations rather tended to disprove my theory regarding one of the causes of the annual migration which affects nearly all the species of the Galapagos tortoises. I had formed the opinion that the migration was partly due to the slightly colder weather and heavy rains high up on the mountains during the winter season, but it would seem from the actions here cited that these causes have but little to do with it after all. With this species *(Testudo vicina)*, it might be the mating instinct that causes them to wander down three or four miles from their summer home.

"Love affairs were in full progress during our stay [March 20 to April 2], and the amorous exclamations of the males could be heard at a distance exceeding 300 yards, even in the thick forest. The actions of the tortoises living in the hollows and small valleys along the mountain top were very similar to those of the cattle that occupied the same range. Walking cautiously over a rise we would see perhaps three or four at a water-hole, drinking, and dispersed in the open valley would be others busily nibbling at the short grass. During the heat of the day many would be seen lying in the shallow pools of water that the heavy rains had formed, or under the bushes near by them. One hot day I saw two large tortoises and two young bulls lying side by side under a small tree. Nearby were other cattle, and another large tortoise was headed for the tree, having just left a water-hole a few rods away.

"After seeing on this mountain dozens of tortoises of good size, one wonders where the small ones are; but after spending a few days a-foot and seeing the many wild dogs in that region—descendants of those left years ago by sailing vessels—we can only wonder that so many of the large ones remain. From the time that the egg is laid until the tortoise is a foot long, the wild dogs are a constant menace, and it is doubtful if more than one out of 10,000 escapes. We certainly saw none, and the natives told us that the dogs ate them as fast as they were hatched.

"In November, 1897, we found several nests in the lower edge of the forest. Of these, two had been rifled, and the broken egg-shells were what first attracted our attention to them. All the eggs found on that date (November 12th) were perfectly fresh, and we saw two or three newly dug holes with tortoises but a few feet from them. Most of the nests found were in well-traveled cattle or tortoise trails. They were so placed that the sun shone on them but a few hours each day; when it did it was very hot. Ordinarily it was very difficult to recognize the site of a nest, the very slight elevation in the trail, or slightly fresher-looking earth being our sole guide. Several times we imagined that we had discovered nests, and prodded about with our sticks and dug with our hands, until finally we realized that we had misinterpreted the signs.

"On finding our first nests in the trail, the old adage, 'Don't put all your eggs into one basket,' was forcibly brought to mind. This is the rule that is followed by the tortoise, for within a radius of 15 feet four nests were found, each containing 8 to 17 eggs. The holes were about 15 inches in depth, and nearly a foot in diameter. The eggs were placed in layers of 3 to 6, the first layer being on the soft soil on the bottom, separated from the next by an inch or so of dirt, and the second layer separated from the third in the same manner. The dirt surrounding the eggs was loose, but the top of the hole was covered to a depth of 3 or 4 inches with a very hard crust that had probably been formed by the tortoise lying on it and working from side to side in the same manner that we frequently noticed them working down a form to lie in.

"Judging by the size and number of the eggs found in several of the tortoises that we dissected, it would seem that one or two nests are finished at a given period, and a week or two later the remainder of the eggs are laid. From 10 to 20 eggs were ready for extrusion together, while 20 or 30 more were from one-half to two-thirds the normal size.

"At the rate of destruction now in progress it will require but a few years to clear this entire mountain of tortoises; and when we see the methods pursued by the proprietor in getting tortoise oil for shipment to the mainland, we know that the large tortoises can last but a few months after the work of the oil-hunter begins in earnest.

"To show what has already been done by oil-hunters, I took two photographs at the water-hole, where lay the largest number of tortoise skeletons. There were about 150 skeletons at this pool, and a half mile away, in another depression, were about 100 more. While there were more skeletons at these two places than we saw elsewhere, frequently 10 or 15 were observed in other basins where the tortoises had gone for water.

"The outfit of the oil-hunter is very simple, consisting merely of a can or pot in which to try out the oil, and three or four burros for carrying the five- or ten-gallon kegs in which it is transported to the settlement. After making a camp near a water-hole, and killing the tortoises there, the collector brings up a burro, throws a couple of sacks over the pack-saddle, and starts out to look for more tortoises, killing them wherever found. A few strokes of the machete separate the plastron from the body, and 10 minutes' work will clear the fat from the sides. The fat is then thrown into the sack, and the outfit moves on.

"When the burro is well laden, man and beast travel back to camp, where the oil is tried out. Each large tortoise yields from one to three gallons of oil. The small ones are seldom killed, because they have but little fat. By daily visits to the few water-holes during the driest season, in the course of a month the hunters get practically all the tortoises that live on the upper part of the mountain.

"When we first stepped ashore at the settlement we saw a number of casks lying on the beach, and learned on inquiry that they contained 800 gallons of tortoise oil. In a large boat, under a nearby shed, were 400 gallons more. While we were there, the boat sailing between the island and Guayaquil left for the port with those casks and a cargo of hides. The value of the oil in Guayaquil was about $9.00 (American) per 100 pounds. While the tortoises are so plentiful as we saw them, this price yields a fair profit to the hunters, but two more raids such as that shown in the photograph will clear that mountain of all the fair-sized tortoises upon it, and then the oil business is ended."

The statements of the various authors to whom we have referred, indicate that tortoises had been found upon Abingdon, James, Duncan, Indefatigable, Chatham, Charles, Hood, and Albemarle islands; that they remain in considerable numbers only in parts of Albemarle, and perhaps Duncan; that they reached the verge of extinction on Charles Island as early as 1846; and that none had been seen in recent years upon James, Chatham, Charles, or Hood island.

It was largely for the purpose of gathering further information regarding tortoises that an expedition was sent to the

Galapagos Archipelago by the California Academy of Sciences. This expedition set sail from San Francisco on the twenty-eighth of June, 1905, in the schooner "Academy," which had been purchased and rechristened for the purpose. The scientific staff of the expedition consisted of eight young men. Mr. R. H. Beck, who has had more experience in these islands than any other collector—this being his fourth expedition to them—was in charge. Mr. Alban Stewart went as botanist; Mr. W. H. Ochsner, as geologist; Mr. F. X. Williams, as entomologist; while Mr. E. W. Gifford and Mr. J. S. Hunter were to study and collect the birds, and my assistant, Mr. J. R. Slevin, with the aid of Mr. E. S. King, was to care for the reptiles.

Having made brief stops at various islands near the coast of Lower California, as well as at San Benedicto, Socorro, Clipperton, and Cocos islands, the party reached the Galapagos Archipelago and landed upon Hood Island, September 24, 1905. During the months which followed. the most arduous collecting was vigorously carried on in all the islands of the group, many of the larger being visited several times, and on September 25, 1906, after a full year of work, the "Academy" left Culpepper Island and set sail for San Francisco, where she arrived in safety Thanksgiving day, November 29, 1906.

This exploration met with far greater success than I had anticipated. Tortoises, or their remains, were found for the first time on Barrington, Jervis, and Narborough islands, and on Cowley Mountain, Albemarle Island. They were also found still living in all the localities from which they had ever been recorded except Charles Island, where they appear, as on Barrington, to be really extinct. Only on Duncan Island and the southern portion of Albemarle were they encountered in considerable numbers, and in the latter region they are being rapidly reduced by the raids of the natives who kill them for meat and oil.

It was Captain Porter who first called attention to the fact that each of the tortoise-bearing islands of the archipelago had its own peculiar race or species. With the exception of Albemarle, no island has more than one kind of tortoise. Now there is evidence that Albemarle, the largest island of the group, has been formed by the union of several smaller islands, corresponding, probably, to its five great volcanoes. Accordingly, we find on Albemarle five distinct races of tortoises, each of which, I believe, originated upon one of these constituent volcanoes prior to their union. If this view be correct, some of these races have since spread to other portions of Albemarle Island, but each race still is found either in greatest numbers or alone upon that portion of the island where it originated. Thus one finds at Bank's Bay, in the northern part of Albemarle, a kind of tortoise not found elsewhere. The region about Tagus Cove, in north-central Albemarle, has tortoises of but one race, which race, however, seems to occur also on the southern coast of Albemarle. The same is true of Iguana Cove, while on Vilamil Mountain and in the adjoining portions of the island is found still another race, which does not occur elsewhere. The Cowley Mountain tortoise seems nearly identical with that of Indefatigable Island; but this conclusion is based upon a single female specimen, not adult, and I believe that a good series of specimens would lead to a different result.

The present state of our knowledge indicates, then, that there once lived in the Galapagos Archipelago fourteen or fifteen distinct races of gigantic land tortoises, each occupying its own island, as follows:

	ISLAND	PRESENT STATUS
1.	Abingdon	Rare
2.	James	Rare
3.	Jervis	Very rare
4.	Duncan	Fairly abundant
5.	Indefatigable	Not rare
6.	Barrington	Extinct
7.	Chatham	Nearly extinct
8.	Hood	Very rare
9.	Charles	Extinct
10.	Narborough	Very rare
11.	Vilamil, Albemarle	Abundant
12.	Iguana Cove, Albemarle	Numerous
13.	Tagus Cove, Albemarle	Fairly numerous
14.	Bank's Bay, Albemarle	Fairly numerous
15.	Cowley Mt., Albemarle	Rare

It now becomes necessary to consider what names are applicable to these various races.

SYSTEMATIC ACCOUNT

1. Nomenclature

Eighteen names have been proposed for Galapagos tortoises, as follows:

	DATE	NAME	AUTHORITY	LOCALITY
1.	1824	*Testudo nigra*	Quoy & Gaimard	"California"
2.	1824	*Testudo californiana*	Quoy & Gaimard	
3.	1827	*Testudo elephantopus*	Harlan	Galapagos
4.	1835	*Testudo nigrita*	Duméril & Bibron	No locality
5.	1855	*Testudo planiceps*	Gray	No locality
6.	1875	*Testudo ephippium*	Günther	No locality
7.	1875	*Testudo microphyes*	Günther	No locality
8.	1875	*Testudo vicina*	Günther	No locality
9.	1877	*Testudo abingdonii*	Günther	Abingdon
10.	1889	*Testudo galapagoensis*	Baur	Charles
11.	1889	*Testudo güntheri*	Baur	No locality
12.	1901	*Testudo becki*	Rothschild	North Albemarle
13.	1902	*Testudo wallacei*	Rothschild	No locality
14.	1904	*Testudo porteri*	Rothschild	Indefatigable
15.	1907	*Testudo hoodensis*	Van Denburgh	Hood
16.	1907	*Testudo darwini*	Van Denburgh	James
17.	1907	*Testudo chathamensis*	Van Denburgh	Chatham
18.	1907	*Testudo phantasticus*	Van Denburgh	Narborough

Eight of these names are based upon specimens whose origin is definitely known. There can be no question as to the races to which these names apply. The other ten, however, were proposed, often with vague descriptions from examples which leave much to be desired in respect both to history and to condition. It will be necessary to consider each of these names in turn to determine, if possible, its proper use.

1. *Testudo nigra* Quoy & Gaimard. 1824

This name was applied by Quoy and Gaimard, in 1824, to a very young tortoise presented to M. de Freycinet by Captain Meek, of the "Boston Eagle," while the "Uranie" and "Physicien" were in the Sandwich Islands, and said to have come from California. Owing to the small size of this tortoise the differential characters are not developed. Rothschild, who recently examined the type in the Paris Museum, writes[1] that it "is a young tortoise with a carapace barely 10½ inches long, and so indifferently preserved that it is *absolutely* impos-

[1]Novitates Zool., IX, 1902, p. 618.

sible to say to what race it belongs. Dr. Albert Günther, who examined the specimen with me, is even more emphatic on this point than I am." The exact locality of origin being unknown, I think it impossible ever to decide which species it represents, and therefore follow Günther, Baur and Rothschild in ignoring the name *Testudo nigra.*

2. *Testudo californiana* Quoy & Gaimard. 1824

This name, also proposed by Quoy and Gaimard in 1824, evidently was based upon the specimen which they described as *Testudo nigra.* It is therefore a substitute name.

3. *Testudo elephantopus* Harlan. 1827

This name was first used by Dr. Richard Harlan in a paper published in the *Journal of the Academy of Natural Sciences of Philadelphia,* in 1827, and afterward reprinted in Harlan's *Medical and Physical Researches* (1835). The description was based upon a living specimen in the possession of Mr. Whitton Evans. Beyond the mere fact that it was from the Galapagos Islands, Dr. Harlan said nothing of the origin of this tortoise.

In 1874, Dr. Günther, recognizing the fact that Harlan's specimen belonged to one of the broad races, associated with the name *Testudo elephantopus* certain specimens of indefinite origin. The carapace which he figured is depressed, with somewhat elevated front, width over curve greater than length over curve, height to marginals low, and pectoral plates well developed.

In 1889, after having examined a specimen which he thought was the one described by Harlan, Dr. George Baur[2] stated his conclusion that the specimens which Dr. Günther had referred to *Testudo elephantopus* did not belong to the species represented by Harlan's type. It is probable that the specimen Baur examined is a South Albemarle tortoise of the *vicina* type, for Baur states that "a number of specimens collected by the 'Albatross' agree exactly with" this specimen "and the *T. vicina* of Günther."

[2]Am. Naturalist, Dec. 1889, p. 1043.

Later, Rothschild borrowed this specimen which Baur had examined and, having studied it, concluded[3] that it was not the same as Günther's *Testudo elephantopus,* and that it was identical with Günther's *Testudo vicina.* He, moreover, held that Günther's *Testudo elephantopus* was the same as Harlan's, and, a little later,[4] expressed the opinion that it came from Hood Island.

We have, therefore, to consider three questions:

1.—Is *T. elephantopus* from Hood Island?

2.—Is Günther's *T. elephantopus* the same as Harlan's?

3.—Is it possible to determine what race Harlan's specimen represented?

These I shall endeavor to answer in the order in which they are given.

1.—I think it may be stated postively that neither Harlan's nor Günther's *Testudo elephantopus* came from Hood Island. Both are of the broad form, in which the width over the curve exceeds the length over curve, while in the Hood Island race the curved length exceeds the curved width. There are also other points of difference.

2.—I feel equally positive that the specimen figured by Dr. Günther is not identical with Harlan's species. The chief points of distinction are: Günther's specimen has the height to marginals low, while, if one may judge from his plate, Harlan's specimen belonged to one of those races in which this measurement is great. Günther's specimen has the anterior portion of the carapace expanded, while in Harlan's there is at least an approach to the laterally compressed, "saddle-backed" form. Günther's specimen, moreover, has a greater straight width than Harlan's, and there are minor points which also lead to the conclusion that the two belong to different races. The identity of the specimen figured by Günther will be considered under the heading *Testudo güntheri* Baur.

3.—Inasmuch as Harlan did not know that there existed in the Galapagos Islands more than one kind of tortoise, his description is brief and couched in terms so general as to render

[3]Novitates Zool., IX, 1902, p. 448.
[4]*Loc. cit.*, p. 618.

it very difficult to determine positively from it which race his specimen represented. This being true, the fate of Harlan's specimen becomes of much interest, since only from it can we obtain the desired data. Unfortunately, there is little doubt that this specimen no longer exists. Baur,[5] it is true, mentions examining Harlan's original specimen in the Philadelphia Academy of Natural Sciences, but the specimen to which he refers does not agree with the description or measurements given by Harlan, and, indeed, has never been regarded as Harlan's type by the authorities of the Academy. At my request, Dr. Arthur E. Brown has been kind enough to look the matter up, and, while the Philadelphia Academy has no complete records of its museum in those early days, he has found in an early volume of the *Journal,* in the list of donations in February, 1827, mention of a "*Testudo elephantopus* from Richard Harlan, M. D." As this was only five months after Harlan's paper was read, it seems fair to presume that the specimen presented was the one which had served as the basis of his description. With Mr. Witmer Stone, Dr. Brown then "made a careful search through a lot of odds and ends of old material, with the result that we found the cleaned leg bones of one side, and a part of the legs of the other side with dried skin still on them, of a *Testudo* about the size of Harlan's type, with an index number (366) making it almost certain that it came from Harlan." Dr. Brown says, "In the opinion of both Mr. Stone and myself, these fragments are probably all that is left of the type of *T. elephantopus,* which had apparently been mounted, but long ago became dismembered, leaving only these scraps which do not bear any of the specific characters."

It therefore seems fairly certain that no one ever will know from the specimen itself what Harlan's *Testudo elephantopus* really was, and that any opinion must be based upon the meager data to be derived from Harlan's original description and plate. I have already stated that I believe these to be scarcely adequate. The points of value in this connection are: that it was a young individual, probably a female, with elevated central areas and concentric ridges on the plates, pectoral plates meeting extensively on the median line—therefore not from Chatham Island; breadth over curve (22.6) greater than length over curve

[5] Am. Naturalist, Dec. 1889, p. 1043.

(21.6)—therefore, considering its size,[6] not from Hood, Abingdon, Bank's Bay, Narborough, Tagus Cove, James, Chatham, or Duncan; vertical diameter nine inches; lateral diameter fourteen inches; marginals reflected upward anteriorly and over limbs; height to marginals apparently great—therefore not from Chatham, Tagus Cove, Bank's Bay, nor Narborough; front of carapace elevated—therefore not from Indefatigable Island nor Cowley Mountain, Albemarle.

In the foregoing list we have excluded most of the races of the Galapagos Archipelago. Of all the localities where tortoises ever had been found in the archipelago up to the date of the visit of the present expedition, there remain to be considered only two—Charles Island and southern Albemarle.[7] I doubt if it be possible to decide with certainty from either the description or the plate whether Harlan's type came from Charles Island rather than from Albemarle; but there is other evidence which throws some light upon the question. First, there is the circumstance that most of the early voyagers secured their tortoise from Charles, James, and Hood islands. Second, Porter stated in his journal that the tortoises of Hood Island were similar in appearance to those of Charles Island, the form of the shell being elongate and turned up forward in the manner of a Spanish saddle. Third, Harlan's plate strikingly resembles my specimens from Hood Island, although his measurements show that he had a different and much broader species. Fourth, the few specimens in collections which can be pretty definitely traced to Charles Island agree with Harlan's specimen in having the length over the curve less than the breadth over the curve.

I hold, therefore, that Harlan's specimen came from Charles Island, although we cannot positively prove this to have been the case. This being true, the name *Testudo elephantopus* cannot be used for the distinct race to which Günther applied it.[8] Some might think it best not to use the term at all, sub-

[6]The young are narrower than the adults, so that this statement is true, although in some of the races here enumerated adult individuals may have the curved width greater than the curved length.

[7]The shape of the carapace of the tortoise found on Jervis Island is quite different from Harlan's plate of *T. elephantopus*, and although the carapace of the Barrington Island tortoise is unknown, I think that these islands may safely be ignored as possible places of origin of Harlan's specimen, for the reason that tortoises had never been found upon them by any of the earlier explorers.

[8]See *Testudo güntheri infra*.

stituting for it Baur's later but more definite name *Testudo galapagoensis;* but to me the evidence seems sufficiently conclusive to justify the retention of Harlan's excellent name for the Charles Island tortoise.

4. *Testudo nigrita* Duméril & Bibron. 1835

Regarding this name I quote from Günther:

"No doubt can possibly be entertained as regards the correct application of this name to the species which I am about to describe. It had been given by Duméril and Bibron (Erpétol. Génér. II, p. 80) to two examples, of which the smaller, very young one, is in the Paris Museum, whilst the larger, but also of young age, is the property of the Royal College of Surgeons. Bibron's description is almost entirely drawn up from the latter specimen, which, therefore, must be regarded as the type."

Günther associated with this specimen a large carapace, without plastron, belonging to the British Museum. Nothing is known regarding the origin of these specimens. Günther figured both the type and large carapace, and states that both probably were males. Study of the plates and measurements given has developed no reason for doubting the correctness of Günther's conclusion that these two specimens represent the same species of tortoise.

Since the original specimens of Duméril and Bibron represent animals too young to have developed distinctive specific characters, the attempt to determine to which particular race the name *Testudo nigrita* should apply must rest upon the adult specimen with which Günther later associated it. This specimen has the following measurements:

Straight length	39.25	inches	
Straight width	33.50	"	85%
Length over curve	50.75	"	129%
Width over curve	52.25	"	133%
Width at 2-3d marginals	21.	"	53%

Unfortunately this specimen is incomplete. There remains only the upper shell. However, the circular outline and the great height of the dome-shaped carapace are so characteristic that I have no hesitation in expressing the opinion that it must represent one of two very similar races. These races are the one characteristic of Indefatigable Island, and that found upon Cowley Mountain in central Albemarle. The question then arises, to which of these can the name *Testudo nigrita* be applied.

The differences between the Cowley Mountain tortoise and those of Indefatigable are very slight. Indeed, there is no measurement of the former which cannot be duplicated in some specimen from Indefatigable Island. However, the curved length and the width between second and third marginals are less, and the middle height and difference between curved length and curved width are greater, than is usual in the Indefatigable tortoise. If we take, then, the percentages of these measurements and add the first two (the curved length *plus* width at second to third marginals), and subtract from this the sum of the other two measurements, we have as the result 111, a figure which always is exceeded when we combine in the same way the measurements of any Indefatigable tortoise.

The fact that I have only one tortoise from Cowley Mountain, of course, renders unsafe the conclusion that we have here two distinct races; but, on the other hand, the fact that my 23 specimens from Indefatigable all are alike in this difference from the Cowley specimen gives that conclusion considerable weight.

Unfortunately, we cannot know the middle height of Günther's specimen, but the other measurements enable us to say that it agreed with the Indefatigable tortoises and was unlike the Cowley specimen, unless it had a middle height greater than in any other specimen of any race of Galapagos tortoise.

We seem justified, then, in saying that Günther's *Testudo nigrita* agrees with the Indefatigable tortoise. When, in addition, it is recalled that the early tortoise-hunters frequented Indefatigable Island, but rarely visited Albemarle, I can see no good reason for doubting that this specimen really came from Indefatigable, and that it belongs to the race which recently has been called *Testudo porteri*. However, since conclusions based upon an imperfect specimen of unknown origin must always be open to some question, and especially since this specimen is not the original type upon which the name was established, it seems best to pass over the name *Testudo nigrita,* and to use for the Indefatigable Island race the name *Testudo porteri.*

5. *Testudo planiceps* Gray. 1855

This name was established for a skull of unknown origin. Dr. Günther regarded it as representing the race previously named *Testudo nigrita.* The name has since appeared only in the synonymy of that tortoise.

6. *Testudo ephippium* Günther. 1875

The original description of this species was published by Dr. Günther, in 1875, in the *Philosophical Transactions.* It was based upon a single specimen of unknown origin belonging to the Edinburgh Museum of Science and Arts. Because Porter's remarks on the tortoises of Charles Island applied so well to this specimen, Dr. Günther was originally[1] of the opinion that it represented the Charles Island race, but he later[2] referred it to Indefatigable Island.

Dr. George Baur,[3] in 1889, was convinced that *Testudo ephippium* represented the Abingdon Island race. This was chiefly because of some notes which Dr. Baur found in an edition of Captain Basil Hall's *Extracts from a Journal.*[4] Captain Hall visited the Galapagos Islands in January, 1822. Abingdon was the only island upon which he landed. Speaking of the tortoises, Captain Hall says: "We took some on board, which lived for many months, but none of them survived the cold weather off Cape Horn. I preserved one in a cask of spirits, and it may now be seen in the Museum of the College at Edinburgh; it is about the medium size."

As Dr. Günther remarks,[5] "this discovery received further confirmation when Dr. Traquair, on renewing his inquiries, found in the records of the old College Museum an entry of a 'Large Turtle from South Sea—Captain Basil Hall.' Un-

[1]Trans. Royal Soc. Lond. 1875, pp. 260, 271.

[2]Gigantic Land Tortoises Brit. Mus., 1877, p. 11.

[3]Am. Nat., XXIII, 1889, pp. 1041-1042.

[4]Hall, Extracts from a Journal written on the Coasts of Chili, Peru, and Mexico, in the Years 1820, 1821, 1822. Part II. London, 1840. (Original Edition, Edinburgh, 1824.)

[5]Novitates Zool., III, No. 4, 1896, p. 333.

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fortunately no mark or label is attached to the specimen by which its identification could have been placed beyond question, so that, as Dr. Traquair says at the end of a letter to Dr. Baur, "we have no absolute certainty as to whether our *Testudo ephippium* is the specimen from the South Sea presented by Captain Basil Hall or not."

Recently,[6] Dr. Günther has compared the type of his *T. ephippium* directly with three specimens of the Abingdon tortoise and four specimens from Duncan Island. He finds that the agreement of the Duncan Island specimens with the type of *T. ephippium* is perfect, while marked differences exist between that specimen and those from Abingdon Island.

After careful study of his descriptions, measurements, and plates, in connection with my large series of specimens from Duncan Island, I see no reason to doubt the correctness of Günther's conclusion that the name *Testudo ephippium* may properly be applied to the Duncan Island tortoise.

7. *Testudo microphyes* Günther. 1875

Testudo microphyes was first described by Günther, in 1875, from a small adult individual which he then thought was a male, but which he later concluded was a female. This specimen was without definite locality. Günther at first[7] thought it represented the Hood Island race, but later[8] identified it with specimens from Tagus Cove, Albemarle Island. The merging of the anterior two marginals of each side into a single plate is probably, as Günther remarked, only an individual variation.

Some measurements of the type specimen in the British Museum were made for me, as follows:

Straight length	21.3	inches	100%
Straight width	15.85	"	74.4%
Length over curve	26.45	"	124%
Width over curve	26.5	"	124%
Width at 2-3d marginals	12.4	"	58.2%
Middle height	10.1	"	47.4%
Front height	6.8	"	32%
Height to marginals	.9	"	4.2%
Length of plastron	17.6	"	82.6%

[6]Novitates Zool., III, No. 4, 1896, pp. 329-334.
[7]Trans. Royal Soc. Lond., 1875, pp. 260, 275.
[8]Gigantic Land Tortoises Brit. Mus., 1877, p. 78.

These measurements, as well as Günther's figures, show clearly that the height to marginals is very low in the type specimen. This being true, it must have come from one of three localities, if it represents any of the known non-saddle-backed races. These localities are Chatham, Tagus Cove, and southern Albemarle. The general shape, the great breadth over curve, and the development of the pectoral plates, indicate that it did not originate in Chatham Island. It must, therefore, have come from Albemarle Island. Since there occur in southern Albemarle (Cape Rose) tortoises which I have been unable to distinguish from those of Tagus Cove, any attempt to determine more definitely the place of origin of Günther's type seems needless. If, then, we are right in considering that the tortoises from Cape Rose are identical with those of Tagus Cove, there are two Albemarle races having the general characteristics of the type of *Testudo microphyes.* These are the race found at Tagus Cove (and Cape Rose) and the smooth flat-backed race of southeastern Albemarle, for which I employ the name *Testudo güntheri* Baur. Lacking as I do any females from Tagus Cove, I am unable, from Günther's figures and descriptions, or from the measurements at hand, to indicate any very satisfactory points of distinction between the type of *T. microphyes* and those tortoises from southeastern Albemarle. My opinion, however, is that Günther's type belongs with the Tagus Cove specimens, and my "key" so refers it.

Until it can be shown that his type specimen differs from the specimens taken at Tagus Cove, Günther's later association of the name *Testudo microphyes* with this race should be followed. I therefore employ the name *Testudo microphyes* for the tortoises from Tagus Cove, Albemarle, and for a few specimens taken near Cape Rose on the southern coast of Albemarle Island.

8. *Testudo vicina* Günther. 1875

This name was proposed by Günther[1] for the carapace and skeleton of a large male of unknown origin. Commander Cookson having found at Iguana Cove, Albemarle, a tortoise

[1]Trans. Royal Soc. Lond. 1875, p. 277.

of different shape and general appearance from those captured near Tagus Cove,[2] Günther[3] thought it very probable that Albemarle was inhabited by at least two distinct races. He compared the skull of the type specimen of his *Testudo vicina* with a skull[4] brought by Commander Cookson from Iguana Cove, and, finding them identical, concluded that *Testudo vicina* was the race native to southwestern Albemarle. Many years later, Rothschild obtained specimens from Iguana Cove, and confirmed this opinion, which since then has been accepted quite generally.

The discovery of several races which were not known to Günther, Baur, or Rothschild, makes it necessary to reopen the question, and to consider whether Günther's specimen may not belong to one of the latter rather than to the race with which it has been associated. I find, however, that the only tortoises, aside from South Albemarle specimens, bearing any great resemblance to Günther's type are those from James and Jervis islands; but since I have as yet been unable to find any differences sufficient to enable me to distinguish the single Jervis specimen from the Iguana Cove tortoises, we need consider, in the present connection, only those from James Island.

Günther's type specimen has the following dimensions,[5] in inches and percentages of the straight length:

Straight length	32.9	inches	100%
Straight width	25	"	76%
Length over curve	41	"	125%
Width over curve	40	"	122%
Width at 2-3d marginals	16.75	"	51%
Middle height	16	"	49%
Front height	14.2	"	41%
Height to marginals	2.75	"	8%
Length of plastron	25.5	"	77%

These measurements, like Günther's plate, show that the specimen has not the high convex back and other characteristics of the James Island race, but that it agrees very closely with specimens from Iguana Cove. I can see no good reason for not regarding it as identical with specimens from the latter locality, and, therefore, shall follow all recent authors in

[2]Cookson, Proc. Zool. Soc. Lond. 1876, p. 524.

[3]Gigantic Land Tortoises Brit. Mus., 1877, p. 73.

[4]The single living specimen was lost before reaching England.

[5]These measurements have been in part taken for me with the kind permission of Dr. Boulenger, and in part are derived from Gunther's writings.

the use of the name *Testudo vicina* Günther for the race found at Iguana Cove and throughout southern Albemarle.

9. *Testudo galapagoensis* Baur. 1889

In 1833, Commander John Downes visited the Galapagos Islands in the United States Frigate "Potomac."[6] Charles was the only island on which he landed. The visit there extended from August 31 to September 10. "A large number of the crew were daily on shore after terrapin, and frequently exposed throughout the day to a hot sun, with these immense animals on their backs, traveling over the broken lava." The "Potomac" returned to Boston, May 23, 1834. In the following month, Captain John Downes, of the "Potomac," presented to the Boston Society of Natural History two living gigantic Galapagos tortoises, weighing nearly three hundred pounds each.[7] There would seem to be little room for doubt that these specimens originated in Charles Island.

These tortoises, a male and a female, served as material for a paper, by Dr. J. B. Jackson, entitled *Anatomical Description of the Galapagos Tortoise*,[8] published in 1837. Jackson regarded them as identical with Harlan's *Testudo elephantopus*, it being generally thought that all Galapagos tortoises were of one species.

Of these two specimens, it appears that only the male is still in the collection of the Boston Society of Natural History. The measurements given by Jackson prove it to be the specimen described by him. What became of the female is not known.

In his article published in the *American Naturalist* for December, 1889, Dr. Baur, having compared the skull of the specimen remaining in the collection of the Boston Society with that of a tortoise belonging to the Philadelphia Academy of Sciences, which he mistook for Harlan's original specimen,[9] stated that the two were specifically distinct. Without stating any of the points of difference, Dr. Baur named the

[6]Reynolds, Voyage of the United States Frigate Potomac, 1835, pp. 464-73, 547; *c. f.* Baur, Am. Nat., XXIII, 1889, p. 1039.

[7]Journal Boston Soc. Nat. Hist., I, 1834-37, p. 521.

[8]Tom. cit., pp. 443-64, pls. X, XI.

[9]Regarding the identity of this specimen see remarks under *Testudo elephantopus* Harlan, 1827, p. 245.

Charles Island specimen *Testudo galapagoensis.* Were it not for the fact that Baur specifically refers to this particular specimen in the Museum of the Boston Society of Natural History, this name might be regarded as a *nomen nudum.* It remained for Dr. Günther, in 1902,[10] to point out characters distinguishing *Testudo galapagoensis* from the other races known to him.

To me, the evidence that the type of *Testudo galapagoensis* came originally from Charles Island, although circumstantial, is convincing. Also, I believe that it represents a race distinct from any known from another locality. While Baur was right in his conclusion that it differed from the specimen which he thought was Harlan's type of *T. elephantopus,* he was wrong in so regarding the latter specimen, which, it seems, is merely a young *Testudo vicina* and not Harlan's specimen at all. Therefore, it never has been shown that Jackson's specimens, one of which became the type of Baur's *Testudo galapagoensis,* were not the same as Harlan's *T. elephantopus.* I have already[12] given my reasons for thinking that Harlan's specimen represented the Charles Island race. If I am right in this view, Harlan's *Testudo elephantopus* and Baur's *Testudo galapagoensis* are synonyms. The former is much the older term.

10. *Testudo güntheri* Baur. 1889

In his article on Gigantic Land Tortoises of the Galapagos Islands,[13] published in 1889, Dr. George Baur proposed the name *Testudo güntheri* for the species described by Dr. Günther as *Testudo elephantopus* Harlan. The specimen figured by Dr. Günther may be regarded as the type. This specimen, as I have stated in discussing *T. elephantopus,* is of indefinite origin. The carapace is depressed, with somewhat elevated front; width over curve greater than length over curve; height to marginals low; and pectoral plates well-developed. In shape, it resembles the Chatham Island tortoise, but differs in the greater breadth over curve and in the development of the pectoral plates. It, seemingly, is identical with the smooth,

[10]Novitates Zool., IX, July, 1902, pp. 184-92, pls. XVI-XXI.

[12]p. 247 *ante.*

[13]Baur, Am. Naturalist, XXIII, Dec. 1889, p. 1044.

depressed race found in southeastern Albemarle, in which the height to marginals is low. *Testudo güntheri,*[14] therefore, is available as a name for that tortoise.

11. *Testudo wallacei* Rothschild. 1902

Rothschild proposed this name for a carapace of unknown origin. He says it belongs to the section including *T. vicina.* It is not saddle-shaped, but in other respects seems nearer to *Testudo galapagoensis* than to any other race. It differs from *T. galapagoensis* in its greater depth, much narrower anterior portion of carapace, convex marginal plates, and in being strongly declivous in front. The total length in a straight line is 32.25 inches. From the fact that between the years 1800 and 1835 most of the giant tortoises were got on James and Chatham islands, and that Captain Porter says the James Island ones were round, Rothschild was of the opinion that this carapace represented the Chatham Island species.

It would be quite impossible, I think, from this brief description alone to form an opinion of any value as to the identity of *Testudo wallacei.* Fortunately, however, I now have before me a photograph of Rothschild's specimen. Since Mr. Rothschild's article appeared we have received tortoises from both Chatham and James islands. *T. wallacei* is very different from the Chatham Island race. The only tortoises which Mr. Rothschild's specimen at all resembles are those of Charles, James, and Jervis islands, and one race of southern Albemarle. Rothschild himself has given reasons for regarding it as distinct from the specimens which are believed to have come from Charles Island. We need consider, then, only its relationship to the tortoises of James, Jervis and southern Albemarle.

The James Island tortoise is one of the races which may be considered as intermediate between the saddle-backed and non-saddle-backed groups. It is narrow, with a long plastron; and is high in front, with a still higher, somewhat dome-shaped, back. The Jervis and Iguana Cove tortoises have more horizontal backs sloping down anteriorly. The curved length

[14]Dr. Hans Gadow (Trans. Zool. Soc. Lond. 1894, p. 320) has proposed the name *Testudo güntheri* for certain fragmentary specimens from Mauritius. This term being preoccupied by Baur's application of it to a Galapagos tortoise, Dr. Gadow's species may be called *Testudo gadowi.*

is less, the straight width is usually greater, the plastron shorter.

In the Iguana Cove tortoises the curved width averages greater than the curved length, while in the James and Jervis tortoises the reverse is true.

There is current in the islands a rumor, which I have been unable to substantiate, that the tortoises on Jervis Island were introduced there by Dr. Baur. If this rumor is founded upon fact, the tortoises must have originated in southern Albemarle, and are, of course, identical with the *T. vicina* of that region. Certainly the Academy's specimen from Jervis has many points of resemblance to those from Iguana Cove. The curved length is greater, but I am unable to point out other definite points of distinction; although one gets the impression that differences exist, and would probably become evident, had one a series of specimens to compare. All this being true, it seems best, pending further information, to regard the Jervis Island tortoise as native to, and characteristic of, that island. I do not, however, feel justified in giving it a new name.

Rothschild gives only the straight length of his type of *T. wallacei*, and without other measurements it is hazardous to attempt to say which form it represents. However, the photograph before me shows a flat-backed shell which differs in many respects from my James Island specimens, while it seems to agree much more closely with the Jervis Island tortoise and the *T. vicina* from southern Albemarle. Rothschild had specimens of *T. vicina* with which to compare his *T. wallacei*, and evidently thought them distinct, although he says they belong to the same section. This leaves only the Jervis tortoise. I confess it is with a certain lack of confidence that I have concluded to use the name *T. wallacei* for this Jervis Island tortoise. Nevertheless it seems the best way out of two difficulties.

Having thus considered these questions of nomenclature we may now return to our list of races and apply to them the following names:

1. Abingdon .... *T. abingdoni* Günther.
2. James .... *T. darwini* Van Denburgh.
3. Jervis .... *T. wallacei* Rothschild.
4. Duncan .... *T. ephippium* Günther.
5. Indefatigable .... *T. porteri* Rothschild.
6. Barrington .... *T. sp.*
7. Chatham .... *T. chathamensis* Van Denburgh.
8. Hood .... *T. hoodensis* Van Denburgh.
9. Charles .... *T. elephantopus* Harlan.
10. Narborough .... *T. phantastica* Van Denburgh.
11. Vilamil, Albemarle .... *T. güntheri* Baur.
12. Iguana Cove, Albemarle .... *T. vicina* Günther.
13. Tagus Cove, Albemarle .... *T. microphyes* Günther.
14. Bank's Bay, Albemarle .... *T. becki* Rothschild.
15. Cowley Mountain, Albemarle...... *T. sp.*

2. DESCRIPTION.

It next becomes necessary to investigate the differences which distinguish these races of land tortoises one from another, to endeavor to find the limits of their variation, and to point out those characters which are available for their classification. This investigation we may divide into a consideration of external characters and an examination for osteological differences. The external characters may be divided into those of the shell, and those of the soft parts—the head, neck, limbs, and tail.

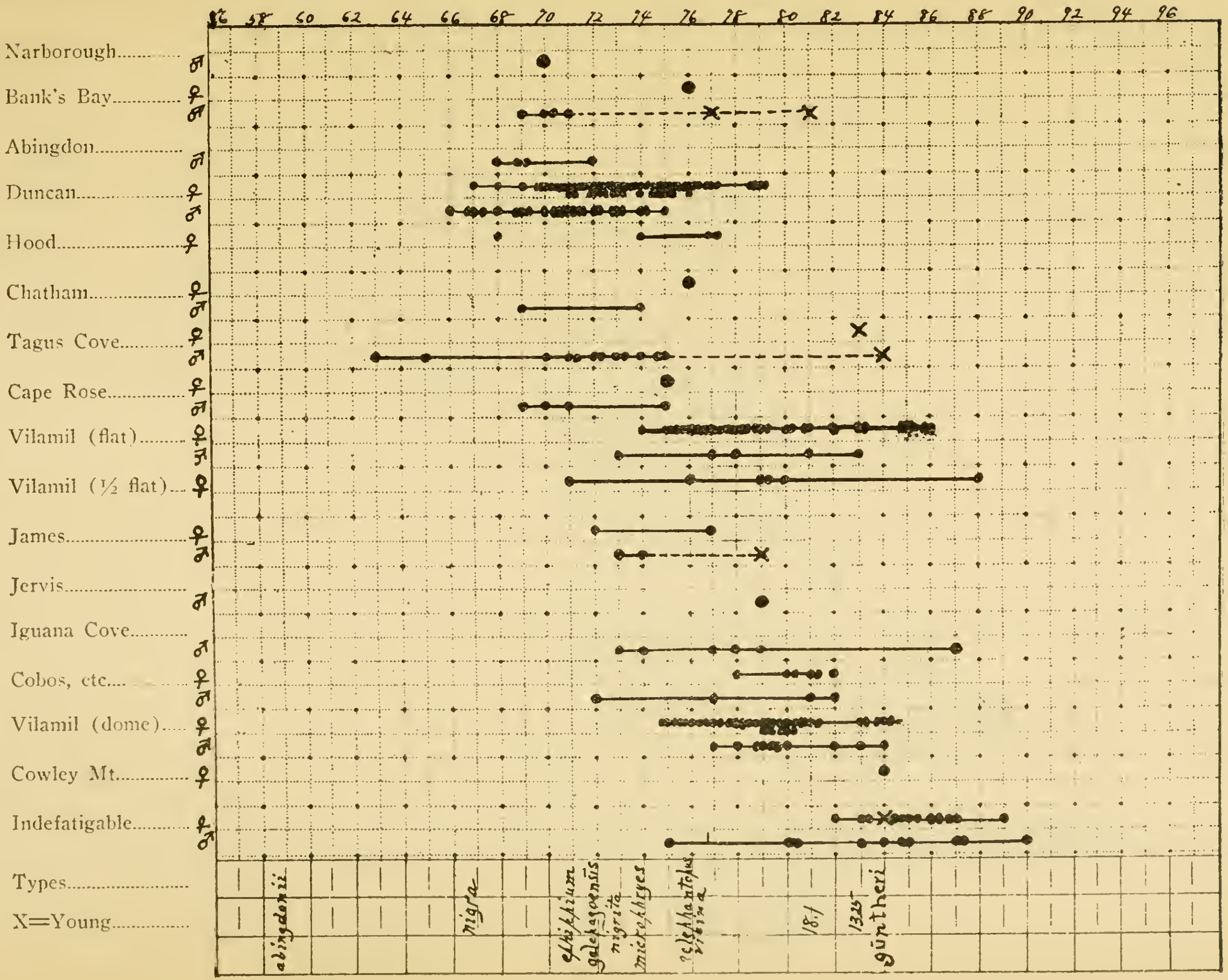
THE SHELL—Is covered with horny plates which do not differ in number,[1] but which vary in outline according to the shape of the bony shell. In young tortoises these plates bear striations corresponding to the lines of growth. Older individuals become smoother, but in certain races this tendency seems to be developed more strongly than in others. The oldest individuals of almost all races lose these striations. In certain races, the central portions of the vertebral and costal plates are elevated much more than in others. There are also marked differences in the lateral outline of the marginal plates. The upper border of the eighth marginal plate in *Testudo abingdoni* is much shorter than in any other race. In the Duncan Island tortoises one finds an occasional specimen with the pectoral plates reduced in size so that they do not meet on the median line. This tendency becomes more constant in *T. chathamensis.* It is unknown in any of the other races.

[1]Except as individual variations. See *T. ephippium* and *T. microphyes.*

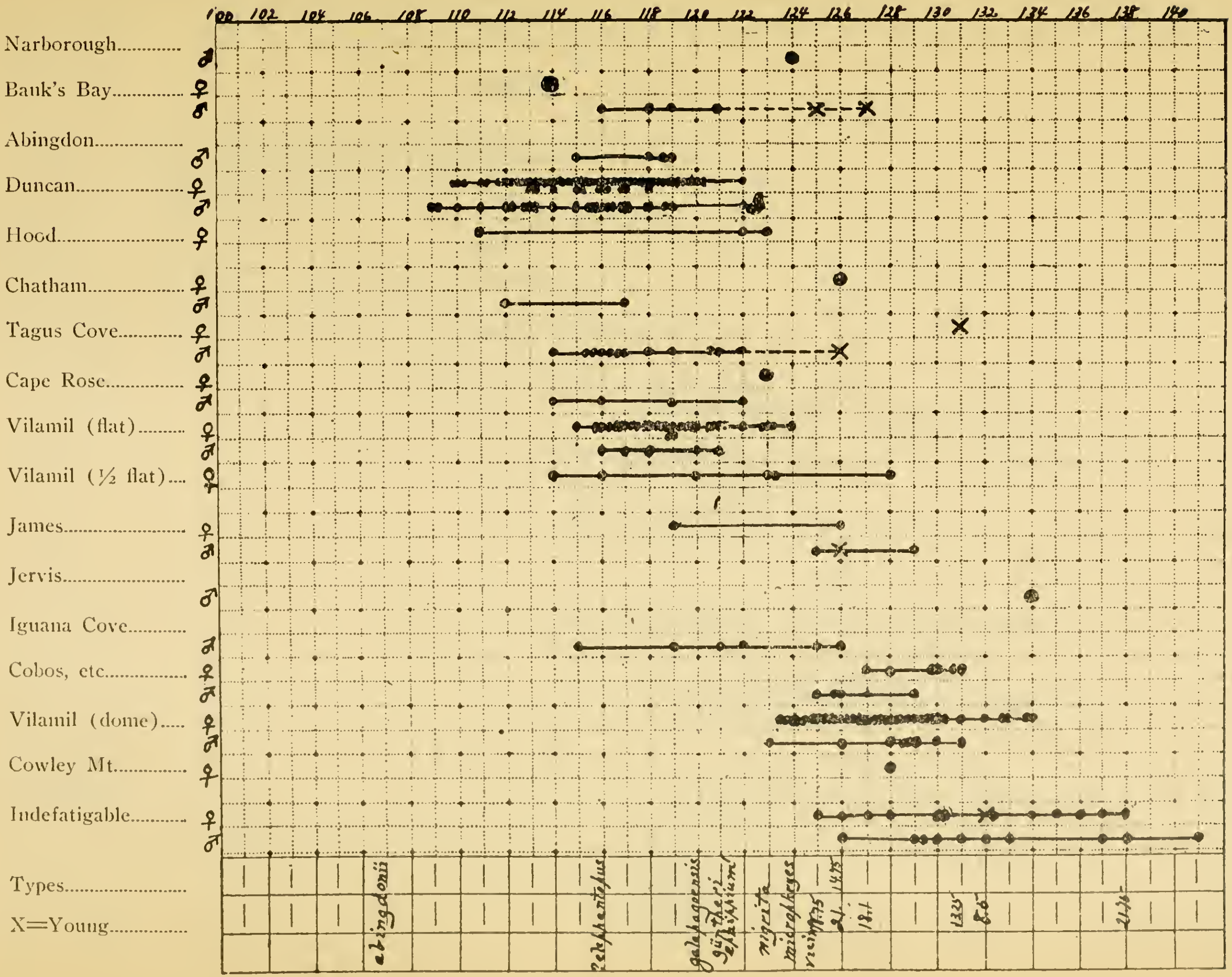
In certain specimens from Vilamil (*T. güntheri*) one notes a curiously pitted surface on some of the plates, as though they were diseased. It is due to unequal shedding of the layers of the horny plates. Why it should be confined to this region, I cannot explain. Differences in color are very slight, but one specimen shows on one plate a single diagonal clear yellow ray, probably due to the absence of pigment cells at one point of growth.

When one sees side by side tortoises from several islands, the differences which are most evident are those in the shape of the shell. But, while these differences are noticeable and real, they are subject to so much variation that their formulation is most difficult, not to say confusing. In order to avoid hopeless indefiniteness it is necessary to devise some means of expressing and comparing upon paper these variations in shape. It was found that this could best be done by taking numerous measurements of each tortoise and reducing all these measurements to percentages of the (straight) length of the tortoise In this way, the measurements of tortoises of all sizes may be directly compared. The tortoise is placed upon a level board or table in such a position that as nearly as possible it rests naturally upon the entire length of the plastral bridge of each side. With the tortoise in this position, the straight length is the distance between verticals erected at the nuchal notch and at the posterior border of the supracaudal plate. The straight width is the distance between verticals erected at the sides of the tortoise opposite the line of meeting of the second and third costal plates. The curved length is measured with a tape-measure over the midvertebral line from the nuchal notch to the posterior edge of the supracaudal plate. The curved width is taken from the bend in the marginal plates up along the line of meeting of the second and third costals, across the middle of the third vertebral, down between the second and third costals, to the line of bending of the marginals. The width second-to-third-marginals is the straight width at the level of the lateral margins of the sutures between the second and third marginal plates of each side. The middle height is the vertical distance between the board or table and the middle of the third vertebral plate, and is taken with a square and spirit-level. The front height is taken in the same manner at the nuchal notch. The height to marginals is the vertical distance from the table to the lower border of the marginal plates at about the middle of the plastral bridge. The plastron is measured with a tape along the median line—the tape is not pushed into plastral depressions, and when the plastron is notched the projections are not measured.

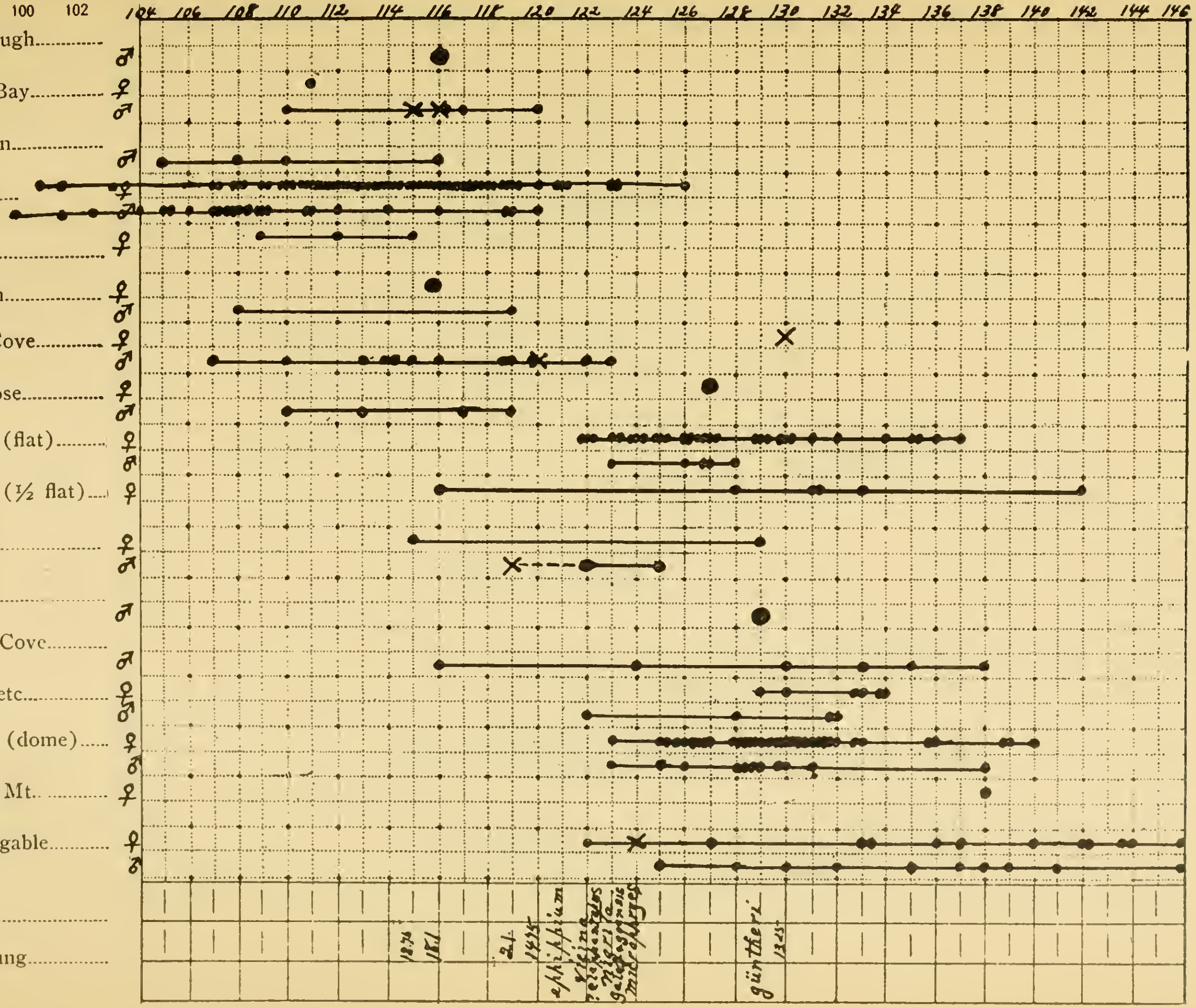
The actual measurements of the tortoises in the collection of the Academy will be given under each species. For purposes of comparison I have made charts showing each dimension as found in all the races represented. The males and females are charted on separate lines. Each medium-sized or adult specimen is represented by a dot, while the young are indicated by crosses. Certain combinations of these measurements are also charted.



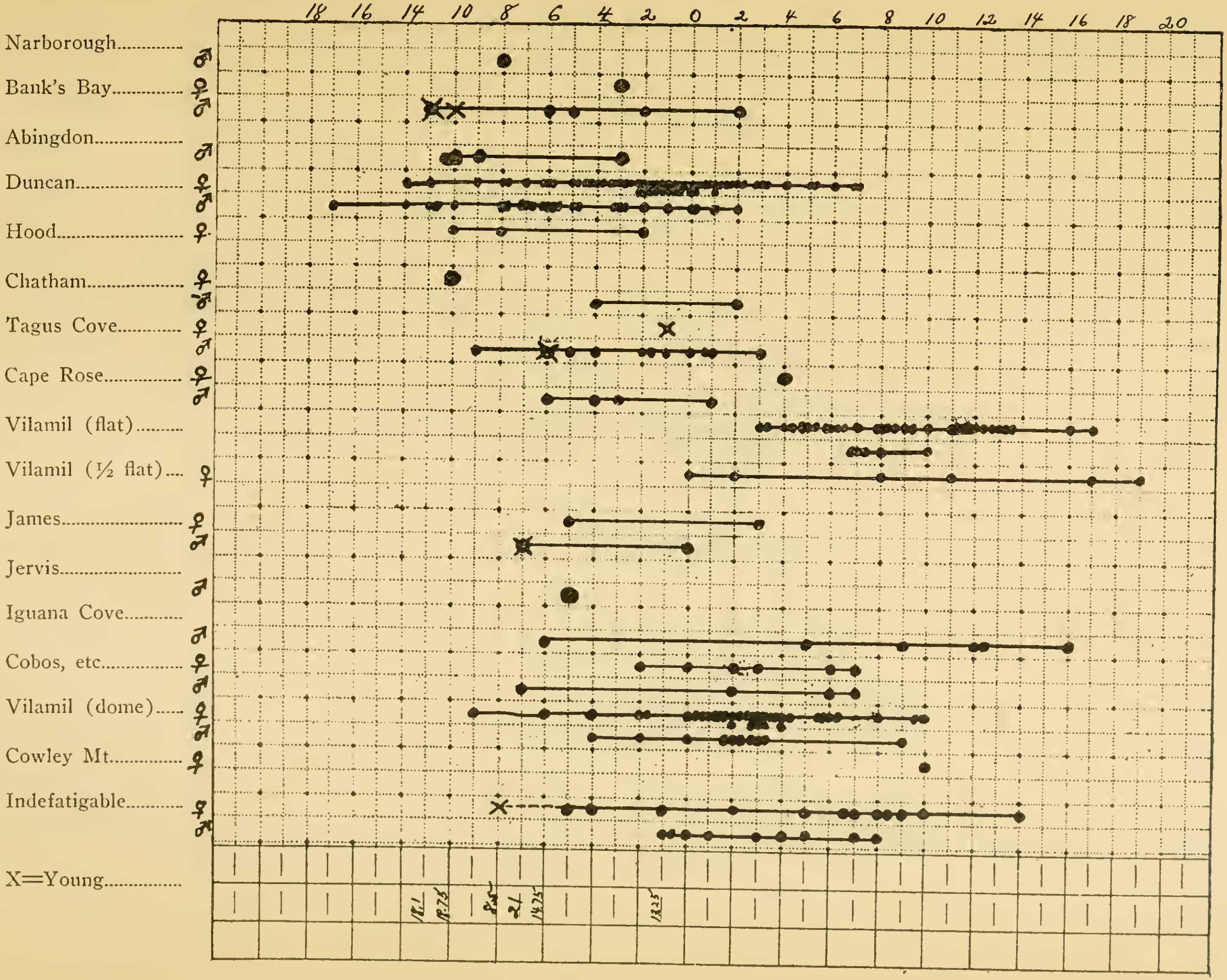
Straight Width.



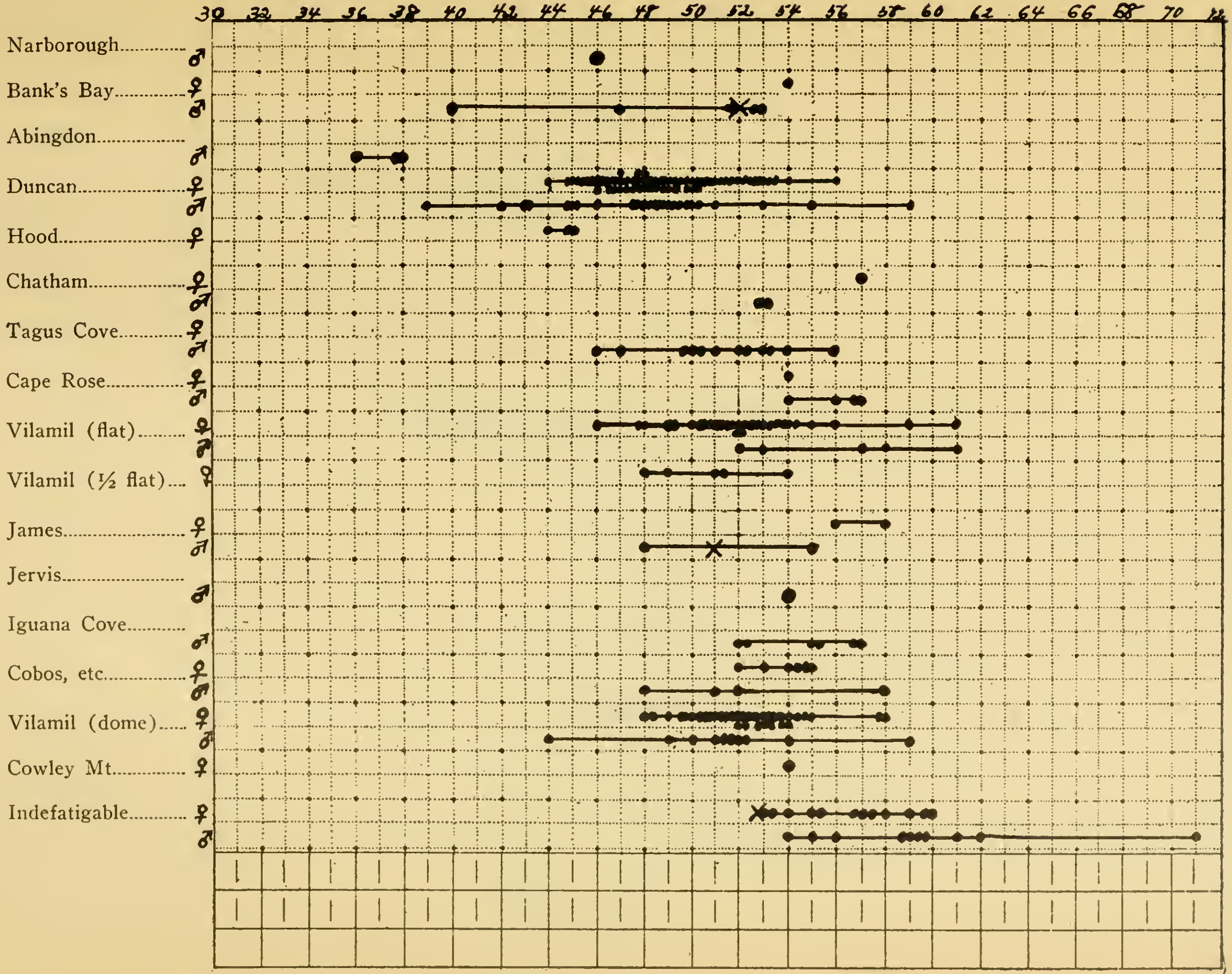
Length Over Curve.



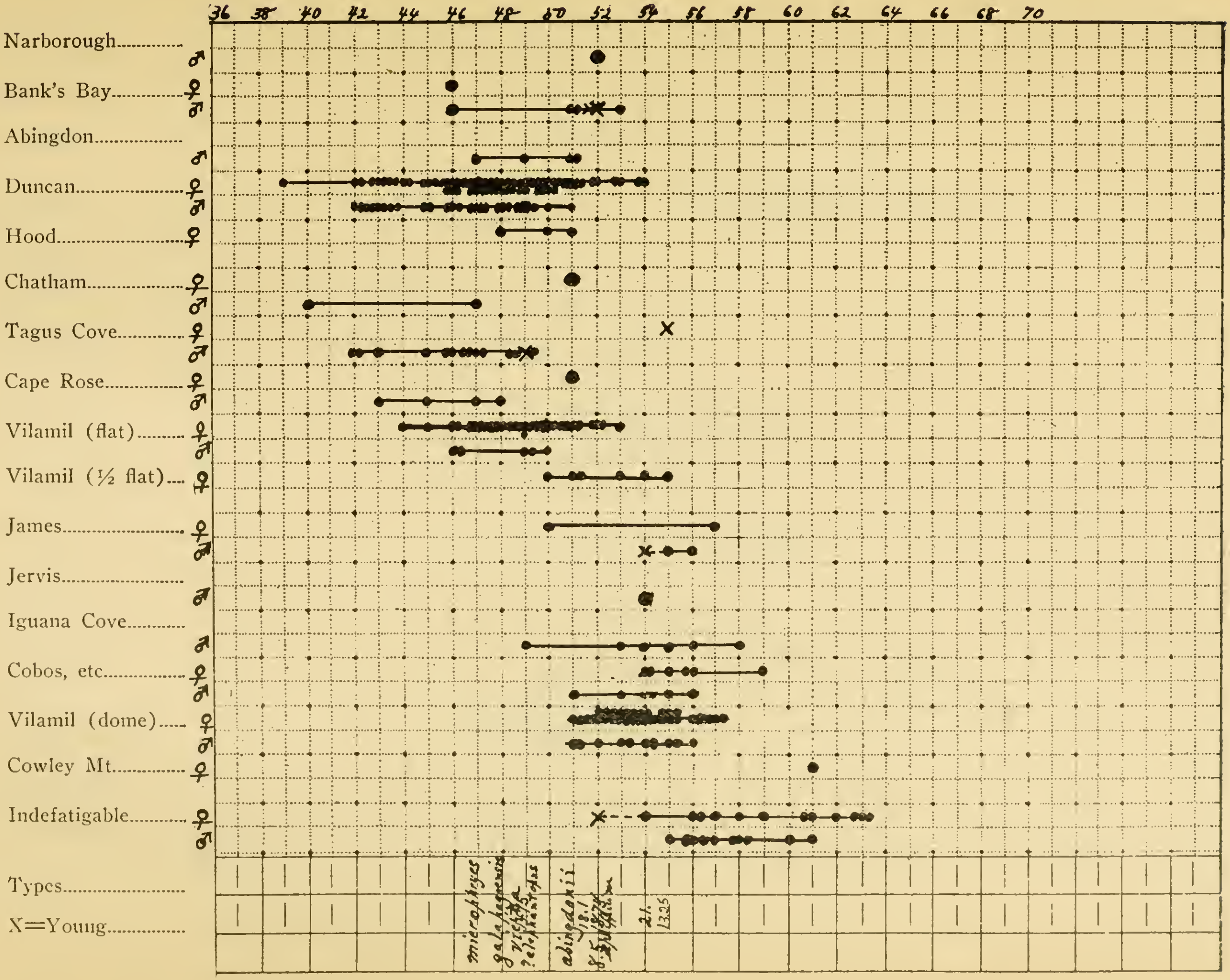
Curved Width.



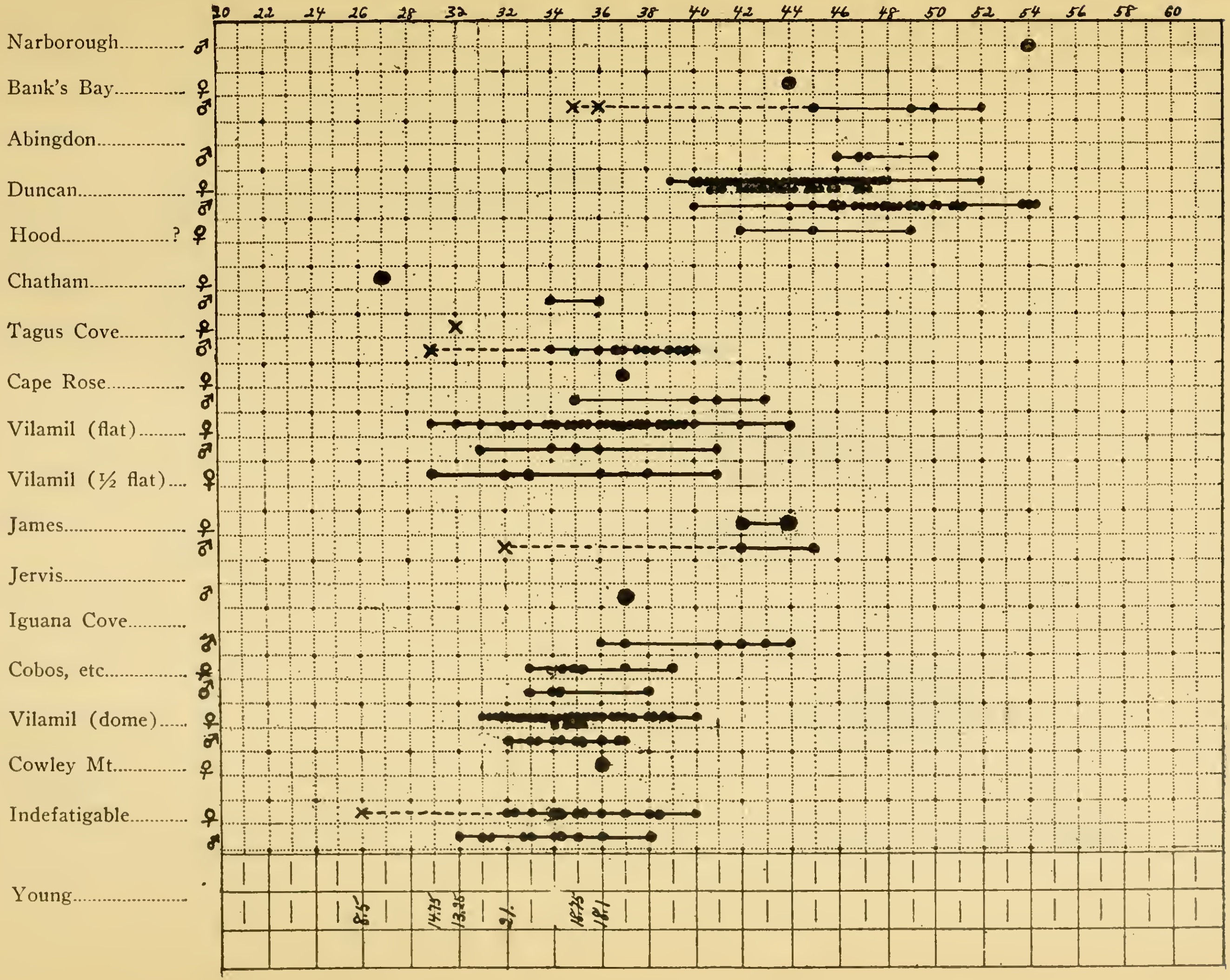
Curved Width Exceeds Width——Curved Width Exceeds Length.



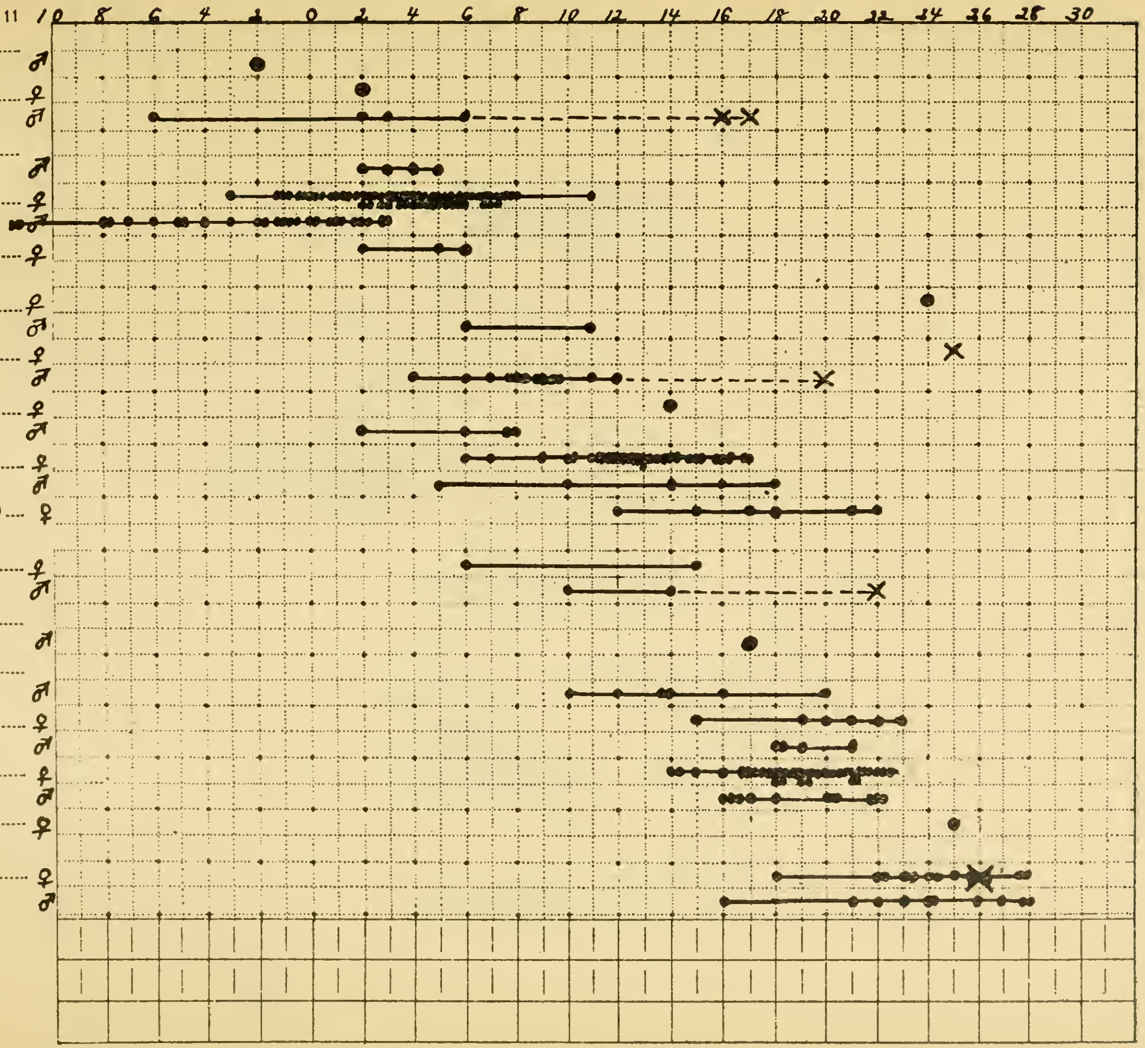
Width at 2d to 3d Marginals.



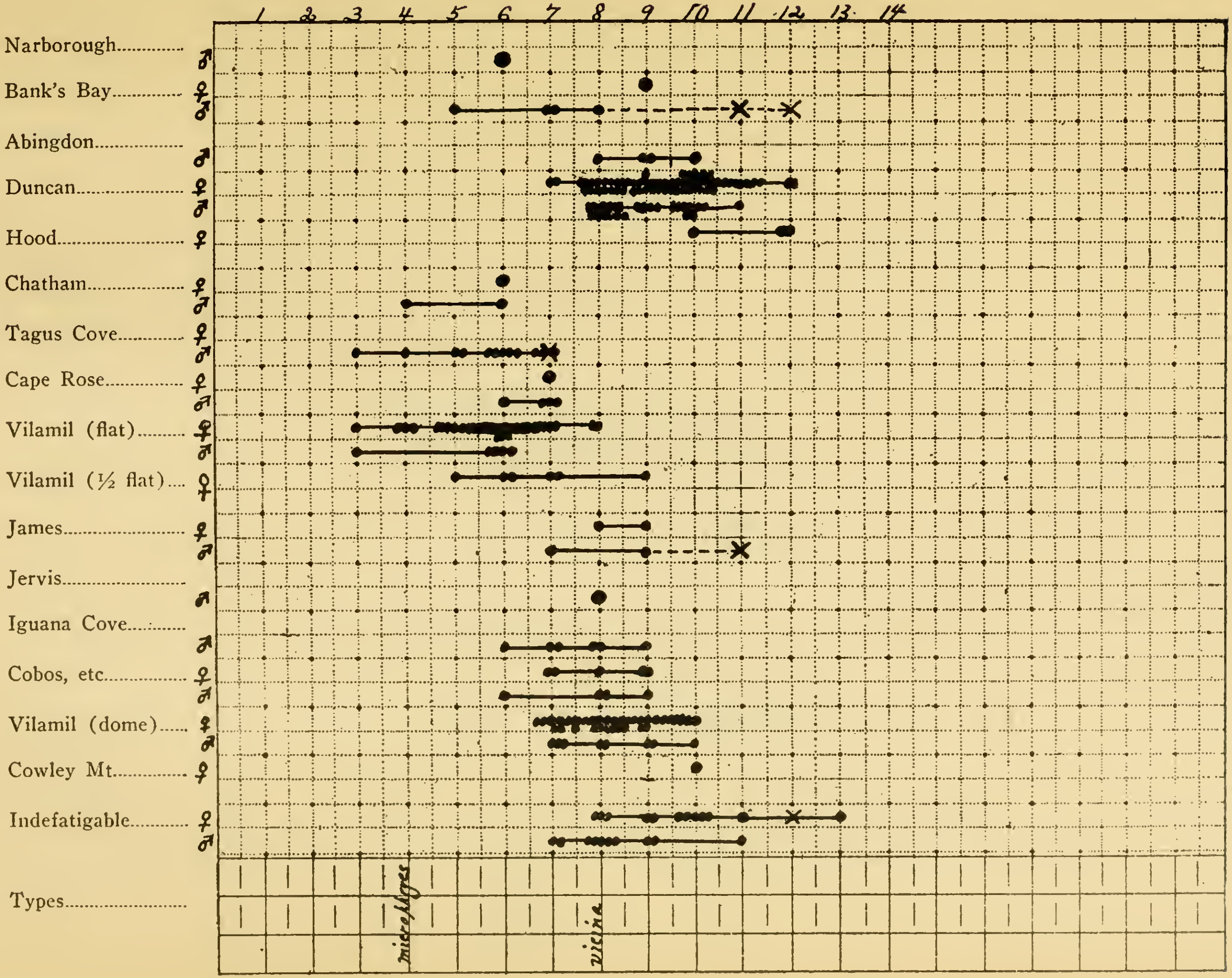
Middle Height.



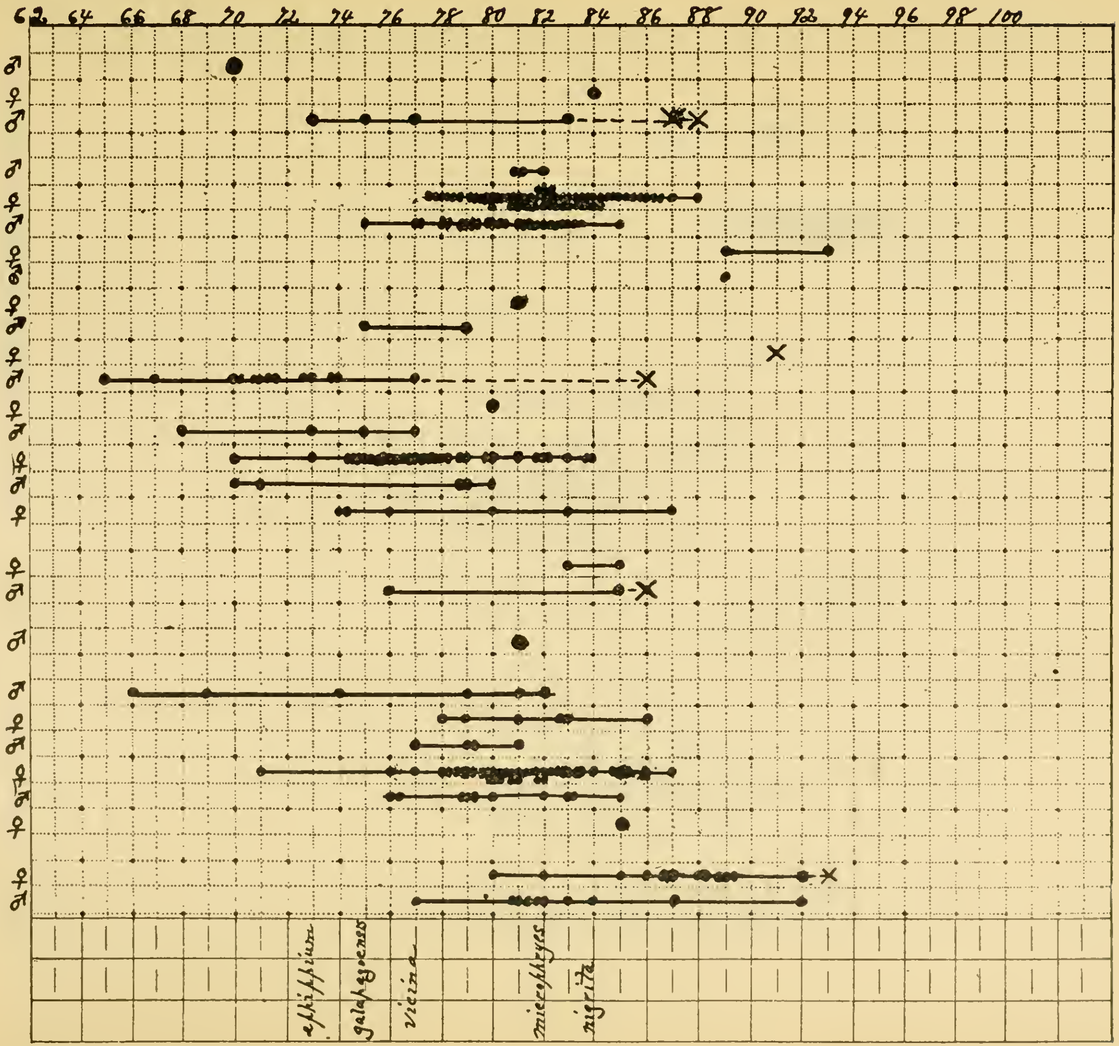
Front Height.



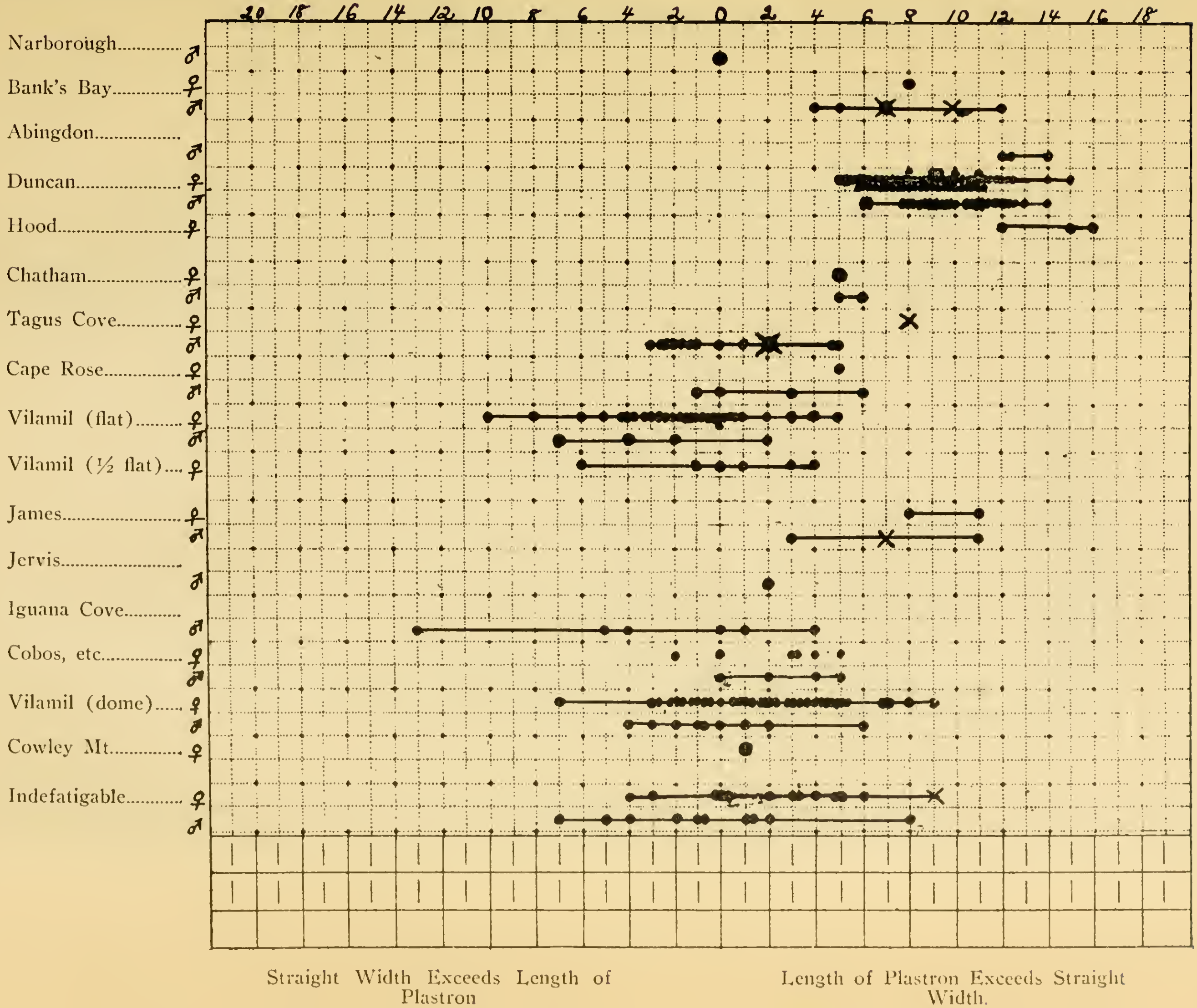
Front Height Compared with Middle Height.

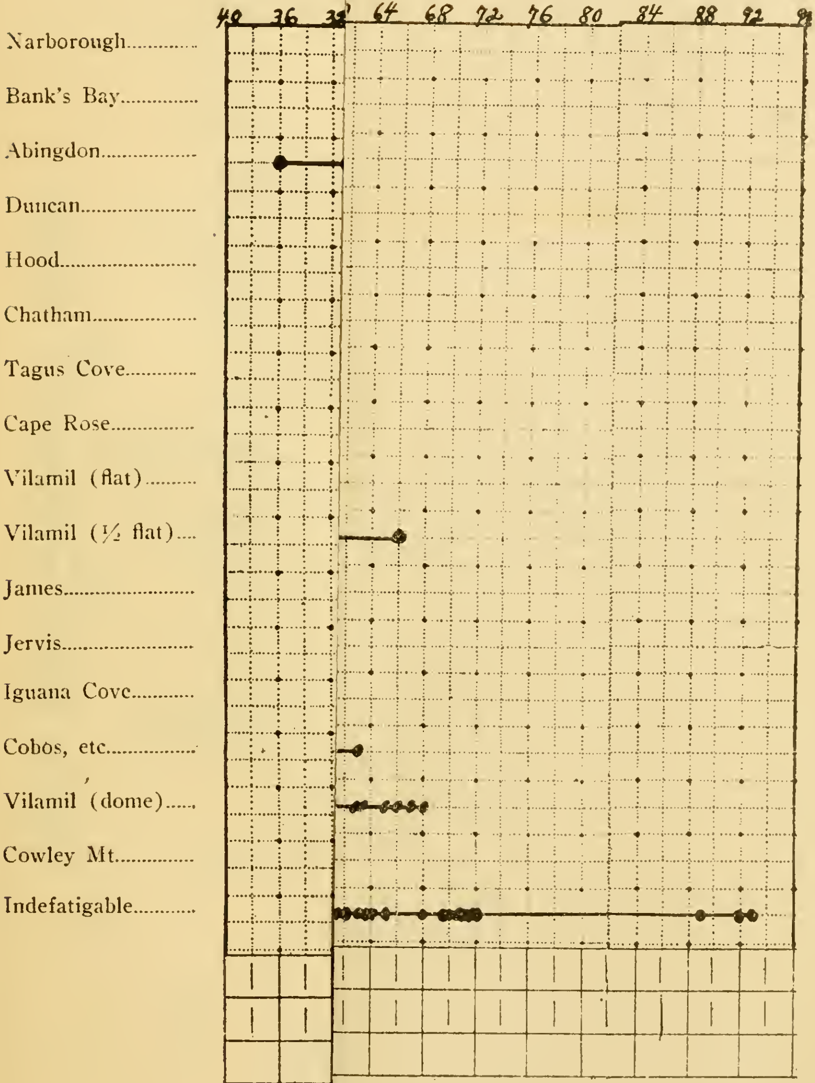


Height to Marginals.



Length of Plastron.


20 18 16 14 12 10 8 6 4 2 0 2 4 6 8 10 12 14 16 18
Narborough ♂
Bank's Bay ♀ ♂
Abingdon ♂
Duncan ♀ ♂
Hood ♀
Chatham ♀ ♂
Tagus Cove ♀ ♂
Cape Rose ♀ ♂
Vilamil (flat) ♀ ♂
Vilamil (½ flat) ♀
James ♀ ♂
Jervis ♂
Iguana Cove ♂
Cobos, etc. ♀ ♂
Vilamil (dome) ♀ ♂
Cowley Mt. ♀
Indefatigable ♀ ♂
Straight Width Exceeds Length of Plastron
Length of Plastron Exceeds Straight Width.


40 36 32
64 68 72 76 80 84 88 92
Narborough
Bank's Bay
Abingdon
Duncan
Hood
Chatham
Tagus Cove
Cape Rose
Vilamil (flat)
Vilamil (½ flat)
James
Jervis
Iguana Cove
Cobos, etc
Vilamil (dome)
Cowley Mt
Indefatigable

"a²."

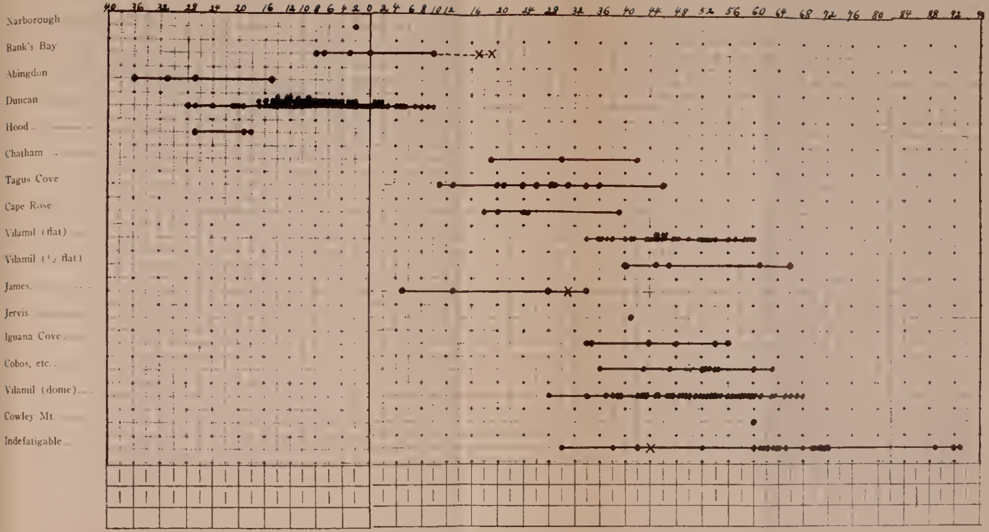


Chart Showing Division into Saddle-Backed and Non-Saddle-Backed Races According to Key Divisions "a" and "a²"

TABLE OF AVERAGE MEASUREMENTS OF TORTOISES.

Locality	Number	Sex	Straight Width Per Cent	Curved: Length Per Cent	Curved: Width Per Cent	Curved: Width Minus Length Per Cent	Width 2d to 3d marginals—Per Cent	Height: Middle Per Cent	Height: Front Per Cent	Height: Middle Minus Front Per Cent	Height to marginals Per Cent	Plastron Per Cent	Fore Limb Per Cent	Hind Limb Per Cent	Axilla to Elbow Per Cent	Neck Per Cent	Tail Per Cent
Narborough	1	♂	70	124	116	—8	46	52	54	—2	6	70					
Bank's Bay	2	young	79	126	115.5	—10.5		52	35.5	16.5	11.5	87.5	53	49	28	54	15
Bank's Bay	1	♀	76	114	111	—3	54	46	44	2	9	84					
Bank's Bay	4	♂	70	118.5	116	—1	48	50	49	1	7	77	56	50	27	72	16
Abingdon	4	♂	69.5	118	107	—8	37	50	47.5	3.5	9	81	60	53	29	63	17
Duncan	61	♀	73	115	114	—15	49	48	44	3.5	9	82	55	51	29.5	63	8
Duncan	25	♂	71	115	109	—6	48	46	48	—2	9	80	56	52	29	69	13
Hood	2	♀	75.5	117	112	—5	44.5	49.5	45.5	4	11	91	55	50	33	52	7
Hood	1	♂	77	122	112	—10	45	50	45	5	12	89	56	52	27	59	7
Chatham	1	♀	76	126	116	—10	46	51	27	24	6	81	46	45	21	52	13
Chatham	2	♂	71.5	114.5	113.5	—1	53	43.5	35	8.5	5	77					
Tagus Cove	2	young	83.5	128.5	125	—3.5		52	29.5	22.5	7	88.5	43	41		49	9
Tagus Cove	12	♂	71	118	116	—2	51	46	37.5	8	5	71	45.5	40.5	26.5	53	12
Cape Rose	1	♀	75	123	127	+4	54	51	37	14	7	80	53	47	22	53	7
Cape Rose	4	♂	69	118	115	—3	56	46	40	6	7	73	48	42	24	46	11
Vilamil (flat)	30	♀	79	119	127	+9	52	49	35	13	6	78	47	42	21	48	7
Vilamil (flat)	5	♂	78	118	126	+8	56	48	35	13	5	74	45	41	25	51	10
Vilamil (half flat)	6	♀	79	121	130	+9.5	51	52	35	17.5	7	79	49	40	24	50	5
James	1	young	79	126	119	—7	51	54	32	22	11	86					
James	2	♀	74.5	122.5	121.5	—1	57	53.5	43	10.5	8.5	84					
James	2	♂	73.5	127	123.5	—3.5	51.5	55.5	43.5	12	8	80.5	49.5	44.5	30	59	13.5
Jervis	1	♂	79	134	129	—5	54	54	37	17	8	81	53	44	25	57	17
Iguana Cove	6	♂	78	122	129	+8	55	54	40.5	14	7.5	75	51.5	45	31	55	11
Vilamil Dome	35	♀	79	127	130	+3	54	54	35	19	8.5	81	46	39	25.5	51	9
Vilamil Dome	10	♂	80	128	129	+2	51	53	34.5	19	8	80	47.5	43	25	51	10.5
Cowley Mt.	1	♀	84	128	138	+10	54	61	36	25	10	85	48	49	27		9
Indefatigable	1	young	84	132	124	—8	53	52	26	26	12	93					
Indefatigable	9	♀	85	132	139	+7	56	60	36	25	9	86	47	45	28	51	7
Indefatigable	9	♂	83	133	135	+3	60	58	33	23	8	82	52	47	25.5	57.5	11

TABLE OF EXTREME MEASUREMENTS OF TORTOISES.

Locality	Number	Sex	Straight		Curved		Width 2d to 3d marginals	Height		Height to marginals	Plastron	Fore Limb	Hind Limb	Axilla to Elbow	Neck	Tail
			Length Inches	Width Per Cent	Length Per Cent	Width Per Cent	Per Cent	Middle Per Cent	Front Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent
Narborough	1	♂	34.5	70	124	116	46	52	54	6	70					
Bank's Bay	1	♀	21.75	76	114	111	54	46	44	9	84					
Bank's Bay	4	♂	34-41.5	69-71	116-121	110-120	40-53	46-53	45-52	5-8	73-83	50-62	47-54	24-32	64-78	12-18
Abingdon	4	♂	29.3-36	68-72	115-119	105-116	36-38	47-51	46-50	8-10	81-82	57-62	47-58	24-33	51-74	15-18
Duncan	63	♀	18.4-27	67-79	110-122	100-126	44-56	39-54	39-52	7-12	78-88	52-60	48-59	25-31	60-66	2-11
Duncan	25	♂	23.25-29.5	66-75	109-122	99-120	39-59	42-51	40-54	8-11	75-85	55-60	49-56	24-33	61-75	11-14
Hood	2	♀	19.75-21	74-77	111-123	109-115	44-45	48-51	42-49	10-12	89-93	55	50	33	52	7
Hood	1	♂	22.2	77	122	112	45	50	45	12	89	56	52	27	59	7
Chatham	1	♀	22.5	76	126	115	46	51	27	6	81	46	45	21	52	13
Chatham	2	♂	25.25-35.25	69-76	112-117	108-119	53	40-47	34-36	4-6	75-79					
Tagus Cove	12	♂	34.5-40.5	62-75	114-122	107-123	46-56	42-49	33-40	3-7	65-77	36-50	26-46	24-29	48-57	10-16
Cape Rose	1	♀	25	75	123	127	54	51	37	7	80	53	47	22	53	7
Cape Rose	4	♂	29.2-38	69-75	114-122	110-119	54-57	43-48	35-43	6-7	68-77	44-51	41-43	23-26	45-47	9-12
Vilamil (flat)	30	♀	24-28.8	74-86	115-124	122-137	46-61	44-53	29-44	3-8	70-84	42-55	36-49	18-24	48-52	5-9
Vilamil (flat)	5	♂	24.5-40	73-83	116-121	123-128	52-61	46-50	31-41	3-6	70-80	45	41	25	51	10
Vilamil (half flat)	6	♀	23.7-27.8	70-88	114-128	116-142	48-54	50-55	29-41	5-9	74-87	49	40	24	50	5
James	2	♀	25.75-30	72-77	119-126	114-129	56-58	50-57	42-44	8-9	83-85	48-52	44-48	20-23	44-54	6-9
James	3	♂	21-40.25	73-79	125-129	119-125	48-55	54-56	32-42	7-11	76-86	47-52	43-46	30	56-62	9-18
Jervis	1	♂	36.2	79	134	129	54	54	37	8	82	53	44	25	21	17
Iguana Cove	6	♂	34.3-43	73-87	115-126	116-138	52-57	49-58	36-44	6-9	66-82	47-51	40-55	28-33	51-68	10-13
Cobos, etc.	6	♀	26.3-30.2	78-82	127-131	129-134	52-55	54-59	33-39	7-9	78-36					
Cobos, etc.	4	♂	32-40.5	72-82	125-129	122-132	48-58	51-56	33-38	6-9	77-81	43-53	41-46	24-26	49-50	11-13
Vilamil (dome)	35	♀	21.25-31.2	75-84	124-134	123-140	48-58	51-57	31-40	7-10	71-87	30-53	28-47	22-30	46-54	6-12
Vilamil (dome)	10	♂	24-33.2	77-84	123-131	123-138	44.59	51-56	32-37	7-10	76-85	44-50	35-46	22-27	47-54	9-12
Cowley Mt.	1	♀	26-75	84	128	138	54	61	36	10	85	48	49	27		9
Indefatigable	12	♀	21.75-35.8	82-89	125-138	122-146	53-60	54-63	32-40	8-13	80-92	43-49	40-48	26-30	46-58	5-8
Indefatigable	10	♂	23.6-41.4	75-90	126-141	125-146	54-71	55-61	30-38	7-11	77-92	48-60	45-51	23-29	56-59	7-16

Examination of these charts shows four kinds of variation in shape:

1. Variation with age.
2. Variation with sex.
3. Variation with distribution.
4. Individual variation.

1. *Variation with age.*—Young tortoises of all races are similar in shape. The racial characteristics become evident only after the tortoises have attained a considerable size. The differences between the young and adult are more marked in the male than in the female, and in the so-called saddle-backed than in the non-saddle-backed races. In other words, the young are all more or less dome-shaped, the elevation and constriction of the anterior portion of the carapace in the saddle-backed races being acquired later in life.

In the young, the front height averages less; while the middle height, the height to marginals, the curved length, the length of plastron, and the straight width average more than in the adult. The plastron is flat, notched posteriorly, and lacks the posterior knob-like thickenings which later develop in the males.

2. *Variation with sex.*—In the purely dome-shaped races, such as that of Indefatigable Island, there is but little difference in shape between the sexes. In the intermediate races, such as those of Tagus Cove, Iguana Cove, James and Chatham Islands, the female retains the high-backed, low-fronted carapace; while in the male the anterior portion becomes elevated, and the back, in consequence, appears flattened. In the saddle-backed races, the males have the anterior portion raised still higher, so that it sometimes is higher than the middle of the carapace, and the first costal plates with the corresponding marginals appear as though pressed inward toward the median line. The females of these races show this elevation and constriction, but in a lesser degree.

In adult males the plastron often is quite concave, is shorter than in females, and is thickened at its posterior extremity into broad knob-like masses. These tumefactions seem to be peculiar to the males except in one race. In *Testudo güntheri* of southeastern Albemarle many of the female tortoises have these knobs as highly developed as in any male.[1]

The females are broader than the males. In them also the height to marginals usually is greater. The males attain a much larger size than the females.

3. *Variation with distribution.*—We have already stated that the tortoises from any island differ in shape from those from any other. When we consider how close these islands are one to another, it is not strange that these differences should be slight; nor are they the less interesting and worthy of study on this account. When we compare *Testudo abingdoni* with the tortoise of Indefatigable, or that of Narborough with that of Chatham, the differences are, indeed, great. Had we specimens from these islands only, we should, without hesitation, regard them as very distinct species. But when we have before us a large number of tortoises from many islands, we find that the matter of their separation becomes most difficult. When we chart our measurements, we see at once that, while certain forms are very dissimilar, others are much less so, and that when the entire group of races is considered the change is so gradual that no sharp lines of distinction can be drawn. It is evident that there are two main groups: the saddle-backed and non-saddle-backed races. But the differences between even these are to a great extent bridged by such forms as the James (*T. darwini*), the Tagus Cove (*T. microphyes*), and the Chatham Island (*T. chathamensis*) tortoises. Nevertheless, the differences are real, and appear in the table of averages. The extremes of individual variation in races so closely related must overlap and prevent clear diagnosis, unless this variation can in some way be hidden. Now, extremes of variation in any one tortoise rarely affect more than a few measurements. It therefore is possible, by selecting the measurements which best bring out the racial differences, and by combining them in various ways, to bury, as it were, the extremes of individual variation by a process of summation of characters. It is only in this way that we can hope to make a key for the separation of the various races. Even when thus constructed the key must be inadequate for the separation of some specimens. All

[1]Since this seems to be true also in the type of Günther's *T. microphyes* I was at first inclined to associate the latter name with this race, but it seems better to follow Günther's use of the term. See remarks p. 253 *ante*.

that can be said for it is that it seems the only solution of a most difficult problem, and must be regarded as a necessary evil.

Although sharp lines cannot be drawn between the various races, I shall use binomials in referring to them, since I believe nothing is to be gained by a more cumbersome nomenclature when dealing with such insular forms.

4. *Individual Variation.*—In the shape of the carapace this variation is very considerable, as is shown by the charts of measurements. There is also much variation in the size attained by different specimens. Some very old individuals are much smaller than younger ones of the same races. The horny plates are remarkably constant in number and shape, but certain individual variations occur. The type of *T. microphyes* has the anterior two marginals of each side merged into single plates. One specimen of *Testudo vicina* (No. 8254) from Vilamil has an intergular plate. Another (No. 8196) has a single light-yellow ray on one second costal, and an extra plate in the front part of the plastron. Van Lidth de Jeude has figured a specimen of *T. ephippium* in which the pectorals do not reach the midline. This variation seems not very rare in this race. I have noted it in Nos. 8321 and 8333; and Nos. 8332 and 8367 have the left pectorals not extending to the midline, although those of the right side reach it. In this Duncan Island race also No. 8375 has five left costals, No. 8326 has five right costals, and No. 8361 has five right costals, and also has the third vertebral divided into three irregular portions. In No. 8265 (*Testudo güntheri*) the pectorals are divided longitudinally.

The Soft Parts.—These also vary with age, with sex, individually, and with race. The young have proportionally shorter necks, limbs, and tails than the adults; and the adult females have these parts proportionally shorter than the adult males. In the saddle-backed races these parts are longer than in the dome-shaped races. Both sexes of the saddle-backed races usually have more or less yellow on the lower jaw and throat. This coloration appears also in some of the males of *T. güntheri,* and is found also in the James Island race. The non-saddle-backed forms, the Tagus Cove race, and at least the females of the Chatham race are entirely blackish brown.

OSTEOLOGICAL DIFFERENCES.—Those which have been considered of taxonomic value are mainly differences which appear in the skulls, cervical vertebrae, shoulder-girdle, pelvis, and large limb bones. As in the case of the shell, these are differences of proportion. It has been stated that *Testudo becki* and the Charles Island tortoise (*T. elephantopus s. galapagoensis*) differ from the other races in having the third instead of the fourth cervical vertebra biconvex. This condition in the type of *T. becki* is an individual variation, since it is the fourth vertebra which is biconvex in my series of seven specimens from Bank's Bay. The condition doubtless is anomalous also in the Charles Island specimen. The differences in proportion of the bones of the limbs and neck correspond with the relative length of these parts in the various races, the number of bones being the same in all. They are proportionally shorter in the dome-shaped races, and longer in those in which the carapace is elevated and compressed anteriorly. These differences are shown in the measurements of the limbs and neck given with the description of each race or species. Certain differences in the skulls of the tortoises of the various races have been pointed out by Dr. Günther. I believe that the differences he has indicated are all merely individual variations. In a series of 24 skulls from Vilamil, Albemarle, I find all of the variations which Dr. Günther mentions; and upon careful comparison of this series with one skull from Hood Island (No. 8125), one from Indefatigable (No. 8381), one from James (No. 8105), three from Duncan (Nos. 8378, 8379, and 8380), four from Chatham (Nos. 8127, 8128, 8130, and 8131), and one from Iguana Cove (No. 8179), I can find no constant differences in the skulls of the various races. In the skulls from Vilamil, the frontal region may be flat or somewhat convex. The occipital spine may be short or long, not reaching the posterior borders of the mastoid processes or projecting far behind them, and may or may not rise much above the level of the skull. There is much variation in the shape of the tympanic case and cavity. The fossa in front of the occipital condyle may be deep or very shallow. The tuberosity for the temporal muscle may be quite small or very largely developed. The nasal opening may be as high as broad, or broader than high. The palatal region varies much in shape. It may be narrow or broad, and the pterygoid edges may be sharp or blunt. The alveolar ridges also vary in position and degree of development. We may safely say that no constant differences exist among the skulls of the various races of Galapagoan tortoises.

Key to Galapagoan Races

a.—Saddle-backed races.—The sum of the percentage straight width, curved width, width between second and third marginals, and the difference between front and middle heights is less than, or exceeds by not more than 10, the sum of the percentage straight length, front height, twice the height to marginals, and length of plastron; or else straight width less than 66%.

b.—Plastron more than 72%; percentage of plastron exceeds that of straight width by not less than 3; distance between prominent points of first marginals less than 30%; front height usually less than 53%.

c.—Plastron more than 88%. Height to marginals 10 to 12%. Hood Island.
T. hoodensis.—p. 313.

c[2].—Plastron not more than 88%;

d.—Width at 2nd to 3rd marginals less than 39%; eighth marginal much reduced and wedgeshaped at top; height to marginals 8 to 10%. Abingdon Island.
T. abingdoni.—p. 296.

d[2].—Width at 2nd to 3rd marginals not less than 39%; eighth marginal with a considerable superior margin.

e.—Width at 2nd to 3rd marginals plus middle height minus front height equals less than 59%;

f.—Height to marginals greater, 7 to 12%; size small; plastron often shorter. Duncan Island.
T. ephippium.—p. 306.

f[2].—Height to marginals less, 5 to 9%; size large; plastron often longer. Northern Albemarle.
T. becki.—p. 303.

e[2].—Width at 2nd to 3rd marginals plus middle height minus front height equals not less than 60% (one small ♀). James Island.
T. darwini.—p. 319.

b[2].—Plastron less than 72%; percentage of plastron not exceeding that of straight width; distance between prominent points of first marginals more than 30%; front height more than 53%; curved length more than 123%.
Height to marginals less than 7%. Narborough Island.
T. phantastica.—p. 299.

a[2].—Non-saddle-backed races. The sum of the percentage straight width, curved width, width between second and third marginals and the difference between front and middle heights exceeds by more than ten the sum of the percentage straight length, front height, twice the height to marginals, and plastron.

bb.—The sum of the curved length, front height, middle height, and plastron, equals or exceeds the sum of the straight length, straight width and curved width; the front height is more than 41% of the straight length.

Straight width nor less than 72%; percentage of middle height exceeds percentage of front height by not less than six; curved length of male more than 122%; middle height in male not less than 54%; front height in male not exceeding 45%. James Island.

T. darwini.—p. 319.

bb².—The sum of the curved length, front height, middle height, and plastron, is less than the sum of the straight length, straight width, and curved width; or[1] the front height does not exceed 41% of the straight length.

cc.—The sum of the straight width, curved width and half the height to marginals is less than twice the straight length; the height to marginals is not more than 7%; the curved length does not exceed 126%; the middle height does not exceed 51%; the percentage of the curved width does not exceed the percentage of the curved length by more than 4.

dd.—Pectoral plates much reduced medially, (usually) not reaching the midline; plastron longer, its percentage exceeding that of straight width by more than 4. Chatham Island.

T. microphyes.—p. 329.

dd².—Pectoral plates not more reduced than in most races, meeting on the midline; plastron shorter, its percentage rarely exceeding that of straight width by more than 4. Tagus Cove, Albemarle.

T. chathamensis.—p. 323.

cc².—The sum of the straight width, curved width and half the height to marginals is not less than twice the straight length;[2] or (if not) the height to marginals is more than 7%; or the curved length exceeds 126%; or the middle height exceeds 51%; or the percentage of the curved width exceeds the percentage of the curved length by more than four;

ddd.—The sum of the straight width, middle height, difference between front and middle heights, and width at 2nd to 3rd marginals exceeds 218%; or the difference between percentages of front and middle heights not less than 26; or height to marginals more than 10%; or plastron more than 87%.

ee.—Curved length plus width at 2nd to 3rd marginals minus difference between curved length and curved width minus middle height equals not less than 112%. Indefatigable Island.

T. porteri.—p. 354.

ee².—Curved length plus width at 2nd to 3rd marginals minus difference between curved length and curved width minus middle height equals not more than 111%. Cowley Mountain, Albemarle.

T. sp.—p. 362.

ddd².—The sum of the straight width, middle height, difference between front and middle heights and width at 2nd to 3rd marginals not exceeding 218%; difference between percentages of front and middle heights less than 26; height to marginals not more than 10%; plastron not more than 87%.

[1]In 2 Indefatigable and 4 dome-shaped ♀♀ from South Albemarle.

[2]Three exceptions to this are 1 Iguana Cove, 1 Cobos, and 1 Vilamil specimen.

eee.—Marginal border not scalloped; first marginals without prominent points; height to marginals low, 3 to 8%; the sum of the curved length, middle height, difference between front and middle heights, and height to marginals is less than twice the straight length. Southeastern Albermarle.
T. güntheri.—p. 335.

eee².—Marginal border scalloped; first marginals with more or less prominent points; height to marginals greater, 6 to 10%; the sum of the curved length, middle height, difference between front and middle heights, and height to marginals usually is more than twice the straight length.
ff.—Width over curve greater, usually greater than length over curve. South Albemarle.
T. vicina.—p. 344.

ff².—Width over curve less, not equal to length over curve. Jervis Island.
T. wallacei.—p. 351.

Descriptions of the Races

In the following pages each race or species of Galapagoan tortoise is treated separately. Since these tortoises are structurally so nearly identical, and differ chiefly in shape and proportions, it has been thought best to omit long descriptions of each race. Instead, brief diagnoses are given, and it is hoped that the numerous photographs of specimens, together with the tables of measurements, will convey a more accurate and comprehensive knowledge of these tortoises than any descriptions could.

The field notes were made by Mr. Slevin.

Testudo abingdoni Günther

Abingdon Island Tortoise

Plates 24 to 29.

Testudo abingdonii GÜNTHER, P. Z. S., 1877, p. 66; GÜNTHER, Gigantic Land Tortoises Brit. Mus., 1877, p. 85, pls. XI, XII, XIV figs. D-F, XLVIII-L; BOULENGER, Cat. Chelonians Brit. Mus., 1889, p. 171; BAUR, Am. Nat., XXIII, 1889 [1890] p. 1041, 1044 (part); GADOW, Cambridge Nat. Hist., VIII, 1901, p. 378; HELLER, Proc. Washington Acad. Sci., V. 1903, p. 59; BECK, Seventh Report N. Y. Zool. Soc., 1903, p. 17; SIEBENROCK, Zool. Jahrb., Suppl. X, 3, 1909, p. 535.

Type specimens.—British Museum. Three adult males. Straight length 38, 34, and 38½ inches. Taken on Abingdon Island, by Commander Cookson, in 1875.

Distribution.—This species seems to be confined to the moist district near the southern end of Abingdon Island.

Material.—The Academy has complete skins of three adult males and a nearly complete bony shell of a fourth. There is a skeleton in the U. S. National Museum. The British Museum contains the types, and the Tring Museum has one adult male and one young example. So far as I can learn, no female has ever been collected.

Diagnosis.—No nuchal; gulars paired; fourth cervical vertebra biconvex; front of carapace high, higher than, or but little lower than, middle; height at nuchal notch more than 45% (46 to 50%) of straight length; difference between percentage of heights at third vertebral and at nuchal notch less than 9 (2 to 5); carapace saddle-shaped, very narrow anteriorly, width at margin of junction of second and third marginals not more than 38% (36 to 38%); first marginals not greatly enlarged, not much everted, their ventral surfaces not vertical, their most prominent points separated by less than 30% (20 to 26%); length over curve not more than 123% (115 to 119%); greater than width over curve; vertical distance from lower surface of plastron to lower edge of lateral marginals great, 8 to 10%; general size large, straight length 29.3 to 36 inches; plastron long, median length 81 to 82%; plates generally smooth; pectorals forming a suture on median line; eighth marginal plate wedge-shaped with very short superior border; lower jaw and throat of male marked with yellow.

TABLE OF MEASUREMENTS OF ABINGDON ISLAND TORTOISES.

Number	Sex	Straight			Curved				Width 2d to 3d marginals	Per Cent	Height				Height to marginals	Per Cent	Plastron	Per Cent	Fore Limb	Per Cent	Hind Limb	Per Cent	Axilla to Elbow	Per Cent	Neck	Per Cent	Tail	Per Cent
		Length	Width	Per Cent	Length	Per Cent	Width	Per Cent			Middle	Per Cent	Front	Per Cent														
8112	♂	36.	24.8	69	41.4	115	37.8	105	13.7	38	16.75	47	17.9	50	3.	8	29.	81	20.4	57	16.8	47	9.6	24	22.6	63	6.6	18
8111	♂	35.	24.2	69	41.8	119	38.4	110	12.5	36	17.7	51	16.2	46	3.5	10	28.4	81	21.2	61	19.4	55	10.	29	18.	51	5.4	15
8110	♂	32.	21.75	68	38.	118	34.5	108	12.3	38	15.7	49	15.	47	2.9	9	26.1	82	19.8	62	18.4	58	10.4	33	23.6	74	5.4	17
8113	♂	29.3	21.	72	34.75	119	34.	116			15.	51	13.7	47	2.5	9												

General remarks.—This is one of the most "saddle-backed" of the Galapagoan tortoises. It is most like *T. becki* of northern Albemarle and *T. ephippium* of Duncan. The former, however, is a larger species, while the Duncan race rarely if ever grows as large as the Abingdon one. The shells of the Abingdon tortoises are quite thin, and there is much yellow about the head in males.

*Field Notes**—

September 18, 1906.—Sailed this morning for Abingdon, where we anchored at 12:30 on the south side of the island, which appears to be the highest.

September 19, 1906.—Went up the mountain after tortoises. We commenced to get into good tortoise country at about seven or eight hundred feet elevation, the beginning of the green zone. There is not much earth, the ground being nearly all lava, but there is plenty of water and cactus. The top of the mountain is covered with fog most of the time, and everything is very wet. We saw fresh signs of tortoises soon after getting into the green zone, and soon found a trail. This we followed, and came upon a tortoise on the top of a large rock which contained a few small water holes. It is capital country for tortoises; we did not, however, look farther, but skinned and carried out our first find. Ochsner went up the mountain a little higher, and came upon another large male. There are trails all around the mountain side. Beck found a male on the southern slope of the mountain, lower down. He also found the fresh trail of another tortoise, but failed to find the tortoise. We expect to go in tomorrow and get the tortoise Oschner found. The one we got out today was a very fat male. Its stomach contained cactus.

September 20, 1906.—Spent the day getting out the tortoise found by Ochsner. Saw several trails but no new tortoises. Today Beck found the one the trail of which he saw yesterday, but it is too far in to get out. Expect tomorrow to get out the one he found yesterday. The stomach of the one skinned today contained cactus and grass.

September 21, 1906.—Went in after the tortoise which Beck found September 19. It was about a mile or two above the green zone on the southern slope of the mountain. Up there it is continually raining or foggy throughout the morn-

*All the field notes, unless otherwise stated, are by Mr. Joseph R. Slevin.

ing, but clears off in the afternoon. It is capital tortoise country, everything being green, with plenty of water and cactus. The three tortoises taken were very fat, and showed the effects of good living. We saw no other signs, and they probably are very rare on Abingdon Island. The stomach of the one collected today contained grass and cactus. Beck also found an old shell and a few bones in a cave, where the tortoise probably had fallen in and died. We carried these down, and they are in fairly good condition.

Testudo phantastica Van Denburgh

Narborough Island Tortoise

Plates 30 and 31.

Testudo phantasticus Van Denburgh, Proc. Cal. Acad. Sci. (4), I, 1907, p. 4; Siebenrock, Zool. Jahrb., Suppl., X. 3, 1909, p. 535.

Type specimen.—California Academy of Sciences No. 8101. Adult male. Straight length 34.5 inches. Taken on Narborough Island, by R. H. Beck, April 5, 1906.

Distribution.—This tortoise is from Narborough Island.

Material.—The type specimen is the only one that ever has been seen.

Diagnosis.—No nuchal; gulars paired; fourth cervical vertebra biconvex; front of carapace high, not lower than middle; height at nuchal notch more than 41% (54%) of straight length; difference between percentages of height at third vertebral and at nuchal notch less than 9 (2); carapace saddle-shaped, narrow anteriorly, width at margin of junction of second and third marginals not more than 54% (46%); first marginals much enlarged, everted more than in any other race, their ventral surfaces nearly vertical, their edges from nuchal notch to prominent point nearly horizontal, prominent point almost a right angle; distance between prominent points of first marginals more than 30% (32%); length over curve more than 123% (124%), greater than width over curve; vertical distance from lower surface of plastron to lower edge of lateral marginals small, 6%; general size moderate, straight length 34.5 inches; plastron short, 70%; pectoral plates forming a suture on median line; eighth marginal not reduced; lower jaw and throat marked with yellow.

TABLE OF MEASUREMENTS OF NARBOROUGH ISLAND TORTOISES.

Number	Sex	Straight			Curved				Width 2d to 3d marginals	Per Cent	Height				Height to marginals	Per Cent	Plastron	Per Cent
		Length	Width	Per Cent	Length	Per Cent	Width	Per Cent			Middle	Per Cent	Front	Per Cent				
8101	♂	34.5	24.	70	42.	124	41.	116	16.	46	18.	52	18.75	54	2.	6	24.	70

General remarks.—This is a "saddle-backed" tortoise with the anterior marginal plates very strongly reverted. It seems most nearly related to *Testudo becki* of northern Albemarle, but no such enlargement and outward and backward development of the anterior marginals is seen in any other tortoise. The early voyagers did not report the presence of tortoises on Narborough Island, so the discovery of this species was rather unexpected.

Field Notes.—Leaving Tagus Cove, April 2, 1906, Mr. Beck and Mr. Hunter set out for Narborough to hunt for tortoises. The climbing of the volcano proved most arduous, but Mr. Beck, leaving Mr. Hunter at the lower level, pushed on to the rim of the crater. The story of the finding of the only tortoise known to have been taken upon this island is told by Mr. Beck as follows:

Starting at daylight on April 3, 1906, a point about one-half the distance to the top of Narborough Island was reached at noon. Here commenced a narrow "island" of lava of more ancient eruption than that over which the first stage of the journey was made. This "island" had scattering cactus and a few bushes and vines. As I worked up through this strip of lava I saw a few old droppings of a tortoise, and on examination I found he had been eating a considerable quantity of *Cereus*, a cactus that is not often attacked by other tortoises, as the spines are much more difficult to make way with. Many spines were found in some of the excrement. Thinking that if a tortoise were down in this desolate patch, there would be many on top, I climbed toward the top, stopping on the way at one small mount of much older larva, seemingly of about the same age as Tagus Cove Mountain, for there was considerable soil. There were no signs of tortoises here, though iguanas were plentiful. Reaching the base of the main crater at about 5 o'clock, I camped, and next morning climbed up to the top, which was, where I climbed, a plateau a half mile across to the edge of the crater. The crater was probably over 1000 feet deep and a half mile in diameter. The plateau was covered with rank grass with clumps of *Opuntia* near the outer edge and scattering *Cereus*—an excellent place for tortoises; but none was seen, nor any signs.

Returned to camp, and struck down to the place where the tortoise signs were. Reached it at 4:30 P. M., and laying down the pack commenced searching, and in a portion of the "island" of old lava found a still older flow where there was considerable soil. Here I found a tortoise trail which had been travelled the day before. I followed this, and soon found in the trail a rock which had been used for the same purpose that rocks in similar places on Tagus Cove Mountain have served ever since the whalers carried off all the female tortoises. Going on some distance farther the old male was found slowly feeding on grass near the trail. Getting my pack, I ate supper and skinned the tortoise by moonlight. Starting with him next morning, I reached the shore at 4:30 P. M.

Testudo becki Rothschild

North Albemarle Island Tortoise

Plates 31 to 38.

Testudo becki Rothschild, Nov. Zool., VIII, 1901, p. 372; Van Denburgh, Proc. Cal. Acad. Sci. (4), I, 1907, p. 4; Siebenrock, Zool. Jahrb., Suppl. X, 3, 1909, p. 536.

Testudo bedsi, Heller, Proc. Washington Acad. Sci., V, 1903, p. 59 (err. typ.).

Type specimen.—Tring Museum, England. Adult male. Length 40.75 inches. Taken at Cape Berkeley, northern Albemarle, by R. H. Beck.

Distribution.—This tortoise seems to be confined to the northern end of Albemarle Island, where it has been taken near Bank's Bay and Cape Berkeley.

Material.—The Academy collection contains seven specimens, of which one is an adult female. The Tring Museum contains five adult males collected by Mr. Beck.

Diagnosis.—No nuchal; gulars paired; fourth cervical vertebra biconvex; front of carapace high, in males sometimes higher than middle; height at nuchal notch not less than 44% (44 to 52%) of straight length; difference between percentages of front and middle heights less than 9 (—6 to +6); carapace saddle-shaped, narrow anteriorly, width at margin of junction of second and third marginals not more than 54% (40 to 54%); first marginals not very greatly enlarged, not greatly everted, their ventral surfaces not vertical, their most prominent points separated by less than 30% (23 to 29%); length over curve not more than 123% (114 to 121%), greater than width over curve (except in one specimen); vertical distance from lower surface of plastron to lower edge of lateral marginals small—5 to 8% in males, 9% in female; general size large, straight length 34 to 41.5 inches; plastron of moderate length, 73 to 84%; plates nearly smooth in adults; pectorals forming a suture on median line; eighth marginal plate not reduced; lower jaw and throat of males marked with yellow.

TABLE OF MEASUREMENTS OF BANK'S BAY, ALBEMARLE ISLAND TORTOISES.

Number	Sex	Straight			Curved				Width 2d to 3d marginals	Per Cent	Height				Height to marginals	Per Cent	Plastron	Per Cent	Fore Limb	Per Cent	Hind Limb	Per Cent	Axilla to Elbow	Per Cent	Neck	Per Cent	Tail	Per Cent
		Length	Width	Per Cent	Length	Per Cent	Width	Per Cent			Middle	Per Cent	Front	Per Cent														
8115	♂	41.5	28.5	69	50.25	121	48.25	116	22.	53	21.25	51	18.6	45	3.25	8	30.2	73	20.8	50	19.6	47	10.	24	26.4	64	7.2	17
8117	♂	37.3	26.2	70	44.3	119	43.8	117	14.8	40	19.2	51	18.2	49	2.	5	28.6	77	22.4	60	20.	54	10.8	26	26.8	72	4.4	12
8118	♂	34.25	24.1	70	39.8	116	37.75	110	16.25	47	15.6	46	17.7	52	2.25	7	25.75	75	18.	53	16.	47	8.4	25	24.4	74	6.	18
8116	♂	34.	24.3	71	40.1	118	40.8	120	18.	53	18.	53	17.	50	2.5	7	28.1	83	21.	62	18.	53	10.8	32	26.6	78	6.	18
8119	♂	18.75	14.5	77	23.5	125	21.5	115			9.8	52	6.75	35	2.12	11	16.25	87	10.	53	9.2	49	5.2	28	10.12	54	2.8	15
8114	♂	18.1	14.7	81	23.	127	21.1	116	9.4	52	9.4	52	6.6	36	2.25	12	15.9	88										
8120	♀	21.75	16.6	76	24.9	114	24.25	111	11.8	54	9.9	46	9.6	44	2.	9	18.25	84										

General remarks.—Testudo becki is a very large "saddle-backed" tortoise with a thick, heavy shell. The female specimen, however, although evidently an old individual, is small and might easily be mistaken for some of the Duncan Island females. One of the large males is less compressed in front, and somewhat resembles the James Island males.

Field Notes—April 9 to 16, 1906.—Prepared to go to Bank's Bay, and sailed in the boat with the mate. We had light breezes and were out all night . The skiff picked us up in the morning, and we towed up to the camping beach. The mountain appears very much like the one at Tagus Cove, but has two recent lava-flows running down the side. The vegetation is very dense and green. The flat, however, at this time was getting dry, and the tortoises had evidently gone up higher, as we got only seven. Their trails were numerous and distinct. They fed chiefly on a coarse grass that is abundant at the foot of the mountain. No cactus was found in any of the stomachs examined, and not much water was found in the sac around the heart. This fluid is somewhat oily, and not thin like water. The country at the foot of the mountain is brushy, with some large trees, quite a bit of reddish soil, and some lava-flows fairly well covered. Beck and I went up the coast about three miles to an isolated patch of brush and trees to see if there were any signs of tortoises, but saw none. I should suppose the only chance of their being there would be if they had happened to be along the coast during the wet season, and were then shut off by the recent lava-flows, for the distance to travel from the mountain would be too great. We made a stay of seven days at Banks Bay and collected seven tortoises. All these tortoises had comparatively longer necks than any others measured thus far. We left on the afternoon of the sixteenth and got back to the ship about midnight.

Testudo ephippium Günther

Duncan Island Tortoise

Plates 39 to 52.

Testudo ephippium Günther, Trans. Royal Soc. Lond., CLXV, 1875, p. 271, pls. 34, 35 fig. B, 37 fig. C, 38 fig. C, 39 fig. C, 42 fig. B, 44 fig. B, 45 fig. B; Günther, Gigantic Land Tortoises Brit. Mus., 1877, p. 81, pls. XXXI B, fig. B, XXXIX, XLIV, XLII fig. C, XLIII fig. C, XLIV fig. C; Boulenger, Cat. Chelonians Brit. Mus., 1889, p. 171; Baur, Am. Nat. XXIII, 1889 (1890) p. 1040; Günther, Novit. Zool., III, 1896, p. 329, pls. XX-XXII; Lidth de Jeude, Notes Leyden Mus., XX, 1898, p. 126; pls. III-V; Gadow, Cambridge Nat. Hist., VIII, 1901, p. 378; Heller, Proc. Washington Acad. Sci., V, 1903, p. 57; Beck, Seventh Report N. Y. Zool. Soc., 1903, p. 15; Siebenrock, Zool. Jahrb., Suppl. X, 3, 1909, p. 534.

Testudo abingdonii (part), Baur, Am. Nat., XXIII, 1889 (1890), p. 1039.

Type specimen.—Museum of Science and Arts, Edinburgh. Adult male. Straight length 33 inches. Origin unknown.

Distribution.—This tortoise has been found only on Duncan Island.

Material.—There are in the Academy's collection eighty-six specimens of this tortoise. Twenty-five of these are males. This race and those found in southeastern Albemarle are the ones most abundantly represented in museums.

Diagnosis.—No nuchal; gulars paired; fourth cervical vertebra biconvex; front of carapace high, higher than or but little lower than middle; height at nuchal notch more than 38% (39 to 54%) of straight length; difference between percentages of heights at third vertebral and at nuchal notch less than 12 (—11 to +11); carapace saddle-shaped, usually narrow anteriorly, width at margin of junction of second and third marginals not more than 39 to 59%; first marginals sometimes much everted, their most prominent points separated by less than 30% (17 to 29%); length over curve not more than 123% (109 to 122%); usually greater than width over curve; vertical distance from lower surface of plastron to lower edge of lateral marginals great—7 to 12%; general size rather small, straight length 18.4 to 29.5 inches; plastron of moderate length, 75 to 88%; plates generally smooth in adults; pectorals usually forming a suture on median line; eighth marginal plate not reduced, with a considerable superior border; lower jaw and throat in males marked with yellow.

TABLE OF MEASUREMENTS OF DUNCAN ISLAND TORTOISES.

Number	Sex	Straight			Curved						Height															
		Length	Width	Per Cent	Length	Per Cent	Width	Per Cent	Width 2d to 3d marginals	Per Cent	Middle	Per Cent	Front	Per Cent	Height to marginals	Per Cent	Plastron	Per Cent	Fore Limb	Per Cent	Hind Limb	Per Cent	Axilla to Elbow	Per Cent	Neck	Per Cent	Tail	Per Cent
8358	♂	29.5	21.75	74	35.25	119	35.5	120	14.25	48	15.	51	14.5	49	2.8	9	23.6	80	16.6	56	14.4	49	8.8	30	19.7	67	3.3	11
8351	♂	29.5	20.5	69	34.3	116	33.6	114	11.5	39	14.2	48	13.3	45	2.25	8	23.	78										
8296	♂	28.	19.75	71	33.3	119	33.4	119	12.	43	13.75	49	13.1	47	2.15	8	23.	82	16.8	60	15.2	54	6.8	24	17.	61	3.6	13
8313	♂	27.1	19.7	73	31.4	116	29.6	109	13.3	49	12.1	45	12.	44	2.25	8	21.4	79										
8364	♂	27.1	19.1	71	31.6	117	30.2	111	13.5	50	12.7	47	14.5	54	2.5	9	22.6	83										
8315	♂	27.	18.6	69	29.75	110	28.4	105	13.25	49	11.5	43	10.9	40	2.1	8	20.7	77										
8320	♂	27.	18.1	67	29.3	109	29.1	108	12.1	45	12.7	47	12.4	46	2.6	10	20.25	75										
8293	♂	26.5	19.3	73	30.9	117	29.5	111	13.25	50	12.25	46	13.6	51	2.1	8	21.6	82	16.	60	14.8	56	8.8	33	20.	75	3.8	14
8328	♂	26.4	19.9	75	32.2	122	31.5	119	12.8	49	12.6	48	13.1	50	2.5	10	22.5	85										
8327	♂	26.3	17.3	66	30.	114	26.	99	11.85	45	10.9	42	12.6	48	2.	8	20.8	79										
8323	♂	26.	17.9	69	28.25	109	27.5	106	13.	50	11.8	45	12.	46	2.2	8	20.5	80										
8369	♂	25.8	17.3	67	30.	116	27.75	108	12.3	48	12.6	49	12.	47	2.5	10	20.3	79										
8365	♂	25.5	18.8	74	29.5	116	29.5	116	12.25	48	12.75	50	13.	51	2.1	8	21.1	83										
8368	♂	25.5	18.6	73	29.7	116	27.5	108	11.75	46	11.7	46	12.2	48	2.5	10	20.9	82										
8295	♂	25.4	17.2	68	28.7	113	27.3	107	10.7	42	11.9	47	12.	47	2.25	9	20.4	80	14.	55	12.6	50	7.	28	18.6	73	3.2	13
8343	♂	25.2	17.7	70	28.4	113	25.8	102	12.2	48	10.5	42	12.7	50	2.5	10	19.75	78										
8314	♂	25.	17.7	71	28.3	113	25.2	101	12.	48	10.7	43	11.9	48	2.4	10	19.2	77										
8359	♂	24.9	17.9	72	28.6	115	25.9	104	13.2	53	10.7	43	13.4	54	2.25	9	20.4	82										
8329	♂	24.8	16.9	68	28.1	117	27.	109	11.8	48	10.7	43	11.8	47	1.9	8	19.5	79										
8318	♂	24.3	17.25	71	27.1	112	25.9	107	13.4	55	10.4	43	13.	54	2.	8	19.55	80										
8338	♂	24.1	17.2	71	28.4	118	26.	108	14.2	59	10.5	43	12.4	51	2.	8	20.	83										
8317	♂	24.	17.	71	27.8	116	26.1	109	10.9	45	11.4	47	11.5	48	2.4	10	19.6	82										
8360	♂	23.6	17.	72	27.9	118	26.5	112	11.5	49	11.3	48	11.5	49	2.	8	19.2	81										
8331	♂	23.4	15.6	67	26.3	112	24.6	105	10.1	43	10.9	46	11.5	49	2.3	10	19.	81										
8356	♂	23.25	16.4	71	26.7	111	25.	108	10.5	45	11.4	49	10.8	46	2.5	11	19.5	83										

TABLE OF MEASUREMENTS OF DUNCAN ISLAND TORTOISES.

Number	Sex	Straight			Curved				Width 2d to 3d marginals	Per Cent	Height				Height to marginals	Per Cent	Plastron	Per Cent	Fore Limb	Per Cent	Hind Limb	Per Cent	Axilla to Elbow	Per Cent	Neck	Per Cent	Tail	Per Cent
		Length	Width	Per Cent	Length	Per Cent	Width	Per Cent			Middle	Per Cent	Front	Per Cent														
8299	♀	27.	18.9	70	31.5	117	30.2	112	12.25	45	13.25	49	12.5	46	2.1	8	21.7	80										
8301	♀	26.5	19.8	75	31.4	118	31.1	117	12.25	46	13.4	51	12.5	47	3.1	12	21.2	80										
8298	♀	25.8	17.3	67	28.7	111	25.4	100	13.2	51	10.1	39	12.1	47	2.3	9	20.2	78										
8345	♀	24.25	18.2	75	27.7	114	27.9	115	11.5	47	11.9	49	10.8	45	2.4	10	19.9	82										
8355	♀	23.4	17.	73	26.1	112	26.	111	12.6	54	9.8	42	10.5	45	1.7	7	18.8	80										
8297	♀	23.2	17.9	77	27.8	120	27.5	119	11.	47	11.5	50	9.9	43	2.2	9	19.5	84										
8294	♀	22.8	17.9	79	26.5	116	27.6	121	12.1	53	11.5	50	10.5	46	2.1	9	19.4	85										
8371	♀	22.75	16.7	73	27.	119	26.3	111	10.6	47	11.6	51	10.25	45	2.3	10	18.9	83										
8348	♀	22.2	16.7	75	25.9	117	26.2	118	11.2	50	11.25	51	9.5	43	2.25	10	18.5	83										
8340	♀	22.2	16.15	73	25.8	116	25.3	114	11.	50	10.8	49	10.5	47	2.1	9	18.	81										
8341	♀	22.	16.75	76	26.	118	26.2	119	11.3	51	11.1	50	9.7	44	1.8	8	19.	86										
8291	♀	22.	15.1	69	25.	114	23.75	108	10.6	48	10.4	47	95.	43	2.25	10	17.5	80	11.6	53	11.2	51	6.8	31	14.6	66	.4	2
8321	♀	21.9	16.25	74	25.3	116	25.5	116	10.8	49	10.8	49	9.5	43	2.2	10	18.25	83										
8339	♀	21.9	15.8	72	24.7	113	24.6	112	10.2	47	10.4	47	10.	46	2.	9	17.5	80										
8335	♀	21.8	15.7	72	25.25	116	24.4	112	10.25	47	10.5	48	9.7	44	2.3	11	18.2	83										
8336	♀	21.7	16.2	75	25.1	116	25.2	116	11.5	53	10.	46	10.	46	2.	9	17.7	82										
8361	♀	21.6	15.3	71	23.7	110	23.6	109	10.25	47	10.	46	9.7	45	2.1	10	17.5	81										
8354	♀	21.5	16.	74	24.5	114	25.	116	10.5	49	10.1	47	9.	47	1.75	8	16.75	78										
8307	♀	21.5	15.2	71	25.6	119	23.6	110	10.6	49	10.	46	8.9	41	1.8	8	18.4	86										
8324	♀	21.5	15.2	71	24.2	113	24.	112	12.1	56	9.2	43	9.5	44	1.75	8	17.6	82										
8326	♀	21.4	16.	79	25.3	118	24.8	116	9.7	45	10.8	50	9.3	43	2.25	11	18.	84										
8302	♀	21.4	15.7	73	24.7	115	24.2	113	9.8	46	10.3	48	8.75	41	2.1	10	17.7	82										
8366	♀	21.4	15.5	72	23.6	110	24.3	114	10.3	48	9.7	45	9.3	43	1.7	8	17.	80										
8303	♀	21.3	15.6	73	25.	117	24.	113	10.	47	10.2	48	9.25	43	2.25	11	17.6	83										
8372	♀	21.3	15.25	72	24.8	112	22.8	107	10.2	48	10.	47	8.5	40	2.3	11	16.7	78										
8304	♀	21.2	16.	75	25.4	119	25.4	119	10.2	48	10.8	51	9.9	47	2.25	11	17.7	82										

TABLE OF MEASUREMENTS OF DUNCAN ISLAND TORTOISES—Continued.

8342	♀	21.2	15.1	71	24.2	114	23.8	112	9.7	46	9.9	47	9.5	45	1.8	8	17.5	82										
8347	♀	21.2	14.9	70	24.	113	23.5	111	10.1	48	9.7	46	8.8	42	1.7	8	16.5	78										
8300	♀	21.1	15.2	72	23.7	112	23.4	111	10.5	50	9.9	47	8.7	41	1.75	8	17.	81	11.6	55	10.4	49	5.2	25	13.2	63	1.4	7
8292	♀	21.	16.2	77	25.1	120	25.9	123	9.2	44	11.25	54	9.8	47	2.	10	17.5	83										
8310	♀	21.	16.	76	25.2	120	26.3	126	11.	50	11.4	54	9.8	47	2.1	10	17.4	83	12.	57	10.2	48	6.6	31	13.2	63	2.	9
8337	♀	21.	15.1	72	24.1	115	23.5	112	10.25	49	9.9	47	9.	43	1.6	8	17.1	81										
8325	♀	21.	15.	71	24.6	117	24.	114	9.9	47	10.6	50	9.5	45	2.	10	16.75	80										
8311	♀	20.8	16.4	79	25.	120	25.6	123	11.1	53	11.	53	10.	48	2.	10	17.7	85										
8362	♀	20.7	15.1	73	23.	111	23.9	116	9.5	46	9.8	47	9.5	46	1.8	9	16.5	80										
8376	♀	20.5	15.6	71	23.7	116	24.	117	10.8	53	9.4	46	9.	44	1.8	9	17.4	85										
8316	♀	20.5	15.6	76	23.4	114	24.8	121	9.4	46	9.75	48	8.5	41	1.6	8	17.1	83										
8350	♀	20.5	15.2	74	24.	117	24.	117	9.5	46	8.8	43	8.5	41	2.1	10	16.7	81										
8308	♀	20.5	15.	71	24.	117	23.7	116	10.1	49	10.8	50	8.7	42	1.9	9	17.	83	12.3	60	12.	59	6.4	31	12.4	60	2.	10
8333	♀	20.5	15.	71	23.6	115	21.9	107	10.4	51	9.6	47	8.2	40	2.4	12	16.	78										
8306	♀	20.5	14.5	71	23.1	113	22.5	110	10.8	53	9.45	46	9.4	46	1.75	9	16.7	81										
8309	♀	20.4	15.7	77	24.5	120	24.4	120	9.1	45	10.6	52	9.8	48	2.	10	17.5	86										
8363	♀	20.4	15.4	75	23.2	114	22.5	110	10.8	53	8.8	43	8.9	44	1.6	8	17.4	85										
8322	♀	20.4	15.2	75	24.9	122	24.7	121	9.5	47	10.3	50	9.1	45	1.8	9	17.2	84										
8334	♀	20.4	15.	74	23.	113	22.7	111	9.7	48	9.2	45	9.2	45	2.3	11	16.5	81										
8344	♀	20.4	14.3	70	23.5	115	23.1	113	9.8	48	9.7	48	9.	44	2.1	10	16.6	81										
8370	♀	20.2	15.	79	23.75	118	23.2	115	10.4	51	10.8	53	9.4	47	1.8	9	17.7	88										
8332	♀	20.1	15.25	76	23.8	118	23.6	117	9.5	47	10.4	52	8.4	42	2.1	10	16.2	81										
8352	♀	20.1	14.9	74	23.3	116	23.5	117	10.5	52	9.6	48	9.1	45	2.	10	17.2	86										
8373	♀	19.9	15.	75	23.5	118	22.2	112	9.6	48	9.7	49	8.5	43	2.	10	16.7	84										
8312	♀	19.8	14.6	74	22.4	113	22.9	116	10.2	52	8.9	45	8.3	42	1.6	8	16.2	82										
8346	♀	19.7	14.75	75	23.	117	23.3	118	10.	51	10.	51	10.3	52	2.2	11	16.9	86										
8357	♀	19.7	14.1	72	21.75	110	20.25	103	10.	51	8.75	44	8.2	42	1.9	10	16.	81										
8375	♀	19.6	15	76	22.	112	23.3	119	9.7	49	8.2	42	8.	41	1.75	9	16.5	84										
8305	♀	19.6	14.3	73	23.2	118	22.5	115	10.	51	9.4	48	8.5	43	1.75	9	16.4	84										
8319	♀	19.6	14.2	72	22.6	115	22.3	114	9.35	48	9.3	47	8.2	42	1.45	7	16.2	83										
8353	♀	19.5	14.	72	22.	113	21.2	109	9.1	47	8.6	44	7.9	41	1.95	10	15.25	78										
8367	♀	19.2	13.8	72	21.6	112	21.7	113	9.2	48	9.2	48	8.	42	1.6	8	14.9	78										
8349	♀	18.7	13.7	73	21.5	115	20.1	108	9.3	50	8.1	43	8.	43	1.5	8	15.7	84	9.8	52	9.2	49			12.	64	2.	11
8374	♀	18.7	12.8	68	21.2	113	18.9	101	9.2	49	8.1	43	7.4	39	1.9	10	15.	80										
8330	♀	18.4	13.8	75	21.3	116	21.	114	8.75	47	9.	49	8.6	47	1.9	10	16.1	87										

General remarks.—The Duncan Island tortoise is one of the smaller species. The size is by no means proportionate to the age, if one may judge from the ossification of the points of growth in the bones and the loss of striation of the plates of the carapace. Some of the large males seem to be quite young, and some of the oldest females are very small. The large males are most similar in shape to those of Abingdon. There is much variation in shape in both sexes, as is shown in the tables and charts of measurements and the photographs of specimens. A number of specimens have the pectoral plates not meeting on the midline.

An egg (No. 8423) from Duncan Island measures 2.34x 2.30 inches. It was found lying on the surface of the ground in December, 1905.

Field Notes—Dec. 1, 1905.—Sailed for Duncan Island in the morning, and anchored off the northeast side of the island at dusk. Light winds all day.

Dec. 2, 1905.—Skinned two turtles and a tortoise which Hunter brought down from the edge of the crater. Beck went ashore looking for tortoises, and found twelve, which he tied up. Monday we start to skin them and get them to the vessel. I shall clear things up somewhat before going on Tuesday to camp with Beck. Beck found the skull of a tortoise in good condition, and brought it down.

Dec. 4, 1905.—Beck went into camp today on the top of the crater. I go up tomorrow to skin tortoises. Stewart, Hunter, and Ochsner brought down a tortoise each today; two males and a female.

Dec. 5, 1905.—Finished the skinning of the three tortoises brought down yesterday. All were very fat, and had very long necks for their size. The female had eggs in yolk and one nearly developed.

Dec. 6-9, 1905.—I was in camp skinning and carrying tortoises. We had our camp in a valley near the top of the island just south of the large crater. The country is very rough, and covered in most places with thick brush and thorn bushes. No tortoises were found in the crater, but Beck saw the tracks of one there. We found several old males, which were brought down alive, and which will be kept if possible.

The tortoises have lots of moss in their stomachs and a kind of thick grass that, when dried, looks somewhat like straw. They also feed largely on cactus. I was able to get the temperature of some, and found them to be warm, but they happened to be in the sun. Some measurements were lost because my note book got wet. It is not the best kind of country for books or tools of any description. We have got about twenty-nine tortoises on board up to date and have several more tied up ashore which we expect to get next week. The tortoises here all have very dark livers, while on Indefatigable all were very light-colored and fat. The Duncan tortoises are all very fat except the old males, which had no fat or very little. I am going back the first thing Monday morning to work on tortoises again.

Dec. 11-16, 1905.—Camped in the central part of Duncan, working on tortoises. We have been here two weeks now, and probably have about eighty tortoises. They were common along the southern and western slopes of the island, where most of them were taken. All the females had eggs in yolk form, and one with hard shell was found. Mr. Beck found two eggs exposed on the ground. We kept them to blow, though both were cracked. We had a light rain all night on the twelfth, and the tortoises came out from the brush to the water holes. Those we found after this were mostly filled with water, which seemed to be all through the body, and would come out as soon as the plastron was cut into. The stomachs contained cactus, grass and moss. Some of the old males taken would stretch out their necks and, with mouths wide open, would have a somewhat fierce expression, but they made no attempt to bite. Several pictures were taken—one of an old male which was holding a small female by the hind leg. The old tortoises had lichen growing on their backs and at a short distance looked exactly like blocks of lava, which were covered with the same growth. I shall have to spend a few days now getting the tortoises put in shape. With such a grand rush they could not well be in the best condition. We have to go to Conway Bay tomorrow, and from there to Jervis and James.

Jan. 30, 1906.—The Duncan tortoises are doing well, and eat a good portion of cactus. They are very slow and deliberate in their movements. They take very small bites, scraping the inside of the cactus with their horny jaws.

July 11, 1906.—One of the old Duncan tortoises died today. He was full of sores (abscesses?) and had something the matter with his feet, as the skin nearly fell off them. The lungs were very dry and full of hard lumps. The skull was broken and several other bones were cracked or very weak. Altogether, he was in a bad state, whatever was the matter.

August 14, 1906.—Anchored off Duncan about ten in the morning. I went ashore for lizards, while Beck went in after tortoises.

August 15, 1906.—I went down into the large crater at the north end of the island. The floor of the crater is 450 feet above the sea level, and is composed of red loam covered with large thorn bushes and old stumps. The vegetation is thickest around the edge, while the central portion is almost bare. I saw old signs of tortoises, but lizards were the only reptiles seen in the crater. Beck got seven tortoises down to the vessel, some alive and some partly skinned. We shall have to clean up the mess tomorrow. Tortoises still are abundant on Duncan. We run across them while hunting for other things. Former collectors could not have covered very much country, if they could say they doubted whether more than two or three yet remained on the island. Beck found that one female contained large eggs with soft white shell nearly ready to lay. He brought these down, and I will see if it is possible to preserve them. We expect to sail for Vilamil early in the morning.

Sept. 8, 1906.—The large male tortoise we took off Duncan during our first visit died today.

Oct. 4, 1906.—A male Duncan tortoise died on board today.

Testudo hoodensis Van Denburgh

Hood Island Tortoise

Plates 52 to 55.

Testudo hoodensis Van Denburgh, Proc. Cal. Acad. Sci. (4), I, 1907, p. 3; Siebenrock, Zool. Jahrb., Suppl. X, 3 1909, p. 535.

Type specimen.—California Academy of Sciences No. 8121. Male. Straight length 22.2 inches. Taken on Hood Island, by Joseph R. Slevin and E. S. King, June 27, 1906.

Distribution.—This tortoise is known only from Hood Island.

Material.—The Academy has the skins and bones of one male and two female specimens, one extra skull and some fragments. The Honorable Walter Rothschild writes me that there is in his museum at Tring a carapace without plastron which he refers to this species.

Diagnosis.—No nuchal; gulars paired; fourth cervical vertebra biconvex; front of carapace high, little lower than middle, height at nuchal notch 42 to 49% of straight length; difference between percentages of heights at third vertebral and at nuchal notch less than 9 (2 to 6); carapace saddle-shaped, narrow anteriorly, width at margin of junction of second and third marginals not more than 54% (45%); first marginals not greatly enlarged, not much everted, their ventral surfaces not vertical, their most prominent points separated by less than 30% (20%); length over curve not more than 123% (111 to 123%); greater than width over curve; vertical distance from lower surface of plastron to lower edge of lateral marginals great, 10 to 12%; general size rather small, straight length, 22.2 inches; plastron long, median length 89 to 93%; plates striated, central portions of vertebrals and costals much elevated; pectoral plates forming a suture on median line; lower jaw and throat marked with yellow.

TABLE OF MEASUREMENTS OF HOOD ISLAND TORTOISES.

Number	Sex	Straight			Curved				Width 2d to 3d marginals	Per Cent	Height				Height to marginals	Per Cent	Plastron	Per Cent	Fore Limb	Per Cent	Hind Limb	Per Cent	Axilla to Elbow	Per Cent	Neck	Per Cent	Tail	Per Cent
		Length	Width	Per Cent	Length	Per Cent	Width	Per Cent			Middle	Per Cent	Front	Per Cent														
8121	♂	22.2	17.5	77	27.	122	24.8	112	10.	45	11.2	50	10.	45	2.75	12	19.7	89	12.5	56	11.5	52	6.	27	13.	59	1.5	7
8122	♀	21.	16.2	77	25.75	123	24.25	115	9.5	45	10.75	51	10.3	49	2.5	12	19.5	93	11.5	55	10.5	50	7.	33	11.	52	1.5	7
8123	♀	19.75	14.75	74	22.	111	21.5	109	8.75	44	9.4	48	8.3	42	2.	10	17.5	89										

General remarks.—The Hood Island tortoise probably never attained great size. None of our specimens is fully adult, but I should judge that an adult would not be larger than a Duncan tortoise. It is probable that the Charles Island and the Hood Island tortoises were very similar in shape, but the Hood Island ones are narrower than the specimens which are thought to have originated in Charles Island.

Field Notes—Hood Island was reached September 24, 1905. Various parts of the island were explored during this visit which ended October 2. On September 27, Mr. Beck found some fragments of tortoise bones on the western end of the island. They were lying on the ground among the lava blocks and were exposed to the sun. These fragments were the only signs of tortoises. Hood Island was visited again from January 31 until February 7, 1906. A piece of tortoise carapace and some old droppings were found near the top of the island.

On June 23, 1906, the anchor was again dropped in Gardner Bay. Exploration revealed no evidence of tortoises until June 26, when, as Mr. Slevin records: [Mr. Ochsner and I] went into the interior at the east end of the island and picked up some lizards, which are abundant everywhere. We reached an elevation of about 300 feet and, in a grove of cactus trees about two miles inland from Gardner Bay, ran on to a tortoise. The country here is very brushy, and the ground is covered with small rocks, so that no trails can be seen anywhere. The tortoise was lying in the shade of a large cactus at the edge of a thick patch of brush. It appears to be an adult female. No other signs were encountered and it is only great luck to find a tortoise, as there are no trails to follow.

June 27, 1906.—Went again after tortoises to the same country we visited yesterday. Mr. King had the good fortune to find a tortoise, this time in the thick brush near the edge of a large open area. It appears to be an adult female. Beck went over to the northwest end of the island and says he got into good tortoise country. He saw no signs of living tortoises but found some good bones.

June 28, 1906.—Went in after tortoises again but failed to find any. We however found a very fresh sign; but the brush was so thick that we could not find the tortoise, even after a long search. Examined some fresh droppings, and found it contained the red bark of the cactus and coarse grass. The tortoises evidently feed poorly, as the goats, which run thick all over the island, keep the cactus eaten up as soon as it falls.

June 29, 1906.—Still searching for tortoises but find no signs.

June 30, 1906.—Went in again after tortoises. No luck.

July 2, 1906.—Beck was in after tortoises, and found one small one about four miles inland from Gardner Bay. Evidently they have been well cleaned out.

Testudo elephantopus Harlan

Charles Island Tortoise

Plates 55 and 56.

? *Testudo nigra* Quoy & Gaimard, Voy. Uranie et Physic., Zool., 1824, p. 172, pl. XI; Duméril & Bibron, Erpét Génér., II, 1835, p. 115; Wiegmann, N. Acta Leop.—Carol., XVII, 1835, p. 118, pl. XIII; Strauch, Mém. Ac. St. Petersb. (7), V. No. 7, 1862, p. 85.

? *Testudo californiana* Quoy & Gaimard, Bull. Sci. Nat., I, 1824, p. 90, pl. XI [substitute name].

Testudo elephantopus Harlan, Journ. Ac. Nat. Sci. Phila., V, 1827, p. 284, pl.—; Harlan, Medical & Physical Researches, 1835, p. 190, pl.; Jackson, Journ. Boston Soc. Nat. Hist., I, 1837, p. 443, pls. X-XI.

? *Testudo indica* Gray, Syn. Rept., 1831, p. 9 (part).

Testudo galapagoensis Baur, Am. Nat., XXIII, Dec. 1889 [1890], p. 1044; Günther, Nov. Zool., IX, 1902, p. 184, pls. XVI-XXI; Heller, Proc. Washington Acad. Sci., V, 1903, p. 53; Siebenrock, Zool. Jahrb., Suppl. X, 3, 1909, p. 533.

Type specimens.—?Testudo nigra: Paris Museum. Young. Straight length about 10½ inches. Presented to M. de Freycinet by Captain Meek of the "Boston Eagle" while the "Uranie" and "Physicien" were in the Sandwich Islands. It was said to have come from California.

Testudo elephantopus: Academy of Natural Sciences of Philadelphia. Probably No. 366. Young. Curved length 21.6 inches. Taken in the Galapagos Islands.

Testudo galapagoensis: Boston Society of Natural History. Skeleton of adult male. Curved length 45 inches. Taken, probably on Charles Island, by Captain John Downes, in 1833, and presented in June, 1834.

Distribution.—This tortoise formerly was abundant on Charles Island to which it was confined. It probably is now extinct.

Material.—The Academy's collection contains no specimens of the Charles Island tortoise. In addition to the skeleton in the Boston Society of Natural History, three other specimens have been referred to this species by Dr. Günther. These are the carapace of an adult male in the Rothschild Museum at Tring, England, a female in the Harvard Museum of Comparative Zoology, and probably a male in the Peabody Academy of Science in Salem, Massachusetts.

Diagnosis.—No nuchal; gulars paired; third[1] cervical vertebra biconvex; front of carapace fairly high; carapace inclining toward the saddle-shape, broad, depressed, flat-backed, rather broad anteriorly; first marginals not much enlarged, not everted, their ventral surfaces not vertical, their most prominent points not widely separated; length over curve not more than 125% (120-125%), less than width over curve; vertical distance from lower surface of plastron to lower edge of lateral marginals great; general size large, straight length 37.5 inches; plastron moderate, median length 75 to 80%; plates generally smooth; pectorals forming a suture on median line; eighth marginal large with a long superior border.

General Remarks.—The Charles Island tortoise was closely related to that of Hood Island, but was of a somewhat broader, and perhaps smoother type. No tortoise has been taken in Charles Island for many years and there can be little doubt this race is extinct.

Neither Mr. Slevin nor any other member of the Expedition found anything to indicate the presence of tortoises on Charles Island. Not even a bit of bone was found, although much time was spent in searching on various parts of the island, as the following extracts from Mr. Slevin's notes show:

Field Notes—Oct. 4, 1905.—Went ashore at Post Office Bay and worked towards the interior. Found animal life of every description scarce. No signs of tortoises, nor any bones, were seen.

Oct. 5-6, 1905.—Ashore at the northeast end of the island. No reptiles seen except *Tropidurus* and geckos.

[1]This probably is an abnormal, individual variation. The same condition has been described in the type of *T. becki* in which the fourth normally is biconvex as in the other races.

Oct. 7, 1905.—Went ashore at Black Beach and followed along the road, which is more properly a trail, quite a distance inland. I saw no reptiles of any description except geckos. This part of the island is thickly wooded, and has no large lava-fields; more green vegetation and soil.

Oct. 9, 1905.—Went ashore at Black Beach and worked into the interior up to some springs south of the highest peak.

Oct. 10, 1905.—Worked up to the top of the crater on the highest mountain, but saw no signs of any reptiles whatever. It rained quite often near the summit; so I worked down into a valley to the south, and found clear open country with plenty of cattle trails and everything green. Worked down toward the coast with the ocean on the south side in view. No tortoise bones were found. Nothing has been seen by any of the party.

Oct. 11, 1905.—Worked toward the interior southwest of Black Beach. The country is fairly open. Saw no sign of any reptiles except geckos.

Oct. 12, 1905.—Worked into the interior to see if I could find any lizards or snakes. Found fine open country with everything green, wild cattle, hogs, etc. Found no trace of any reptiles whatever.

Feb. 26, 1906.—Went ashore at Cormorant Bay.

Feb. 27-Mar. 2, 1906.—Black Beach. No reptiles of any description, other than geckos, were seen by any of the party during their hunting trips on this part of the island.

May 15-16, 1906.—Went in from Black Beach camping to shoot cattle and lay in a supply of meat. Stayed two days, and brought down two loads.

May 17, 1906.—Stopped about an hour at Cormorant Bay.

May 23, 1906.—Collected near Black Beach.

May 24-June 1, 1906.—Stayed in camp getting beef.

June 2, 1906.—Went up to the highest mountain on the island, and climbed to the top. This tramp, like a long trip around the south side of the island on the 25th of May, showed no signs of any reptiles whatever.

June 4, 1906.—Went up the trail to about 600 feet elevation, and collected a few more geckos.

Testudo darwini Van Denburgh

James Island Tortoise

Plates 56 to 63.

Testudo darwini Van Denburgh, Proc. Cal. Acad. Sci. (4), I, 1907, p. 4; Siebenrock, Zool. Jahrb., Suppl. X, 3, 1909, p. 533.

Type specimen.—California Academy of Sciences No. 8108. Adult male. Straight length 38 inches. Taken on James Island, by R. H. Beck and Joseph R. Slevin, July 31, 1906.

Distribution.—This tortoise seems now to be confined to the less accessible parts of James Island. It formerly was very abundant, but seems now to be very near extinction.

Material.—Although this tortoise was taken from the Galapagos Islands in great numbers by vessels which visited them in early days, no specimen of it seems to have been preserved in any museum until the recent expedition secured five for the Academy.

Diagnosis.—No nuchal; gulars paired; fourth cervical vertebra biconvex; carapace high, elongate, somewhat dome-shaped but high in front; posterior declivity beginning about middle of third vertebral; height at nuchal notch more than 41% (42 to 45%) of straight length; difference between percentages of height at third vertebral and at nuchal notch in male more than 9 (10 to 14); carapace not saddle-shaped, width at margin of junction of second and third marginals 48 to 58%; width over curve in male not greater than length over curve; vertical distance from lower surface of plastron to lower edge of lateral marginals moderately great, 7 to 9%; general size large, straight length 38 inches; shell heavy; pectoral plates forming a suture on median line; eighth marginal not reduced; the sum of the measurements of the length over curve, length of plastron, height at nuchal notch, and height at third vertebral, equals or exceeds the sum of the measurements of the straight length, straight width, and width over curve; jaws and throat black marked with yellow.

TABLE OF MEASUREMENTS OF JAMES ISLAND TORTOISES.

Number	Sex	Straight			Curved				Width 2d to 3d marginals	Per Cent	Height				Height to marginals	Per Cent	Plastron	Per Cent	Fore Limb	Per Cent	Hind Limb	Per Cent	Axilla to Elbow	Per Cent	Neck	Per Cent	Tail	Per Cent
		Length	Width	Per Cent	Length	Per Cent	Width	Per Cent			Middle	Per Cent	Front	Per Cent														
8109	♂	40.25	29.5	73	50.25	125	50.5	125	19.5	48	22.4	56	17.	42	2.8	7	30.75	76	20.8	52	18.4	46	12.	30	24.8	62	3.8	9
8108	♂	38.	28.	74	49.	129	46.	122	21.	55	20.87	55	17.12	45	3.4	9	32.25	85	18.	47	16.4	43			21.2	56	6.8	18
8107	♂	21.	16.5	79	26.5	126	25.	119	10.75	51	11.25	54	6.75	32	2.3	11	18.	86										
8106	♀	30.	23.	77	37.75	126	38.75	129	17.5	58	17.	57	12.5	42	2.6	9	25.5	85										
8105	♀	25.75	18.5	72	30.75	119	29.5	114	14.5	56	13.	50	11.25	44	2.	8	21.5	83										

General remarks.—The James Island tortoise is a very large, heavy, thick-shelled species which resembles most closely the tortoise of Jervis Island and the *Testudo vicina* of southern Albemarle. It is somewhat intermediate in shape between the saddle-backed and dome-shaped races. The front of the carapace is high, but the middle of the back rises still higher. There is but little narrowing of the front of the carapace.

Field Notes.—December 26, 1905.—Went down the coast to a place which the Captain says is marked in his epitome as Adam's Cove. Beck and Williams went inland to camp and look for tortoises.

Jan. 2, 1906.—Mr. Beck returned on the 29th from a trip to the interior. He reports stopping at the camp where the hunters for tortosies encamped, and says there were bones scattered all about. He collected some of the best specimens, which will be packed in a box. Williams says he saw an old piece of dung at the same place. No fresh signs of tortoises have been seen by any of the party so far.

July 27, 1906.—Sailed from Seymour early in the morning and anchored off the coast of the east end of James Island near Bartholomew. The country presents a very desolate appearance. It is all fresh lava with a few cacti and some brush. Intend to go in after tortoises tomorrow.

July 28, 1906.—Went inland for tortoises. Followed up a valley toward Bartholomew Island, and found the brush and cactus thicker as we got higher. I saw no fresh signs of tortoises, but Beck says he saw some about three weeks old. He also picked up a few old bones.

July 30-August 4, 1906.—Went in after tortoises about five miles northwest of Sullivan Bay. The country is extremely rough—the worst we have encountered since we arrived in the islands. The lava-flows are all comparatively recent, and many places have no vegetation whatever. There is a valley opposite our anchorage which runs into the interior, and is fairly thick with cactus, small trees, and shrubs. We went up this valley about a mile, and saw our first signs of tortoises. There is no earth whatever here; everything is lava, and it is impossible to do any trailing. King, Beck and I looked over the surrounding country for three or four hours. We saw fresh signs, but found no tortoises. I returned to the ship, while

Beck and King went farther up to camp. When I went in to the camp the next day, Beck had found two large male tortoises about five miles up the valley, and in better, or very good, tortoise country. We found plenty of earth and cactus here and everything in favor of finding tortoises. King had one of the males partly skinned, so I helped him finish it, and we brought it out to camp. Beck went over toward the main mountain, and covered lots of country, finding two more males and a female. He went over the next day and skinned the female and another small one which he found on the way, and, with the assistance of Ochsner and Hunter, who came in to help us carry, brought them to the camp. King and I took the first male, which we had skinned, part way down to the vessel. The country was so rough and hard to get over that our shoulders became so sore that we could not hold the tortoise up any longer, so had to leave him in order to get to the beach by dark. The rest of the party, who were to help us out, missed us on the way, so King and I had to go it alone. They found the tortoise on the trail and, carrying it the rest of the way, reached the beach just at dusk. These tortoises have the heaviest shells and bones of any taken by us. The old males were not black (as Porter described them) but the females seem to be quite black. They are all very fat, more so than any we have seen yet. The fat is of a rich yellow color and looks almost like butter. The two males taken are somewhat unlike in shape. The other two males Beck found are far over toward Jervis Island, and it will be impossible for us to get them out. It was very difficult to get out the ones we did. No wonder people don't find tortoises on James! King got the measurements as well as possible, but it is impossible to get accurate measurements for the reason that a tortoise can throw a person in any direction he pleases with one of his legs. I got the measurements of the second male. Beck skinned the females and no measurements were taken. Beck found that these females contained large yolks, but there were no signs of shell on any of the eggs as yet. We saw no signs of any nests, so probably the breeding season commenced during June and July.

August 6, 1906.—Sailed for James Bay, and straightened up things on board. Sailing along the coast, we soon lost sight of the barren lava-flows, and everything appeared thickly wooded. The green zone on top was plainly visible, as the day was fine and clear. We passed by the cove where the tortoise-hunters went in, and saw good tortoise country along the hillsides. We anchored about three o'clock.

August 7, 1906.—Went up some distance into the interior, about to the beginning of the green zone—1200 feet.

August 9, 1906.—Sailed from James Bay for Cowley Mountain.

Testudo chathamensis Van Denburgh

Chatham Island Tortoise

Plates 64 to 69.

Testudo chathamensis Van Denburgh, Proc. Cal. Acad. Sci. (4), I, 1907, p. 4; Siebenrock, Zool. Jahrb., Suppl. X, 3, 1909, p. 533.

Type specimen.—California Academy of Sciences No. 8127. Skeleton of adult male. Straight length 35.25 inches. Found in a cave on Chatham Island, by R. H. Beck and Joseph R. Slevin, Feb. 12-14, 1906.

Distribution.—Chatham Island.

Material.—The Academy has a skin with bones of an adult female, the bony carapaces of two adult males and a number of skulls and other bones. The Honorable Walter Rothschild writes me that he has a young male specimen. It is probable that this species is now almost or quite extinct.

Diagnosis.—No nuchal; gulars paired; fourth cervical vertebra biconvex; carapace depressed, front elevated in male; height at nuchal notch less than 41% of straight length (male 34 to 36 female 27%); male flat-backed, female dome-shaped, difference between percentages of heights at third vertebral and at nuchal notch 6 to 11 in male, 24 in female; carapace of male slightly saddle-shaped but broad, width at margin of junction of second and third marginals 53% in male; anterior marginals but little everted; length over curve in male 112 to 117%, female 126%; vertical distance from lower surface of plastron to lower edge of lateral marginals small, 4% to 6%; general size moderate, straight length in male 35.25 inches, female 22.5 inches; pectoral plates much reduced, not meeting on mid-line; eighth marginal plate not reduced; jaws and throat of female black.

TABLE OF MEASUREMENTS OF CHATHAM ISLAND TORTOISES.

		Straight			Curved						Height																	
Number	Sex	Length	Width	Per Cent	Length	Per Cent	Width	Per Cent	Width 2d to 3d marginals	Per Cent	Middle	Per Cent	Front	Per Cent	Height to marginals	Per Cent	Plastron	Per Cent	Fore Limb	Per Cent	Hind Limb	Per Cent	Axilla to Elbow	Per Cent	Neck	Per Cent	Tail	Per Cent
8127	♂	35.25	24.25	69	39.5	112	38.	108	18.5	53	14.	40	12.	34	1.5	4	26.25	75										
8131	♂	27.6	21.	76																								
8132	♂	25.25	18.75	74	29.5	117	30.	118.8	13.4	53	11.75	47	9.	36	1.5	6	20.	79										
8133	♀	22.5	17.	75.6	28.25	125.6	26.	115.6	10.3	46	11.5	51	6.	27	1.4	6	18.25	81	10.4	46	10.2	45	4.8	21	11.6	52	3.	13

General remarks.—The Chatham Island tortoise is one of the lowest, most depressed, of the Galapagoan races. It is most similar in shape to *Testudo güntheri* and *Testudo microphyes* of Albemarle Island. It differs from both in the frequent, or perhaps constant, reduction of the pectoral plates. The only living specimen found by our expedition was a small but very old female. It is much more dome-shaped than the males found in the cave. It had lost one of its fore limbs in early life, only the head of the humerus remaining, and the shell is not symmetrically developed, being smaller on this side.

Field Notes.—October 15-18, 1905.—Three days were spent in hunting near Wreck Bay, Chatham, but only geckos and *Tropiduri* were found.

Jan. 24, 1906.—Anchor was again cast in Wreck Bay.

Jan. 25, 1906.—Went ashore for the morning. Pouring rain most of the time. No one did much collecting except near the beach. Found only a few geckos and *Tropiduri*.

Jan. 26, 1906.—Weather dried up a little, and we went ashore again. Too wet to do much.

Jan. 27, 1906.—Went ashore collecting, and made for higher altitudes. Went up to about 800 feet, and found everything wet and muddy with no signs of any reptiles.

Jan. 29, 1906.—Went to the top of Chatham Island. Found the country different from anything seen so far. It is just like large pastures and fields of grass. The soil is damp everywhere, and no reptiles were seen. The country to the east is a large plateau, and seems to be wooded fairly well in some portions. There are many small lakes on the opposite side from our anchorage (the southwest side). The island is so easily accessible that it seems hardly probable that there could be a tortoise left on it. The next time we stop here, we probably shall be able to explore the other side for a couple of days at least, if the weather is good.

Feb. 7, 1906.—Sailed at day-break for Fresh Water Bay, Chatham Island, but on account of wind and currents failed to make it; so made an anchorage east of Stephens Bay.

Feb. 8, 1906.—Went ashore at our present anchorage, and worked up to about 1000 feet altitude. The country is all rough lava thickly grown over with trees and shrubs. The higher portions look like good tortoise country, and are more open than below. No signs of tortoises were encountered, however, and no bones were found. Everything is very green, and the ground had been thoroughly soaked by recent rains. We expect to sail for Stephens Bay in the morning.

Feb. 10, 1906.—Went ashore at Sappho Cove and worked inland. The country is a plateau of recent lava, covered sparingly with cactus and fairly well with trees. Beck worked in the same general direction and had the great fortune to run on to a tortoise. It was eating cactus (*Opuntia*) when found. The right fore-leg was missing, and it seems hard to tell whether this was natural or the result of an accident. The ovaries contained eggs in yolk form. The locality where this tortoise was found was about four miles inland from Sappho Cove, and at about 300 feet elevation.

Feb. 12-14, 1906.—Went into the interior with Beck to search for tortoises. We worked for two days and a half around the central portion of the island without finding the least sign of a living tortoise. The entire country is rough lava overgrown with brush and trees. Cactus is fairly abundant. *Cereus* is the most common, while *Opuntia* is fairly common. Tortoises are likely to be found around the *Opuntia* if any are present, for the flat leaves often fall to the ground, and the spines are not so tough as those of the *Cereus*. We went to the top of a small hill and took the following bearings for the position of the living tortoise taken on February 10th: Mt. Pitt bore N. E. ½ N.; Finger Point bore N. W. by W. Kicker Rock bore W. by N.; top of island bore S. W. ½ S.; East Rock bore S. E. by E. The tortoise lay about three miles due west of this position. We had the good fortune to run across a large cave containing the remains of about seventeen tortoises. We made our headquarters in this cave, and looked over all the remains, collecting the best specimens. I made measurements in all possible cases of those we could not take.

1.—Collected a good set of bones, marked O. [C. A. S. No. 8128]. The carapace was far gone and not worth taking, inasmuch as we got good specimens. The plastron was intact. It was sunken like a male tortoise, and the indentation was very prominent with a ridge on the back part, as in the male tortoises of Duncan Island. Length of plastron 610 mm.; width at front curves 300 mm.; greatest width of shell 570 mm.; length of indentation in plastron 340 mm.; width of indentation 320 mm. Some of the marginal plates were loosely attached to the carapace. Some old dried grass from the intestines could still be seen and several old plates of a brown color but nearly rotted away were near the remains.

2.—Bones marked X [C. A. S. No. 8129] from remains so badly rotted away that no measurements could be taken.

3.—Skull marked 8 [C. A. S. No. 8130]. No bones or shell could be found near by.

4.—Collected one shell with carapace and plastron in perfect condition [C. A. S. No. 8132], but no bones were found with it.

5.—Found one old shell which measured as follows: Length of plastron 440 mm.; width between front curves 230 mm.; greatest width of shell 410 mm. Several bones were near by, shoulder bones and pelvis, but very soft and crumbling away.

6, 7.—Saw two more skeletons all crumbled away so that no measurements could be taken.

8.—A shell in fairly good condition. Greatest width of shell 523 mm.; greatest length of shell 665 mm.; distance between front curves of plastron 270 mm.; distance between hind curves of plastron 310 mm.; width of plastral indentation 280 mm.; length of indentation 340 mm. This was probably a male, as the indentation in the plastron is very prominent with a ridge at the back as in the male Duncan tortoises. Skull marked with a star [C. A. S. No. 8131] belongs to this tortoise. The other bones were in bad condition.

9.—One old carapace showed the following measurements: length of carapace 670 mm.; width between front curves of plastron 320 mm.; between hind curves of plastron 400 mm.

10.—One old piece of plastron found. Width between front curves 205 mm.

11.—Bones and large shell collected [C. A. S. No. 8127], marked with a rectangle. Four marginal plates still on the front of the carapace.

12.—One old skeleton in which the front curves of the plastron measured 200 mm.

13.—One old skeleton. Greatest width of shell 405 mm.; width between front curves of plastron 215 mm.

14–15.—Two more skeletons all crumbling away.

It appears that the tortoises fell into this cave while in search of food or water. Once in, it was impossible for any to get out, and consequently they starved to death. Some of the shells lay with the plastron upward, while others were in a perfectly natural position. They were protected from moisture and probably had been in the cave many years.

Feb. 15, 1906.—Sailed for Fresh Water Bay.

Feb. 21, 1906.—Arrived at Wreck Bay this morning after an attempt to reach Fresh Water Bay.

Feb. 22, 1906.—Met the schooner from Guayaquil and saw the Captain, who is an Englishman. He says he has taken tortoises on Chatham Island, and that he ate the last one on the island some twenty years ago.

July 3–July 8, 1906, were also spent at Chatham, but nothing further was learned regarding tortoises.

Testudo microphyes Günther

Tagus Cove Tortoise

Plates 70 to 83.

Testudo microphyes Günther, Trans. Royal Soc. Lond., CLXV, 1875, p. 275, pls. 36, 37 fig. B, 38 fig. B, 39 fig. B; Günther, P. Z. S., 1877, p. 66; Günther, Gigantic Land Tortoises Brit. Mus., 1878, p. 78, pls. XXXII-XXXVIII, XLII fig. B, XLIII fig. B, XLIV fig. B, XLV figs. A-C; Boulenger, Cat. Chelonians Brit. Mus., 1889, p. 170; Strauch, Mém. Acad. Sci. St. Petersb. (7), XXXVIII, 2, 1890, p. 53; Vaillant, Bull. Mus. d'Hist. Nat. Paris, 1900, p. 228, Heller, Proc. Washington Acad. Sci., V, 1903, p. 56; Beck, Seventh Report N. Y. Zool. Soc., 1903, p. 13; Siebenrock, Zool. Jahrb., Suppl. X, 3, 1909, p. 534.

Type specimen—British Museum. Adult female. Straight length 22.5 inches. Origin unknown.

Distribution.—Günther and other authors have thought that *Testudo microphyes* was confined to the vicinity of Tagus Cove, Albemarle Island. The Academy's collection, however, contains specimens from Cape Rose, on the southern coast of Albemarle Island, which I am unable to distinguish from those secured at Tagus Cove.

Material.—The Academy has thirteen males and one young female from Tagus Cove, and four males and a female from Cape Rose. Many museums contain specimens of this tortoise, which is not rare in collections.

Diagnosis.—No nuchal; gulars paired; fourth cervical vertebra biconvex; front of carapace low, in males higher than in females; height at nuchal notch not more than 44% (34 to 43%) of straight length; difference between percentages of front and middle heights less than 14 (2 to 14); carapace not saddle-shaped, not narrow anteriorly, width at margin of junction of second and third marginals not less than 46% (46 to 57%); first marginals not enlarged, not everted, their ventral surfaces not vertical, their most prominent points separated by less than 25% (15 to 24%); length over curve not more than 123% (114 to 123%); width over curve less than length over curve or exceeding it by less than 5%; vertical distance from lower surface of plastron to lower edge of lateral marginals small, 3 to 7%; general size large, straight length 25 to 40.5 inches; plastron short, 65 to 80%; plates nearly smooth in adults; pectorals forming suture on median line; eighth marginal plate not reduced; lower jaw and throat of males not marked with yellow.

TABLE OF MEASUREMENTS OF TAGUS COVE, ALBEMARLE ISLAND, TORTOISES.

Number	Sex	Straight			Curved				Width 2d to 3d marginals	Per Cent	Height				Height to marginals	Per Cent	Plastron	Per Cent	Fore Limb	Per Cent	Hind Limb	Per Cent	Axilla to Elbow	Per Cent	Neck	Per Cent	Tail	Per Cent
		Length	Width	Per Cent	Length	Per Cent	Width	Per Cent			Middle	Per Cent	Front	Per Cent														
8158	♂	40.5	25.4	63	47.1	116	43.5	107	18.7	46	16.9	42	14.6	36	1.8	4	27.2	67	18.4	45	17.2	42	9.6	24	19.6	48	5.	12
8157	♂	39.5	27.9	71	47.9	121	46.	116	20.5	52	18.6	47	14.	35	2.4	6	28.9	73										
8162	♂	38.3	25.	65	43.6	114	40.25	115	19.	50	16.2	42	12.7	33	2.2	6	25.	65										
8167	♂	37.8	26.4	70	43.9	116	43.	114	17.75	47	17.8	47	15.	40	2.5	7	26.8	71	18.4	49	17.2	46	10.	26	20.8	55	3.8	10
8168	♂	37.5	27.5	73	44.	117	42.5	113	20.	53	17.3	46	14.4	38	2.5	7	26.5	71	16.8	45	14.8	39	10.	27	20.4	54	4.	11
8160	♂	37.3	27.	72	45.	121	44.75	120	20.	54	18.25	49	15.	40	2.25	6	28.8	77										
8159	♂	37.3	26.8	72	45.4	122	45.6	123	19.3	52	18.1	49	14.2	38	2.2	6	26.2	70	18.6	50	17.2	46	10.4	28	19.6	53	4.6	12
8163	♂	37.	27.8	75	43.	116	42.	114	18.5	50	15.9	43	14.4	39	2.	5	27.4	74										
8164	♂	36.25	26.4	73	43.1	116	40.8	110	18.5	51	16.6	46	13.3	37	2.5	7	25.75	71	13.2	36	9.6	26	9.2	25	18.	50	3.8	10
8165	♂	36.	27.1	75	42.5	118	43.8	122	20.2	56	16.3	45	13.4	37	1.1	3	26.2	73	17.2	48	16.	44	10.4	29	20.4	57	5.6	16
8166	♂	36.	26.5	74	43.	119	43.	119	18.2	50	17.	47	14.1	39	2.6	6	25.6	71										
8161	♂	34.5	24.5	71	40.2	116	41.2	119	18.8	53	16.1	47	13.	38	1.7	5	24.	70										
8156	♂ ?	14.75	11.6	84	18.5	126	17.75	120			7.25	49	4.25	29	1.	7	12.75	86	6.4	43	6.	41			7.2	49	1.36	9
8155	♀	13.25	11.	83	17.5	131	17.25	130			7.25	55	4.	30			12.	91										

TABLE OF MEASUREMENTS OF CAPE ROSE TORTOISES.

		Straight			Curved						Height																	
Number	Sex	Length	Width	Per Cent	Length	Per Cent	Width	Per Cent	Width 2d to 3d marginals	Per Cent	Middle	Per Cent	Front	Per Cent	Height to marginals	Per Cent	Plastron	Per Cent	Fore Limb	Per Cent	Hind Limb	Per Cent	Axilla to Elbow	Per Cent	Neck	Per Cent	Tail	Per Cent
8169	♂	38.	26.3	70	46.8	122	45.	119	21.6	57	17.8	47	15.5	41	2.5	7	27.6	73	16.8	44	16.4	43			17.2	45	4.	11
8170	♂	35.25	25.	71	42.	119	41.	113	20.	57	16.75	48	14.	40	2.	6	27.	77	16.8	48	14.6	41	8.	23	16.	46	4.2	12
8171	♂	35.	24.2	69	40.	114	38.6	110	18.9	54	15.1	43	12.2	35	2.6	7	23.7	68	17.8	51	14.8	42	8.	23	15.8	45	3.2	9
8172	♂	29.2	22.	75	33.8	116	34.1	117	16.4	56	13.	45	12.5	43	2.1	7	21.8	75	14.6	50	12.	41	7.6	26	13.6	47	3.4	12
8173	♀	25.	18.8	75	30.8	123	31.8	127	13.4	54	12.8	51	9.2	37	1.8	7	20.	80	13.2	53	11.8	47	5.6	22	13.2	53	1.8	7

General remarks.—The tortoises of Tagus Cove Mountain and vicinity are very different from those of the northern end of Albemarle Island. The males have low shells with flat backs, the front of the carapace being but little below the level of the middle of the back. The shell is thin and light. These tortoises bear most resemblance to those of Chatham Island and the *T. güntheri* of southeastern Albemarle. The males from Cape Rose seem to be absolutely identical with those from Tagus Cove.

Field Notes.—March 23, 1906.—Anchored at Tagus Cove. Beck and King went ashore to hunt for tortoises. Beck found two. One of these he skinned and brought on board this evening. It is a male.

March 24, 1906.—Went in with King to get the tortoise found yesterday. The country in the vicinity of the cove is somewhat barren, and, on the hillsides and in the valleys, several fresh lava-flows can be seen that have no vegetation at all. The place where we saw the signs of tortoises is a valley about a mile from the shore. Most of it was grown over with brush, but thick only in places. We saw several old skeletons with the bones crumbled to dust. There were no fresh signs of tortoises, other than the two found. The one we got today was at the farther end of the valley, right on the edge of a barren lava-flow. While King and I got this one out, Mr. Beck went hunting for more tortoises, and found a large male at the foot of the mountain and directly opposite the cove. I suppose we shall go in for him tomorrow.

March 25–31, 1906.—Worked on tortoises up on the mountain all the week. We found no fresh trails in the valley, so went up the mountain, which presents a similar appearance as regards growth of trees, etc. There are two large lava-flows extending down the mountain sides, with green patches on them, and some of these were well cut up with tortoise trails. The tortoises work all through the brush on the mountain side, and it cannot be said that they are rare; but it is so much work to get them, that people report them scarce. The females, however, appear to be rare, as none have been found by us so far. They are smaller than the males and have more fat, so that they probably have been killed by oil-hunters when they came down into the valley. All the tortoises we have taken were heading up the mountain. At Tagus and Iguana coves I noticed that the tortoises were covered with ticks all over the skin and along the cracks between the plates of the plastron. Cactus is somewhat scarce here compared with other places, and the chief part of the tortoises' diet is a coarse grass that is abundant on the hills and in the valleys. The tortoises here seem to be of a uniform size and have thin shells.

April 2, 1906.—During the morning I worked on board with tortoises, etc. Mr. Beck went over to Narborough to hunt for tortoises. King and I went up to camp this afternoon, to carry out a tortoise we had tied up on the mountain.

April 3, 1906.—Skinned the tortoise and carried him out—a good day's work.

April 4, 1906.—King and I went to the foot of the mountain to get a tortoise Beck said he had tied up, but after hunting all day failed to find it. We obtained a good view of the north side of the mountain, which appears to be all fresh lava with very few patches of vegetation. The whole country to the north is fresh lava. Cape Berkeley was plainly visible, and appeared very high and steep. The mountain at Banks Bay was also seen, but the character of the country and vegetation could not be made out.

April 7, 1906.—Went ashore to get the tortoise Beck tied up several days ago. We found him a long way up the mountain and not where Beck told us to look. His stomach contained grass.

March 14, 1906.—We sailed down the coast toward the high mountain at Iguana Cove, and anchored at evening about six or eight miles east of it.

March 15, 1906.—Went ashore, about two miles west from our anchorage, at a small cove on the coast in the vicinity of Cape Rose. We got into a fine tortoise country, where the natives had been killing off the tortoises some years ago. There was a small plateau, well cut up with cattle trails and having abundant cactus (*Opuntia*). There was also an abundance of the trees which produce a fruit that looks like a small apple. This fruit appears to have a somewhat poisonous effect, and goes through the tortoise like a purge. The tortoises taken here were full of this fruit, and the intestines were much swollen and very thin, so that they looked almost membranous. The fruit passes through the intestine unchanged except in color, which fades from green to a light yellow. The tortoises seem to prefer this food to cactus, for there was an abundance of the latter all around. The tortoises taken at this particular place seem to be much fatter than any taken thus far, and their shells are very light for their size.

July 27, 1906.—Stewart says the plant with the apple-like fruit is *Hippomane mancinella.*

Testudo güntheri Baur

Vilamil Mountain Tortoise

Plates 84 to 92.

Testudo elephantopus Günther, [*nec* Harlan] Trans. Royal Soc., CLXV, 1875, p. 261, pls. 33, 37 fig. A, 38 fig. A, 39 fig. A, 40 fig. A, 41 fig. B, 42 fig. A, 43. 44 figs. A,A', C,D; Günther, Gigantic Land Tortoises Brit. Mus., 1877, p. 63, pls. XXX fig. A, XLII fig. A—XLIV fig. A, XLVI fig. A, LI—LIII; Rothschild, Novit. Zool., IX, 1902, p. 448; Rothschild, Novit. Zool., IX, 1902, p. 618; Heller, Proc. Washington Acad. Sci., V, 1903, p. 53; Siebenrock, Zool. Jahrb., Suppl. X, 3, 1909, p. 532.

Testudo nigra Boulenger, Cat. Chelonians Brit. Mus., 1889, p. 170.

Testudo güntheri Baur, Am. Nat., XXIII, Dec. 1889 (1890), p. 1044.

Type specimen.—Oxford Museum, England. Skeleton of adult male. Straight length 31 inches. Purchased of a dealer in Paris. Origin unknown.

Distribution.—Vilamil Mountain and vicinity in the southeastern part of Albemarle Island.

Material.—There are in the Academy's collection forty-one specimens which I refer to this race. The Tring museum has a number of specimens.

Diagnosis.—No nuchal; gulars paired; fourth cervical vertebra biconvex; front of carapace from 5 to 22% lower than middle; height at nuchal notch not more than 44% (29 to 44%) of straight length; difference between percentages of heights at third vertebral and at nuchal notch more than 5 (5 to 22); carapace not saddle-shaped, broad anteriorly, width at margin of junction of second and third marginals not less than 46% (46 to 61%); first marginals not everted, without prominent points; length over curve not more than 128% (114 to 128%), never greater than width over curve; vertical distance from lower surface of plastron to lower edge of lateral marginals small, 3 to 9%; general size usually rather small, straight length 23.7 to 40 inches; plastron of moderate length, 70 to 87%, often with posterior knobs even in females; plates generally smooth in adults; pectorals forming a suture on median line; eighth marginal plate not reduced, with a considerable superior border; lower jaw and throat in males sometimes marked with yellow.

TABLE OF MEASUREMENTS OF VILAMIL MOUNTAIN TORTOISES.

Number	Sex	Straight			Curved				Width 2d to 3d marginals	Per Cent	Height				Height to marginals	Per Cent	Plastron	Per Cent	Fore Limb	Per Cent	Hind Limb	Per Cent	Axilla to Elbow	Per Cent	Neck	Per Cent	Tail	Per Cent
		Length	Width	Per Cent	Length	Per Cent	Width	Per Cent			Middle	Per Cent	Front	Per Cent														
8391	♂	40.	30.6	77	46.3	116	49.	123	23.	58	18.25	46	16.3	41	2.2	6	28.6	70										
8194	♂	39.	32.5	83	46.6	120	49.4	127	23.7	61	17.9	46	14.	36	1.1	3	30.75	79	17.6	45	16.	41	9.6	25	20.	51	4.	10
8220	♂	28.	20.5	73	32.75	117	35.5	127	14.5	52	13.6	49	9.75	35	1.65	6	20.	71										
8256	♂	25.1	19.65	78	30.3	121	32.1	128	14.3	57	12.5	50	8.6	34	1.5	6	20.	80										
8217	♂	24.5	19.75	81	29.	118	31.	126	13.	53	12.	49	8.5	31	1.5	6	19.25	79										
8199	♀	28.8	22.5	78	34.1	122	35.7	127	14.7	51	12.7	44	9.6	33	1.	3	21.8	76										
8189	♀	28.5	22.75	79	33.25	116	37.	129	15.8	55	14.5	51	11.	39	1.8	6	22.5	79	12.	42	10.4	36	5.2	18	14.	49	1.8	6
8232	♀	28.2	20.9	74	33.	117	34.6	123	15.2	54	13.2	47	9.5	34	1.8	6	19.6	70										
8239	♀	27.9	21.6	77	33.25	119	34.5	124	13.3	48	13.3	48	8.7	31	1.3	4	21.5	77										
8234	♀	27.9	21.2	76	33.1	119	34.9	125	13.3	48	13.	47	9.	32	1.25	4	21.2	76										
8251	♀	27.3	22.3	82	31.6	116	34.7	127	14.8	54	13.3	49	10.7	39	1.75	6	21.4	78										
8237	♀	26.75	20.75	77	32.25	121	33.5	125	14.75	51	12.75	48	9.25	35	1.	4	21.	79										
8225	♀	26.3	19.9	76	31.9	121	32.6	124	13.6	52	12.	46	8.	30	1.4	5	20.	76										
8269	♀	26.	22.	85	32.	123	34.3	132	13.8	53	13.1	50	9.5	37	1.6	6	20.5	75										
8209	♀	26.	21.	81	30.2	116	32.5	125	13.4	52	12.6	48	10.	38	1.9	7	20.6	75	12.4	48	11.2	43			12.8	49	1.5	6
8224	♀	26.	20.3	78	30.9	119	33.6	129	13.6	52	13.	50	10.	38	1.5	6	21.5	83										
8244	♀	26.	20.	77	30.	115	32.9	127	13.2	51	12.5	48	9.1	35	1.5	6	19.4	75										
8210	♀	25.9	19.75	76	30.8	119	32.8	127	13.4	52	12.6	49	9.5	37	1.4	5	19.25	74	11.6	45	10.6	41	6.	23	13.6	52	2.	8
8215	♀	25.75	19.5	76	30.75	119	31.75	123	12.7	49	13.	50	8.9	35	2.1	8	19.5	76										
8190	♀	25.7	20.7	81	31.2	121	33.2	129	14.	54	13.25	52	9.9	39	1.9	7	20.5	80	11.2	44			5.1	20	12.4	48	2.2	9
8268	♀	25.5	22.	86	32.5	124	34.7	136	15.	59	13.2	52	10.1	40	1.5	6	21.5	84										
8265	♀	25.5	21.7	85	31.4	123	33.5	131	15.5	61	12.4	49	10.6	42	2.	8	21.	82										
8206	♀	25.5	20.	78	30.8	117	33.2	130	13.2	52	13.2	52	10.	39	1.75	7	20.1	75	11.6	45	10.8	49	6.	24	12.4	49	1.2	5
8212	♀	25.5	19.5	76	29.5	116	31.	122	13.3	52	11.5	45	9.25	36	1.4	5	19.5	76										
8226	♀	25.4	21.	83	30.1	119	34.25	135	14.2	56	13.	51	10.	39	1.5	6	21.	82										
8240	♀	25.4	19.	75	30.	118	31.5	124	13.5	53	13.5	53	9.3	37	1.75	7	19.3	76										
8191	♀	25.1	19.4	77	29.9	119	31.6	126	12.6	50	12.	48	8.6	34	1.6	6	19.3	77										
8233	♀	25.	20.	80	30.	120	34.2	137	12.8	51	12.5	50	11.	44	1.4	6	21.	84										
8263	♀	25.	19.6	78	29.7	119	30.4	122	11.4	46	12.3	49	9.1	36	1.6	6	19.5	75										
8259	♀	24.8	21.1	85	29.1	117	30.5	122	12.8	51	11.3	46	7.25	29	1.2	5	19.1	77										
8218	♀	24.7	20.6	83	29.25	118	32.	130	13.2	53	11.9	48	8.8	32	1.6	6	19.5	79										
	♀	24.7	19.6	79	29.5	117	32.2	130	12.1	49	12.	49	8.5	34	1.5	6	20.25	82	13.5	55	12.	49	6.	24	10.5	43		
8267	♀	24.7	19.4	79	29.25	118	31.	126	13.	52	11.6	47	8.75	35	1.2	5	19.25	78										
8230	♀	24.6	19.6	80	29.7	121	33.	134	13.1	53	12.5	51	9.	37	1.4	6	19.6	80										
8248	♀	24.	20.7	86	29.6	123	32.4	135	12.3	51	12.3	51	8.8	37	1.7	7	19.5	81										

TABLE OF MEASUREMENTS OF SOUTH ALBEMARLE TORTOISES.

		Straight			Curved						Height							
Number	Sex	Length	Width	Per Cent	Length	Per Cent	Width	Per Cent	Width 2d to 3d marginals	Per Cent	Middle	Per Cent	Front	Per Cent	Height to marginals	Per Cent	Plastron	Per Cent
8197	♀	27.8	21.25	76	33.4	120	36.3	131	13.6	49	14.3	51	10.	36	1.6	6	21.25	76
8250	♀	27.2	21.6	80	33.4	123	35.7	131	14.6	54	13.9	51	9.1	33	1.4	5	20.25	74
8214	♀	26.4	23.3	88	32.6	123	37.6	142	13.5	51	14.4	55	10.1	38	1.5	6	21.3	87
8247	♀	25.8	20.4	79	30.1	116	34.4	133	13.1	51	13.75	53	10.6	41	1.7	7	20.7	80
8241	♀	25.4	20.25	80	32.5	128	32.6	128	12.3	48	13.6	54	8.1	32	2.3	9	21.1	83
8271	♀	23.7	16.5	70	27.	114	27.5	116			11.9	50	6.9	29	1.75	7	17.5	74

General remarks.—The tortoises of southern Albemarle present many difficulties. The specimens from Iguana Cove seem to be quite uniform in shape, and it is probable that only *Testudo vicina* occurs there. Somewhat farther east, at Cape Rose, are found tortoises which I am unable to distinguish from those taken at Tagus Cove, which again appear to be constantly of one type. But when one collects still farther east, on Vilamil Mountain or in the vicinity of Turtle Cove or the old Cobos settlement, tortoises of two distinct types are found together. Those of one type agree closely with the tortoises of Iguana Cove, and I therefore include them under the head of *Testudo vicina.* Those of the other type are much more depressed, with less elevated backs, with the height to marginals very low, and have very smooth shells. These I refer to another race, for which the name *Testudo güntheri* seems available. They resemble both the Tagus Cove and the Chatham Island tortoises in many respects. A few specimens, included in the second table of measurements, are nearly intermediate in shape between the typical *T. güntheri* and the dome-shaped females of *T. vicina.* Altogether, the problem is a difficult one, and I am in some doubt whether these tortoises which I have called *T. güntheri* are really a distinct race or merely old individuals of the same race as those I have referred to *T. vicina.* I cannot understand, however, how age could produce changes in shape such as exist, and I therefore think it probable that the two great mountains of southern Albemarle—at Iguana Cove and Vilamil—each developed its own peculiar race of tortoise, perhaps at a time when these mountains were separate islands. If this view be correct, *T. vicina* has spread eastward more rapidly than *T. güntheri* has wandered toward the west. The following field notes are based upon tortoises of both kinds.

Ten eggs (No. 8426) taken Sept. 1, 1906, from tortoise No. 8197, measure 2.38x2.30, 2.37x2.36, 2.37x2.30, 2.37x2.24, 2.34x2.25, 2.33x2.28, 2.33x2.25, 2.30x2.30, 2.27x2.25 and 2.21x2.25 inches. The smallest eggs in our collection measure 2.10x1.87 and 2.01x1.90 inches. They are No. 8430 and were taken from tortoise No. 8197.

Field Notes.—Oct. 30, 1905.—We sailed for Turtle Cove, on leaving Brattle, and anchored early in the afternoon.

Nov. 1, 1905.—Went ashore at Turtle Cove and worked up the trail toward the settlement. Expect to go tomorrow along the coast in the direction of Iguana Cove, to look for some tortoises that the natives say are near the shore.

Nov. 2, 1905.—Went down the coast west of Vilamil about six miles to look for tortoises where Beck found them before. The country is level and cut up with cattle trails. We found five tortoises during the day. They all were taken near the cattle trails, in small patches they had dug up under the bushes. As they were found fairly near the beach, we brought four aboard alive, only skinning one that was farthest inland. These were the only tortoises seen by the party, but we could not well have taken more in the boat. We did not cover a great amount of country, and the tortoises may be fairly common in this locality.

Nov. 3, 1905.—I stayed on board all day skinning tortoises and iguanas. Mr. Beck bought another small tortoise from the natives today. We expect to sail for Indefatigable tomorrow to look for more tortoises in a different locality.

March 5, 1906.—I went up the trail toward the settlement (at Vilamil) but saw no reptiles except lizards. The country is a large plain of lava covered sparingly with cactus and brush.

March 6, 1906.—Went down the coast north of the port and found nothing. The country is a desert of lava. It was a day wasted as far as enlarging the collection was concerned, but I at least found out what the country is like.

March 7, 1906.—Went up the trail toward the settlement and collected more lizards, but saw no other reptiles. The weather is very hot now and has been so for several days past. Hunter and Gifford went up to the settlement collecting. They report seeing hundreds of bones of tortoises along the trail and at several water-holes where the tortoises used to gather. No live tortoises were seen below the settlement, and the natives say all have been killed off there, and that they no longer are abundant on the mountain.

March 8–9, 1906.—Worked on board ship.

March 10, 1906.—I worked on board in the morning, and in the afternoon we sailed about ten miles down the coast toward Iguana Cove, and anchored at eight o'clock.

March 11, 1906.—Mr. Beck went ashore and found two tortoises.

March 12, 1906.—Went ashore about a mile west of our anchorage to hunt for tortoises and to get the two Mr. Beck found yesterday. This portion of the coast is a large plateau which rises very gradually to the mountain at Iguana Cove and to lower hills in the distance to the eastward. This plateau is densely wooded with large trees and cactus and thick brush which, fortunately, is well cut through with cattle trails. The tortoises are rather common; at least, large ones are, while the smaller ones seem to have been all killed by the natives, if one may judge from the numerous skeletons scattered through the woods. We saw, during our two days ashore here, about ten tortosies, all males I think. They like the shade, and in the heat of the day prefer to stay in some hollow or under a bush. Judging from the amount of black mud on them, they wallow in the mud like swine. We found one tortoise lying in a mud hole with all legs stretched out and his head stuck in the mud. We also found one under a bush near a cattle trail, and so skinned him and brought him part way out. The day was very hot, and we could not make very good time. We ran out of water, and felt anything but active. Finally we left the tortoise on the beach down the coast and made for our boat, breaking through brush and mangroves every inch of the way. We reached the vessel after dark thoroughly tired out. We expect to go ashore in the morning, when the tide is low, and bring the tortoise around by the beach. King is pretty well under the weather, having drunk too much water from a hole we encountered near the end of our journey. The day was altogether too hot for us to carry tortoises.

March 13, 1906.—Beck and I went ashore and carried the tortoise down the coast to our boat. The tide was very low, so we carried it around by the beach. We went inland again from the boat to get another tortoise, and found one late in the afternoon. We partly skinned this one, cutting out all the heavy meat, and rushed him out to the coast, getting there just before dark. In this vicinity, near the old Cobos settlement, we noticed on some of the cattle trails the excrement from the tortoises. They had eaten the fruit of a large tree, which is abundant everywhere, and this fruit passed through the intestines unchanged without having been chewed or disfigured in any way. This fruit is shaped like an apple, and about an inch in diameter.

April 25–27, 1906.—We drifted up the coast toward Vilamil and, in the evening of the 24th anchored off the old Cobos settlement which we call Bull Beef Anchorage. Beck says we put in just to get some beef to salt. As King and I were the only ones working on tortoises here, we could not get more than one a day. We found them common near the coast, in mudholes under the shade of trees. The ones we found were buried in the soft black mud, with just their heads and the tops of their carapaces exposed. It would seem that the natives have killed off all the females, as we find only males. The two tortoises we took had stomachs nearly empty, and evidently had been in the mud for some time, since no traces could be seen where they went in. There are mudholes and lagoons all along the coast here, and cactus and grass are abundant, so that it is ideal tortoise-country.

August 16-19, 1906.—Sailed from Duncan, early on the morning of the 16th, for Vilamil, where we arrived on the evening of the 19th, after four days spent in beating against the wind and strong currents.

August 20, 1906.—Sailed into Turtle Cove, to our anchorage. We had to anchor outside last night as we arrived about dark, too late to get in. We are making preparations to go up the mountain to skin tortoises. A few tortoises have been brought in by the natives from along the coast toward Cape Rose, but they find it too much of a job to get many, having to cut a trail for each tortoise brought out. We expect to stay here until September 5. I have things ready now to pack away. All the tortoise skins are ready to stow away for the voyage home.

August 21, 1906.—Everything was ready to go up after the large tortoises on the top of the mountain, but we could not get the mules, so will wait another day.

August 22 to 30, 1906.—We went up with our outfit to the hacienda to start up the mountain. At this elevation (1300 feet) the weather is constantly rainy and foggy, and the prospects of camping are not very pleasant. There is nothing visible, in the way of reptiles. The grassy area commences at 1500 feet and extends clear to the rim of the crater, which is at an elevation of 3150 feet. We encountered our first living tortoises about two miles from the top of the crater. In this place it almost seems as though one were seeing them in a park, for they are met simply lying around on the grass—some feeding and others sleeping. They follow the trails made by the cattle and pack mules, and we often had to turn off the trail to pass by them. They are by no means rare around this mountain, although great inroads have been made upon them by the oil-hunters. Those we saw on the way up the mountain were moderate-sized females. The males, being the larger, were killed off first for their oil, and consequently are rare.

We reached the top about noon and set our course toward a large valley to the southwest of the mountain, where the natives killed the large tortoises for their oil. We continued to travel through fine pasture land free from fog and dampness, for on the top of the mountain the weather is perfect. On all sides of us were tortoise skeletons—hundreds of them! With few exceptions, they all had been killed by the natives. The wild dogs have a few to their credit. These may be distinguished by the carapace and plastron being intact. The natives cut theirs open with axes. We saw no living tortoises on this steep slope of the crater, nor did we encounter any until we reached the level valley below. Fog hung over this valley early in the morning, and lifted a little toward noon. The vegetation here was the same as on the mountain—fine green grass and small trees. We made our camp in an old house the oil-hunters had left, and started on our search for tortoises. We soon found two near the house, but they were only moderate-sized ones. One of these we killed in order to get the liver for lunch, and, while we were eating, our native guide slipped out and cut off one of its legs for his own lunch. This spoilt it for a skin, so we saved only the skull. We skinned the other one in the afternoon. On our return to camp we found that the dogs had eaten what was left of our first tortoise. They ate even the shell, which, by morning, was half gone.

Next morning we started with two mules and our guide to follow the trail where the big tortoises used to be abundant, but found that they had been slaughtered by wholesale, so that we found no large ones. We saw only the ordinary females, which were common. We skinned four of them.

The following day King and I skinned three, that we found near the camp. Beck and the guide went out hunting again, but failed to find any large tortoises. The largest skeleton we saw measured seven spans. We collected a sack-full of old skulls in fairly good condition. Seeing that we could not get what was desired, Beck decided to return, and we started back Sunday with eight tortoises we had skinned on the trip. On the way up the mountain, and about half way to the hacienda, King found a large male tortoise that measured six spans. We decided to return next day and skin him. This we accomplished, and got back to the hacienda by dark with our ninth tortoise. This tortoise was a very old male. The plates on the side of the carapace were loose in life, and the plates on top all chipped up. The fore legs were scarred up where they had been chewed by dogs. Altogether, he was a regular old patriarch. The principal food of these tortoises was the grass that covers the entire country for miles around. One of the females contained eggs nearly ready to lay. The others had ovaries somewhat less developed, several containing large yolks. One female (C. A. S. No. 8189) had a scar in the right hind end of the carapace where a hole had healed over. Our guide explained that the natives made these holes to see whether the tortoises were fat enough to kill. Although this wound had grown over, it left a large abscess in the tortoise, the odor from which in skinning was anything but pleasant.

August 31, 1906.—Skinned tortoises collected by the natives and brought to the house at Vilamil. I am not sure of the exact locality where these tortoises were secured. I saw some brought down off the mountain, and most of them came from there, but probably a dozen or so came from the coast.

Testudo vicina Günther

Iguana Cove Tortoise

Plates 93 to 110.

Testudo vicina GÜNTHER, Trans. Royal Soc. Lond., CLXV, 1875, p. 277, pls. 35 fig. A, 40 fig. B, 41 figs. A, C, 45 figs. C-D; GÜNTHER, Gigantic Land Tortoises Brit. Mus., 1877, p. 73, pls. XXXI, XLVII, fig. A, LIV, figs. C-D; BOULENGER, Cat. Chelonians Brit. Mus., 1889, p. 170; ROTHSCHILD, Novit. Zool., IX, 1902, p. 448; HELLER, Proc. Washington Acad. Sci., V, 1903, p. 54; BECK, Seventh Report N. Y. Zool. Soc. 1903, p. 7; SIEBENROCK, Zool. Jahrb., Suppl. X, 3, 1909, p. 534.

Testudo elephantopus, BAUR, Am. Nat., XXIII, 1889, p. 1044; LUCAS, Smith. Report, 1889 (1891), pp. 643-647, pl. CIV, figs. ——; GADOW, Cambridge Nat. Hist., VIII, 1901, p. 378.

Testudo nigrita, COPE, Proc. U. S. Nat. Mus. 1889, p. 147; LUCAS, Smith. Report, 1889 (1891), pp. 643-647, pl. CIV, fig. ——.

Type specimen.—British Museum. Carapace of adult male. Straight length 33 inches. Origin unknown.

Distribution.—This tortoise probably is distributed throughout the whole southern end of Albemarle Island. At Iguana Cove it appears to be the only kind, but near Vilamil one finds both *Testudo vicina* and *Testudo güntheri.*

Material.—This is one of the commoner species in collections. The Academy has six from Iguana Cove, ten from the vicinity of the old Cobos settlement in southeastern Albemarle, and forty-five from near Turtle Cove and Vilamil Mountain.

Diagnosis.—No nuchal; gulars paired; fourth cervical vertebra biconvex; front of carapace moderately high in males, much lower than middle in females; height at nuchal notch less than 45% (31 to 44%) of straight length; difference between percentages of heights at third vertebral and at nuchal notch more than 9 (10 to 23); carapace not saddle-shaped, not narrow anteriorly, width at margin of junction of second and third marginals not less than 44% (44 to 59%); first marginals not greatly enlarged, not everted, their ventral surfaces not vertical, their most prominent points separated by less than 25% (13 to 24%); length over curve not less than 115% (115 to 134%); usually less than width over curve; vertical distance from lower surface of plastron to lower edge of lateral marginals great, 6 to 10%; general size large, straight length to 49.5 inches; plastron moderately long, median length 66 to 87%; plates generally striated; pectorals forming a suture on median line; eighth marginal plate not reduced, with well developed superior border; lower jaw and throat not marked with yellow.

TABLE OF MEASUREMENTS OF IGUANA COVE TORTOISES.

Number	Sex	Straight Length	Straight Width	Per Cent	Curved Length	Per Cent	Curved Width	Per Cent	Width 2d to 3d marginals	Per Cent	Height Middle	Per Cent	Height Front	Per Cent	Height to marginals	Per Cent	Plastron	Per Cent	Fore Limb	Per Cent	Hind Limb	Per Cent	Axilla to Elbow	Per Cent	Neck	Per Cent	Tail	Per Cent
8179	♂	43.	31.75	74	49.5	115	53.3	124	21.5	52	22.8	56	15.4	36	3.5	8	32.	74										
8178	♂	41.	32.	78	49.8	121	54.5	133	23.4	57	22.7	55	17.	41	2.8	7	32.25	79										
8180	♂	38.5	30.5	79	16.	119	52.	135	20.	52	20.8	54	16.8	44	2.5	6	25.25	66	22.4	58	21.2	55	12.6	33	26.	68	4.	10
8176	♂	37.2	27.	73	45.25	122	43.1	116	20.5	55	18.1	49	13.6	37	3.	8	25.6	69	17.4	47	16.	43	11.6	31	18.8	51	5.8	13
8175	♂	35.25	27.3	77	44.	125	45.8	130	19.5	55	18.8	53	15.1	43	2.5	7	28.7	81	18.	51	14.8	42	10.8	31	19.	54	3.6	10
8177	♂	34.3	29.75	87	43.3	126	47.4	138	19.7	57	19.8	58	14.5	42	3.2	9	28.	82	17.2	50	13.6	40	9.6	28	18.	52	4.	12

TABLE OF MEASUREMENTS OF TORTOISES FROM OLD COBOS SETTLEMENT AND VICINITY. ALBEMARLE.

Number	Sex	Straight Length	Straight Width	Per Cent	Curved Length	Per Cent	Curved Width	Per Cent	Width 2d to 3d marginals	Per Cent	Height Middle	Per Cent	Height Front	Per Cent	Height to marginals	Per Cent	Plastron	Per Cent	Fore Limb	Per Cent	Hind Limb	Per Cent	Axilla to Elbow	Per Cent	Neck	Per Cent	Tail	Per Cent
8186	♂	40.5	29.	71.6	52.25	129	49.5	122	20.5	51	20.5	51	13.5	33	2.25	6	31.25	77	17.4	43	16.8	41	9.6	24	19.8	49	5.4	13
8390	♂	33.6	26.3	77	42.2	126	43.	128	17.6	52	17.7	53	11.3	34	2.8	8	26.6	79										
8187	♂	33.3	27.2	82	41.6	125	44.	132	16.1	48	18.4	55	11.2	34	3.	9	26.2	79	16.	48	14.4	43	8.8	26			4.8	14
8185	♂	32.	25.8	81	40.5	126	42.1	132	18.7	58	17.8	56	12.3	38	2.6	8	26.	81	16.8	53	14.8	46	8.	25	16.	50	3.6	11
8184	♀	29.3	22.5	78	38.5	131	37.7	129	15.8	54	15.9	54	11.3	39	2.7	9	24.3	83	14.	48	12.8	44	6.	20	15.8	54	2.2	8
8389	♀	30.2	24.5	81	39.2	130	40.2	133	16.6	55	16.8	56	10.6	35	2.25	7	24.5	81										
8387	♀	29.2	23.8	82	37.5	128	39.	134	16.1	55	17.1	59	10.	37	2.6	9	25.2	86										
8182	♀	28.5	22.9	80	37.2	131	38.	133	15.4	54	16.	56	9.4	33	2.3	8	22.25	78	14.8	52	13.6	48	6.4	22	13.	46	2.6	9
8181	♀	28.3	22.75	80	36.	127	37.9	134	14.6	52	15.5	55	9.8	35	1.9	7	23.5	83	14.	49	13.2	47	6.4	23	12.4	44	1.8	6
8388	♀	26.3	21.2	81	34.3	130	34.35	130	14.	53	14.2	54	9.3	35	2.2	8	20.8	79										

TABLE OF MEASUREMENTS OF SOUTH ALBEMARLE TORTOISES.

		Straight			Curved						Height																	
Number	Sex	Length	Width	Per Cent	Length	Per Cent	Width	Per Cent	Width 2d to 3d marginals	Per Cent	Middle	Per Cent	Front	Per Cent	Height to marginals	Per Cent	Plastron	Per Cent	Fore Limb	Per Cent	Hind Limb	Per Cent	Axilla to Elbow	Per Cent	Neck	Per Cent	Tail	Per Cent
8196	♂	33.2	26.5	80	43.3	130	43.3	130	19.7	59	18.3	55	11.	33	2.4	7	25.25	76	16.	48	15.2	46	8.8	27	16.8	51	4.	12
8188	♂	33.	26.1	79	41.6	126	42.4	128	17.2	52	17.8	54	10.4	32	2.6	8	27.25	83	14.4	44	11.6	35	7.4	22	15.6	47	3.6	11
8211	♂	27.9	22.	79	35.1	126	36.	129	14.3	51	14.9	53	9.2	33	2.1	8	21.1	76										
8207	♂	26.8	22.25	83	34.5	128	34.8	130	11.6	44	14.3	53	10.	37	2.7	10	22.2	82	13.	49	12.	45	7.2	27	14.4	54	2.8	10
8252	♂	26.75	21.2	79			33.	123	14.	52	13.6	51	9.1	34	2.25	8	21.	79										
8208	♂	25.	20.6	82	32.2	129	32.8	131	13.5	54	13.6	54	8.6	34	2.	8	20.1	80	12.6	50	11.2	45			13.6	54	2.2	9
8236	♂	24.4	20.45	84	31.5	129	33.6	138	12.7	52	13.3	55	9.	37	1.6	7	20.2	83										
8222	♂	24.2	18.75	77	29.8	123	30.4	126	12.	50	12.25	51	8.5	35	1.6	7	19.1	79										
8254	♂	24.1	18.6	78	31.6	131	31.2	129	12.4	51	13.4	56	8.25	34	2.2	9	19.	79										
8255	♂	24.	19.	79	31.	129	30.	125	11.8	49	12.5	52	8.7	36	2.2	9	20.3	85										
8193	♀	31.2	24.9	80	39.6	127	40.25	129	15.8	51	16.9	54	11.	35	2.5	8	24.8	79										
8418	♀	30.	22.5	75	37.4	125	37.	123	15.5	52	15.5	52	9.25	31	2.5	8	24.1	80										
8264	♀	29.6	23.1	78	36.75	124	37.2	126	14.1	48	15.4	52	10.1	34	2.5	8	21.	71	12.8	43	11.2	38	6.8	23	14.4	49	2.4	8
8270	♀	29.2	23.4	80	37.25	128	38.25	131	15.25	52	15.9	54	11.2	38	3.	10	24.25	83										
8192	♀	28.75	23.8	84	36.4	127	38.25	133	14.3	50	15.5	54	11.2	39	2.	7	23.25	82	12.	42	11.2	39			13.2	46	2.	7
8198	♀	28.75	22.5	79	37.4	130	40.2	140	14.3	50	16.4	57	11.5	40	2.4	8	21.8	76	15.2	53	12.4	43	6.8	24	15.6	54	2.	7
8205	♀	28.7	22.4	78	35.75	125	36.4	127	14.9	52	15.1	53	10.25	36	2.5	9	22.2	77	14.	49	13.2	46	6.4	22	15.2	53	2.4	8
8203	♀	28.4	22.75	80	35.1	124	36.9	130	15.2	54	15.	52	9.5	33	2.2	8	23.2	82										
	♀	28.	21.6	77	36.3	130	36.6	131	15.	54	14.6	52	9.8	35	2.	7	23.6	84										

TABLE OF MEASUREMENTS OF SOUTH ALBEMARLE TORTOISES—Continued.

8201	♀	28.	21.25	76	36.	129	35.	125	14.5	52	14.75	53	11.	39	2.7	10	22.75	81	13.6	49	13.2	47	8.	29	14.4	52	2.2	10
8204	♀	27.7	22.3	81	34.9	126	35.6	129	14.71	53	14.9	54	9.2	33	2.5	9	21.8	79	13.2	48	12.4	45	8.4	30	14.	54	3.2	12
8257	♀	27.5	21.25	77	35.	127	35.25	128	14.75	54	14.75	54	10.	36	2.25	8	22.5	82										
8202	♀	27.2	20.6	76	33.6	124	35.6	131	13.2	49	14.25	52	9.7	36	1.8	7	21.1	78	13.6	50	12.8	47	7.4	27			2.1	8
8241	♀	27.1	21.5	79	34.2	126	35.1	130	14.	52	14.5	53	9.4	35	2.	7	22.5	83										
8200	♀	27.	21.5	80	33.5	124	34.5	128	14.25	53	13.8	51	10.1	37	1.8	7	22.	81	13.2	49	9.	33			13.6	50	1.72	6
8246	♀	27.	20.5	76	34.6	128	34.25	126	14.6	54	14.2	53	8.3	31	2.3	9	21.	78										
8258	♀	26.75	21.1	79	34.4	129	37.1	139	15.4	58	15.	56	10.	37	1.75	7	22.	82										
8231	♀	26.4	20.9	75	34.75	132	34.2	126			14.4	55	9.2	35	2.4	9	21.	80										
8243	♀	26.	20.75	80	34.	131	34.6	133	13.1	50	14.25	55	9.6	37	1.8	7	21.	81										
8219	♀	25.9	20.8	80	33.75	130	34.	131	14.	58	13.8	53	8.2	32	1.9	7	21.	81										
8261	♀	25.8	20.7	80	34.25	133	35.	136	13.8	53	14.6	57	9.1	35	2.5	10	20.7	80										
8223	♀	25.8	20.25	78	32.7	127	33.8	131	13.5	52	14.25	55	8.8	34	2.3	9	20.8	81										
8238	♀	25.75	19.2	75	32.	124	33.5	130	13.4	52	13.8	54	8.3	32	1.8	7	21.	82										
8216	♀	25.1	20.2	80	32.1	128	32.8	131	12.5	50	13.6	54	9.2	37	2.4	10	20.6	82										
8227	♀	25.	19.	76	33.5	134	34.	136	13.7	55	14.25	57	9.5	38	2.1	8	21.25	85										
8242	♀	24.8	19.6	79	31.	125	31.6	127	12.3	50	13.	52	7.7	31	2.3	9	19.8	80										
8260	♀	24.75	19.75	81	31.5	127	33.5	131	13.	53	13.5	55	8.75	35	1.75	7	19.5	79										
8228	♀	24.6	20.7	84	31.5	128	32.3	131	13.25	54	13.4	55	8.2	33	2.	8	20.4	83										
8235	♀	24.6	19.75	79	30.5	124	31.	126	13.	53	12.75	51	8.1	33	2.	8	20.4	82										
8221	♀	24.5	19.8	83	31.5	129	31.7	129	11.9	49	13.1	53	8.5	35	2.	8	19.6	80										
8213	♀	24.	19.9	83	30.2	126	31.	129	12.61	53	12.75	53	8.	33	2.2	9	19.6	82										
8263	♀	24.	19.1	80	31.	129	31.	129	12.25	51	13.	54	8.5	35	2.25	9	19.6	82										
8195	♀	24.	19.	79	32.	133	33.3	139	12.61	53	13.75	57	8.4	35	2.	8	20.8	87	12.	50	10.8	45	5.4	23	12.6	53	1.9	8
8253	♀	23.7	20.	84	31.7	134	30.6	125	12.	51	13.4	57	8.6	36	2.	8	20.3	86										
8183	♀	21.25	17.25	81	27.5	129	27.75	131	11.5	54	11.25	53	7.1	33	2.9	9	18.	85	6.4	30	6.	28	5.6	26	10.6	50	2.2	10
8273	?	3.3	2.8		3.85		3.85				1.6						2.81											

General remarks.—See also remarks under *T. güntheri*. *Testudo vicina* attains a very large size. The shell usually is quite thick and heavy. The females are dome-shaped, while the adult males have the front of the carapace considerably elevated. In this elevation of the front of the carapace these tortoises resemble the Tagus Cove and James Island species. In *Testudo darwini* the central portion of the back rises higher than in *T. vicina*. *Testudo microphyes* is a smoother, lighter race, in which the back is nearly flat. Our only specimen from Jervis Island is nearly intermediate between *T. darwini* and *T. vicina*.

Nine eggs (No. 8425) from tortoise No. 8388, collected Nov. 2, 1905, about eight miles west of Vilamil, Albemarle Island, measure 2.44x2, 2.30x2.20, 2.25x2.12, 2.25x2.10, 2.20x2.10, 2.20x2.08, 2.18x2.10, 2.10x1.95, and 2.08x2.04 inches.

Field Notes.—March 16, 1906.—Sailing to get around to Iguana Cove. Busy all day skinning tortoises, all hands helping in the morning. There is hardly any wind, and we are drifting with the current. We are nearly abeam of the mountain near the Cove. It rises very abruptly, and seems to be well covered with brush. Several black lava-flows can be seen, and the plateau to the eastward is all new lava.

March 17, 1906.—Anchored at noon in Iguana Cove. It is a very bad anchorage, having deep water and heavy swells, with not much room for the ship to swing. The coast is heavily wooded with brush and trees, as at Cocos Island, and is very abrupt, with many steep cliffs visible on the mountain side. Beck, King, Williams, and I went down the coast to the southward about two miles, and landed on a rocky beach to hunt for tortoises. The country was covered with thick brush, and the tortoise trails went along underneath, so that quite often one had to go on hands and knees. The place where we hunted was a small flat, where cactus and tall grass were fairly abundant. We found three tortoises; all males. We drove two of these down to the beach, as they were only seventy-five or a hundred yards from the shore. They were too large to get them into the boat. We failed to get them in while the boat was on the beach. Then we towed one out and tried to get him in; but as the boat was in the breakers and half full of water it sank when we got the tortoise aboard, and he floated off while we struggled in the water. Luckily, King was on the beach, for he cannot swim. Williams struck out for shore, while Beck and I tried to turn the boat over, for by this time the swells had rolled it bottom up. The current was too strong for Williams to make the beach, so he came back to the boat. With his assistance we righted it, and, getting two oars that were stuck under the seats, Beck sculled and I pulled till we got near the rocks. Then I swam ashore with the painter and pulled the boat in, so Beck and Williams got ashore. We tried to pull the boat along the rocks to the beach, but the swell was so heavy that it was smashed into a thousand pieces. All that we saved was the painter and two oars. I had left most of my clothes on the beach, so only lost a shirt and a hat. Williams lost all of his collecting outfit, canteen, etc.

By this time it was five o'clock, so we put on what clothes we had left, and made back along the coast, while our tortoises were drifting away out at sea. We had anything but a pleasant walk back. I had lost my shirt, and the thorns and cactus spines felt anything but pleasant. We traveled on till about eight o'clock, when we saw a light on the water and hailed the other boat. The boys on the ship, seeing nothing of us, had put off to the rescue in the second boat with some ropes and life preservers. They soon found out that we were all safe. We told them to go to the Cove and pick us up, as the surf was too high elsewhere. We got to the Cove about the same time as the boat, and got safely aboard a little after nine. Beck says he is going to get what tortoises he can, and pull out as soon as possible. All hands are anxious to leave, and I won't shed any tears myself.

March 18, 1906.—Still anchored at the Cove. We sighted the two tortoises drifting down the coast and, putting out the boat, rescued both of them. One was badly battered up, and evidently had been knocked up against the rocks by the surf. We also picked up several pieces of our skiff. The tortoises had been in the water about eighteen hours, and seemed none the worse for it. They would stick their heads out of the water occasionally and look around while they floated along like corks, nearly all the carapace being out of the water. We still keep on the lookout for wreckage, and expect to go back to the same place tomorrow for the other tortoise, and more if we find them.

March 19, 1906.—We went down the coast to the place where we lost the boat. The tortoises come down to the cactus trees about fifty to seventy-five yards from the bluffs, and work around in the flat country near the coast. We found three. Beck took two pictures of one of them. So far we have brought all our Iguana Cove tortoises on board alive, but I think we shall have to skin a large one tomorrow, and put two over the cliffs into the sea and tow them to the ship. King did not care to go with us today, our experience on Saturday having been too much for him, so he went ashore at Iguana Cove to hunt tortoises. He failed to find any signs whatever. Hunter says he saw an old watering place about seven hundred feet up the mountain, but the grass had grown over all the trails, and there were no fresh signs of tortoises anywhere. The tortoises taken have numerous blood-sucking ticks along the cracks between the plastral plates.

March 20, 1906.—Went down the coast to get the tortoises we have tied up. We put them all off into the sea and towed them to the ship. Two of them were badly battered up by the surf. We had to lower them over the cliffs with ropes and let them drift out to the boat. Beck took several pictures of the operation. It took up about the whole day. One of the tortoises that came floating by on Sunday morning died the night of the 19th of the injuries it had received. Its stomach contained cactus and grass. We expect to sail tomorrow, as the place is rather dangerous to anchor, and all hands will feel safer out of here.

March 21, 1906.—Worked on board all day, skinning two tortoises that died from injuries received in collecting them. We sailed for Narborough at 10:30 A. M.

Testudo wallacei Rothschild

Jervis Island Tortoise

Plates 111 and 112.

Testudo wallacei ROTHSCHILD, Novit. Zool., IX, 1902, p. 619; HELLER, Proc. Washington Acad. Sci., V, 1903, p. 54; SIEBENROCK, Zool. Jahrb., Suppl. X, 3, 1909, p. 533.

Type specimen.—In the Rothschild Museum at Tring, England. Carapace, probably of adult male. Straight length 32.25 inches. Purchased from the Bullock collection. Origin unknown.

Distribution.—Jervis Island, Galapagos Archipelago.

Material.—Our collection includes the skin of one adult male and some fragments of bone from another specimen.

Diagnosis.—No nuchal; gulars paired; fourth cervical vertebra biconvex; front of carapace moderately high in males, but considerably lower than middle height; height at nuchal notch less than 45% (37%) of straight length; difference between percentages of heights at third vertebral and at nuchal notch more than 13 (17); carapace not saddle-shaped, not narrow anteriorly, width at margin of junction of second and third marginals not less than 44% (54%); first marginals not greatly enlarged, not everted, their ventral surfaces not vertical; length over curve 134%, greater than width over curve (129%); vertical distance from lower surface of plastron to lower edge of lateral marginals great, 8%; general size large, straight length 36.2 inches; plastron moderately long, median length 81%; pectorals forming a suture on median line; eighth marginal plate not reduced, with well-developed superior border; lower jaw and throat not marked with yellow.

TABLE OF MEASUREMENTS OF JERVIS ISLAND TORTOISE

Number	Sex	Straight Length	Straight Width	Per Cent	Curved Length	Per Cent	Curved Width	Per Cent	Width 2d to 3d marginals	Per Cent	Height Middle	Per Cent	Height Front	Per Cent	Height to marginals	Per Cent	Plastron	Per Cent	Fore Limb	Per Cent	Hind Limb	Per Cent	Axilla to Elbow	Per Cent	Neck	Per Cent	Tail	Per Cent
8134	♂	36.2	28.5	78.7	48.6	134	46.75	129	19.6	54	19.5	53.8	12.9	36.6	2.9	8	29.5	81.4	19.2	53	16.8	43.6	9.	24.8	20.8	57.4	6.2	17.1

General remarks.—The single tortoise at hand from Jervis Island is very similar in shape to the large males of *Testudo vicina* from Iguana Cove. The length over the curve in the Jervis Island tortoise is greater than in those from Iguana Cove, so that the curved width is less than the curved length. The front height is less than in *T. darwini* of James Island, making the difference between front and middle heights greater. Upon the whole it may be said that the Jervis tortoise is intermediate between those of James Island and Iguana Cove, and that it seems to resemble the latter a little more than the former. My reasons for using the name *T. wallacei* for this tortoise are stated in the introductory portion of this paper (see page——).

Field Notes—December 18, 1905.—Left Duncan Island this morning, and made Jervis early in the afternoon. Worked on Duncan tortoises all day and got the mess straightened out as well as possible. Expect to get ashore on Jervis tomorrow. Gifford says he saw a lot of old tortoise trails and old droppings. The island is very steep, and is composed of red-lava blocks. The beach is all red-lava sand or dust, and trees in the lagoon are visible from the ship.

December 19, 1905.—Went ashore on Jervis. A fine sand beach with a lagoon back of it. The island is covered with red-lava blocks and ashes. The highest peak is 1050 feet by barometer. I saw old tortoise trails in the ashes, one of which ran up a valley clear to the top. Saw lots of old dung that apparently had been rained on, as it was bleached out rather white.

December 20, 1905.—Mr. Beck went ashore on Jervis and found a large tortoise on the north side in a small valley. It looks like the south Albemarle ones.

Testudo porteri Rothschild

Indefatigable Island Tortoise.

Plates 113 to 121.

? *Testudo indica* (part), Gray, [*nec* Perrault, 1676] Syn. Rept., 1831, p. 9; Gray, Cat. Tort. Croc. Amphis. Brit. Mus., 1844, p. 5; Gray, Cat. Shield Rept. Brit. Mus., I, 1855, p. 6; Gray, Suppl. Cat. Shield Rept. Brit. Mus., 1870, p. 5; Sowerby & Lear, Tortoises, 1872, pl. VI.

? *Testudo nigrita,* Dum. & Bibr., Erpét. Génér., II, 1835, p. 80; Günther, Trans. Royal Soc. Lond., CLXV, 1875, p. 267, pls. 33 fig. B, 35 fig. C, 37 fig. D, 38 fig. D, 39 fig. D; Günther, Gigantic Land Tortoises Brit. Mus., 1877, p. 69, pls. XXX fig. B, XXXI*B* fig. C., XLII fig. D, XLIII fig. D, XLIV fig. D; Boulenger, Cat. Chelonians Brit. Mus., 1889, p. 169; Kammerer, Blätt. Aquar.—Terr.—Kunde, XIX, 1898, p. 737, figs. 1-2 [*T. vicina?*]; Waite, Rec. Austral Mus., III, 1891, p. 95; Heller, Proc. Washington Acad. V, 1903, p. 53; Siebenrock, Zool. Jahrb., Suppl. X, 3, 1909, p. 531.

? *Testudo planiceps,* Gray, Cat. Shield Rept. Brit. Mus, 1855, p. 6, pl. XXXIV; Gray, Suppl. Cat. Shield Rept. Brit. Mus., 1870, p. 5; *Elephantopus planiceps,* Gray, Proc. Zool. Soc. Lond., 1873, p. 724.

? *Testudo elephantina,* Strauch, [*nec* Duméril & Bibron] Mém. Ac. St. Petersb., (7), V, No. 7, 1862, p. 83.

? *Testudo elephantopus,* Gray, [*nec* Harlan] Proc. Zool. Soc. Lond., 1870, p. 708, pl. XII, (part); Gray, Append. Cat. Shield Rept. Brit. Mus., 1872, p. 3.

Testudo porteri Rothschild, Novit. Zool., X, 1903, p. 119; Siebenrock, Zool. Jahrb., Suppl. X, 3, 1909, p. 532.

Type specimens.—Testudo nigrita: Paris Museum. Very young. Origin unknown. And Museum Royal College of Surgeons, London. Young. Straight length 22 inches. Origin unknown.

Testudo planiceps: British Museum. Skull of adult. Origin unknown.

Testudo porteri: Tring Museum, England. Adult. Curved length 51.5 inches. Taken on Indefatigable Island, by R. H. Beck.

Distribution.—Indefatigable Island, Galapagos Archipelago.

Material.—In the Tring Museum are two adult males, two adult females, one young, and six skulls. The species also is represented in the collection in Vienna. The California Academy has twenty-three of both sexes and various sizes.

Diagnosis.—No nuchal; gulars paired; fourth cervical vertebra biconvex; front of carapace low, from 18 to 28% lower than middle; height at nuchal notch not more than 40% (30 to 40%) of straight length; difference between percentages of heights at third vertebral and at nuchal notch more than 17 (18 to 28); carapace dome-shaped, very broad anteriorly, width at margin of junction of second and third marginals not less than 53% (53 to 71%); first marginals not everted, their most prominent points separated by less than 25% (18 to 24%); length over curve not less than 125% (126 to 141%), usually greater than width over curve; vertical distance from lower surface of plastron to lower edge of lateral marginals great, 7 to 11%; general size large, straight length to 41.4 inches; plastron long, 77 to 92%; plates generally striated; pectorals forming a suture on median line; eighth marginal plate not reduced, with a considerable superior border; lower jaw and throat in males not marked with yellow.

TABLE OF MEASUREMENTS OF INDEFATIGABLE ISLAND TORTOISES.

Number	Sex	Straight			Curved				Width 2nd and 3d Marginals	Per Cent	Height				Height to Marginals	Per Cent	Plastron	Per Cent	Fore Limb	Per Cent	Hind Limb	Per Cent	Axilla to Elbow	Per Cent	Neck	Per Cent	Tail	Per Cent
		Length	Width	Per Cent	Length	Per Cent	Width	Per Cent			Middle	Per Cent	Front	Per Cent														
8289	♂	41.4	35.2	85	53.4	129	53.1	128	24.3	59	22.8	55	13.5	33	3.5	8	34.8	84										
8282	♂	40.3	32.1	80	53.7	133	53.3	132	25.	62	22.6	56	14.	35	3.2	8	32.75	81										
8284	♂	39.6	33.8	85	54.5	138	55.1	139	28.2	71	23.1	58	12.3	31	3.4	9	32.5	81	19.	48	18.	45	9.2	23	21.4	56	2.6	7
8290	♂	39.6	31.5	80	52.	131	54.6	138	23.5	59	22.5	57	13.5	34	2.8	7	32.1	81										
8281	♂	39.	29.3	75	50.8	130	50.8	130	21.2	54	22.4	57	12.	31	3.	8	30.	77										
8275	♂	38.25	33.3	87	53.9	141	56.	146	23.5	61	23.3	61	12.75	33	2.7	7	31.1	82	18.4	48	17.6	46	9.2	24			6.	16
8288	♂	37.5	30.25	81	48.5	129	51.5	137	22.	59	22.5	60	14.5	36	3.	8	30.5	81										
8285	♂	35.5	32.	90	48.6	137	50.	141	21.1	59	20.7	58	10.75	30	2.7	8	29.5	83										
8383	♂	25.3	22.	87	33.4	132	34.2	135	14.2	56	14.7	58	8.5	34	2.4	9	22.	87										
8386	♂	23.6	19.8	84	30.8	126	29.5	125	13.	55	13.1	56	8.9	38	2.6	11	21.6	92	14.2	60	12.	51	6.8	29	14.	59	2.2	9
8286	♀	35.8	29.5	83	45.6	127	48.75	136	19.	53	20.8	58	11.6	32	2.75	8	28.8	80										
8287	♀	31.	25.5	82	39.8	128	41.2	133	16.6	54	17.75	57	10.5	34	2.5	8	25.5	82	15.2	49	14.8	48			14.8	48	2.4	8
8277	♀	30.2	25.8	85	40.	132	44.1	146	17.2	57	19.1	63	11.6	38	2.8	9	26.2	87										
8280	♀	29.8	25.3	85	40.25	135	42.2	142	16.3	55	18.5	62	10.6	36	3.	10	26.3	88	12.8	43	11.8	40	7.6	26	13.6	46	1.4	5
8278	♀	29.2	25.1	86	38.1	130	40.75	140	16.7	57	17.9	61	9.6	33	3.	10	25.2	86										
8279	♀	29.1	25.5	84	39.75	137	42.	144	17.1	59	18.3	63	10.2	35	2.9	10	26.	89										
8276	♀	28.75	25.	87	38.75	134	41.	142	17.2	60	17.5	61	10.6	37	2.5	9	25.15	87										
8384	♀	28.4	25.3	89	36.8	130	39.	137	17.	60	15.9	56	10.7	38	2.3	8	24.	85										
8274	♀	28.1	24.2	86	38.4	136	40.5	144	16.2	58	17.6	63	11.3	40	2.7	10	25.	89	13.8	49	12.8	46	8.4	30	16.4	58	2.	7
8283	♀	26.3	21.	84	33.1	126	32.	122	13.9	53	14.3	54	8.5	32	2.75	10	23.1	88										
8385	♀	26.	21.5	83	32.5	125	33.	127	14.2	55	14.5	56	8.75	34	3.5	13	23.1	89										
8382	♀	21.75	19.	87	30.	138	29.	133	12.4	57	12.9	59	7.6	35	2.3	11	20.	92										
8419	♀ ?	8.5	7.1	84	11.25	132	10.5	124	4.5	53	4.4	52	2.25	26	1.	12	7.9	93										

General remarks.—*Testudo porteri* seems to be still fairly common. It is a very large species with thick, heavy shell. The large males are rounder and more dome-shaped than those of any other locality. Some of the half-grown females can only with great difficulty be distinguished from southern Albemarle specimens. If one may judge from the condition of the bones, the largest specimens in our collection are still quite young, in fact none of our Indefatigable tortoises appears to be of great age. It is probable that they grow rapidly when in their native haunts, although our smallest specimen grew less than an inch and a half in length in six years of life in San Francisco.

Nine eggs (No. 8421) taken from a nest found on Indefatigable October 25, 1905, measure 2.50x2.20, 2.45x2.30, 2.44x2.24, 2.35x2.30, 2.35x2.24, 2.30x2.25, 2.25x2.25, 2.25x 2.20 and 2.23x2.22 inches.

Field Notes.—Oct. 25, 1905, went ashore on Indefatigable to look for tortoises at the same place where Beck found them before, and hunted all day. Early in the morning, soon after our arrival at the hunting grounds, we found one small female. We then scattered, everybody following different trails. The trails are from three to five feet wide. At intervals the ground may be seen dug up, like a wallow. No fresh droppings were seen, but lots of old ones along the trails. I saw several apparently fresh wallows, but no tortoises. At two o'clock, we all met at the place we found the first tortoise and started back for the ship, King and Hunter carrying the tortoise. Beck, Williams and myself went a little to the north, and soon fell upon a fresh track. We followed this for about ten minutes, and soon came upon a big male tortoise walking slowly through the brush. While looking at our prize, we heard a noise in the brush at one side, and, turning around, saw a large female heading the way we had just come. We killed the female, and turning the male on his back, tied his feet to a tree, as it was too late to do more. The female had eggs in the ovaries at different stages of development—some already with hard shells and some in yolk. Some vacant spaces were seen from which the eggs had already been laid. We found a nest on one of the trails, and Beck dug it out, finding ten eggs. The nests look like a little round space scraped clean of brush and leaves. The top is hard earth, but, on digging down the earth gets softer, and a small hole is found about seven or eight inches in diameter, and thirteen inches deep. This is the nest proper and contains the eggs buried in loose soil. Beck found one more set earlier in the day. We brought both sets back to the ship, and shall try to blow them. Shall also try to save those taken from the female captured. Beck found part of the skull of a tortoise he killed when here before. Also saw bones of one he killed on that trip. We are going in tomorrow to try to get out the two other tortoises.

Oct. 26, 1905.—Went in after the tortoises found yesterday. The big male had broken loose from the lashings, but was only about twenty yards away. We started work skinning at once; the mate, Ochsner, King, and myself on the big fellow, with Hunter and Williams on the smaller one. Beck went around looking for more, but failed to find any. However, he reported having seen a fresh trail of a little one, about seven or eight inches wide. At about half past three we started down toward the coast with the tortoises, having removed all the heavy meat from them, and arrived at the vessel at about half past five. The eggs taken from the female were left behind, as we had too much to carry. Tomorrow I suppose we shall clean out the tortoises ready for pickle, and also skin the one brought down yesterday.

Oct. 27, 1905.—Stayed on board all day skinning tortoises. got the two females in pickle, and the big male nearly ready. Beck went inland again, and found two more tortoises—one a fair-sized female and one little tortoise about nine and one-half inches long. King and Williams will go in for the large one tomorrow. I hope tomorrow to get the large male into pickle, and try to blow some eggs.

Oct. 28, 1905.—Went ashore with Williams, and carried out the other tortoise. King finished the large male and blew the eggs. Got embryos out of the eggs from one of the nests. Beck searched all day for tortoises, but failed to find any, or any traces outside of the grounds where we found the others. Will sail tomorrow for South Albemarle.

Nov. 6, 1905.—Beck went ashore with Ochsner, Stewart, and Williams, to cut or find a trail leading into the interior, and to look for tortoises. Beck found a large female, and killed it. We are going in tomorrow to skin this tortoise. Williams and King will bring it back and Beck and I will camp over night.

Nov. 7, 1905.—Went into the tortoise belt with Beck, prepared to camp for a few days. After hunting all day we found three tortoises, tied them up and returned to camp. One was a large male, and the other two were females. The large male was grazing along in the grass when found, as a cow or a horse might do. It appeared to be perfectly deaf, as it took no notice whatever of us when we went up to it and yelled; but as soon as it saw us it drew in its head with a loud hiss. The tortoise belt is two hundred feet in elevation by barometer, and is filled with cactus and brush together with a number of large trees.

Nov. 8, 1905.—Started out from camp early in the morning. I began skinning a female taken yesterday, while Beck went hunting for more, and made a trail up the mountain. He returned in the evening and we went back to camp.

Nov. 9, 1905.—Started out from camp, and by noon had finished the female I worked on yesterday. Hunter and King came up today and we three started for the coast with the two tortoises. Beck stayed in camp and found another tortoise in the afternoon. He also struck the trail of a large one, which he came up with toward evening. He killed this one, and returned to camp.

Nov. 10, 1905.—Went back to camp again with Ochsner, Hunter and King. Ochsner and King finished skinning a small female, and took it down to the coast. Hunter, Beck and myself went to the big male found yesterday, and partially skinned him so that he could be taken out next day. We returned to the ship by dark.

Nov. 11, 1905.—Stayed on board all day and prepared tortoises. Blew some eggs and straightened things up in general. Beck and the rest of the party went in after the big tortoise. Beck took some pictures of the party carrying the tortoise down a cliff which has to be climbed in order to reach the interior.

Nov. 12, 1905.—All hands resting.

Nov. 13, 1905.—Went in to the camp again, and skinned the large male that we left tied up to a tree. Beck searched for more tortoises and found three farther inland. We returned and camped all night at the old place.

Nov. 14, 1905.—Finished skinning the large male and one female which Beck found yesterday. Hunter and Stewart took out the male, while King and I took out the female. On the way down Williams and Gifford overtook us, and said they had killed a small tortoise up the trail just outside the cactus belt. Williams and I will go after it tomorrow, while the rest help Beck with the other two tortoises.

Nov. 15, 1905.—Went up the trail with Williams after the tortoise found yesterday. He was about half a mile beyond the cactus belt, and when found was crossing the trail, going around the base of the mountain. His stomach contained grass and weeds. Beck, Ochsner, and Stewart brought out the big male, so there is one small tortoise left to carry down.

Nov. 16, 1905.—Stayed on board all day and finished cleaning the tortoises brought down. Have all the tortoises pickled now except some of the Albemarle ones, which are living in the tortoise pen. Expect to sail in the morning for Gordon Rocks and anchor there, so that Mr. Beck and party can try to reach the top of the mountain.

Nov. 17, 1905.—Sailed for Gordon Rocks and anchored about five o'clock in a cove on the northwest side of Indefatigable Island. The country here is a slightly elevated plateau and very open, there being a few cacti and scattered brush.

Jan. 11, 1906.—Were becalmed off the coast southwest of Puerta de l'Aguada, and anchored with the kedge. Beck and Hunter went ashore while I held the boat. Hunter found the skeletons of two small tortoises which appeared to have been killed by natives. No skulls were found.

Jan. 12, 1906.—Spent most of the day watering ship.

Jan. 13, 1906.—Worked on tortoises all day. Beck went ashore and found one large male and a female.

Jan. 14, 1906.—All hands resting.

Jan. 15, 1906.—Beck, King, and myself went into the interior, and skinned and carried out the female tortoise found

Saturday. This tortoise was very fat with large light-colored liver, just the opposite to those found on Duncan. This probably is on account of the difference in food, those on this island getting more green food, while the Duncan tortoises get dry grass and lichen also. We are going in to-morrow for the large male. The female had very few eggs in the ovaries, all in yolk form.

Jan. 16, 1906.—King, Beck, and myself went into the interior and brought out the big tortoise found on Saturday, the 13th. This tortoise had more fat than any other male taken thus far. As a rule they do not have nearly so much as the females.

Jan. 17, 1906.—King, Beck, and myself went in again after tortoises. Found three, but one got away. Skinned a small female, and brought her down to the ship. We are going in after another female that is tied up. King found the big male that got away.

Jan. 18, 1906.—Went in again after tortoises, and skinned and carried out a male tortoise found yesterday. Beck found another female today, and also the big male that got away. We now have two females and a large male tied up, and are going in tomorrow with all hands to get the two females. The tortoise skinned today was found eating cactus, and its stomach was full. The bladder was full of water. Lots of cactus spines were stuck in the throat. All the tortoises taken during this visit here were found about three and one-half miles inland.

Jan. 19, 1906.—Went in after the two female tortoises which had been left tied up. We find the females have much larger livers than the males. One of the tortoises taken today is about the largest female we have found.

Jan. 20, 1906.—Went in and brought out the tortoise which escaped from us on the 17th. He had traveled about two miles in an afternoon. He was fairly fat for a male, and had a stub tail, probably due to some accident when small.

July 11, 1906.—Sailed for Puerta de l'Aguada and anchored at eleven in the morning.

July 12, 1906.—Went in after a tortoise with King and Beck. In the same country where we had hunted before we found numerous trails and signs of tortoises. We ran across a good-sized male early in the morning, and skinned and brought him out. His stomach contained cactus.

July 20, 1906.—At anchor at a little cove near Conway Bay where the trail that led up to the old settlement commenced.

July 24, 1906.—Went ashore for a couple of hours in the morning and got a mess of doves for food. The country here is covered with dry grass and small trees. I saw no reptiles of any description. We sailed for Daphne Island at about nine o'clock.

Testudo species?

Cowley Mountain Tortoise.

Plates 122 and 123.

Distribution.—Cowley Mountain, Albemarle Island, Galapagos Archipelago.

Material.—The Academy collection includes only one skin with bones of a female, and a few fragments of other individuals.

Diagnosis.—No nuchal; gulars paired; fourth cervical vertebra biconvex; front of carapace low; height at nuchal notch 36% of straight length; difference between percentages of front and middle heights 25; carapace dome-shaped, broad anteriorly, width at margin of junction of second and third marginals 54%; first marginals not greatly enlarged, not everted; their ventral surfaces not vertical, their most prominent points separated by less than 25% (17%); length over curve more than 123% (128%); width over curve greater than length over curve; vertical distance from lower surface of plastron to lower edge of lateral marginals great, 10%; general size moderate, straight length 26.75 inches; plastron moderately long, 85%; plates striated; pectorals forming a suture on median line; eighth marginal plate not reduced; lower jaw and throat of female black.

TABLE OF MEASUREMENTS OF COWLEY MOUNTAIN TORTOISE.

Number	Sex	Straight Length	Straight Width	Per Cent	Curved Length	Per Cent	Curved Width	Per Cent	Width 2d to 3d marginals	Per Cent	Height Middle	Per Cent	Height Front	Per Cent	Height to marginals	Per Cent	Plastron	Per Cent	Fore Limb	Per Cent	Hind Limb	Per Cent	Axilla to Elbow	Per Cent	Neck	Tail	Per Cent
8141	♀	26.75	22.5	84	34.5	128	37.	138	14.4	54	16.25	61	9.5	36	2.7	10	22.9	85	12.8	48	13.2	49	7.2	27		2.4	9

General remarks.—This tortoise is most closely related to *T. porteri* of Indefatigable Island and *T. vicina* of the southern part of Albemarle Island. It is more nearly circular in outline than any other tortoise. Its high dome-shaped back makes it resemble *T. porteri* very closely, but it is more like the dome-shaped females of *T. vicina* in its curved length, and in its width at second and third marginal suture. The difference between the front and middle heights is greater than in any specimen of *T. vicina.* The width at suture between second and third marginals is less than in most of my specimens of *T. porteri;* as is also the curved length. The female taken had well developed ovaries containing large yolks. With only a single female specimen of this tortoise for comparison, it is quite impossible to be certain as to whether it really represents a distinct race. It, therefore, seems best to leave it without a specific name until male specimens have been secured.

Field Notes.—Aug. 9, 1906.—Sailed from James Bay for Cowley Mountain, Albemarle, and anchored off the mountain at about six in the evening.

Aug. 10-11, 1906.—Went in after tortoises. Cowley Mountain on this eastern side is a vast stretch of pumice stone with practically no vegetation for some miles inland. It rises with a gradual slope for about five miles, then gets quite steep at the elevation of about two thousand feet, where the vegetation becomes thick—small trees covered with moss, and tall dry grass tramped down in most places by the mules, being met with. At about 2200-2500 feet, a level area about a mile and a half in width surrounds the rim of the volcano. The mules do not get into this area because of a tall grass, growing higher than one's head, which it is almost impossible to push through. We had a good look at the rim of the crater but could not get through to it, so, turning back, we camped for the night near the edge of this belt. We searched for tortoises next morning in the dry grass below, and found signs about a month old, but did not see any tortoises. The trails ran into the mule trails, which made it impossible to track them. Beck came down the mountain where we were looking, and ran across a tortoise a little farther up the hill. He had been over to the southward, and found it a little better going, so that he got closer to the crater. He found the camp where the natives killed the tortoises, and saw about seventy old skeletons. We saw a few to the northward. It is a capital place to use mules, and, no doubt, the natives cleaned the tortoises out very thoroughly here. Beck skinned the tortoise out roughly, and King and I finished it on Sunday.

Testudo species?

Barrington Island Tortoise.

Plates 123 and 124.

Nothing has been known of the presence of tortoises on Barrington Island. None of the early navigators mentions having seen them there, and no recent visitor to the archipelago has made note of them. Our expedition secured evidence that tortoises formerly were fairly abundant on this island. Fragmentary remains of some fourteen individuals were found. These are mostly very old bones—pelves, femora, humeri. etc.—and leave us completely ignorant of the shape and relationship of the tortoises of Barrington Island. A few of these bones are figured in the plate given. Two very old semi-fossil eggs also were found, one of which is shown, photographed together with eggs from Albemarle, Duncan, and Indefatigable islands, in Plate 124. These eggs are larger than any that I have seen from other islands. They (No. 8424) measure 2.55x2.25 and 2.50x2.40 inches. Some of the bones evidently came from very large tortoises, while some with well-united sutures are quite small. It would thus appear that the tortoises of Barrington Island varied considerably in size.

Field Notes.—Feb. 22, 1906.—We met the schooner from Guayaquil, and saw the Captain, who is an Englishman. He says he has taken tortoises on Chatham, and says he ate the last one on the island some twenty years ago. He also reports having taken them off Barrington Island about fifteen years ago, but that they are now extinct. None of our party saw any remains while staying there. He got tortoises from Hood some years ago, probably before 1897. There was an Albemarle tortoise tied up at the wharf, and the Captain says the tortoise changes his shell completely, but he doesn't know how often! This one had a plate on the carapace loose.

July 9, 1906.—Sailed for Barrington Island about 5 A. M. and arrived at 11 A. M. Captain Levick, of the schooner that runs between the islands, informed us that thirty years ago tortoises were found scattered all over Barrington, and that he had taken them off that island. He doubted very much whether we would find any as, he says, they were all killed off long ago. We landed after dinner and proceeded on a tortoise hunt. For lack of time, we could not go far or cover much ground, but we had good luck. Beck found some old bones, and Mr. Nelson, the mate, found two old eggs on the north side of the island. He said they were near an iguana's hole, whence they had been dug out and were lying on the ground. They appear to be not more than a year old. We are going in again tomorrow. Mr. Nelson says he will try to find the spot again where he took the eggs, and we will dig down and see if any more can be found. He was in too much of a hurry to look, as it was nearly dark and he was heading for the boat at full speed.

July 10, 1906.—Made another search for tortoises, but found no live ones. Beck found some more bones on the higher portions of the north end of the island. He mentions having seen a very old piece of dung yesterday. Mr. Nelson tried to find the place where he found the old eggs, but failed to do so. We have come to the conclusion that the eggs probably are more than a year old, and were lately dug up by iguanas and exposed to the sun. King and I visited the valleys on the north coast, but found no signs whatever of tortoises.

GENERAL CONCLUSIONS.

The various races of tortoises of the Galapagos Islands differ from one another chiefly in shape. There are no real differences in structure, such as are found in the lizards and snakes of the archipelago. The relative values which should be attached to these differences in shape are extremely difficult to estimate. Therefore the tortoises do not throw much light upon the history and development of the archipelago. Some points, however, are of considerable interest.

Tortoises either live, or are known to have lived, upon Abingdon, Chatham, Hood, Charles, Barrington, Indefatigable, James, Jervis, Duncan, Narborough, and Albemarle islands. The last named island supports several races of tortoises. The tortoises of Barrington are practically unknown. Each of the other nine islands had its own peculiar race of tortoise, and on none of these nine islands has evidence of more than one race been found. This lends particular interest to the fact that several races of tortoises occur on Albemarle Island.

Although these tortoises can live for at least several days floating on the surface of the ocean, they are absolutely helpless in the water. They are unable to swim, and can only float and drift at the mercy of the winds and currents. When they drift on island shores, they usually are so battered and injured on the rocks that they only live a few days thereafter. The fact that each island, except Albemarle, has one and only one race of tortoise, is evidence that interchange of tortoises between the islands has not occurred, for such interchange would result either in preventing differentiation or in the presence of more than one race on an island.

If the transportation of tortoises from one island to another does not occur, there is little reason to believe that tortoises, at some time in the past, have drifted over the vastly greater distance from some continent, and have reached each of the eleven islands on which they have been found. Nor do we know whence they could have come. The evidence offered by these tortoises, therefore, seems to be against the view that these are oceanic islands, which have been independently thrust above the surface of the water, and have received such animals as have drifted to them. We must rather adopt the view that the islands are but the remains of a larger landmass which formerly occupied this region, and was inhabited by tortoises, probably of but one race; that the gradual partial submersion of this land separated its higher portions into various islands; and that the resulting isolation of the tortoises upon these islands has permitted their differentiation into distinct races or species.

If isolation plays so prominent a part in the differentiation of species in the Galapagos Archipelago, and each island has its one distinct race, what is the explanation of the fact that on Albemarle Island five distinct races of tortoises occur?

September 30, 1914.

The fact that each of the five great mountains of Albemarle seems to have been the original home of one of these five races, suggests that these volcanoes formerly were separated by water and formed five islands. These five islands must have remained separate long enough to permit the development of the differences which distinguish the five kinds of tortoises now found upon Albemarle. Then these five small islands must have been elevated until they merged to form the present Albemarle Island.

If there has been such an elevation of Albemarle Island in recent times, we might hope to find some record of it in the rocks, either in the form of fossils or of elevated beaches. Mr. Ochsner, the geologist of our expedition, found such evidence; but, since his results have not yet been published, I shall content myself by calling attention merely to Heller's statement:

"Near Iguana Cove, Albemarle, there are several old sea-cliffs now situated a considerable distance inland. At Tagus Cove on the same island a series of terraces, still containing the characteristic cavities made by sea-urchins, are now several hundred feet above the present sea-level."

This is positive proof of the recent elevation of Albemarle Island, and favors our explanation of the presence of several species of tortoises upon this island.

Our studies of the reptiles of the Galapagos Archipelago, therefore, all point to the conclusion that these are not oceanic islands. We must regard the present islands as made up of the higher portions of a much more extensive land-mass which formerly existed in this region. This Galapagos Land was the home, probably, of one race of giant tortoises, of one kind of gecko, of one species of *Tropidurus,* of two kinds of iguanas, and of two species of snakes. Gradual depression resulted in the submersion of much of this Galapagos Land. As the lower portions were covered by water the higher parts became, at intervals, separate islands, inhabited, after isolation, by the same kinds of reptiles which had occupied them before. Variation through a long period of time produced specific and sub-specific changes in these isolated colonies of reptiles, until each island upon which tortoises remained sustained its own peculiar kind. Similarly, the snakes, the gecko, and the *Tropidurus,* of various islands became differentiated. Since this differentiation varies in degree on the various islands—being greatest usually on the more out-lying islands—it may be regarded as an index to the order of separation of the various islands, and evidence of their gradual depression. Only on Albemarle Island do the reptiles suggest that there has been land elevation, and even here the recent period of rising must have been preceded by a long period of depression, during which the present Albemarle Island was represented, probably, by five separate islands corresponding to its five great volcanoes.

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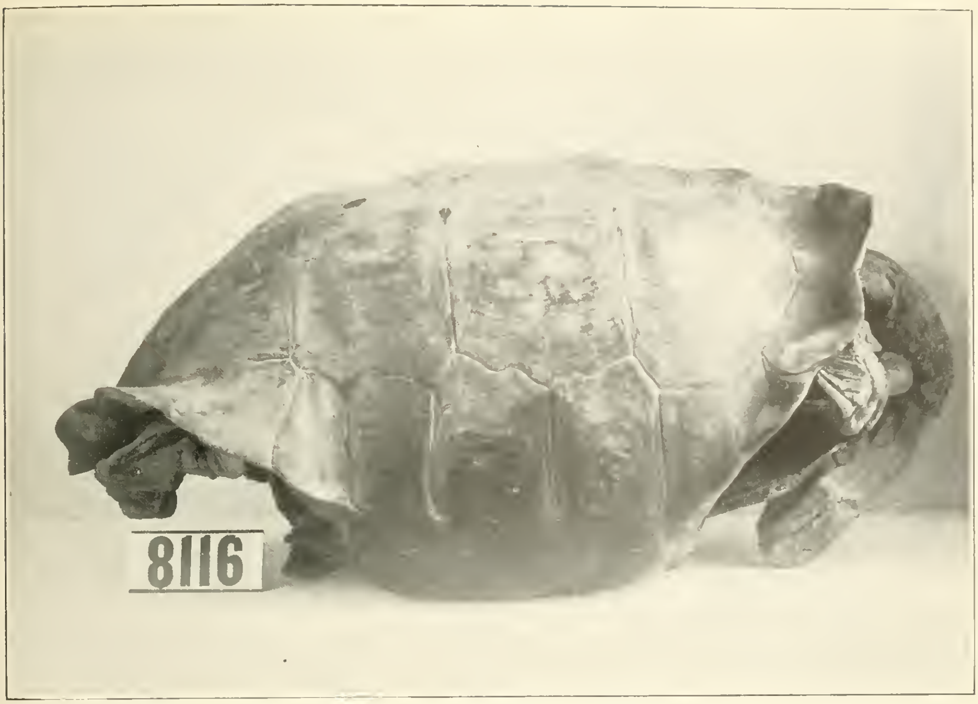

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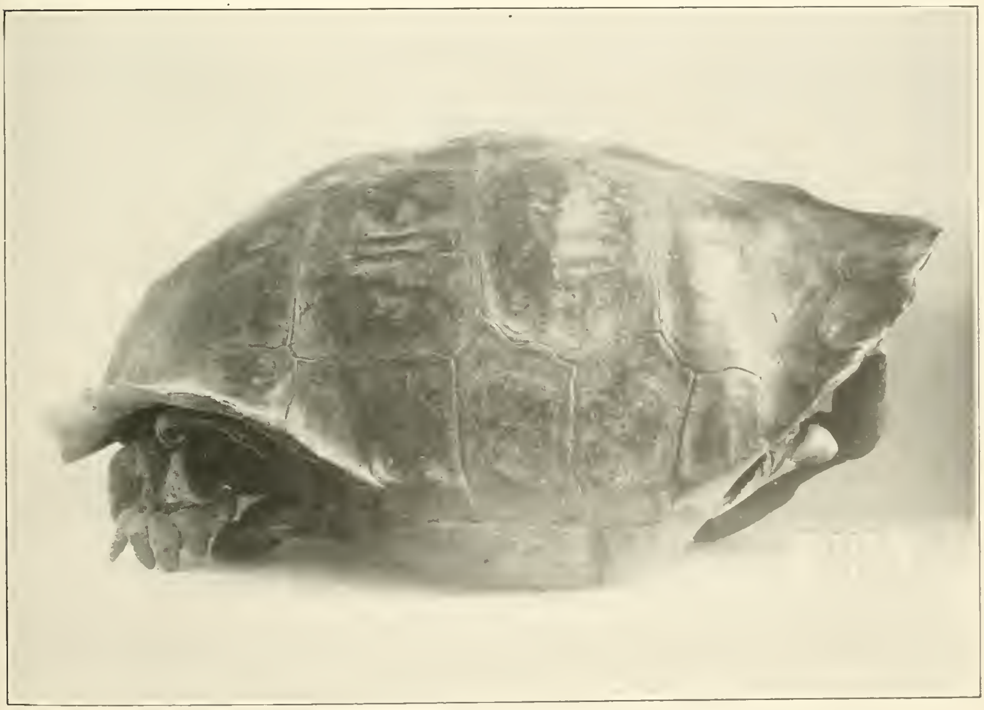

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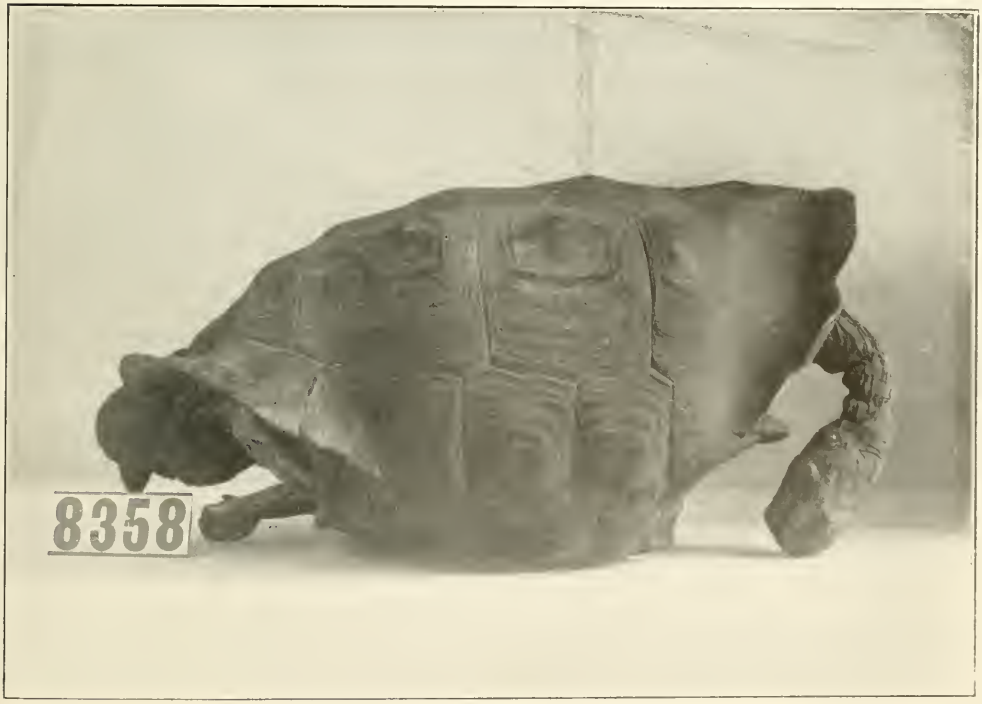

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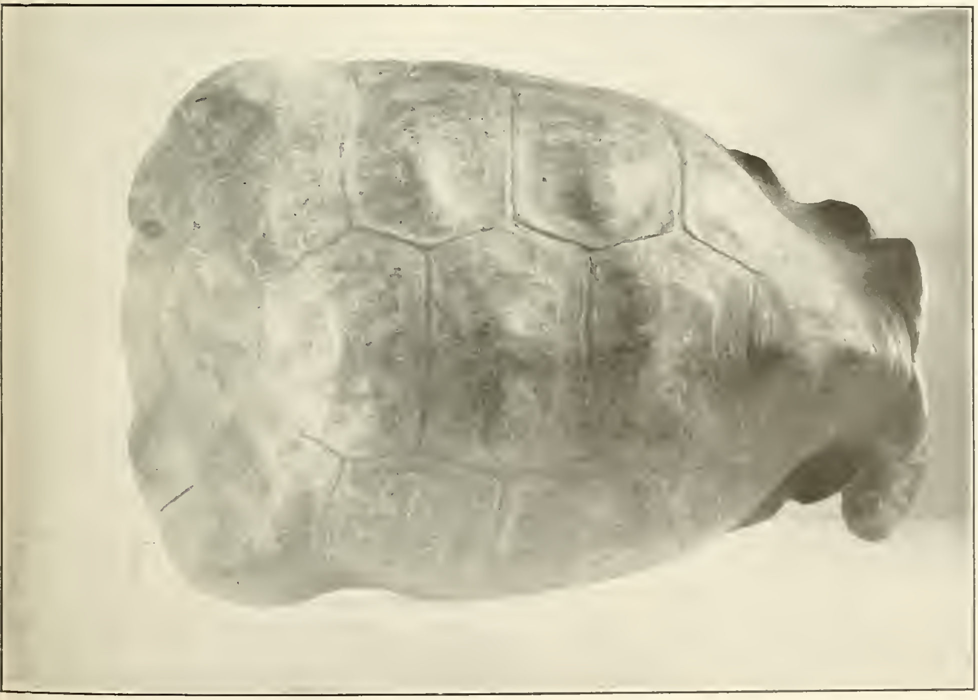

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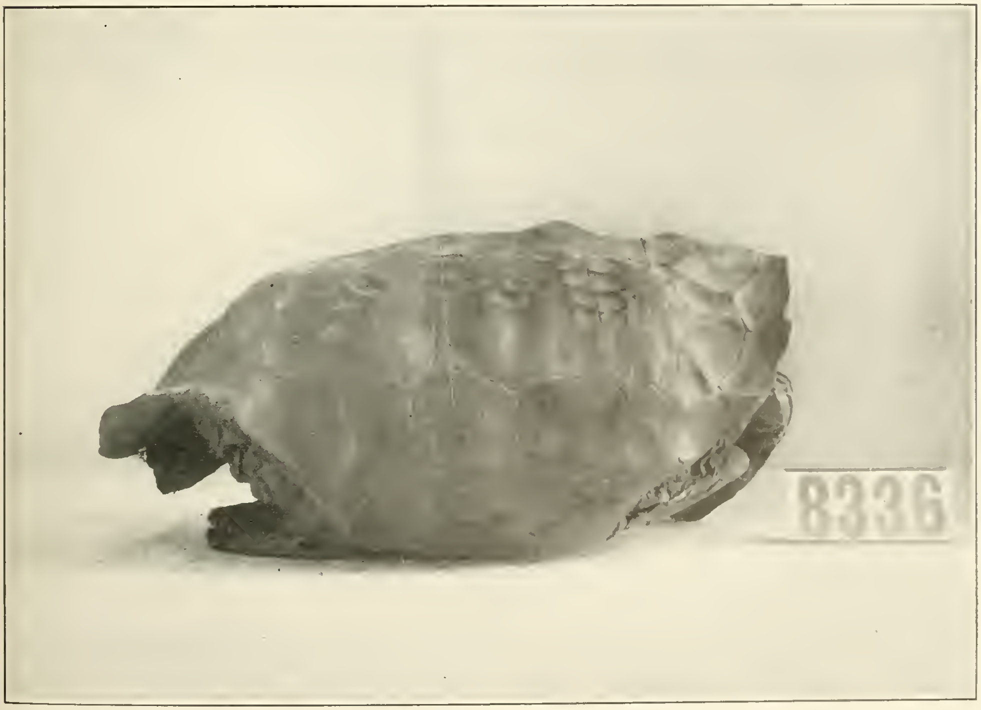

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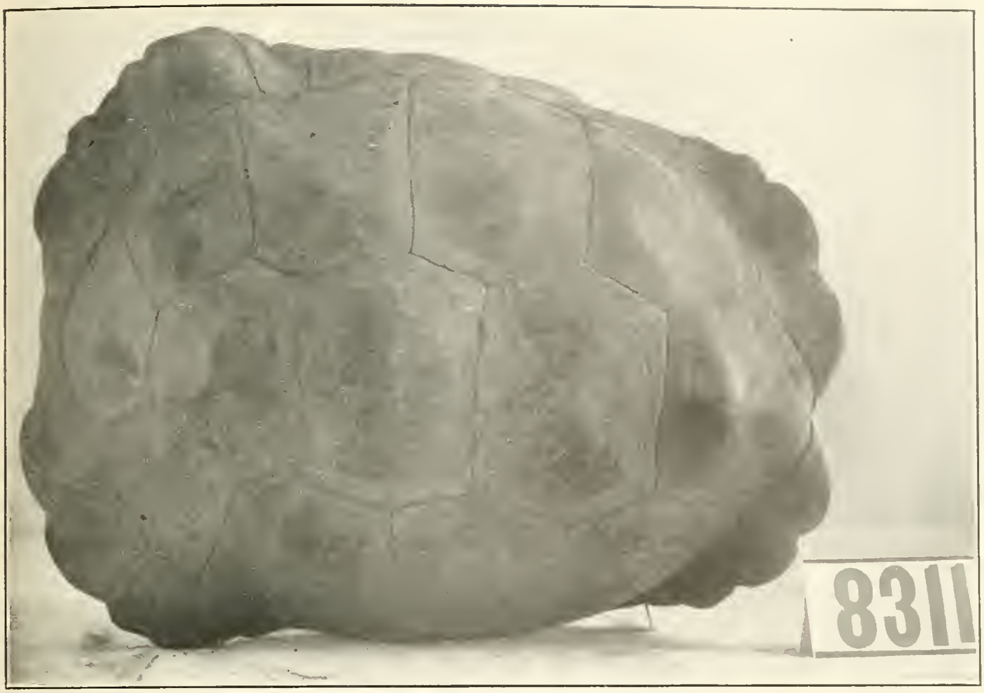

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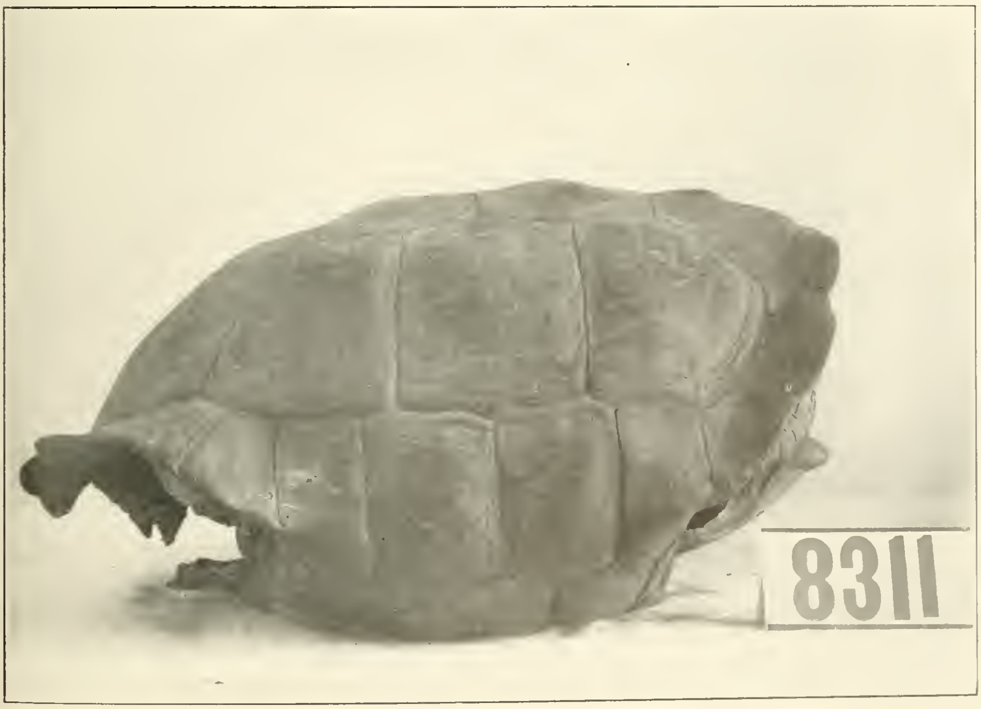

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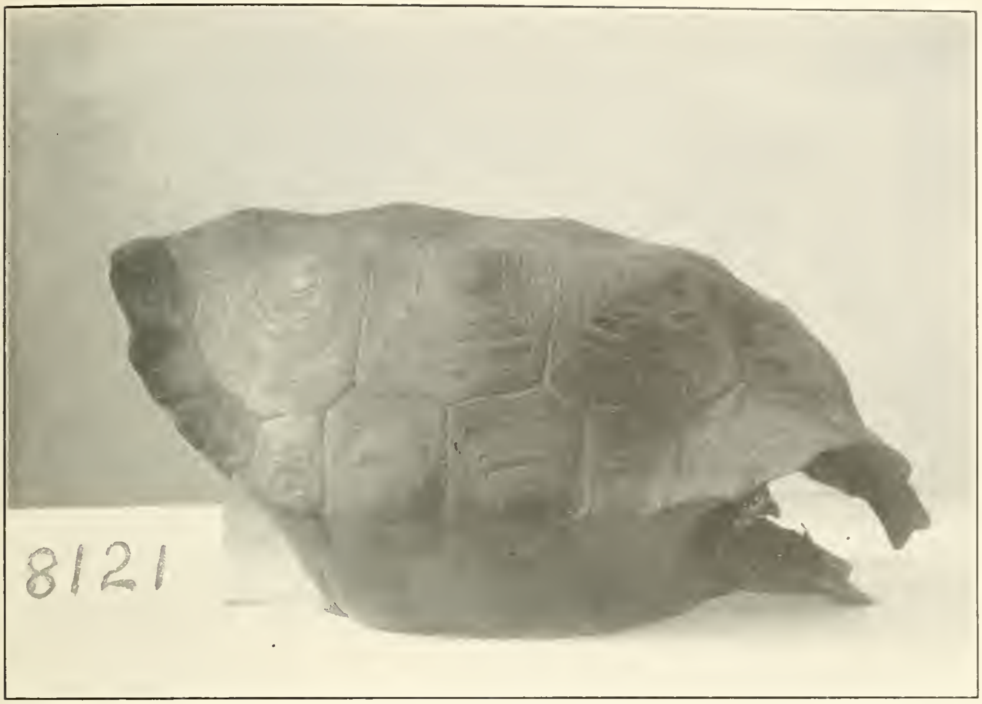

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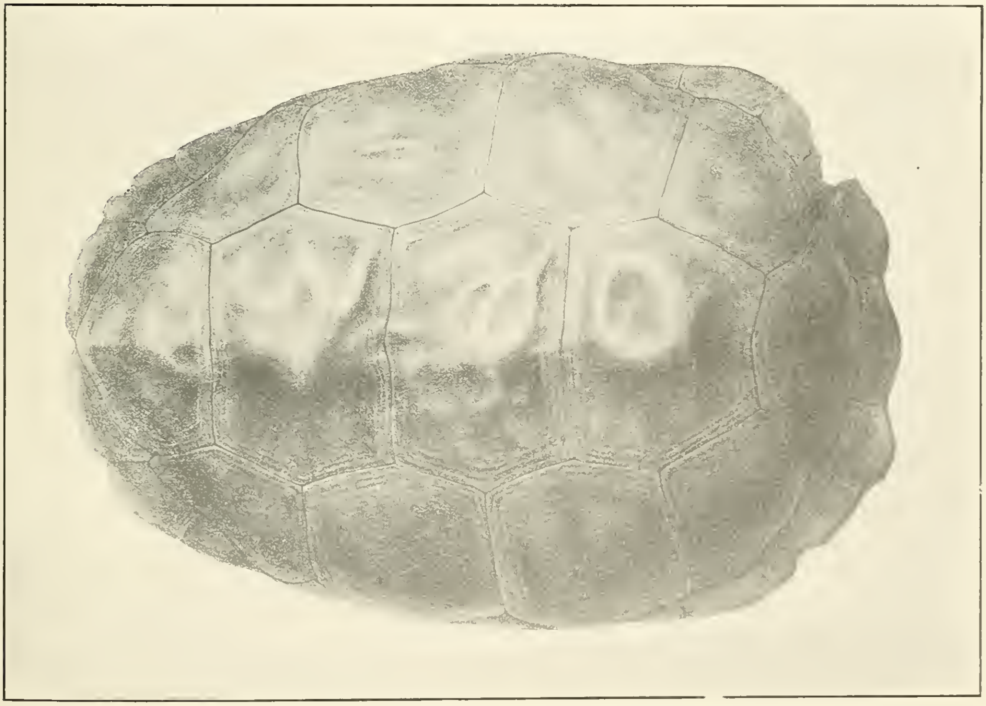

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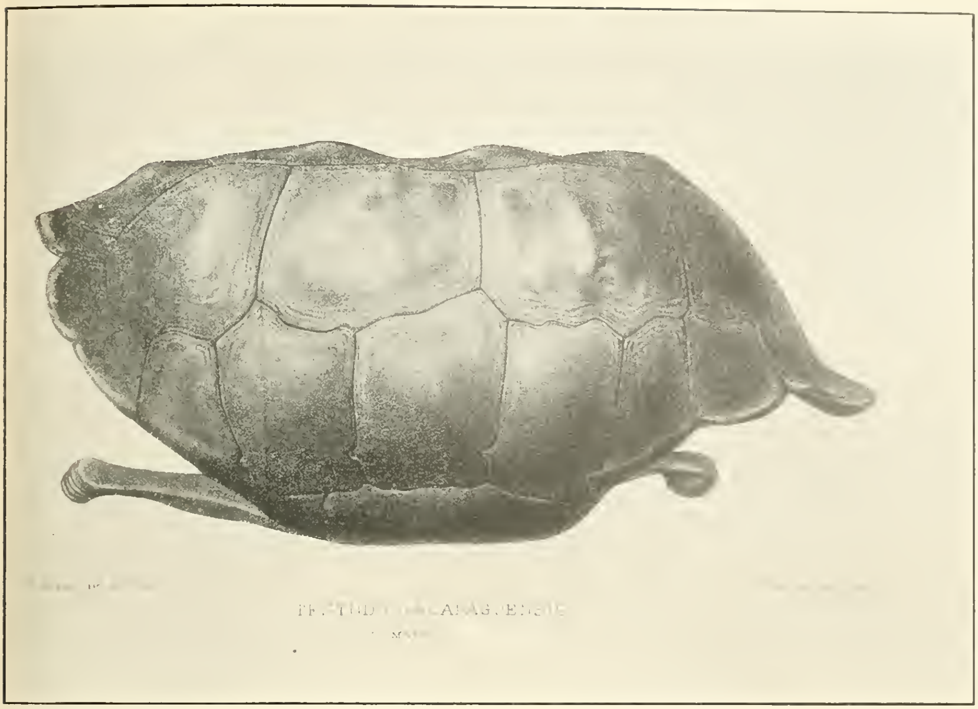

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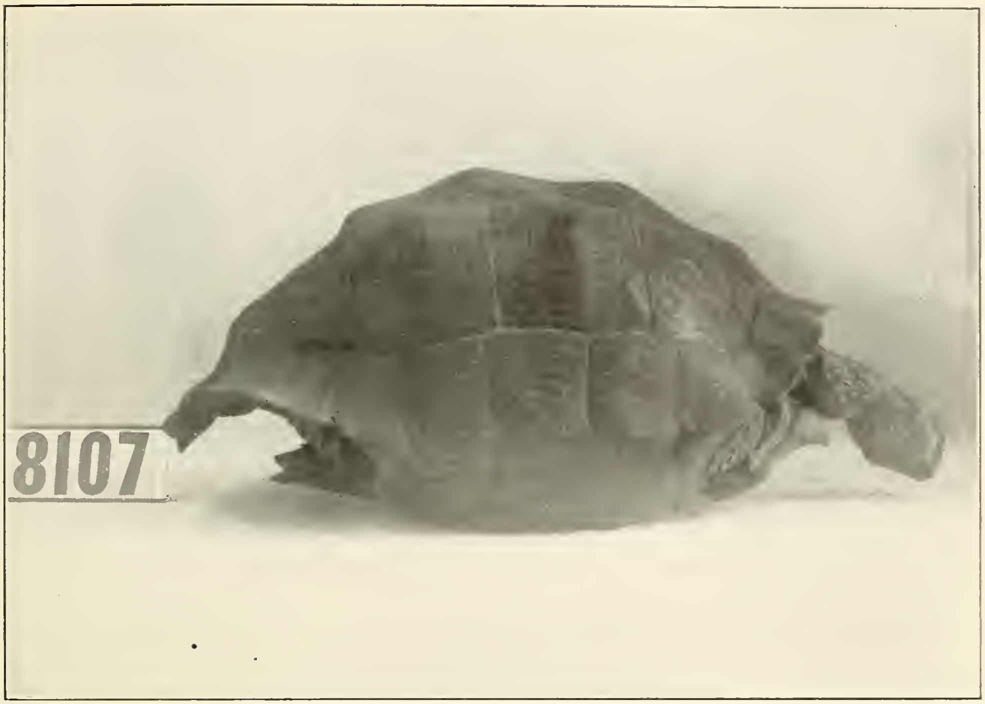

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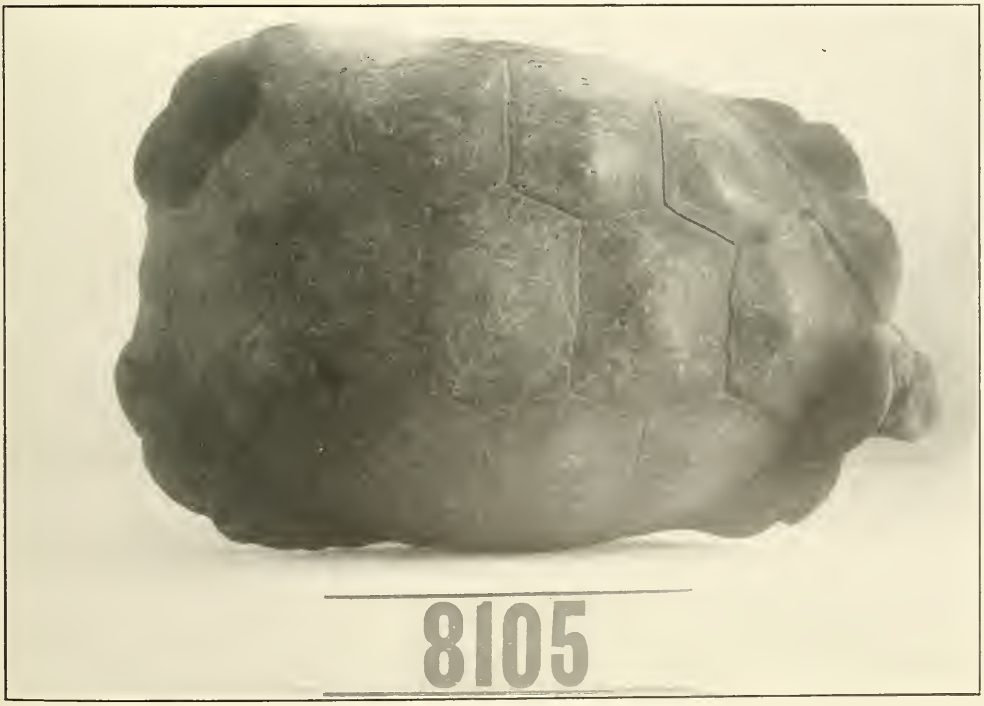

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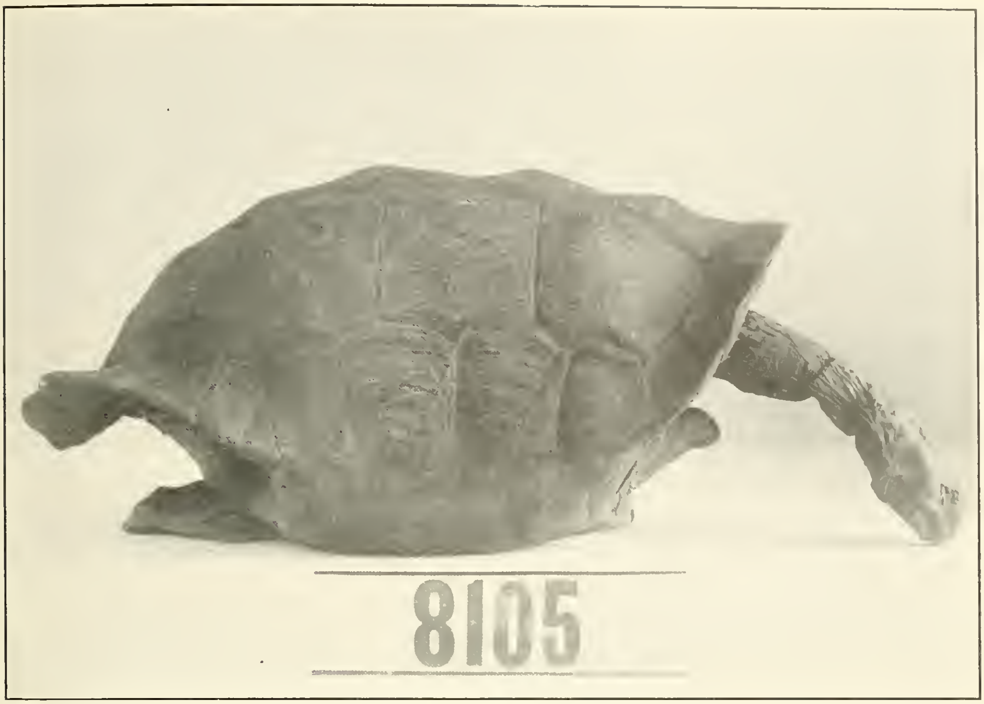

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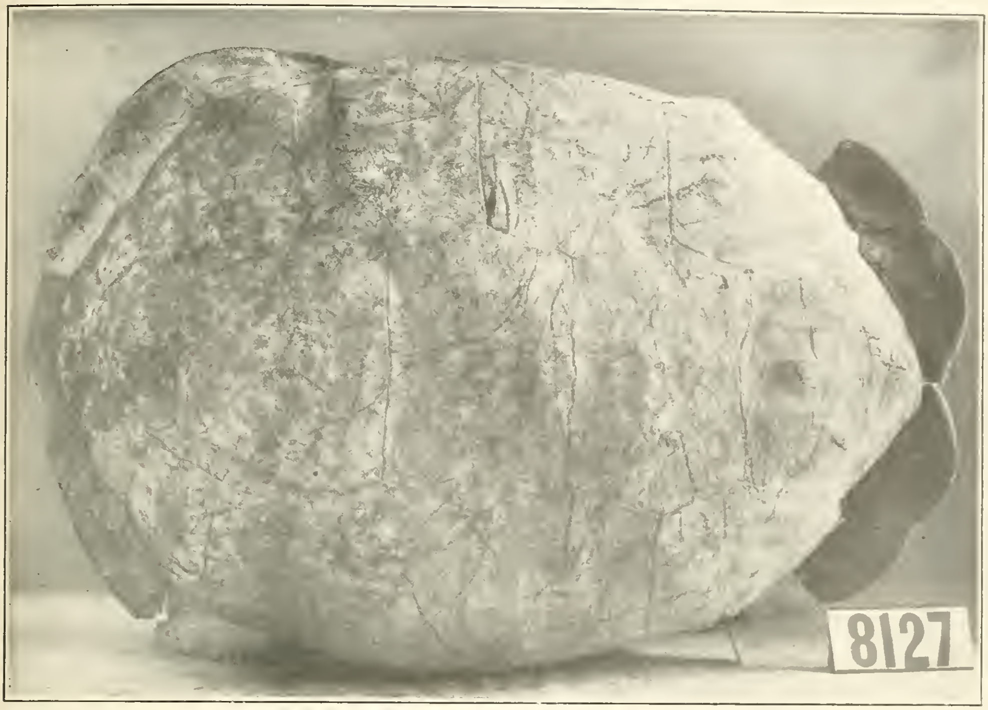

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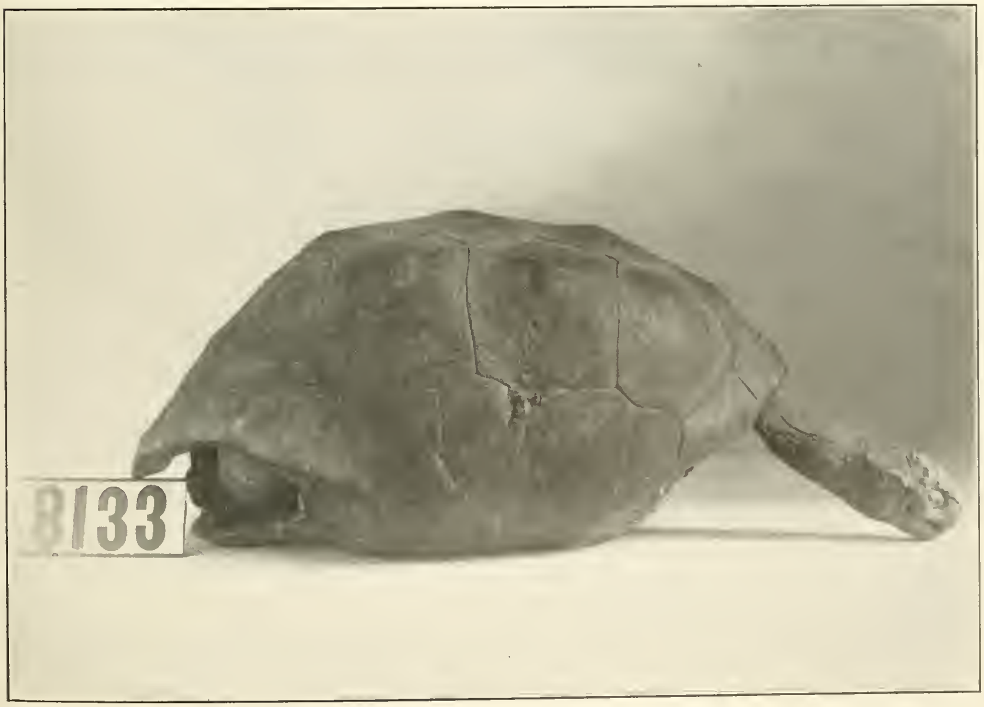

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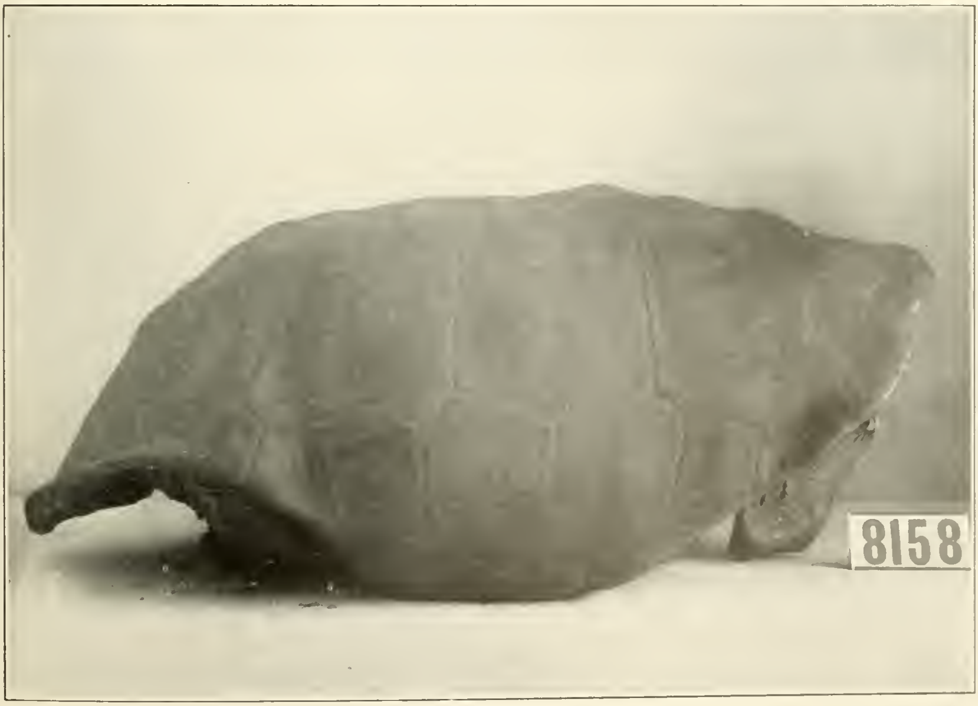

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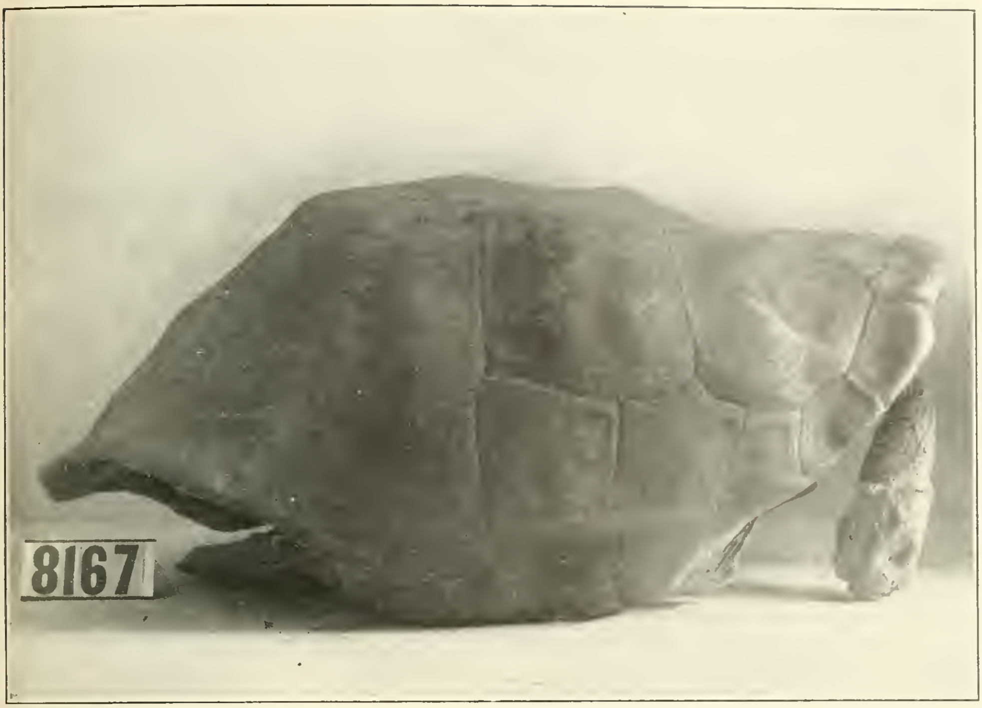

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Fig. 1. Testudo microphyes Günther.
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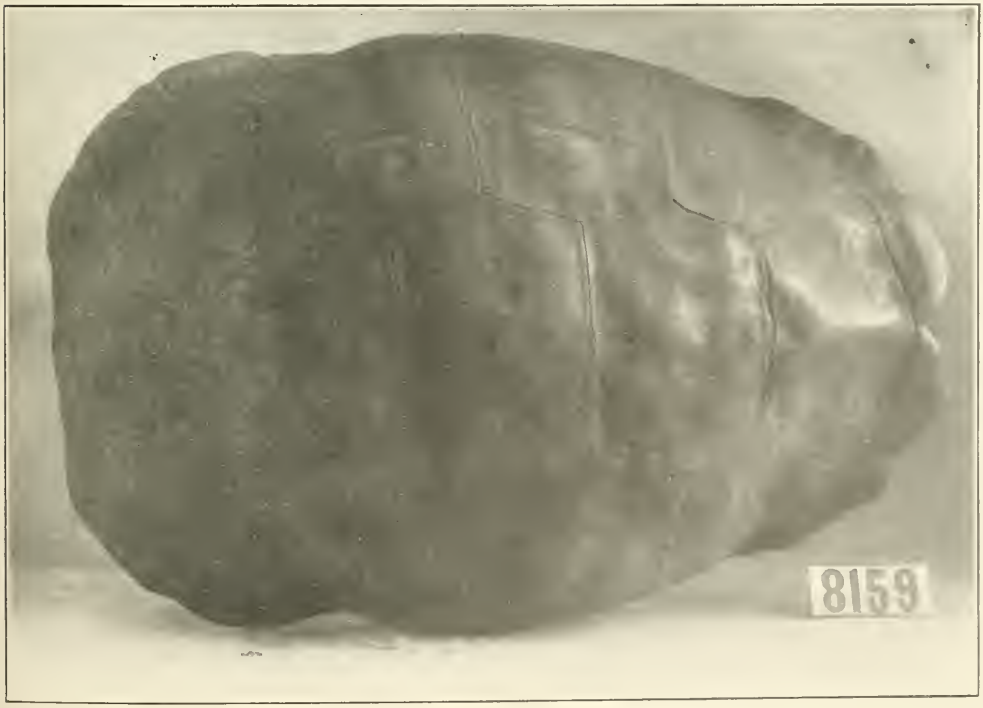

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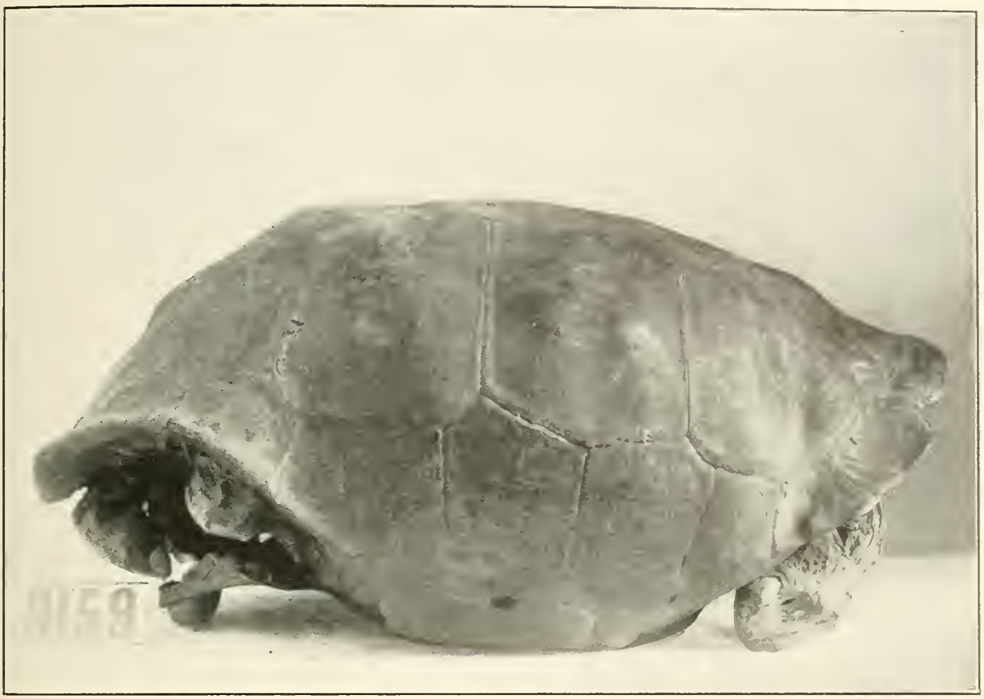

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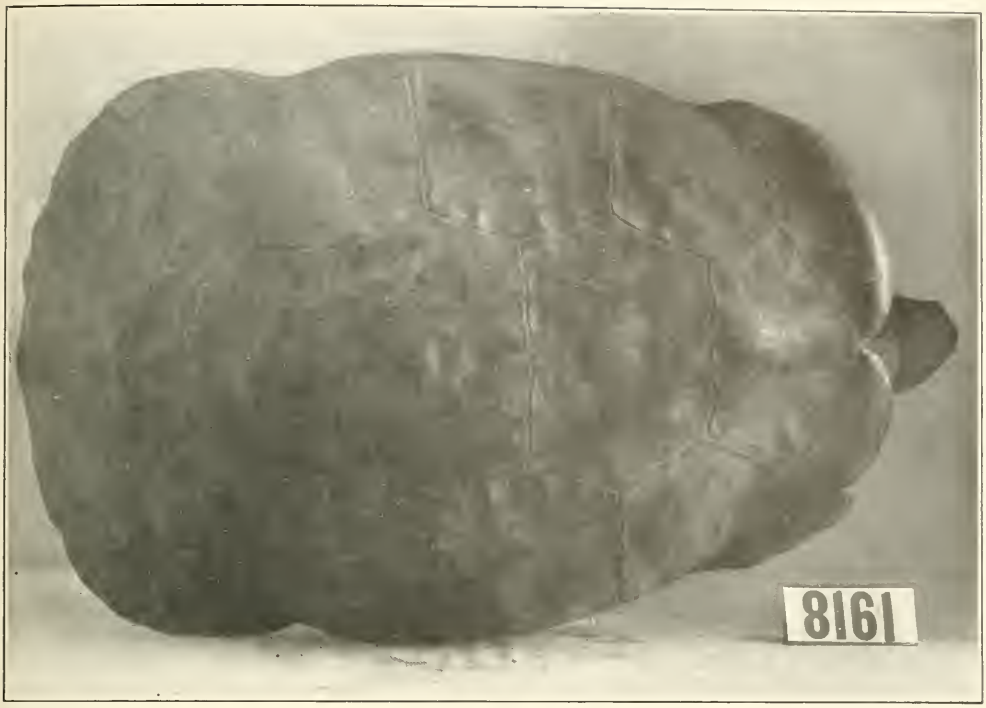

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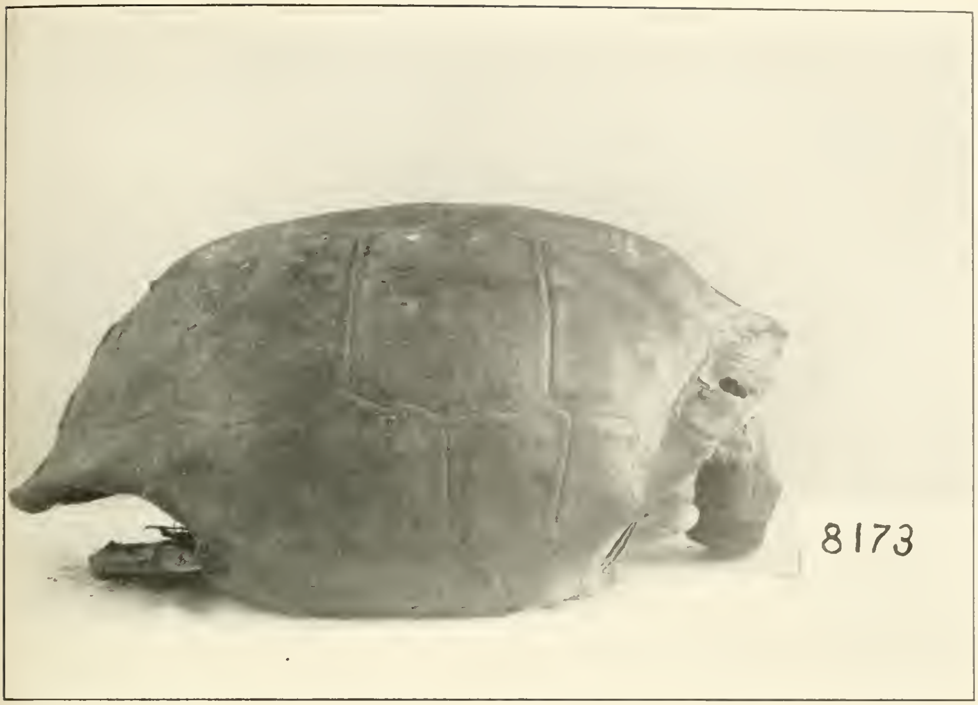

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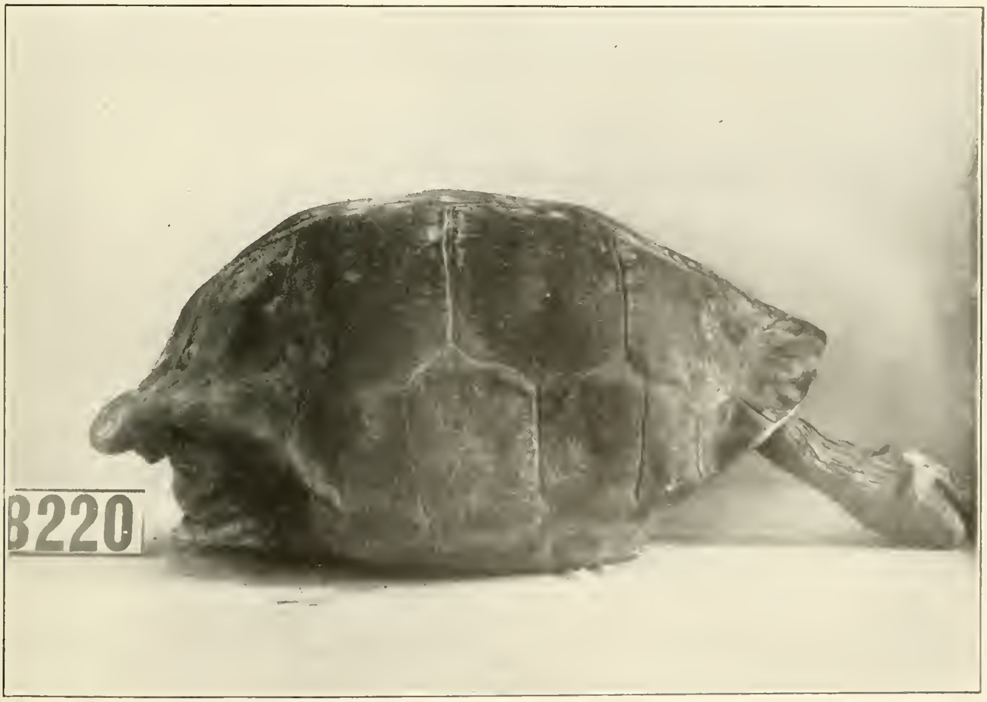

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Fig. 1. Testudo güntheri Baur.
Vilamil, Albemarle Island. 25.1 inch male. From side.

Fig. 2. Testudo güntheri Baur.
Vilamil, Albemarle Island. 25.1 inch male. From in front.

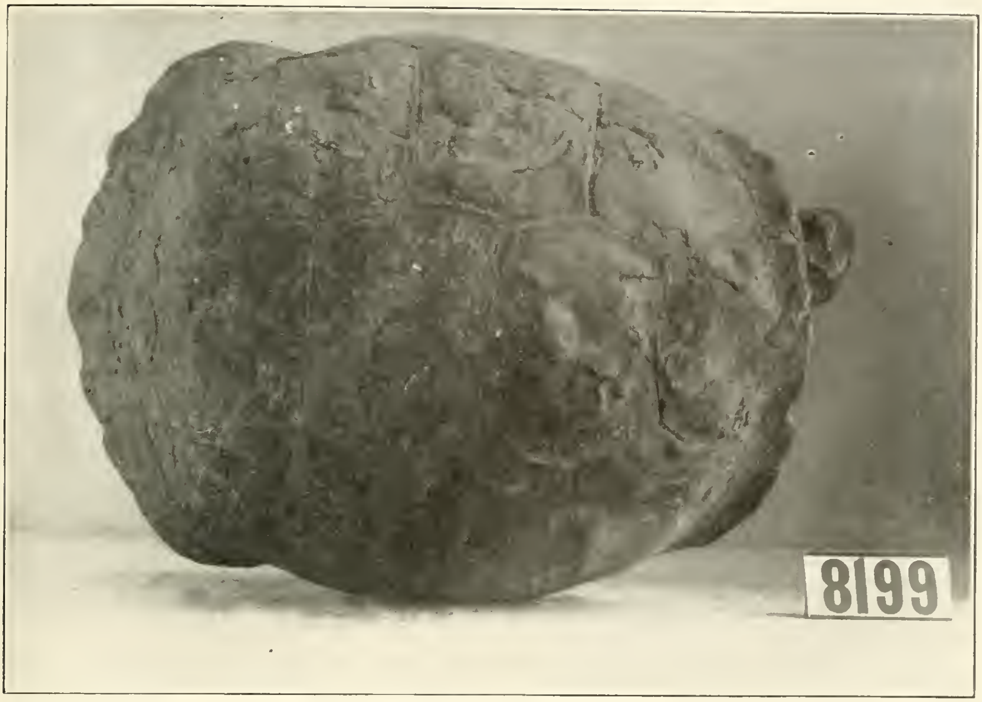


Fig. 1. Testudo güntheri Baur.
Vilamil, Albemarle Island. 28.8 inch female. From above.

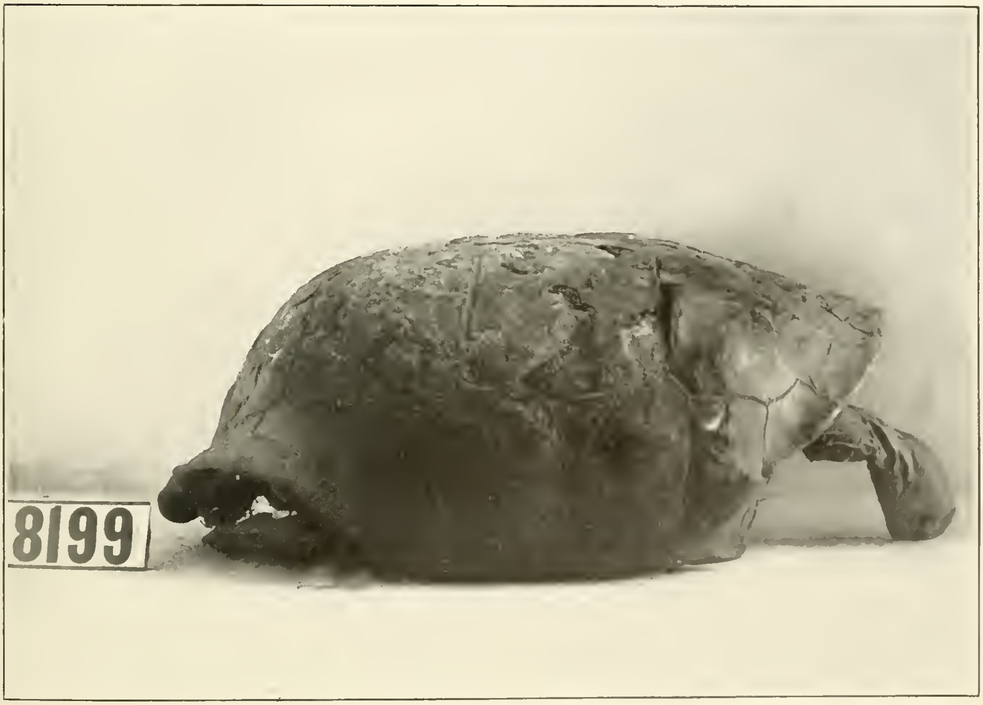


Fig. 2. Testudo güntheri Baur.
Vilamil, Albemarle Island. 28.8 inch female. From side.

Fig. 1. Testudo güntheri Baur.
Vilamil, Albemarle Island. 28.8 inch female. From in front.

Fig. 2. Testudo güntheri Baur.
Vilamil, Albemarle Island. 27.9 inch female. From above.

Fig. 1. Testudo güntheri Baur.
Vilamil, Albemarle Island. 27.9 inch female. From side.

Fig. 2. Testudo güntheri Baur.
Vilamil, Albemarle Island. 27.9 inch female. From in front.

Fig. 1. Testudo vicina Günther.
Iguana Cove, Albemarle Island. 43 inch male. From above.

Fig. 2. Testudo vicina Günther.
Iguana Cove. Albemarle Island. 43 inch male. From side.

Fig. 1. Testudo vicina Günther.
Iguana Cove, Albemarle Island. 43 inch male. From in front.

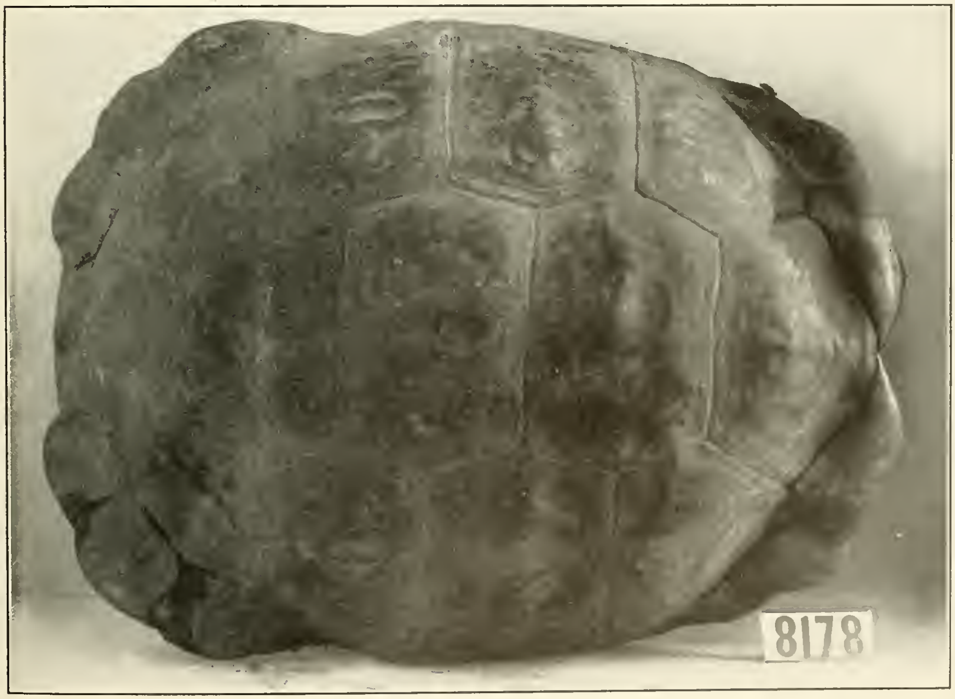


Fig. 2. Testudo vicina Günther.
Iguana Cove, Albemarle Island. 41 inch male. From above.

Fig. 1. Testudo vicina Günther.
Iguana Cove, Albemarle Island. 41 inch male. From side.

Fig. 2. Testudo vicina Günther.
Iguana Cove, Albemarle Island. 41 inch male. From in front.

Fig. 1. Testudo vicina Günther.
Iguana Cove, Albemarle Island. 38.5 inch male. From above.

Fig. 2. Testudo vicina Günther.
Iguana Cove, Albemarle Island. 38.5 inch male. From side.

Fig. 1. Testudo vicina Günther.
Iguana Cove, Albemarle Island. 38.5 inch male. From in front.

Fig. 2. Testudo vicina Günther.
Iguana Cove, Albemarle Island. 37.2 inch male. From above.

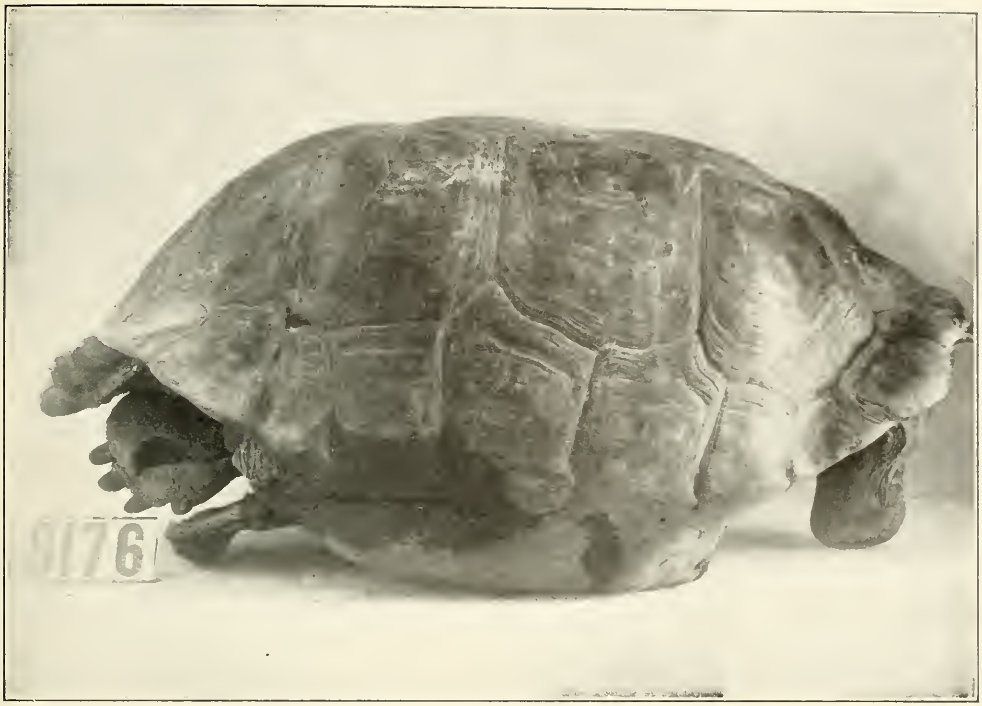


Fig. 1. Testudo vicina Günther.
Iguana Cove, Albemarle Island. 37.2 inch male. From side.

Fig. 2. Testudo vicina Günther.
Iguana Cove, Albemarle Island. 37.2 inch male. From in front.

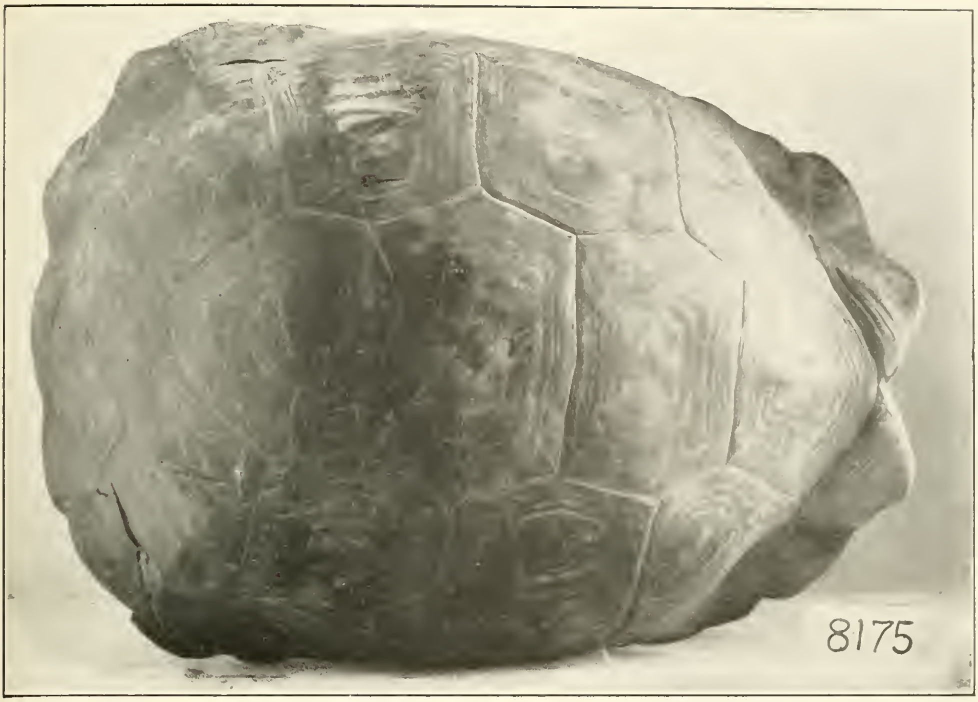


Fig. 1. Testudo vicina Günther.
Iguana Cove, Albemarle Island. 35.25 inch male. From above.

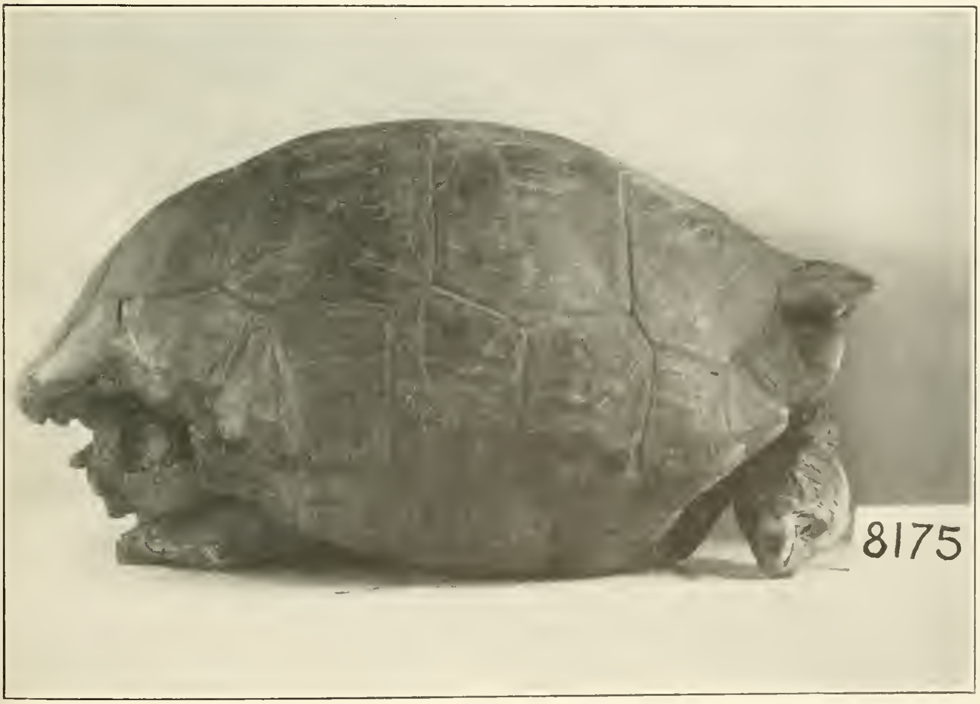


Fig. 2. Testudo vicina Günther.
Iguana Cove, Albemarle Island. 35.25 inch male. From side.

Fig. 1. Testudo vicina Günther.
Iguana Cove, Albemarle Island. 35.25 inch male. From in front.

Fig. 2. Testudo vicina Günther.
Cobos Settlement, Albemarle Island. 40.5 inch male. From above.

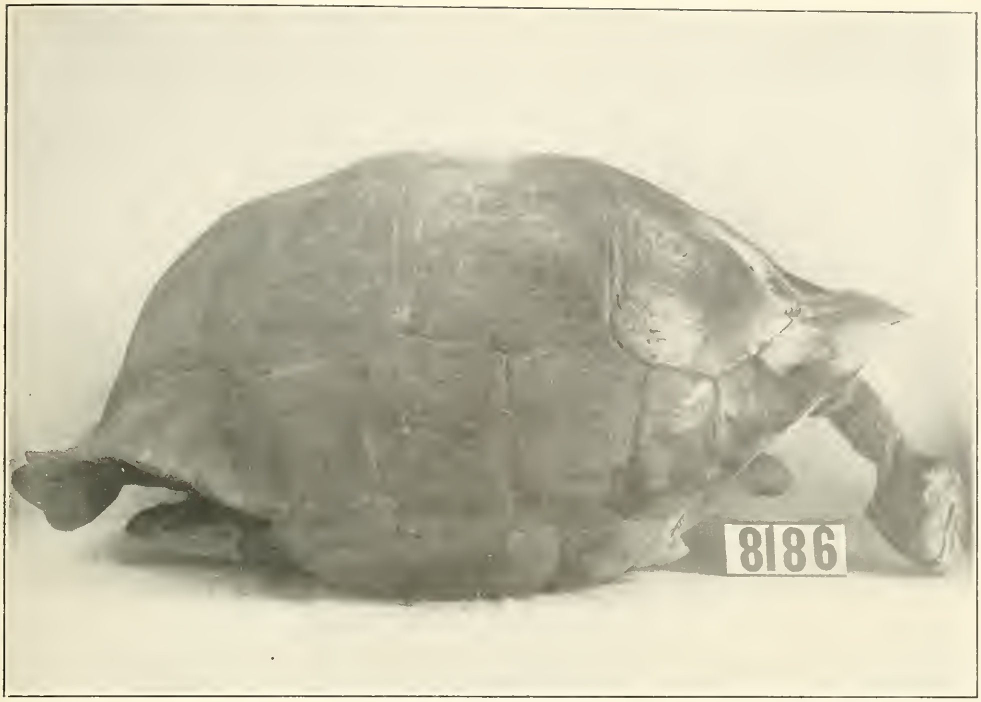


Fig. 1. Testudo vicina Günther.
Cobos Settlement, Albemarle Island. 40.5 inch male. From side.

Fig. 2. Testudo vicina Günther.
Cobos Settlement, Albemarle Island. 40.5 inch male. From in front.

Fig. 1. Testudo vicina Günther.
Cobos Settlement, Albemarle Island. 33.3 inch male. From above.

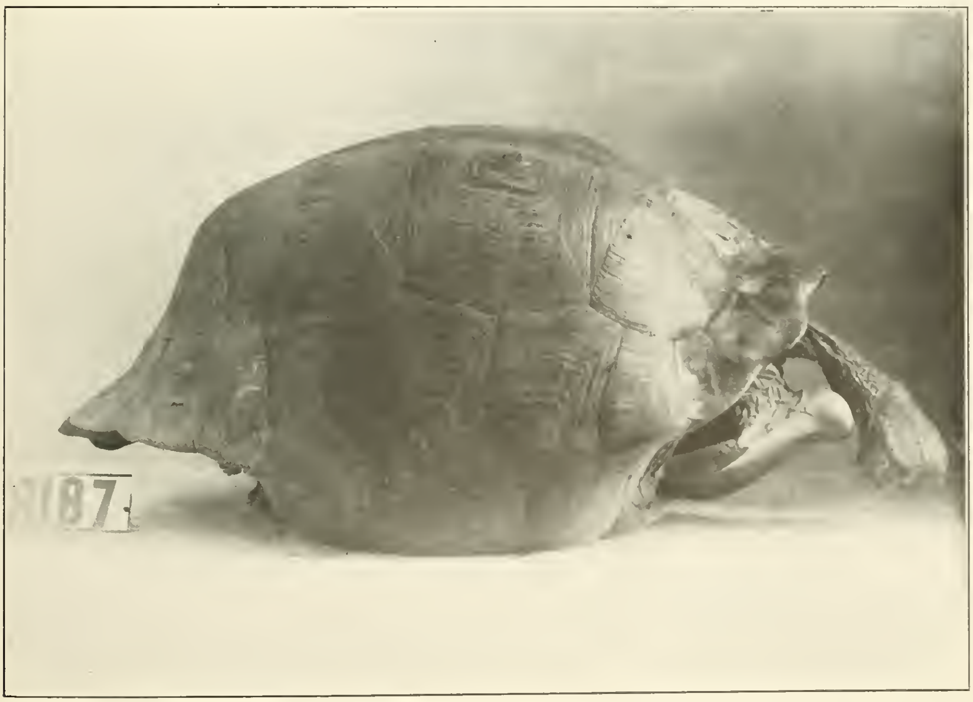


Fig. 2. Testudo vicina Günther.
Cobos Settlement, Albemarle Island. 33.3 inch male. From side.

Fig. 1. Testudo vicina Günther.
Cobos Settlement, Albemarle Island. 33.3 inch male. From in front.

Fig. 2. Testudo vicina Günther.
Vilamil, Albemarle Island. 33 inch male. From above.

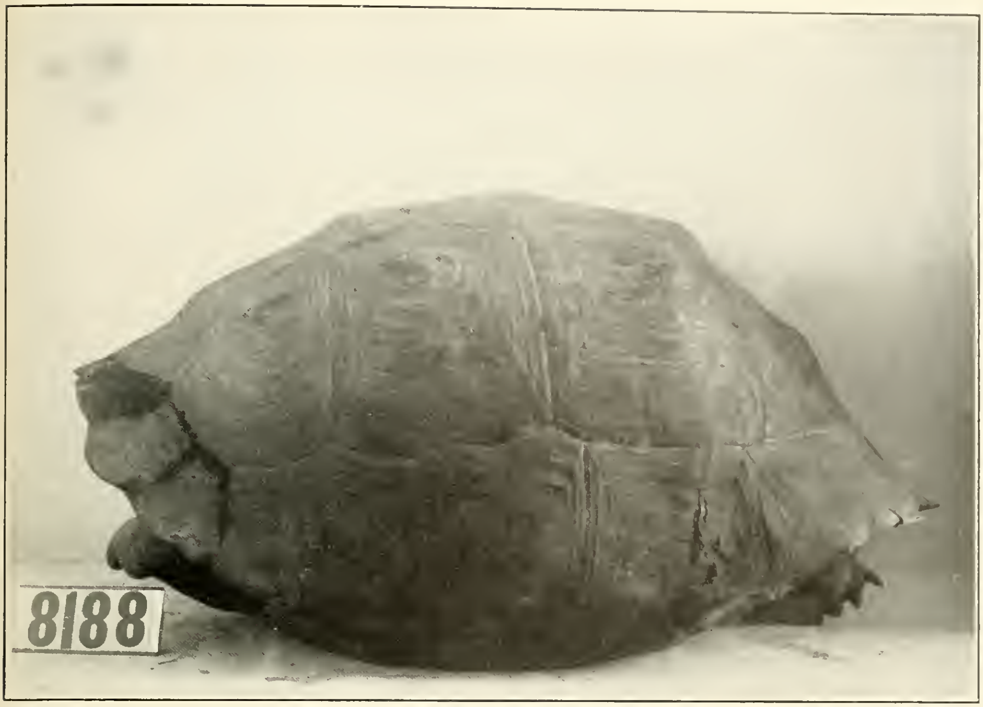


Fig. 1. Testudo vicina Günther.
Vilamil, Albemarle Island. 33 inch male. From side.

Fig. 2. Testudo vicina Günther.
Vilamil, Albemarle Island. 33 inch male. From in front.

Fig. 1. Testudo vicina Günther.
Vilamil, Albemarle Island. 26.8 inch male. From above.

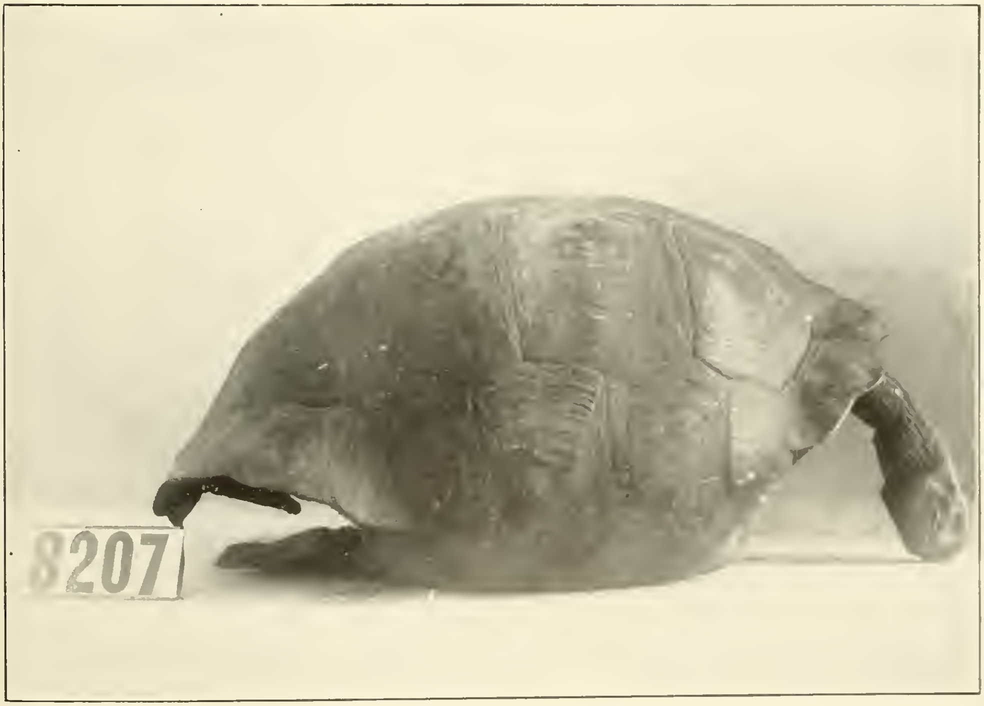


Fig. 2. Testudo vicina Günther.
Vilamil, Albemarle Island. 26.8 inch male. From side.

Fig. 1. Testudo vicina Günther.
Vilamil, Albemarle Island. 26.8 inch male. From in front.

Fig. 2. Testudo vicina Günther.
Vilamil, Albemarle Island. 24.4 inch male. From above.

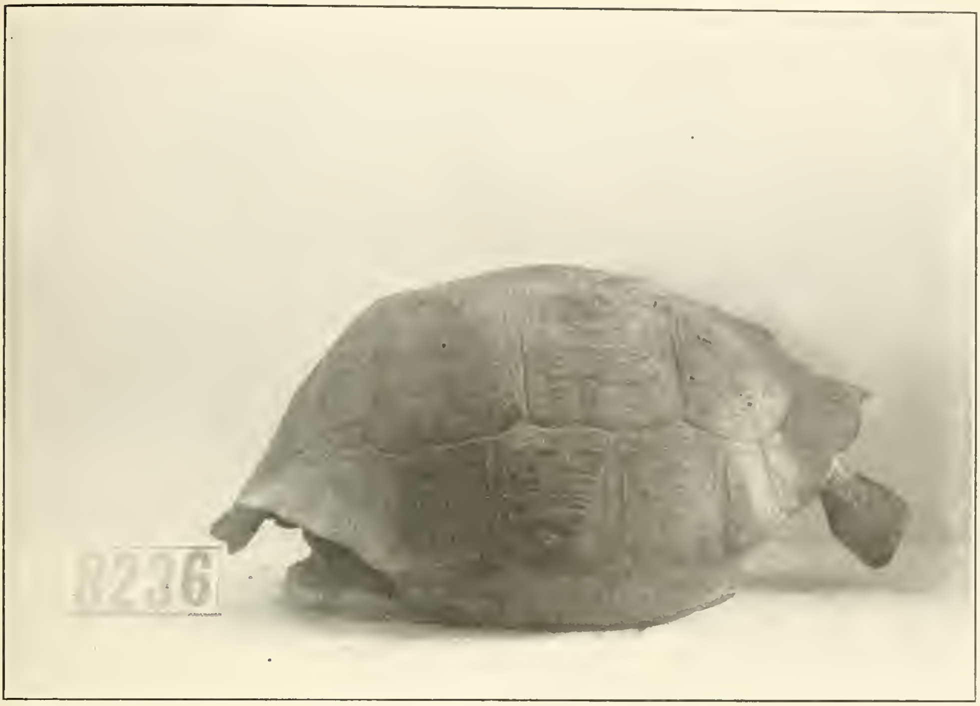


Fig. 1. Testudo vicina Günther.
Vilamil, Albemarle Island. 24.4 inch male. From side.

Fig. 2. Testudo vicina Günther.
Vilamil, Albemarle Island. 24.4 inch male. From in front.

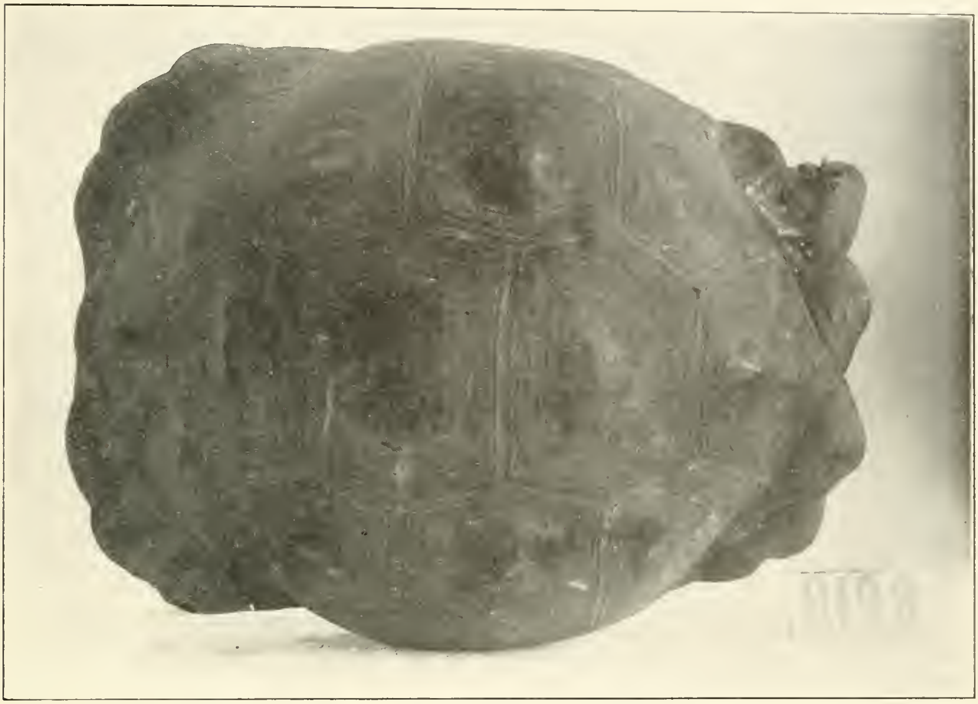


Fig. 1. Testudo vicina Günther.
Vilamil, Albemarle Island. 28.75 inch female. From above.

Fig. 2. Testudo vicina Günther.
Vilamil, Albemarle Island. 28.75 inch female. From side.

Fig. 1. Testudo vicina Günther.
Vilamil, Albemarle Island. 28.75 inch female. From in front.

Fig. 2. Testudo vicina Günther.
Vilamil, Albemarle Island. 27.5 inch female. From above.

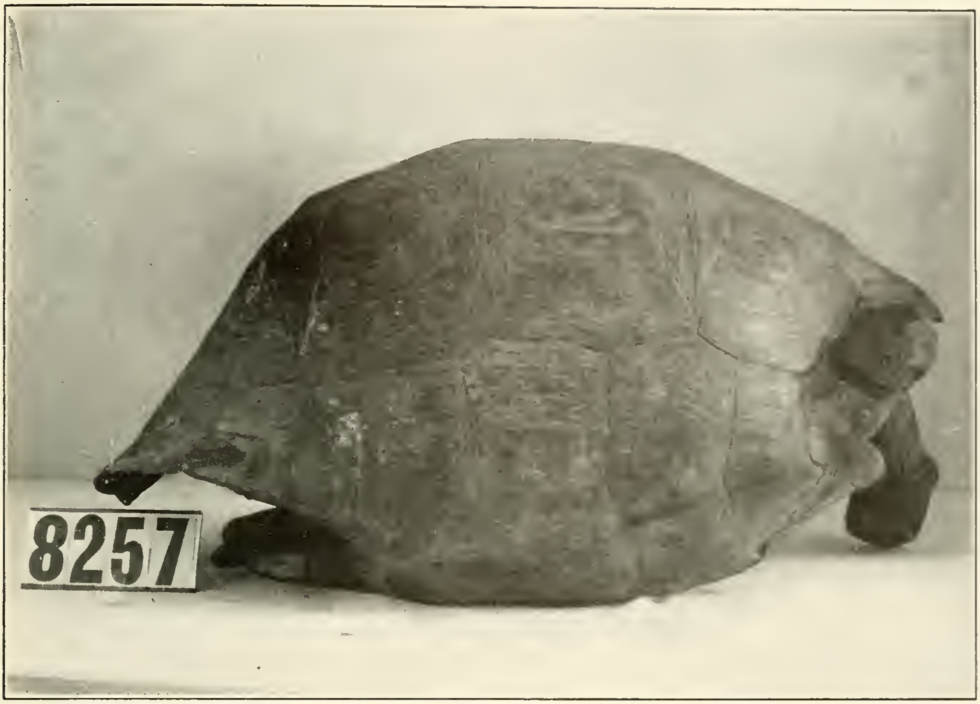


Fig. 1. Testudo vicina Günther.
Vilamil, Albemarle Island. 27.5 inch female. From side.

Fig. 2. Testudo vicina Günther.
Vilamil, Albemarle Island. 27.5 inch female. From in front.

Fig. 1. Testudo wallacei Rothschild.
Type specimen in the Tring Museum.

Fig. 2. Testudo wallacei Rothschild.
Jervis Island. 36.2 inch male. From above.

Fig. 1. Testudo wallacei Rothschild.
Jervis Island. 36.2 inch male. From side.

Fig. 2. Testudo wallacei Rothschild.
Jervis Island. 36.2 inch male. From in front.

Fig. 1. Testudo porteri Rothschild.
Indefatigable Island. 41.4 inch male. From above.

Fig. 2. Testudo porteri Rothschild.
Indefatigable Island. 41.4 inch male. From side.

Fig. 1. Testudo porteri Rothschild.
Indefatigable Island. 41.4 inch male. From in front.

Fig. 2. Testudo porteri Rothschild.
Indefatigable Island. 40.3 inch male. From above.

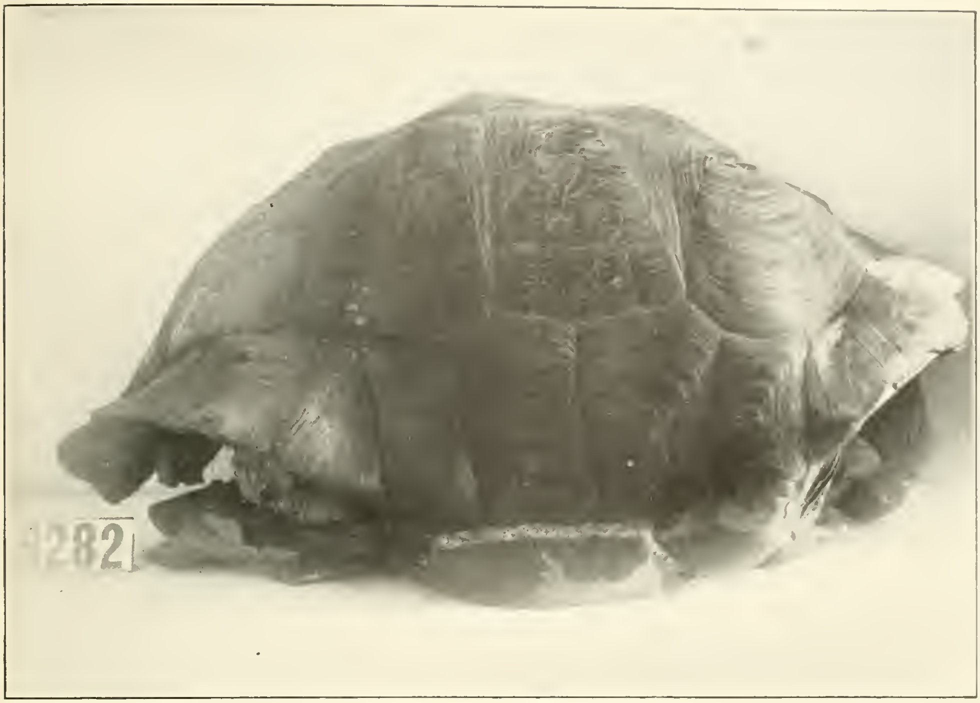


Fig. 1. Testudo porteri Rothschild.
Indefatigable Island. 40.3 inch male. From side.

Fig. 2. Testudo porteri Rothschild.
Indefatigable Island. 40.3 inch male. From in front.

Fig. 1. Testudo porteri Rothschild.
Indefatigable Island. 39.6 inch male. From above.

Fig. 2. Testudo porteri Rothschild.
Indefatigable Island. 39.6 inch male. From side.

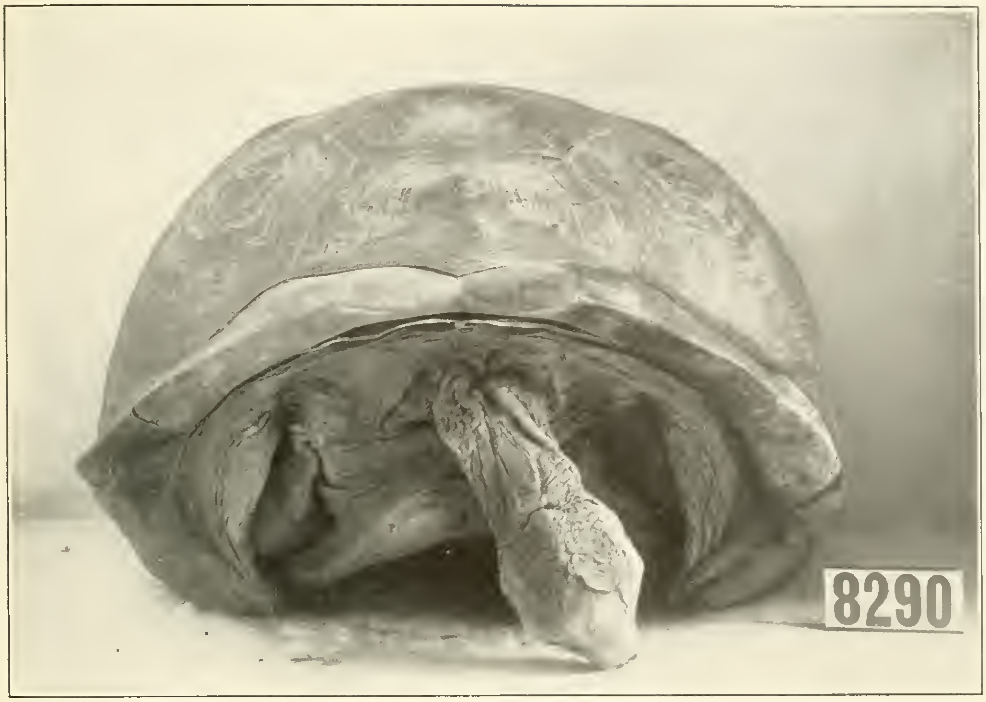


Fig. 1. Testudo porteri Rothschild.
Indefatigable Island. 39.6 inch male. From in front.

Fig. 2. Testudo porteri Rothschild.
Indefatigable Island. 35.5 inch male. From above.

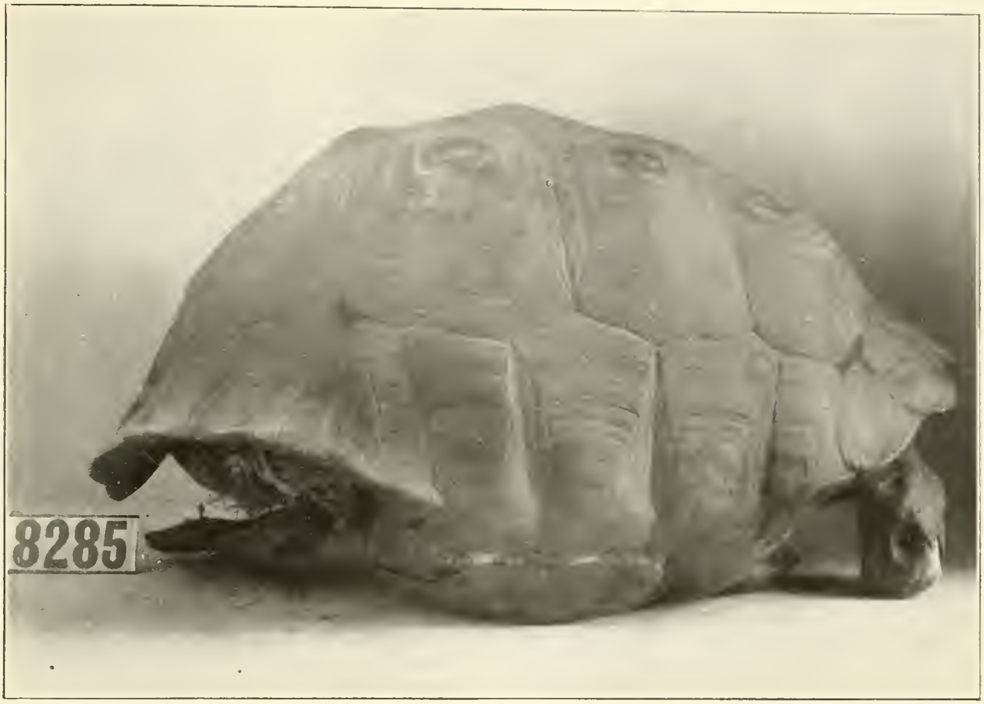


Fig. 1. Testudo porteri Rothschild.
Indefatigable Island. 35.5 inch male. From side.

Fig. 2. Testudo porteri Rothschild.
Indefatigable Island. 35.5 inch male. From in front.

Fig. 1. Testudo porteri Rothschild.
Indefatigable Island. 35.8 inch female. From above.

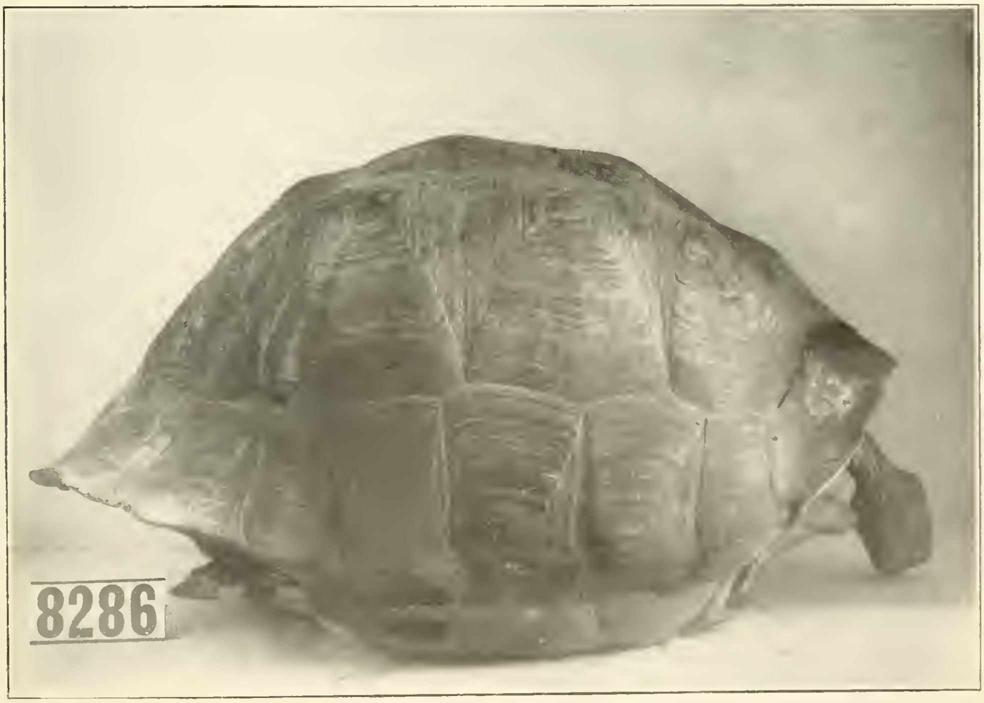


Fig. 2. Testudo porteri Rothschild.
Indefatigable Island. 35.8 inch female. From side.

Fig. 1. Testudo porteri Rothschild.
Indefatigable Island. 35.8 inch female. From in front.

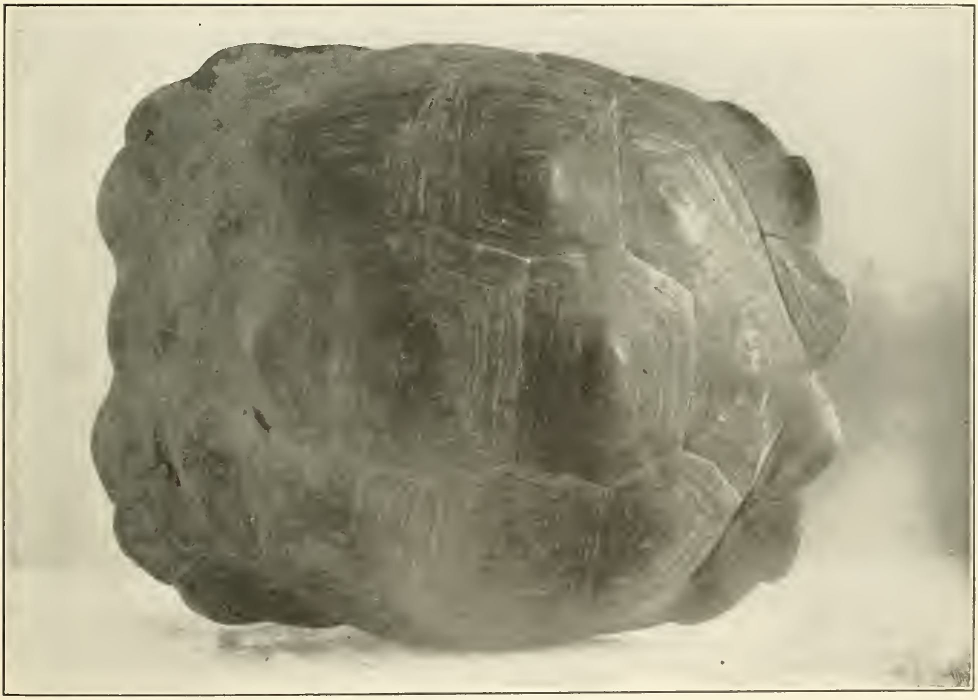


Fig. 2. Testudo porteri Rothschild.
Indefatigable Island. 28.75 inch female. From above.

Fig. 1. Testudo porteri Rothschild.
Indefatigable Island. 28.75 inch female. From side.

Fig. 2. Testudo porteri Rothschild.
Indefatigable Island. 28.75 inch female. From in front.

Fig. 1. Testudo, species.
Cowley Mountain, Albemarle Island. 26.75 inch female. From above.

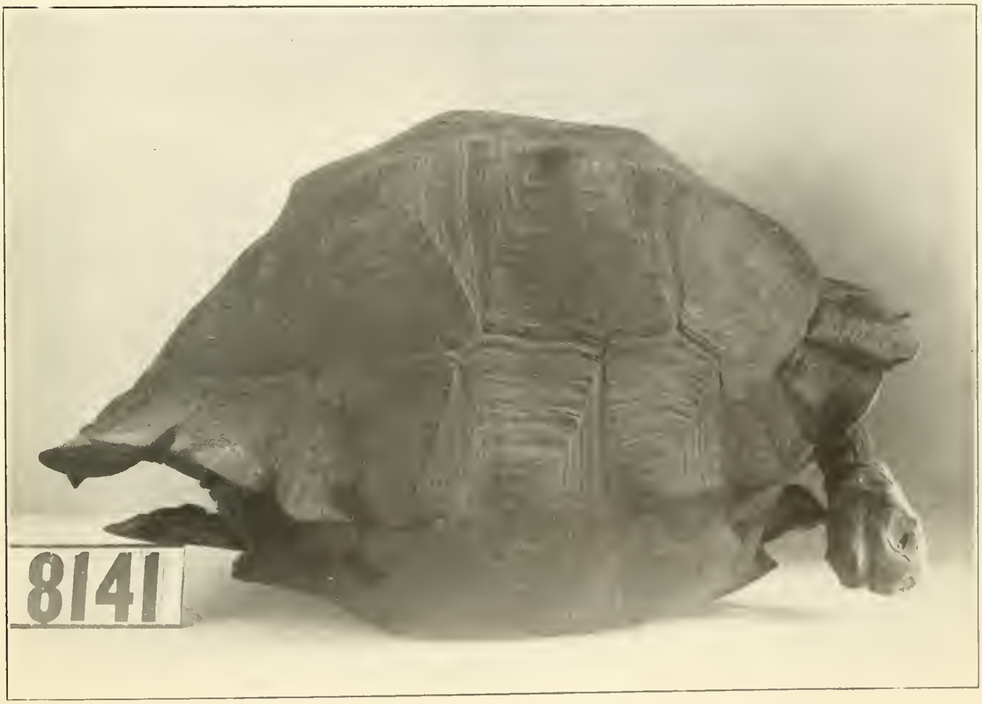
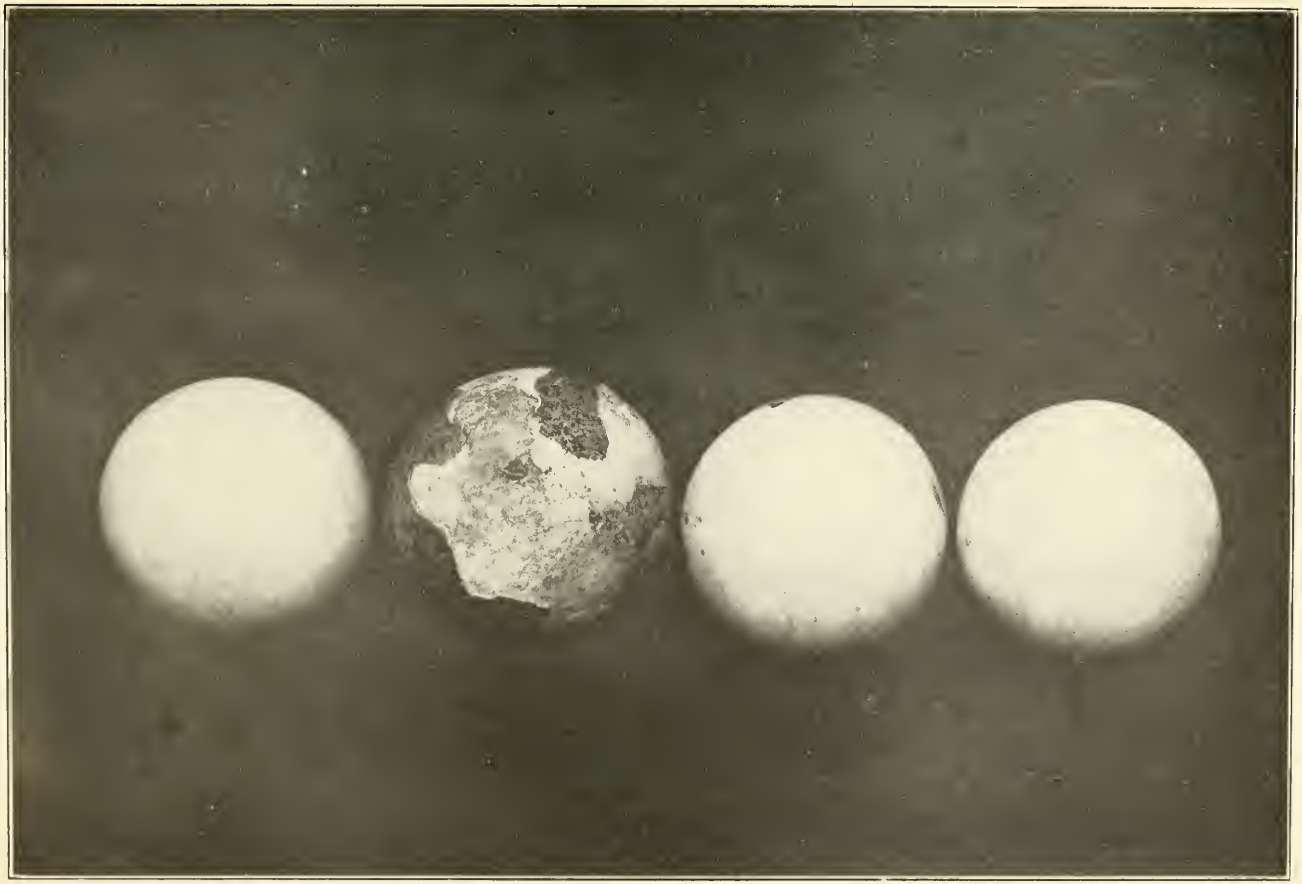


Fig. 2. Testudo, species.
Cowley Mountain, Albemarle Island. 26.75 inch female. From side.

Fig. 1. Testudo, species.
Cowley Mountain, Albemarle Island. 26.75 inch female. From in front.

Fig. 2. Testudo, species.
Barrington Island. Bones of tortoises.



Eggs of Galapagos Tortoises. From left to right these eggs are from

Vilamil, Albemarle Island. Barrington Island. Duncan Island. Indefatigable Island.